

DEPARTMENT OF ENERGY

FY 2012 AGENCY PERFORMANCE PLAN SUPPLEMENT



Performance Measures Summary

The U.S. Department of Energy (DOE) is committed to sharing information about its operations with Congress and the public. The Agency Performance Plan (APP) sets performance goals for each fiscal year that articulates the results the Department is pursuing.

Improving Performance Measure Quality for the FY 2012 Budget

This year, the Department undertook an initiative to improve the quality of its performance measures, more closely aligning the measure to the just released strategic plan. In addition, the Department set out to reduce the overall number of performance measures reported, focusing on the critical few measures that best describe program objectives and intended results. The final product is a more quantitative, data driven inventory of 161 measures. The Department will continue to make improvements in the next budget cycle, and welcomes any feedback you have (contact information below).

Work remains to develop better measures for a handful of programs, and that work is underway (Nuclear Energy and Departmental Administration). The Department will continue to work with the Office of Management and Budget and include those performance measures in the FY 2013 Congressional Budget submission.

Table 1. Performance Measures by Program

Goal	Program	No. of Performance Measures
Transforming our Energy Systems	Energy Efficiency and Renewable Energy (EE)	38
	Loan Programs Office (LP)	8
	Office of Electricity Delivery and Energy Reliability (OE)	9
	Power Marketing Administrations (PMA)	15
	Advanced Research Projects Agency - Energy (ARPA-E)	2
	Nuclear Energy (NE)	TBD
	Fossil Energy Research and Development (FE)	7
The Science and Engineering Enterprise	Science (SC)	26
Securing our Nation	National Nuclear Security Administration (NA)	38
	Nuclear Energy (NE)	TBD
	Environmental Management (EM)	16
	Legacy Management (LM)	2
Management Excellence	Departmental Administration (DA)	TBD

Organization and Additional Information

The tables in this report briefly list the Department’s performance measures and targets for FY 2009 through FY2012, and Appendix A describes the alignment of programs to the strategic plan. Additional appendices featuring detailed information and supporting narrative text on the performance tables contained here can be found at <http://www.mbe.doe.gov/budget/12budget>. For more information or to provide feedback, please contact the Office of Budget at 202-586-4180 or email us at StrategicPlan@hq.doe.gov.

Results for FY2011 performance measures in the FY 2011 Congressional Justification will be posted at the end of the fiscal year in the FY 2011 Annual Performance Report at <http://www.energy.gov/about/budget.htm>. Prior year data can be found at the same website.

Transforming our Energy Systems

Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies.

Energy Efficiency and Renewable Energy

For details on the Energy Efficiency and Renewable Energy performance plan see Appendix B.

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Table 2. Biomass and Biorefinery R&D: Develops and transforms domestic, renewable, and abundant biomass resources into cost-competitive, high performance biofuels, biopower, and bioproducts.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have and Discover the Solutions We Need					
Strategy: Demonstrate and Deploy Clean Energy Technologies and Establish Technology Test Beds					
Program: Energy Efficiency and Renewable Energy / Biomass and Biorefinery R&D (EE9)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram Name: Feedstocks					
Reduce feedstock supply system logistics cost in dollars per dry matter ton (\$/DM ton, in \$2007, for delivery to plant gate or conversion reactor inlet) to support the development of cost-effective, high tonnage feedstock logistics systems and enable the supply of biomass feedstocks for a growing bio-based industry.	n/a	n/a	T: \$36.10	T: \$35.00	Dry herbaceous feedstock logistics cost, linked with biochemical conversion, of \$35 per ton by 2012. Dry woody feedstock logistic cost, linked with gasification, of \$46.37 per ton by 2017. Dry woody feedstock logistic cost, linked with pyrolysis, of \$56.77 per ton by 2017 (including pre-conversion processing cost). All are in 2007\$.
Subprogram Name: Biochemical Conversion					
Reduce the modeled cellulosic ethanol biochemical conversion cost in \$/gallon of ethanol (in \$2007).	n/a	n/a	T: \$0.97/gal	T: \$0.86/gal	Achieve a modeled cost for mature technology of \$2.62/GGE (\$1.76/gallon of ethanol) for ethanol by 2012, and then, of \$2.85/gallon of renewable gasoline, \$2.84/gallon of renewable diesel, and \$2.76/gallon of renewable jet by 2017 (all costs in 2007\$).
Subprogram Name: Thermochemical Conversion					
Reduce the modeled cellulosic ethanol conversion cost for a thermochemical process to \$0.86/gallon of ethanol (in \$2007)	n/a	n/a	T: \$0.97/gal	T: \$0.86/gal	Achieve a modeled cost for mature technology of \$2.62/GGE (\$1.76/gallon of ethanol) for ethanol by 2012, and then, of \$2.85/gallon of renewable gasoline, \$2.84/gallon of renewable diesel, and \$2.76/gallon of renewable jet by 2017 (all costs in 2007\$).

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram Name: Integrated Biorefineries					
Validate the total yearly production capacity of 45 million gallons (MG) of advanced biofuels by 2014	n/a	n/a	T: 5 MG	T: 15 MG	45 MG of total yearly production capacity of advanced biofuels by 2014.
Subprogram Name: Biopower					
Initiate limited scale boiler tests of densified biomass mixed with coal to characterize emissions and prepare foundational analysis, as part of a phased implementation of the program's biopower strategy..	n/a	n/a	T:Qualitative:	T:Qualitative	30 MW of new biopower generation using advanced technologies by 2016.

Table 3. Solar Energy: Enables solar energy to achieve grid-parity without any subsidies and thus become competitive with fossil fuel electricity production throughout the U.S. and the world by reaching a dollar-a-watt (\$1/W_{DC} or 5c/kWh equivalent) installed price for solar energy systems by 2020.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Solar Energy (EE5)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
(T = Target; R= Result)					
Subprogram: Photovoltaic R&D					
Reduce the unsubsidized levelized cost of solar electricity from PV at large scale for utility, commercial, and residential applications (cents kilowatt hour) (the range in the targets corresponds to different U.S. geographic regions; convert to \$/W _{DC} targets using 5 cents/kWh per \$/W _{DC})	T: 17-19 R: MET	T: 14-24 R: 15-20	T: 8-20	T: 11-13	Unsubsidized 6 cents/kWh by 2020 – cost-competitive with traditional electricity sources
Subprogram: Concentrating Solar Power					
Reduce the unsubsidized levelized cost (LCOE) of solar electricity from CSP for utility applications (including the value of storing energy into the evening hours). (cents per kilowatt hour)	T: 14-17 R: UNMET	T: 14-17 R: 20-25	T: 14-16	T: 12-15	Unsubsidized 6 cents/kWh by 2020 – cost-competitive with traditional electricity sources
Subprogram: Systems Integration					
Provide enabling technologies for >20 percent annual solar energy penetration into four types of distribution feeder circuits, in support of achieving the SunShot program goals. (percent penetration/number of circuits)	n/a	T: 5 R: MET	T: >5% /2	T: >5% /5	>20% on 4 types of distribution feeder circuits by 2020
Subprogram: Market Transformation					
Reduce market barriers and support domestic market growth to enable increasing annual solar installations in the U.S. (gigawatts (GW) installed per year)	n/a	T: 0.02 GW R: 2 GW	T: 3 GW	T: 5 GW	Enable up to 100 – 120GW of annual solar electricity generating capacity by 2020

Table 4. Wind Energy: Enables rapid expansion of clean, affordable, reliable and domestic wind power to promote national security, economic vitality, and improved environmental quality.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Wind Energy (EE6)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Technology Development and Testing					
Unsubsidized land-based wind cost of energy, in cents per kWh, in Class 4 wind speed areas (7.25 m/s mean wind speed at 50m above ground) from a 2010 baseline of 9.0 cents/kWh. (cents/kWh)	n/a	T: n/a R: 9.0	T: 8.9	T: 8.8	Reduce unsubsidized wind land utility cost of energy to 7.4 cents/kWh in 2020 from a baseline of 9.0 cents/kWh in 2010 ¹
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Unsubsidized shallow water market cost of energy, in cents per kWh, in Class 6 wind speed areas (9.25 m/s mean wind speed at 50m above ground) from a 2010 baseline of 26.9 cents/kWh. (cents per kWh)	n/a	T: n/a R: 26.9	T: 26.9	T: 26.2	Reduce unsubsidized offshore wind cost of energy to 10.0 cents/kWh in 2020 from a baseline of 26.9 cents/kWh in 2010
Units of new distributed wind turbines deployed in the U.S. market annually or sold by U.S. Manufacturers outside of the U.S. (units of new distributed wind turbines – with rated capacities between 1 kW and 1,000 kW each)	T: 3590 R: 4321	T: 4390 R: 4520	T: 5369	T: 6565	12005 units of new distributed wind turbines deployed in the U.S. market annually or sold by U.S. Manufacturers outside of the U.S. by 2015 ¹
Subprogram: Technology Application					
Number of States with at least 1,000 MW of wind energy installed. (number of States)	T: 4 R: MET	T: 10 R: 14	T: 14:	T: 14	Achieve installed generation of 1000MW of wind energy in 16 states by the end of 2016

Table 5. Geothermal Technology: Advances geothermal technologies through an integrated portfolio of cost-shared R&D and field demonstrations of both high-risk high-payoff EGS and technologies.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Geothermal Technology (EE7)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Reduce near-field EGS to 18 cents/kWh. for 24-hour electricity production (cents/kWh LCOE)	n/a	n/a	n/a	T: 18	5 MWe in near-field EGS generation by 2020

Table 6. Water Power: Researches, tests, and develops innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from water.

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic objective: Deploying the Technologies We Have</p> <p>Strategy: Demonstrate and Deploy Clean Energy Technologies</p> <p>Program: Water Power (EE10)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Test marine and hydrokinetic devices and components to determine baseline cost, performance, and reliability. (Number of devices tested).	n/a	n/a	T: 2	T: 5	Testing of devices will allow the program to establish baseline cost of energy and performance and identify technology improvement opportunities. This measure is intended to lead to a future outyear performance target of reducing cost of energy for these technologies.
Complete feasibility assessments at conventional hydropower facilities to identify opportunities for at least 5 percent increased electricity generation through efficiency and capacity upgrades, powering existing non-powered dams, and adding new pumped storage hydropower capacity. (number of completed demonstration assessments)	n/a	n/a	T: 3	T: 50	These assessments are intended to lead to an additional performance measure starting in FY 2013 of megawatts of incremental hydropower generated at sites identified through 3 feasibility studies. Feasibility studies serve as first stage gate for further Program investment in additional feasibility studies and supporting deployment at identified sites. Hundreds of facilities could potentially be interested in cost-effective upgrades.

Table 7. Vehicle Technologies: Develops and promotes energy-efficient and environmentally friendly transportation technologies that will enable America to use significantly less petroleum and reduce greenhouse gas emissions.

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic objective: Deploying the Technologies We Have</p> <p>Strategy: Demonstrate and Deploy Clean Energy Technologies</p> <p>Program: Vehicle Technologies (EE11)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Batteries and Electric Drive Technology					
Reduce the cost of electric-drive technologies. (\$/kilowatt peak power)	T: \$19/kW peak R: MET	T: \$19/kW peak R: MET	T: \$18/kW peak	T: \$17/kW peak	\$12/kW in 2015

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Reduce the cost of energy storage for PHEVs. (\$/kilowatt-hour)	n/a	n/a	T: \$700/kW-hr	T:\$500/kW-hr	\$300/ kWh in 2014, reducing the cost of electrical vehicle batteries by approximately 50% (roughly \$5,000) from FY 11 and reducing the vehicle payback period by more than 40%
Subprogram: Vehicle and Systems Simulation & Testing					
Increase cumulative miles of PHEV/EV testing. (miles tested)	n/a	n/a	T: 15M	T: 62M	112 Million miles of PHEV testing by 2015
Subprogram: Advanced Combustion Engine R&D					
Improve modeled fuel economy for passenger and commercial vehicles solely from improvements in powertrain efficiency. (Fuel economy gain percentage, passenger%/commercial %, compared to a 2009 baseline of XX mpg)	n/a	n/a	T: 10% / 5%	T: 15% / 10%	Passenger 25% in 2015; commercial 20% in 2015 15% in 2015, which would improve fuel economy by an estimated 5-7%
Demonstrate through modeling and laboratory data, an 10% energy conversion efficiency from engine waste heat to electricity of a thermoelectric device. (energy conversion efficiency percentage)	n/a	n/a	T: 8%	T: 10%	
Subprogram: Materials technology					
Validate (to within 10 percent uncertainty) the cost-effective reduction of the weight of passenger vehicle body and chassis systems by 50 percent with safety, performance, and recyclability comparable to 2002 vehicles. (weight reduction percentage, relative to 2009 baseline)	n/a	n/a	T: MODEL	T: 25%	50% weight reduction in 2015
Subprogram: Outreach, Deployment, and Analysis					
Reduce the use of petroleum through the adoption of alternative fuel vehicles and infrastructure. (gallons per year)	n/a	n/a	T: 570M	T: 700M	1000M gal/year in 2015

Table 8. Building Technologies: Develops and promotes efficient, environmentally friendly, and affordable technologies, systems, and practices for our nation’s residential and commercial buildings that will lower greenhouse gas emissions, costs and energy usage.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Building Technologies (EE4)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Residential Buildings Integration					
Complete cost-effective Energy Efficient Residential Solution Packages for new and existing homes.	n/a	n/a	T: 1	T: 1/1	10 energy savings packages in total (covering new and existing homes in each of 5 climate regions). For existing homes, packages will result in 15-30 percent greater efficiency for FY 2012-2015 and 30-50 percent greater efficiency beginning in FY 2015. For new homes, packages will result in 30 percent greater efficiency for FY 2011-14 and 30-50 percent greater efficiency beginning in FY 2014, based on the Building America benchmark and the International Energy Conservation Code 2009.
Subprogram: Commercial Buildings Integration					
Complete Retrofit and New Commercial Buildings Case Studies demonstrating 20% energy savings over previous building usage, with five year or less payback. These business cases will then be provided to stakeholders for potential adoption. (annual number of case studies completed)	n/a	n/a	T: 5/5	T: 10/10	20 percent reduction in energy consumption by 2015 in existing commercial buildings that adopt these energy savings measures
Subprogram: Emerging Technologies					
Increase efficacy measured in lumens per watt of “white light” SSL in a lab device. (lm/w)	n/a	n/a	T: 123lm/W	T:145lm/W	157 lm/W in 2016
Subprogram: Technology Validation and Market Introduction					
Annual number of completed ENERGY STAR test procedure proposals or final test procedures	n/a	n/a	T: 8	T: 12	75 completed test procedures (cumulative) by 2016
Subprogram: Equipment Standards and Analysis					
Annual number of products for which NOPR issues/number of products for which final ruled issued for test procedures and energy energy standards	n/a	n/a	T: 14/16	T: 34/17	73/57 products for which NOPR issues/number of products for which final ruled issued for test procedures and standards by 2016(cumulative).

Table 9. Industrial Technologies: Increases the energy productivity and reduces the carbon intensity of the U.S. industrial sector by partnering with industry to research and develop advanced manufacturing technologies and accelerate industrial adoption of energy saving, environmentally friendly technologies and practices.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Industrial Technologies (EE3)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
[NEW] Number of next-generation materials and manufacturing process technologies demonstrated in a proof of concept and moved forward along the technology development pipeline.	n/a	n/a	n/a	T: 2	Reduce the life-cycle energy cost of 10 new materials by a minimum of 25% over 10 years
[NEW] Cumulative number of manufacturing facilities certified in Superior Energy Performance by ANSI-accredited bodies.	n/a	n/a	n/a R: 5	T: 25	Total cumulative energy savings of these plants of 3 TBtus over the three year certification period.
[NEW] Number of new industrial energy efficiency engineers and managers finding permanent employment in the industry.	n/a	n/a	n/a	T: 200	Meet the market demand each year for industrial energy efficiency engineers and managers
[NEW] Cumulative number of new manufacturing systems technologies (or sets of related technologies) that save more than 25 percent energy per unit output compared with conventional processes – developed and demonstrated by university-based consortia centers focusing on clean energy manufacturing (Manufacturing Energy Systems Program).	n/a	n/a	n/a	T: 4	By 2020, demonstrate 15 or more new manufacturing systems technologies that each save a minimum 25% energy per unit output compared with conventional processes
[NEW] Cumulative number of new manufacturing processes that save a minimum of 25 percent energy compared with conventional manufacturing processes (Next Generation Manufacturing Processes program).	n/a	n/a	n/a	T: 2	Reduce energy intensity in the industrial sector by a minimum of 25% over 10 years

Table 10. Federal Energy Management Program: Facilitates the Federal government’s implementation of sound, cost effective energy management and investment practices to enhance the Nation’s energy security and environmental stewardship.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Leading the national conversation on energy					
Strategy: Make the Federal Government a Leader in Sustainability					
Program: Federal Energy Management Program (EE28)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Federal Energy Management Program					
[NEW] Cumulative lifecycle savings enabled in Federal facility energy use through alternative financing or technical assistance since 2010. (Trillion British Thermal Units (TBtus) saved over the lifetime of the installed energy savings measures)	n/a	n/a	n/a	T: 52	28% greenhouse gas reduction by 2020 (equivalent to approximately 117 TBtus less annual facility energy in 2020 than in 2008); and Energy Intensity Reduction of 30% by 2015 across the Federal sector (equivalent to approximately 59 TBtus less annual facility energy in 2015 than in 2010)

Table 11. Weatherization: Significantly accelerates, in partnership with State and local organizations, the deployment of energy efficiency and renewable energy technologies and practices by a wide range of Government, community, and business stakeholders.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Weatherization (EE1)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Weatherization Assistance					
Weatherize homes using DOE funds	T: 52,360 R: 95,821	T: 22,168 R: 24,492	T: 33,484	T: 50,609	1 million retrofits by the end of 2013
Program: State Energy Program (EE2)					
Subprogram: Weatherization Assistance					
Achieve an average annual energy savings (in trillions of Btus) from DOE funded projects	T: 6-7 R: 8.8	T: 6-7 R: 10.95	T: 5.2	T: 4.2	Cumulative lifetime cost savings of \$94.2 billion and cumulative carbon savings of 300 million metric tons of CO2 by 2020

Table 12. Hydrogen and Fuel Cell Technologies: Reduces petroleum use, greenhouse gas emissions, and criteria air pollutants, and contributes to a more diverse energy supply and efficient energy use by enabling the widespread commercialization of hydrogen and fuel cell technologies.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Hydrogen and Fuel Cell Technologies (EE8)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Sub-program: Fuel Cell Systems R&D					
Improve the catalyst specific power of fuel cells, as measured in units of kW per gram of platinum group metal, from 2.8 kW/g in 2008 to 8.0 kW/g in 2017. (kW/g)	n/a	T: 3.0 R: 5.0	T: 5.5	T: 5.7	8.0 kW/g in 2017
Sub-program: Hydrogen Fuel R&D					
Relative to the 2010 baseline, decrease the capital cost for hydrogen production using renewable resources. (percent decrease)	n/a	n/a	T: 10%	T: 25%	65% by 2016
Sub-program: Safety, Codes & Standards					
[NEW] By 2016, complete the underlying research to enable development of 7 regulations, codes and standards, to accelerate deployment of hydrogen and fuel cell technologies. (Percentage of R&D completed, as determined through formal merit review of the program, by assessing progress on key activities)	n/a	n/a	n/a	T: 20%	100% of R&D completed by 2016

Loan Programs Office

Advanced Technology Vehicles Manufacturing Loan Program

For details on the Advanced Technology Vehicles Manufacturing Loan Program performance plan see Appendix C.

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Table 13. Advanced Technology Vehicles Manufacturing: Provides direct loans to eligible automobile manufacturers and component suppliers for projects that reequip, expand, and establish manufacturing facilities in the U.S. to produce light-duty vehicles and components for such vehicles.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Advanced Technology Vehicles Manufacturing (LP12)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
[NEW] Battery production capacity of 120,000 lithium-ion PHEV batteries (1,200,000 kWh) established.	n/a	n/a	n/a	T: 120,000	(HPPG Goal) Assist in the development and deployment of advanced battery manufacturing capacity to support 500,000 plug-in hybrid electric vehicles a year by 2015.
[NEW] Reduction in petroleum usage (in millions of gallons of fuel per year) achieved through the use of advanced technology vehicles manufactured (at least in part) with funding provided through the ATVM loan program as compared to vehicles available in the base year.	n/a	n/a	n/a	T: 150	Net Oil Imports (mmbpd)
[NEW] Loss rate of loans.	n/a	n/a	n/a	T: 4%	Provide loan guarantees for innovative clean energy projects in categories including renewable energy systems, advanced nuclear facilities, coal gasification, carbon sequestration, energy efficiency, and various other types of projects.

Title 17 Innovative Technology Loan Guarantee Program

For details on the Title 17 Innovative Technology Loan Guarantee Program performance plan see Appendix C.

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Table 14. Loan Guarantee: Administers a federal loan guarantee program for advanced technology projects that avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Loan Guarantee (LP24)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Loss rate of guaranteed loans.	n/a	T: 4% R: 0%	T: 4%	T: 4%	Provide loan guarantees for innovative clean energy projects in categories including renewable energy systems, advanced nuclear facilities, coal gasification, carbon sequestration, energy efficiency, and various other types of projects.
Annual generation capacity from projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	n/a	T: 0.1 GW	T: 1.2 GW	Contributes to the HPPG: Double renewable energy generation (excluding conventional hydropower and biopower) by 2012.
[NEW] Annual manufacturing capacity from projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	n/a	T: 0.2 GW	T: 0.6 GW	
[NEW] Annual fuel production from biofuel projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	n/a	T: Baseline	T: TBD	Net Oil Imports (mmbpd)
Estimated annual greenhouse gas emissions reductions from projects receiving loan guarantees that have achieved commercial operations compared to 'business as usual' energy generation.	n/a	n/a	T: 200,000 tons CO2	T: 3,000,000 tons CO2	Annual Greenhouse Gas Emissions (mmtCO2)

Electricity Delivery and Energy Reliability

For details on the Electricity Delivery and Energy Reliability performance plan see Appendix D.

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Table 15. Electricity Delivery & Energy Reliability: Leads national efforts to modernize the electric grid, enhance security and reliability of energy infrastructure, and facilitate recovery from disruptions to the energy supply.

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic objective: Deploying the Technologies We Have</p> <p>Strategy: Modernize the Electric Grid</p> <p>Program: Electricity Delivery & Energy Reliability (OE 19)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Research and Development - Smart Grid R&D					
FY 2012 - Demonstrate integration of renewable and distributed systems for 12% load factor improvement on a distribution feeder circuit.	n/a	T: 1 R: MET	T: 1	T: 12%	Develop an efficient, fully integrated “smart” grid through the adaptation and integration of digital information and communication technologies into the Nation’s electricity delivery system.
Subprogram: Research and Development - Power Electronics					
[NEW] FY 2012 - Demonstrate a gallium nitride on silicon (GaN-Si) device that can be operated at a minimum voltage of 1.3 kV to support the development of grid-scale power electronics devices to enhance power flow control and grid reliability.	n/a	n/a	n/a	T: 1.3 kV	Develop a utility-scale power electronics that provide faster switching capabilities, flexible power conversion, and better flow control resulting in improved grid performance and increased grid efficiency.
Subprogram: Research and Development - Energy Storage					
FY 2012: Demonstrate 50% improvement in power density for flow battery, which will lead to a cost equivalence of \$2,250/kW for grid-scale energy management applications.	T: 1 R: MET	T: 1 R: NOT MET	T: \$2,500/kW	T: \$2,250/kW	Lower the cost and improve the performance of stationary energy storage technologies for utility-scale applications and to develop energy storage technologies that can reduce power disturbances, and improve system flexibility to better incorporate variable and intermittent renewable resources and reduce peak demand.
Subprogram: Research and Development - Cyber Security for Energy Delivery Systems					
FY 2012: Conduct two power system control component studies to identify vulnerabilities and develop mitigation recommendations that vendors and asset owners may use to harden next-generation energy delivery systems against cyber-attack.	T: 4 R: MET	T: 3 R: MET	T: 2	T: 1	Reduce the risk of energy disruptions due to cyber attacks,
Subprogram: Research and Development - Transmission Reliability and Renewable Energy Integration					
[NEW] Demonstrate prototype distributed dynamic state estimator at 2 utilities that measures and displays the exact state of the grid in seconds versus minutes.	n/a	n/a	n/a	T: 2	Develop advanced transmission-driven technologies to improve grid reliability, efficiency, and security. It supports the development of methodologies to better integrate variable and intermittent renewable resources

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Research and Development - Advanced Modeling Grid Research					
[NEW] Develop roadmap for research activities required to develop mathematical foundation to enable predictive capability in electricity system operations	n/a	n/a	n/a	T: 1	
Subprogram: Permitting, Siting, and Analysis (PSA)					
FY 2012 - Assist 30 States in designing and implementing State electricity policy, statutes and regulations.	T: Cong. Study R: MET	T: 2 Conferences R: 2 Conferences	T: 30	T: 30	Increase access to reliable, affordable and sustainable energy sources.
Subprogram: ISER					
FY 2012 - Create a near-real time monitoring situational awareness system that DOE ISER will use to collect and analyze performance data on energy infrastructure systems to improve decision makers' capacity to mitigate, and restore from, disruptions, by achieving a 100% situational awareness capability index in five year.	T: 1 R: MET	T: 1 R: Met	T: 1	T: 1	Ensure the reliability, survivability and resiliency of the energy infrastructure

Power Marketing Administrations

For details on the Power Marketing Administration performance plan see Appendix E.

Performance Plan

Table 16. Western Area Power Administration: Sell electricity primarily generated by federally owned hydropower projects, contributing to the reliability of the nation's electricity supply and grid.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Western Area Power Administration (PMA20)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
(T = Target; R= Result)					
Meet North American Electric Reliability Corporation Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system's performance at matching supply to changing demand requirements and supporting desired system frequency in one-minute increments. CPS2 measures a generating system's performance at limiting the magnitude of generation and demand imbalances in ten-minute increments.	T: CPS1>100, CPS2>90 R: CPS1 188.5, CPS2 99.5	T: CPS1>100, CPS2>90 R: CPS1 178.0, CPS2 96.5	T: CPS1>100, CPS2>90	T: CPS1>100, CPS2>90	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).
Increase transmission capacity by developing infrastructure for the delivery of renewable resources as financed with Borrowing Authority under the Recovery Act.	n/a	n/a	T: 300 MW R: 300 MW	T: 300 MW R: 300 MW	Maintain and modernize systems and infrastructure to increase the reliability, efficiency, and use of Federal assets.
Effectively operate the transmission system to limit the number of accountable outages to no more than 26 annually.	T: ≤26 R: 15	T: ≤26 R: 11	T: ≤26	T: ≤26	Maintain and modernize the Federal power system and facilities.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUD).	T: UI≤\$8,868 R: UI=\$6,196	T: UI≤\$8,930 R: UI=\$6,216	T: UI≤\$8,850	T: UI≤\$8,879	Assure power rates are adequate to repay the Federal investment
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the national median for public power.	n/a	T:<\$0.062/kWh R: \$0.012/kWh	T:<\$0.060/kWh	T:<\$0.060/kWh	Manage power delivery costs.

Table 17. Bonneville Power Administration: Sell electricity primarily generated by federally owned hydropower projects, contributing to the reliability of the nation’s electricity supply and grid.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid Program: Bonneville Power Administration (PMA21)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Attain average North American Electric Reliability Corporation (NERC) compliance ratings for the following NERC Control Performance Standards (CPS) measuring the balance between power generation and load, including support for system frequency: (1) CPS1, which measures generation/load balance on one-minute intervals (rating > or =100); and (2) CPS2, which limits any imbalance magnitude to acceptable levels (rating > or =90).	T: CPS1>100, CPS2>90 R: CPS1 192.5, CPS2 95.9	T: CPS1>100, R: CPS1 177.3	T: CPS1>100	T: CPS1>100, CPS2>90	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).
Achieve > or = 97.5% Heavy-Load-Hour Availability (HLHA) through efficient performance of Federal hydro-system processes and assets, including joint efforts of BPA, Army Corps of Engineers, and Bureau of Reclamation. HLHA is actual machine capacity available during heavy-load hours (0700-2200 Monday-Saturday), divided by planned available capacity during heavy-load hours.	T: >=97.5% R: 100.2%	T: >=97.5% R: 99.57	T: >=97.5%	T: >=97.5%	Maintain and modernize systems and infrastructure to increase the reliability, efficiency, and use of Federal assets.
Meet planned annual repayment of principal on Federal power investments.	T: \$276 million R: \$432 million	T: \$387 million R: \$460 million	T: Meet planned annual repayment of principal on Federal power investments.	T: Meet planned annual repayment of principal on Federal power investments.	Assure power rates are adequate to repay the Federal investment..

Table 18. Southeastern Power Administration: Sell electricity primarily generated by federally owned hydropower projects, contributing to the reliability of the nation’s electricity supply and grid.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Southeastern Power Administration (PMA22)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Meet NERC Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system’s performance at matching supply to changing demand requirements and supporting desired system frequency in one minute increments. CPS2 measures a generating system’s performance at limiting the magnitude of generation and demand imbalances in ten minute increments.	T: >100 R: 225	T: >100 R: 238	T: >100	T: >100	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency:
	T: >90 R: 100	T: >90 R: 99.85	T: >90	T: >90	
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the National median for public power. The public power's national median cost for operation and maintenance expense per kilowatt-hour generated is \$0.062	n/a	T: <\$0.062/kWh R: \$0.016	T: <\$0.062/kWh	T: <\$0.062/kWh	Manage power delivery costs.
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUI) (Definition Revised in 2010).	T: UI/AUI<=1 R: UI/AUI<=1	T: UI/AUI<=1 R: UI/AUI<=1	T: UI/AUI<=1	T: UI/AUI<=1	Assure power rates are adequate to repay the Federal investment.

Table 19. Southwestern Power Administration: Sell electricity primarily generated by federally owned hydropower projects, contributing to the reliability of the nation’s electricity supply and grid.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Southwestern Power Administration (PMA23)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Meet NERC Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system’s performance at matching supply to changing demand requirements and supporting desired system frequency in one minute increments. CPS2 measures a generating system’s performance at limiting the magnitude of generation and demand imbalances in ten minute increments.	T: >100 R: 199.98	T: >100 R: 199.99	T: >100	T: >100	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency:
	T: >90 R: 99.82	T: >90 R: 99.87	T: >90	T: >90	
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the National median for public power.	T: \$0.0620 R: \$0.0126	T: < \$0.0620 R: \$0.0143	T: <\$0.0600	T: <\$0.0600	Manage power delivery costs.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUI) (Definition Revised in 2010).	T: \$6,223 R: \$60,282,026	T: UI<=\$1,023 M R: 543M	T: UI<=\$1,306M	T: UI<=\$1,379 M	Assure power rates are adequate to repay the Federal investment.
Effectively operate the transmission system to limit the number of accountable outages to no more than 3 annually.	T: =< 3 R: 0	T: =< 3 R: 1	T: =< 3	T: =< 3	Maintain and modernize the Federal power system and facilities.

Advanced Research Projects Agency - Energy

For details on the Advanced Research Projects Agency – Energy performance plan see Appendix F.

Performance Plan

Table 20. Advanced Research Projects Agency - Energy: Funds specific high risk, high payoff, and game-changing research and development projects to meet the nation’s long-term energy challenges.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic Objective: Discovering the new solutions we need					
Strategy: Accelerate energy innovation through pre-competitive Research and Development					
Program: Advanced Research Projects Agency - Energy (ARPA-E25)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Cumulative percentage of award funding committed 45 days after funding opportunity announcement (FOA) award announcements.	T: n/a R: 75%	n/a	T: 70%	T: 70%	Fund specific high-risk, high payoff, game-changing research and development projects to meet the nation’s long-term energy challenges
Cumulative percentage of follow on funding from other Federal (not ARPA-E) and Private organizations as a result of ARPA-E direct funding.	T: n/a R: 35%	n/a	T: 10%	T:10%	

Fossil Energy Research and Development

For details on the Fossil Energy Research and Development performance plan see Appendix G.

Performance Plan

Table 21. Clean Coal: Developing technologies to enhance the clean use of domestic fossil fuels and to reduce emissions from fossil-fueled electricity generation plants to achieve near-zero atmospheric emissions power production.

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic objective: Discovering the New Solutions We Need</p> <p>Strategy: Establish Technology Test Beds and Demonstrations</p> <p>Program: Fossil Energy Research and Development / Clean Coal (FE15)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Carbon Capture					
[New] Conduct laboratory through pilot-scale tests of advanced post-and oxy-combustion capture technologies that show, through engineering and systems analyses studies, 90 percent CO ₂ capture at no more than a 50 percent increase in levelized cost of electricity when compared to a reference power plant.	n/a	n/a	n/a	T: 50%	CO ₂ capture at no more than a 35 percent increase in levelized cost of electricity when compared to a reference power plant
Conduct laboratory through pilot-scale tests of technology components of Advanced Energy Systems with pre-combustion capture that show, through engineering and systems analyses studies, 90 percent CO ₂ capture at no more than a 13 percent increase in levelized cost of electricity when compared to a reference power plant.	T: 17% AA: 17%	T: 15% AA: 15%	T: 14%	T: 13%	CO ₂ capture at no more than a 10 percent increase in levelized cost of electricity when compared to a reference power plant
Subprogram: Carbon Storage					
Inject 3.0 million (cumulative since 2009) metric tons of CO ₂ in large-volume field test sites to demonstrate the formations capacity to permanently, economically, and safely store carbon dioxide.	T: 0.5 R: 0.6	T: 1.0 R: 1.0	T: 1.5	T: 3.0	Since January 1, 2009, inject and cumulatively store 9.0 million metric tons of CO ₂
Subprogram: CCS Demonstrations					
[NEW] FY2012: Initiate or continue construction of at least 3 CCS Demonstration projects.	n/a	n/a	n/a	T: 3	Initiate operations of five commercial scale CCS demonstrations including the Clean Coal Power Initiative (CCPI), FutureGen 2.0, and the Industrial CCS Demonstration projects (includes projects funded by both annual appropriations and the Recovery Act.)

Table 22. Petroleum Reserves: Insuring the energy security of the nation.

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Program: Petroleum Reserves (FE18)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
90 day sustainable drawdown rate (million barrels per day)	T: 4.4 R: 4.4	T: 4.4 R: 4.4	T: 4.4	T: 4.4	Maintains the operational readiness of the SPR to ensure a 4.4 MMB/Day drawdown rate.
Calculated Maintenance Performance Appraisal Report (MPAR) Rating (% of monthly maintenance and accessibility goals)	T: ≥ 95% R: 98.4%	T: ≥ 95% R: 98.5%	T: ≥ 95%	T: ≥ 95%	Monthly maintenance and accessibility goals.
Operating cost per barrel of storage capacity (operating cost per barrel)	T: ≤ \$0.25 R: \$0.207	T: ≤ \$0.25 R: 0.210	T: ≤ \$0.25	T: ≤ \$0.25	Maintain operating cost per barrel of storage capacity.

The Science and Engineering Enterprise

Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas.

Science

For details on the Science performance plan see Appendix H.

Performance Plan

Table 23. Advanced Scientific Computing Research: Discover, develop, and deploy the computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to DOE.

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas					
Strategic Objective: Lead computational sciences and high performance computing					
Program: Science/ Advanced Scientific Computing Research (SC34)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Average annual percentage increase in the computational effectiveness (either by simulating the same problem in less time or simulating a larger problem in the same time) of a subset of application codes, tools and/or libraries.	T: >100% R: Target Met	T: >100% R: Target Met	T: >100%	T: >100%	Deliver forefront computational and networking capabilities to scientists nationwide that enable them to extend the frontiers of science, answering critical questions that range from the function of living cells to the power of fusion energy. (In the process of reviewing in light of the new Strategic Plan)
Focus usage of the primary supercomputer at the National Energy Research Scientific Computing Center (NERSC) on capability computing. Percentage of computing time will be used by computations that require at least 1/8 of the NERSC resource.	T: 40% R: Target Met	T: 30% R: Target Met	T: 35%	T: 30%	

Table 24. Basic Energy Sciences: Supports fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support DOE missions in energy, environment, and national security.

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas					
Strategic Objective: Extending our knowledge of the natural world					
Program: Science/ Basic Energy Sciences (SC31)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Temporal resolution; maintain x-ray pulse of less than 70 femtoseconds in duration and containing more than 1trillion photons per pulse. <i>(No further improvement in performance is expected for this measure since the current suite of instruments has met their maximum performance level. This performance goal is a measure of SC's intent to maintain the maximum level of performance for users of the current SC facilities until the next generation of instruments and facilities becomes available.)</i>	T: <100 duration, >100 million intensity R: Target Met	T: <100 duration, >100 million intensity R: Target Met	T: <70 duration, >1trillion intensity	T: <100 duration, > 1trillion intensity	Provide the scientific knowledge and tools to achieve energy independence, securing U.S. leadership and essential breakthroughs in basic energy sciences. (In the process of reviewing in light of the new Strategic Plan)

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Maintain spatial resolutions for imaging in the hard x-ray region of <100 nm and in the soft x-ray region of <18 nm, and spatial information limit for an electron microscope of 0.05 nm. <i>(No further improvement in performance is expected for this measure since the current suite of instruments has met their maximum performance level. This performance goal is a measure of SC's intent to maintain the maximum level of performance for users of the current SC facilities until the next generation of instruments and facilities becomes available.)</i>	T: <100 hard x-ray, <18 soft x-ray, 0.08 limit R: Target Met	T: <100 hard x-ray, <18 soft x-ray, 0.08 limit R: Target Met	T: <100 hard x-ray, <18 soft x-ray, 0.05 limit	T: <100 hard x-ray, <18 soft x-ray, 0.05 limit	Provide the scientific knowledge and tools to achieve energy independence, securing U.S. leadership and essential breakthroughs in basic energy sciences. (In the process of reviewing in light of the new Strategic Plan)
Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.	T: <10% R: Target Met	T: <10% R: Target Met	T: <10%	T: <10%	
Achieve an average operation time of the scientific user facilities as a percentage of the total scheduled annual operating time of greater than 90%.	T: >90% R: Target Met	T: >90% R: Target Met	T: >90%	T: >90%	

Table 25. Biological and Environmental Research: Understand complex biological, climatic, and environmental systems across spatial and temporal scales ranging from sub-micron to global, from individual molecules to ecosystems, and from nanoseconds to millennia.

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas					
Strategic Objective: Extending our knowledge of the natural world					
Program: Science/ Biological and Environmental Research (SC32)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
(T = Target; R = Result)					
Develop a coupled climate model with fully interactive carbon and sulfur cycles, as well as dynamic vegetation to enable simulations of aerosol effects, carbon chemistry, and carbon sequestration by the land surface and oceans and the interactions between the carbon cycle and climate.	T: Provide improved climate simulations on subcontinental, regional, and large watershed scales, with an emphasis on improved simulation of precipitation and produce new continuous time series of retrieved cloud, aerosol, and radiation for Arctic region R: Target Met	T: Provide a new parameterization for aerosol effects on cloud drizzle for incorporation into atmospheric models R: Target Met	T: Earth system model to be used in generating scenarios for the IPCC Fifth Assessment Report and provide integrated aerosol sub-model that includes direct and indirect forcing	T: Demonstrate coupled climate models at 20 km resolution	Provide the biological and environmental discoveries necessary to clean and protect our environment, offer new energy alternatives, and facilitate the entertainment of physical science advances in biology. (In the process of reviewing in light of the new Strategic Plan)

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Strategic Objective: Delivering new technologies to advance our mission Program: Science/ Biological and Environmental Research (SC32)					
Determine the dominant processes controlling the fate and transport of contaminants in subsurface environments and develop quantitative numerical models to describe contaminant mobility at the field scale.	T: Test geophysical techniques that measure parameters controlling contaminant movement under field conditions in at least two distinct subsurface environments R: Target Met	T: Develop a reactive transport model for a complex field site that accounts for heterogeneity and objectively evaluate against field data R: Target Met	T: Refine subsurface transport models by developing computational methods to link important processes impacting contaminant transport at smaller scales to the field scale	T: Perform time-lapse geophysical experiments to monitor spatial and temporal dynamics of hydrogeological and biogeochemical parameters impacting contaminant transport processes	[same as previous: Provide the biological and environmental discoveries necessary to clean and protect our environment, offer new energy alternatives, and facilitate the entertainment of physical science advances in biology. (In the process of reviewing in light of the new Strategic Plan)]
Increase by at least 10% the number of high quality (less than one error in 10,000) bases of DNA from microbial and model organism genomes sequenced the previous year, and decrease by at least 10% the cost (billion base pair/dollar) to produce these base pairs from the previous year's actual results.	T: Sequence 253 billion base pairs at a rate of 4,600 bp/\$1 R: Target Met	T: Sequence 1,100 billion base pairs at a rate of 15,942 bp/\$1 R: Target Met	T: Sequence 6,644 billion base pairs at a rate of 78,782 bp/\$1	T: To be determined based on FY 2011 results	
The achieved operation time of the JGI scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	
The achieved operation time of the ARM scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	
The achieved operation time of the EMSL scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	

Table 26. Fusion Energy Sciences: Supports research to expand the fundamental understanding of matter at very high temperatures and densities, and to build the scientific foundations needed to develop a fusion energy source.

<p>Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Delivering new technologies to advance our mission Program: Science/ Fusion Energy Sciences (SC33)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Conduct experiments on the major fusion facilities (DIII-D, Alcator C-Mod, NSTX) leading toward the predictive capability for burning plasmas and configuration optimization.	T: See details below R: Target Met	T: See details below R: Target Met	T: See details below	T: See details below	Answer the key scientific questions and overcome enormous technical challenges to harness the power that fuels our Sun. (In the process of reviewing in light of the new Strategic Plan)
<p>FY 2012: Conduct experiments on major fusion facilities leading toward improved understanding of core transport and enhanced capability to predict core temperature and density profiles. In FY 2012, FES will assess the level of agreement between predictions from theoretical and computational transport models and the available experimental measurements of core profiles, fluxes and fluctuations. The research is expected to exploit the diagnostic capabilities of the facilities (Alcator C-Mod, DIII-D, and NSTX) along with their abilities to run in both unique and overlapping regimes. The work will emphasize simultaneous comparison of model predictions with experimental energy, particle and impurity transport levels and fluctuations in various regimes, including those regimes with significant excitation of electron modes. The results achieved will be used to improve confidence in transport models used for extrapolations to planned ITER operation.</p> <p>FY 2011: Improve the understanding of the physics mechanisms responsible for the structure of the pedestal and compare with the predictive models described in the companion theory milestone. Perform experiments to test theoretical physics models in the pedestal region on multiple devices over a broad range of plasma parameters (e.g., collisionality, beta, and aspect ratio). Detailed measurements of the height and width of the pedestal will be performed augmented by measurements of the radial electric field. The evolution of these parameters during the discharge will be studied. Initial measurements of the turbulence in the pedestal region will also be performed to improve understanding of the relationship between edge turbulent transport and pedestal structure.</p> <p>FY 2010: Conduct experiments on major fusion facilities to improve understanding of the heat transport in the tokamak scrape-off layer (SOL) plasma, strengthening the basis for projecting divertor conditions in ITER. The divertor heat flux profiles and plasma characteristics in the tokamak SOL will be measured in multiple devices to investigate the underlying thermal transport processes. The unique characteristics of C-Mod, DIII-D, and NSTX will enable collection of data over a broad range of SOL and divertor parameters (e.g., collisionality, beta, parallel heat flux, and divertor geometry). Coordinated experiments using common analysis methods will generate data that will be compared with theory and simulation.</p> <p>FY2009: Identify the fundamental processes governing particle balance by systematically investigating a combination of divertor geometries, particle exhaust capabilities, and wall materials. Alcator C-Mod operates with high-Z metal walls, NSTX is pursuing the use of lithium surfaces in the divertor, and DIII-D continues operating with all graphite walls. Edge diagnostics measuring the heat and particle flux to walls and divertor surfaces, coupled with plasma profile data and material surface analysis, will provide input for validating simulation codes. The results achieved will be used to improve extrapolations to planned ITER operation.</p>					

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Continue to increase resolution in simulations of plasma phenomena—optimizing confinement and predicting the behavior of burning plasmas require improved simulations of edge and core plasma phenomena, as the characteristics of the edge can strongly affect core confinement.	T: See details below R: Target Met	T: See details below R: Target Met	T: See details below	T: See details below	[same as previous: Answer the key scientific questions and overcome enormous technical challenges to harness the power that fuels our Sun. (In the process of reviewing in light of the new Strategic Plan)]
<p>FY 2012: Our understanding of ITER performance is largely based on the idealization of 2D magnetic fields that are symmetric about the central axis of the tokamak. However, ITER will have a number of intrinsic sources of nonaxisymmetric magnetic fields due to a finite number of toroidal field coils and ripple reducing ferritic shims, ferritic steel test blanket modules, and possibly 3D coils for plasma stability control. These fields can both improve and degrade ITER performance. A number of computer simulation tools that are capable of providing quantitative predictions of the effects of such nonaxisymmetric fields have been and are continuing to be developed. In FY 2012, we will compare the predictions of the simulations with experiments on present facilities, and will assess how this understanding impacts our predictions of the operational space and performance of ITER.</p> <p>FY 2011: A focused analytic theory and computational effort, including large-scale simulations, will be used to identify and quantify relevant physics mechanisms controlling the structure of the pedestal. The performance of future burning plasmas is strongly correlated with the pressure at the top of the edge transport barrier (or pedestal height). Predicting the pedestal height has proved challenging due to a wide and overlapping range of relevant spatiotemporal scales, geometrical complexity, and a variety of potentially important physics mechanisms. Predictive models will be developed and key features of each model will be tested against observations, to clarify the relative importance of various physics mechanisms, and to make progress in developing a validated physics model for the pedestal height.</p> <p>FY 2010: Gyrokinetic simulations of turbulent transport of toroidal momentum with both kinetic and Boltzmann electrons will be carried out. These simulations will explore the Ion Temperature Gradient (ITG) and the Collisionless Trapped Electron Mode (CTEM) regimes.</p> <p>FY 2009: Gyrokinetic edge electrostatic turbulence simulations will be carried out across the divertor separatrix with enhanced resolution down to the ion gyroradius scale.</p>					
Average achieved operation time of the major national fusion facilities (DIII-D, Alcator C-Mod, NSTX) as a percentage of the total planned operation time is greater than 90%.	T: >90% R: Target Met	T: >90% R: Target Met	T: >90%	T: >90%	
Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects kept to less than 10%.	n/a	n/a	T: <10%	T: <10%	

Table 27. High Energy Physics: Supports research to understand how our universe works at its most fundamental level.

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Extending our knowledge of the natural world Program: Science/ High Energy Physics (SC30)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Measure within 20% of the total integrated amount of data (in protons on-target) delivered to the MINOS (or NOvA) detector using the NuMI facility.	T: Baseline is 2.2×10^{20} (within 20% is 1.8×10^{20}) R: Target Met	T: Baseline is 2.7×10^{20} (within 20% is 2.2×10^{20}) R: Target Met	T: Baseline is 2.7×10^{20} (within 20% is 2.2×10^{20}) R: Target Met	T: Baseline is 1.3×10^{20} (within 20% is 1.0×10^{20}) R: Target Met	Understand the unification of fundamental particles and forces and the mysterious forms of unseen energy and matter that dominate the universe, search for possible new dimensions of space, and investigate the nature of time itself. (In the process of reviewing in light of the new Strategic Plan)
Deliver within 20% of baseline estimate a total integrated amount of data (in inverse picobarns [pb^{-1}]) to the CDF and D-Zero detectors at the Tevatron.	T: Baseline is $1,684 \text{ pb}^{-1}$ (within 20% is $1,347 \text{ pb}^{-1}$) R: Target Met	T: Baseline is $1,700 \text{ pb}^{-1}$ (within 20% is $1,360 \text{ pb}^{-1}$) R: Target Met	T: Baseline is $2,000 \text{ pb}^{-1}$ (within 20% is $1,600 \text{ pb}^{-1}$) R: Target Met	Discontinued (FY 2011 is last planned year of operations for CDF and D-Zero detectors)	
Achieve less than 10% for both the cost-weighted mean percentage variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.	T: <10% R: Target Met	T: <10% R: Target Met	T: <10% R: Target Met	T: <10% R: Target Met	
Achieve greater than 80% average operation time of the scientific user facilities (the Fermilab Tevatron and the Neutrinos at the Main Injector (NuMI beamline) as a percentage of the total scheduled annual operating time.	T: >80% R: Target Met	T: >80% R: Target Met	T: >80% R: Target Met	T: >80% R: Target Met	

Table 28. Nuclear Physics: Discover, explore, and understand all forms of nuclear matter.

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Extending our knowledge of the natural world Program: Science/ Nuclear Physics (SC29)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Achieve at least 80% of the integrated delivered beam used effectively for all experiments run at each of the Argonne Tandem Linac Accelerator System (ATLAS) and the Holifield Radioactive Ion Beam (HRIBF) facilities measured as a percentage of the scheduled delivered beam considered effective for each facility. (measure established in FY 2009; starting in FY 2012, this measure applies only to ATLAS)	T: > 80% R: Target Not Met	T: $\geq 80\%$ R: Target Met	T: $\geq 80\%$ R: Target Met	T: $\geq 80\%$ R: Target Met	Understand the evolution and structure of nuclear matter, from the smallest building blocks, quarks and gluons, to the stable elements in the universe created by stars, to unique isotopes created in the laboratory that exist at the limits of stability and possess radically different properties from known matter. (In the process of reviewing in light of the new Strategic Plan)

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Achieve at least 80% of the integrated delivered beam used effectively for experimental research in each of Halls A, B and C at the Continuous Electron Beam Accelerator Facility (CEBAF) measured as a percentage of the scheduled delivered beam considered effective for each Hall. The values from each Hall will be averaged for the end of the year result starting in FY 2010.	T: >80% R: Target Not Met	T: ≥ 80% R: Target Not Met	T: ≥ 80%	T: ≥ 80%	[same as previous: Understand the evolution and structure of nuclear matter, from the smallest building blocks, quarks and gluons, to the stable elements in the universe created by stars, to unique isotopes created in the laboratory that exist at the limits of stability and possess radically different properties from known matter. (In the process of reviewing in light of the new Strategic Plan)]
Achieve at least 80% of the projected integrated heavy-ion collision luminosity for each of the PHENIX and STAR experiments at the Relativistic Heavy Ion Collider, where the projected values take into account anticipated collider performance and detector data-taking efficiencies.	n/a	T: ≥ 80% R: Target Met	T: ≥ 80%	T: ≥ 80%	
Achieve at least 80% of the projected integrated proton-proton collision luminosity for each of the PHENIX and STAR experiments at the Relativistic Heavy Ion Collider, where the projected values take into account anticipated collider performance and detector data-taking efficiencies.	T: > 80% R: Target Not Met	n/a	T: ≥ 80%	T: ≥ 80%	
Achieve at least 80% average operation time of the scientific user facilities as a percentage of the total scheduled annual operating time.	T: 80% R: Target Met	T: 80% R: Target Met	T: 80%	T: 80%	
Achieve within 10% for both the cost-weighted mean percentage variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects	T: <10% R: Target Met	T: <10% R: Target Met	T: <10%	T: <10%	

Securing our Nation

Goal: Enhance nuclear security through defense, nonproliferation, and environmental efforts.

National Nuclear Security Administration

For details on the National Nuclear Security Administration performance plan see Appendix I.

Performance Plan

Table 29. Office of the Administrator: Creates a well-managed, inclusive, responsive, and accountable organization through the strategic management of human capital and acquisitions and enhanced cost-effective utilization of information technology.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: This program supports all NNSA strategic objectives. Strategy: This program supports all NNSA strategies. Program: Office of the Administrator (NA56)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Federal Administrative Costs: Maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6% (Efficiency)	N/A	N/A	T: 5.9% R: 5.0%	T: 5.9% R: 5.2%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	In keeping with OMB and DOE expectations that administrative costs be minimized, maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6%.

Table 30. Directed Stockpile Work: Contributes to national security by enhancing the safety and security while ensuring the reliability of the nation’s nuclear weapons stockpile for a continued effective deterrent, without underground nuclear testing.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs & Dismantle excess nuclear weapons to meet national objectives Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile. Program: Directed Stockpile Work (NA36)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Annual Warheads Certification: Annual percentage of warheads in the Stockpile that is safe, secure, reliable, and available to the President for deployment. (Annual Outcome)	T: 100% R: 100%	T: 100% R: 100%	T: 100% R: 100%	T: 100% R: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, maintain 100% of the warheads in the stockpile as safe, secure, reliable, and available to the President for deployment.
W76-1 Life Extension Program (LEP): Cumulative percentage of progress in completing Nuclear Weapons Council (NWC)-approved W76-1 Life Extension Program (LEP) activity. (Long-term Output)	T: 39% R: 38%	T: 44% R: 44%	T: 48% R: 48%	T : 52% R: 49%	T: 65%	T : 70%	T : 75%	T : 80%	T : 85%	T : 90%	By FY 2018, complete NWC-approved W76-1 LEP.
LEP Production Costs: Cumulative percent reduction in projected W76 warhead production costs per warhead from established validated baseline, as computed and reported annually by the W76 LEP Cost Control Board. (Efficiency)	T: 0.50% R: 0.39%	T: 1.0% R: 0.78%	T: 1.0% R: 0.8%	T: 1.0% R: 0.8%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	Achieve the projected W76-1 LEP warhead production costs per warhead from established validated baseline by 1.0%, then maintain through end of production.

Table 31. Science Campaign: Develops our nation’s scientific capabilities and experimental infrastructure used to assess the safety, security, reliability, and performance of the nuclear explosives package without reliance on further underground testing.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Strengthen the Science, Technology, and Engineering Base. Program: Science Campaign (NA37)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>First Principles Physics Models: Cumulative percentage of progress in replacing key empirical parameters in the nuclear explosive package assessment with first principles physics models assessed by validation with experiment. Collaboration with ICF Campaign. (Long-term Outcome)</p>	T: 36% R: 36%	T: 42% R: 46%	T: 50% R: 46%	T: 60% R: 58%	T: 63%	T: 66%	T: 69%	T: 72%	T: 75%	T: 78%	By the end of FY 2020, use modern physics models in assessment calculations to replace the major empirical parameters affecting weapon performance. (Shared with ICF Campaign)

Table 32. Engineering Campaign: Provides the modern tools and capabilities needed to ensure the safety, security, reliability and performance of the United States nuclear weapons stockpile.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Strengthen the Science, Technology, and Engineering Base Program: Engineering Campaign (NA38)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>[NEW] Technology Maturation Capabilities: Annual percentage (90%) of technology maturation capabilities delivered, as measured by incremental progress towards pre-defined Technology Readiness Levels (TRLs) and Manufacturing Readiness Levels (MRLs) for the portfolio of components described in the Component Maturation Framework (CMF). (Annual Outcome)</p>	N/A	N/A	N/A	N/A	N/A	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	By the end of each fiscal year, achieve 90% of the incremental progress towards pre-defined TRLs and MRLs as described in the CMF. This is a new measure, developed during the DOE Performance Measures Streamlining Initiative.

Table 33. Inertial Confinement Fusion Ignition and High Yield Campaign: Provides the experimental capabilities and scientific understanding in high-energy density physics necessary to maintain a safe, secure, and reliable nuclear weapons stockpile without underground testing.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Strengthen the Science, Technology, and Engineering Base Program: Inertial Confinement Fusion Ignition and High Yield Campaign (NA39)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Key Extreme Experiments: Cumulative percentage of progress towards achievement of key extreme experimental conditions of matter for predictive capability for nuclear weapons performance. Collaboration with the Science Campaign. (Long-term Outcome)</p>	N/A	N/A	N/A	T : 35% R: 35%	T: 55%	T: 75%	T: 85%	T: 90%	T: 100%	N/A	By the end of FY 2015, achieve greater than unity value of the average of the ratio of achieved conditions to needed conditions. (Shared with Science Campaign)

Table 34. Advanced Simulation and Computing Campaign: Provides leading edge, high-end simulation capabilities to meet the requirements of weapons assessment and certification, including weapon codes, weapons science, computing platforms, and supporting infrastructure.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Strengthen the Science, Technology, and Engineering Base Program: Advanced Simulation and Computing Campaign (NA40)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Reduced Reliance on Calibration: The cumulative percentage reduction in the use of calibration “knobs” to successfully simulate nuclear weapons performance. (Long-term Outcome)</p>	T : 8% R: 8%	T: 16% R: 16%	T: 25% R: 25%	T: 30% R: 33%	T: 35%	T: 40%	T: 45%	T: 50%	T: 55%	T: 60%	By the end of FY 2024, 100% of selected calibration knobs (non-science based models) affecting weapons performance simulation have been replaced by science-based, predictive phenomenological models. Reduced reliance on calibration will ensure the development of robust ASC simulation tools. These tools are intended to enable the understanding of the complex behaviors and effect of nuclear weapons, now and into the future, without nuclear testing.

Table 35. Readiness Campaign: Operates the capability for producing tritium to maintain the national inventory needed for the nuclear weapons stockpile and selects and matures production technologies that are required for manufacturing components to meet the Planning and Production Directive schedule and war reserve requirements.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile. Program: Readiness Campaign (NA41)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Critical Capabilities Deployed: Cumulative number of critical immediate and urgent capabilities deployed to support our Directed Stockpile Work (DSW) customer's nuclear weapon refurbishment needs derived from the Production Readiness Assessment Plan. (Long-term Output)</p>	T: 20 R: 20	T: 22 R: 22	T: 24 R: 24	T: 25 R: 25	T: 27	T: 28	T: 28	T: 29	T: 30	T: 31	By the end of FY 2016, deploy 31 critical immediate and urgent capabilities to support Directed Stockpile Work nuclear weapons refurbishment deliverables.
<p>Tritium Production: Cumulative number of Tritium-Producing Burnable Absorber Rods (TPBARs) irradiated in Tennessee Valley Authority reactors to provide the capability of collecting new tritium to replace inventory for the nuclear weapons stockpile. (Long-term Output)</p>	T: 480 R: 480	T: 720 R: 720	T: 960 R: 1,088	T: 960 R: 1,088	T: 1,328	T: 1,872	T: 1,872	T: 2,112	T: 2,352	T: 2,352	By the end of FY 2016, complete irradiation of 2,352 Tritium-Producing Burnable Rods (to provide tritium for nuclear weapons.)

Table 36. Readiness in Technical Base and Facilities: Provides state-of-the-art facilities and infrastructure equipped with advanced scientific and technical tools.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability Program: Readiness in Technical Base and Facilities (NA42)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Major Construction Projects: Execute construction projects within approved costs and schedules, as measured by the total percentage of projects with total estimated cost (TEC) greater than \$20 million with a schedule performance index (ratio of budgeted cost of work performed to budgeted cost of work scheduled) and a cost performance index (ratio of budgeted cost of work performed to actual cost of work performed) between 0.9-1.15. (Efficiency)</p>	T: 80% R: 100%	T: 85% R: 67%	T: 90% R: 74%	T: 90% R: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	Annually achieve 90% of baselined construction projects with TEC greater than \$20M with actual SPI and CPI of 0.9-1.15 as measured against approved baseline definitions.

Table 37. Secure Transportation Asset: Safely and securely transports nuclear weapons, weapons components, and special nuclear materials to meet projected Department of Energy (DOE), Department of Defense (DoD), and other customer requirements.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability Program: Secure Transportation Asset (NA43)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Safe and Secure Shipments: Annual percentage of shipments completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material. (Annual Outcome)</p>	T: 100% R: 100%	T: 100% R: 100%	T: 100% R: 100%	T: 100% R: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, ensure that 100% of shipments are completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material.

Table 38. Nuclear Counterterrorism Incident Response: Responds to, and mitigates nuclear and radiological incidents worldwide and has a lead role in defending the Nation from the threat of nuclear terrorism.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Applying DOE’s capabilities for other critical national security missions.											
Strategy: Strategic partnerships to address broad national security requirements. / Analysis of foreign nuclear weapons programs and novel technologies. / Counter the threat of nuclear terrorism.											
Program: Nuclear Counterterrorism Incident Response (NA54)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Emergency Operations Readiness Index: Emergency Operations Readiness Index measures the overall organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide (This Index is measured from 1 to 100 with higher numbers meaning better readiness--the first three quarters will be expressed as the readiness at those given points in time where as the year end will be expressed as the average readiness for the year’s four quarters). (Efficiency)	T: 91 R: 91	T: 91 R: 91	T: 91 R: 91	T: 91 R: 88	T: 91	T: 91	T: 91	T: 91	T: 91	T: 91	Annually, maintain an Emergency Operations Readiness Index of 91 or higher.

Table 39. Facilities and Infrastructure Recapitalization Program: Restore, rebuild and revitalize the physical infrastructure of the nuclear security enterprise.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs											
Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability											
Program: Facilities and Infrastructure Recapitalization Program (NA44)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Deferred Maintenance: Annual dollar value and cumulative percentage of legacy deferred maintenance baseline of \$900 million; funded for elimination by FY 2013. (Long-term Output)	T: \$60M (38%) R: \$75M (56%)	T: \$80M (64%) R:\$93M (73%)	T: \$62M (80%) R:\$75.7M (81.7%)	T:(34.1M (85.5%) R:\$65.4M (89.0%)	T:\$24.7M (91.7%)	T:\$24.5M (94.5%)	T:\$23.6M (97.1%)	N/A	N/A	N/A	Eliminate \$900,000,000 of NNSA’s legacy deferred maintenance backlog by the end of 2013.

Table 40. Site Stewardship: Ensures the overall health and viability of specific site-wide infrastructure at NNSA sites to support NNSA, Department of Energy and other national missions, bringing focus on environmental compliance and energy and operational efficiency.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability Program: Site Stewardship (NA45)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Environmental Monitoring and Remediation: Annual percentage of environmental monitoring and remediation deliverables that are required by regulatory agreements to be conducted at NNSA sites under Long Term Stewardship (LTS) that are executed on schedule and in compliance with all acceptance criteria. (Annual Output)	N/A	R: 100%	T: 95% R: 100%	T: 95% R: 100%	T: 95%	T: 95%	T: 95%	T: 95%	T: 95%	T: 95%	Annually, submit on schedule and receive regulatory approval of at least 95% of all environmental monitoring and remediation deliverables that are required at NNSA sites under LTS by regulatory agreements.
Special Nuclear Material Removed: Cumulative percentage of security category I/II Special Nuclear Material removed from Lawrence Livermore National Laboratory. (Long-term Output)	N/A	R: 35%	T: 50% R: 55%	T: 80% R: 80%	T: 90%	T: 100%	N/A	N/A	N/A	N/A	By the end of 2012, all security category I and II SNM removed from the Lawrence Livermore National Laboratory.

Table 41. Defense Nuclear Security: Provides protection for NNSA personnel, facilities, nuclear weapons, and information from a full spectrum of threats, most notably from terrorism, which has become of paramount concern since the September 11, 2001 attacks.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability Program: Defense Nuclear Security (NA46)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
NNSA Security Policy Reform: Reduce 20 percent of security requirements over the next four years. (Long-term Outcome)	N/A	N/A	N/A	N/A	T: 5%	T: 5%	T: 5%	T: 5%	N/A	N/A	Reduce, within four years, 20% of defense nuclear security requirements throughout the Nuclear Security Enterprise, as part of the reform effort.

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Assurance of Effective Performance: Complete 100% of planned assessments annually. (Long-term Output)	N/A	N/A	N/A	N/A	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually complete 100% of planned assessments to demonstrate that Defense Nuclear Security has up-to-date operational awareness of safeguards and security activities throughout the Nuclear Security Enterprise.

Table 42. Cyber Security: Ensures that sufficient information management security safeguards are implemented throughout the nuclear security enterprise to adequately protect the NNSA information assets and to provide the requisite guidance in compliance with the Department of Energy’s (DOE) Defense-in-Depth Cyber Security strategy and the NNSA Information Management Strategic Plan.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs											
Strategy: Recapitalize the Nuclear Infrastructure and Deterrent Capability											
Program: Cyber Security (NA47)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
[NEW] Cyber Security Reviews: Annual percentage of Cyber Security Site Assistance Reviews conducted by the Office of Health, Safety, and Security (HSS) and Office of the Chief Information Officer (OCIO) that resulted in the rating of "effective." (Long-term Outcome)	N/A	N/A	N/A	N/A	N/A	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, achieve an effective rating of at least 100% of OA Cyber Security reviews. This is a new measure developed as a result of the DOE Performance Measures Streamlining Initiative.

Table 43. National Security Applications: Makes strategic investments in the national security science, technology and engineering capabilities and infrastructure base that are necessary to address current and future global security issues.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Applying DOE's capabilities for other critical national security missions											
Strategy: Strategic partnerships to address broad national security requirements/ Analysis of foreign nuclear weapons programs and novel technologies											
Program: National Security Applications (NA53)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Tools for Counter Terrorism and Weapons Effects: Percent complete toward delivery of a new generation of transportable, high-performance radiation source. (Long-term Output)	N/A	N/A	N/A	N/A	T : Baseline	T : 25%	T : 40%	T : 65%	T : 100%	N/A	Complete delivery of a new generation of transportable, high-performance radiation sources by the end of FY 2015.
Tools for Nuclear Nonproliferation: Percent complete toward delivery of a prototype enhanced particle accelerator that can be used for proton and x-ray radiography diagnostics (Long-term Output)	N/A	N/A	N/A	N/A	T : Baseline	T : 25%	T : 40%	T : 65%	T : 100%	N/A	Complete delivery of a prototype enhanced particle accelerator that can be used for proton and x-ray radiography diagnostics by the end of FY 2015.

Table 44. Nonproliferation and Verification Research &Development: Improves U.S. national security through the development of novel technologies to detect foreign nuclear weapons proliferation/detonation and verification of foreign commitments to treaties and agreements.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Reducing global nuclear dangers											
Strategy: Enhance nonproliferation efforts and the security of nuclear materials											
Program: Nonproliferation and Verification Research &Development (NA52)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Uranium-235 Production Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Uranium-235 production activities. (Progress is measured against the baseline criteria and milestones published in the "FY 2006 R&D Requirements Document"). (Long-term Outcome)	T: 15% R: 15%	T:20% R: 20%	T: 25% R: 25%	T: 30% R: 30%	T: 50%	T: 60%	T: 75%	T: 90%	T: 95%	T:100%	By the end of FY 2016, demonstrate the next generation of technologies and methods to detect Uranium-235 production activities.

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Plutonium Production Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Plutonium production activities. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”). (Long-term Outcome)	T: 20% R: 20%	T: 25% R: 25%	T: 30% R: 30%	T: 50% R: 50%	T: 65%	T: 75%	T: 90%	T: 95%	T: 100%	N/A	By the end of FY 2015, demonstrate the next generation of technologies and methods to detect Plutonium production activities.
Special Nuclear Material Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Special Nuclear Material movement. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”). (Long-term Outcome)	T: 20% R: 20%	T: 27% R: 27%	T: 33% R: 33%	T: 60% R: 60%	T: 80%	T: 90%	T: 100%	N/A	N/A	N/A	By the end of FY 2013, demonstrate the next generation of technologies and methods to detect Special Nuclear Material movement.
R&D Detonation Detection: Annual index that summarizes the status of all NNSA detonation detection R&D deliveries that improve the nation’s ability to detect nuclear detonations. (Annual Output)	T: 90% R: 90%	T: 90% R: 95%	T: 90% R: 90%	T: 90% R: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	Annually achieve timely delivery of NNSA nuclear detonation detection products (90% target reflects good on-time delivery. Index considers factors beyond NNSA’s control and impact on customer schedules).

Table 45. Nonproliferation and International Security: Supports NNSA efforts to prevent and counter the proliferation or use of weapons of mass destruction, including materials, technology and expertise, by state and non-state actors.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Reducing global nuclear dangers Strategy: Support the President's arms control and non-proliferation agendas Program: Nonproliferation and International Security (NA51)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Russian Weapon-Usable Highly Enriched Uranium (HEU) Eliminated: Cumulative metric tons of Russian weapon-usable HEU that U.S. experts have monitored and confirmed as permanently eliminated from the Russian stockpile under the HEU Purchase Agreement. (Long-term Outcome)	T: 312 R: 315	T: 342 R: 345	T: 372 R: 375	T: 402 R: 403	T: 432	T: 462	T: 492	T: 500	N/A	N/A	By the end of calendar year 2013 (1 st quarter FY 2014), confirm that 500 metric tons of weapons-usable HEU has been permanently eliminated from the Russian stockpile.
Nuclear Export Control Program: Cumulative number of countries where International Nonproliferation Export Control Program (INECP) is engaged that have export control systems that meet critical requirements. (Long-term Outcome)	T: 7 R: 7	T: 8 R: 8	T: 9 R: 9	T: 11 R: 21	T: 22	T: 24	T: 26	T: 29	T: 32	T: 35	By the end of FY 2020, 38 of 41 countries where INECP is engaged have export control systems that meet critical requirements, defined as having (1) control lists consistent with the WMD regimes; (2) initiated outreach to producers of WMD-related commodities; (3) developed links between technical experts and license reviewers and front-line enforcement officers; and (4) begun customization of WMD Commodity Identification Training (WMD CIT) materials and technical guides.
Safeguards Systems: Annual number of safeguards systems deployed and used in international regimes and other countries that address an identified safeguards deficiency. (Annual Output)	T: 3 R: 3	T: 3 R: 3	T: 3 R: 3	T: 4 R: 10	T: 5	T: 5	T: 5	T: 5	T: 5	N/A	By the end of FY 2015, 38 technologies are deployed and used in international regimes and other countries that address an identified safeguards deficiency.

Table 46. International Nuclear Materials Protection and Cooperation: Enhances nonproliferation efforts and the security of nuclear materials.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: International Nuclear Materials Protection and Cooperation (NA49)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Second Line of Defense (SLD) Sites: Cumulative number of Second Line of Defense (SLD) sites with nuclear detection equipment installed (Cumulative number of Megaports completed). (Long-term Output)	T:173 (12) R:162 (12)	T: 224 (23) R: 232 (19)	T: 312 (28) R: 335 (27)	T: 404 (41) R :399 (34)	T: 463 (45)	T: 498 (48)	T: 536 (52)	T: 590 (63)	T: 646 (76)	T: 716 (85)	By the end of FY 2018, install radiation detection equipment at approximately 650 border crossing sites and 100 Megaports (750 total SLD sites), assuming no expansion of program sites.
Materials Protection, Control and Accountability (MPC&A) Upgrades – Buildings: Cumulative number of buildings containing weapons-usable material with completed MPC&A upgrades. (Long-term Output)	N/A	T: 191 R: 181	T: 210 R: 210	T: 213 R: 213	T: 218	T: 221	T: 229	N/A	N/A	N/A	By the end of FY 2013, complete MPC&A upgrades on approximately 229 buildings containing weapons-usable nuclear material including Post Bratislava work-scope.

Table 47. Fissile Materials Disposition: Eliminates surplus Russian weapon-grade plutonium and surplus U.S. weapon-grade plutonium and highly enriched uranium.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Fissile Materials Disposition (NA50)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Mixed Oxide (MOX) Fuel Fabrication Facility: Cumulative percentage of the design, construction, and cold start-up activities completed for the Mixed Oxide (MOX) Fuel Fabrication Facility. (Long-term Output)	T: 24% R: 24%	T: 30% R: 30%	T: 39% R: 38%	T: 49% R: 48%	T: 62%	T: 70%	T: 81%	T: 90%	T: 95%	T: 100%	By the end of FY 2016, complete design, construction, and cold start-up activities for the MOX Facility.
Waste Solidification Building: Cumulative percentage of the design, construction, and cold start-up activities completed for the Waste Solidification Building (WSB). (Long-term Output)	N/A	N/A	T: 30% R: 26%	T: 45% R: 47%	T: 65%	T: 80%	T: 100%	N/A	N/A	N/A	By the end of FY 2013, complete design, construction, and cold start-up activities for the WSB.
U.S. Highly Enriched Uranium (HEU) Downblended: Cumulative amount of surplus U.S. highly enriched uranium (HEU) down-blended or shipped for down-blending. (Efficiency)	T: 103 MT R: 103 MT	T: 112MT R: 117 MT	T: 125 MT R: 127 MT	T: 130 MT R: 133MT	T: 136 MT	T: 139 MT	T: 141 MT	T: 143 MT	T: 145 MT	T: 147 MT	By the end of FY 2050, complete disposition of 209 MT of surplus HEU.

Table 48. Global Threat Reduction Initiative: Reduces and protects vulnerable nuclear and radiological materials located at civilian sites worldwide.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts. Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Global Threat Reduction Initiative (NA48)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Highly Enriched Uranium (HEU) Reactors Converted or Shutdown: Cumulative number of HEU reactors converted or verified as shutdown prior to conversion. (Long-term Outcome)	T: 53 R: 55	T: 62 R: 62	T: 68 R: 67	T: 71 R: 72	T: 75	T: 83	T: 90	T: 101	T: 114	T: 129	By 2022, convert or verify the shutdown prior to conversion of 200 HEU reactors.

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Nuclear Material Removed: Cumulative number of kilograms of vulnerable nuclear material (HEU and plutonium) removed or disposed. (Efficiency Measure)	T: 1,671 R: 1,791	T: 2,133 R: 1,948	T: 2,311 R: 2,317	T: 2,767 R: 2,853	T: 3,102	T: 3,555	T: 4,289	T: 4,548	T: 4,791	T: 4,801	By 2016, remove or dispose of 4,801 kilograms of vulnerable nuclear material (HEU and plutonium) (enough for more than 190 nuclear bombs). (GTRI will continue to remove U.S.-origin fuel from foreign research reactors until 2019 as an incentive for converting research reactors from HEU to LEU fuel.)
Nuclear and Radiological Buildings Protected: Cumulative number of buildings with high priority nuclear and radiological materials secured. (Long-term Outcome)	T: N/A R: 426	T: N/A R: 514	T: 694 R: 705	T: 855 R: 971	T: 1,081	T: 1,239	T: 1,329	T: 1,789	T: 2,130	T: 2,607	By 2025 protect an estimated 8,500 buildings with high-priority nuclear and radiological materials.

Table 49. Naval Reactors: Ensures the safe and reliable operation of reactor plants in nuclear-powered submarines and aircraft carriers (constituting 40 percent of the Navy’s combatants), and fulfills the Navy’s requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Strategic Goal: Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.											
Strategic Objective: Applying DOE’s capabilities for other critical national security missions											
Strategy: Design and develop integrated Navy nuclear propulsion systems											
Program: Naval Reactors (NA55)											
Performance Goal	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target	
Fleet Reactor Plant Operations: Cumulative miles steamed, in millions, of safe, reliable, militarily effective nuclear propulsion plant operation supporting National security requirements. (Long-term Outcome)	T: 140 R: 140	T: 142 R: 142	T: 144 R: 145	T: 146	T: 148	T: 150	T: 152	T: 154	N/A	By the end of FY 2015, complete safe steaming of approximately 154 million miles in nuclear-powered ships. (Interim Target)	
Program Operations: Annual percentage of Program operations that have no adverse impact on human health or the quality of the environment. (Annual Outcome)	T: 100% R: 100%	T: 100% R: 100%	T: 100% R: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, ensure that 100% of Program operations have no adverse impact on human health or the quality of the environment.	

Environmental Management

For details on the Environmental Management performance plan see Appendix J.

Performance Plan

Table 50. Legacy Footprint Reduction and Tank Waste Completed: Cleans up environmental legacy brought about from five decades of nuclear weapons development and production, and Government-sponsored nuclear energy research.

Strategic Goal : Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts Strategic Objective: Completing environmental remediation of our legacy and active sites Strategy: Protect Human Health and the Environment and A technical roadmap to address radioactive liquid tank waste Program: Environmental Management / Legacy Footprint Reduction (EM59) and Tank Waste Completed (EM60)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Certified containers of enriched uranium packaged ready for long-term storage	R: 7,629	R: 7,863	T:7,953	T: 7,953	Meet environmental cleanup compliance requirements. Reduce the legacy cold war footprint by cleaning up facilities, land and water resources in communities.
Depleted and other uranium packaged for disposition (metric tons)	R: 14,636	R: 14,636	T: 32,186	T: 63,686	
Liquid waste eliminated (millions of gallons)	R: 2,924	R: 3,613	T: 4,505	T: 5,913	
Number of liquid tanks closed	R: 9	R: 9	T: 9	T: 15	
Canisters of high-level waste packaged for final disposition	R: 3,070	R: 3,260	T: 3,571	T: 3,883	
Spent (used) nuclear fuel packaged for final disposition (metric tons of heavy metal)	R: 2,128	R: 2,128	T: 2,128	T: 2,128	
Transuranic waste dispositioned (cubic meters)	R: 63,288	R: 70,744	T: 76,728	T: 84,610	
Low-level waste/mixed low-level waste disposed (cubic meters);	R: 1,065,246	R: 1,081,578	T: 1,090,875	T: 1,106,415	
Number of material access areas eliminated	R: 26	R: 30	T: 30	T: 31	
Number of nuclear facilities completed	R: 93	R: 93	T: 94	T: 105	
Number of radioactive facilities completed	R: 364	R: 369	T: 393	T: 418	
Number of industrial facilities completed	R: 1,588	R: 1645	T: 1,741	T: 1,871	
Number of release sites remediated	R: 6,800	R: 6,970	T: 7,157	T: 7,408	
Number of geographic sites closed	R: 88	R: 89	T: 90	T: 91	

Legacy Management

For details on the Legacy Management performance plan see Appendix K.

Performance Plan

Table 51. Legacy Management: Ensures remediation on its sites remains effective and does not pose a risk to human health and the environment.

Strategic Goal : Securing our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts					
Strategic Objective: Completing environmental remediation of our legacy and active sites					
Strategy: Ensure a long-term solution to the Cold War's environmental legacy					
Program: Legacy Management (LM65)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Maintain the protectiveness of installed environmental remedies through inspections and other actions at all sites within LM's responsibility in accordance with legal agreements.	T: 100% R: 100%	T: 100% R: 100%	T: 100%	T: 100%	Ensure the sustainable protection of human health and the environment after DOE cleanup is completed,
Reduce the cost of performing long-term surveillance and maintenance activities by 2 percent while meeting all regulatory requirements. Reduction is measured in percent from the life-cycle baseline. Final goal is a 10 percent reduction by FY 2015.	T: 2% R: 3.8%	T: 2% R: 3.5%	T: 2%	T: 4%	Supports long-term stewardship activities (e.g., groundwater monitoring, disposal cell maintenance, records management, and management of natural resources) at sites where active remediation has been completed.

Appendix A: Program and Strategic Plan Alignment

The table below shows the alignment of the Secretary’s strategic plan goals, objectives, and strategies with the program and administrative offices.

Goal	Objective	Strategy	Program	Office
Transforming Our Energy Systems: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure u.s. leadership in clean energy technologies.	Deploying the Technologies We Have	Drive Energy Efficiency to Reduce Demand Growth	Weatherization (EE1)	EE
			State Energy Programs (EE2)	EE
			Industrial Technologies (EE3)	EE
			Building Technologies (EE4)	EE
		Demonstrate and Deploy Clean Energy Technologies	Solar Energy (EE5)	EE
			Wind Energy (EE6)	EE
			Geothermal Technology (EE7)	EE
			Hydrogen And Fuel Cell Technologies (EE8)	EE
			Biomass And Biorefinery R&D (EE9)	EE
			Water Power (EE10)	EE
			Vehicle Technologies (EE11)	EE
			Advanced Technology Vehicles Manufacturing (LP12)	LP
		Loan Guarantee (LP24)	LP	
		Modernize the Electric Grid	Electricity Delivery & Energy Reliability (OE19)	OE
			Western Area Power Administration (PMA20)	PMA
			Bonneville Power Administration (PMA21)	PMA
			Southeastern Power Administration (PMA22)	PMA
			Southwestern Power Administration (PMA23)	PMA
		Discovering the New Solutions We Need	Accelerate Energy Innovation through Pre-Competitive Research and Development	Advanced Research Projects Agency - Energy (ARPA-E 25)
	Applied Programs Simulation And Validation Work (OE, EE, NE, FE)			OE EE NE FE
	While Not GPRA Units, Efrcs, Hubs, And Mesps Are Discussed Here			N/A
	Facilitate Technology Transfer to Industry		Tbd	Tbd
	Establish Technology Test Beds and Demonstrations		Nuclear Technologies RD&D (NE 13)	NE
			Clean Coal (FE15) (Near-Zero Emissions Coal-Based Electricity And Hydrogen Production)	FE
			Biomass And Biorefinery R&D (EE)	EE
			Nuclear RD&D Capabilities (NE14)	NE
			Natural Gas Technology (FE16)	FE
Petroleum Technologies (FE17)	FE			

Goal	Objective	Strategy	Program	Office
		Leverage Partnerships to Expand our Impact	Policy And International Affairs (PI 26)	PI
	Leading the National Conversation on Energy	Provide Sound Information on Energy Systems And Their Evolution	Energy Information Administration (EI27)	EI
		Promote Energy Literacy	Energy Information Administration (EI27)	EI
		Make the Federal Government a Leader in Sustainability	Federal Energy Management Program (EE28)	EE
			Petroleum Reserves (FE18)	FE
The Science and Engineering Enterprise: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas.	Extending our Knowledge of the Natural World		Nuclear Physics (SC29)	SC
			High Energy Physics (SC30)	SC
			Basic Energy Sciences (SC31)	SC
			Biological and Environmental Research (SC32)	SC
	Delivering New Technologies to Advance our Mission		Biological and Environmental Research (SC32)	SC
			Fusion Energy Sciences (SC33)	SC
	Lead Computational Sciences and High Performance Computing		Advance Scientific Computing Research (SC34)	SC
Sustaining a World-Leading Technical Workforce		Workforce Development for Teachers and Scientists (SC35)	SC	
Securing Our Nation: Enhance nuclear security through defense, nonproliferation, and environmental efforts.	Supporting the U.S. Nuclear Stockpile and Future Military Needs	Maintain A Safe, Secure, and Effective U.S. Nuclear Stockpile	Directed Stockpile Work (NA36)	NA
			Readiness Campaign (NA41)	NA
		Strengthen the Science, Technology, and Engineering Base	Science Campaign (NA37)	NA
			Engineering Campaign (NA38)	NA
			Inertial Confinement Fusion Ignition And High Yield Campaign (NA39)	NA
			Advanced Simulation And Computing Campaign (NA40)	NA
		Recapitalize the Nuclear Infrastructure and Deterrent Capability	Readiness In Technical Base And Facilities (Operations) (NA42)	NA
			Secure Transportation Asset (NA43)	NA
			Facilities And Infrastructure Recapitalization Program (NA44)	NA
			Site Stewardship (NA45)	NA
			Defense Nuclear Security (NA46)	NA
			Cyber Security (NA47)	NA
Dismantle Excess Nuclear Weapons to Meet National Objectives		Tbd	NA	

Goal	Objective	Strategy	Program	Office	
	Reducing Global Nuclear Dangers	Enhance Nonproliferation Efforts and the Security Of Nuclear Materials	Global Threat Reduction Initiative (NA48)	NA	
			International Nuclear Materials Protection Control And Cooperation (NA49)	NA	
			Fissile Materials Disposition (NA50)	NA	
			Nonproliferation And Verification R&D (NA52)	NA	
		Support the President's Arms Control and Non-Proliferation Agendas	Nonproliferation And International Security (NA51)	NA	
	Applying DOE's Capabilities for Other Critical National Security Missions	Strategic Partnerships to Address Broad National Security Requirements	Analysis Of Foreign Nuclear Weapons Programs and Novel Technologies	Nuclear Counterterrorism Incident Response (NA54)	NA
				National Security Applications (NA53) Previously: Science, Technology And Engineering Capability)	NA
				National Security Applications (NA 53) Previously: Science, Technology And Engineering Capability)	NA
				Design and Develop Integrated Navy Nuclear Propulsion Systems	Naval Reactors (NA55)
	Supporting Responsible Civilian Nuclear Power Development A\and Fuel Cycle Management	Support the Development of a New International Framework for Nuclear Cooperation	Strengthen International Safeguards and Export Controls to Support Safe and Secure Deployment of Nuclear Power Globally	Fuel Cycle R&D And International Frameworks (NA64)	NE
				Tbd	Tbd
	Completing Environmental Remediation Of Our Legacy And Active Sites	Protect Human Health and the Environment	Maximize Success of Construction and Operations Outcomes	Legacy Footprint Reduction (EM59)	EM
				Construction Management (EM61)	EM
				A Technical Roadmap to Address Radioactive Liquid Tank Waste	Tank Waste Completed (EM60)

Goal	Objective	Strategy	Program	Office
		Ensure a Long-Term Solution to the Cold War's Environmental Legacy	Legacy Management (LM65)	LM

Appendix B: Energy Efficiency and Renewable Energy

Energy Efficiency and Renewable Energy

Mission

The [Office of Energy Efficiency and Renewable Energy](#) (EERE) supports research, development, demonstration, and deployment activities on technologies and practices essential for meeting national security goals by reducing dependence on oil, meeting environmental goals by minimizing the emissions associated with energy production and use, and stimulating economic growth and job creation by minimizing the cost of energy services and stimulating investment and job creation in US businesses. The EERE portfolio emphasizes work areas where the potential impact is largest, where federal funds are most critical. It balances investments in high-risk research with partnerships with private firms that speed the translation of innovations into practical business opportunities. The diverse set of technologies supported helps ensure that the US has many options for meeting its energy goals. Program management is designed to identify the best groups in the country to address these challenges and supports work in universities, companies, national laboratories, and consortia.

EERE's individual program activities promote the specific development and use of sector-based clean, reliable, and cost-effective technologies through two key sectors: energy efficiency and renewable energy. The increased productivity from efficiency gains and the generation of power from renewable energy sources can help meet growing national energy needs, reduce dependence on oil, and enhance energy and environmental security. The FY 2012 budget request is \$3.2 billion, an increase of \$983.7 million, or approximately 44.4 percent above the FY 2010 current appropriation.

Details on DOE's FY 2012 Congressional Budget Request for the Office of Energy Efficiency and Renewable Energy are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume3.pdf>.

Biomass and Biorefinery Systems RD&D

Mission

The Biomass Program develops and transforms domestic, renewable, and abundant biomass resources into cost-competitive, high performance biofuels, biopower, and bioproducts through targeted planning, research, development and demonstration (RD&D) leveraging public and private partnerships.

Overview

The Biomass Program supports the following two Strategic Program Measures: (1) "Achieve a modeled cost for mature technology of \$2.62 per GGE (gallon gasoline equivalent, or, in this case \$1.76/gallon of ethanol) for ethanol by 2012, and then, of \$2.85 per gallon of renewable gasoline, \$2.84 per gallon of renewable diesel, and \$2.76 per gallon of renewable jet by 2017 (all costs in 2007\$)" and (2) "30 MW of new biopower generation capacity using advanced technologies by 2016." These measures are critical outcomes in support of the Department's

strategic goal of catalyzing the timely, material, and economic transformation of the nation's energy system and secure U.S. leadership in clean energy technologies by discovering the solutions we need and deploying the technologies we have, in addition to their crucial support of EISA RFS targets.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have and Discover the Solutions We Need					
Strategy: Demonstrate and Deploy Clean Energy Technologies and Establish Technology Test Bed					
Program: Energy Efficiency and Renewable Energy /Biomass and Biorefinery R&D (EE9)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
(T = Target; R= Result)					
Subprogram Name: Feedstocks					
Reduce feedstock supply system logistics cost in dollars per dry matter ton (\$/DM ton, in \$2007, for delivery to plant gate or conversion reactor inlet) to support the development of cost-effective, high tonnage feedstock logistics systems and enable the supply of biomass feedstocks for a growing bio-based industry..	n/a	n/a	T: \$36.10	T: \$35.00	Dry herbaceous feedstock logistics cost, linked with biochemical conversion, of \$35 per ton by 2012. Dry woody feedstock logistic cost, linked with gasification, of \$46.37 per ton by 2017. Dry woody feedstock logistic cost, linked with pyrolysis, of \$56.77 per ton by 2017 (including pre-conversion processing cost). All are in 2007\$.
Previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2010: Achieve a modeled dry herbaceous feedstock logistics cost of \$37.80 per dry ton (excluding grower payment, in 2007\$). FY 2009: Initiate a GIS-based regional feedstock atlas system incorporating USDA agricultural datasets, energy crop field test results, residue removal trial results, DOE and USDA funded biorefinery project results, and other assessments from public and private sources to provide the best biomass resource database, models, and tools available for a wide variety of users including Federal and state governments, biorefinery developers, growers, and researchers. These efforts will enable evaluation of potential future feedstock supply in support of the goal of producing feedstocks at \$47 per dry ton by 2012.	n/a	T: \$37.80 R: MET	T: RETIRED	n/a	

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram Name: Biochemical Conversion					
Reduce the modeled cellulosic ethanol biochemical conversion cost in \$/gallon of ethanol (in \$2007).	n/a	n/a	T: \$0.97 ¹ /gal	T: \$0.86 ² /gal	Achieve a modeled cost for mature technology of \$2.62/GGE (\$1.76/gallon of ethanol) for ethanol by 2012, and then, of \$2.85/gallon of renewable gasoline, \$2.84/gallon of renewable diesel, and \$2.76/gallon of renewable jet by 2017 (all costs in 2007\$).
<p>Previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2010: Achieve reduction of modeled ethanol conversion cost to \$1.33/gallon through improvements in pretreatment and hydrolysis; this is in support of achieving the \$0.92 conversion cost necessary to achieve the ethanol production cost within the estimated cost competitive range of \$1.76-2.06/gallon by 2012 (in 2007\$).</p> <p>FY 2009: Demonstrate alternative pretreatment technologies at bench-scale using advanced cellulase enzymes and integrated technologies that have the potential of achieving \$0.12 per pound of sugars on the pathway to \$0.073 per pound by 2012 (in \$2007). Reduced sugar costs will reduce cellulosic ethanol costs, leading to increased adoption of ethanol and reduced consumption of petroleum.</p>	T: \$0.12/ pound sugars (2007\$) R: MET	T: \$1.33/ gal ethanol conversion cost R: MET	T: RETIRED	n/a	
Subprogram Name: Thermochemical Conversion					
Reduce the modeled cellulosic ethanol conversion cost for a thermochemical process to \$0.86/gallon of ethanol (in \$2007) ³ .	n/a	n/a	T: \$0.97/gal ⁴	T: \$0.86/gal ^c	Achieve a modeled cost for mature technology of \$2.62/GGE (\$1.76/gallon of ethanol) for ethanol by 2012, and then, of \$2.85/gallon of renewable gasoline, \$2.84/gallon of renewable diesel, and \$2.76/gallon of renewable jet by 2017 (all costs in 2007\$).

¹ FY 2011: This contributes to the overall modeled production cost of \$1.68, dependent on a feedstock cost of \$52.00/dry ton.

² FY 2012: This contributes to the overall modeled production cost of \$1.49, dependent on a feedstock cost of \$50.90/dry ton.

³ In FY 2013-2016, the performance measure will shift from modeled minimum ethanol selling price to focus on a reduction in minimum gasoline price per gallon

⁴ FY 2011-2016: The overall modeled production cost is dependent on a feedstock cost of \$50.70/dry ton

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
<p>The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2011: Through improved fuel synthesis catalysts, achieve a modeled ethanol price of \$1.70/gal (with a 2007\$ feedstock cost of \$51.80/ton) for thermochemical gasification followed by mixed alcohol synthesis and ethanol separation.</p> <p>FY 2010: Through improved tar reforming catalysts, achieve a modeled ethanol price of \$1.90/gal (with a 2007\$ feedstock cost of \$54.20/ton) for thermochemical gasification followed by mixed alcohol synthesis and ethanol separation.</p> <p>FY 2009: Achieve a modeled ethanol price of \$1.97/gal for thermochemical gasification followed by mixed alcohol synthesis and ethanol separation. This will be achieved by demonstrating pilot-scale technology capable of economically converting biomass feedstocks, and will be based on a feedstock cost of \$60/dry ton (calculated in 2007 dollars).</p>	T: \$1.97/gal modeled ethanol price R: MET	T: \$1.90/gal modeled ethanol price R: MET	T: RETIRED	n/a	
Subprogram Name: Integrated Biorefineries					
Validate the total yearly production capacity of 45 million gallons (MG) of advanced biofuels by 2014 ⁵	n/a	n/a	T: 5 MG	T: 15 MG	45 MG of total yearly production capacity of advanced biofuels by 2014.

⁵ This annual performance measure assumes successful NEPA compliance, secured financing, and positive decisions on stage gate reviews for biorefinery projects to remain on schedule. A cumulative production is not assumed since going concern operations is outside the control of departmental scope and funding. It is expected that these projects will lead to commercial scale replications.

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
<p>The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2010: (1) Initiate construction of two additional commercial-scale biorefinery projects selected in FY 2007 (three in total); (2) Complete sufficient engineering design to allow initiating construction (after financial and other requirements, i.e. NEPA, are met) for two demonstration projects selected in FY 2008; (3) Complete at least one trial run of an innovative integrated biorefinery process to demonstrate the integrated operation of processing biomass into a biofuel. This will support validating the programmatic \$2.01-2.87 per gallon estimated cost competitive target range in integrated biorefineries by 2017 (in 2007\$).</p> <p>FY 2009: (1) Initiate construction of at least one commercial-scale biorefinery project (designed to 700 ton per day feedstock processed) including orders for long lead items, vendor packages, and structural steel. Validation of biorefinery concepts will reduce technological risk and attract additional sources of capital to accelerate deployment and oil displacement; (2) Approve engineering design of one additional commercial scale biorefinery (two in total) including orders for long lead items, vendor packages, and structural steel. The result of this will ultimately be to complete construction by 2011; (3) Approve preliminary engineering design package, market analysis and financial projections for at least four demonstration scale biorefineries (designed to 70 ton per day feedstock) selected in FY 2008. These efforts work toward validating the programmatic \$2.01-2.87 per gallon estimated cost competitive target range in integrated biorefineries by 2017 (in 2007\$).</p>	T: Qualitative R: See footnote ⁶	T: Qualitative R: See footnote ^f	T: RETIRED	n/a	
Subprogram Name: Biopower					
Initiate limited scale boiler tests of densified biomass mixed with coal to characterize emissions and prepare foundational analysis, as part of a phased implementation of the program's biopower strategy. ⁷	n/a	n/a	T:Qualitative ⁸ :	T:Qualitative ⁹	30 MW of new biopower generation using advanced technologies by 2016.

⁶ The FY 2009 and FY 2010 performance targets for Integrated Biorefineries were comprised of multiple process milestones: in 2009, one was met, and the other was not; in 2010, one was met, and two were not. Unmet process milestones were related to external economic conditions affecting private partner cost-share and technical readiness, resulting in project schedule delays beyond the program's control.

⁷ Due to an extended FY 2011 Continuing Resolution, this biopower signature initiative is expected to commence late in FY 2011, at earliest, and thus only qualitative milestones were accomplished during the first year of funding, should FY 2011 Appropriations be received for this new activity.

⁸ FY 2011: Conduct a competitive solicitation for biopower RD&D projects. The biopower projects will target a combined generation capacity of 10 MW operational by 2015, and 30 MW by 2016.

⁹ FY 2012 – FY 2014: Continue R&D projects from FOA in support of build-outs in FY 2015 and FY 2016.

Means and Strategies

The Biomass Program will use various means and strategies to achieve its GPRA Unit program goal. The program will implement the following means to improve the cost-competitiveness of biomass technologies:

- Hold competitive RD&D solicitations for partnerships with appropriate cost sharing to attract innovation and ensure investment value;
- Manage RD&D with a series of objectives, milestones, and stage gate reviews tracked by the Project Management Center and verified with technology experts;
- Validate commercial and demonstration scale integrated biorefineries through competitive solicitations to collect data under real operating conditions for validating economic and technical feasibility;
- Hold a Cellulosic Biofuels Reverse Auction to support the emerging cellulosic biofuels industry; and,
- Peer review¹⁰ program plans and activities aim to obtain expert, independent opinions on the program's goals and objectives; feasibility of reaching the goals; appropriateness of technical barriers being addressed; appropriateness of the Federal role, and, whether resources are commensurate with technical objectives.

The Biomass Program will implement the following strategies:

- Collaborate with the DOE Office of Science for mutually advantageous exchanges and alignment of work with basic bioenergy science breakthroughs and ARPA-e innovation;
- Leverage the research capabilities of National Laboratories and universities in all applicable program areas;
- Collaborate with EERE's Strategic Programs in activities that through integrated planning and resources maximize effectiveness of both program and corporate activities for EERE and DOE;
- Identify and engage with private sector and non-profit RD&D and technology deployment partners through competitive solicitations and cooperative agreements;
- Collaborate with other Federal agencies (such as DOD, EPA, NSF, DOT and USDA) either directly or through Interagency Working Groups (IWGs) such as those chartered at the direction of the Biomass R&D Board; and,
- Utilize guidance from the Biomass Technical Advisory Committee and the Biomass R&D Board authorized under FCEA to integrate R&D across agencies.

The following external factors could affect the program's ability to achieve its strategic goals:

- Cost and availability of conventional fossil energy sources;
- Federal and state farm policies and grower's actual adoption rate for new crops;
- Widespread adoption of sustainable crop management practices;
- Consumer acceptance;

¹⁰ The most recent program peer review was held in July 2009. For more information, please visit: <http://www.obpreview2009.govtools.us/>. The next program peer review will be held in June 2011; more information can be accessed at: <http://obpreview2011.govtools.us/>

- Cost of competing alternative energy technologies;
- General capital market conditions and the availability of external finance for private sector RD&D partners from both private sector and public sources external to the program; and,
- Market penetration rate of bio-based technologies, which is a function of all the external factors listed and technical breakthroughs, incentives; price trends of coal, oil and natural gas; and policy factors.

Validation and Verification

The Biomass Program conducts internal and external reviews and audits to verify progress towards its performance metrics. The sources and baselines for these metrics are summarized below.

- Data Sources:
- The Renewable Fuels Association’s production statistics;¹¹
 - Energy Information Administration (EIA) reports and statistics;¹²
 - Data and reports from the USDA National Agricultural Statistics Service;¹³ and
 - Individual projects develop production cost and quantity estimates for biofuel intermediates, ethanol, and other fuels, power, and chemicals (reviewed and monitored by managers).
 - Pilot, demonstration and commercial scale demonstrations
- Baselines:
- In 2007, the total feedstock baseline delivered cost (which includes collection, preprocessing, grower payment, and delivery to a conversion facility inlet, in 2007\$) was \$69.60 per dry ton for dry herbaceous (approximately \$0.97 per gallon of ethanol produced via a biochemical conversion pathway, in 2007\$). A more vigorous analysis is underway for woody feedstocks; however, a 2007 baseline of \$67.55 per dry ton for woody feedstocks (approximately \$1.58 per gallon of ethanol produced via a thermochemical conversion pathway, in 2007\$) is currently being used.
 - In 2005,¹⁴ Thermochemical conversion R&D baseline mature conversion costs for woody feedstocks to ethanol via a gasification route was \$1.89 per gallon (2007\$) based on bench scale data (see figure in Conversion Technologies section).
 - In 2005, Biochemical R&D baseline mature conversion costs for dry corn stover to ethanol was \$1.79 per gallon (2007\$) based on bench scale data (see figure in the Conversion Technologies section).
 - Baselines are being established for algal biofuels.

RD&D projects use an analysis model to generate mature technology cost and bench scale performance data based on generic NREL integrated biorefinery designs. The biorefinery projects funded under the Integrated Biorefineries subprogram will validate each project’s specific and proprietary economic and technical performance.

¹¹ Accessible at: <http://www.ethanolrfa.org/pages/statistics>

¹² For examples, see: Annual Energy Review, <http://www.eia.doe.gov/aer/>, Renewable Energy Annual http://www.eia.doe.gov/cneaf/solar/renewables/page/rea_data/rea_sum.html, and Annual Energy Outlook <http://www.eia.doe.gov/oiaf/aeo/>

¹³ USDA National Agricultural Statistics Service website: <http://www.nass.usda.gov/>

¹⁴ Note: The 2005 baselines have been adjusted to \$2007 for consistency with current numbers.

As these integrated biorefinery projects are based on different designs (feedstocks, conversion technologies, etc.), they will not likely validate or match up to the “nth plant” modeled cost based on the NREL designs, nor will it be possible to disseminate the specific economic and technical performance data due to proprietary restrictions. Therefore, the program will use an aggregate performance metric for demonstration and commercial scale biorefineries as these facilities become operational in order to protect each project’s proprietary data.

Evaluation: In carrying out its mission, the Biomass Program uses several forms of evaluation to assess progress and to promote program improvement:

- Stage gate review, technology validation and operational field measurement, as appropriate;
- Peer review by independent outside experts of program and subprogram portfolios;
- Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate;
- Quarterly and annual assessment of program and management results based performance through the Performance Measurement Manager (PMM, the DOE quarterly performance progress review of budget targets);
- Continue to conduct the transparent oversight and performance management initiated by Congress and the Administration;
- Annual review of methods, and updated analysis of potential benefits for GPRA; and
- Technical Advisory Committee feedback.

The National Laboratories may receive direct funds for technology R&D, based on their capabilities and performance. Advisory panels consisting of non-Federal and industry experts review each laboratory and industry project at scheduled stage gate reviews and peer evaluation of RD&D.

Projects are evaluated based on the following criteria:

- Relevance to overall DOE objectives;
- Approach to performing RD&D;
- Technical accomplishments and progress toward project and DOE goals;
- Technology transfer/collaborations with industry/universities/laboratories; and
- Approach and relevance of proposed future research.

The panels also evaluate the strengths and weaknesses of each project, and recommend additions to or deletions from, the scope of work. The program organization facilitates relationships to ensure that Federal RD&D results are transferred to industry.

Frequency: Potential benefits are estimated annually. Independent evaluation of RD&D projects are performed according to schedule per the stage gate process for moving each project through an independent review “gate”, from a less costly stage (such as

preliminary paper studies) to a more costly stage (such as bench-scale experiments). Program peer reviews are conducted biennially. The Biomass Program will be incorporating Technology Readiness Levels (TRLs) to track performance and aligning these TRLs with existing stages gates.

- Data Storage: EERE Benefits website, the EERE Corporate Planning System, and other computer-based data systems.
- Verification: DOE technology managers verify the achievement of targets through project reviews, including reviews of cost and performance modeling results. Project leaders in the field must provide documentation of experimental and/or analytic results as evidence of success. Peer reviews are conducted by independent personnel from industry, academia and other governmental agencies.

Solar Energy

Mission

The Solar Energy Technologies Program's (SETP) main objective is to enable solar energy achieve grid-parity without any subsidies and thus become competitive with fossil fuel throughout the U.S. and the world by reaching a dollar-a-watt ($\$1/W_{DC}$ or 4-5c/kWh equivalent) installed price for solar photovoltaics (PV) electricity by 2017. This objective is critical if the U.S. is to regain leadership in worldwide PV manufacturing. The program will continue to develop concentrating solar power (CSP) technologies with thermal storage to reach base-load grid parity by 2020.

Overview

The PV and CSP subprograms support the Strategic Program measure of “Dollar a Watt.” This measure is critical to the outcome of EERE strategy by driving the costs of solar electricity to a level where it is competitive with the intermediate power market electricity generated by fossil fuels by 2017. The Systems Integration and Market Transformation subprograms support the Strategic Program measure “Generation Capacity (GW).” This measure is critical to the outcome of EERE strategy by enabling up to 100-120GW of annual solar electricity generating capacity by 2020.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Energy Efficiency and Renewable Energy /Solar Energy (EE5)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Photovoltaic R&D					
Reduce the unsubsidized levelized ¹⁵ cost of solar electricity from PV at large scale for utility, commercial, and residential applications ¹⁶ (cents kilowatt hour) ¹⁷ (convert to \$/WDC targets using \$.05/kwh per \$/WDC)	T: 17-19 R: MET	T: 14-24 R: 15-20	T: 8-20	T: 11-13	Unsubsidized 6 cents/kWh by 2020
Subprogram: Concentrating Solar Power					
Reduce the unsubsidized levelized cost of solar electricity (LCOE) from CSP for utility applications (including the value of storing energy into the evening hours)..(cents per kilowatt hour)	T: 14-17 R: UNMET	T: 14-17 R: 20-25	T: 14-16	T: 12-15	Unsubsidized 6 cents/kWh by 2020 – cost-competitive with traditional electricity sources
Subprogram: Systems Integration					
Provide enabling technologies for >20 percent annual solar energy penetration into four types of distribution feeder circuits, in support of achieving the Dollar-a-Watt program goals. ¹⁸ (percent penetration/number of circuits)	n/a	T: 5 ¹⁹ R: MET	T: >5% /2	T: >5% /5	>20% on 4 types of distribution feeder circuits by 2020
Subprogram: Market Transformation					
Reduce market barriers and support domestic market growth to enable increasing annual solar installations in the U.S. (gigawatts (GW) installed per year) ²⁰	n/a	T: 0.02GW ²¹ R: 2 GW	T: 3 GW	T: 5 GW	Enable up to 100 – 120GW of annual solar electricity generating capacity by 2020

¹⁵ LCOE is a cost per unit energy calculated by unitizing the present value of the total life-cycle system cost and total generation of the system. LCOE ranges are calculated with the Solar Advisor Model and based on input on system and operating costs from industry sources, representative financial assumptions, and various geographic locations. LCOE ranges are re-benchmarked as of FY 2010. Steady-state margins are used to compare targeted costs to actual costs.

¹⁶ No state, local or utility incentives are included. The ranges are due to different insulation conditions across the U.S. There is an assumed 6 percent discount rate and the system is south facing with a 25 degree tilt). For a complete list of assumptions, see DOE Solar Cost Targets (2009 – 2030), in process.

¹⁷ Cents per kilowatt hour can be nominally converted to \$/WDC assuming 10MW scale. Nominal estimates will differ from actual costs depending on variations in locality.

¹⁸ The same penetration level in four different feeders can result in different impacts, thus it is important to understand the range of impacts. Demonstrating the target penetration levels on at least four types of distribution circuit feeders will help utilities feel more comfortable with installing PV systems on a larger percentage of their distribution systems. Percent penetration is PV energy divided by load energy served by the feeder, over one year. Five percent PV penetration by energy is about 25 percent by generation (defined as rated PV generation divided by feeder peak load).

¹⁹ The FY 2010 performance measure was number of SEGIS awards to move into prototype development in Phase II. The FY 2011 performance measure was created in transition from reporting qualitative milestones to quantitative performance measures. The previous year's performance measure for this subprogram is not a direct predecessor measure to the FY 2011 performance measure. However, the FY 2010 measure is enabling the progress necessary to support the new FY 2011 Performance Measure.

²⁰ Installation targets may be affected by the state of the private financial markets, technology development risks, transmission availability and citing issues. These are yearly targets. Additional information is valid for FY 2011 – FY 2016. The Market Transformation subprogram's out-year goals are not tied to 2010 AEO estimates. However, they are moderately conservative estimates based on a few different resources, including generation goals from the Program's draft version of the Solar Vision Study, and the Interstate Renewable Energy Council's 2009 Updates & Trends Report (technical assistance).

²¹ The FY 2010 performance measure was number of cities that provided assistance under the Solar America Cities Program. The FY 2011 performance measure was created in transition from reporting qualitative milestones to quantitative performance measures. The previous year's performance measure for this subprogram is not a direct predecessor measure to the FY 2011 performance measure. However, the FY 2010 measure is enabling the progress necessary to support the new FY 2011 Performance Measure.

Means and Strategies

The Solar Program will use various means and strategies to achieve its GPRA Unit Program goals. “Means” include operational processes, resources, information, and the development of technologies. Those means used by the Solar Program include:

- Performing R&D activities in partnership with other DOE agencies, specifically ARPA-E and Office of Science, coalitions of industry members, universities, National Laboratories and/or State agencies to reduce costs to meet the Dollar a Watt imperative;
- Conducting critical demonstrations of solar technologies to better understand issues that may result with grid-tied use or other aspects of fielded systems; and
- Coordinating with EERE’s Buildings Technologies Program (BTP) to accelerate deployment of building integrated (BIPV) technologies and higher-efficiency buildings incorporating PV technologies.

Strategies include working collaboratively with stakeholders on program, policy, management and legislative initiatives and approaches, such as:

- Developing cost-shared partnerships consisting of industry members, universities, National Laboratories, States and/or other governmental entities to solve scientific and technical barriers to improve performance and reliability, while reducing cost in PV and CSP technology pathways;
- Working with States, industry, and other entities to leverage Federal taxpayer resources, communicate technology advances and opportunities effectively, reduce barriers, and accelerate market penetration of technology applications; and
- Collaborating with DOE’s Office of Science and the NSF on solar R&D and incorporation of advanced materials for PV systems, ARPA-E on advanced power electronics, BTP and the Federal Energy Management Program (FEMP), and DOE’s Office of Electricity on deployment opportunities, and with other agencies such as the Defense Advanced Research Projects Agency (DARPA), the Bureau of Land Management (BLM).

The Solar program will leverage its planning, analysis and deployment funds by collaborating with EERE’s Strategic Programs in activities that maximize the effectiveness of both program and corporate activities for EERE and DOE. Efforts such as integrated strategic planning and analysis, green job training and education, collaborative cross-cutting initiatives and technology sector futures studies leverage both program and corporate funding. These efforts will continue to reduce unnecessary overlap to ensure program activities are focused cost effectively and seamlessly toward Departmental goals.

The following external factors could affect the Solar Program’s ability to achieve its strategic goal:

- Material costs and availability (e.g., silicon supply, etc.) and labor costs;

- Currency exchange rates; and interest rates and inflation;
- The price and availability of alternative technologies and conventional fuels;
- Financial incentives and other policies;
- State and local regulation;
- Utility barriers and pricing strategies; and
- Worldwide supply and demand imbalance.

The Solar Program will also collaborate with solar energy and other industry experts outside of DOE to:

- Ensure that the program’s research directions and priorities address the needs of manufacturers, utilities, State agencies, consumers, and other stakeholders;
- Ensure that program activities are within the realm of technical feasibility and properly aligned with market forces;
- Develop technology roadmaps and peer reviews, versions of which have been completed within the last two years for each of the primary solar subprograms; and
- Ensure that adequate Federal land and transmission is made available for solar power plants.

Validation and Verification

To validate and verify program performance, the Solar Program will conduct internal and external reviews and audits.

- Data Sources:
- Solar Program Peer Reviews (2010, 2009, 2007, 2005)
 - National Solar Technology Roadmaps (2007)
 - Sargent and Lundy, Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts (2003)²²

- Baselines:
- The Solar Program’s 2010 baseline cost of electricity in terms of Dollar a Watt are:
 - \$3-4/ W_{DC} for utility PV (at 30-40 MW scale);
 - \$5-6/ W_{DC} for utility-scale CSP technologies.

- Frequency:
- Annual

Evaluation: The Solar Program uses several forms of evaluation to assess progress and to promote program improvement:

²² “Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts.” Sargent & Lundy LLC Consulting Group. Chicago. October 2003: <http://www.nrel.gov/docs/fy04osti/34440.pdf>

- Technology demonstration and operational field measurement;
- Implementation of a roadmap that will enable us to track the Dollar-a-Watt cost and price of Solar Electricity as a function of technology evolution as well as subsidies
- Critical peer review of both the program and subprogram portfolios and activities by independent outside experts;
- Annual internal Technical Program Review of the Solar Program;
- Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate;
- Continue to conduct the transparent oversight and performance management initiated by Congress and the Administration;
- Quarterly and annual assessment of program and management results based performance through the Performance Measurement Manager (PMM, the DOE quarterly performance progress review); and
- Annual review of methods, and re-computation of potential benefits for GPRA.

Data Storage: EIA and other organizations; both the National Renewable Energy Laboratory (NREL) and SNL store data on computer servers.

Verification: Peer reviews; National Laboratory system and component test data; trade association reviews; EIA survey of solar manufacturers; literature reviews; industry workshops; manufacturing and system cost models developed with inputs supplied by industry contacts.

Wind Energy

Mission

The mission of the Wind Energy Program is to enable rapid expansion of clean, affordable, reliable and domestic wind power to promote national security, economic vitality, and improved environmental quality.

Overview

The Wind Program supports the Strategic Program Measure: “reduce unsubsidized wind land utility cost of energy to 7.4 cents/kWh in 2020 from a baseline of 9.0 cents/kWh in 2010”; “reduce unsubsidized offshore wind cost of energy to 10.0 cents/kWh in 2020 from a baseline of 26.9 cents/kWh in 2010”; and “achieve installed generation of 1000MW of wind energy in 16 states by the end of 2016”. These measures are critical to achieving deployment of renewable energy and green house gases reduction targets.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Energy Efficiency and Renewable Energy /Wind Energy (EE6)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Technology Development and Testing					
Unsubsidized land-based wind cost of energy, in cents per kWh, in Class 4 wind speed areas (7.25 m/s mean wind speed at 50m above ground) from a 2010 baseline of 9.0 cents/kWh. (cents/kWh) ²³	n/a	T: n/a R: 9.0	T: 8.9	T: 8.8	Reduce unsubsidized wind land utility cost of energy to 7.4 cents/kWh in 2020 from a baseline of 9.0 cents/kWh in 2010 ²⁴
Unsubsidized shallow water market cost of energy, in cents per kWh, in Class 6 wind speed areas (9.25 m/s mean wind speed at 50m above ground) from a 2010 baseline of 26.9 cents/kWh. (cents per kWh)	n/a	T: n/a R: 26.9	T: 26.9	T: 26.2	Reduce unsubsidized offshore wind cost of energy to 10.0 cents/kWh in 2020 from a baseline of 26.9 cents/kWh in 2010 ²⁴
Reduce the modeled land-based wind cost of energy, in cents per kWh, in Class 4 wind speed areas (7.25 m/s mean wind speed at 50m above ground) from a 2009 baseline of 8.0 cents/kWh. ²⁵ (cents per kWh)	n/a	n/a	T: 0.10	T: RETIRED	
Reduce the modeled shallow water cost of energy, in cents per kWh, in Class 6 wind speed areas (9.25 m/s mean wind speed at 50m above ground) from a 2009 baseline of 16.0 cents/kWh. (cents per kWh)	n/a	n/a	T: 0.10	T: RETIRED	
Cents per kWh modeled cost of wind power in land-based Class 4 wind speed areas (i.e., 13 mph annual average wind speed at 33 feet above ground). (cents per kWh)	T: 3.9 R: 4.02	T: 3.8 R: Not Met	T: RETIRED	n/a	
Cents per kWh modeled cost of wind power in Class 6 wind speed areas (i.e., 15 mph annual average wind speed at 33 feet above ground) for shallow offshore systems. (cents per kWh)	T: 9.15 R: n/a ²⁶	T: 9.1 R: n/a ³⁵	T: RETIRED R: n/a	n/a	
Units of new distributed wind turbines deployed in the U.S. market annually and sold by U.S. Manufacturers outside of the U.S. (units of new distributed wind turbines)	T: 3590 R: 4321	T: 4390 R: 4520	T: 5369	T: 6565	12005 units of new distributed wind turbines deployed in the U.S. market annually and sold by U.S. Manufacturers outside of the U.S. by 2015 ²⁷

²³ New land-based and offshore COE targets have been developed for the FY 2012 budget request which correspond to updated FY 2010 COE baselines and updated cost of energy reduction trajectories. Cost of energy targets and updated baseline costs ensure that the program is able to provide useful information to DOE management, policy-makers, and Congress, as well as reliable inputs for internal program planning.

²⁴ The Wind targets are being revised based on the new EERE standardized COE analysis which will provide more comparable cost of energy across the Renewable portfolio. Incorporating the new external assumptions into the Wind system model will not change the model relationships but is expected to result in a lower baseline for all wind and lower the endpoint target for onshore.

²⁵ Preliminary land-based and offshore cumulative modeled cost reduction targets were included in the FY 2011 budget request with potential for revision pending the results of analyses in FY 2010. Revision is now complete and these preliminary performance targets have been retired.

²⁶ The 2009 & 2010 modeled COE was not calculated due to the large divergence in market conditions and deterioration of assumptions in the original model. The model has been updated for FY 2011 and FY 2012.

²⁷ The Wind targets are being revised based on the new EERE standardized COE analysis which will provide more comparable cost of energy across the Renewable portfolio. Incorporating the new external assumptions into the Wind system model will not change the model relationships but is expected to result in a lower baseline for all wind and lower the endpoint target for onshore.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Technology Application					
Number of States with at least 1,000 MW of wind energy installed. (number of States)	T: 4 R: MET	T: 10 R: 14	T: 14:	T: 14	Achieve installed generation of 1000MW of wind energy in 16 states by the end of 2016 ²⁷
Number of States with at least 100 MW of wind energy installed. (number of States)	T: 27 R: MET	T: 30 R: 26	T: 30	T: RETIRED	

Means and Strategies

The Wind Energy Program will use various means and strategies to achieve its GPRA Unit Program goals. “Means” include operational processes, resources, information, and the development of technologies, and “strategies” include program, policy, management and legislative initiatives and approaches. Various external factors, as listed below, may impact the ability to achieve the program’s goals. Collaborations are integral to the planned investments, means and strategies, and to addressing external factors.

The Wind Energy Program will leverage its planning, analysis and deployment funds by collaborating with EERE Strategic Programs in activities to maximize the effectiveness of both program and corporate activities for EERE and DOE. Efforts such as integrated strategic planning and analysis, green job training and education, collaborative cross-cutting initiatives and technology sector futures studies leverage both program and corporate funding. These efforts will continue to reduce unnecessary overlap to ensure program activities are focused cost effectively and seamlessly toward Departmental goals.

The Wind Energy Program will be implemented through the following means:

- Utility-scale, land-based wind systems technology RD&D;
- Offshore wind turbine technology RD&D;
- Independent testing and certification of small and medium system distributed wind turbine technology;
- Addressing the technical barriers to integrating increasing amounts of wind energy into our Nation’s generation mix. The program will expand efforts to more fully characterize wind resources throughout the country, and address challenges of utility planning and operations. To aid the electricity planning community, the program will provide the capability for state-of-the-art representations of renewable energy development potential in support of the evolution of the Nation’s electric system. In support of power system operations, this activity will acquire information on actual system performance characteristics, develop system models for integrated resource planning activities, and develop advanced wind forecasting models and promote use in utility control rooms.
- Manufacturing and supply chain development activities; and focus on assisting wind turbine manufacturers in adopting appropriate U.S. based standards for parts and components, as well as prospective domestic suppliers with wind turbine standards compliance.

- Dedicated efforts to disseminate technically accurate information will improve the technology acceptance of wind energy. The program supplies information on a range of wind energy technologies and related issues to national, state, and local stakeholders, decision makers, and potential customers and investors to ensure a transparent exchange of credible information. Open and clear dialogue with appropriate stakeholders is necessary for making informed and long-lasting energy and environmental decisions.

The Wind Energy Program will implement the following strategies:

- The state of progress in wind energy technology R&D and the financial strength of an emerging utility market for wind turbine systems are decreasing the level of government support needed for technology development in large scale, land-based wind turbine systems in favor of targeted research on components and others issues affecting wind turbine performance and reliability.
- Conducting cooperative R&D with the IEA, academia, and the National Laboratories.
- Provide technical expertise to the Department of the Interior’s Bureau of Ocean Energy Management, Regulation and Enforcement (DOI BOEM) with regard to developing codes and standards for the permitting of offshore wind turbine structures.
- Provide leadership to the wind industry through stakeholder outreach and environmental and siting R&D to reduce the barriers to large-scale wind energy deployment. To reduce barriers to wind energy deployment the program works with State energy offices, research institutions, and experts in the field to develop resources necessary for market adoption. To address radar and other military issues affected by wind turbines, the program works closely with the FAA and DOD. Environmental siting issues are worked with wind energy stakeholder groups and industry representatives.
- Work with DOE’s OE and transmission/distribution industry groups on transmission and integration of wind into the electrical grid.

Validation and Verification

To validate and verify program performance, the Wind Energy Program will conduct internal and external reviews and audits, as well as continue to conduct and build upon the transparent oversight and performance management initiated by Congress and Administration. The table below summarizes validation and verification activities.

- Data Sources:
- DOE Report “2008 Wind Technologies Market Report,” July 2009. <http://www1.eere.energy.gov/windandhydro/pdfs/46026.pdf>.
 - DOE Report “20% Wind Energy by 2030,” May 2008. http://www.windpoweringamerica.gov/pdfs/20_percent_wind_2.pdf.
 - “Musial, W.D.; Butterfield, S.; Laxson, A.; Heimiller, D.; Ram, B – “Large-Scale Offshore Wind Power in the United States: Assessment of Opportunities and Barriers,” NREL Report #TP-50040745, November 2007: www.nrel.gov/wind/pdfs/40745.pdf.
 - “Distributed Wind Market Applications,” Trudy Forsyth and Ian Baring-Gould, NREL Technical Report TP-500-39851, November 2007:

<http://www.nmsu.edu/~tdi/Wind/39851.pdf>.

- “Low Wind Speed Technologies Annual Turbine Technology Update (ATTU): Process for Land-Based Utility-based Technology,” NREL Report #TP-50037505, June 2005: <http://www.nrel.gov/docs/fy05osti/37505.pdf>.
- FY 2008 Wind Energy Program Peer Review. http://www1.eere.energy.gov/windandhydro/pdfs/FY08_wind_program_merit_review_report.pdf.
- AWEA Small Wind Turbine Industry Roadmap: <http://www.awea.org/smallwind/documents/31958.pdf>.

Baselines: Utility Scale Systems, Research Development and Testing: \$0.09 \$2009/kWh in FY 2010 for land-based applications in Class 4 winds; \$0.269 \$2009/kWh in FY 2010 for shallow water offshore applications in Class 6 winds.

Small and Medium Systems Research Development and Testing: 2,400 turbines deployed in distributed wind applications in 2007.

Technology Application: Eight states in 2002 with at least 100 MW wind installed (retired), and six states in FY 2008 with at least 1,000 MW installed.

Frequency: Annual.

Evaluation: The program uses several forms of evaluation to assess progress and to promote program improvement:

- Technology validation and operational field measurement;
- Implementation of a consistent methodology across the program for analyzing levelized cost of energy (LCOE);
- Critical peer review of both the program and subprogram portfolios and activities by independent outside experts;
- Specialized program evaluation studies to examine progress and process impacts;
- Continue to conduct the transparent oversight and performance management initiated by Congress and the Administration;
- Quarterly and annual assessment of program and management results based performance through the Performance Measurement Manager (PMM, the DOE quarterly performance progress review); and
- Annual review of methods, and re-computation of potential benefits for GPRA.

Geothermal Technology

Mission

The mission of the Geothermal Technologies Program (GTP) is to establish geothermal energy as a significant contributor to America’s future electricity generation by partnering with industry, academia and the national laboratories to discover new geothermal resources, develop innovative methods, and demonstrate high-impact technologies.

Overview

GTP supports the Strategic Program Measures of renewable energy generation, average electricity price and RE HPPG: Doubling the renewable energy generation by 2012. These measures are critical outcomes of the transformation of the nation’s energy systems as they quantify the benefits from development and demonstration of geothermal technologies and the impact of accelerating energy innovation through pre-competitive R&D. GTP will advance geothermal technologies through an integrated portfolio of cost-shared R&D and field demonstrations of both high-risk high-payoff EGS and technologies that have a near-term impact by confirming undiscovered hydrothermal resources and transforming geothermal into a national renewable energy source.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have and Discovering the new solutions we need					
Strategy: Demonstrate and Deploy Clean Energy Technologies and Accelerate energy innovation through pre-competitive R&D					
Program: Energy Efficiency and Renewable Energy /Geothermal Technology (EE7)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Reduce near-field EGS to 18 cents/kWh. for 24-hour electricity production (cents/kWh LCOE)	n/a	n/a	n/a	T: 18	5 MWe in near-field EGS generation by 2020
FY2012: The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY2011:- Increase average total flow rate per well to 12 kg/s for EGS. FY 2010: Modeled 10% increase in flow rate for EGS field site demo. FY 2009: Determine actual (baseline) pre-stimulation reservoir flow rate for at least one EGS field site.	T: n/a R: MET	T: n/a R: MET	T: RETIRED	n/a	

Means and Strategies

GTP will use various means and strategies to achieve its GPRA unit program goals. “Means” include operational processes, resources, information, and the development of technologies.

GTP will implement the following means:

- Perform a coherent core of research projects through cost-shared awards to private companies, academic institutions, and national laboratories selected via competitive solicitations to ensure the best value for taxpayer dollars;
- Target R&D to improve cost-driving technologies so that investments made bring about the largest possible cost reductions to support the economic transformation of the Nation’s energy systems; and
- Provide comprehensive and timely information about geothermal resources and technology to interested stakeholders from the public and private sector to reduce or eliminate institutional, regulatory, and other non-technical barriers that hamper the expanded use of geothermal energy in the U.S.

“Strategies” include program, policy, management and legislative initiatives such as:

- Demonstrating geothermal technologies to expand geothermal power production into geologically and geographically diverse areas of the U.S;
- Accelerating energy innovation by improving efficiency of exploration tools, energy conversion, and drilling systems;
- Demonstrating and validating geothermal-related tools and technologies at competitively-selected field sites; and
- Continuing work on a National Geothermal Data System to store critical geothermal site attribute information and reduce exploration risk.

External factors impacting geothermal development include fluctuations in the price of basic materials to construct wells and power plants. Changes in drill rig demand, availability, and costs also affect GTP’s performance. In addition, the following external factors could affect GTP’s ability to achieve its mission:

- Market incentives and demand for electricity;
- Availability of conventional energy supplies;
- Regulatory and environmental requirements;
- State Renewable Portfolio Standards;
- Availability of prospective land for geothermal leasing;
- Cost of competing technologies;
- State and federal tax incentives and implementation of other policies at both levels; and
- Proximity of transmission grid and resolution of grid choke points.

GTP also performs domestic and international collaborative activities to help leverage its activities and meet its goals. Collaboration efforts include:

- Identifying common research needs for geothermal energy and carbon sequestration with DOE’s Office of Science (SC) and Office of Fossil Energy (FE), a crucial first step in coordinating research efforts across DOE offices. For example, collaborating with FE on geothermal coproduced fluids projects to advance low temperature geothermal resources;

- Supporting competitive, cutting-edge research on advanced geothermal technologies at national laboratories, universities, and in industry. These partnerships foster innovation and the development of revolutionary technologies that could significantly grow the geothermal industry;
- Collaborating with the DOE Advanced Research Projects Agency –Energy (ARPA-E) to support an advanced hybrid thermal/mechanical drilling technology which promises to attain high rates of penetration in geothermal hard rock environments;
- Communicating with the Department of Defense on geothermal exploration and benefits of geothermal energy;
- Partnering with the U.S. Geological Survey (USGS) to supply data inputs to National Geothermal Data System and perform resource assessments;
- Partnering with the Bureau of Land Management, specifically the California, Nevada and Oregon field offices, throughout GTP’s field demonstration projects’ Environmental Assessment process to ensure knowledge sharing and collaboration on all levels;
- Sharing expertise, data, technologies, and access to demonstration sites with the Environmental Protection Agency for their Hydraulic Fracturing Study to understand the fate and transport of injectants;
- Partnering with National Science Foundation representatives from geosciences and geoengineering divisions to identify basic and applied sciences research needs;
- Assisting the Bureau of Indian Affairs to assess the potential of geothermal resources on tribal lands;
- Collaborating with Iceland, Switzerland and Australia on projects and to coordinate research efforts. Additionally, coordinating international efforts with the U.S. State Department and Department of Commerce, and Canada, Germany, New Zealand, and Indonesia to establish mutually-agreeable geothermal research areas that ultimately lead to greater geothermal deployment and lower GHG emissions; and
- Partnering with the European Commission’s Geothermal Engineering Integrated Mitigations of Induced Seismicity in Geothermal Reservoirs project to investigate induced seismicity as a tool to image the subsurface and as a potential hazard, with the goal of mitigation of induced seismicity to acceptable levels.

The program will leverage its funds by collaborating with EERE’s Strategic Programs in activities that maximize the effectiveness of both program and corporate activities for EERE and DOE. Efforts such as integrated strategic planning and analysis, green job training and education, collaborative cross-cutting initiatives and technology sector futures studies leverage both program and corporate funding. These efforts will continue to reduce unnecessary overlap to ensure program activities are focused cost effectively and seamlessly toward Departmental goals.

Validation and Verification

To validate and verify program performance, GTP will conduct internal and external reviews and audits with the assistance of experts from a variety of stakeholder organizations. For more information on validation and verification, please see information online at <http://www1.eere.energy.gov>.

- Data Sources:
- “2010 Geothermal Technology Program Peer Review Report,” U.S. Department of Energy, 2010.
(http://www1.eere.energy.gov/geothermal/pdfs/peer_review_2010/2010_gtp_peer_review_report_final.pdf)
 - “Retrospective Benefit-Cost Evaluation of U.S. DOE Geothermal Technologies R&D Program Investment: Impacts of a Cluster of Energy Technologies,” Gallaher et al., U.S. Department of Energy, 2010.
(http://www1.eere.energy.gov/geothermal/pdfs/geothermal_cost_benefit_analysis_2010.pdf)
 - “Low Temperature, Coproduced, and Geopressed Geothermal Technologies Strategic Action Plan-Draft,” U.S. Department of Energy, 2010
(http://www1.eere.energy.gov/geothermal/pdfs/lctg_strategic_action_plan_draft.pdf)
 - “An Evaluation of Enhanced Geothermal Systems Technology,” Geothermal Technologies Program, 2008.
(http://www1.eere.energy.gov/geothermal/pdfs/evaluation_egs_tech_2008.pdf)
 - “Updated U.S. Geothermal Supply Curve,” Chad Augustine, Katherine Young and Arlene Anderson, National Renewable Energy Lab and U.S. DOE, 2010.
(<http://www.nrel.gov/docs/fy10osti/47458.pdf>)
 - “2030 GW GTP target that can be achieved with 2012 budget,” DOE Geothermal Technologies Program Record, 2010.
- Baselines:
- EGS pre-stimulation reservoir flow rate baseline as determined in FY 2009.
 - Low Temperature and Coproduced Resources LCOE will be established in FY 2012.
- Evaluation:
- GTP will continue to conduct and build upon the transparent oversight and performance management initiated for the Recovery Act. GTP conducts annual merit reviews of program activities using independent technology experts. Quarterly and annual assessment of program and management results-based performance are reviewed through Performance Measure Management (the DOE quarterly performance progress review of budget targets); and GTP reviews quarterly and annual technical and financial reports through project management by the Golden Field Office.
 - GTP will maintain updates of its RD&D projects employing full transparency on its website: <http://www1.eere.energy.gov/geothermal/>. Lessons learned and

techniques developed will also be posted on the GTP website.

- Frequency: Annual.
- Data Storage: Web, paper publications and online storage.
- Verification: Peer Reviews and EGS reservoir creation at one of the following demonstrations sites: Brady Hot Springs in Lyon County (NV); Raft River in Cassia County (ID); The Geysers in Lake/Sonoma Counties (CA); Naknek in Bistol Bay Borough (AK); Newberry Volcano in Deschutes County (OR); New York Canyon in Pershing County (NV); and Desert Peak in Lyon County (NV).
- Coproduced demonstration projects at the Rocky Mountain Oilfield Test Center in Natrona County (WY), and projects in Liberty County (TX) and Bowman County (ND). Geopressed demonstration project in Cameron Parish (LA). Low temperature demonstration projects in: Churchill County (NV); Bowman County (ND); Lake County (OR); Eureka County (NV); Lake and Sonoma Counties (CA); and two in Klamath County (OR).

Water Power

Mission

The mission of the Water Power Program is to research, test, and develop innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from water. These include MHK technologies, a suite of renewable technologies that harness the energy from untapped wave, tidal, current and ocean thermal resources, as well as technologies and processes to improve the efficiency, flexibility, and environmental performance of conventional hydropower (CH) generation.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Energy Efficiency and Renewable Energy /Water Power (EE10)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Test marine and hydrokinetic devices and components to determine baseline cost, performance, and reliability. ²⁸ (Number of devices tested).	n/a	n/a	T: 2	T: 5	Testing of devices will allow the program to establish baseline cost of energy and performance and identify technology improvement opportunities. This measure is intended to lead to a future outyear performance target of reducing cost of energy for these technologies.

²⁸ Testing of devices will allow the program to establish baseline for cost of energy and performance, identify technology improvement opportunities, and is intended to lead to a future out year performance target of reducing cost of energy for these technologies. Number of devices is cumulative from FY 2011.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2010: Identify priority research areas to reduce project development costs by completing environmental impact assessment of marine and hydrokinetic energy development. FY 2009: Complete draft Multi-Year Program Plan.	T: Qualitative R: MET	T: Qualitative R: MET	T: RETIRED	n/a	
Complete feasibility assessments at conventional hydropower facilities to identify opportunities for at least 5 percent increased electricity generation through efficiency and capacity upgrades, powering existing non-powered dams, and adding new pumped storage hydropower capacity. (number of completed demonstration assessments))	n/a	n/a	T: 3	T: 50	These assessments are intended to lead to an additional performance measure starting in FY 2013 of megawatts of incremental hydropower generated at sites identified through 3 feasibility studies. Feasibility studies serve as first stage gate for further Program investment in additional feasibility studies and supporting deployment at identified sites. Hundreds of facilities could potentially be interested in cost-effective upgrades.
The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2010: Complete analysis of generation and water flow data at 20 percent of the hydropower projects in the U.S to establish baseline data.	n/a	T: Qualitative R: MET	T: RETIRED	n/a	

Means and Strategies

The Water Power Program will achieve its GPRA Unit Program goal as described below. “Means” include operational processes, resources, information, and the development of technologies, and “strategies” include program, policy, management and legislative initiatives and approaches. Various external factors, as listed below, may impact the ability to achieve the program’s goals. Collaborations are integral to the planned investments, means and strategies, and to addressing external factors.

The Water Power Program will implement the following means:

MHK

- Competitive solicitations for cost-shared partnerships to: develop, deploy and test existing MHK and incremental hydropower water power systems; help develop new and innovative water power conversion technologies; develop baseline cost of energy; and address non-technical barriers to the development and deployment of water power devices.

- Regular communication with stakeholders to understand R&D needs and concerns, provide useful and timely information on the development of technologies and projects, and provide access to valuable development and testing resources. This includes sponsoring meetings to allow industry and other stakeholders to assess the program's overall performance and offer suggestions for improved direction.
- Strategic planning efforts that solicit industry and public stakeholders' input on the direction of the program and initiate a road-mapping process to identify needs and barriers critical to the development of a viable U.S. water power industry. This includes conducting annual program reviews of funded projects, with continued funding dependent upon successful project performance.

The program will implement the following strategies:

- Facilitate in-water device testing for higher maturity technologies to support development and identify baseline cost of energy;
 - Characterize the various MHK technologies, with the goal of determining cost, performance and reliability characteristics, and the identification of performance-leading designs.
 - Support rigorous and standardized device testing protocols based on technology readiness levels;
 - Support R&D to identify and reduce key cost drivers and improve energy capture efficiency and system reliability; and
 - Collect and disseminate validated cost and performance data for technologies and projects.
 - Gather and support the generation of site-specific environmental data in MHK deployment regions in order to improve the prediction, monitoring, and evaluation of environmental impacts; and reduce the time and costs associated with permitting ocean energy systems.
 - Collect, synthesize, evaluate and disseminate existing impact information that directly affects the MHK industry.CH:
 - Identify opportunities for new or incremental hydropower generation through capacity and efficiency upgrades at existing facilities, powering existing non-powered dams;
 - Support the development and testing of new advanced technologies and tools to increase efficiency and bring down capital costs of small hydropower and spur innovative advanced pumped storage development;
 - Develop technologies and methods to reduce environmental impacts and regulatory and financing challenges facing hydropower development;
- Develop, collect, and disseminate industry and market data to identify opportunities to reduce costs and increase generation, and improve the ability of hydropower to further integrate variable renewable generation to the U.S. electric grid.

The following external factors could affect the Water Power Program's ability to achieve its benefits:

- Application of State or Federal tax or other incentives, including the inclusion of hydropower in current or future State or Federal Renewable Energy Standards and RPS targets;
- Federal, State and regional regulatory actions affecting water power technologies, including the licensing/permitting processes for private and Federal construction;
- Implementation of other policies at the national level, including Federal efforts to reduce carbon and criteria pollutants;
- The results of ongoing marine spatial planning and coastal zone management processes at state and Federal levels;
- The availability of conventional energy supplies;
- The cost of competing technologies;
- The ability of the domestic industry to quickly adapt to marketplace and technology changes;
- State and international efforts to support water power technologies; and
- The state of internationally recognized standards and certification.

The program collaborates with and seeks feedback from industry partners, including technology developers and utilities, to determine and prioritize research, development, deployment, and demonstration (RDD&D) efforts and engages public stakeholders in formulating the direction of the program. The program will leverage its planning, analysis and deployment funds by collaborating with EERE's Strategic Programs to maximize effectiveness of both program and corporate activities for EERE and DOE.

The program leverages its relationships with universities, particularly the National Marine Renewable Energy Centers, as well as its relationships with other agencies, including the Department of the Interior, U.S. Army Corps of Engineers, the National Oceanic and Atmospheric Administration and the Department of Defense. On issues concerning water power licensing and interconnection, the program actively collaborates with Federal and State regulators, including the Federal Energy Regulatory Commission (FERC) and the Department of the Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (DOI BOEM), and engages Federal and State resource agencies, local stakeholders, and the environmental community regarding environmental and navigational impacts and competing resource use. The program works closely with international researchers and technology developers to cooperate on research efforts and to develop international standards for the marine industry. In addition, the program benefits from the strong capabilities within the DOE National Laboratories from both the former Hydropower Program and technology programs that share complementary elements to conduct resource assessments, test, develop, and refine advanced water power technologies, develop international standards, and study potential environmental impacts of these technologies.

Validation and Verification

To validate and verify program performance, Water Power will conduct various internal and external reviews and audits. These programmatic activities are subject to continuing review by Congress, the General Accountability Office, the Department's Inspector General, the U.S. EPA, and state environmental agencies.

- Data Sources:
- “Assessment of Waterpower Potential and Development Needs,” EPRI, Palo Alto, CR: 2007. 1014762.
(<http://www.epriweb.com/public/000000000001014762.pdf>)
 - Avery, W.H., Wu, C., *Renewable Energy from the Ocean, A Guide to OTEC*. New York, NY: Oxford University Press, 1994. (ISBN #: 0195071999)
 - Bedard, R. Siddiqui, O. Previsic, M., and Polagye, B. “Economic Assessment Methodology for Tidal In- Stream Power Plants”, EPRI-TP-002 NA Rev 2, June 10, 2006.
(http://oceanenergy.epri.com/attachments/streamenergy/reports/002_TP_Econ_Methodology_06-10-06.pdf)
 - Brown, S. and Garnant, G. “Advanced-Design Turbine at Wanapum Dam Improves Power Output, Helps Protect Fish.” *Hydro Review*, April 2006.
 - Hagerman, G. and Bedard, R. “E2I/EPRI Specification – Guidelines for Preliminary Estimation of Power Production by Offshore Wave Energy Conversion Devices” E2I/EPRI-WP-US-001, December 22, 2003.
(http://oceanenergy.epri.com/attachments/wave/reports/001_WEC_Power_Production.pdf)
 - Hagerman, G., Polagye, B., Bedard, R., and Previsic, M. “Methodology for Estimating Tidal Current Energy Resources and Power Production by Tidal In-Stream Energy Conversion (TISEC) Devices” EPRI-TP- 001-NA Rev 3, September 29, 2006.
(http://oceanenergy.epri.com/attachments/streamenergy/reports/TP-001_REV_3_BP_091306.pdf)
 - Johansson, T., Kelly, H., Reddy, A., and Williams, R. *Renewable Energy: Sources for Fuels and Electricity*, Island Press, 1993. (ISBN #: 1559631384)
 - Miller, R. and Winters, M. “Opportunities in Pumped Storage Hydropower: Supporting Attainment of Our Renewable Energy Goals,” *Hydro Review*, April 2009
(<http://www.bcse.org/images/pdf/pumped%20storage%20paper%20april%2009.pdf>)
 - Odeh, M. “A Summary of Environmentally Friendly Turbine Design Concepts.” DOE/ID/13741: July 1999.
(<http://hydropower.inel.gov/turbines/pdfs/doeid-13741.pdf>)
 - Previsic, M., Siddiqui, O., and Bedard, R. “EPRI Global E2I Guideline: Economic Assessment Methodology for Offshore Wave Power Plants” E2I/EPRI WP-US-002 Rev 4, November 30, 2004.
(http://oceanenergy.epri.com/attachments/wave/reports/002_Rev_4_Econ_Methodology_RB_12-18-04.pdf)
 - Previsic, M. and Bedard, R., “Methodology for Conceptual Level Design of

tidal In-Stream Energy Conversion (TISEC) Power Plants”, EPRI TP-005 NA, August 26, 2005.

<http://oceanenergy.epri.com/attachments/streamenergy/reports/005TISECSysTemLevelConceptualDesignMethodologyRB08-31-05.pdf>

- Takahashi, P. and Trenka, A, Ocean Thermal Energy Conversion, John Wiley & Sons, 1996. (ISBN #: 0471960098)

Baselines: The program is in the process of establishing baseline cost of energy and performance for MHK by collecting and analyzing data from its device testing program, lifecycle cost analyses projects, and technology development, testing and deployment projects.

Frequency: Annual.

Data Storage: Web, paper publications and on-line storage.

Evaluation: The program will use several forms of evaluation to assess progress and promote program improvement;

- Conduct internal and external independent peer reviews and audits, program reviews and review of baseline data;
- MHK resource assessments, cost analyses, environmental impact studies and testing and development of these technologies to set the baseline for quantifying the benefits of these technologies, identifying technology improvement opportunities, and for furthering the development of technology goals and annual targets;
- CH assessment of the existing domestic hydropower fleet to provide the baseline data necessary to identify and quantify the potential for incremental hydropower, including: advanced hydropower systems and modernization technologies to increase efficiency and capacities at existing power stations; the development of power stations at existing non-powered dams and in constructed waterways; and small hydropower (<5 MW);
- Conduct annual program reviews of all program-funded projects, with continued funding dependent upon successful project performance;
- Hold annual meetings to allow industry and other stakeholders to assess the program’s overall performance and offer suggestions for improved direction;
- Work collaboratively with developers, regulators, State and Federal resource agencies, tribal governments, environmental stakeholders and local communities to understand both positive and negative impacts of technology deployment, and to minimize the cost, time, and negative impacts associated with water power projects;
- Conduct strategic planning to engage industry and public stakeholders’ input in formulating the direction of the program and initiate a road-mapping process to identify needs and barriers critical to the development of a viable U.S. water power industry; and

- Continue to conduct the transparent oversight and performance management initiated by Congress and the Administration.

Frequency: Potential benefits will be estimated annually and program peer reviews will be conducted annually.

Verification: DOE technology managers verify the achievement of targets through project reviews, including reviews of cost and performance modeling results. Project leaders in the field must provide to the technology managers documentation of experimental and/or analytic results as evidence of success. The evidence is listed in material supporting the DOE Performance Measurement Manager (PMM) performance tracking system. Various trade associations review the data and the modeling processes (e.g., REPIS), and the EIA verifies the REPIS database. Peer reviews are conducted by independent personnel from industry, academia and governmental agencies other than DOE.

Vehicle Technologies

Mission

The mission of the Vehicle Technologies Program (VTP) is to develop and promote energy-efficient and environmentally friendly transportation technologies that will enable America to use significantly less petroleum and reduce greenhouse gas (GHG) emissions while meeting or exceeding drivers' performance expectations and environmental requirements.

Overview

The Vehicle Technologies Program activities support the Strategic Program Measures of reduction in net oil imports (mmbpd) and reduction in greenhouse gas emissions (MMTCO₂). These measures are critical outcomes of EERE strategies to develop, demonstrate and deploy clean energy technologies in order to meet the goal of transforming the nation's energy systems.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies and Accelerate energy innovation through pre-competitive R&D					
Program: Energy Efficiency and Renewable Energy /Vehicle Technologies (EE11)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Batteries and Electric Drive Technology					
Reduce the cost of electric-drive technologies. (\$/kilowatt peak)	T: \$19/kW peak R: MET	T: \$19/kW ²⁹ peak R: MET	T: \$18/kW peak ³⁰	T: \$17/kW peak ^d	\$12/kW in 2015
Reduce the cost of energy storage for PHEVs. (\$/kilowatt-hour)	n/a	n/a	T: \$700/kW-hr ³¹	T:\$500/kW-hr ^f	\$300/ kWh in 2014, reducing the cost of electrical vehicle batteries by approximately 50% (roughly \$5,000) from FY 11 and reducing the vehicle payback period by more than 40%
Reduce the production cost of a high power 25kW battery for use in passenger vehicles from \$3,000 in 1998 to \$500 by the end of 2010, enabling cost competitive market entry of hybrid vehicles. (Storage batteries are a key cost and performance component for hybrid vehicles, which offer improved fuel economy). ³² (kilowatt hour)	T: \$550 R: NOT MET	T: \$500 R: MET	T: RETIRED	n/a	
Subprogram: Vehicle and Systems Simulation & Testing					
Increase cumulative miles of PHEV/EV testing. (miles tested)	n/a	n/a	T: 15M ³³	T: 62M	112 Million miles of PHEV testing by 2015
Subprogram: Advanced Combustion Engine R&D					
Improve modeled fuel economy for passenger and commercial vehicles solely from improvements in powertrain efficiency. (Fuel economy gain percentage, passenger%/commercial %, compared to a 2009 baseline of XX mpg)	n/a	n/a	T: 10% / 5% ³⁴	T: 15% / 10%	Passenger 25% in 2015; commercial 20% in 2015
Demonstrate through modeling and laboratory data, an 10% energy conversion efficiency from engine waste heat to electricity of a thermoelectric device. (energy conversion efficiency percentage)	n/a	n/a	T: 8% ³⁵	T: 10%	15% in 2015, which would improve fuel economy by an estimated 5-7%

²⁹ The FY 2010 cost target remained the same as in FY 2009 (\$19/kW peak), but at an increased power density (2.0 kW/l in FY 2009 versus 2.2 kW/l in FY 2010).

³⁰ Demonstrate with data and modeling a combined inverter/motor of 1.1 kW/kg, 2.7 kW/liter and cost of \$18/kW peak. (Additional information valid FY 2011 – FY 2016).

³¹ Measure is focused on modeled cost of a high-energy lithium-ion battery assuming production of 100,000 units. Therefore, high volume battery manufacturing is included in the cost estimate. Credit for Recovery Act battery manufacturing lower capital expense is not included in the target estimate, and could result in a slightly lower cost. Storage batteries are a key cost and performance component of PHEVs. Reducing cost enables cost competitive market entry. (Additional information valid FY 2011 – FY 2015).

³² The FY 2011 performance measure reflects the transition from energy storage technologies for hybrid electric vehicles (high power batteries) to high energy batteries for plug-in hybrid vehicles.

³³ Complete development, validation, and transfer to industry of standard modeling tool.

³⁴ Increases in fuel economy (passenger vehicles / commercial vehicles) result from improvements in powertrain efficiency. Baselines are relative to MY 2009 gasoline vehicles and 42 percent engine efficiency for commercial engines. (Additional information valid FY 2011 – FY 2014)

³⁵ Modeling and laboratory data predict the conversion efficiency from engine waste heat to electricity of a thermoelectric device rated at 500W output. (Additional information valid FY 2011 - FY 2016)

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
<p>The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.³⁶</p> <p>FY 2010: Internal combustion laboratory demonstrated engine efficiency for light-duty vehicles of 45 percent.</p> <p>FY 2009: Internal combustion laboratory demonstrated engine efficiency for light-duty vehicles of 44 percent</p>	T: 44% R: MET	T: 45% R: MET	T: RETIRED	n/a	
Subprogram: Materials technology					
Validate (to within 10 percent uncertainty) the cost-effective reduction of the weight of passenger vehicle body and chassis systems by 50 percent with safety, performance, and recyclability comparable to 2002 vehicles. (weight reduction percentage, relative to 2009 baseline)	n/a	n/a	T: MODEL ³⁷	T: -25% ³⁸	50% weight reduction in 2015
<p>The FY 2011 performance measure was created to transition from development and design to validation. Prior year measures focused on models that analyzed components using lighter weight materials and enabled this sub program to focus on the design of lighter weight assemblies that are made of several components. The milestone for</p> <p>FY 2011 focuses on the development of the design for the assemblies that make up the lighter weight vehicle and the milestones for FY 2012 through 2015 focus on validating the weight reduction of the vehicle. The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2010: Reduce the modeled weight of a passenger vehicle body and chassis system by 50 percent relative to 2002 baseline.</p> <p>FY 2009: Reduce the modeled weight of a passenger vehicle body and chassis system by 40 percent relative to 2002 baseline</p>	T: 40% R: MET	T: 50% R: MET	T: RETIRED	n/a	
Subprogram: Outreach, Deployment, and Analysis					
Reduce the use of petroleum through the adoption of alternative fuel vehicles and infrastructure. (gallons per year)	n/a	n/a	T: 570M	T: 700M	1000M gal/year in 2015

³⁶ The FY 2011 performance measure was created to transition from reporting peak engine efficiency results to reporting increases in fuel economy (mpg) due to improvements in overall engine efficiency.

³⁷ Completion of design and cost model for multi-materials vehicles (MMV) for validating assessments of weight reduction in 2012 to 2014.

³⁸ Modeled vehicle weight reduction achievable at comparable cost, performance, safety, and recyclability compared to baseline vehicle. (Additional information valid FY 2011 – FY 2014).

Means and Strategies

To accomplish its strategic goal of transforming our energy systems, VTP supports both near-term and long-term R&D, early deployment and field validation of advanced technologies, and support for higher-education programs that "fill the pipeline" with young engineers motivated to improve America's energy efficiency.

The primary barriers and opportunities for improved vehicle efficiency are technological. Therefore, the principal strategy of the program is to support R&D of technologies that have the potential to achieve significant improvements in vehicle fuel efficiency or significant displacement of petroleum-based fuels with clean, cost-competitive alternative fuels that can be produced domestically. The program strategy also supports activities to facilitate market adoption of new technologies, train new engineers in advanced technologies, and inform program planning. These strategies align with the Strategic Program Measures of reducing oil imports and greenhouse gas emissions.

The R&D strategy is divided into four technology pathways, each of which can result in lowering vehicle oil use and GHG emissions:

- Reduce the weight of vehicles (up to 30 percent improvement in fuel economy);
- Improve combustion engines and fuel characteristics (up to 40 percent improvement in fuel economy and displacement of oil by non-petroleum fuels);
- Improve hybrid electric vehicle component efficiency (up to 50 percent improvement in fuel economy); and
- Improve PHEV components (up to 300 percent improvement in fuel economy).

These improvements can be combined to create integrated advanced technology vehicles capable of between 200 and 400 percent increased fuel economy per vehicle for passenger vehicles and 40 to 50 percent for commercial vehicles.

Results of the Recovery Act projects will be incorporated in VTP's strategic planning process and R&D will be adjusted to achieve maximum benefit. With this request, VTP is broadening its R&D and deployment activities to include non- and off-highway vehicles so as to reduce their use of petroleum and to lower their GHG emissions. Results of combustion and fuels R&D for passenger and commercial highway vehicles can be leveraged for use in this sector to reduce petroleum use. VTP will also explore means to reduce future average vehicle miles traveled (VMT) on highways, which also contributes to petroleum reduction.

Some external factors that could limit the achievement of VTP's strategic objectives are:

- Ethanol distribution infrastructure: Successful use of alternative fuel vehicles (AFVs) depends on development of adequate infrastructure for large-scale distribution of ethanol and ethanol blends.
- Electricity grid capacity: Successful utilization of PHEVs depends on adequate grid capacity during charging hours.
- Market Appeal: The interest of consumers in fuel economy and alternative fuels can be very dependent on the market price of fuels.
- Market Inertia: The rate at which new efficiency technology is adopted by vehicle manufacturers influences the rate at which efficient vehicles are adopted in the market.

Replacement of the fleet of 240 million lower efficiency vehicles would take at least 20 years, assuming all new vehicles have higher efficiency.

VTP has a long and successful history of working in partnership with industry to identify and discuss R&D needs and technology gaps, develop joint technical targets and technology roadmaps, and evaluate R&D progress. VTP collaborates with other Federal agencies, State and local governments, and as opportunities arise, with foreign governments and international organizations. VTP's principal EERE counterparts are the Biomass Program and the Fuel Cell Technologies program. VTP's principal DOE counterparts are the Office of Electricity Delivery and Energy Reliability, and Office of the Science's Basic Energy Sciences (BES) Program. VTP will pursue crosscutting collaboration with other parts of DOE in the areas of energy systems simulation for internal combustion engines, and PE, which is an essential component of almost every aspect of the coming clean energy revolution. VTP will leverage its own planning, analysis and deployment functions by collaborating with EERE Strategic Programs in integrated planning and corporate activities such collaborative cross-cutting initiatives and technology sector futures studies.

Validation and Verification

To validate and verify program performance, VTP uses several forms of evaluation to assess progress and to promote program improvement. These are conducted at both the program and the activity levels. Based on these evaluations, resource availability, and other factors, VTP considers new opportunities, makes adjustments to technology specific targets, and sets goals as appropriate. The types of evaluations are:

- Technology validation and operational field measurement, as appropriate;
- Peer review by independent outside experts of both the program and subprogram portfolios;
- Annual internal Technical Program Review of VTP;
- Specialized program evaluation studies to examine process, impacts, or market baseline and impacts, as appropriate;
- Quarterly and annual assessment of program and management results based on performance management measures (PMM), the DOE quarterly performance progress review of budget targets;
- Peer reviews of the industry partnerships by an independent third party, such as the National Academy of Sciences/National Academy of Engineering, to evaluate progress and program direction.
- Continual development of the transparent oversight and performance management initiated by Congress and the Administration.

These programmatic activities are subject to review at various times by Congress, DOE's Inspector General, and NAS. VTP also uses several program performance management methods to validate and verify its performance during the course of the program on an annual and ongoing basis, including: management standards; incorporation of goals; measurement and reporting from program contracts; peer reviewed roadmaps and activities; performance modeling and estimation; prototype testing; and site visits.

Building Technologies

Mission

The mission of the Building Technologies Program (BTP) is to develop and promote efficient, environmentally friendly, and affordable technologies, systems, and practices for our nation’s residential and commercial buildings that will lower greenhouse gas (GHG) emissions, foster economic prosperity and increase National energy security while providing the energy-related services and performance expected from our buildings.

Overview

BTP’s progress towards departmental goals will be indicated by the amount of annual energy saved (Btus) Strategic Program Measure. Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies the BTP will deploy technologies to drive energy efficiency and reduce demand growth, which drives progress towards achieving our EERE Strategic Goal.

Performance Plan

Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Energy Efficiency and Renewable Energy / Building Technologies (EE4)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Residential Buildings Integration					
Complete cost-effective Energy Efficient Residential Solution Packages, available to builders, contractors, and others for new and existing homes. (annual number of newly completed solution packages) ³⁹ .	n/a	n/a	T: 1	T: 1/1 ⁴⁰	10 energy savings packages in total (covering new and existing homes in each of 5 climate regions). For existing homes, packages will result in 15-30 percent greater efficiency for FY 2012-2015 and 30-50 percent greater efficiency beginning in FY 2015. For new homes, packages will result in 30 percent greater efficiency for FY 2011-14 and 30-50 percent greater efficiency beginning in FY 2014, based on the Building America benchmark and the International Energy Conservation Code 2009.

³⁹ Packages will result in 15-30 percent greater efficiency for FY 2012-2015 and 30-50 percent greater efficiency beginning in FY 2015 for existing homes. Packages will result in 30 percent greater efficiency for FY 2011-14 and 30-50 percent greater efficiency beginning in FY2014 in new homes.

⁴⁰ The target refers to the number of Energy Efficient Residential Solution Packages – the first number referring to existing and the second to new residential buildings.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
<p>Previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. The measures included below enabled the progress necessary to support this measure.</p> <p>FY 2010: Complete 2 design technology packages for new residential buildings (that are 40 percent more energy efficient relative to the 2004 Building America benchmark) at net zero financed cost to the homeowner for two climate zones.</p> <p>FY 2009: Complete 1 design technology packages for new residential buildings (that are 40 percent more energy efficient relative to the 2004 Building America benchmark) at net zero financed cost to the homeowner for one climate zones.</p>	T: 1 R: MET	T: 2 R: MET	T: RETIRED	n/a	
Subprogram: Commercial Buildings Integration					
<p>Complete Retrofit and New Commercial Buildings Case Studies demonstrating 20% energy savings over previous building usage, with five year or less payback. These business cases will then be provided to stakeholders for potential adoption. (annual number of case studies completed).⁴¹</p>	n/a	n/a	T: 5/5	T: 10/10	20 percent reduction in energy consumption by 2015 in existing commercial buildings that adopt these energy savings measures
<p>The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2010: Complete 4 design technology packages for new commercial buildings (that achieve at least 50 percent increase in energy efficiency relative to the ASHRAE 90.1-2004 benchmark) with five year or less payback.</p> <p>FY 2009: Complete 4 additional design technology packages for new commercial buildings (that achieve 30 percent increase in energy efficiency relative to the ASHRAE 90.1-2004 benchmark) with five year or less payback.</p>	T: 4 R: MET	T: 4 R: MET	T: RETIRED	n/a	
Subprogram: Emerging Technologies					
<p>Increase efficacy measured in lumens per watt of "white light" SSL in a lab device.⁴² (lm/w)</p>	n/a	n/a	T: 123lm/W	T:145lm/W	157 lm/W in 2016
<p>The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure.</p> <p>FY 2010: Achieve efficiency of "white light" solid state lighting in a lab device, of at least 113 lumens per Watt.</p> <p>FY 2009: Achieve efficiency of "white light" solid state lighting in a lab device, of at least 110 lumens per Watt</p>	T: 110 R: MET	T: 113 R: MET	T: RETIRED	n/a	

⁴¹ Case study guides achieve a 30 percent efficiency increase for retrofits and a 50 percent increase in new buildings relative to the ASHRAE 90.1-2004 benchmark.

⁴² In FY 2010 BTP issued a solicitation to SSL manufacturers through the Recovery Act for cost shared R&D focused on lowering the cost of producing SSLs. Currently no contracts are awarded through the DOE Solid-State Manufacturing R&D Initiative, preventing the inclusion of a modeled cost metric in FY 2011.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Technology Validation and Market Introduction					
Annual number of completed ENERGY STAR test procedure proposals or final test procedures	n/a	n/a	T: 8	T: 12	75 completed test procedures (cumulative) by 2016
The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2009: Achieve market penetration target for ENERGY STAR appliances of 39 percent (baseline 30 percent in 2003), 12 percent for CFLs (baseline 2 percent in 2003), and 56 percent for windows (baseline 40 percent in 2003). Revised criteria for clothes washers, refrigerators and windows Release criteria for photovoltaic systems. Complete evaluation for developing ENERGY STAR criteria for small wind turbines.	T: Qualitative R: MET	T: RETIRED R: n/a	n/a	n/a	
Subprogram: Equipment Standards and Analysis					
Annual number of products for which NOPR issues/number of products for which final ruled issued for test procedures and energy energy standards	n/a	n/a	T: 14/16	T: 34/17	73/57 products for which NOPR issues/number of products for which final ruled issued for test procedures and standards by 2016 (cumulative)
The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2010: Complete 14-17 proposals ⁴³ to update appliance standards and test procedures to publish in the Federal Register. Final rules will be issued for 10 product categories, consistent with law, to amend appliance standards and test procedures that are economically justified and will result in significant energy savings. FY 2009: Complete 14-16 proposals ⁴⁴ to update appliance standards and test procedures to publish in the Federal Register. Final rules will be issued for 4-6 product categories, consistent with law, to amend appliance standards and test procedures that are economically justified and will result in significant energy savings.	T: Qualitative R: MET	T: Qualitative R: MET	T: RETIRED	n/a	

⁴³ For this measure “proposal” includes 14-17 unique product inclusions as above.

⁴⁴ For this measure “proposal” includes 14-16 unique product inclusions as above.

Means and Strategies

BTP will use various means and strategies to achieve its GPRA Unit Program goal and achieve the goals laid out in the DOE strategic plan. “Means” include operational processes, resources, information, and the development of technologies; “Strategies” include program, policy, management, and legislative initiatives and approaches. Collaborations are integral to the planned investments, means and strategies, and to addressing external factors.

BTP will implement the following means:

- **Residential Buildings Integration:** Focus on improving the efficiency of the approximately 113 million existing homes and 1.1 million new homes built each year.⁴⁵ These improvements are accomplished via RD&D and technology transfer activities. Overall, the program seeks to make improvements by realigning research towards a more immediate near term focus, including straightforward and reliable home energy retrofit information and technical guidelines for implementation of retrofit measures, which can be immediately utilized by contractors and other service professionals;
- **Commercial Buildings Integration:** Address energy savings opportunities in new and existing commercial buildings, including RD&D of whole building technologies, such as sensors and controls, design methods, and operational practices. These efforts support the goal of cost-effective energy efficiency, not only by reducing building energy needs, but also by developing design methods and operating strategies;
- **Emerging Technologies:** Conduct R&D and technology transfer associated with energy efficient products and technologies for residential and commercial buildings. These efforts, along with the establishment of the Energy Efficient Building Systems Design Hub, address high-impact opportunities within building components, such as lighting, building envelope technologies (including advanced windows), space conditioning, water heating, working fluids, and analysis tools;
- **Technology Validation and Market Introduction (TVMI):** Accelerate the adoption of clean, efficient, and domestic energy technologies through three major activities, ENERGY STAR, Building Energy Codes, and Solar Decathlon by: testing ENERGY STAR products; submitting code proposals to the International Code Council (ICC) and American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE); supporting the upgrade of model building energy codes; providing technical and financial assistance to States to update, implement, and enforce their energy codes to meet or exceed the model codes, in support of Energy Policy and Conservation Act (EPCA) Section 304; and promulgating standards for manufactured housing as required by Section 413 of the Energy Independence and Security Act of 2007 (EISA); and
- **Equipment Standards and Analysis:** Work to improve the efficiency of appliances and equipment by conducting analyses and developing standards that are technologically feasible and economically justified by EPCA, as amended. Analysis performed under this program supports related program activities, such as the

⁴⁵ 2009 Buildings Energy Data Book.

implementation of test procedures and verification for ENERGY STAR, to ensure a consistent methodology is used in setting efficiency levels for related programs.

BTP's challenge is to address these opportunities with apt strategies and design programs that give appropriate consideration to the nature of the marketplace and existing barriers to energy efficiency. To accomplish this, BTP will implement the following strategies:

- Focus program R&D portfolios to ensure that only the most promising and revolutionary technologies and techniques are being explored for existing and new buildings; align the Residential and Commercial Integration activities to maximize cost-effective energy efficiency in buildings; appropriately close out those areas of technology research that are sufficiently mature or proven in the marketplace; and cease efforts where investigations prove to be technically or economically infeasible (“off ramps”);
- Increase minimum efficiency levels of buildings and equipment through codes, standards, and guidelines that are technologically feasible and economically justified. BTP develops standards through a public process and submits code proposals to International Energy Conservation Code (IECC) and ASHRAE;
- Coordinate with other programs in EERE in support of a management strategy that achieves low carbon buildings: the Solar Energy, Biomass and Biorefinery Systems R&D, Wind Energy, Water Power, Hydrogen and Fuel Cell Technologies, Federal Energy Management (FEMP), and Weatherization and Intergovernmental (WIP) programs. For example BTP co-manages Better Buildings activities with WIP. BTP also invests in technical program review, market analysis, and performance assessment in order to direct effective strategic planning; and
- Provide technical information to customers through deployment of cost-effective energy technologies, forming partnerships with private and public sector organizations.

These strategies can result in significant cost savings and a dramatic reduction in the consumption of energy, and can cost effectively reduce demand for energy, thus lowering carbon emissions and decreasing energy expenditures.

The following external factors could affect BTP's ability to achieve its strategic goal:

- Fragmented construction market: The private sector includes a highly diversified industry comprised of thousands of builders and manufacturers, none of which has the capacity, including financial incentives, to sustain R&D activities over multi-year periods;
- Communication between professional groups: The compartmentalization of the building professions, where architects and designers, developers, construction companies, engineering firms, and energy services providers do not typically apply integrated strategies for siting, construction, operations and maintenance;⁴⁶ and
- Upfront costs: Higher initial cost of energy efficient building appliances can keep consumers from purchasing them even if they are cost effective in the long run.

⁴⁶ Scott Hassell, Anny Wong, Ari Houser, Debra Knopman, Mark Bernstein, RAND Corporation: *Building Better Homes: Government Strategies for Promoting Innovation in Housing*. 2003: http://www.rand.org/pubs/monograph_reports/MR1658/MR1658.pdf

In carrying out the program's mission, BTP performs the following collaborative activities:

- Partners and establishes cost share arrangements with industry and other Federal agencies, which act as high-impact management tools that can build a critical mass to address these barriers. ENERGY STAR is a joint DOE/EPA program with more than 4,000 retailers who label ENERGY STAR qualified appliances and energy efficient products. DOE provides technical support through its R&D, regulatory activities (including its test procedures and verification and enforcement processes), and technology demonstrations with EPA's marketplace activities (<http://www.energystar.gov>). Through these activities with EPA, BTP contributes to the reduction of GHG emissions;
- Implements the Commercial Buildings Initiative (CBI) which collaborates with National Laboratories, the private sector, other Federal agencies, and non-governmental organizations (NGOs) to advance high-performance commercial green buildings. In support of CBI, BTP has launched programs and initiatives that will produce quick-hitting, practical results, including:
 - Commercial Building Energy Alliances (including retailers, commercial real estate owners, and institutions);
 - National Laboratory Collaborative on Building Technologies; and
 - Commercial Building Partners.
- Works with National, regional, and State building code officials and stakeholders to help building owners, builders, and the design community understand the science, benefits, and techniques for going significantly beyond code with added value strategies. BTP also trains over 10,000 code officials, designers, and builders to implement these codes. In addition, BTP updates and improves the core materials and code compliance software to reflect recent changes in the model energy codes and emerging energy efficiency technologies;
- Coordinates with DOE's Office of Science in basic research on SSL technology;
- Manages strategically through five key elements: a customer focused, team-based organization for greater accountability and improved results; systematic multi-year planning including collaboratively developed technology roadmaps to provide for a more integrated, customer driven R&D portfolio; utilization of stage-gate management processes to ensure progress and market relevance; greater competition in project solicitations to increase innovation and broaden research participation; and increased peer review to assure scientifically sound approaches; and
- Interacts regularly with industry to ensure relevance of research, including R&D workshops (e.g., three workshops per year and biennial reviews in SSL and windows research) and peer reviews.

Validation and Verification

To validate and verify program performance, BTP will conduct various internal and external reviews and audits. These programmatic activities are subject to continuing review by Congress, the General Accountability Office, DOE's Inspector General, EPA, and State environmental agencies.

- Data Sources:
- “Annual Energy Review 2009,” Department of Energy/Energy Information Administration, DOE/EIA-0384(2009), August 19, 2010, <http://www.eia.doe.gov/aer/>;
 - 2003 Commercial Building Energy Consumption Survey (CBECS)⁴⁷, Department of Energy/Energy Information Administration, <http://www.eia.doe.gov/emeu/cbecs/contents.html>;
 - 2005 Residential Energy Consumption Survey (RECS)⁴⁸, Department of Energy/Energy Information Administration, <http://www.eia.doe.gov/emeu/recs/contents.html>;
 - 2009 Building Energy Data Book (BED), Department of Energy/Building Technologies Program, <http://buildingsdatabook.eren.doe.gov/Default.aspx>;
 - “Annual Energy Outlook (AEO) 2010,” Department of Energy/Energy Information Administration, DOE/EIA-0383(2010), May, 2010, <http://www.eia.doe.gov/oiaf/aeo/>;
 - ISTAR (ENERGY STAR database), <https://www.energystar.gov/istar/pmpam/>;
 - “Current Industrial Reports (CIR)” U.S. Census Bureau, <http://www.census.gov/manufacturing/cir/index.html>;

Baselines: The following are key baselines used in the BTP program:

- New Residential Buildings: Energy use varies by climate and region, based on the Building America Benchmark, which incorporates the IECC 2009 building codes.⁴⁹ BTP will focus on creating design technology packages to reduce energy consumption from the Building America Benchmark at 30 percent and 50 percent above the IECC 2009.
- Existing Residential Buildings: Based on building vintage and climate region, and actual energy use in the home. The energy use reduction is compared to the current home’s actual use.
- New Commercial Buildings Energy Use Intensity: Varies by climate region and building type (ASHRAE 90.1-2004⁵⁰).
- SSL (2002): 25 lumens/Watt (lm/W) efficacy (SSL white light).
- Windows (2003): 0.33 to 0.75 U-values (varies by region).
- Residential Heating and Cooling (2003): Average total heating and cooling system energy use, defined by reported consumption in EIA for residential buildings and all existing buildings, and the Building America benchmark for new residential buildings, by climate region.
- New Residential Building Codes: 2003 International Energy Conservation Code (IECC), International Code Council.
- New Commercial Building Codes: ASHRAE 90.1-2004.
- ENERGY STAR: Federal appliance minimum standards and applicable

⁴⁷ CBECS updates are currently conducted on a quadrennial basis.

⁴⁸ RECS updates are conducted on an irregular basis.

⁴⁹ Hendron, R., NREL: *Building America Research Benchmark Definition*. December 2008: <http://www.nrel.gov/docs/fy08osti/42662.pdf>

⁵⁰ ANSI/ASHRAE/IESNA Standard 90.1-2004, *Energy Standard for Buildings except Low-Rise Residential Buildings*. 2004: <http://www.ashrae.org/>

National building codes (windows).

- Frequency: Completion of revalidation of assumptions and results can take place every three to four years due to the reporting cycle of two crucial publications: CBECS and RECS. However, updates of most of the baseline forecast and BTP outputs will be undertaken annually.
- Evaluation: BTP uses several forms of evaluation to assess progress and to promote program improvement:
- Technology validation and operational field measurement, as appropriate;
 - Peer review by independent outside experts of program and subprogram portfolios;
 - Annual internal technical and management reviews of program and subprogram portfolios;
 - Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate;
 - Quarterly and annual assessment of program and management results-based performance through the Performance Measurement Manager (PMM);
 - Peer reviews as needed when evaluating go/no go decision points in each research area;
 - Annual review of methods, and re-computation of potential benefits for Government Performance Results Act (GPRA); and
 - Continuing to conduct and build upon the transparent oversight and performance management initiated by Congress and the Administration.
- Data Storage: EIA and DOC data sources are publicly available. Trade publications are available on a subscription basis. BTP output information is contained in various reports and memoranda.
- Verification: Calculations are based on assumptions of future market status, equipment or technology performance, and market penetration rates. These assumptions can be verified against actual performance through technical reports, market survey and product shipments.

Industrial Technologies

Mission

The mission of the Industrial Technologies Program (ITP) is to significantly increase the energy productivity (output per unit of energy) and reduce the carbon intensity of the U.S. industrial sector by partnering with industry to research and develop advanced manufacturing technologies and accelerate industrial adoption of energy saving, environmentally friendly technologies and practices.

Overview

The Industrial Technologies Program supports the Strategic Program Measure “amount of industrial energy saved in Btu.” This measure is a critical outcome of the DOE strategies to drive energy efficiency to reduce demand growth as well as accelerating energy innovation through precompetitive research and development.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Energy Efficiency and Renewable Energy /Industrial Technologies (EE3)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
[NEW] Number of next-generation materials and manufacturing process technologies demonstrated in a proof of concept and moved forward along the technology development pipeline.	n/a	n/a	n/a	T: 2	Reduce the life-cycle energy cost of 10 new materials by a minimum of 25% over 10 years
[NEW]Cumulative number of manufacturing facilities certified in Superior Energy Performance by ANSI-accredited bodies.	n/a	n/a	n/a	T: 25	Cumulative energy savings of 3tBtus over the three year certification period.
[NEW]Number of new industrial energy efficiency engineers and managers finding permanent employment in the industry.	n/a	n/a	n/a	T: 200	Meet the market demand each year for industrial energy efficiency engineers and managers
[NEW] Cumulative number of new manufacturing systems technologies (or sets of related technologies) that save more than 25 percent energy per unit output compared with conventional processes – developed and demonstrated by university-based consortia centers focusing on clean energy manufacturing (Manufacturing Energy Systems Program).	n/a	n/a	n/a	T: 4	By 2020, demonstrate 15 or more new manufacturing systems technologies that each save a minimum 25% energy per unit output compared with conventional processes
Commercialize 2 new industrial technologies in partnership with the most energy-intensive industries that improve energy efficiency of an industrial process or product by at least 10 percent.	T: 3 R: 3	T: 2 R: 2	T: 2	T: RETIRED	
Achieve an estimated 100 trillion Btus energy savings from applying EERE technologies (trillion Btu).	T: 100 R: MET	T:100 R: MET	T:100	T: RETIRED	

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Achieve an estimated 100 trillion Btus energy savings from applying EERE technologies (trillion Btu). Annually impact 600 energy-intensive plants. ⁵¹ (TBtus/number of energy intensive plants)	T: 100/600 R: MET	T: RETIRED R: n/a	n/a	n/a	
[NEW] Cumulative number of new manufacturing processes that save a minimum of 25 percent energy compared with conventional manufacturing processes (Next Generation Manufacturing Processes program).	n/a	n/a	n/a	T: 2	Reduce energy intensity in the industrial sector by a minimum of 25% over 10 years

Means and Strategies

ITP's activities stimulate innovative technology research and accelerate market uptake of highly energy-efficient industrial technologies and practices. ITP will use various means and strategies to meet its near and long-term performance goals. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

ITP implements its R&D portfolio through the following means:

- Investing in pre-competitive and high-risk RD&D that will radically increase the energy productivity and reduce carbon emissions of U.S. industry and for which individual companies are unable to undertake without government support;
- Sharing project costs with multiple industrial and academic partners (industrial partners typically contribute 20 to 50 percent) to leverage public investment with private resources, increases access to scientific capabilities, increases industry commitment to achieving R&D success, shortens the technology development and commercialization cycle, and facilitates technology delivery; and
- Using expert technical staff from the National Laboratories to help identify priorities and develop strategies within their areas of expertise.

ITP's strategies to meet its objectives include the following:

- Harness expertise from industry, academia, and the National Laboratories to identify the disruptive new technologies, critical materials, and processing innovations required to enable large-scale use of ultra-efficient, clean energy manufacturing and low-carbon production of goods that will succeed in global markets.
- Conduct technical assistance activities to help plants access and apply the most efficient technologies and implement effective energy management practices.

The following external factors could affect ITP's ability to achieve its goals:

- Industry's economic health and profit margins;
- Rates of market growth/technology adoption and adoption rates of technologies;

⁵¹ "Impacted" refers to the number of unique plants receiving EERE energy information or applying EERE energy technologies and practices.

- Labor and material costs, capital investment requirements, cost of technologies, and foreign competition;
- Energy supply markets and prices; and
- Safety and environmental regulations; and environmental policies at the national and State level, including Federal efforts to reduce carbon and criteria emissions.

Collaborations are integral to achieving the planned investments, means and strategies, and for addressing external factors. ITP performs the following collaborative activities:

- ITP's R&D activities heavily leverage the intellectual property and knowledge of the National Laboratories. ITP also leverages its resources with DOE's Office of Science Basic Energy Sciences and the Department's Advanced Research Projects Agency – Energy (ARPA-E) to translate scientific discoveries in nanotechnology, chemistry, and materials science into technology solutions. ITP funding in materials supports the Department's Materials in Extreme Environments crosscutting initiative, and also will be coordinated with EERE's Vehicle Technologies Program. In clean energy manufacturing, ITP partners with EERE programs to independently develop viable manufacturing technologies for advanced energy technologies, including Wind Energy, Solar Energy, and Vehicle Technologies. For manufacturing processes, ITP coordinates with ARPA-E, EERE's Hydrogen and Fuel Cells Technology Program on fuel cell activities, and the U.S. Environmental Protection Agency (EPA) regarding combined heat and power;
- Participates with the National Science and Technology Council interagency working group on nanomanufacturing, and with National Institute of Standards and Technology (NIST), Department of Defense (DoD), and other agencies on areas of common interest such as advanced materials;
- Leverages its partnerships with NIST, EPA, and utilities in the implementation of its *Save Energy Now* LEADER partnership;
- Forms coalitions with regional groups resulting in a series of industrial energy efficiency summits with associated industries, utilities, States, and other stakeholders; establishes the foundations for a commitment to increase industrial energy productivity and reduce carbon emissions;
- Partners with states and regional entities, providing a State Incentives and Resources Database, Energy Saving Assessments, and events and training;
- Partners with academia to train the next-generation of energy engineers;
- Works with industry and American National Standards Institute (ANSI) to develop standards for facility level comprehensive energy management (ISO 50001), and measurement and verification;
- Collaborates with FEMP and ENERGY STAR on Energy-Efficient Data Centers; and
- Works with several utility trade groups to establish a program which will utilize energy efficiency options to slow electric and gas demand.

The program will leverage its planning, analysis and deployment funds by collaborating with EERE's Strategic Programs in activities that maximize the effectiveness of both program and corporate activities for EERE and DOE. Efforts such as integrated strategic planning and analysis, green job training and education, collaborative cross-cutting initiatives and technology sector futures studies leverage both program and corporate funding. These efforts will continue

to reduce unnecessary overlap to ensure program activities are focused cost effectively and seamlessly toward Departmental goals.

Validation and Verification

To validate and verify program performance, ITP will report and manage its performance plan and conduct internal and external reviews and audits. These programmatic activities are subject to continuous review by the Congress, the General Accountability Office, the DOE Inspector General, the EPA, and State environmental agencies. ITP also undertakes analyses to address GPRA. Progress toward annual performance targets and results are also tracked on a quarterly basis through the DOE's Performance Measurement Manager (PMM).

- Data Sources:
- Energy productivity is calculated from the Energy Information Administration's (EIA's) Annual Energy Outlook, the Manufacturing Energy Consumption Survey (MECS), and Department of Commerce (DOC) data.^{52,53}
 - The number of students participating in the Industrial Assessment Center program, facilities certified by ANSI-accredited bodies, and Manufacturing Energy Systems centers are collected by the program.
 - R&D projects and their associated Technology Readiness Levels are tracked by the program.
 - The number of technologies and their energy savings are ascertained through interviews with technology developers and suppliers, and commercially available products developed through ITP funding are recorded in the IMPACTS document.
 - Energy savings for the technical assistance programs are estimated based upon past reported participant data and plant energy assessments.

- Evaluation: In carrying out the program's mission, ITP uses several forms of evaluation to assess progress and to promote program improvement:
- Technology validation and operational field measurement, as appropriate;
 - Peer review by independent external experts of the program and subprogram portfolios;
 - Annual internal Technical Program Review of ITP;
 - Continue to conduct the transparent oversight and performance management initiated by Congress and the Administration;
 - Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate;
 - Annual review of methods, and re-computation of benefits for GPRA; and
 - Quarterly and annual assessment of program and management results based performance through PMM; annual departmental and Program Secretarial Officer (PSO) based goals whose milestones are planned, reported and reviewed quarterly.

⁵² EIA Annual Energy Outlook, available at <http://www.eia.doe.gov/oiaf/aeo/>

⁵³ EIA Manufacturing Energy Consumption Survey, available at <http://www.eia.doe.gov/emeu/meecs/>

- Baselines:** The following are the key baselines used in ITP for contributions to its program goal:
- Industrial energy productivity: value of manufacturing shipments (\$2010)/Btu.
- Frequency:** EIA/MECS collects energy data once every four years, and ITP makes annual estimates based upon data from annual Department of Commerce (DOC) surveys. ITP collects data on energy savings and technologies commercialized annually.
- Data Storage:** Energy information is contained in EIA's computer database. Data on energy savings and technologies commercialized are stored in ITP's Impacts Database. Data on technical assistance activities is collected by Oak Ridge National Laboratory.
- Verification:** ITP uses prospective and retrospective peer reviews to evaluate project performance and to adjust support. To verify program performance and results, ITP tracks all technologies commercialized (and the extent of their use) by industry through an analysis of program impacts conducted by the Pacific Northwest National Laboratory. ITP also provides EIA quality control and outside peer review of the Manufacturing Energy Consumption Survey. Industry representatives review data on energy savings and technologies commercialized. ITP conducted reviews of the impacts of several technical programs and assistance programs have also been reviewed several times.

Federal Energy Management Program

Mission

The Federal Energy Management Program (FEMP) facilitates the Federal government's implementation of sound, cost effective energy management and investment practices to enhance the Nation's energy security and environmental stewardship. By increasing its use of energy efficiency and renewable energy, the Federal sector leading by example, will reduce its GHG emissions, and will meet more of its energy requirements from clean technologies and secure sources.

Overview

Saving energy (Btus) in the Federal Sector will help reduce Federal operating cost and greenhouse gas emissions (MMTCO₂). Furthermore, it will enable the Federal Government to be a leader in sustainability which will help catalyze the timely, material, and economic transformation of the nation's energy system and secure U.S. leadership in clean energy technologies. The Federal Energy Management Program furthers these goals through alternative financing contract support, technical assistance and training, coordination of Federal reporting

and evaluation, and supporting the introduction of advanced technologies into the Federal vehicle fleet.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Leading the national conversation on energy					
Strategy: Make the Federal Government a Leader in Sustainability					
Program: Energy Efficiency and Renewable Energy / Federal Energy Management Program (EE28)					
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Federal Energy Management Program					
[NEW] Cumulative lifecycle savings enabled in Federal facility energy use through alternative financing or technical assistance since 2010. ⁵⁴ (Trillion British Thermal Units (TBtus) saved over the lifetime of the installed energy savings measures)	n/a	n/a	n/a	T: 52	28% greenhouse gas reduction by 2020 (equivalent to approximately 117 TBtus less annual facility energy in 2020 than in 2008); and Energy Intensity Reduction of 30% by 2015 across the Federal sector (equivalent to approximately 59 TBtus less annual facility energy in 2015 than in 2010)
The previous year performance measures for this subprogram are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2011: Enable the additional lifecycle savings of 54 trillion Btus (TBtus) in Federal facility energy use through alternative financing, technical assistance. (British Thermal Units) FY 2010: Estimated lifecycle energy savings expected in Federal agencies' facilities as a result of FEMP activities are 50.0 trillion Btus (TBtu). FEMP's facilitation activities include alternative financing and technical assistance. These savings should result in about a 0.7 percent annual reduction in energy intensity. FY 2009: Estimated lifecycle energy savings expected in Federal agencies' facilities as a result of FEMP activities are 34.4 trillion Btus (TBtu). FEMP's facilitation activities include alternative financing, technical assistance, and directly funded energy efficiency projects within the Department. These savings should result in about a 0.5 percent annual reduction in energy intensity	T: 34.4 R: MET	T: 50.0 R: MET	T: 54	T: Retired	

⁵⁴ The amount of lifecycle Btus saved in FY 2012 is projected to be less than the projected amount in FY 2011, consistent with the reduced budget request.

Means and Strategies

FEMP will use various means and strategies to enable the Federal government to achieve its cost reduction goals, create jobs and be a leader in sustainability. FEMP will implement the following means to include operational processes, resources, information, and the development of technologies:

- Implement cost savings projects at Federal facilities;
- Provide the ability for alternative financing programs (i.e., ESPC-UESC) within Federal agencies;
- Develop policy and guidance to achieve Executive Order and legislative requirements;
- Demonstrate new, innovative technologies in the Federal sector; and
- Analyze data and report on the progress of the Federal government, and use this information to further cost reduction strategies.

FEMP will implement the following strategies to include program, policy, management and legislative initiatives and approaches:

- Identify high impact opportunities across Federal agencies for energy efficiency improvements and increase the use of renewable energy;
- Deploy these opportunities through coordinated procurement, alternative financing or other means, including renewable energy technologies where appropriate;
- Improve the effectiveness of these opportunities by leveraging the Interagency Working Group, the Interagency Sustainability Working Group, the Federal Utilities Partnership Working Group and the Interagency Renewables Working Group for greater overall results;
- Leverage FEMP's planning, analysis and deployment funds by collaborating with EERE's Strategic Programs in activities to maximize effectiveness of both program and corporate activities for EERE and DOE; and
- Partner with the Sustainability Performance Office (SPO) in implementing the Department-wide SSPP as necessary.

The following external factors could affect FEMP's ability to achieve its strategic goal:

- Availability of energy management personnel at Federal sites;
- Mission changes at Federal sites that could change building usage; and
- Significant changes in energy price that would affect the focus on energy conservation.

Validation and Verification

FEMP conducts ongoing internal reviews of its program activities each year. FEMP provides a report to Congress every year on the progress of Federal agencies toward reaching their respective energy efficiency and renewable energy goals.

Data Sources: Agencies submit annual reports to DOE documenting energy use in buildings, costs, gross square footage and exempt facilities. FEMP compiles this information in a report to Congress each year. For the Federal vehicle fleet activity, agencies enter fleet and fuel use data into the Federal Automotive Statistical Tool (FAST) database.

Baselines:	The baseline for the energy efficiency goal for Federal facilities of EPAct 2005, E.O. 13423 and DOE Order 430.2B is the FY 2003 energy intensity of standard and energy intensive Federal buildings – 126.627 Btu per square foot (for the entire government). As established by E.O. 13423 (which also applies to the DOE Order 430.2b), the baseline for the Federal vehicle fleet is the amount of Federal petroleum usage in 2005 – 420 million gallons of gasoline equivalent.
Frequency:	Annual.
Evaluation:	In carrying out its mission, FEMP uses several forms of evaluation to assess progress and to promote program improvement: <ul style="list-style-type: none"> ▪ Peer review by independent outside experts of both the program and subprogram portfolios; ▪ Annual internal program reviews; ▪ Quarterly and annual assessment of program and management results based performance through the Performance Measurement Manager (PMM, the DOE quarterly performance progress review of budget targets); and
Data Storage:	FEMP maintains a database of reported information. Agencies maintain their own detailed data which they submit to the EISA 432 database.
Verification:	External audits are conducted each year. Reporting anomalies are identified and resolved during the annual reporting cycle.

Weatherization and Intergovernmental Activities

Mission

The mission of the Weatherization and Intergovernmental Activities Program (WIP) is to significantly accelerate, in partnership with State and local organizations, the deployment of energy efficiency and renewable energy technologies and practices by a wide range of Government, community, and business stakeholders.

Overview

Energy Saved (Btus) Strategic Program Measure supports the Strategic Plan strategy to drive energy efficiency and reduce demand growth. WAP also directly contributes to the HPPG one million homes energy retrofit measure.

WIP supports the implementation of energy efficiency projects in the buildings, industry, transportation, and utility sectors. Activities include:

- Sponsoring residential energy retrofits for low-income families;
- Encouraging energy efficiency retrofits of public buildings;

- Fostering new approaches for financing energy efficiency improvements;
- Preparing thousands of workers for careers in residential energy and other energy-related fields; and
- Developing and sharing effective energy technology, policy assessment and planning tools.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Drive energy efficiency and reduce demand growth					
Program: Energy Efficiency and Renewable Energy /Weatherization (EE1)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Subprogram: Weatherization Assistance					
Weatherize homes using DOE funds ⁵⁵	T: 52,360 R: 95,821	T: 22,168 R:24,492	T: 33,484 ⁵⁶	T: 50,609	1 million retrofits by the end of 2013.
Strategic objective: Technology Deployment					
Strategy: Drive energy efficiency and reduce demand growth					
Program: State Energy Program (EE2)					
Subprogram: State Energy Program					
Achieve an average annual energy savings (in trillions of Btus) from DOE funded projects ⁵⁷	T: 6-7 R: 8.8	T: 6-7 R: 10.95	T: 5.2	T: 4.2 ⁵⁸	Cumulative lifetime cost savings of \$94.2 billion and cumulative carbon savings of 300 million metric tons of CO2 by 2020

Means and Strategies

WIP will utilize the following means and strategies to achieve its GPRA Unit Program goals. However, various external factors and collaborative activities may impact the program’s ability to reach these goals.

WIP will implement the following means:

- Provide technical assistance targeting high priority energy needs and expanding clean energy choices for citizens and businesses;
- Use competitive grants to support high impact and innovative energy efficiency and renewable energy projects;
- Use formula grants to support core capabilities of States and weatherization offices;
- Assist with feasibility studies and implementation planning on specific energy efficiency and renewable energy projects and policies; and

⁵⁵ From FY 2007 to FY 2010 home weatherization targets were based on the annual formula funding appropriation.

⁵⁶ The FY 2013 – FY 2016 targets are based on an annual funding amount of \$200M.

⁵⁷ The energy saving targets and success measurements are based on a methodology developed by ORNL in: Estimating Energy and Cost Savings and Emissions Reductions for the State Energy Program Based on Enumeration Indicators Data (January 2003); and An Evaluation of State Energy Program Accomplishments Program Year 2002 (June 2005). The SEP National Evaluation currently underway will focus study on quantifying energy, cost, and demand savings; job creation; renewable energy generation and carbon reduction. Interim reports are due out in mid 2011.

⁵⁸Target value may be modified based on improved accuracy of this measure. A national study is underway to provide an improved measurement of energy savings which is expected to be completed by November 2011.

- Develop assessment, planning, and decision-making tools to facilitate clean energy technology delivery.

WIP will implement the following strategies:

- Form partnerships with program participants focusing on energy market transformation, sustainable energy integration, and clean energy deployment;
- Leverage Federal dollars by requiring or attracting State, local and private sector matching funds on a more than one to one basis;
- Develop new innovative models to leverage Federal weatherization resources;
- Establish policies and practices that encourage conservation and the expansion of renewable energy through collaborations with national and regional organizations representing key decision-makers (e.g., governors, mayors, State legislators, end users, and product and service providers);
- Improve cost effectiveness and technological innovation in the residential energy retrofit process and standards; and
- Expand the training, including certification, for thousands of workers in residential energy retrofits and other energy-related fields.

The following external factors could affect the achievement of these benefits:

- Rates of market growth/technology adoption;
- Capital investment requirements;
- Energy supply markets and prices;
- Costs and adoption of technologies;
- Partner cost share and participation rates; and
- Geopolitical changes.

In carrying out the program's mission, WIP collaborates with several groups on key activities:

- WIP coordinates with the EERE, Buildings Technology Program (BTP) and participates in an MOU with Housing and Urban Development (HUD) to develop integrated home energy rating and energy audit processes;
- WAP and SEP work closely with all 50 States, the District of Columbia, local governments, U.S. Territories, other Federal agencies and national stakeholder groups; and
- Tribal Energy coordinates activities with the 565 federally recognized Tribes and collaborates with the Bureau of Indian Affairs, the Federal Interagency Working Group on Environmental Justice, and the Federal Interagency Working Group on Tribal Renewable Energy Development and Energy Efficiency.
- The program will leverage its planning, analysis and deployment funds by collaborating with EERE's Strategic Programs in activities that maximize resource effectiveness of both program and corporate activities for EERE and DOE.

Validation and Verification

To validate and verify program performance, WIP will conduct internal and external reviews and audits. These programmatic activities are subject to continuing review as described below.

Data Sources:	The Energy Information Administration's (EIA) Annual Energy Review (AER); Renewable Energy Annual and Annual Energy Outlook; Commercial Building Energy Consumption Survey (CBECS); Residential Energy Consumption Survey (RECS); DOE Laboratory reports; and information collected directly from WIP performers or partners.
Baseline:	<ul style="list-style-type: none">▪ The SEP baseline of 1990 state energy consumption was established in EPAct 2005 as part of an overall goal for a 25 percent increase in energy efficiency by 2012. This baseline will be updated as part of the findings from a major national evaluation to be completed in FY 2012.▪ Between FY 2000 and FY 2020, the key Tribal Energy objective is a 200 MW increase in renewable energy capacity on tribal lands. The Tribal Energy baseline is renewable energy capacity on tribal lands.
Frequency:	Annual: Complete revalidation of assumptions and results take place every three to four years, due to the reporting cycle of two critical publications, CBECS and RECS. However, updates of most of the baseline forecast and WIP outputs are undertaken annually.
Evaluation:	WIP uses several forms of evaluation to assess progress and to promote program improvement. <ul style="list-style-type: none">▪ Operational field measurement as appropriate;▪ National evaluations of SEP and WAP to improve benefit estimates and performance decisions;▪ Peer review by independent outside experts of both the program and subprogram portfolios;▪ Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate;▪ Quarterly and annual assessment of program and management results based on performance through the Performance Measurement Manager (PMM, the DOE quarterly performance progress review of budget targets); Annual Departmental and Program Secretarial Officer (PSO) based goals whose milestones are planned, reported and reviewed quarterly); and Annual review of methods, and re-computation of potential benefits for GPRA;▪ Continue to conduct and build upon the transparent oversight and performance management initiated by Congress and the Administration; and▪ Continue to quantitatively measure grantee progress through WIP Project Officers use of an integrated reporting, monitoring, and validation system.

Data Storage: EIA data sources are available on line. Trade publications are available on a subscription basis. WIP output information is contained in DOE information systems and various reports and memoranda. Reviews and analyses conducted by Oak Ridge National Laboratory (ORNL) are available on line at: http://www.ornl.gov/info/reports/ORNL_reports.shtml.

Verification: Calculations are based on assumptions of future market status, equipment or technology performance, and market penetration rates. These assumptions can be verified against actual performance through technical reports and market surveys. SEP based results on an assessment of program outcomes conducted by ORNL whose methodology was independently reviewed in FY 2005 by the Board of Directors of the International Energy Program Evaluation Conference. Tribal Energy subprogram maintains project information and receives data from individual tribal governments. The most recent peer review was completed in 2006. The next review is scheduled for 2011. EIA data undergo regular verification reviews.

Hydrogen and Fuel Cell Technologies

Mission

The mission of the Hydrogen and Fuel Cell Technologies (HFCT) Program is to reduce petroleum use, greenhouse gas (GHG) emissions, and criteria air pollutants, and to contribute to a more diverse energy supply and more efficient energy use by enabling the widespread commercialization of hydrogen and fuel cell technologies. The program pursues this mission through research, development, demonstration, and deployment (RDD&D) activities, with the key goals of advancing these technologies to be competitive in terms of cost, reliability and performance, and reducing the institutional and market barriers to their widespread commercialization.

Overview

Fuel Cell Systems R&D, Hydrogen Fuel R&D, and Safety, Codes and Standards performance measures support the Strategic Program measures of reducing cumulative greenhouse gas emissions (MMT CO₂) and cumulative net oil imports (billion of barrels). Achieving the goals for fuel cell specific power, capital cost reduction for renewable hydrogen production and the underlying research for new codes and standards will enable the market penetration of fuel cells for clean energy generation and the resulting reduction in GHGs and petroleum imports.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Energy Efficiency and Renewable Energy /Hydrogen and Fuel Cell Technologies (EE8)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Sub-program: Fuel Cell Systems R&D					
Improve the catalyst specific power of fuel cells, as measured in units of kW per gram of platinum group metal, from 2.8 kW/g in 2008 to 8.0 kW/g in 2016. (kW/g) ⁵⁹	n/a	T: 3.0 R: 5.0	T: 5.5	T: 5.7	8.0 kW/g in 2017
The current performance measure was created in FY 2011 for the new sub-program, Fuel Cell Systems R&D, which consolidates Fuel Cell Stack Components R&D, Transportation Fuel Cell Systems, Distributed Energy Fuel Cell Systems and Fuel Processor R&D. The previous year performance measures for this sub-program are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY 2009: DOE-sponsored research reduced the modeled technology cost of a hydrogen-fueled 80kW fuel cell power system to \$60/kW. Reducing automotive fuel cell costs accelerates the market viability and deployment of fuel cell technologies, which contributed to the Department's goal of increased energy security and reduced greenhouse gas and pollutant emissions.	T: \$60/kW R: MET	T: RETIRED R: NA	n/a	n/a	
Sub-program: Hydrogen Fuel R&D					
Relative to the 2010 baseline ⁶⁰ , decrease the capital cost for hydrogen production using renewable resources. (percent decrease)	n/a	n/a	T: 10%	T: 25%	65% by 2016
The previous year performance measures for this sub-program are not direct predecessor measures to the FY 2012 performance measure. These measures included below enabled the progress necessary to support the FY 2012 performance measure. FY2010: Conducted down-select decision on advanced hydrogen storage materials that are projected to meet 2010 revised targets of 0.9 kWh/L and 1.5 kWh/kg when packaged in a system.	T: RETIRED R: n/a	n/a	n/a	n/a	

⁵⁹ As of January 21, 2010, the April futures price for platinum was \$1,600 per troy ounce (roughly \$52 per gram). Usage of platinum for an 80 kW fuel cell stack would be 29g at the 2008 level of 2.8 kW/g; achievement of the FY 2016 goal would reduce that to 10g, leading to a cost reduction of nearly \$1, 000 at the January 21, 2010 April futures platinum price, not including the processing cost for the platinum-based catalyst. The reference cost of \$1,100/troy oz has been used as a consistent standard.

⁶⁰ There are three pathways that may be addressed. The 2010 baseline capital cost components were: Electrolysis, \$1.65/gge (gallon of gasoline equivalent); Aqueous phase reforming, \$2.00/gge; Pyrolysis oil reforming, \$2.45/gge.

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Sub-program: Safety, Codes & Standards					
By 2016, complete the underlying research to enable development of 7 regulations, codes and standards, to accelerate deployment of hydrogen and fuel cell technologies. ⁶¹ (Percentage of R&D completed as determined through formal merit review of the program, by assessing progress on key activities)	n/a	n/a	n/a	T: 20%	100% of R&D completed by 2016

Means and Strategies

HFCT will use various means and strategies to achieve its GPRA Unit Program goals as described below. “Means” include operational processes, resources, information, and the development of technologies, and “strategies” include program, policy, management and legislative initiatives and approaches.

HFCT leverages its R&D activities by collaborating with other complementary programs within and outside DOE. For details, please see the Collaboration and Coordination section below.

HFCT employs the following strategies to accomplish its goals:

HFCT sub-programs have established cost, performance and/or durability goals to enable hydrogen and fuel cell technologies to be competitive with alternate technologies. For example, for stationary fuel cell systems to be competitive, the cost target is \$750/kW, and the durability target is 40,000 hours. To meet these goals, the sub-programs use a competitive selection process to award projects to National Laboratories, universities and industry, and make use of programmatic, policy and legislative approaches in accordance with the Energy Policy Act of 2005 (EPA 2005) and EISA to achieve GPRA Unit goals.

The following external factors could affect the ability of the HFCT program to achieve these long-term goals and benefits:

- Fuel availability: Successful deployment of fuel cells will depend on adequate availability of the appropriate fuels for each type of fuel cell.
- Market appeal of fuel cells: The interest of consumers and businesses in using fuel cells as a substitute for less-efficient power sources will depend in part on the price of conventional sources of energy, such as gasoline and diesel fuel. Historically fluctuating oil prices have not provided a consistent signal to either buyers or manufacturers.

HFCT leverages its R&D activities by collaborating with other complementary programs within and outside of DOE.

- HFCT coordinates across five DOE Offices: EERE, Science, Nuclear Energy, Fossil Energy, and Electricity Delivery and Energy Reliability. HFCT is the DOE fuel cell lead and

⁶¹ The seven codes and standards are currently expected to include one Global Technical Regulation, one comprehensive national code, and five critical component standards.

coordinates RD&D planning, budget formulation and execution, and peer review.

- Within EERE, the program collaborates with the VTP, Biomass and Biorefinery R&D, Solar Technologies, Wind Energy, Water Power, Buildings, Industrial and Federal Energy Management programs.
- Hydrogen and Fuel Cell Interagency Task Force: HFCT participates in the Task Force in accordance with EPAct 2005, to leverage and coordinate Federal resources and activities.
- IPHE: HFCT is DOE's primary representative to the IPHE, which strives to leverage R&D capabilities globally.
- FreedomCAR and Fuel Partnership: DOE (represented by VTP and HFCT) participates in the Partnership with the U.S. Council for Automotive Research (USCAR), five energy companies, and two utilities. The Partnership focuses on precompetitive high-risk research necessary to provide a full range of affordable energy-efficient cars and passenger trucks, and their fueling infrastructure. Fuel cell vehicles represent the long-term end of the R&D spectrum coordinated through the Partnership.
- The program will leverage its planning, analysis and deployment funds by collaborating with EERE's Strategic Programs in activities that maximize the effectiveness of both program and corporate activities for EERE and DOE. Efforts such as integrated strategic planning and analysis, green job training and education, collaborative cross-cutting initiatives and technology sector futures studies leverage both program and corporate funding. These efforts will continue to reduce unnecessary overlap to ensure program activities are focused cost effectively and seamlessly toward Departmental goals.

Validation and Verification

To validate and verify program performance, the program conducts internal and external reviews and audits. Programmatic activities are subject to continuing review by, for example, Congress, the Government Accountability Office, the National Academies, DOE's Inspector General, as well as by reviewers from other agencies, such as the EPA and State environmental agencies through HFCT's Annual Merit Review and Peer Evaluation process. Specific milestones, go/no-go decision points, and technical progress are systematically reviewed through the program's merit review process and independent assessments.

Data Sources: Merit Review and Peer Evaluation of R&D,⁶² Program Peer Reviews, and independent assessments are conducted;
Engineering models and experimental results to validate technical progress, with documentation provided through quarterly and annual reports;
Learning demonstration activities (through FY 2009) also verify and validate technical progress towards meeting targets and help guide R&D; and
Summary program plans and annual presentations by the program are used to communicate the status of verification/validation activities and to evaluate proposed approaches towards meeting technical targets.

Baselines: The following are the key baselines used in HFCT:
Compressed hydrogen tank-only storage (2003): 1.3 kWh/kg (3.9 percent by weight) and 0.6 kWh/L system capacity
Solid state materials for storage systems (2003): 1 percent by weight system capacity and 0.5 kWh/L
Transportation systems/stack component R&D (2002): \$275/kW fuel cell cost
Distributed energy systems/fuel processor R&D (2002): 29 percent electrical efficiency
Technology validation (2003, laboratory): 1,000 hours durability of fuel cell vehicle systems
Validated production (delivered) (2004): \$3.60/gge (beginning of life testing)
Catalyst specific power in fuel cells (2008, laboratory): 2.8 kW/gram
Capital cost reduction (percentage) for hydrogen production using renewable resources (2010, projected commercialized). There are three pathways that may be addressed. The 2010 baseline capital costs are:
Electrolysis: \$1.65/gge;
Aqueous phase reforming: \$2.00/gge; and
Pyrolysis oil reforming: \$2.45/gge.
Total power capacity of new fuel cells placed in use each year, in megawatts: baseline will be determined in FY 2011.

Frequency: Expected results and benefits of the budget are estimated annually in response to GPRA; merit review and peer evaluation of R&D projects and program peer review are conducted biennially. Quarterly reports are submitted to DOE Technology Development Managers. Summary program plans are submitted annually.

Data Storage: EERE Corporate Planning System

Evaluation: The program uses several forms of evaluation to assess progress and to promote program improvement:

⁶² 2009 Annual Merit Review and Peer Evaluation Report, U.S. Department of Energy, October 2009.
http://www.hydrogen.energy.gov/annual_review.html.

Transparent oversight and performance management initiated by Congress and the Administration.

Technology validation and operational field measurement, as appropriate.

Peer review by independent outside experts of both the program and sub-program portfolios.

Annual internal Technical Program Review of the program.

Specialized program evaluation studies to examine process, impacts, or market baseline and effects, as appropriate.

Quarterly and annual assessment of program and management results based on PMM.

Annual review of methods, and recomputations of potential benefits for GPRA.

The Hydrogen and Fuel Cell Technical Advisory Committee (HTAC) reports regularly on recent significant accomplishments. In *The State of Hydrogen and Fuel Cell Commercialization and Technical Development*,⁶³ published in 2009, HTAC noted as specific examples of recent progress that, “In 2008, 3M Inc. announced that their membrane electrode assembly ... operated over 7,300 hours with load cycling, and Plug Power announced that it had reached 10,000 hours in field operation of their fuel cell packs designed for forklift duty cycles. These are major steps forward...”

The National Academies' “Review of the Research Program of the FreedomCAR and Fuel Partnership—Second Report” (August 2008) noted that the Partnership “is well planned, organized and managed. It is an excellent example of an effective industry/government cooperative effort ...”⁶⁴

Merit reviews and peer evaluations, conducted by energy and fuel cell experts from outside of DOE, are held to evaluate RD&D projects to ensure that priorities and key technology barriers identified in the program’s planning documents are addressed.

In a report released February 11, 2008, the GAO commended DOE for making important R&D progress, for effectively aligning its R&D priorities with industry, and for working with other agencies in coordinating activities and facilitating scientific exchanges.⁶⁵ GAO recommended that program plans be updated to provide an overall assessment of what DOE reasonably expects to achieve by its technology readiness date.

The program develops and implements planning documents and supports the development of technology roadmaps with industry.⁶⁶ These efforts are used to focus the program’s investments on activities that are within the Federal government’s role and that address top priority needs.

Energy and fuel cell industry experts review each university, laboratory, and industry project at the annual Merit Review and Peer Evaluation. Consistent with the principles of the R&D Investment Criteria, project peer reviews include evaluation of: 1) relevance to overall DOE and HFCT objectives; 2) approach to performing the

⁶³ 2008 Annual Report of The Hydrogen and Fuel Cell Technical Advisory Committee. Released May/June 2009: http://www.hydrogen.energy.gov/pdfs/2008_hftac_annual_report.pdf

⁶⁴ Page 4 of the Summary: http://www.nap.edu/openbook.php?record_id=12113&page=4

⁶⁵ “Hydrogen Fuel Initiative: DOE Has Made Important Progress and Involved Stakeholders but Needs to Update What It Expects to Achieve by Its 2015 Target,” United States Government Accountability Office, January 2008. <http://www.gao.gov/new.items/d08305.pdf>

⁶⁶ Links to program plans, roadmaps and vision documents can be found at <http://www.hydrogen.energy.gov/library.html>.

work; 3) technical accomplishments and progress toward project and DOE goals; 4) and coordination and collaboration with industry, universities, and/or laboratories; and 5) approach and relevance of proposed future work. The panel also evaluates the strengths and weaknesses of each project, and recommends additions to or deletions from the scope of work.

Most projects are also evaluated by the FreedomCAR joint technical teams each year. The program facilitates supplier-customer relationships to ensure that R&D results from National Laboratories and universities are transferred to industry suppliers, and that industry supplier developments are made available to automakers, energy industry, and stationary power producers.

Reviews are conducted by the Hydrogen Safety Panel to monitor the safety of procedures and facilities throughout the program.

Verification: Quarterly reports from DOE-funded industry, university, and National Laboratory partners document the status of quarterly targets and milestones. An Annual Report is used to evaluate progress towards meeting program goals and technical targets. Independent assessments will be conducted by the Systems Integration activity to evaluate research results.

Appendix C: Loan Programs Office

Advanced Technology Vehicles Manufacturing Loan Program

Mission

The [Advanced Technology Vehicles Manufacturing](#) (ATVM) Loan Program provides direct loans to eligible automobile manufacturers and component suppliers for projects that reequip, expand, and establish manufacturing facilities in the United States to produce light-duty vehicles and components for such vehicles, which provide meaningful improvements in fuel economy performance beyond certain specified levels. Section 136 also allows these grants and loans to cover engineering integration costs associated with such projects.

The total budget request for the ATVM Loan Program is \$6 million in FY 2012. Details on DOE's FY 2012 Congressional Budget Request for the ATVMATVM Loan Program are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume2.pdf>.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Demonstrate and Deploy Clean Energy Technologies					
Program: Advanced Technology Vehicles Manufacturing (LP12)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
[NEW] Battery production capacity of 120,000 lithium-ion PHEV batteries (1,200,000 kWh) established.	n/a	n/a	n/a	T: 120,000	(HPPG Goal) Assist in the development and deployment of advanced battery manufacturing capacity to support 500,000 plug-in hybrid electric vehicles a year by 2015.
[NEW] Reduction in petroleum usage (in millions of gallons of fuel per year) achieved through the use of advanced technology vehicles manufactured (at least in part) with funding provided through the ATVM loan program as compared to vehicles available in the base year.	n/a	n/a	n/a	T: 150	Net Oil Imports (mmbpd)
[NEW] Loss rate of loans.	n/a	n/a	n/a	T: 4%	Provide loan guarantees for innovative clean energy projects in categories including renewable energy systems, advanced nuclear facilities, coal gasification, carbon sequestration, energy efficiency, and various other types of projects.
Percentage of funded projects manufacturing advanced technology vehicles manufacturing vehicles or components 3, 5, and 10 years after loan disbursement.	n/a	n/a	T: 5%	T: Retired	
Increase in production-volume weighted average fuel economy of vehicles manufactured through funded projects compared to vehicles available in the base year.	n/a	n/a	n/a	T: Retired	

Means and Strategies

The ATVM Loan Program will achieve its mission and performance targets by developing and implementing clear rules and procedures and policies for the submission, review, and negotiation of loan applications and for follow-on project review.

Validation and Verification

To validate and verify program performance, the ATVM Loan Program will continuously monitor achievements for all performance targets through reporting mechanisms and periodic reviews. On a quarterly basis, the accountable manager will sign-off on entering performance results into the corporate DOE system. The ATVM Loan Program is also subject to continuing review by the Congress, the Government Accountability Office, and the Inspector General's Office.

Title 17 Innovative Technology Loan Guarantee Program

Mission

The mission of the [Loan Guarantee Program Office](#) (LGPO) is to administer a federal loan guarantee program for advanced technology projects that avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and have a reasonable prospect of repaying the principal and interest on their debt obligations.

The total budget request for the Loan Guarantee Program Office is \$200 million in FY 2012. Details on DOE's FY 2012 Congressional Budget Request for the LGPOLGPO are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume2.pdf>.

Performance Plan

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic objective: Deploying the Technologies We Have</p> <p>Strategy: Demonstrate and Deploy Clean Energy Technologies</p> <p>Program: Loan Guarantee (LP24)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Loss rate of guaranteed loans.	n/a	T: 4% R: 0%	T: 4%	T: 4%	Provide loan guarantees for innovative clean energy projects in categories including renewable energy systems, advanced nuclear facilities, coal gasification, carbon sequestration, energy efficiency, and various other types of projects.
Annual generation capacity from projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	n/a	T: 0.2 GW	T: 0.7 GW	Contributes to the HPPG: Double renewable energy generation (excluding conventional hydropower and biopower) by 2012.

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
[New] Annual manufacturing capacity from projects receiving DOE loan guarantees that have achieved commercial operations..	n/a	n/a	T: 0.4 GW	T: 0.9 GW	Contributes to the HPPG: Double renewable energy generation (excluding conventional hydropower and biopower) by 2012.
[New] Annual fuel production from biofuel projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	n/a	T: Baseline	T: TBD	Net Oil Imports (mmbpd)
Estimated annual greenhouse gas emissions reductions from projects receiving loan guarantees that have achieved commercial operations compared to 'business as usual' energy generation.	n/a	n/a	T: 8 M tons CO2	T: 20 M tons CO2	Annual Greenhouse Gas Emissions (mmtCO2)
Percentage of projects receiving DOE loan guarantees that have achieved and maintained commercial operations.	n/a	T: 7% R: Not Met	T: 15%	T: Retired	
Average cost per MW for power generation projects receiving DOE loan guarantees that have achieved commercial operations.	n/a	T: Baseline R: 0	T: TBD	T: Retired	
Estimated annual air pollutant emissions (NOx, SOx,) reductions from projects receiving loan guarantees that have achieved commercial operations compared to 'business as usual' energy generation.	n/a	T: 800 tons NOx; 900 tons SOx R: 0	T: 10,000 tons NOx ; 11,000 tons SOx	T: Retired	

Means and Strategies

The Loan Guarantee Program Office will achieve its mission and performance targets by developing and implementing clear rules and procedures and policies for the submission, review, and negotiation of loan guarantee applications and for follow-on project monitoring and review. The LGPO is developing additional strategies for assessing and prioritizing projects, incentivizing private sector lender involvement, and loan monitoring.

Validation and Verification

The Department is in the process of establishing appropriate performance measures and targets for this program. Measures included here are subject to change and refinement. To validate and verify program performance, the Loan Guarantee Program Office will continuously monitor achievements for all performance targets through reporting mechanisms and periodic reviews. The Loan Guarantee Program is also subject to continuing review by the Congress, the Government Accountability Office, and the Inspector General's Office.

Appendix D: Electricity Delivery and Energy Reliability

Electricity Delivery and Energy Reliability

Mission

The [Office of Electricity Delivery and Energy Reliability](#) (OE) leads national efforts to modernize the electric grid, enhance security and reliability of energy infrastructure, and facilitate recovery from disruptions to the energy supply. Reliable, affordable, efficient, and secure electric power is vital to expanding the economic recovery, protecting critical infrastructures, and enabling the transition to renewable energy sources.

The total budget request for the Office of Electricity Delivery and Energy Reliability is \$238 million in FY 2012. In support of its mission, OE consists of three programs: Research and Development (R&D), Permitting, Siting and Analysis (PSA), and Infrastructure Security and Energy Restoration (ISER).

Details on DOE's FY 2012 Congressional Budget Request for the Office of Electricity Delivery and Energy Reliability are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume3.pdf>.

OE Research and Development

Mission

The OE Research and Development (R&D) program works in partnership with industry, government, and the public to advance technologies to meet America's need for a reliable, efficient, secure, and affordable electric power grid.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Electricity Delivery & Energy Reliability (OE 19)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Subprogram: Research and Development - HTS					
FY2012: None FY 2010: Demonstrate prototype 70,000 A-m critical current-length for second generation wire. FY 2009: Maintain progress in routinely manufacturing prototype superconducting wires to fabricate, test and produce 2 Tesla magnetic fields at 65 Kelvin (K) coils for electric power applications. <i>Comments: measure to end in FY2010.</i>	T: 50,000A-m R: MET	T: 1 R: MET	T: 70,000A-m R: MET	n/a	

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Research and Development - Clean Energy Transmission and Reliability					
FY 2012 – None FY 2011: Demonstrate effectiveness of electro-mechanical grid stability alarm (analysis of characteristic power oscillations) implemented in 5 control centers. FY 2010: Demonstrate electromechanical grid stability prototype	T: 1 R: MET	T: 1 R: MET	T: 1	n/a	
Subprogram: Research and Development - Smart Grid R&D					
FY 2012 - Demonstrate integration of renewable and distributed systems for 12% load factor improvement on a distribution feeder circuit. FY 2011: Transition the fully developed Smart Grid Maturity Model (SGMM) to industry for global implementation of a measurement and verification process for smart grid advancements. FY 2010: Complete development of open-source-based database architecture and Web applications for the Smart Grid Information Clearinghouse.	n/a	T: 1 R: MET	T: 1	T: 12%	Develop an efficient, fully integrated “smart” grid through the adaptation and integration of digital information and communication technologies into the Nation’s electricity delivery system
Subprogram: Research and Development - Peak Load Reduction					
FY 2012 – None. FY 2011: Demonstrate 10% peak load reduction or improvement in asset utilization on two feeder systems. FY 2010: Demonstrate 10% peak load reduction or improvement in asset utilization on two feeder systems.	n/a	T: 10% - 1 R: MET	T: 10% - 2	n/a	
Subprogram: Research and Development - Power Electronics					
[NEW] FY 2012 - Demonstrate a gallium nitride on silicon (GaN-Si) device that can be operated at a minimum voltage of 1.3 kV to support the development of grid-scale power electronics devices to enhance power flow control and grid reliability.	n/a	n/a	n/a	T: 1.3 kV	Develop a utility-scale power electronics that provide faster switching capabilities, flexible power conversion, and better flow control resulting in improved grid performance and increased grid efficiency.
Subprogram: Research and Development - Energy Storage					
FY 2012: Demonstrate 50% improvement in power density for flow battery, which will lead to a cost equivalence of \$2,250/kW for grid-scale energy management applications. FY 2011: Identify mechanism of carbon addition in lead acid battery and establish storage baseline cost of \$2,500/kW for grid-scale application. FY 2010: Demonstrate MW scale flow battery for renewable firming and load management. FY 2009: Finalize conceptual system design for a Flywheel Energy Storage System for Voltage Support and Distribution Upgrade Deferral in collaboration with the New York State Energy Research and Development Authority (NYSERDA).	T: 1 R: MET	T: 1 R: NOT MET	T: \$2,500/kW	T: \$2,250/kW	Lower the cost and improve the performance of stationary energy storage technologies for utility-scale applications and to develop energy storage technologies that can reduce power disturbances, and improve system flexibility to better incorporate variable and intermittent renewable resources and reduce peak demand.

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Research and Development - Cyber Security for Energy Delivery Systems					
FY 2012: None FY 2011: Test and assess 2 control systems most widely used in the energy sector. FY 2010: Complete development of security audit files for 3 control systems.	T: 4 R: MET	T: 3 R: MET	T: 2	n/a	Reduce the risk of energy disruptions due to cyber attacks,
FY 2012: Conduct two power system control component studies to identify vulnerabilities and develop mitigation recommendations that vendors and asset owners may use to harden next-generation energy delivery systems against cyber-attack.	T: 4 R: MET	T: 3 R: MET	T: 2	T: 1	Reduce the risk of energy disruptions due to cyber attacks,
Subprogram: Research and Development - Transmission Reliability and Renewable Energy Integration					
[NEW] Demonstrate prototype distributed dynamic state estimator at 2 utilities that measures and displays the exact state of the grid in seconds versus minutes.	n/a	n/a	n/a	T: 2	Develop advanced transmission-driven technologies to improve grid reliability, efficiency, and security. It supports the development of methodologies to better integrate variable and intermittent renewable resources
Subprogram: Research and Development - Advanced Modeling Grid Research					
[NEW] Develop roadmap for research activities required to develop mathematical foundation to enable predictive capability in electricity system operations	n/a	n/a	n/a	T: 1	

Means and Strategies

The OE R&D Program uses a variety of means and strategies to achieve its GPRA Unit Program goal, recognizing that many external factors will affect the probability of success. Accordingly, the Office implements a strategy that emphasizes collaboration with external stakeholders.

The Office emphasizes projects that are vital to the electric system and its consumers but will not be pursued by the private sector or states without federal support. Focus is placed on technology development activities that address the long-term needs of the power system but also contribute to today's critical challenges. The Office remains "technology neutral" regarding generation sources and end use demands; it seeks to create a robust, resilient, interoperable grid that provides maximum flexibility in the marketplace.

The Office seeks to increase market penetration of advanced electric transmission and distribution systems by 1) decreasing cost and increasing technological performance; and (2) implementing national industry consensus standards for interoperability of smart grid technologies, including various distributed energy systems, smart meters, and advanced metering infrastructure systems. Technology advances include development of secure communications protocols and hardened supervisory control and data acquisition (SCADA) systems to enhance cyber security protections, development of real-time monitoring and control software tools, and

development of system operating models to improve grid reliability and energy efficiency. Modernization and expansion of the electricity infrastructure is achieved by: (1) developing real-time information and control technologies and systems with inherent cyber security protections; (2) developing distributed, intelligent sensing and control technologies; (3) reducing the cost and increasing the energy density of energy storage systems; (4) providing technical assistance and analysis that supports state and regional wholesale electric market improvements; and (5) developing interoperability standards with the National Institutes of Standards and Technology and standards development organizations.

The success of OE's efforts is affected by certain external factors. First, most grid assets are privately owned and technology investments must be justified within private companies. Second, a constantly shifting economic and regulatory environment adds uncertainty and risk to technology investment decisions. Accordingly, OE pursues partnerships with key stakeholders, particularly those who can influence and change conditions and circumstances that the federal government may be unable to influence and change on its own. These partnerships enable OE to leverage its resources and capabilities, including investments made under the American Recovery and Reinvestment Act, by conducting joint planning, information exchange, and cost-shared research, development, and demonstration projects with national laboratories, universities, the private sector, and state and other federal agencies. OE facilitates technology development and adoption, recognizing that most of the nation's energy infrastructure is owned and operated by the private sector.

Portions of the funding requested for R&D programs may be used toward collaborative efforts with universities, which will result in a workforce that is better skilled to achieve our Nation's energy vision, including a modern electricity grid.

Partnership and collaboration with key stakeholders is a fundamental strategy that OE uses to accomplish its mission. Collaborative activities include:

- Planning, reviewing, partnering, and cost-sharing with leading U.S. companies to pursue research and development of electric transmission, distribution, and energy storage technologies;
- Consulting with utilities, Regional Transmission Organizations, and Independent System Operators on regional policies, market assessments, planning, and regulations;
- Collaborating with DOE offices and related entities, including:
 - The Office of Fossil Energy and the Office of Energy Efficiency and Renewable Energy on how to best ensure energy security with a diverse supply of reliable, affordable, and environmentally responsible energy
 - The Office of Science to apply basic research and science capabilities to technological barriers involving the electric grid
 - The Energy Information Administration on market analysis
 - The Power Marketing Administrations and the Tennessee Valley Authority (TVA) on evaluating transmission-related technologies that enhance reliability and lower costs to consumers
 - DOE laboratories on planning, managing, reviewing, and completing R&D technical work with industry

- Working with other federal agencies, such as the Federal Energy Regulatory Commission, Department of Commerce, National Institute of Standards and Technology, Environmental Protection Agency, Department of Interior, and Department of Agriculture to develop policies, market mechanisms, and programs that facilitate modernization and expansion of the nation's electricity grid and development and deployment of smart grid technologies, tools, and business practices; as well as the Department of Homeland Security, the Department of State, and the Department of Defense to develop and test technologies, coordinate vulnerability and cyber security issues, and provide assessments;
- Collaborating with electric utility organizations such as the North American Electric Reliability Corporation, Electric Power Research Institute, Edison Electric Institute, American Public Power Association, and the National Rural Electric Cooperative Association along with power companies, equipment manufacturers, and IT vendors to analyze market mechanisms and develop improved approaches to grid modernization and expansion;
- Working with states and regional entities, such as regional governors' associations, the National Governors Association, National Association of Regulatory Utility Commissioners, National Association of State Energy Offices, and the National Council of State Legislators to develop policies, market mechanisms, state laws, and programs to improve the electric grid at the local, state, and regional levels; and
- Partnering with universities to develop plans and reviews, and to further research and development efforts.

Validation and Verification

To validate and verify performance, the OE R&D program will conduct internal and external reviews and audits. The Office's programmatic activities are subject to continuing review by Congress, the Government Accountability Office, and the Department's Inspector General. Senior management invites external reviews of office-wide planning, design, management, and programmatic results in order to improve efficiencies. Each program activity manager conducts at least biennial peer reviews by committees comprising independent subject-area experts to review the management and technical achievements of both programs and projects. Program activity managers are responsible for validating the accuracy of quarterly performance measures, which are then hosted in an external reporting system OE will build on previous budget and performance integration progress, and rigorously apply its integrated project reporting system, including the monitoring of milestones, performance, cost and schedule, and the implementation of corrective actions as needed.

Permitting, Siting, and Analysis

Mission

The mission of the Permitting, Siting, and Analysis Division (PSA) is to support modernization of the nation's electric grid by: (1) providing technical assistance to states and regions on electricity policy design to support the enhancement of the electricity infrastructure; (2) implementing the statutory obligations for permitting electric transmission facilities and electricity exports between the United States and foreign countries; and (3) contributing to the development of electricity policy at the Federal and state level.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Electricity Delivery & Energy Reliability (OE 19)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Subprogram: Permitting, Siting, and Analysis (PSA)					
<p>FY 2012 - Assist 30 States in designing and implementing State electricity policy, statutes and regulations.</p> <p>FY 2011: Assist 30 States per year in designing and implementing State electricity policy, statutes and regulations.</p> <p>FY 2010: Hold at least two events (workshops or technical conferences) to facilitate collaborative efforts among groups of states to address congestion problems identified in the Congestion Studies or other problems related to the modernization of electricity related infrastructure.</p> <p>FY 2009: DOE publishes the 2009 Congestion Study by August 8, 2009. Outcome: The number of states that actually enact policies, statutes, and/or regulations that result in increased access to clean energy.</p>	T: Cong. Study R: MET	T: 2 Conferences R: 2 Conferences	T: 30	T: 30	Increase access to reliable, affordable and sustainable energy sources.
<p><i>Comments:</i> PSA will assist 30 states each year (FY 2012-2016) in designing and implementing state electricity policies, statutes, and regulations that facilitate the development of the electricity infrastructure needed to access clean energy resources. The mixture of states and state assistance will vary from year to year.</p> <p>Secondary Measures for FY12:</p> <p>PSA will publish third National Electric Transmission Congestion Study.</p> <p>PSA will process 30 Electricity Export Authorizations and 3 Presidential Permits for cross-border transmission lines.</p>					

Means and Strategies

The PSA program implements electricity provisions of various Federal laws including Executive Order 10485 (regarding permitting electricity transmission facilities between the United States and a foreign country), the FPA, EPAct, FUA, and EISA. Means and strategies include:

- It provides technical assistance to states and regions on best practice-based electricity policies including but not limited to demand response, renewables, clean coal, distributed generation, ratepayer-funded energy efficiency, regional electricity planning/coordination, smart grid, and transmission siting.
- PSA provides technical assistance to states and regions on an as-requested basis, as well as providing that assistance in a neutral, unbiased manner, so as to comply with the rules and regulations that govern Federal interaction with state and local governments on policy matters.
- PSA also authorizes electricity exports and issues Presidential permits for cross-border transmission facilities.

In carrying out the program's objective, PSA performs the following collaborative activities:

- Providing technical assistance to state public utility commissions, governor's staffs, state legislatures, state energy offices, Tribal governments and various Federal offices.
- Working with national and regional state-based organizations who seek to help their members to modernize the electricity infrastructure at the state, regional and national levels. These groups include the National Association of Regulatory Utility Commissioners, National Council of State Legislatures, National Governors Association, National Association of State Energy Officials, and regional groups such as the Western Governors Association.
- Consulting with electric utilities and their national associations, North American Electric Reliability Corp, Electric Power Research Institute, and regional transmission organizations and independent system operators on various electricity-related topics.
- Consulting and collaborating with other DOE and non-DOE Federal entities, including:
 - DOE's Office of Energy Efficiency and Renewable Energy; Office of Fossil Energy; Office of Nuclear Energy; Office of Policy and International Affairs; Loan Guarantee Office; and the Federal Power Marketing Administrations.
 - Department of the Interior, Department of Agriculture, U.S. Army Corps of Engineers, Department of Defense, Federal Energy Regulatory Commission, Environmental Protection Agency, National Institute of Standards and Technology, and the Tennessee Valley Authority.

Validation and Verification

PSA's experience is that providing assistance in a neutral, unbiased manner is the most appropriate approach to use with state and regional electricity policymakers. The policymakers show their respect and appreciation for such an approach by the majority of states every year voluntarily asking for such assistance. The continued high level of requests from states and regions for such assistance is the ultimate validation and verification.

Grants made to national state-based groups for technical electricity policy assistance require reporting against identified goals and deliverables. Funded projects are monitored against budget, schedule, and deliverables to ensure that the objectives are met.

All studies and reports prepared pursuant to the EPAct undergo extensive review. For its triennial transmission congestion study, PSA quantitatively tracks progress in the relieving of transmission congestion since the last study by using both transmission and non-transmission solutions, with such information a main focus of each new transmission congestion study.

The programmatic activities are subject to continuing review by the Congress, the Government Accountability Office (GAO), and the Department's Inspector General. Additionally, budget performance measures and milestones are tracked by the Department's reporting system, and all PSA inputs are verified and validated by an accountable program manager.

Infrastructure Security and Energy Restoration

Mission

The mission of the Infrastructure Security and Energy Restoration (ISER) program is: (1) to enhance the reliability, survivability and resiliency of the energy infrastructure; and (2) to facilitate recovery from disruptions to the energy supply.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Electricity Delivery & Energy Reliability (OE 19)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
(T = Target; RR= Result)					
Subprogram: ISER					
<p>FY 2012 - Create a near-real time monitoring situational awareness system that DOE ISER will use to collect and analyze performance data on energy infrastructure systems to improve decision makers' capacity to mitigate, and restore from, disruptions, by achieving a 100% situational awareness capability index in five year.</p> <p>FY 2011: Complete a mitigation strategy document to enhance the security of the Nation's energy infrastructure using the results of the 2010 pilot study of the energy system and its interdependencies in order to further enhance the reliability, survivability, and resiliency of energy system.</p> <p>FY 2010: In cooperation with the private sector, complete an analysis of a pilot study to expand OE's understanding of the Nation's energy system and its interdependencies in order to further enhance the reliability, survivability, and resiliency of energy systems.</p> <p>FY 2009: Formally request access to electric transmission information from all relevant regional stakeholders in order to have near real time visualization capability of the entire U.S. electric transmission grid within the Energy Response Center, thereby enabling improved situational awareness during emergencies.</p>	<p>T: 1 R: MET</p>	<p>T: 1 R: Met</p>	<p>T: 1</p>	<p>T: 1</p>	<p>Ensure the reliability, survivability and resiliency of the energy infrastructure</p>

Means and Strategies

ISER will use various means and strategies to achieve its GPRA Unit Program Goals.

First, ISER maintains a cadre of trained emergency responders dedicated to the ten regional offices of the Federal Emergency Management Agency (FEMA) to organize and coordinate emergency response activities. These responders rapidly deploy under national emergency declarations to areas where the energy infrastructure has been severely damaged. This established team of responders applies market-ready technology, expertise from the national labs, experience from the power marketing administrations, and knowledge of DOE program offices to meet any challenge facing the US energy systems.

Second, ISER will implement a strategy to expand its infrastructure reliability activities by applying a robust systems analysis process designed to identify critical assets and key interdependencies within energy systems. This process serves as a compliment to ISER's Energy Preparedness, Response and Restoration responsibilities by incorporating scientific applications to improve current methodologies and enhance analytical techniques. This will also improve situational awareness and response capabilities through advancements in power outage and restoration visualization and modeling.

Third, ISER analyzes the potential impacts of disruptions, identifies critical nodes, and collaborates with stakeholders to develop optimized strategies to prevent or mitigate disruptions. Upon request, ISER will conduct an initial engineering assessment to provide expert advice to key energy producing allies on securing their critical energy infrastructure. Any support beyond this initial assessment, will be provided on a cost reimbursable basis. In addition, OE compliments DOE's international efforts by providing a senior energy advisor to every Combatant Command headquarters; these advisors are funded by Department of Defense through interagency agreements.

Finally, DOE collaborates with DHS to enhance ISER's ability to execute both DOE's Energy-Sector Specific Agency responsibilities and its National Response Framework-Emergency Support Function 12 responsibilities. ISER also executes significant responsibilities under the recently signed DOE-Department of Defense (DoD) Memorandum of Understanding (MOU) *Concerning Cooperation in a Strategic Partnership to Enhance Energy Security*.

Validation and Verification

To validate and verify performance, ISER participates in numerous peer-evaluated performance exercises, drills, and reviews. ISER's products and efforts are, in large part, focused on external customers and interfaces, such as other federal agencies, the States, and a multitude of private sector partners in the energy industry.

Grants awarded by ISER to states require reporting against identified goals and deliverables. Funded projects from both programmatic areas are monitored against budget, schedule, and deliverables to ensure that the objectives are met.

All studies and reports prepared pursuant to Energy Policy Act of 2005 (EPAct) undergo extensive review by affected states and industry organizations.

The programmatic activities within ISER are subject to continuing review by Congress, the Government Accountability Office (GAO), and the Department's Inspector General.

Additionally, budget planning, strategic planning, and milestone management are tracked by the Department's program management reporting system.

ISER also participates in FEMA Regional Interagency Security Committee exercises in all ten FEMA-designated regions. Additionally, ISER participates in national level annual exercises, such as TOPOFF and Ardent Sentry. Direct participation and feedback from industry during symposia and information exchanges provide valuable insight into shortfalls and areas for improvement.

Interagency collaboration with DHS, DOD, State Department, DOT, EPA, the National Guard, the Coast Guard, and FEMA provide opportunities for review and discussion of policies and plans, as well as corrective actions resulting from interagency exercises.

Emergency response efforts, such as deployments in response to hurricane damage to the energy infrastructure, are routinely critiqued by FEMA, and generally subject to other reviews by the IG, GAO, or special commissions. ISER efforts are tracked and recorded for later self-evaluation and outside review. After-action reports are generated for the major energy crises for which ISER has deployed its Emergency Support Function 12 resources, with documented lessons learned and actions tracked to completion. Additionally, the overall performance of the Emergency Support Functions under the National Response Framework is subject to post-disaster review and reporting to assess the total system effectiveness, and to identify strengths and weaknesses within the system.

Appendix E: Power Marketing Administrations

Power Marketing Administrations

The four **Power Marketing Administrations** (PMAs) sell electricity primarily generated by federally owned hydropower projects, contributing to the reliability of the nation's electricity supply and grid. Preference in the sale of power is given to public entities and electric cooperatives. Revenues from the sale of federal power and transmission services are used to repay all related power costs.

The total budget request for the three Power Marketing Administrations which request annual appropriations is \$85 million in FY 2012. Those three PMA's are: Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration. The fourth PMA, the Bonneville Power Administration, is self-financed and finances its operation with a business-type budget under the Government Corporation Control Act.

The **Southeastern Power Administration** (Southeastern) markets and delivers all available federal hydroelectric power from 22 U.S. Army Corps of Engineers (Corps) multipurpose projects to preference customers in an eleven-state area in the southeastern United States. Southeastern does not own or operate any transmission facilities, and contracts with regional utilities that own electric transmission systems to deliver the federal hydropower to Southeastern's customers.

The **Southwestern Power Administration** (Southwestern) markets and delivers renewable federal hydroelectric power from 24 Corps multipurpose projects to preference customers in a six-state area and participates with other water resource users in an effort to balance diverse interests with power needs. To deliver power to its customers, Southwestern maintains 1,380 miles of high-voltage transmission lines, 25 substations/switchyards, and 51 microwave and VHF radio sites. The President's budget request for Southwestern provides for maintenance, additions, replacements, and interconnections ensuring a clean, affordable and reliable federal power system, which is an integral part of the nation's electrical grid.

The **Western Area Power Administration** (Western) markets and transmits Federal power to a 1.3-million-square-mile service area in 15 central and western states from 56 Federally-owned hydroelectric power plants primarily operated by the Bureau of Reclamation (Bureau), the Corps, and the International Boundary and Water Commission. Western also markets the United States' entitlement to power from the Navajo coal-fired power plant near Page, Arizona.

The **Bonneville Power Administration** (Bonneville) provides electric power, transmission, and energy services to a 300,000-square-mile service area in eight states in the Pacific Northwest. Bonneville wholesales the power produced at 31 federal projects operated by the Corps and the Bureau and from certain non-federal generating facilities. Bonneville, which is self-financed with revenues, funds the expense portion of its budget, and the power operations and

maintenance costs of the Bureau of Reclamation and the Army Corps of Engineers in the Federal Columbia River Power System. The capital portion of the budget is funded mostly through borrowing from the U.S. Treasury, at interest rates comparable to the rates prevailing in the market for similar bonds issues by Government corporations, and also with some non-federal financing.

Details on DOE’s FY 2012 Congressional Budget Request for the Power Marketing Administrations are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume6.pdf>.

Western Area Power Administration

Mission

Western markets and delivers reliable, cost-based Federal hydroelectric power and provides related services throughout the central and western United States.

Overview

Western’s performance measures as defined in the template below reflect activities that promote the development of higher capacity, more expansive U.S. energy infrastructure to support the delivery/ development of renewable resources in securing the Nation’s energy needs. These measures also speak to Western’s ability to sustain a stable and reliable interconnected power system, contain annual maintenance expenses and retain the value of Federal assets.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Western Area Power Administration (PMA20)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Meet North American Electric Reliability Corporation Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system’s performance at matching supply to changing demand requirements and supporting desired system frequency in one-minute increments. CPS2 measures a generating system’s performance at limiting the magnitude of generation and demand imbalances in ten-minute increments.	T: CPS1>100, CPS2>90 R: CPS1CPS1 188.5, CPS2 99.5	T: CPS1>100, CPS2>90 R: CPS1CPS1 178.0, CPS2 96.5	T: CPS1>100, CPS2>90	T: CPS1>100, CPS2>90	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).
Increase transmission capacity by developing infrastructure for the delivery of renewable resources as financed with Borrowing Authority under the Recovery Act.	n/a	n/a	T: 300 MW R: 300 MW	T: 300 MW R: 300 MW	Maintain and modernize systems and infrastructure to increase the reliability, efficiency, and use of Federal assets.
Effectively operate the transmission system to limit the number of accountable outages to no more than 26 annually.	T: ≤26 R: 1515	T: ≤26 R: 1111	T: ≤26	T: ≤26	Maintain and modernize the Federal power system and facilities.

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUD).	TT: UI≤\$8,868 R: UI=\$6,196	T: UI≤\$8,930 R: UIUI=\$6,216	T: UI≤\$8,850	T: UI≤\$8,879	Assure power rates are adequate to repay the Federal investment
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the national median for public power.	n/a	T:<\$0.062/kWh R: \$0.012/kWh	T:<\$0.060/kWh	T:<\$0.060/kWh	Manage power delivery costs.

Means and Strategies

Western will use the means and strategies identified below to carry out its mission. Although external factors may affect its efforts, with the support of its Federal power partners, Western can effectively meet industry trends and address current issues in the marketing and delivery of Federal power.

Western will implement the following means:

- Employ technology and equipment enhancements to improve the capability, performance and reliability of the integrated grid.
- Encourage partnerships and economic coordination in the development of large-scale transmission projects to improve Western’s transmission infrastructure, system reliability and the overall effectiveness of the Nation’s integrated grid.
- Improve workforce capabilities and skills in maintaining a high-performing team to carry out the agency’s mission.
- Update power system operational technologies to maintain required industry reliability standards and compliance.
- Conduct business and operational evaluations to maximize capabilities and meet growing demands in complying with transmission service commitments and energy policy requirements.

Western will implement the following strategies:

- Meet the increasing demands on maintenance for aging infrastructure from transmission growth and evolving transmission and regulatory reliability compliance standards.
- Maintain and modernize systems and infrastructure to increase the reliability, efficiency and use of Federal assets.
- Operate the transmission system efficiently to support the Nation’s integrated power grid.
- Manage power delivery costs.
- Participate in reliability and restructuring initiatives in Federal, state and industry forums and transmission studies as an advocate for customer benefits.
- Continue to provide open access to Western’s transmission system to further industry restructuring and to support local and regional utilities in the delivery of electricity to their customers.

These strategies will support a well-maintained, reliable Federal power system and an exemplary workforce to operate and maintain the system in the most efficient and cost effective manner possible.

The following external factors may affect Western's ability to achieve its goal: Weather, natural disasters, changes in North American Electric Reliability Corporation (NERC) operating standards, industry deregulation, changing electric industry organizational structures, interconnections, open access, etc. More specifically:

- The Nation's energy infrastructure is not keeping pace with the growth in energy supply and demand, endangering the reliability of the integrated electrical system.
- Western's transmission infrastructure continues to age, despite an ongoing replacement program.
- A number of states have adopted aggressive Renewable Portfolio Standards calling for the integration of renewable resources into the Nation's energy mix further straining the grid.
- Many of the best sites for renewable generating sources--wind, solar and biomass--are located in parts of the West and Midwest that are not near load centers, and many of the nearby transmission lines lack available capacity to transport this energy.
- Industry efforts to improve the reliability of the bulk power grid are placing more requirements on our workforce to implement mandatory reliability standards.
- Our highly skilled technical workforce continues to age as we compete within the electric utility industry to attract and retain the caliber of workforce needed to provide reliable power supply and transmission services.

Validation and Verification

Western's performance measurement data are validated and verified annually by an independent accounting firm as part of the Department's annual financial statement audit. Western's power supply and delivery reliability measures are benchmarked against NERC operating standards for the electric utility industry while its efficiency measures (to manage operation and maintenance costs associated with Federal power assets and infrastructure) are benchmarked annually against public power entities in the utility industry.

The performance goals and associated reporting by the power marketing administrations (PMAs) allow for the benchmarking of performance and costs as Western looks for efficiencies in operating, maintaining and enhancing the Federal grid.

Western's program is subject to continuing independent review by external entities to include Congress (Congressional Research Service), the Government Accountability Office, the Department's Office of Inspector General, Federal Energy Regulatory Commission, the U.S. Environmental Protection Agency, Office of Personnel Management, NERC and regional reliability councils.

To ensure the continuous operation and reliability of the power system, Western partners with the Department's Office of Cyber Security and Special Reviews and the other PMAs to recertify and accredit mission-critical supervisory control and data acquisition (SCADA) systems under the [U.S. Department of Commerce](#)'s National Institute of Standards and Technology to ensure energy security.

Bonneville Power Administration

Mission

The mission of Bonneville as a public service organization is to create and deliver the best value for its customers and constituents as it acts in concert with others to assure the Pacific Northwest:

- An adequate, efficient, economical and reliable power supply;
- An open access transmission system that is adequate for integrating and transmitting power from Federal and non-Federal generating units, providing service to BPA's customers, providing interregional interconnections, and maintaining electrical reliability and stability; and
- Mitigation of the Federal Columbia River Power System (FCRPS) impacts on fish and wildlife.

Bonneville is legally obligated to provide cost-based rates and public and regional preference in its marketing of power. Bonneville will set its rates as low as possible consistent with sound business principles and sufficient to ensure the full recovery of all of its costs, including timely repayment of the Federal investment in the system.

As Bonneville sets its long-term strategic direction, shapes programs and plans spending levels to fulfill this mission, these efforts are driven by the agency's vision that encompasses the following four pillars:

- High reliability;
- Low rates consistent with sound business principles;
- Responsible environmental stewardship; and
- Accountability to the region.

BPA endeavors to pursue this vision consistent with its three core values: trustworthy stewardship of the FCRPS, collaborative relationships, and operational excellence.

Overview

Bonneville supports these DOE strategic focus areas by pursuing its long-term vision to advance a Northwest power system that is a national leader in providing reliable power, low rates consistent with sound business principles, environmental stewardship, and accountability to the region. To achieve this vision and support Administration and DOE objectives, Bonneville assesses the challenges and opportunities of its internal and external environment, refreshes its long-term strategic objectives, develops supporting initiatives and targets, and regularly monitors and evaluates its performance against these objectives and targets.

Bonneville is continuing its emphasis on performance with accountability for agency targets across four balanced scorecard perspectives (stakeholder value, financial performance, internal operations, and people and culture). In particular, Bonneville is aggressively pursuing transmission construction to meet new generation needs including wind power development, the development of means to integrate substantial new wind power, energy efficiency investments, and research and collaboration to support Smart Grid development. At the same time, achieving electricity availability, adequacy, reliability and cost-effectiveness through the power and transmission functions remain a fundamental performance focus, along with fulfilling vital responsibilities for fish and wildlife, energy conservation, renewable resources and low-cost power in the Pacific Northwest.

These efforts are consistent with Bonneville’s core infrastructure and operation functions in transmission and power generation, as reflected in Bonneville’s Government Performance Results Act (GPRA) Unit:

- Market and Deliver Federal Power: Ensure Federal hydropower is marketed and delivered while passing the North American Electric Reliability Corporation's (NERC) control compliance ratings, meeting planned repayment targets, and achieving targeted hydropower generation efficiency performance.

Bonneville measures and reports to DOE on its performance against this GPRA unit, in part based on the following three measures (see Performance Plan for details):

- Transmission System Reliability
- Repayment of Federal Power Investment
- Hydro Generation Performance Efficiency

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Bonneville Power Administration (PMA21)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Attain average North American Electric Reliability Corporation (NERC) compliance ratings for the following NERC Control Performance Standards (CPS) measuring the balance between power generation and load, including support for system frequency: (1) CPS1, which measures generation/load balance on one-minute intervals (rating > or =100); and (2) CPS2, which limits any imbalance magnitude to acceptable levels (rating > or =90).	T: CPS1>100, CPS2>90 R: CPS1 192.5, CPS2 95.9	T: CPS1>100, R: CPS1 177.3	T: CPS1>100	T: CPS1>100, CPS2>90	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).

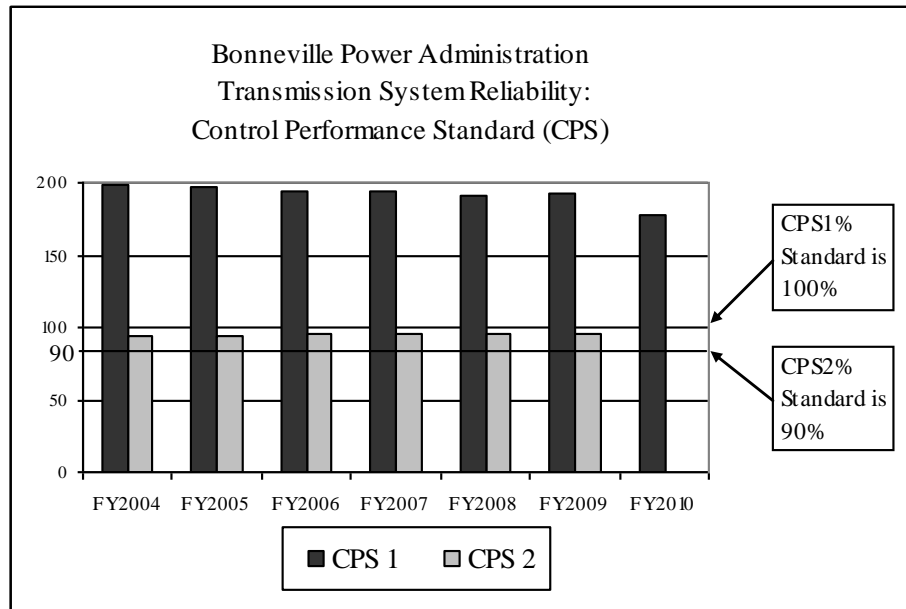
Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Achieve > or = 97.5% Heavy-Load-Hour Availability (HLHA) through efficient performance of Federal hydro-system processes and assets, including joint efforts of BPA, Army Corps of Engineers, and Bureau of Reclamation. HLHA is actual machine capacity available during heavy-load hours (0700-2200 Monday-Saturday), divided by planned available capacity during heavy-load hours.	T: >=97.5% R: 100.2%	T: >=97.5% R: 99.57	T: >=97.5%	T: >=97.5%	Maintain and modernize systems and infrastructure to increase the reliability, efficiency, and use of Federal assets.
Meet planned annual repayment of principal on Federal power investments.	T: \$276 million R: \$432 million	T: \$387 million R: \$460 million	T: Meet planned annual repayment of principal on Federal power investments.	T: Meet planned annual repayment of principal on Federal power investments.	Assure power rates are adequate to repay the Federal investment..

Transmission System Reliability Performance Indicator

This indicator defines a standard of minimum monthly control performance as established by the NERC. Each control area within the system is to operate above minimum monthly control compliance ratings that can be achieved within the bounds of reasonable economic and physical limitations. Each control area is to monitor its control performance continuously against two control performance standards, CPS 1 and 2.

The CPS-1 and CPS-2 performance indicators are industry standards that U.S. and Canadian electric utilities use in conjunction with NERC to help assure the reliability of the North American high voltage distribution system, and thereby to benefit the public. These measures are intended to indicate whether or not electric utility systems are being operated within acceptable operating parameters. Any deviation from the minimum standards must be reported to NERC. CPS-1 helps assure generation and load balance. CPS-2 helps limit the magnitude of any imbalance to acceptable levels, and provides a frequency sensitive evaluation of how well a control area meets its demand requirements.

Transmission System Reliability Target in FY 2012: Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).



Note: As a participant in the Western Electricity Coordinating Council (WECC) field trial of NERC’s Reliability Based Control (RBC) draft standard beginning in FY 2010, BPA will not report CPS-2 to DOE because the RBC and CPS-2 standards are mutually exclusive (only one of these standards can be in effect at the same time). The use of CPS-2 will be reevaluated after the RBC field trial.

Repayment of Federal Power Investment Performance Indicator

This indicator measures the variance of actual from planned principal payments to the U.S. Department of Treasury (Treasury).

Treasury payment outyear estimates for planned amortization of principal are based on rate case estimates when available and planned amortization for future rate case periods. These estimates may change due to revised capital investment plans, actual Treasury borrowing, and advanced amortization payments. Bonneville made its full scheduled FY 2010 payment responsibility to the Treasury. Bonneville’s aggregate Treasury payment was \$864 million, comprised of \$460 million in amortization (of which \$38.5 million was unscheduled advanced amortization), \$364 million in interest, and \$40 million of unfunded CSRS liabilities and other costs. Repayment target in FY 2012 – Meet planned repayment of principal on Federal power investments in FY 2012.

The following chart displays principal repayment only.

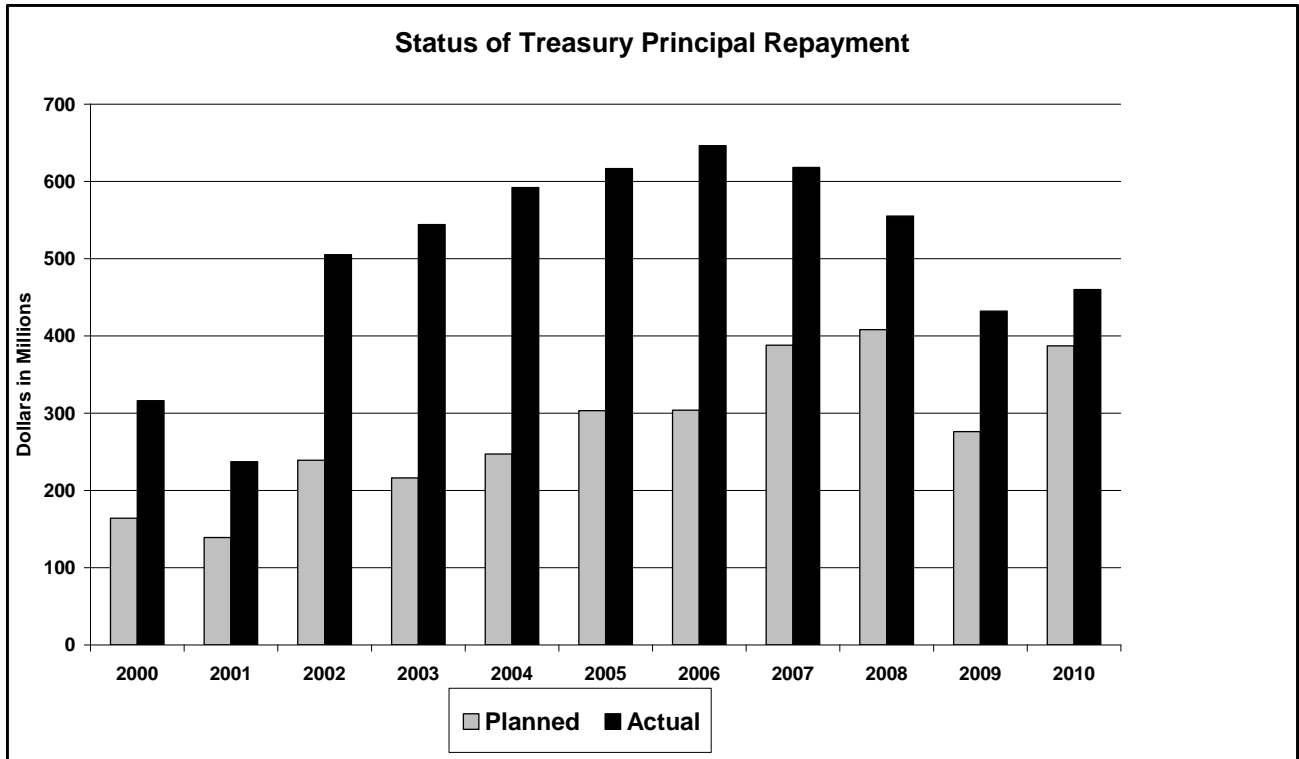


Chart Notes:

FYs 2000 - 2010 payments include portions of future planned amortization amounts consistent with BPA's capital strategy plan and the BPA/Energy Northwest debt optimization program.

Advance amortization due to sale of low-voltage transmission facilities includes \$13 million and \$5.3 million in FYs 2003 and 2006, respectively.

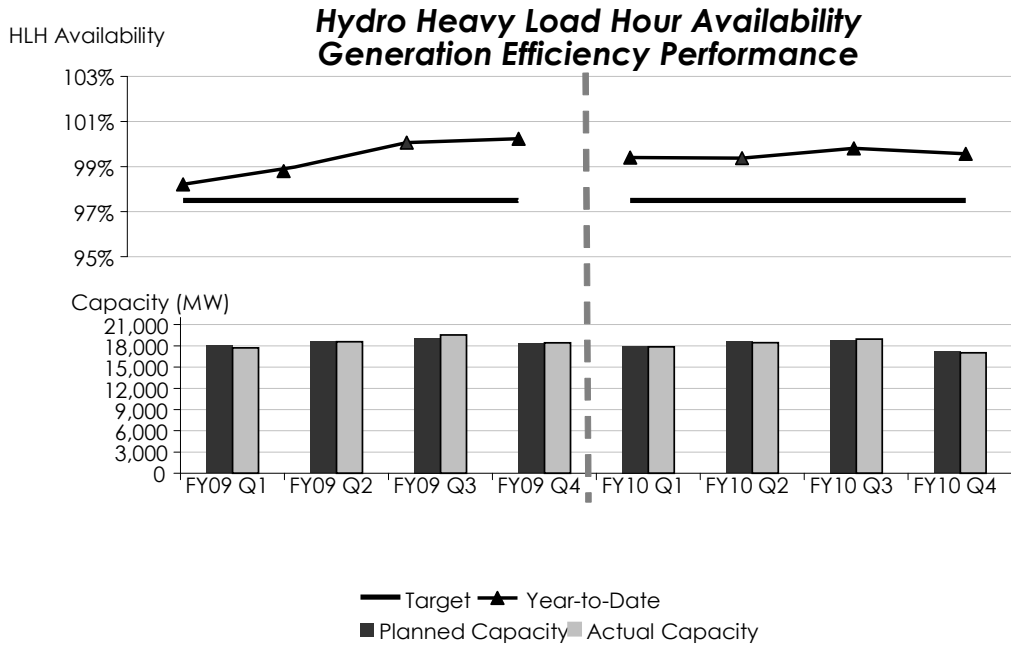
For FYs 2007 - 2009, the planned repayment of principal of Federal power investment reflects the amounts 2007 Power Rate Case and 2006 and 2008 Transmission Rate Cases that were scheduled to be the lowest level of amortization satisfying the repayment requirements. The rate case projections also included some amount of advanced repayment of principal to the U.S. Treasury that resulted from BPA's debt optimization program, which involved restructuring Energy Northwest (EN) debt, the cost of which BPA is obligated to pay.

Hydropower Generation Efficiency Performance Indicator

The fundamental programmatic role of Bonneville within the FCRPS is the marketing of electricity generated at the multi-purpose hydro projects in the Pacific Northwest owned and operated by the Corps and Reclamation. Heavy Load Hour Availability (HLHA) concerns the actual effective performance of the hydro system, reflecting joint work between BPA, the Corps, and Reclamation to improve performance of these generating projects when generation is needed most for commercial power operation. It is important from a reliability and economic standpoint to have power generation available when loads are high.

HLHA is the ratio of actual available machine capacity during heavy load hours, divided by planned available capacity during heavy load hours, expressed as a percentage.

Hydropower Generation Efficiency target: Achieve actual efficiency results at or above planned availability target levels for hydropower generation efficiency.



As represented above, FCRPS hydro performance tracked very closely to the HLHA targets for all four quarters of FY 2009 and FY 2010..

Means and Strategies

In order to transform energy systems and support grid modernization, as well as improve system adequacy, reliability and availability, BPA has embarked on a number of major transmission infrastructure projects. The projects shore up the region’s transmission system and help deliver the region’s future power needs. These projects address multiple challenges, such as integration of renewable energy, the need to relieve a number of congested transmission paths, the pressure to keep up with growing energy demands and the need to meet BPA’s open access transmission policy in support of competitive markets. Bonneville’s GPRA measure of “System Reliability Performance” helps ensure that the performance of transmission infrastructure and operations continues to keep pace with the many demands placed on this system (see Annual Performance Targets and Results).

For FY 2012, BPA’s total transmission capital budget includes a total of \$579 million for main grid additions, upgrades and additions, system replacements, area and customer services, and projects funded in advance (PFIA). These investments, the costs of which are recovered entirely

in rates charged to BPA's transmission customers or benefiting third parties, are fundamental to BPA's transmission performance.

Bonneville is also working to improve efficiency and initiate cost reductions in the power generation arena. Bonneville coordinates its power operational activities with the Corps, Reclamation, NERC, regional electric reliability councils, its customers, and other stakeholders to provide the most efficient use of Federal assets. Ongoing work with the Corps and Reclamation is focused on improving the reliability of the FCRPS, increasing its generation efficiency, and optimizing hydro facility operation. Bonneville's GPRA measure of "Hydropower Generation Efficiency" helps ensure that the performance of generation infrastructure and operations continues to keep pace with the many demands placed on this system (see Annual Performance Targets and Results).

Also, under Federal laws Bonneville is to repay the long-term federal investment in the FCRPS in a reasonable period of time and in a manner consistent with sound business principles. Bonneville's GPRA measure of "Repayment of Federal Power Investment" helps ensure that Bonneville remains financially healthy and on track to repay Treasury the planned federal principal on federal FCRPS investments (see Performance Plan).

In addition, Bonneville is committed to continue funding efforts to protect listed fish and wildlife species in the Columbia Basin under its own organic legislation and the Endangered Species Act (ESA) and to work closely with the Council, regional fisheries managers, and other Federal agencies to prioritize and manage fish and wildlife program projects.

Bonneville initiatives are impacted by external factors such as continually changing economic and institutional conditions, competitive dynamics, and ongoing changes in the electric industry.

Private and public sector partners have been and continue to be an important part of BPA's collaborative efforts to promote and foster efficient use of energy. BPA has initiated efforts to explore non-Federal financial participation in its transmission infrastructure projects with transmission customers and others in the region. Additionally, BPA has partnered and assisted with a DOE Wind Power crosscutting initiative to strengthen energy security by adding alternative sources of renewable energy.

Additional activities and products contributing to BPA's long-term achievement of its mission include implementing the Regional Dialogue, an enhanced capital asset management plan, a workforce plan that addresses the long-term staffing needs of the agency, and continued efforts to increase operational efficiencies. The Regional Dialogue process is a long-term cost control process that allows customers meaningful input. The Regional Dialogue process evolved out of an effort sponsored jointly by BPA and the Northwest Power and Conservation Council (NPCC) to outline how BPA should market the power generated by the FCRPS. A separate Technology

and Innovation office within BPA leads the long-term strategy development and management for research, development, demonstration and deployment of new technology by BPA.

Validation and Verification

To validate and verify program performance, Bonneville conducts various internal and external reviews and audits. Bonneville's programmatic activities are subject to review by Congress, the U.S. Government Accountability Office (GAO), the DOE's Inspector General, and other governmental entities. Bonneville accounts and financial statements are reviewed annually by an independent outside auditor. Bonneville has received a clean audit opinion since the mid-1980s and no material weaknesses have been identified in controls over financial reporting.

Southeastern Power Administration

Mission

Southeastern's power marketing and wheeling activities fulfill the requirements of Section 5 of the Flood Control Act of 1944 and reflect Southeastern's goals and objectives to market and deliver cost-based power in a safe and reliable manner, and repay the Federal investment with interest, while providing environmental and economic benefits to the region. Southeastern focuses on its repayment goal, which assures timely repayment of the Federal hydropower investment.

Overview

Southeastern contributes to the transformation of our energy system by performing its power marketing mission through two subprogram activities: Program Direction and Purchase Power and Wheeling. Southeastern contributes to grid modernization, by marketing and delivering all available hydroelectric power from U. S. Army Corps of Engineers (Corps) dams, while balancing power needs with the diverse interests of other water resource users; and markets and delivers federal power in a cost-efficient manner to assure reliability of the power system and maximize the use of Federal assets to repay the investment (principal and interest).

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies Strategic objective: Deploying the Technologies We Have Strategy: Modernize the Electric Grid Program: Southeastern Power Administration (PMA22)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Meet NERC Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system's performance at matching supply to changing demand requirements and supporting desired system frequency in one minute increments. CPS2 measures a generating system's performance at limiting the magnitude of generation and demand imbalances in ten minute increments.	T: >100 R: 225	T: >100 R: 238	T: >100	T: >100	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).
	T: >90 R: 100	T: >90 R: 99.85	T: >90	T: >90	
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the National median for public power. The public power's national median cost for operation and maintenance expense per kilowatt-hour generated is \$0.062	n/a	T: <\$0.062/kWh R: \$0.016	T: <\$0.062/kWh	T: <\$0.062/kWh	Manage power delivery costs.
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUI) (Definition Revised in 2010).	T: UI/AUI<=1 R: UI/AUI<=1	T: UI/AUI<=1 R: UI/AUI<=1	T: UI/AUI<=1	T: UI/AUI<=1	Assure power rates are adequate to repay the Federal investment.

Means and Strategies

Southeastern will use various means and strategies to modernize the grid. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

Southeastern will implement the following means:

- Operate the Federal power system effectively and efficiently by providing training and certification to update workforce skills and by updating power system operation technologies to maintain required industry standard compliance.
- Assure power rates are adequate to repay the Federal investment by conducting annual power repayment studies.
- Conduct business process reviews to maximize efficiency and eliminate redundancy.
- Provide economic benefits to the region by marketing and delivering all available hydropower.

Southeastern will implement the following strategies:

- Market and deliver power using appropriations, net billing, bill crediting, and offsetting collections.

- Maintain a diverse and knowledgeable workforce by providing employee training, leadership development, retention programs, and recruitment activities.
- Market all available hydropower by working with the Corps, other Federal entities, States, cooperative and municipal utilities to meet the expectations of our customers, while balancing the interest of other water users.
- Maintain the security of the Federal power system, facilities, and information technology (IT) systems.
- Address industry restructuring changes, when needed, by reclassifying positions as opportunities arise.
- Maximize the capabilities of business systems to improve processes and provide greater efficiency.
- Promote adoption of energy efficiency and renewable energy among Federal power customers.

These strategies will result in a well-maintained Federal power system that is in compliance with Energy Reliability Organization (ERO) operating regulations and an expert workforce to operate the system in the most effective and cost-efficient manner possible.

The following external factors could affect Southeastern's ability to achieve its program goals:

- Achieving and maintaining system reliability can be affected by weather, natural disasters, changes in the North American Electric Reliability Corporation (NERC) operating standards, new load patterns, deregulation of the electricity market, changing electric industry organizational structures, and additions to other transmission systems interconnected to the Federal system.
- Achieving full repayment of the Federal power investment and enhancing economic growth to the region can be affected by weather, power markets, natural disasters, and other external costs and revenue factors.
- Statutory or administrative reallocation of water storage from hydropower to water supply.

In carrying out its mission to market and deliver hydroelectric power, Southeastern performs the following collaborative activities:

- Southeastern coordinates operational activities with NERC, other regional electric reliability councils, the Corps, customers and other stakeholders to provide the most efficient use of Federal assets.

Validation and Verification

To validate and verify program performance, Southeastern conducts internal and external reviews and audits as directed by the Program Assessment Rating Tool. Southeastern's programmatic activities are subject to continuing review by internal and external entities such as Congress, the Government Accountability Office (GAO), the Department of Energy, the Department of Energy's Inspector General, FERC, the U.S. Environmental Protection Agency, the Office of Personnel Management, Southeastern, and National and Regional Reliability Corporations. Southeastern's annual financial audit is conducted and prepared by an independent accounting firm.

Southeastern also complies with Cyber Security requirements, as directed by the Department of Energy and NERC. Southeastern is audited by DOE and NERC, as well as internal audits and reviews by the other Power Marketing Administrations and independent auditors every three years for recertification. Compliance with the NERC standards is filed each year through regional reliability organizations. The Department of Energy also requires Southeastern to follow the National Institute of Standards (NIST) and the Federal Information Processing Standards (FIPS).

Southwestern Power Administration

Mission

Southwestern's mission is to market and reliably deliver Federal hydroelectric power with preference to public bodies and cooperatives. This is accomplished by maximizing the use of Federal assets to repay the Federal investment and participating with other water resource users in an effort to balance their diverse interests with power needs within broad parameters set by the U. S. Army Corps of Engineers (Corps), and implementing public policy.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Deploying the Technologies We Have					
Strategy: Modernize the Electric Grid					
Program: Southwestern Power Administration (PMA23)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Meet NERC Control Performance Standards (CPS) of CPS1>100 and CPS2>90 and meet or exceed industry averages. CPS1 measures a generating system's performance at matching supply to changing demand requirements and supporting desired system frequency in one minute increments. CPS2 measures a generating system's performance at limiting the magnitude of generation and demand imbalances in ten minute increments.	T: >100 R: 199.98	T: >100 R: 199.99	T: >100	T: >100	Attain average NERC compliance ratings for the following NERC CPS measuring the balance between power generation and load, including support for system frequency: (1) CPS-1, which measures generation/load balance on one-minute intervals (rating >= 100); and (2) CPS-2, which limits any imbalance magnitude to acceptable levels (rating >=90).
	T: >90 R: 99.82	T: >90 R: 99.87	T: >90	T: >90	
Provide power at the lowest possible cost by keeping total operation and maintenance expense per kilowatt-hour generated below the National median for public power.	T: \$0.0620 R: \$0.0126	T: < \$0.0620 R: \$.0143	T: <\$0.0600	T: <\$0.0600	Manage power delivery costs.
Ensure timely repayment of Federal investment in accordance with DOE Order RA 6120.2 by maintaining unpaid investment (UI) equal to or less than the allowable unpaid investment (AUI) (Definition Revised in 2010).	T: \$6,223 R: \$60,282,026	T: UI<=\$1,023 M R: 543M	T: UI<=\$1,306M	T: UI<=\$1,379 M	Assure power rates are adequate to repay the Federal investment.
Effectively operate the transmission system to limit the number of accountable outages to no more than 3 annually.	T: =< 3 R: 0	T: =< 3 R: 1	T: =< 3	T: =< 3	Maintain and modernize the Federal power system and facilities.

Means and Strategies

Southwestern will use the means and strategies outlined below to ensure customers continue to receive the maximum benefit from Federal resources. Although various external factors may impact the ability to achieve this goal, Southwestern, through the collaborative support of our Federal power partners, will continue to market and deliver a cost-based, valuable, and renewable power product that supports the Administration's efforts to ensure America's energy future.

Southwestern will implement the following means:

- Employ technology and equipment to improve the capability, performance, reliability, compliance, and efficiency of the integrated grid.
- Upgrade and modernize the financial system and associated peripherals to ensure financial integrity.
- Utilize the following funding mechanisms: appropriations; appropriations offset by receipts; use of Federal power receipts; and alternative financing arrangements, including net billing, bill crediting, and/or reimbursable authority (customer advances).
- Maintain a diverse and knowledgeable workforce through employee training, skills gap analyses, leadership development, student intern programs, retention programs, and aggressive recruitment activities.
- Address changes in the electric utility industry, technology, and workload by moving administrative and indirect positions to direct ("front line") positions as opportunities arise.

Southwestern will implement the following strategies:

- Market all available hydropower generated at the Corps multipurpose projects and work with the Corps, states, cooperatives, and municipalities to meet statutory requirements while balancing the interests of other water users and provide power at the lowest possible cost.
- Maintain and modernize systems and infrastructure to increase the reliability, efficiency, and use of Federal assets.
- Conduct annual power repayment studies to ensure power rates are sufficient to repay all annual operating costs and the Federal investment with interest.
- Meet Southwestern's limited 1200-hour peaking power contractual obligations with necessary purchased power and wheeling through the use of Federal power receipts; alternative financing arrangements, including net billing, bill crediting, and/or reimbursable authority (customer advances); and the Continuing Fund as necessary in periods of below-average hydropower generation.
- Operate the transmission system efficiently to support the Nation's integrated power grid.
- Meet requirements for Southwestern's compliance with the latest North American Electric Reliability Corporation (NERC) standards and perform operating personnel certification and annual emergency operations training for power system dispatchers.
- Maintain and modernize the Federal power system and facilities.

These strategies will result in a well-maintained, reliable Federal power system, and an exemplary workforce to operate and maintain the system in the most effective and cost-efficient manner possible.

The following external factors could impact Southwestern's ability to achieve its program goal: weather, natural disasters, changes in the NERC operating standards, industry deregulation, changing electric industry organizational structures, interconnections, open access, the lack of adequate funding resources, and other unforeseen requirements. More specifically:

- Southwestern's transmission infrastructure continues to age, despite an ongoing replacement program.
- Industry efforts to improve the reliability of the bulk power grid are placing more requirements on our workforce to implement mandatory reliability standards.
- Our highly skilled technical workforce continues to age and we are competing with the rest of the electric utility industry to attract and retain the caliber of workforce needed to provide reliable power supply and transmission services.

Successful collaboration of the Federal hydropower partners is necessary for Southwestern to achieve its program goal. Southwestern coordinates its operational activities with the Corps, customers, competing resources interests, the Southwest Power Pool/Regional Transmission Organization, and Congress to provide the most efficient and effective use of Federal assets and to ensure NERC and regional reliability council standards are met.

Validation and Verification

Southwestern's program is subject to continuing independent review by external entities to include Congress, the Government Accountability Office, the Department's Office of Inspector General, Federal Energy Regulatory Commission, the U.S. Environmental Protection Agency, Office of Personnel Management, NERC and regional reliability councils. Performance results are validated and verified annually by an independent accounting firm as part of the Department's annual financial audit. Southwestern's program managers review and approve the accuracy of results before entering data into a corporate DOE system. The system reliability performance measures are also benchmarked against NERC operating standards for the electric utility industry; whereas, Southwestern's efficiency measure of managing the operation and maintenance costs associated with Federal power assets and infrastructure is benchmarked annually against public power entities in the utility industry.

The performance targets and associated performance reporting by the Power Marketing Administrations are aligned to allow benchmarking as efficiencies in operating and maintaining our portion of the National interconnected electrical grid.

Appendix F: Advanced Research Projects Agency - Energy

Advanced Research Projects Agency - Energy

Mission

The [Advanced Research Projects Agency – Energy \(ARPA-E\)](#) is devoted exclusively to funding specific high risk, high payoff, game-changing research and development projects to meet the nation’s long-term energy challenges. In 2005, a bipartisan group of Members of Congress requested that the National Academies “identify the most urgent challenges the United States faces in maintaining leadership in key areas of science and technology.”¹ In response, the National Academies authored a report entitled *Rising Above the Gathering Storm* in which were expressed grave concerns about the state of U.S. economic and technological competitiveness. Among the many recommendations in the *Gathering Storm* report that were enacted into law was the creation of ARPA-E.

The total budget request for the ARPA-E is \$650 million in FY 2012. Details on DOE’s FY 2012 Congressional Budget Request for the ARPA-E are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume3.pdf>.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies					
Strategic Objective: Discovering the new solutions we need					
Strategy: Accelerate energy innovation through pre-competitive Research and Development					
Program: Advanced Research Projects Agency - Energy (ARPA-E25)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R= Result)				
Cumulative percentage of award funding committed 45 days after funding opportunity announcement (FOA) award announcements.	T: n/a R: 75%	n/a	T: 70%	T: 70%	Fund specific high-risk, high payoff, game-changing research and development projects to meet the nation’s long-term energy challenges
Cumulative percentage of follow on funding from other Federal (not ARPA-E) and Private organizations as a result of ARPA-E direct funding.	T: n/a R: 35%	n/a	T: 10%	T:10%	

Means and Strategies

ARPA-E will pursue the following means and strategies to achieve its goals:

- Lead the rapid development of transformational energy technologies;
- Drive the swift transition of energy innovations toward market impact;
- Contribute to the advancement of U.S. leadership and global competitiveness in advanced energy technologies; and
- Build an innovative, highly effective, and sustainable organization.

Validation and Verification

The validation and verification of ARPA-E’s activities are subject to continuing review by Congress, the Government Accountability Office (GAO), and the DOE Inspector General. ARPA-E will conduct an annual internal controls review under the Federal Managers’ Financial Integrity Act. Performance measures on quality improvements are being established and monitored.

Appendix G: Fossil Energy Research and Development

Fossil Energy Research and Development

Mission

The mission of the [Fossil Energy Research and Development](#) (FER&D) Program creates public benefits by enhancing U.S. economic, environmental, and energy security. The program carries out three primary activities: (1) managing and performing energy-related research that reduces market barriers to the environmentally sound use of fossil fuels; (2) partnering with industry and others to advance fossil energy technologies toward commercialization; and (3) supporting the development of information and policy options that benefit the public.

The total budget request for the Office of Fossil Energy Research and Development is \$452.9 million in FY 2012.

Details on DOE's FY 2012 Congressional Budget Request for the Office of Fossil Energy Research and Development are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume3.pdf>.

Coal

Mission

The Coal Program will ensure the availability of near-zero atmospheric emissions, abundant, affordable, domestic energy to fuel economic prosperity, strengthen energy security, and enhance environmental quality.

Performance Plan

Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies					
Strategic objective: Discovering the New Solutions We Need					
Strategy: Establish Technology Test Beds and Demonstrations					
Program: Fossil Energy/Clean Coal (FE15)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; A = Actual)				
Subprogram: Carbon Capture					
Conduct laboratory through pilot-scale tests of advanced post-and oxy-combustion capture technologies that show, through engineering and systems analyses studies, 90 percent CO ₂ capture at no more than a 50 percent increase in levelized cost of electricity when compared to a reference power plant.	n/a	n/a	n/a	T: 50%	CO ₂ capture at no more than a 35 percent increase in levelized cost of electricity when compared to a reference power plant
Conduct laboratory through pilot-scale tests of technology components of Advanced Energy Systems with pre-combustion capture that show, through engineering and systems analyses studies, 90 percent CO ₂ capture at no more than a 13 percent increase in levelized cost of electricity when compared to a reference power plant.	T: 17% R: 17%	T: 15% R: 15%	T: 14%	T: 13%	CO ₂ capture at no more than a 10 percent increase in levelized cost of electricity when compared to a reference power plant

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: Carbon Storage					
Inject 3.0 million (cumulative since 2009) metric tons of CO ₂ in large-volume field test sites to demonstrate the formations capacity to permanently, economically, and safely store carbon dioxide.	T: 0.5 R: 0.6	T: 1.0 R: 1.0	T: 1.5	T: 3.0	Since January 1, 2009, inject and cumulatively store 1.0 million metric tons of CO ₂
Subprogram: Innovations for Existing Plants					
Conduct laboratory through pilot-scale tests of advanced post-and oxy-combustion capture technologies that show, through engineering and systems analyses studies, continued achievement toward the goal of 90 percent CO ₂ capture at no more than a 50% percent increase in cost of electricity.	T: NA R: NA	T: 55% R: 55%	T: 55%	n/a	Innovation for Existing Plants post-combustion CO ₂ technology is required to meet Carbon Capture post-combustion End Point goal
Subprogram: Gasification					
Support the development and deployment of advanced low cost, low carbon, energy efficient electrical generation technologies. Targeting an 8-10% increase in Cost of Electricity (COE) compared to a 2003 baseline for a near zero emissions IGCC with CCS system. The baseline COE is 9.4c/kWh (\$2007).	T: : \$1760/kW (\$2007) capital cost, 44% efficiency R: \$1629/kw capital cost, 44% efficiency	T: : \$1600/kW (\$2007) capital cost, 45% efficiency R: \$1600/kW (\$2007) capital cost, 45% efficiency	T: c.o.e.: <14 % increase compared to 2003 baseline CO ₂ near-zero emission CCS IGCC system	n/a	Gasification technology required to meet Carbon Capture pre-combustion End Point goal
Subprogram : Turbines					
Demonstration of a hydrogen fueled combined cycle gas turbine (previously fueled with syngas) and maintain the same efficiency performance improvement realized in 2010 (2 – 3 percentage points) coupled with a 30% power increase.	T: 44% R: 44%	T: 45% R: 45%	T: 2-3% (Syngas-H ₂)	n/a	Turbine technology required to meet Carbon Capture pre-combustion End Point goal
Subprogram: Fuel Cells					
Solid Oxide Fuel Cells activities were identified as a lower priority research and are being deferred due to shared sacrifice and budget austerity	T: Stack: \$290/kW Power Block: \$1050/kW R: \$285/kw	T: Stack: \$175/kW Power Block: \$700/kW R: Stack: \$175/kW Power Block: \$700/kW	T: Stack: \$175/kW Power Block: \$700/kW	n/a	Fuel Cells technology required to meet longer term Transformational CCS goals of near zero cost increase of non-CCS systems
Subprogram: Fuels					
The Fuels activity helps reduce technological market barriers for the reliable, efficient and environmentally friendly co-conversion of coal to power, hydrogen, fuels and chemicals. Fuels activities were identified as a lower priority research and are being deferred due to shared sacrifice and budget austerity	n/a	n/a	T: \$8.20/MMBTU (2002\$)	n/a	

Performance Goals	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Subprogram: CCS Demonstrations					
[NEW] FY2012: Initiate or continue construction of at least 3 CCS Demonstration projects.	n/a	n/a	n/a	T: 3	Initiate operations of five commercial scale CCS demonstrations including the Clean Coal Power Initiative (CCPI), FutureGen 2.0, and the Industrial CCS Demonstration projects (includes projects funded by both annual appropriations and the Recovery Act.)
FY2010: Begin construction of one major CCPI Round 1-2 project(s) that will promote and bring the best emerging new coal-based power generating technologies to demonstration through the use of industry partnerships. Make awards for CCPI-Round 3. FY2009: Encourage the Nation's energy industry to identify and cost share the best emerging new coal-based power generating technology by completing CCPI Round 3 solicitation, proposal evaluations and project selections to assemble the initial portfolio of advanced technology systems that capture and reuse or sequester carbon dioxide from coal-fired energy systems on a commercial scale.	T: n/a R: MET	T: n/a R: MET	T:RETIRED	n/a	

Means and Strategies

Fossil Energy will use various means and strategies to achieve its program goals. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

The Department will implement the following means:

- Fossil Energy will engage the scientific, academic and industrial communities, and other public sector entities, including the states, to identify research needs and opportunities; technology strategies for addressing the highest priority needs; and the appropriate government roles in meeting those needs. The program will be implemented through competitively solicited, cost-shared public-private partnerships.

The Department will implement the following strategies:

- It will employ a systematic approach to monitor the spectrum of R&D needs to better select and plan activities with a clear governmental role. Such an approach will ensure better planning and execution. Periodic external reviews will be conducted to ensure that the program maintains its focus and terminates projects that industry can fund.

These strategies will accelerate the commercial availability of cost-effective, lower emission coal utilization technology that will save consumers money, improve the environment, and enhance security through the use of an abundant, domestic energy resource.

The following external factors could affect FE's ability to achieve its strategic goal:

- The benefits of some of FE's R&D, such as CCS, are dependent on future domestic and global actions that strongly incentivize reduction of greenhouse gas emissions.
- Program results may also be affected by world prices for competitive feedstocks and energy technologies; new and evolving environmental regulations or new legislation; industry restructuring/deregulation issues and uncertainties; and technology advances in the private sector.

In carrying out the program's mission, FE performs the following collaborative activities:

- Leveraging R&D activities in partnership with universities, state and local governments, industry, foreign governments and research organizations, and other stakeholders; using cost-shared projects and diverse technology paths to improve chances of success, and to create a direct technology transfer component; seeking synergy with the capabilities of multiple governmental agencies and industry, including the unique capabilities of National Laboratories; collaborating with other agencies to effectively promulgate revolutionary energy technologies; investing jointly with other groups in promising technologies for target areas; conducting field demonstrations in collaboration with industry, academia, and others; and transferring technologies in cooperation with state and industry organizations.

Validation and Verification

The program and projects contained within this goal will be evaluated by peer review at annual meetings and other forums. In addition, program benefits are estimated using macroeconomic and detailed industry-specific models. Modeling assumptions and methods are reviewed externally and the results are compared to results from other programs to determine the best application of R&D resources. To validate and verify program performance, FE will conduct various internal and independent external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the Government Accountability Office, the Department's Inspector General, the National Research Council, the U.S. Environmental Protection Agency, state environmental and health agencies, and the Department's Office of Engineering and Construction Management. Each year the Office of Engineering and Construction Management conducts external independent reviews of selected projects. In addition, various Operations/Field Offices commission external independent reviews of site baselines or portions of the baselines. Additionally, FE Headquarters senior management and field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.

Natural Gas Technology

Mission

The Natural Gas Technologies program has focused on developing technologies to improve the safety and environmental performance of producing from gas hydrate deposits, shale gas formations, and deepwater regions.

Means and Strategies

No funds are being requested in FY 2012.

Validation and Verification

No funds are being requested in FY 2012.

Strategic Petroleum Reserve

Mission

The Strategic Petroleum Reserve (SPR) protects the U.S. from future disruptions in critical petroleum supplies and meets the U.S. obligations under the International Energy Program (Energy Policy and Conservation Act, Section 151). SPR also includes Defense Department crude oil, stored for national defense purposes.

Overview

The corporate performance measures support the strategic goal of “Transforming our Energy Systems” by insuring the energy security of the nation until our energy systems are transformed and eliminate the present vulnerabilities of petroleum supply disruptions by domestic and international events, including terrorism and severe weather.

Performance Plan

<p>Strategic Goal: Catalyze the timely, material, and efficient transformation of the nation’s energy system and secure U.S. leadership in clean energy technologies</p> <p>Strategic Objective: To insure the Nation’s energy security, maintain the capabilities of the Strategic Petroleum Reserve over the next decade to address potential disruptions in U.S. petroleum supplies that would result from international incidents, hurricanes or terrorism, and to meet U.S. international commitments for a 90 day petroleum stockpile.</p> <p>Strategy: Provide for a SPR of sufficient size to protect the Nation and the capability to respond rapidly to a wide range of disruptions.</p> <p>Program: Fossil Energy/ Petroleum Reserves (FE18)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
90 day sustainable drawdown rate (million barrels per day)	T: 4.4 R: 4.4	T: 4.4 R: 4.4	T: 4.4	T: 4.4	Maintains the operational readiness of the SPR to ensure a 4.4 MMB/Day drawdown rate.
Calculated Maintenance Performance Appraisal Report (MPAR) Rating (% of monthly maintenance and accessibility goals)	T: ≥ 95% R: 98.4%	T: ≥ 95% R: 98.5%	T: ≥ 95%	T: ≥ 95%	Monthly maintenance and accessibility goals.
Operating cost per barrel of storage capacity (operating cost per barrel)	T: ≤ \$0.25 R: \$0.207	T: ≤ \$0.25 R: 0.210	T: ≤ \$0.25	T: ≤ \$0.25	Maintain operating cost per barrel of storage capacity.

Means and Strategies

The SPR will use various means and strategies to continue its mission and achieve program goals. Assurance of a readiness posture will be accomplished through internal readiness reviews, assessments, exercises, and tests. Effectiveness of the SPR to mitigate severe oil supply disruptions will be influenced by the SPR's size (inventory and capacity) and ability to deliver into the marketplace. In FY 2009, DOE used available balances for the purchase of additional SPR oil, and continued to fill using Federal royalty oil until a 727 million barrel inventory was achieved in December 2009. The sale of approximately 6 million barrels of oil has been proposed in FY 2012 to provide for operational purposes, which will reduce the inventory to 721 million barrels. To ensure that the SPR program is environmentally responsible and fully responsive to the needs of the Nation and the public, the FY 2012 request proposes to complete the construction activities and transfer the oil from the existing cavern into the replacement cavern.

The SPR utilizes a transportable degas plant to ensure availability of crude oil inventories at SPR sites within environmental and safety constraints. This process prevents the off-gassing of volatile organic compounds (VOCs) above safe levels during oil movements through commercial distribution points. Inventory processing at Big Hill was completed in FY 2006, and the self-contained degas plant was relocated to Bryan Mound in FY 2007. When Bryan Mound degas operations is completed in FY 2011, efforts will begin to move the plant to the West Hackberry site. In FY 2010, modifications/foundations at the West Hackberry site were made in preparation for relocation of the degas plant to the site. In FY 2012, degas operations were scheduled to begin at the West Hackberry site. Due to the FY 2011 Continuing Resolution rescission of \$15.3 million, the SPR does not have sufficient funding for the required relocation and operations of its crude degasification plant. The suspension of the oil degasification operations will reduce the availability of SPR crude inventory for drawdown in an emergency and the SPR drawdown response rate.

Program performance can be affected by several external factors including:

- Changing petroleum consumption and import dependence levels
- Petroleum market conditions, and
- Developments in the commercial distribution system (i.e., pipelines, and terminals)

Validation and Verification

There is a hierarchy of performance information for the SPR. The Department collects and tracks the executive-level "corporate" measures. The SPR Program Office monitors the "critical few," specific short- and long-term measures. The SPR Project Management Office manages the detailed, operational measures that are implemented by the contractors. Organizational and action plans are reviewed and analyzed at quarterly Program Reviews. Project Reviews/Assessments, including dashboard updates, are conducted monthly to analyze performance against all milestones and contracts. These reviews provide an opportunity to

discuss performance and provide direction to contractors. These same measures are reviewed daily during the site managers' site status meetings.

Budget formulation/execution assessments are regularly conducted throughout the year, including annual budget validations. Other evaluations include: semi-annual Management & Operating (M&O) contractor award fee performance assessments against Work Authorization Directives; on-site reviews to verify operational, maintenance and management performance data; and drawdown readiness quarterly reviews.

Appendix H: Science

Science

The mission of the [Office of Science](#) is the delivery of scientific discoveries and major scientific user facilities and tools to transform our understanding of nature and to advance the energy, economic, and national security of the United States. Science supports basic research in the following areas: fundamental research in energy, matter, and the basic forces of nature; biological systems; climate change and the environmental consequences of energy production, development, and use; fundamental science that supports the foundations for new energy technologies and environmental mitigation; a knowledge base for fusion as a potential future energy source; and advanced computational and networking tools critical to research.

The total budget request for the Office of Science is \$5.4 billion in FY 2012. In support of its mission, Science's responsibilities are in three main areas: selection and management of research; operation of world-class, state-of-the-art scientific facilities; and design and construction of new facilities. Science activities are carried out in ten programs: Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, Nuclear Physics, Workforce Development for Teachers and Scientists, Science Laboratories Infrastructure, Safeguards and Security, and Science Program Direction.

Details on DOE's FY 2012 Congressional Budget Request for the Office of Science are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume4.pdf>.

Means and Strategies

All research projects and facilities undergo regular peer review and merit evaluation based on procedures set down in 10 CFR 605 for the extramural grant program and under a similar process for the laboratory programs and scientific user facilities. All new projects are selected through peer review and merit evaluation.

Office of Science programs ensure effective management processes for cost-effective investments and timely delivery of projects and utilize input from the scientific community to ensure progress is made and opportunities are identified. Programs also form mutually beneficial partnerships with programs sharing common goals. The basic science supported by each program is coordinated with the activities of other programs within the Office of Science, with programs of the DOE applied technology offices and the National Nuclear Security Administration, and with programs of other federal agencies. The Office of Science also promotes the transfer of basic research results to contribute to DOE missions in areas of energy, environment, and national security. Program-specific means and strategies are described in detail in the "Program Planning and Management" sections of the individual Science program budget justification narratives.

Validation and Verification

Progress against established plans is evaluated by periodic internal and external performance reviews. These reviews provide an opportunity to verify and validate performance. Monthly, quarterly, semiannual, and annual reviews consistent with specific program management plans are performed to ensure technical progress, cost and schedule adherence, and responsiveness to program requirements.

Advanced Scientific Computing Research

Mission

The mission of the Advanced Scientific Computing Research (ASCR) program is to discover, develop, and deploy the computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to DOE. Scientific computing is particularly important for the solution of energy and environment research problems that are not solvable through traditional theoretical and experimental approaches or are too hazardous, time-consuming, or expensive to solve by traditional means. A particular challenge of the ASCR program is fulfilling the science potential of emerging computing systems and other novel computing architectures, which will require numerous significant modifications to today's tools and techniques to deliver on the promise of exascale science. The architecture of future computing systems, from desktops to exascale, will be transformed by changes in the underlying semiconductor technology and will be constrained by the need for greater energy efficiency. ASCR supports research in applied mathematics, computer science, advanced networking, and computational partnerships (Scientific Discovery through Advanced Computing, or SciDAC), as well as research and evaluation prototypes, and the operation of high performance computing systems and networks.

Performance Plan

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas					
Strategic Objective: Lead computational sciences and high performance computing					
Program: Science/ Advanced Scientific Computing Research (SC34)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Average annual percentage increase in the computational effectiveness (either by simulating the same problem in less time or simulating a larger problem in the same time) of a subset of application codes, tools and/or libraries.	T: >100% R: Target Met	T: >100% R: Target Met	T: >100%	T: >100%	Deliver forefront computational and networking capabilities to scientists nationwide that enable them to extend the frontiers of science, answering critical questions that range from the function of living cells to the power of fusion energy. ⁶⁷
Focus usage of the primary supercomputer at the National Energy Research Scientific Computing Center (NERSC) on capability computing. Percentage of computing time will be used by computations that require at least 1/8 of the NERSC resource.	T: 40% R: Target Met	T: 30% R: Target Met	T: 35%	T: 30%	

Basic Energy Sciences

Mission

The mission of the Basic Energy Sciences (BES) program is to support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support DOE missions in energy, environment, and national security. BES-supported research disciplines—condensed matter and materials physics, chemistry, geosciences, and aspects of physical biosciences—provide the knowledge base for the control of the physical and chemical transformations of materials and the discovery and design of new materials with novel structures, functions, and properties. These disciplines drive new solutions and technologies in virtually every aspect of energy resources, production, conversion, transmission, storage, efficiency, and waste mitigation.

⁶⁷ In the process of reviewing in light of the new Strategic Plan

Performance Plan

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Extending our knowledge of the natural world Program: Science/ Basic Energy Sciences (SC31)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Temporal resolution; maintain x-ray pulse of less than 70 femtoseconds in duration and containing more than 1 trillion photons per pulse. <i>(No further improvement in performance is expected for this measure since the current suite of instruments has met their maximum performance level. This performance goal is a measure of SC's intent to maintain the maximum level of performance for users of the current SC facilities until the next generation of instruments and facilities becomes available.)</i>	T: <100 duration, >100 million intensity R: Target Met	T: <100 duration, >100 million intensity R: Target Met	T: <70 duration, >1trillion intensity	T: <100 duration, > 1trillion intensity	Provide the scientific knowledge and tools to achieve energy independence, securing U.S. leadership and essential breakthroughs in basic energy sciences. ⁶⁸
Maintain spatial resolutions for imaging in the hard x-ray region of <100 nm and in the soft x-ray region of <18 nm, and spatial information limit for an electron microscope of 0.05 nm. <i>(No further improvement in performance is expected for this measure since the current suite of instruments has met their maximum performance level. This performance goal is a measure of SC's intent to maintain the maximum level of performance for users of the current SC facilities until the next generation of instruments and facilities becomes available.)</i>	T: <100 hard x-ray, <18 soft x-ray, 0.08 limit R: Target Met	T: <100 hard x-ray, <18 soft x-ray, 0.08 limit R: Target Met	T: <100 hard x-ray, <18 soft x-ray, 0.05 limit	T: <100 hard x-ray, <18 soft x-ray, 0.05 limit	
Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.	T: <10% R: Target Met	T: <10% R: Target Met	T: <10%	T: <10%	
Achieve an average operation time of the scientific user facilities as a percentage of the total scheduled annual operating time of greater than 90%.	T: >90% R: Target Met	T: >90% R: Target Met	T: >90%	T: >90%	

Biological and Environmental Research

Mission

The mission of the Biological and Environment Research (BER) program is to understand complex biological, climatic, and environmental systems across spatial and temporal scales ranging from sub-micron to global, from individual molecules to ecosystems, and from nanoseconds to millennia. This is accomplished by exploring the frontiers of genome-enabled biology; discovering the physical, chemical, and biological drivers of climate change; and seeking the molecular determinants of environmental sustainability and stewardship. BER-supported systems biology research uncovers nature's secrets from the diversity of microbes and plants to understand how biological systems work, how they interact with each other, and how they can be manipulated to harness their processes and products that contribute to new strategies for producing new biofuels, cleaning up legacy waste, and sequestering carbon dioxide. BER plays a vital role in supporting research on atmospheric processes, climate modeling, interactions between ecosystems and greenhouse gases, and analysis of impacts of climatic change on energy production and use. Subsurface biogeochemistry research seeks to understand the role that

⁶⁸ In the process of reviewing in light of the new Strategic Plan

subsurface biogeochemical processes play in determining the fate and transport of contaminants including heavy metals and radionuclides.

Performance Plan

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Extending our knowledge of the natural world Program: Science/ Biological and Environmental Research (SC32)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Develop a coupled climate model with fully interactive carbon and sulfur cycles, as well as dynamic vegetation to enable simulations of aerosol effects, carbon chemistry, and carbon sequestration by the land surface and oceans and the interactions between the carbon cycle and climate.	T: Provide improved climate simulations on subcontinental, regional, and large watershed scales, with an emphasis on improved simulation of precipitation and produce new continuous time series of retrieved cloud, aerosol, and radiation for Arctic region R: Target Met	T: Provide a new parameterization for aerosol effects on cloud drizzle for incorporation into atmospheric models R: Target Met	T: Earth system model to be used in generating scenarios for the IPCC Fifth Assessment Report and provide integrated aerosol sub-model that includes direct and indirect forcing	T: Demonstrate coupled climate models at 20 km resolution	Provide the biological and environmental discoveries necessary to clean and protect our environment, offer new energy alternatives, and facilitate the entertainment of physical science advances in biology. ⁶⁹
Strategic Objective: Delivering new technologies to advance our mission Program: Science/ Biological and Environmental Research (SC32)					
Determine the dominant processes controlling the fate and transport of contaminants in subsurface environments and develop quantitative numerical models to describe contaminant mobility at the field scale.	T: Test geophysical techniques that measure parameters controlling contaminant movement under field conditions in at least two distinct subsurface environments R: Target Met	T: Develop a reactive transport model for a complex field site that accounts for heterogeneity and objectively evaluate against field data R: Target Met	T: Refine subsurface transport models by developing computational methods to link important processes impacting contaminant transport at smaller scales to the field scale	T: Perform time-lapse geophysical experiments to monitor spatial and temporal dynamics of hydrogeological and biogeochemical parameters impacting contaminant transport processes	
Increase by at least 10% the number of high quality (less than one error in 10,000) bases of DNA from microbial and model organism genomes sequenced the previous year, and decrease by at least 10% the cost (billion base pair/dollar) to produce these base pairs from the previous year's actual results.	T: Sequence 253 billion base pairs at a rate of 4,600 bp/\$1 R: Target Met	T: Sequence 1,100 billion base pairs at a rate of 15,942 bp/\$1 R: Target Met	T: Sequence 6,644 billion base pairs at a rate of 78,782 bp/\$1	T: To be determined based on FY 2011 results	

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Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
The achieved operation time of the JGI scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	[same as previous: Provide the biological and environmental discoveries necessary to clean and protect our environment, offer new energy alternatives, and facilitate the entertainment of physical science advances in biology. ⁷⁰]
The achieved operation time of the ARM scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	
The achieved operation time of the EMSL scientific user facility as a percentage of the total scheduled annual operating time is greater than 98%.	T: 98% R: Target Met	T: 98% R: Target Met	T: 98%	T: 98%	

Fusion Energy Sciences

Mission

The mission of the Fusion Energy Sciences (FES) program is to support research to expand the fundamental understanding of matter at very high temperatures and densities, and to build the scientific foundations needed to develop a fusion energy source. This is accomplished by studying plasmas under a wide range of temperature and density, developing advanced diagnostics to make detailed measurements of their properties, and creating theoretical/computational models to resolve the essential physics. FES operates scientific user facilities to enable world-leading research programs in high temperature, magnetically confined plasmas, and to participate in the design and construction of ITER, the world's first facility for studying a sustained burning plasma. FES also supports enabling R&D to improve the components and systems that are used to build fusion facilities.

⁷⁰ In the process of reviewing in light of the new Strategic Plan

Performance Plan

<p>Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas</p> <p>Strategic Objective: Delivering new technologies to advance our mission</p> <p>Program: Science/ Fusion Energy Sciences (SC33)</p>					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Conduct experiments on the major fusion facilities (DIII-D, Alcator C-Mod, NSTX) leading toward the predictive capability for burning plasmas and configuration optimization.	T: See details below R: Target Met	T: See details below R: Target Met	T: See details below	T: See details below	Answer the key scientific questions and overcome enormous technical challenges to harness the power that fuels our Sun. ⁷¹
<p>FY 2012: Conduct experiments on major fusion facilities leading toward improved understanding of core transport and enhanced capability to predict core temperature and density profiles. In FY 2012, FES will assess the level of agreement between predictions from theoretical and computational transport models and the available experimental measurements of core profiles, fluxes and fluctuations. The research is expected to exploit the diagnostic capabilities of the facilities (Alcator C-Mod, DIII-D, and NSTX) along with their abilities to run in both unique and overlapping regimes. The work will emphasize simultaneous comparison of model predictions with experimental energy, particle and impurity transport levels and fluctuations in various regimes, including those regimes with significant excitation of electron modes. The results achieved will be used to improve confidence in transport models used for extrapolations to planned ITER operation.</p> <p>FY 2011: Improve the understanding of the physics mechanisms responsible for the structure of the pedestal and compare with the predictive models described in the companion theory milestone. Perform experiments to test theoretical physics models in the pedestal region on multiple devices over a broad range of plasma parameters (e.g., collisionality, beta, and aspect ratio). Detailed measurements of the height and width of the pedestal will be performed augmented by measurements of the radial electric field. The evolution of these parameters during the discharge will be studied. Initial measurements of the turbulence in the pedestal region will also be performed to improve understanding of the relationship between edge turbulent transport and pedestal structure.</p> <p>FY 2010: Conduct experiments on major fusion facilities to improve understanding of the heat transport in the tokamak scrape-off layer (SOL) plasma, strengthening the basis for projecting divertor conditions in ITER. The divertor heat flux profiles and plasma characteristics in the tokamak SOL will be measured in multiple devices to investigate the underlying thermal transport processes. The unique characteristics of C-Mod, DIII-D, and NSTX will enable collection of data over a broad range of SOL and divertor parameters (e.g., collisionality, beta, parallel heat flux, and divertor geometry). Coordinated experiments using common analysis methods will generate data that will be compared with theory and simulation.</p> <p>FY2009: Identify the fundamental processes governing particle balance by systematically investigating a combination of divertor geometries, particle exhaust capabilities, and wall materials. Alcator C-Mod operates with high-Z metal walls, NSTX is pursuing the use of lithium surfaces in the divertor, and DIII-D continues operating with all graphite walls. Edge diagnostics measuring the heat and particle flux to walls and divertor surfaces, coupled with plasma profile data and material surface analysis, will provide input for validating simulation codes. The results achieved will be used to improve extrapolations to planned ITER operation.</p>					

⁷¹ In the process of reviewing in light of the new Strategic Plan

Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
Continue to increase resolution in simulations of plasma phenomena—optimizing confinement and predicting the behavior of burning plasmas require improved simulations of edge and core plasma phenomena, as the characteristics of the edge can strongly affect core confinement.	T: See details below R: Target Met	T: See details below R: Target Met	T: See details below	T: See details below	Answer the key scientific questions and overcome enormous technical challenges to harness the power that fuels our Sun. ⁷²
<p>FY 2012: Our understanding of ITER performance is largely based on the idealization of 2D magnetic fields that are symmetric about the central axis of the tokamak. However, ITER will have a number of intrinsic sources of nonaxisymmetric magnetic fields due to a finite number of toroidal field coils and ripple reducing ferritic shims, ferritic steel test blanket modules, and possibly 3D coils for plasma stability control. These fields can both improve and degrade ITER performance. A number of computer simulation tools that are capable of providing quantitative predictions of the effects of such nonaxisymmetric fields have been and are continuing to be developed. In FY 2012, we will compare the predictions of the simulations with experiments on present facilities, and will assess how this understanding impacts our predictions of the operational space and performance of ITER.</p> <p>FY 2011: A focused analytic theory and computational effort, including large-scale simulations, will be used to identify and quantify relevant physics mechanisms controlling the structure of the pedestal. The performance of future burning plasmas is strongly correlated with the pressure at the top of the edge transport barrier (or pedestal height). Predicting the pedestal height has proved challenging due to a wide and overlapping range of relevant spatiotemporal scales, geometrical complexity, and a variety of potentially important physics mechanisms. Predictive models will be developed and key features of each model will be tested against observations, to clarify the relative importance of various physics mechanisms, and to make progress in developing a validated physics model for the pedestal height.</p> <p>FY 2010: Gyrokinetic simulations of turbulent transport of toroidal momentum with both kinetic and Boltzmann electrons will be carried out. These simulations will explore the Ion Temperature Gradient (ITG) and the Collisionless Trapped Electron Mode (CTEM) regimes.</p> <p>FY 2009: Gyrokinetic edge electrostatic turbulence simulations will be carried out across the divertor separatrix with enhanced resolution down to the ion gyroradius scale.</p>					
Average achieved operation time of the major national fusion facilities (DIII-D, Alcator C-Mod, NSTX) as a percentage of the total planned operation time is greater than 90%.	T: >90% R: Target Met	T: >90% R: Target Met	T: >90%	T: >90%	
Cost-weighted mean percent variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects kept to less than 10%.	n/a	n/a	T: <10%	T: <10%	

High Energy Physics

Mission

The mission of the High Energy Physics (HEP) program is to support research to understand how our universe works at its most fundamental level. This is accomplished by discovering the most elementary constituents of matter and energy, probing the interactions between them, and exploring the basic nature of space and time itself. HEP is focused on three scientific frontiers in particle physics: the Energy Frontier, the Intensity Frontier, and the Cosmic Frontier. Research

⁷² In the process of reviewing in light of the new Strategic Plan

includes theoretical and experimental studies by individual investigators and large collaborative teams—some who gather and analyze data from accelerator facilities in the U.S. and around the world and others who develop and deploy ultra-sensitive ground- and space-based instruments to detect particles from space and observe astrophysical phenomena that advance our understanding of fundamental particle properties. HEP also invents new particle accelerator and detector technologies to meet the challenges of research at the frontiers.

Performance Plan

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas Strategic Objective: Extending our knowledge of the natural world Program: Science/ High Energy Physics (SC30)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Measure within 20% of the total integrated amount of data (in protons on-target) delivered to the MINOS (or NOvA) detector using the NuMI facility.	T: Baseline is 2.2×10^{20} (within 20% is 1.8×10^{20}) R: Target Met	T: Baseline is 2.7×10^{20} (within 20% is 2.2×10^{20}) R: Target Met	T: Baseline is 2.7×10^{20} (within 20% is 2.2×10^{20})	T: Baseline is 1.3×10^{20} (within 20% is 1.0×10^{20})	Understand the unification of fundamental particles and forces and the mysterious forms of unseen energy and matter that dominate the universe, search for possible new dimensions of space, and investigate the nature of time itself. ⁷³
Deliver within 20% of baseline estimate a total integrated amount of data (in inverse picobarns [pb^{-1}]) to the CDF and D-Zero detectors at the Tevatron.	T: Baseline is $1,684 \text{ pb}^{-1}$ (within 20% is $1,347 \text{ pb}^{-1}$) R: Target Met	T: Baseline is $1,700 \text{ pb}^{-1}$ (within 20% is $1,360 \text{ pb}^{-1}$) R: Target Met	T: Baseline is $2,000 \text{ pb}^{-1}$ (within 20% is $1,600 \text{ pb}^{-1}$)	Discontinued (FY 2011 is last planned year of operations for CDF and D-Zero detectors)	
Achieve less than 10% for both the cost-weighted mean percentage variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects.	T: <10% R: Target Met	T: <10% R: Target Met	T: <10%	T: <10%	
Achieve greater than 80% average operation time of the scientific user facilities (the Fermilab Tevatron and the Neutrinos at the Main Injector (NuMI beamline) as a percentage of the total scheduled annual operating time.	T: >80% R: Target Met	T: >80% R: Target Met	T: >80%	T: >80%	

Nuclear Physics

Mission

The mission of the Nuclear Physics (NP) program is to discover, explore, and understand all forms of nuclear matter. The fundamental particles that compose nuclear matter, quarks, and gluons are relatively well understood, but exactly how they fit together and interact to create different types of matter in the universe is still largely not understood. To solve this mystery, NP supports experimental and theoretical research—along with the development and operation

⁷³ In the process of reviewing in light of the new Strategic Plan

of particle accelerators and advanced technologies—to create, detect, and describe the different forms and complexities of nuclear matter that can exist, including those that are no longer commonly found in our universe . NP also provides stewardship of isotope production and technologies to advance important applications, research, and tools for the nation. By providing support for tools, facilities, and research opportunities, the NP program challenges the imagination and the scientific and technical abilities of U.S. scientists and the international scientific community.

Performance Plan

Strategic Goal: Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity, with clear leadership in strategic areas					
Strategic Objective: Extending our knowledge of the natural world					
Program: Science/ Nuclear Physics (SC29)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; R = Result)				
Achieve at least 80% of the integrated delivered beam used effectively for all experiments run at each of the Argonne Tandem Linac Accelerator System (ATLAS) and the Holifield Radioactive Ion Beam (HRIBF) facilities measured as a percentage of the scheduled delivered beam considered effective for each facility. <i>(measure established in FY 2009; starting in FY 2012, this measure applies only to ATLAS)</i>	T: > 80% R: Target Not Met	T: ≥ 80% R: Target Met	T: ≥ 80%	T: ≥ 80%	Understand the evolution and structure of nuclear matter, from the smallest building blocks, quarks and gluons, to the stable elements in the universe created by stars, to unique isotopes created in the laboratory that exist at the limits of stability and possess radically different properties from known matter. ⁷⁴
Achieve at least 80% of the integrated delivered beam used effectively for experimental research in each of Halls A, B and C at the Continuous Electron Beam Accelerator Facility (CEBAF) measured as a percentage of the scheduled delivered beam considered effective for each Hall. The values from each Hall will be averaged for the end of the year result starting in FY 2010.	T: >80% R: Target Not Met	T: ≥ 80% R: Target Not Met	T: ≥ 80%	T: ≥ 80%	
Achieve at least 80% of the projected integrated heavy-ion collision luminosity for each of the PHENIX and STAR experiments at the Relativistic Heavy Ion Collider, where the projected values take into account anticipated collider performance and detector data-taking efficiencies.	n/a	T: ≥ 80% R: Target Met	T: ≥ 80%	T: ≥ 80%	
Achieve at least 80% of the projected integrated proton-proton collision luminosity for each of the PHENIX and STAR experiments at the Relativistic Heavy Ion Collider, where the projected values take into account anticipated collider performance and detector data-taking efficiencies.	T: > 80% R: Target Not Met	n/a	T: ≥ 80%	T: ≥ 80%	
Achieve at least 80% average operation time of the scientific user facilities as a percentage of the total scheduled annual operating time.	T: 80% R: Target Met	T: 80% R: Target Met	T: 80%	T: 80%	
Achieve within 10% for both the cost-weighted mean percentage variance from established cost and schedule baselines for major construction, upgrade, or equipment procurement projects	T: <10% R: Target Met	T: <10% R: Target Met	T: <10%	T: <10%	

⁷⁴ In the process of reviewing in light of the new Strategic Plan

Appendix I: National Nuclear Security Administration

National Nuclear Security Administration

The [National Nuclear Security Administration](#) is critical to ensuring the security of our nation. The NNSA implements programs for three major national security endeavors: leveraging science to maintain a safe, secure and effective arsenal of nuclear weapons and capabilities to deter any adversary and guarantee that defense to our allies; accelerating and expanding our efforts here in the homeland and around the world to reduce the global threat posed by nuclear weapons, nuclear proliferation and unsecured or excess nuclear materials; and, providing safe and effective nuclear propulsion for the United States Navy.

NNSA is requesting a total of \$11.8 billion in FY 2012, an increase of \$568 million over the FY 2011 Request. NNSA is requesting program funds in four appropriation accounts: Weapons Activities (FY 2011 \$7,008.8 million; FY 2012 \$7,629.7 million); Defense Nuclear Nonproliferation (FY 2011 \$2,687.2 million; FY 2012 \$2,549.5 million); Naval Reactors (FY 2011 \$1,070.5 million; FY 2012 \$1,153.7 million), and Office of the Administrator (FY 2011 \$448.3 million; FY 2012 \$450.1 million)

Note: Per Section 3253 of P.L. 106-65, The National Nuclear Security Administration is required to include all budget years associated with their annual targets.

Office of the Administrator

Mission

The Office of the Administrator creates a well-managed, inclusive, responsive, and accountable organization through the strategic management of human capital and acquisitions; enhanced cost-effective utilization of information technology; and integration of budget and performance data.

Performance Plan

(R = Results; T = Targets)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: This program supports all NNSA strategic objectives. Strategy: This program supports all NNSA strategies. Program: Office of the Administrator (NA56)</p>											
<p>Federal Administrative Costs: Maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6% (Efficiency)</p>	N/A	N/A	R: 5.0% T: 5.9%	R: 5.2% T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	T: 5.9%	In keeping with OMB and DOE expectations that administrative costs be minimized, maintain the Office of the Administrator Federal administrative costs as a percentage of total Weapons Activities and Defense Nuclear Nonproliferation program costs at less than 6%.
<p>PMCDP Certification: Cumulative percent of active NNSA projects managed by a Federal Project Director, certified at the appropriate level through the Project Management Career Development Program (Long-term Output)</p>	N/A	N/A	R: 76% T: 74%	R: 87% T: 80%	T: 85%	N/A	N/A	N/A	N/A	N/A	By the end of 2011, 85% of NNSA Federal Project Directors will be certified at the appropriate level through the Project Management Career Development Program.
<p>Annual average NNSA Program score on the OMB Program Assessment Rating Tool (PART) assessment indicating progress in budget performance integration and results (Efficiency)</p>	R: 84.3% T: 85%	R: 85% T: 85%	N/A ⁷⁵	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increased the annual average PART score to 85% in FY2008

⁷⁵ Prior to FY 2008, the cumulative average NNSA PART score was used as the indicator of the overall health of the organization. This metric was replaced with two new metrics that better depict the overall health of the organization.

Means and Strategies

The Office of the Administrator Program leverages Federal resources with contractual support to optimize its mission achievement. The NNSA has implemented a disciplined planning, programming, and budgeting process to assure management, customers, stakeholders and the public that these programs are integrated and cost effective. The program has an integrated headquarters and field administrative structure, and is forward-looking in its workforce planning initiatives. The program is also implementing information and acquisition management tools and practices for improved job performance and efficiency. The NNSA is demonstrating with the Office of Personnel Management a “pay for performance” system to ensure the best talent is recruited, retained, and rewarded. All employees are accountable to the NNSA Administrator for achieving their elements of the NNSA’s mission.

The Office of the Administrator budget is 73 percent Salaries and Benefits for NNSA Federal staff. Budget components for Information Technology, Space and Occupancy, International Offices, Travel, and Support Services, comprise the remaining 27 percent.

Validation and Verification

To validate and verify program performance, the NNSA conducts various internal and external reviews and audits. The NNSA’s programmatic activities are subject to review by the Congress, the Government Accountability Office, the Department’s Inspector General, the National Security Council, the Defense Nuclear Facilities Safety Board, the Department’s Office of Engineering and Construction Management, and the Department’s Office of Independent Oversight. Each year, numerous external independent reviews are conducted of selected projects. Additionally, NNSA Headquarters senior management and field managers conduct frequent, in-depth reviews of cost, schedule, and scope to ensure projects are on-schedule and within budget.

The NNSA has established a comprehensive validation and verification process as part of its Planning, Programming, Budgeting and Evaluation (PPBE) system. Long-term performance goals are established/validated during the Planning Phase and linked to annual targets and detailed technical milestones. During the Programming Phase, budget and resource trade-offs and decisions are evaluated based on the impact to annual and long-term outcomes. These NNSA decisions are documented and used to develop the budget requests during the Budgeting Phase. Program and financial performance for each measure is monitored and progress verified during the Execution and Evaluation Phase.

The NNSA validation and verification activities during the PPBE Execution and Evaluation Phase include a set of tiered performance reviews to examine program management and corporate performance against long-term goals. The NNSA Administrator reviews each NNSA program as part of the NNSA's PPBE Evaluation process. These reviews, usually conducted annually, include the NNSA Management Council and focus on both technical and financial information to identify issues, monitor program progress, and make recommendations for

corporate improvement. The focus of these reviews is to verify and validate that NNSA programs are on track to meet their long-term goals and annual targets. The results of these reviews are reported quarterly in the Department's performance tracking system and annually in the NNSA Administrator's Annual Performance Report and the DOE Performance Accountability Report (PAR). These documents present the progress that NNSA programs are making toward achieving both annual targets and long-term goals, and help senior managers verify and validate progress toward NNSA and Departmental commitments.

Weapons Activities

Mission

The Weapons Activities appropriation maintains a nuclear security infrastructure of people, programs, and facilities that provide specialized scientific, technical, and engineering capabilities for stewardship of the nuclear weapons stockpile and other national security needs.

Directed Stockpile Work

Mission

The Directed Stockpile Work (DSW) program contributes to national security by enhancing the safety and security while ensuring the reliability of the nation's nuclear weapons stockpile for a continued effective deterrent, without underground nuclear testing. On behalf of the National Nuclear Security Administration (NNSA), DSW provides the number and type of nuclear warheads and bombs (hereafter referred to as warheads) to the Department of Defense (DoD) in accordance with the President's Nuclear Weapons Stockpile Plan (NWSP).

The nation's nuclear weapons stockpile consists of warheads with an average age of 25 years. A stockpile stewardship and management program ensures that all weapons in the stockpile remain safe, secure, and reliable. This includes maintenance, surveillance, assessment, and life extensions as necessary. The DSW program relays the state of health of the nuclear weapons stockpile through its memorandums on Annual Assessment to the President and bi-annual weapons reliability reports to the DoD. In addition, DSW supports nonproliferation goals and international commitments to eliminate militarily available nuclear materials through the dismantlement and disposition of retired weapons and weapons components.

The DSW program also interfaces with other organizations and their mission areas including Campaigns to coordinate component and manufacturing maturation to improve surety (safety, security, and use control), reliability, and survivability of the stockpile; fill critical knowledge gaps in order to ensure success of DSW mission; and provide the necessary tools and capabilities to assess and sustain the reliability and performance of the nation's aging stockpile. The Readiness in Technical Base and Facilities (RTBF) program provides the facilities and infrastructure, and the personnel who maintain them, are essential for being able to perform DSW work. In addition, the Secure Transportation Asset provides secure movement of weapons and weapons components to enable execution of the DSW missions.

The crosscutting mission of DSW increases the need for mature programmatic interrelationships beyond those within the Weapons Activities appropriation. Nonproliferation, Nuclear Energy, Environmental Management, and Homeland Security missions leverage technical capabilities such as those maintained within the materials processing enterprises of plutonium, uranium, and

tritium sustainment. Specifically within DSW, the Plutonium Sustainment subprogram integrates with the overarching plutonium program plans, campaigns, facilities, and the technical base (personnel and skills) and provides the means to maintain necessary capabilities required for mission success. The DSW program sustains and retains the technical skills and infrastructure critical to the nation's ability to work with plutonium across a range of applications. The skills and infrastructure historically retained by the weapons program serve other national missions. Examples include: Pu-238 Heat Source production for the National Aeronautics and Space Administration, Advanced Nuclear Fuels development, production of parts and shapes for scientific experimental purposes, nuclear forensics support, capability development and demonstration and minimal production of plutonium oxide from surplus pits for mixed-oxide fuel, and a Pu-metal standards exchange program that distributes samples for analysis/calibration to participating labs, which includes the United Kingdom's Atomic Weapons Establishment (AWE) and the International Atomic Energy Agency (IAEA).

The DSW derives its nuclear weapons stockpile requirements from the President's NWSP. The DOE and DoD jointly convene the Nuclear Weapons Council (NWC) and develop recommended actions for presidential direction in the NWSP. The NWC also drives ongoing maintenance activities, warhead life extension needs, stockpile surveillance and assessment, and research and development (R&D) of new technologies needed to support the current and future stockpile. The DSW will, in coordination with the DoD: (1) provide unique skills, equipment, testers, and logistics to enable nuclear weapons operations; (2) develop, produce and replace limited life components; (3) conduct scheduled weapons maintenance; (4) conduct surveillance and evaluations to assess weapons reliability and to detect/anticipate potential weapons issues; (5) quantify margins and uncertainties in order to assess and certify the nuclear stockpile; (6) develop options for enhanced safety, security, and reliability for insertion into Life Extension Programs (LEP)/modifications/alterations; (7) efficiently extend the life of existing weapons systems through authorized modifications to correct technical issues and enhance safety, security, and reliability; (8) provide dismantlement and disposition of weapons and components for weapons retired from the stockpile; (9) compile and analyzes information during the Annual Assessment process to determine if problems exist, and (10) sustain the plutonium infrastructure to meet enduring national requirements unique to this special nuclear material.

Overview

The Directed Stockpile Work program's corporate performance measures support the NNSA strategy to maintain a safe, secure, and effective U.S. nuclear stockpile, a central commitment in the President's Nuclear Posture Review, and to dismantle excess nuclear weapons to meet national objectives. The DSW program accomplishes this by performing LEPs, conducting comprehensive stockpile systems reports, dismantling and disposing of retired nuclear weapons, and supplying LLCs deliverables.

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs & Dismantle excess nuclear weapons to meet national objectives Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile. Program: Directed Stockpile Work (NA36)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Annual Warheads Certification: Annual percentage of warheads in the Stockpile that is safe, secure, reliable, and available to the President for deployment. (Annual Outcome)	R: 100% T: 100%	R : 100% T: 100%	R: 100% T: 100%	R: 100% T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, maintain 100% of the warheads in the stockpile as safe, secure, reliable, and available to the President for deployment.
Stockpile Maintenance: Annual percentage of items supporting the Enduring Stockpile Maintenance completed (Annual percentage of prior-year non-completed items completed). (Annual Output)	R: 95% (100%) T: 95% (100%)	R: 95% (100%) T: 95% (100%)	R: 95% (100%) T: 95% (100%)	R: 100% (100%) T: 95% (100%)	T: 95% (100%)	N/A	N/A	N/A	N/A	N/A	Annually, complete at least 95% of all scheduled maintenance activity (100% of prior-year non-completed items). This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
W76-1 Life Extension Program (LEP): Cumulative percentage of progress in completing Nuclear Weapons Council (NWC)-approved W76-1 Life Extension Program (LEP) activity. (Long-term Output)	R: 38% T: 39%	R: 44% T: 44%	R: 48% T: 48%	R: 49% T: 52%	T: 65% ⁷⁶	T : 70%	T : 75%	T : 80%	T : 85%	T : 90%	By FY 2018, complete NWC-approved W76-1 LEP.
B61-7/11 LEP: Cumulative percentage of progress in completing NWC-approved B61-7/11 LEP activity. (Long-term Output)	R: 70% T: 70%	R: 90% T: 90%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Completed the NWC-approved B61-7/11 LEP in FY 2009.

⁷⁶ The W76-1 full scale production program has been re-baselined as a result of the implementation of the Nuclear Posture Review and in accordance with the current planning in the submitted DoD/DOE Nuclear Weapons Council Requirements and Planning Document (RPD)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs & Dismantle excess nuclear weapons to meet national objectives
Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile.
Program: Directed Stockpile Work (NA36)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
LEP Production Costs: Cumulative percent reduction in projected W76 warhead production costs per warhead from established validated baseline, as computed and reported annually by the W76 LEP Cost Control Board. (Efficiency)	R: 0.39% T: 0.50%	R: 0.78% T: 1.0%	R: 0.8% T: 1.0%	R: 0.8% T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	T: 1.0%	Achieve the projected W76-1 LEP warhead production costs per warhead from established validated baseline by 1.0%, then maintain through end of production.

Science Campaign

Mission

The Science Campaign develops our nation's scientific capabilities and experimental infrastructure used to assess the safety, security, reliability, and performance of the nuclear explosives package (NEP) without reliance on further underground testing. The Science Campaign provides this assessment by developing certification and assessment tools and the experimental platforms to inform, validate, and provide confidence in our essential predictive capabilities. Its science-based approach provides the fundamental knowledge needed to: (1) provide a quantitative measure of confidence in weapons performance; (2) address and reduce uncertainties in our predictive capabilities, (3) predict the performance of the NEP as components age; (4) inform decisions for Stockpile Stewardship Programs; and (5) exercise readiness capabilities through experiments and assessments.

Overview

The Science Campaign program's corporate performance measure supports the NNSA strategy to rebuild the required science and technology capabilities needed to support the U.S. nuclear stockpile and future military needs. The program accomplishes this strategy by developing improved capabilities to assess the safety, reliability, and performance of the nuclear package of weapons without further underground testing; enhancing readiness to conduct underground nuclear testing as directed by the President; and developing essential scientific capabilities and infrastructure.

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Strengthen the Science, Technology, and Engineering Base. Program: Science Campaign (NA37)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
First Principles Physics Models: Cumulative percentage of progress in replacing key empirical parameters in the nuclear explosive package assessment with first principles physics models assessed by validation with experiment. Collaboration with ICF Campaign. (Long-term Outcome)	R: 36% T: 36%	R: 46% T: 42%	R: 46% T: 50%	R: 58% T: 60% ⁷⁷	T: 63%	T: 66%	T: 69%	T: 72%	T: 75%	T: 78%	By the end of FY 2020, use modern physics models in assessment calculations to replace the major empirical parameters affecting weapon performance. (Shared with ICF Campaign) ⁷⁸
Quantification of Margins and Uncertainties (QMU): Cumulative percentage of progress in development of the QMU methodology to provide quantitative measures of confidence in the performance, safety, and reliability of the U.S. nuclear weapons stockpile. (Long-term Outcome)	R: 55% T: 55%	R: 70% T: 70%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Completed development of 70% QMU methodology to apply quantitative measures of confidence in the performance, safety, and reliability of the nuclear weapons stockpile in FY 2008.

⁷⁷ Joint Performance Indicator with the Inertial Confinement Fusion Ignition and High Yield Campaign began in FY 2010.

⁷⁸ Prior to FY 2012, both the Science Campaign and Inertial Confinement Fusion Ignition and High Yield Campaign reported on this measure. Both organizations will collaborate on the measure; however the Science Campaign will report on it beginning in FY 2012 as the measure is more closely aligned with Science Campaign's mission.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.

Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs.

Strategy: Strengthen the Science, Technology, and Engineering Base.

Program: Science Campaign (NA37)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT): Cumulative percentage of progress towards completing the DARHT to provide data required to certify the safety and reliability of the U.S. nuclear weapons stockpile. (Long-term Outcome)	R: 95% T: 80%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Completed the DARHT facility to provide data required to certify the safety and reliability of the U.S. nuclear weapons stockpile in FY 2008.
Test Readiness: Readiness, measured in months, to conduct an underground nuclear test as established by current NNSA policy. (Long-term Outcome)	R:24-36 T:24-36	R: 24-36 T: 24-36	R: 24-36 ⁷⁹ T: 24-36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sustained a 24- to 36-month underground nuclear test readiness through 2009.
Hydrodynamic Testing: Annual percentage of hydrodynamic tests completed in accordance with the National Hydrodynamics Plan, to support the assessment of nuclear performance. (Annual Output)	R: 75% T: 75%	R : 75% T: 75%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Annually, complete at least 75% of all scheduled hydrodynamic tests in accordance with the National Hydrodynamics Plan.
JASPER Facility Experiments: Annual average cost per test, expressed in terms of thousands of dollars, of obtaining plutonium experimental data on the Joint Actinide Shock Physics Experimental Research (JASPER) facility to support primary certification models. (Efficiency)	R: \$360K T: \$360K	R: \$340K T: \$340K	R: \$340K T: \$340K	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reduced the annual average cost of obtaining plutonium experimental data on JASPER to \$340K (80% of the 2004 baseline cost of \$425K) in FY 2009.

⁷⁹ The Test Readiness-related activities were moved from the Science Campaign to RTBF in FY 2010.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.

Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs.

Strategy: Strengthen the Science, Technology, and Engineering Base.

Program: Science Campaign (NA37)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Stockpile Stewardship Science: Annual investment, as measured by total Science Campaign budget, per refereed journal publication or final formal internal report. (Efficiency) ⁸⁰	N/A	N/A	R: \$1M T: \$1M	R: \$970K T: \$970K	T: \$940K	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, decrease the annual investment per refereed journal publication or formal final internal report by 3% relative to FY 2009. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
Extreme Temperature and Pressure Conditions: Cumulative percentage of progress towards creating and measuring extreme temperature and pressure conditions for the FY 2013 stockpile stewardship requirement. (Long-term Outcome)	R: 70% T: 70%	R: 75% T: 75%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Created and measured 75% of the extreme conditions so High Energy Density Physics facilities can be used to provide stockpile stewardship data in FY 2008.
Key Extreme Experiments: Cumulative percentage of progress towards achievement of key extreme experimental conditions of matter needed for predictive capability for nuclear weapons performance. (Long-term Outcome)	R: 13% T: 13%	R: 18% T: 18%	R: 25% T: 25%	R: 35% T: 35%	T: 55%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2015, achieve a greater than unity value of the average of the ratio of achieved conditions to needed conditions (as defined in FY 2007). (Shared with ICF Campaign) This measure will be reported by the Inertial Confinement Fusion Ignition and High Yield Campaign as a result of the DOE Performance Measures Streamlining Initiative. ⁸¹

⁸⁰ New efficiency measure added in FY 2010, to replace successfully accomplished previous measure.

⁸¹ Prior to FY 2012, both the Inertial Confinement Fusion Ignition and High Yield Campaign and Science Campaign reported on this measure. Both organizations will collaborate on the measure; however ICF will report on it beginning in FY 2012 as the measure is more closely aligned with ICF Campaign's mission.

Engineering Campaign

Mission

The Engineering Campaign provides the modern tools and capabilities needed to ensure the safety, security, reliability and performance of the United States nuclear weapons stockpile. It provides the fundamental and sustained engineering basis for stockpile certification and assessments that are needed throughout the entire lifecycle of each weapon. The Engineering Campaign funds activities that assess and improve fielded nuclear and non-nuclear engineering components without further underground testing. Additionally, this Campaign increases the ability of the National Nuclear Security Administration (NNSA) to predict the response of weapon components and subsystems to harsh environments and to the effects of aging. In accordance with the 2010 *Nuclear Posture Review Report*, the Engineering Campaign directly supports “strengthening the science, technology, and engineering (ST&E) base needed for conducting weapon system LEPs, maturing advanced technologies to increase weapons surety, qualification of weapon components and certifying weapons without nuclear testing, and providing annual stockpile assessments through weapons surveillance.”

Overview

The Engineering Campaign program’s corporate performance measure supports the NNSA strategy to rebuild the required science and technology capabilities needed to support the U.S. nuclear stockpile and future military needs. The program accomplishes this strategy by providing validated engineering sciences and engineering modeling and simulation tools for design, qualification, and certification; improving surety technologies, and by providing radiation hardening design and modeling capabilities, microsystems and microtechnologies, component and material lifetime assessments and predictive aging models and surveillance diagnostics

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Engineering Campaign (NA38)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Technology Maturation Capabilities: Annual percentage (90%) of technology maturation capabilities delivered, as measured by incremental progress towards pre-defined Technology Readiness Levels (TRLs) and Manufacturing Readiness Levels (MRLs) for the portfolio of components described in the Component Maturation Framework (CMF). (Annual Outcome)	N/A	N/A	N/A	N/A	N/A	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	By the end of each fiscal year, achieve 90% of the incremental progress towards pre-defined TRLs and MRLs as described in the CMF. This is a new measure, developed during the DOE Performance Measures Streamlining Initiative.
Microsystems and Engineering Sciences Applications (MESA): Cumulative percentage of the MESA facility project completed (total project cost), while maintaining a Cost Performance Index of 0.9-1.15. (Efficiency)	R: 95% T: 75%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MESA project construction was completed May 2008 and the contract closeout was completed August 2008. ⁸²
Enhanced Surety: Cumulative percentage of progress towards an improved initiation system to meet detonation safety requirements for future alterations or modifications to stockpiled weapons, measured by the number of milestones, in the implementation plan, completed. (Long-term Output)	R: 70% T: 70%	R: 75% T: 75%	R: 35% T: 35%	R: 41% T: 41%	T: 47%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, achieve 47% completion toward the development of threat-insensitive technologies that meet the safety and security requirements and goals of NSPD-28 and the safety acceptance criteria established by the DOE and DoD. Technologies are scheduled to be delivered in FY 2020. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012. ⁸³

⁸² Rebaselined in 2007 for 2009 completion, based on current results to date, priorities, and available resources. Project closeout achieved early, in 2008 vs. 2009.

⁸³ The scope for the Enhanced Surety Subprogram was redefined in 2008 to include additional features anticipated to be required for weapon systems with a first production unit (FPU) date of 2020. Therefore, the annual targets for FY 2009 and beyond were recomputed and the endpoint target changed to 2020.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Engineering Campaign (NA38)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Enhanced Surveillance: Cumulative percentage of progress towards completion of aging models and assessments, diagnostics, and tools needed for science-based lifetime predictions of specific weapon components and for transformation to more predictive stockpile surveillance, measured by the number of milestones, in the implementation plan, completed. (Long-term Output)	R: 40% T: 40%	R: 47% T: 47%	R: 53% T: 53%	R: 57% T: 57%	T: 62%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, achieve 62% of the aging models and assessments, diagnostics, and tools needed to achieve science-based lifetime predictions and stockpile surveillance transformation. Technologies are scheduled to be delivered in FY 2022. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.
Weapon Systems Engineering Assessment Technology: Cumulative percentage of progress towards system engineering methodology for assessing and predicting the effects of large thermal, mechanical, and combined forces on nuclear weapons for future alterations or modifications, measured by the number of experimental data sets, in the implementation plan, completed. (Long-term Output)	R: 45% T: 45%	R: 53% T: 53%	R: 54% T: 54%	R: 61% T: 61%	T: 60% ⁸⁴	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, achieve 60% of the development of system engineering methodology for assessing and predicting the effects of large thermal, mechanical, and combined forces on nuclear weapons for future alterations or modifications to stockpiled weapons. Technologies are scheduled to be delivered in FY 2020. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.

⁸⁴ Beginning in FY 2011, the Endpoint Target is adjusted from 2017 to 2020 to better align the Weapon Systems Engineering Assessment Technology subprogram with the Engineering Campaign Technology Roadmap. This realignment has contributed to an increase in out-year work scope, which results in a decrease to near-term completion percentages.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Engineering Campaign (NA38)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Nuclear Survivability: Cumulative percentage of completion of design and qualification tools for meeting requirements for survivability in intense radiation environments needed for future alterations or modifications to replace the existing proof-testing approach that uses significant amounts of highly enriched uranium, measured by the number of milestones, in the implementation plan, completed. (Long-term Output)	R: 40% T: 40%	R : 48% T: 48%	R: 56% T: 56%	R: 65% T: 65%	T:70% ⁸⁵	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, achieve 70% replacement of relevant design and assessment technologies for weapon components allowing future alterations or modifications to meet requirements for survivability in intense radiation environments. Technologies are scheduled to be delivered in FY 2020. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.
Ion Beam Laboratory: Cumulative percentage of the Ion Beam Laboratory (IBL) project completed (total project cost), while maintaining a Cost Performance Index of 0.9-1.15. (Efficiency)	N/A	N/A	R: 38.3% T: 31.0%	R:78.6% T: 62%	T:95% ⁸⁶	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, complete 95% of the IBL project while maintaining a Cost Performance Index of 0.9-1.15. (IBL line item construction funding completed in FY 2010). The project will be completed in FY 2012. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

⁸⁵ In the FY 2011 Congressional Budget Request, the FY 2011 performance target of 63% was reported incorrectly. The target should have been reported as 70%.

⁸⁶ The IBL was re-baselined in FY 2010, resulting in a change to the scheduled completion date of the project, from FY 2013 to FY 2012. The FY 2011 target was changed from 86%, as reported in the FY 2011 Congressional Budget Request, to 95% in order to accommodate the change in project schedule.

Inertial Confinement Fusion Ignition and High Yield Campaign

Mission

The Inertial Confinement Fusion (ICF) Ignition and High Yield Campaign provides the experimental capabilities and scientific understanding in high-energy density physics necessary to maintain a safe, secure, and reliable nuclear weapons stockpile without underground testing. Science-based weapons assessments and certification requires advanced experimental capabilities that can create and study matter under extreme conditions that approach the high energy density (HED) environments found in a nuclear explosion. The ICF Campaign provides this capability through the development and use of advanced experimental tools and techniques, including state-of-the-art laser and pulsed power facilities. The demonstration of ignition in the laboratory will provide important information to support assessment and certification of the stockpile, and it is the most important component of the ICF Campaign and a major goal for National Nuclear Security Administration (NNSA) and the U.S. Department of Energy (DOE).

The ICF Campaign supports the NNSA's Stockpile Stewardship Program (SSP) through three strategic objectives:

- Achieve thermonuclear ignition in the laboratory and develop it as a routine scientific tool to support stockpile stewardship.⁸⁷
- Develop advanced capabilities, including facilities, diagnostics, and experimental methods that can access the HED regimes of extreme temperature, pressure, and density required to assess the nuclear stockpile.
- Maintain the U.S. preeminence in HED science and support broader national science goals.

Overview

The ICF Campaign program's corporate performance measure supports the NNSA strategy to rebuild the required science and technology capabilities needed to support the U.S. nuclear stockpile and future military needs. The program accomplishes this strategy by developing laboratory capabilities to create and measure extreme conditions of temperature, pressure, and radiation, including thermonuclear burn conditions approaching those in a nuclear explosion, and conduct weapons-related research in these environments.

⁸⁷ Thermonuclear ignition is an explosive, self sustained nuclear fusion reaction that once initiated, continues until the fuel is exhausted ("burned") or dispersed. Thermonuclear ignition is often referred to as ignition and thermonuclear burn or fusion ignition. Nuclear fusion reactions are at the core of the processes that power the Sun and other stars. Achieving ignition by compressing and heating deuterium (D) and tritium (T) atoms (i.e. the thermonuclear fuel) to millions of degrees Celsius has never been demonstrated in the laboratory.

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Inertial Confinement Fusion Ignition and High Yield Campaign (NA39)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Key Extreme Experiments: Cumulative percentage of progress towards achievement of key extreme experimental conditions of matter for predictive capability for nuclear weapons performance. Collaboration with the Science Campaign. (Long-term Outcome) ^a	N/A	N/A	N/A	R: 35% T: 35%	T: 55%	T: 75%	T: 85%	T: 90%	T: 100%	N/A	By the end of FY 2015, achieve greater than unity value of the average of the ratio of achieved conditions to needed conditions. (Shared with Science Campaign) ⁸⁸
Demonstrate Ignition at National Ignition Facility: Cumulative percentage of progress towards demonstrating ignition (simulating fusion conditions in a nuclear explosion) at the National Ignition Facility (NIF) to increase confidence in modeling nuclear weapons performance. (Long-term Outcome)	R: 80% T: 80%	R: 86% T: 86%	R: 93% T: 93%	R: 97% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	Completed first attempt to demonstrate ignition on the NIF in FY 2010.
National Ignition Facility (NIF) Construction: Cumulative percentage of construction completed on the 192-laser beam NIF. (Long-term Output)	R: 94% T: 94%	R: 99% T: 98%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Completed NIF construction in FY2009.

⁸⁸ Prior to FY 2012, both the ICF Campaign and Science Campaign reported on this measure. Both organizations will collaborate on the measure; however ICF will report on it beginning in FY 2012 as the measure is more closely aligned with ICF's mission.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Inertial Confinement Fusion Ignition and High Yield Campaign (NA39)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
National Ignition Facility (NIF) Equipment Fabricated: Cumulative percentage of equipment fabricated to support ignition experiments at NIF. (Long-term Output)	R: 63% T: 63%	R : 82% T: 82%	R: 95% T: 95%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	Completed fabrication of cryogenics and diagnostics equipment to support ignition experiments on the NIF in FY 2010.
Stockpile Stewardship Experiments at ICF Facilities: Annual number of days available to conduct stockpile stewardship experiments totaled for all ICF facilities. (Annual Output)	R: 403 T: 270	R: 558 T: 240	R: 500 T: 200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increased ICF facility availability to 200 total days per year. In FY 2009.
Z Facility Experiments: Annual average hours per experiment required by the operational crew to prepare the Z facility for an experiment. (Efficiency)	R: 0 T:11	R : 10.59 T: 11	R: 8.17 T: 9.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reduced the operational crew preparation time per Z facility experiment to 8.17 hours in FY 2009. (2004 Baseline equivalent of 11 hours/experiment).
First Principles Physics Models: Cumulative percentage of progress in replacing key empirical parameters in the nuclear explosive package assessment with first principles physics models assessed by validation with experiment. (Long-term Outcome) ⁸⁹	N/A	N/A	N/A	R: 58% T : 60%	T: 63%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2020, use modern physics models in assessment calculations to replace the major empirical parameters affecting energy balance, boost initial conditions, amount of boost, secondary performance, and weapons output. (Shared with Science Campaign.) This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative. ⁹⁰

⁸⁹ Joint Performance Indicator with Science Campaign developed during 2008 OMB PART Review.

⁹⁰ Prior to FY 2012, both the Science Campaign and ICF Campaign reported on this measure. Both organizations will collaborate on the measure; however the Science Campaign will report on it beginning in FY 2012 as the measure is more closely aligned with SC's mission.

<p>Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Inertial Confinement Fusion Ignition and High Yield Campaign (NA39)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Cost Reduction: Cumulative percentage of operating cost reduction from 2009, adjusted for inflation, utility costs, and laboratory indirect costs, all ICF facilities combined. (Efficiency)⁹¹</p>	N/A	N/A	N/A	R: N/A T: 1%	T: 2%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, achieve a 2% cost reduction in combined ICF facilities. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
<p>High Particle and Radiation Environments: Annual percentage of shots/experimental implosions in which the facility and diagnostics meet the minimum requirements for obtaining data in high particle and radiation environments. (Annual Output)⁹²</p>	N/A	N/A	N/A	R: 30% T: 30%	T: 40%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, 40% of the shots conducted annually will meet the minimum data requirements. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

⁹¹ New efficiency measure developed during OMB PART Review in 2008.

⁹² New Performance Indicator developed during OMB PART Review in 2008.

Advanced Simulation and Computing Campaign

Mission

The Advanced Simulation and Computing (ASC) Campaign provides leading edge, high-end simulation capabilities to meet the requirements of weapons assessment and certification, including weapon codes, weapons science, computing platforms, and supporting infrastructure. The ASC Campaign serves as the computational surrogate for nuclear testing to determine weapon behavior. The ASC Campaign underpins the Annual Assessment of the stockpile, and is an integrating element of the Predictive Capability Framework.

Overview

The Advanced Simulation and Computing Campaign corporate performance measure supports the NNSA strategy to rebuild the required science and technology capabilities needed to address the U.S. nuclear stockpile and future military needs. Rebuilding these capabilities includes leadership in computational science and high-performance computing, as well as sustainment of a critically skilled technical workforce. The program accomplishes this strategy by providing leading edge, high-end simulation capabilities to meet the requirements of weapons assessment and certification, including weapon codes, weapons science, computing platforms, and supporting infrastructure.

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Rebuild the required science and technology capabilities. Program: Advanced Simulation and Computing Campaign (NA40)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Reduced Reliance on Calibration: The cumulative percentage reduction in the use of calibration “knobs” to successfully simulate nuclear weapons performance. (Long-term Outcome)	R: 8% T: 8%	R: 16% T: 16%	R: 25% T: 25%	R: 33% T: 30%	T: 35%	T: 40%	T: 45%	T: 50%	T: 55%	60%	By the end of FY 2024, 100% of selected calibration knobs (non-science based models) affecting weapons performance simulation have been replaced by science-based, predictive phenomenological models. Reduced reliance on calibration will ensure the development of robust ASC simulation tools. These tools are intended to enable the understanding of the complex behaviors and effect of nuclear weapons, now and into the future, without nuclear testing.
Adoption of ASC Modern Codes: The cumulative percentage of simulation runs that utilize modern ASC-developed codes on ASC computing platforms as measured against the total of legacy and ASC codes used for stockpile stewardship activities. (Long-term Outcome)	R: 63% T: 63%	R: 72% T: 72%	R: 80% T: 80%	R: 85% T: 85%	T: 90%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, ASC-developed modern codes are used for 90% of simulations on ASC platforms. Adoption of Modern ASC Codes will enable a responsive simulation capability for the nuclear security enterprise. This measure is meant to show how quickly ASC codes are being adopted by the user community in place of legacy codes. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
ASC Impact on SFI Closure: The cumulative percentage of nuclear weapon Significant Finding Investigations (SFIs) resolved through the use of modern (non-legacy) ASC codes, measured against all codes used for SFI resolution. (Long-term Outcome)	R: 25% T: 25%	R: 37% T: 37%	R: 50% T: 50%	R: 60% T: 60%	T: 65%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, ASC codes will be the principal tools for resolution of 65% of SFIs. This demonstrates how valuable the ASC tools are for meeting the needs of the weapon designer’s analysts by documenting the impact on closing SFIs. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

Readiness Campaign

Mission

The Readiness Campaign operates the capability for producing tritium to maintain the national inventory needed for the nuclear weapons stockpile and selects and matures production technologies that are required for manufacturing components to meet the Planning and Production Directive (P&PD)⁹³ schedule and war reserve requirements.

Overview

The Readiness Campaign program's corporate performance measures support the NNSA strategy to maintain a safe, secure, and effective U.S. nuclear stockpile by identifying, developing, and delivering new or enhanced processes, technologies, and capabilities to meet the current and future needs of the stockpile, and support the transformation of the nuclear security enterprise into an agile and more responsive enterprise with greater design to production integration, shorter cycle times, and lower production and operating costs. These capabilities directly impact the reliability of the nuclear stockpile.

⁹³ The Production and Planning Directive (P&PD) is described under the Directed Stockpile Work (DSW), Planning and Scheduling Section.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.

Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs.

Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile.

Program: Readiness Campaign (NA41)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Critical Capabilities Deployed: Cumulative number of critical immediate and urgent capabilities deployed to support our Directed Stockpile Work (DSW) customer's nuclear weapon refurbishment needs derived from the Production Readiness Assessment Plan. (Long-term Output)	R: 20 T: 20	R: 22 T: 22	R: 24 T: 24	R: 25 T: 25	T: 27	T: 28 ⁹⁴	T: 28	T: 29	T: 30	T: 31	By the end of FY 2016, deploy 31 critical immediate and urgent capabilities to support Directed Stockpile Work nuclear weapons refurbishment deliverables.
Reduce Cycle Times: The number of capabilities deployed every other year to stockpile programs that will reduce cycle times at least by 35% (against baselined agility and efficiency). (Annual Outcome)	R: 1 T: 1	R: 0 T: 0	R: 1 T: 1	R: 0 T: 0	T: 1	N/A	N/A	N/A	N/A	N/A	Deploy at least one new capability to a stockpile program every other year that reduces cycle time by at least 35% through FY 2011. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
Tritium Production: Cumulative number of Tritium-Producing Burnable Absorber Rods (TPBARs) irradiated in Tennessee Valley Authority reactors to provide the capability of collecting new tritium to replace inventory for the nuclear weapons stockpile. (Long-term Output)	R: 480 T: 480	R: 720 T: 720	R:1,088 T: 960	R: 1,088 T: 960 ⁹⁵	T: 1,328	T: 1,872	T: 1,872	T: 2,112	T: 2,352	T: 2,352	By the end of FY 2016, complete irradiation of 2,352 Tritium-Producing Burnable Rods (to provide tritium for nuclear weapons.)

⁹⁴ The current fiscal year funding will increase Technical Readiness Levels and Manufacturing Readiness Levels of Arming, Fusing and Firing technology but a component will not be produced to deliver to DSW.

⁹⁵ Irradiation of TPBARs occurs every 18 months, or 1.5 years, in approximately October or March. For FY 2010, the irradiation cycle started in September of 2009 and will then complete in March of 2011. Thus there is no increase to the number of TPBARs irradiated in FYs 2013 and 2016.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.

Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs.

Strategy: Maintain a safe, secure, and effective U.S. nuclear stockpile.

Program: Readiness Campaign (NA41)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Percentage of Investment: Percentage of annual investment in the ADAPT, Stockpile Readiness, Nonnuclear Readiness, and High Explosive and Weapons Operations subprograms in development of capabilities that forecast within three years of production deployment operational cost savings of at least two times the development and deployment cost compared to pre-deployment operations. (Efficiency)	N/A	Baseline	R: 2.5% T: 2.5%	R:2.5% T: 2.5%	T: 2.5%	N/A	N/A	N/A	N/A	N/A	Through FY 2011, on an annual basis, at least 2.5% of the annual investment in the Production Subprograms ADAPT, SR, HEWO, & NNR will yield cost savings equaling at least twice the development and deployment costs, after three years of operation. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
Tritium Extraction Facility (TEF): Cumulative percentage of Tritium Extraction Facility (TEF) project completed (total project cost), while maintaining a Cost Performance Index of 0.9 - 1.15. (Efficiency)	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	By 2007, complete 100% of TEF project, while maintaining a Cost Performance Index of 0.9-1.15. (TEF line item construction funding completed in 2006.)

Readiness in Technical Base and Facilities (Operations)

Mission

The Readiness in Technical Base and Facilities (RTBF) Program provides state-of-the-art facilities and infrastructure equipped with advanced scientific and technical tools to support the National Nuclear Security Administration (NNSA) operational and mission requirements. The RTBF Program accomplishes this mission by achieving the following goals:

- Operate and maintain the nuclear security enterprise program facilities in a safe, secure, efficient, reliable, and compliant condition;
- Provide facility operating costs for utilities, equipment, maintenance and environment, safety, and health (ES&H);
- Maintain critical skills through personnel, training and salaries; and
- Plan, prioritize, and construct state-of-the-art facilities, infrastructure, and scientific tools within approved baseline costs and schedule.

The RTBF program provides unique contributions to the Government Performance and Results Act Unit Program Number 42.

Overview

The RTBF program's corporate performance measure supports the NNSA strategy to recapitalize the infrastructure for a 21st century nuclear security enterprise. The program accomplishes this strategy by operating and maintaining NNSA program facilities in a safe, secure, efficient, reliable, and compliant condition.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards. Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs. Strategy: Recapitalize the infrastructure for a 21 st century nuclear security enterprise. Program: Readiness in Technical Base and Facilities (NA42)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Major Construction Projects: Execute construction projects within approved costs and schedules, as measured by the total percentage of projects with total estimated cost (TEC) greater than \$20 million with a schedule performance index (ratio of budgeted cost of work performed to budgeted cost of work scheduled) and a cost performance index (ratio of budgeted cost of work performed to actual cost of work performed) between 0.9-1.15. (Efficiency)	R: 100% T: 80%	R: 67% T: 85%	R: 74% T: 90%	R: 90% T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	Annually achieve 90% of baselined construction projects with TEC greater than \$20M with actual SPI and CPI of 0.9-1.15 as measured against approved baseline definitions.
Mission-Essential Facilities: Enable NNSA missions by providing operational facilities to support nuclear weapon dismantlement, life extension, surveillance, and research and development activities, as measured by the percent of scheduled versus planned days mission-critical and mission-dependent facilities are available without missing key deliverables. (Annual Outcome)	R: 99% T: 90%	R: 98% T: 95%	R: 95% T: 95%	R: 97.15% T: 95.00%	T: 95%	N/A	N/A	N/A	N/A	N/A	Annually, mission-critical and mission dependent facilities are available at least 95% of scheduled days. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.

Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs.

Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise.

Program: Readiness in Technical Base and Facilities (NA42)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Facility Condition Index (FCI) for Mission Critical Facilities: Annual NNSA complex-wide aggregate Facility Condition Index (FCI), as measured by deferred maintenance costs per replacement plant value, for all mission-critical facilities and infrastructure. (Annual Outcome). ⁹⁶	R: 6.5% T: 6.8%	R: 4.26% T: 5%	R: 3.37% T: 5%	R: 5% T: 5%	T: 5%	N/A	N/A	N/A	N/A	N/A	Annually, maintain the mission-critical facilities and infrastructure at an FCI level of 5% or less. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
FCI for Mission Dependent Not Critical Facilities: Annual NNSA complex-wide aggregate Facility Condition Index, as measured by deferred maintenance costs per replacement plant value, for all mission-dependent, not critical facilities and infrastructure.	N/A	R: 8.92% T: 8.25%	R: 6.91% T: 8.75%	R: 8.60% T: 8.60%	T: 8.45%	N/A	N/A	N/A	N/A	N/A	By the end of 2011, improve mission dependent, not critical facilities and infrastructure to an FCI level of 8.45% or less, then maintain at this level annually. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

⁹⁶ Measure was developed in FY 2007 from prior single measure to reflect change in facility designation (mission essential to mission critical and mission dependent).

Secure Transportation Asset

Mission

The STA program safely and securely transports nuclear weapons, weapons components, and special nuclear materials to meet projected Department of Energy (DOE), Department of Defense (DoD), and other customer requirements.

The STA Government Performance and Results Act (GPRA) unit contains two activities that contribute to GPRA Unit Program Number 43 – Program Direction, and Operations and Equipment. Secure Transportation Asset (STA) is a departmental asset. Program Direction provides primarily for the federal agents and the secure transportation workforce. Operations and Equipment provides for STA’s transportation service infrastructure that is critical in meeting the stockpile refurbishment and modernization initiatives of the nuclear security enterprise.

Overview

The STA program directly supports the strategic goal of Securing the Nation by reducing the nuclear dangers and environmental risks associated with the transportation of nuclear cargo across the United States. The program’s corporate performance measure is dependent upon the NNSA strategy to recapitalize the infrastructure for a 21st century nuclear security enterprise. The STA program accomplishes this strategy by replacing its aging transportation assets, and thereby ensuring the safety and security of its nuclear cargo.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise Program: Secure Transportation Asset (NA43)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Safe and Secure Shipments: Annual percentage of shipments completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material. (Annual Outcome)	R: 100% T: 100%	R: 100% T: 100%	R: 100% T: 100%	R: 100% T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, ensure that 100% of shipments are completed safely and securely without compromise/loss of nuclear weapons/components or a release of radioactive material.
Convoy Cost: Annual cost per convoy expressed in terms of millions of dollars. (Efficiency)	R: \$1.69 T: \$1.80	R: \$1.73 T: \$1.79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Achieved a cost per convoy equivalent of \$1.73M in FY 2008.
Secure Convoys: Annual number of secure convoys completed. (Annual Output)	R: 113 T: 115	R: 109 T: 118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Achieved 109 convoy equivalents in FY 2008.
Safeguard Transporters (SGTs): Cumulative number of Safeguard Transporters (SGTs) in operation. (Long-term Output)	R: 39 T: 38	R: 42 T: 42	R: 45 T: 45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Achieved an operational SGT fleet of 45 in FY 2009.
Federal Agents/Couriers: Cumulative number of Federal Agents at the end of each year. (Long-term Output)	R: 351 T: 355	R: 373 T: 385	R: 379 T: 390	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Achieved end strength of 379 Agents in FY 2009.
Delivery Timeliness: Annual percentage of shipping requests delivered according to schedule. (Efficiency) ⁹⁷	N/A	N/A	Baseline	R: 99% T: 90%	T: 90%	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	Annually, ensure that 90% of shipping requests are delivered according to schedule. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

⁹⁷ During FY 2010, OMB approved a change to the language of the Delivery Timeliness measure. To make the measure less restrictive, "Transportation Shipping Requests (TSRs)" was replaced with "shipping requests," so that the requests from all customers could be included. The phrase "by the scheduled delivery date" was changed to "according to schedule" to have the measure more accurately reflect the true nature of scheduling nuclear shipments.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards											
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs											
Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise											
Program: Secure Transportation Asset (NA43)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Unit Readiness: Annual percentage of Unit Readiness to perform assigned convoy mission-weeks. (Long-term Output)	N/A	N/A	Baseline	R: 84% T: 80%	T: 80%	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	By the end of FY 2011, ensure Operational Units have an 80% readiness rate to perform assigned convoy mission-weeks, then maintain annually. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

Nuclear Counterterrorism Incident Response

Mission

The Nuclear Counterterrorism Incident Response (NCTIR) program, formerly the Nuclear Weapons Incident Response program, responds to, and mitigates nuclear and radiological incidents worldwide and has a lead role in defending the Nation from the threat of nuclear terrorism.

Overview

The NCTIR program's corporate performance measure directly supports the NNSA strategies of 1) forming strategic partnerships to address broad national security requirements; 2) performing analyses of foreign nuclear weapons programs and novel technologies; and 3) countering the threat of nuclear terrorism. The NCTIR program accomplishes this through the subprograms that directly support the President's Nuclear Security Agenda by reducing the threat of nuclear terrorism and increased international engagement on nuclear security matters.

Performance Plan

(R = Results; T = Targets)

<p>Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards.</p> <p>Strategic Objective: Applying DOE's capabilities for other critical national security missions.</p> <p>Strategy: Strategic partnerships to address broad national security requirements. Analysis of foreign nuclear weapons programs and novel technologies. Countering the threat of nuclear terrorism.</p> <p>Program: Nuclear Counterterrorism Incident Response (NA54)</p>											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
<p>Emergency Operations Readiness Index: Emergency Operations Readiness Index measures the overall organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide (This Index is measured from 1 to 100 with higher numbers meaning better readiness--the first three quarters will be expressed as the readiness at those given points in time where as the year end will be expressed as the average readiness for the year's four quarters). (Efficiency)</p>	R: 91 T: 91	R: 91 T: 91	R: 91 T: 91	R: 88 T: 91	T: 91	T: 91	T: 91	T: 91	T: 91	T: 91	Annually, maintain an Emergency Operations Readiness Index of 91 or higher.

Facilities and Infrastructure Recapitalization Program

Mission

The Facilities and Infrastructure Recapitalization Program (FIRP) continues its mission to restore, rebuild and revitalize the physical infrastructure of the nuclear security enterprise. The program funding is utilized to address an integrated, prioritized series of repair and infrastructure projects that significantly increase the operational efficiency and effectiveness of the NNSA nuclear security enterprise sites by focusing on elimination of legacy deferred maintenance. FIRP improves safety and is able to readily respond to changing missions, priorities and decisions affecting both sites and their facilities within the nuclear security enterprise through the implementation of its prioritized project list that targets the highest priority facilities and infrastructure deficiencies first.

Overview

The FIRP links to the DOE's Strategic Goal, Securing our Nation, and the program's corporate performance measure for legacy deferred maintenance reduction supports the NNSA strategy to recapitalize the infrastructure for a 21st century nuclear security enterprise. The FIRP enhances nuclear security by addressing an integrated, prioritized series of repair and infrastructure projects that improve safety and significantly increase the operational efficiency and effectiveness of the enterprise.

Performance Plan

(R = Results; T= Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21 st century nuclear security enterprise Program: Facilities and Infrastructure Recapitalization Program (NA44)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Deferred Maintenance: Annual dollar value and cumulative percentage of legacy deferred maintenance baseline of \$900 million; funded for elimination by FY 2013. (Long-term Output)	R: \$75M (56%) T: \$60M (38%)	R:\$93M (73%) T: \$80M (64%)	R:\$75.7M (81.7%) T: \$62M (80%)	R: \$65.4M (89.0%) T: \$34.1M (85.5%)	T:\$24.7M (91.7%)	T:\$24.5M (94.5%)	T:\$23.6M (97.1%)	N/A	N/A	N/A	Eliminate \$900,000,000 of NNSA's legacy deferred maintenance backlog by the end of 2013. ⁹⁸
Execution of Projects: Execute FIRP projects within approved cost and schedule baselines (including BCPs submitted for approval), such that 90 percent of FIRP projects are on schedule to meet established milestones and are within total estimated costs (TEC). (Efficiency)	N/A	N/A	N/A	R: 92% T: 90% ⁹⁹	T: 90%	N/A	N/A	N/A	N/A	N/A	Achieve 90% of projects on schedule and within total estimated costs through FY 2011. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

²⁵ (1) The program's deferred maintenance goal is to eliminate \$900,000,000 of deferred maintenance by the end of FY 2013. (2) The original FY 2009 date for elimination of the deferred maintenance backlog was extended to 2013 due to constrained outyear funding.

⁹⁹ FIRP's contribution to reducing FCI is minimal compared to the RTBF program's contribution. Therefore, in FY 2010 FIRP developed a new efficiency measure for project execution and no longer reports FCI results. The target was adjusted to align with past performance.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs
Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise
Program: Facilities and Infrastructure Recapitalization Program (NA44)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Footprint Reduction: Annual gross square feet (gsf) of NNSA excess facilities space funded for elimination; and cumulative percentage of FY 2002-FY 2009 total goal of three million gsf eliminated. (Long-term Output)	R: 264,000 (96%) T: 225,000 (92%)	R:292,000 (106%) T:225,000 (100%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	By 2009, eliminate 3,000,000 gsf of excess facility space. ¹⁰⁰
Facility Condition Index (FCI) for Mission Critical Facilities: Annual NNSA complex-wide aggregate Facility Condition Index (FCI), as measured by deferred maintenance costs per replacement plant value, for all mission-critical facilities and infrastructure. (Jointly with Readiness in Technical Base and Facilities). (Efficiency)	R: 6.5% T: 6.8%	R: 4.26% T: 5.00%	R: 3.37% T: 5.00%	N/A ¹⁰¹	N/A	N/A	N/A	N/A	N/A	N/A	By 2009, maintain the condition of mission critical facilities and infrastructure at an FCI level of 5%.

¹⁰⁰ FIRP met its footprint reduction target in FY 2008. Additional facilities continue to be dispositioned as part of FIRP's effort to reduce the deferred maintenance backlog.

¹⁰¹ FIRP's contribution to reducing FCI is minimal compared to the RTBF program's contribution. Therefore, in FY 2010 FIRP developed a new efficiency measure for project execution and no longer reports FCI results.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs
Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise
Program: Facilities and Infrastructure Recapitalization Program (NA44)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Facility Condition Index (FCI) for Mission Dependent Not Critical Facilities: Annual NNSA complex-wide aggregate Facility Condition Index (FCI), as measured by deferred maintenance costs per replacement plant value, for all mission-dependent, not critical facilities and infrastructure. (Jointly with Readiness in Technical Base and Facilities). (Efficiency)	N/A	R: 8.92% T: 8.25%	R: 6.91% T: 8.75%	N/A ²⁸	N/A	N/A	N/A	N/A	N/A	N/A	By 2009, improve mission dependent, not critical facilities and infrastructure to an FCI level of 8.75%.

Site Stewardship

Mission

The goal of Site Stewardship is to ensure the overall health and viability of specific site-wide infrastructure at NNSA sites to support NNSA, Department of Energy and other national missions, bringing focus on environmental compliance and energy and operational efficiency. The Site Stewardship Operations and Maintenance program is comprised of the Operations and Maintenance and Construction subprograms. Within Operations and Maintenance, Environment Projects and Operations, Nuclear Materials Integration, and the Energy Modernization and Investment Program support environmental compliance and energy and operational efficiency.

Overview

The Site Stewardship program's corporate performance measures support the NNSA strategy of recapitalizing the infrastructure for a 21st century nuclear security enterprise by ensuring the overall health and viability of the site wide infrastructure at NNSA sites.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21 st century nuclear security enterprise Program: Site Stewardship (NA45)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Environmental Monitoring and Remediation: Annual percentage of environmental monitoring and remediation deliverables that are required by regulatory agreements to be conducted at NNSA sites under Long Term Stewardship (LTS) that are executed on schedule and in compliance with all acceptance criteria. (Annual Output)	N/A	R: 100%	R: 100% T: 95% ¹⁰²	R: 100% T: 95%	T: 95%	T: 95%	T: 95%	T: 95%	T: 95%	T: 95%	Annually, submit on schedule and receive regulatory approval of at least 95% of all environmental monitoring and remediation deliverables that are required at NNSA sites under LTS by regulatory agreements.
Special Nuclear Material Removed: Cumulative percentage of security category I/II Special Nuclear Material removed from Lawrence Livermore National Laboratory. (Long-term Output)	N/A	R: 35%	R: 55% T: 50% ¹⁰³	R: 80% T: 80%	T: 90%	T: 100%	N/A	N/A	N/A	N/A	By the end of 2012, all security category I and II SNM removed from the Lawrence Livermore National Laboratory.

¹⁰² Target is associated with the previous Environmental Projects and Operations GPRA Unit.

¹⁰³ Performance reporting was initiated in FY 2010 with the transfer of this activity into the new Site Stewardship account. Prior to FY 2010, this activity was funded within the RTBF account and not reported as a discreet performance activity.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs
Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise
Program: Site Stewardship (NA45)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
NNSA Long-Term Stewardship Program: Cumulative cost savings totaling 12% over six years for the NNSA Long Term Stewardship program demonstrated by comparison of the actual annual costs of performing the Stewardship activities at a site as compared to the budgeted annual costs of performing these same activities using Earned Value Management (EVM) principles with a target savings of 2% per year. (Efficiency Measure)	N/A	N/A	Baseline	R: -.07% T: 2.0%	N/A	N/A	N/A	N/A	N/A	N/A	Achieve an annual 2% cost savings. ¹⁰⁴

¹⁰⁴ This metric was established when the Environmental Projects and Operations Program for LTS was initiated as an individual Government Performance Results Act unit for reporting purpose., but the measure has not been beneficial to managing LTS activities nor for reporting actual performance because the large variances in EVMS overshadow the potential savings displayed by the metric. During the FY sites are frequently required to get approvals by the state and federal agencies before work can be performed and often again when the work is complete. Seldom do the state and federal agencies provide approvals in a timely manner and may delay approval of documents and work packages that were planned for that FY. To account for this the site must make “real-time” adjustments to their work schedules which can cause large variances in EVMS data and does not provide a good measure for managing the progress of the program. The current LTS effectiveness measure provides the best reporting on the progress of this program since the main goal of the program is to submit regulatory documents on time and in compliance to avoid fines and penalties.

Defense Nuclear Security

Mission

Safeguards and Security (S&S) is comprised of two Government Performance and Results Act (GPRA) Unit Programs. The Defense Nuclear Security (DNS) program, managed by the National Nuclear Security Administration (NNSA) Associate Administrator for Defense Nuclear Security, provides protection for NNSA personnel, facilities, nuclear weapons, and information from a full spectrum of threats, most notably from terrorism, which has become of paramount concern since the September 11, 2001 attacks. The Cyber Security program, managed by the NNSA Chief Information Officer, provides the requisite guidance needed to ensure that sufficient information management security safeguards are implemented throughout the NNSA enterprise. These program efforts are integrated under NNSA's Chief of Defense Nuclear Security.

Overview

The Defense Nuclear Security program's corporate performance measures support the NNSA strategy to recapitalize the infrastructure for the 21st century nuclear security enterprise through the Zero-Based Security Reviews (ZBSR). These reviews will identify and implement improvements that will reduce security costs and mission impacts, while maintaining very high levels of protection for our critical national security assets based on risk-informed decision-making.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise Program: Defense Nuclear Security (NA46)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Graded Security Protection: Cumulative percentage of progress, measured in milestones completed, towards implementation of all Graded Security Protection (GSP) Policy at NNSA sites. (Long-term Output) ¹⁰⁵	N/A	N/A	R: 100% T: 100%	R: 50% T: 50%	T: 100%	N/A	N/A	N/A	N/A	N/A	Completed 100% of implementation plans (IPs) developed at NNSA sites in FY 2009. Complete 50% of overall GSP milestones in FY 2010, and complete the remaining 50% GSP milestones in FY 2011.
Elite Forces: Cumulative percentage of completion towards modernizing the National Nuclear Security Administration's protective forces in accordance with Tactical Response Force (TRF), also known as "Elite Forces", requirements. (Long-term Output)	N/A	N/A	R: 40% T: 40%	R: 60% T: 60%	T: 100%	N/A	N/A	N/A	N/A	N/A	By the end of 2011, complete TRF implementation.
Standardize Procurement Process: Standardize the procurement process for security equipment, such as vehicles, weapons, ammunition across the National Nuclear Security Administration Defense Nuclear Security complex by FY 2011. (Annual Output) ¹⁰⁶	N/A	N/A	R: 60% T: 50%	R: 100% T: 100%	N/A	N/A	N/A	N/A	N/A	N/A	Standardize 100% of the procurement process for security equipment by the end of FY 2010.

¹⁰⁵ The Department replaced the 2005 Design Basis Threat with the Graded Security Protection policy, issued in FY 2008.

¹⁰⁶ New performance indicator added in FY 2010.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise Program: Defense Nuclear Security (NA46)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Common Procurement System: Cumulative cost savings achieved by implementing a common procurement system for selected security equipment. (Efficiency)	N/A	N/A	R:Baseline	R: 5% T: 5%	T: 10%	N/A	N/A	N/A	N/A	N/A	Achieve a cumulative 10% savings from established baseline by the end of FY 2011. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.
NNSA Security Policy Reform: Reduce 20 percent of security requirements over the next four years. ¹⁰⁷ (Long-term Outcome)	N/A	N/A	N/A	N/A	T: 5%	T: 5%	T: 5%	T: 5%	N/A	N/A	Reduce, within four years, 20% of defense nuclear security requirements throughout the Nuclear Security Enterprise, as part of the reform effort.
Assurance of Effective Performance: Complete 100% of planned assessments annually. ¹⁰⁸ (Long-term Output)	N/A	N/A	N/A	N/A	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually complete 100% of planned assessments to demonstrate that Defense Nuclear Security has up-to-date operational awareness of safeguards and security activities throughout the Nuclear Security Enterprise.

¹⁰⁷ Three DNS performance measures will be completed by the end of FY 2011. This measure aligns with DNS Strategic goals. The measure will demonstrate that Defense Nuclear Security reduced security requirements with this reform effort throughout the Nuclear Security Enterprise.

¹⁰⁸ Three DNS performance measures will be completed by the end of FY 2011. This measure aligns with DNS Strategic goals. The measure will demonstrate that Defense Nuclear Security has up-to-date operational awareness of safeguards and security activities throughout the Nuclear Security Enterprise.

Cyber Security

Mission

The goal of the National Nuclear Security Administration (NNSA) Cyber Security program is to ensure that sufficient information management security safeguards are implemented throughout the nuclear security enterprise to adequately protect the NNSA information assets and to provide the requisite guidance in compliance with the Department of Energy's (DOE) Defense-in-Depth Cyber Security strategy and the NNSA Information Management Strategic Plan. The Cyber Security program is a Homeland Security related activity.

Overview

The cyber security program's corporate performance measure supports the NNSA strategy to recapitalize the infrastructure for the 21st century by providing a secure and protected computer infrastructure for the nuclear security enterprise.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise Program: Cyber Security (NA47)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Cyber Security Reviews: Annual percentage of Cyber Security Site Assistance Reviews conducted by the Office of Health, Safety, and Security (HSS) and Office of the Chief Information Officer (OCIO) that resulted in the rating of "effective." (Long-term Outcome) ¹⁰⁹	N/A	N/A	N/A	N/A	N/A	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, achieve an effective rating of at least 100% of OA Cyber Security reviews. This is a new measure developed as a result of the DOE Performance Measures Streamlining Initiative.
Cyber Security Reviews: Annual average percentage of Cyber Security reviews conducted by the Office of Health, Safety, and Security (HSS) at NNSA sites that resulted in the rating of "effective" (based on the last HSS review at each site over 2 Cyber Security topical areas). (Long-term Outcome)	R : 57% T: 57%	R: 100% T: 100%	R: 100% T: 100%	R: N/A ¹¹⁰ T: 100%	T: 100%	T : N/A	T : N/A	T : N/A	T : N/A	T : N/A	Annually, achieve an effective rating of at least 100% of OA Cyber Security reviews. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.
Cyber Security Site Assessment (SAV): Annual percentage of Cyber Security Site Assessment Visits (SAV) conducted by the Office of the Chief Information Officer (OCIO) Cyber Security Program Manager (CSPM) at NNSA sites that resulted in the rating of "effective". (Annual Output)	N/A	R: 85% T: 100%	R: 100% T: 100%	R: 90% T: 100%	T: 100%	T : N/A	T : N/A	T : N/A	T : N/A	T : N/A	Annually, achieve an effective rating of 100% of OCIO SAV. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.

¹⁰⁹ This measure was created to combine the Review and Assessment measures so that an index could be created. The use of an index will better reflect the effectiveness of the Cyber Program across the enterprise.

¹¹⁰ The result was not reported because NNSA initiated a moratorium on internal reviews in FY 2010.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards											
Strategic Objective: Supporting the U.S. nuclear stockpile and future military needs											
Strategy: Recapitalize the infrastructure for a 21st century nuclear security enterprise											
Program: Cyber Security (NA47)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Cyber Certification and Accreditation: Annual number of NNSA information assets reviewed for certification and accreditation. (Efficiency)	N/A	R: 30 T: 30	R: 35 T: 35	R: 40 T: 40	T: 45	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	By FY 2011, increase the number of assets reviewed per year to 45. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative. It has been replaced with a corporate measure in FY 2012.

National Security Applications

Mission

The National Security Applications (NSA) program (formerly the Science, Technology and Engineering Capability) makes strategic investments in the national security science, technology and engineering capabilities and infrastructure base that are necessary to address current and future global security issues. The NSA budget is separated into its own budget line to highlight technical investments. This program integrates the management, development, and maintenance of NSA capabilities that are relied upon by agencies across the Federal government and provides transparency, alignment, and accountability into the investments made in workforce and infrastructure to preserve national security capabilities into the future.

The facilities and the expert multidisciplinary workforce within the nuclear security enterprise provide decision makers with the ability to understand the state of international scientific and technological advances as well as project how these advances could affect national security. Furthermore, their unique multidisciplinary infrastructure is key to anticipating technological surprise and for providing rapid innovative solutions to complex technical problems faced by multiple agencies. To address these national security challenges beyond the nuclear stockpile, the administration is committed to both retain and nurture national security research and development (R&D) capabilities to serve broader national security interests.

Overview

The National Security Applications corporate performance measures support the NNSA strategies to

1) enable strategic partnerships to build capability and address broad national security requirements and 2) build capability and analyze foreign nuclear weapons programs and novel technologies. The program accomplishes these strategies through investments in the national security science, technology and engineering capabilities and infrastructure base that are necessary to address current and future global security issues.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards											
Strategic Objective: Applying DOE's capabilities for other critical national security missions											
Strategy: Strategic partnerships to address broad national security requirements Analysis of foreign nuclear weapons programs and novel technologies											
Program: National Security Applications (NA53)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Tools for Counter Terrorism and Weapons Effects: Percent complete toward delivery of a new generation of transportable, high-performance radiation source. (Long-term Output)	N/A	N/A	N/A	N/A	T : Baseline	T : 25%	T : 40%	T : 65%	T : 100%	N/A	Complete delivery of a new generation of transportable, high-performance radiation sources by the end of FY 2015.
Tools for Nuclear Nonproliferation: Percent complete toward delivery of a prototype enhanced particle accelerator that can be used for proton and x-ray radiography diagnostics (Long-term Output)	N/A	N/A	N/A	N/A	T : Baseline	T : 25%	T : 40%	T : 65%	T : 100%	N/A	Complete delivery of a prototype enhanced particle accelerator that can be used for proton and x-ray radiography diagnostics by the end of FY 2015.

Defense Nuclear Nonproliferation

Mission

The convergence of heightened terrorist activities and the ease of moving materials, technology, and information across borders have made the potential for terrorism involving weapons of mass destruction (WMD) a serious threat facing the Nation. As part of its national security strategy, the Administration has prioritized keeping WMD material and information out of the hands of terrorists. The FY 2012 budget request for DNN reflects the need to protect the United States (U.S.) and its allies from this threat.

The DNN mission is to provide policy and technical leadership to limit or prevent the spread of materials, technology, and expertise relating to weapons of mass destruction; advance technologies to detect the proliferation of weapons of mass destruction worldwide; and eliminate or secure inventories of surplus materials and infrastructure usable for nuclear weapons -- in short, to detect, deter, secure, or dispose of dangerous nuclear material.

Means and Strategies

The pursuit of nuclear weapons by terrorists and states of concern makes it clear that our nonproliferation programs are urgently required, and must proceed on an accelerated basis. We will fully exploit the world-class expertise of our National Laboratories to increase our design, testing, and fielding capabilities for safeguards, detection, and verification technologies.

The pace and nature of treaties and agreements, extremely poor economic conditions in many host countries, political and economic uncertainties in the former Soviet Union, and the unwillingness of threshold states to engage in negotiations can all have dramatic effects on the pace of program implementation and effectiveness. The Department will implement the following strategies:

Interfaces, Partnerships, and Working Relationships: NNSA partners with many U.S. agencies, international organizations, and non-governmental organizations across its programs to further our nonproliferation goals. All major policy issues are coordinated with the National Security Council, and we also work closely with the Departments of State, Defense, Homeland Security, Justice, Treasury, and Commerce. We leverage our nuclear nonproliferation research and development base within the national security enterprise to achieve program goals. In addition, NNSA coordinates with the Department of State and Nuclear Regulatory Commission on selected aspects of the fissile materials disposition program, and works with the IAEA to further international safeguards. We work with the Tennessee Valley Authority (TVA), WesDyne International, LLC, and Nuclear Fuel Services, Inc. in the disposition of surplus U.S. HEU, and the United States Enrichment Corporation (USEC) is involved in the Russian HEU purchase agreement. The U.S. Industry Coalition is NNSA's partner in the Global Initiative for Proliferation Prevention (GIPP). The U.S. Agency for International Development, the Nuclear Energy Agency, the Intelligence Community, and other agencies are also participants. We anticipate continued frequent collaborations with the Department of Homeland Security, providing technical assistance and training for domestic interdiction and export control cases.

The goal of the Russian Plutonium Disposition program, within Fissile Materials Disposition, is to work with Russia to dispose of at least 34 MT of surplus Russian weapon-grade plutonium. During President Obama's Nuclear Security Summit in April 2010, Secretary of State Hillary Clinton and Russian Foreign Minister Sergei Lavrov signed a Protocol to amend the Plutonium Management and Disposition Agreement (PMDA) to reflect current political and financial realities in both countries. The amended PMDA contains a revised Russian disposition program that relies on the use of fast reactors for plutonium disposition (the existing BN-600 and the BN-800 currently under construction), operating under certain nonproliferation restrictions. Simultaneously, the United States and Russia continue to support research and development of the Gas Turbine-Modular Helium Reactor (GT-MHR) on a cost shared basis, which could also be used for disposition should that technology become operational during the disposition period. It is expected that both countries will begin disposing of their surplus plutonium in the 2018 timeframe.

The amended PMDA calls for the U.S. to make available up to \$400,000,000 to support plutonium disposition in Russia, subject to future appropriations. The balance of the more than approximately \$2,000,000,000 remaining cost of Russia's plutonium disposition would be borne by Russia and, if available, non-U.S. government contributions. Additional funds separate from the \$400,000,000 would also be required to continue U.S. cost sharing of GT-MHR research and development in Russia, U.S. management and oversight of the overall Russian plutonium disposition program, and to implement a bilateral monitoring and inspection regime. Failure of the U.S. to contribute the \$400,000,000 would likely cause Russia to delay or terminate efforts to dispose of its weapon-grade plutonium.

Securing Nuclear Weapons, Material, and Expertise: For over a decade, the U.S. has been working cooperatively with the Russian Federation to enhance the security of facilities containing fissile material and nuclear weapons. The scope of these efforts has been expanded to protect weapons-usable material in countries outside the former Soviet Union, as well. These programs fund critical activities such as installation of intrusion detection and alarm systems and construction of fences around nuclear sites. Efforts to complete this work and to secure facilities against the possibility of theft or diversion have been accelerated through DOE's Office of International Nuclear Materials Protection and Cooperation and the Global Threat Reduction Initiative. DOE also manages the Global Initiatives for Proliferation Prevention Program (GIPP) within Nonproliferation and International Security, which is the only program in the U.S. Government dedicated to transitioning Former Soviet Union WMD scientists, engineers, and related technical experts to commercial, non-weapons-related activities.

Security upgrades were completed for Russian Navy nuclear fuel and weapons storage at the end of FY 2006 and were completed for Rosatom buildings covered by the February 2005 Bratislava Agreement at the end of calendar year 2008. Security upgrades to the nuclear warhead storage sites of the Russian Strategic Rocket Forces were completed in 2007 and upgrades to the Russian Ministry of Defense's 12th Main Directorate nuclear warhead storage sites were completed at the

end of calendar year 2008. Although the Bratislava Agreement workscope was completed in 2008, as agreed, a number of important areas/buildings have been added to the scope of joint work, most of which were completed by FY 2010 while some work scope will continue through FY 2018. Sustainability support for security upgrade investments will continue during this timeframe, with the goal of transitioning responsibility for that sustainability to the Russian Federation.

Revitalizing International Safeguards: With the increasing number, size, and complexity of nuclear facilities deployed worldwide, the widespread entry into force of International Atomic Energy Agency (IAEA) additional protocols, and the emergence of new proliferation threats from both state and sub-state terrorist actors, the current workload of the IAEA far exceeds its resources. At the same time, the current generation of safeguards technologies is becoming outdated and the safeguards “human capital” base is aging and shrinking. As nuclear energy continues to expand, opportunities for proliferation will multiply and the gap between IAEA needs and resources will grow wider.

NNSA's Next Generation Safeguards Initiative (NGSI), within Nonproliferation and International Security, focuses on revitalizing the U.S. safeguards technology and human capital base to ensure that the IAEA has the authorities, capabilities, technologies, expertise, and resources it needs to meet current and future challenges. In particular, NNSA coordinates and implements a dedicated program focused on developing advanced safeguards approaches, technologies, and equipment that will cultivate a new generation of specialists with expertise in a broad range of safeguards-relevant disciplines.

Verifying Nuclear Programs in Countries of Proliferation Concern: The Nuclear Noncompliance Verification (NNV) program, within Nonproliferation and International Security, develops advanced technology applications to verify declared nuclear activities, detect undeclared nuclear materials and activities, and carry out dismantlement and verification of nuclear programs in countries of proliferation concern. The program also provides technical and operational support for U.S. Government policies and activities related to countries of proliferation concern. In FY 2012, the NNV Program will complete the development of three verification tools, technologies, or analyses, and planning and readiness to support verifiable dismantlement of nuclear programs in countries of proliferation concern.

Countering Illicit Supplier Networks: DOE's Nonproliferation and International Security activities strengthen U.S. interdiction through its ability to provide detailed, expert technical analysis not often available from interagency partners. By providing real-time analysis of foreign procurement attempts, procurement networks, and worldwide WMD programs, technical experts within the Enterprise assist the interagency by identifying enabling technologies that are required to build or improve WMD programs in Iran, North Korea, and other countries of proliferation concern. The backbone of this capability is comprised of various customized electronic database applications that exploit information and provide rapid, real-time technical support to the interagency community in determining the best course of action to curb proliferation activities in countries of concern.

Pre-Screening Cargo Containers for Nuclear and Radiological Materials: The world's shipping network, with millions of cargo containers in transit, could conceal nuclear and radiological materials. The Megaports Program, within International Nuclear Materials Protection and Cooperation, provides the tools for law enforcement officials to pre-screen the bulk of the cargo in the world trade system through work with international partners to deploy and equip key ports with the means to detect and deter illicit trafficking in nuclear and other radioactive materials. This effort supports the U.S. Department of Homeland Security's Container Security Initiative. The FY 2012 budget supports the completion of 3 additional ports, which will increase the number of ports participating in and equipped through the Megaports Initiative to 48.

NNSA Support to Presidential Initiative for Research and Development: Following the guidance in the OMB/OSTP July 21, 2010 memo to Executive Branch agencies for FY 2012 S&T funding priorities, the Nonproliferation and Verification Research and Development program has prioritized its investment into a comprehensive R&D program that supports a focused set of technology development areas to provide the U.S. the capability to monitor foreign commitments to international treaties and agreements and give the U.S. the ability to detect illicit foreign nuclear weapons programs, processes, and movement of nuclear materials.

Eliminating Russian Plutonium Production:

The Elimination of Weapons Grade Plutonium Production (EWGPP) Program resulted in the permanent shutdown of the last three weapon-grade plutonium production nuclear reactors in Russian. These reactors produced plutonium for military purposes and also provided the necessary heat and electricity supply to two "closed cities" in the Russian nuclear weapons complex. The EWGPP program provided for alternative heat and electrical supply to allow the reactor shutdowns. Two reactors, located in the city of Seversk, were shut down six months ahead of schedule in June 2008, while the third reactor, located in the city of Zheleznogorsk, was shut down in April 2010.

The FY 2012 budget requests no funding for the EWGPP program. Previous appropriations fully funded the shutdown of the three reactors through (1) the refurbishment of an existing fossil-fuel (coal) power plant in Seversk (which was completed in December 2008); and (2) the construction of a new fossil-fuel plant near Zheleznogorsk which will complete in FY 2011.

Critical Decision CD-4 approval for the Seversk portion of the program was received on September 26, 2008. CD-4 for the Zheleznogorsk portion should be received before mid-year 2011. The remaining activities to expend the full U.S. funding commitment to the Russian Federation are scheduled to complete in FY 2011. This includes the final scope for the construction and installation of four low pressure boilers, a coal handling facility and all supporting infrastructure to supply hot water to Zheleznogorsk.

The shutdown of the reactors eliminated the annual production of 1.2 MT of weapons-grade plutonium. Programs such as the EWGPP are high-value for achieving nonproliferation goals because they prevent material production and, in effect, reduce global risk of misuse. Funding completion of the EWGPP program accomplishes security objectives as intended in 2002 when EWGPP was created.

Disposing of Surplus U.S. and Russian Weapon-Grade Fissile Material: The Fissile Materials Disposition program disposes of inventories of surplus Russian and U.S. weapon-grade plutonium and surplus U.S. highly enriched uranium (HEU). The FY 2012 budget request supports continuing efforts to dispose of surplus U.S. HEU including support for the MOX Backup Low Enriched Uranium Inventory Project. It also supports the design and construction of key facilities required to dispose of surplus U.S. plutonium as well as meet the programmatic needs for MOX fuel irradiation, feedstock, transportation, and project integration. In addition, funds will be used to support implementation of a revised program for disposition of Russian surplus weapon-grade plutonium based on the use of existing and planned fast reactors operating under certain nonproliferation conditions. These activities are of critical importance because they help to ensure that surplus fissile materials in the U.S. and Russia are permanently disposed of and demonstrate U.S. and Russian leadership in working towards a world free of nuclear weapons. A complementary fissile material reduction program, the HEU Transparency Program, continues to confirm the permanent elimination of HEU from the Russian weapons stockpile by monitoring the conversion of 30 MT of HEU to low-enriched uranium annually. The program has eliminated more than 400 MT of HEU from dismantled Russian nuclear weapons of the 500 MT planned by the end of the HEU Purchase Agreement in 2013.

Preventing a Possible Terrorist Attack Using Civilian Nuclear or Radiological Materials: The GTRI mission is to reduce and protect vulnerable nuclear and radiological materials located at civilian sites worldwide. GTRI efforts are focused on the first line of defense, namely securing or removing vulnerable nuclear and radiological material at the source. GTRI directly supports the Administration's goal announced in Prague on April 5, 2009 to secure all vulnerable nuclear material around the world within four years. The Joint Statement from the Moscow Summit in July 2009, the September 2009 UNSC Resolution 1887, and the 47 nation Nuclear Security Summit in April 2010 provide further global commitments to secure or remove vulnerable nuclear and radiological material.

Establishing a Capability to Produce Molybdenum-99: Molybdenum-99, or moly-99, is widely used for medical applications and has been produced commercially with reactors using highly enriched uranium (HEU) fuel. Because of the synergy with its nonproliferation mission to remove HEU from use, NNSA's GTRI program has the lead for moly-99. As part of its nuclear nonproliferation mission, and in light of the current moly-99 supply shortage, GTRI is working in cooperation with industry to demonstrate moly-99 production without the use of HEU. Projects funded to demonstrate the viability of non-HEU based technologies for large-scale commercial moly-99 production include accelerator technology, low-enriched uranium (LEU) target technology, LEU solution reactor technology, and neutron capture technology.¹¹¹

Global Partnership: Our nonproliferation objectives cannot be met without strong cooperation/partnership with other nations. The Global Partnership Against the Spread of

¹¹¹ Isotope production at the Department of Energy is primarily the responsibility of the Office of Science with two exceptions: plutonium-238 production by the Office of Nuclear Energy (NE) and molybdenum-99 production is supported by NNSA's Global Threat Reduction Initiative (GTRI).

Weapons and Materials of Mass Destruction, formed at the G-8 Kananaskis Summit in June 2002, renewed the G-8 nations' (the U.S., Canada, France, Germany, Italy, Japan, Russia, and the United Kingdom) commitment to address nonproliferation, disarmament, counter-terrorism, and nuclear safety issues. The G-8 leaders pledged to devote up to \$20,000,000,000 over ten years to support cooperative efforts, initially in Russia, and have invited other similarly motivated countries to participate in this partnership. The U.S. is committed to provide \$10,000,000,000 over ten years to be matched by \$10,000,000,000 from the other members, attesting to the firm belief that nonproliferation concerns are of the highest government priority, and that this work is of paramount importance for the security of the nation and the world. A total of

\$4,252,000,000 has been costed from FY 2002 through FY 2010. The following table reflects the Department of Energy funds budgeted for FY 2012-2016, by country.

U.S. Nonproliferation and Threat Reduction Assistance to Former Soviet States

(dollars in millions)

Summary by Country	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Russia	477.6	412.2	413.5	366.9	368.7	307.8
Kyrgyzstan	6.4	5.5	4.1	4.6	1.2	1.2
Kazakhstan	9.6	10.4	8.0	12.4	6.3	9.3
Ukraine	24.8	22.8	25.6	34.4	26.0	15.3
Uzbekistan	0.2	0.7	0.2	0.7	0.2	0.2
Georgia	2.5	1.3	1.3	1.6	0.8	0.8
Tajikistan	0.2	0.6	4.5	3.0	4.0	1
Azerbaijan/Armenia	10.4	2.1	2.0	2.6	1.1	1.1
Turkmenistan	0.0	2.4	2.5	5.1	0.0	0
Total, Russia & FSU	531.7	458.0	461.7	431.3	408.3	336.7

Nonproliferation and Verification Research and Development

Mission

This program improves U.S. national security through the development of novel technologies to detect foreign nuclear weapons proliferation/detonation and verification of foreign commitments to treaties and agreements.

Overview

The Nonproliferation and Verification Research & Development program's corporate performance measures support NNSA's strategy to enhance nonproliferation efforts and the security of nuclear materials by the development of novel technologies to detect foreign nuclear weapons proliferation and detonation, and for verification of foreign commitments to treaties and agreements.

Performance Plan

(R= Results; T = Targets)

Strategic Goal: Securing our Nation : Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Nonproliferation and Verification Research &Development (NA52)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Uranium-235 Production Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Uranium-235 production activities. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”). (Long-term Outcome)	R: 15% T: 15%	R: 20% T:20%	R: 25% T: 25%	R: 30% T: 30%	T: 50%	T: 60%	T: 75%	T: 90%	T: 95%	T:100%	By the end of FY 2016, demonstrate the next generation of technologies and methods to detect Uranium-235 Production activities.
Plutonium Production Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Plutonium production activities. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”). (Long-term Outcome)	R: 20% T: 20%	R: 25% T: 25%	R: 30% T: 30%	R: 50% T: 50%	T: 65%	T: 75%	T: 90%	T: 95%	T: 100%	N/A	By the end of FY 2015, demonstrate the next generation of technologies and methods to detect Plutonium Production activities.
Special Nuclear Material Detection: Cumulative percentage of progress toward demonstrating the next generation of technologies and methods to detect Special Nuclear Material movement. (Progress is measured against the baseline criteria and milestones published in the “FY 2006 R&D Requirements Document”). (Long-term Outcome)	R: 20% T: 20%	R: 27% T: 27%	R: 33% T: 33%	R: 60% T: 60%	T: 80%	T: 90%	T: 100%	N/A	N/A	N/A	By the end of FY 2013, demonstrate the next generation of technologies and methods to detect Special Nuclear Material movement.

Strategic Goal: Securing our Nation : Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Nonproliferation and Verification Research & Development (NA52)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
R&D Detonation Detection: Annual index that summarizes the status of all NNSA detonation detection R&D deliveries that improve the nation's ability to detect nuclear detonations. (Annual Output)	R: 90% T: 90%	R: 95% T: 90%	R: 90% T: 90%	R: 90% T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	T: 90%	Annually achieve timely delivery of NNSA nuclear detonation detection products (90% target reflects good on-time delivery. Index considers factors beyond NNSA's control and impact on customer schedules).
Independent Merit Review: Cumulative percentage of active research projects for which an independent R&D merit review of the project's scientific quality and mission relevance has been completed during the second year of effort (and again within each subsequent three year period for those projects found to be of merit). (Efficiency)	R: 100% T: 100%	R: 100% T: 100%	R: 100% T: 100%	R: 100% T: 100%	T: 100%	N/A	N/A	N/A	N/A	N/A	Ensure that 100% of the active research projects have completed an independent R&D peer assessment of the project's scientific quality and mission relevance within a 2-3 year cycle. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.
Merit Reviewed Journals/ Fora: Annual number of articles published in merit reviewed professional journals/fora representing leadership in advancing science and technology knowledge. (Annual Output)	R: 220 T: 200	R: 235 T: 200	R: 331 T: 200	R: 273 T: 200	T: 200	N/A	N/A	N/A	N/A	N/A	Annually, achieve goal of 200 articles published in merit reviewed professional journals/fora representing leadership in advancing science and technology knowledge. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

Nonproliferation and International Security

Mission

The Office of Nonproliferation and International Security (NIS) supports National Nuclear Security Administration (NNSA) efforts to prevent and counter the proliferation or use of weapons of mass destruction (WMD), including materials, technology and expertise, by state and non-state actors. NIS focuses on strengthening the nonproliferation regime in order to reduce proliferation and counterterrorist risks by applying its unique expertise to safeguard nuclear material and strengthen its physical security; control the spread of WMD-related material, equipment, technology and expertise; verify nuclear reductions and compliance with nonproliferation treaties and agreements; and develop and implement Department of Energy (DOE)/NNSA nonproliferation and arms control policy. NIS pursues these objectives through four programs: (1) Nuclear Safeguards & Security; (2) Nuclear Controls; (3) Nuclear Verification; and (4) Nonproliferation Policy.

Overview

The Nonproliferation and International Security program's corporate performance measures support the NNSA goal of Securing our Nation, strategic objective to reduce global nuclear dangers, and strategy to support the President's arms control and non-proliferation agendas by:

- (1) Deploying safeguards systems to international regimes and other countries that address safeguards deficiencies;
- (2) Assisting partner countries in developing export control systems that meet critical requirements, and;
- (3) Eliminating Russian weapon-usable highly enriched uranium (HEU) from the Russian stockpile under the HEU Purchase Agreement.

Performance Plan

(R = Results; T = Target)

Strategic Goal: Securing our Nation : Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Support the President's arms control and non-proliferation agendas Program: Nonproliferation and International Security (NA51)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Russian Weapon-Usable Highly Enriched Uranium (HEU) Eliminated: Cumulative metric tons of Russian weapon-usable HEU that U.S. experts have monitored and confirmed as permanently eliminated from the Russian stockpile under the HEU Purchase Agreement. (Long-term Outcome)	R: 315 T: 312	R: 345 T: 342	R: 375 T: 372	R: 403 T: 402	T: 432	T: 462	T: 492	T: 500	N/A	N/A	By the end of calendar year 2013 (1 st quarter FY 2014), confirm that 500 metric tons of weapons-usable HEU has been permanently eliminated from the Russian stockpile.
Global Initiatives to Prevent Proliferation (GIPP) Non-USG Project Funding: Cumulative percentage of non-USG (private sector and foreign government) project funding contributions obtained relative to cumulative USG GIPP funding contributions. (Efficiency)	R: 75% T: 75%	R: 80% T: 78%	R: 81% T: 81%	R: 82% T: 82%	T: 85%	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, obtain non-USG funding contributions equal to 85% of the cumulative USG GIPP funding contributions. The NIS program intends to obtain non-USG funding contributions equal to 100% of the cumulative USG GIPP funding contributions by FY 2019. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.
Nuclear Export Control Program: Cumulative number of countries where International Nonproliferation Export Control Program (INECP) is engaged that have export control systems that meet critical requirements. (Long-term Outcome)	R: 7 T: 7	R: 8 T: 8	R: 9 T: 9	R: 21 T: 11	T: 22	T: 24	T: 26	T: 29	T: 32	T: 35	By the end of FY 2020, 38 of 41 countries where INECP is engaged have export control systems that meet critical requirements, defined as having (1) control lists consistent with the WMD regimes; (2) initiated outreach to producers of WMD-related commodities; (3) developed links between technical experts and license reviewers and front-line enforcement officers; and (4) begun customization of WMD Commodity Identification Training (WMD CIT) materials and technical guides.

Strategic Goal: Securing our Nation : Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Support the President's arms control and non-proliferation agendas Program: Nonproliferation and International Security (NA51)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Safeguards Systems: Annual number of safeguards systems deployed and used in international regimes and other countries that address an identified safeguards deficiency. (Annual Output)	R: 3 T: 3	R: 3 T: 3	R: 3 T: 3	R: 10 T: 4	T: 5 ¹¹²	T: 5	T: 5	T: 5	T: 5	N/A	By the end of FY 2015, 38 technologies are deployed and used in international regimes and other countries that address an identified safeguards deficiency.
Elimination of Russian HEU: Annual number of special monitoring visits completed to the four Russian processing facilities that downblend highly enriched uranium (HEU) to low-enriched uranium to monitor and confirm the permanent elimination of 30 metric tons of Russian HEU from the Russian weapons stockpile under the HEU Purchase Agreement. (Annual Output)	R: 24 T: 24	R: 24 T: 24	R: 24 T: 24	R : 24 T: 24	T: 24	N/A	N/A	N/A	N/A	N/A	By the end of FY 2011, complete transparency monitoring visits and data gathering at 4 Russian uranium processing facilities to confirm that 432 metric tons of weapons-usable HEU processed through FY 2011 have been permanently eliminated from the Russian stockpile. The NIS program intends to complete transparency monitoring visits and data gathering at 4 Russian uranium processing facilities to confirm that 500 metric tons of weapons-usable HEU have been permanently eliminated from the Russian stockpile by the end of calendar year 2013. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

¹¹² FY 2011 Congressional Budget Request performance target of 4 safeguards systems for FY 2011 was reported incorrectly. The actual performance target should have been 5.

International Nuclear Materials Protection and Cooperation

Mission

The International Nuclear Materials Protection and Cooperation (INMP&C) program prevents nuclear terrorism by working in Russia and other regions of concern.

Overview

The INMP&C program's corporate performance measures support the NNSA goal of "Securing our Nation", strategic objective of reducing global nuclear dangers, and strategy to enhance nonproliferation efforts and the security of nuclear materials by: (1) securing and eliminating vulnerable nuclear weapons and weapons exploitable material; and (2) installing detection equipment at international crossing points and Megaports to prevent and detect the illicit transfer of nuclear material.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: International Nuclear Materials Protection and Cooperation (NA49)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Materials Protection, Control and Accountability (MPC&A) Upgrades – Buildings: Cumulative number of buildings containing weapons-usable material with completed MPC&A upgrades. (Long-term Output)	N/A	R: 181 T: 191	R: 210 T: 210	R: 213 T: 213	T: 218	T: 221	T: 229	N/A	N/A	N/A	By the end of FY 2013, complete MPC&A upgrades on approximately 229 buildings containing weapons-usable nuclear material including Post Bratislava work-scope.
Buildings Secured: Cumulative number of buildings with weapons-usable material secured. (Long-term Output)	R: 193 T: 190	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Secured (rapid or comprehensive upgrades complete) 193 buildings containing weapons-usable nuclear material in FY 2007.
Materials Protection, Control and Accountability (MPC&A) Upgrades: Cumulative number of warhead sites with completed MPC&A upgrades. (Long-term Output)	R: 64 T: 58	R: 65 T: 64	R: 73 T: 73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Completed MPC&A upgrades at 73 warhead sites in December 2008.
Highly Enriched Uranium (HEU) Conversion to Low Enriched Uranium (LEU): Cumulative metric tons of Highly-Enriched Uranium converted to Low-Enriched Uranium. (Long-term Outcome)	R: 9.8 T: 9.5	R: 10.7 T: 11.0	R: 11.7 T: 11.7	R: 12.6 T: 12.6	T: 13.5	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	By the end of FY 2011, convert 13.5 MTs of HEU to LEU. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.
MPC&A Regulations: Cumulative number of MPC&A regulations in the development phase for Russian and other FSU countries. (Long-term Output)	N/A	N/A	R: 162 T: 165	R: 186 T: 194	T: 198	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	By the end of FY 2011, place a total of approximately 198 MPC&A regulations in the development phase for the Russian and other FSU countries. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: International Nuclear Materials Protection and Cooperation (NA49)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Second Line of Defense (SLD) Sites: Cumulative number of Second Line of Defense (SLD) sites with nuclear detection equipment installed (Cumulative number of Megaports completed). (Long-term Output)	R:162 (12) T:173 (12)	R: 232 (19) T: 224 (23)	R: 335 (27) T: 312 (28)	R :399 (34) T: 404 (41) ¹¹³	T: 463 (45)	T: 498 (48)	T: 536 (52)	T: 590 (63)	T: 646 (76)	T: 716 (85)	By the end of FY 2018, install radiation detection equipment at approximately 650 border crossing sites and 100 Megaports (750 total SLD sites), assuming no expansion of program sites.
Megaports with Host Country Cost Sharing: Cumulative number of Megaports with host country cost-sharing, resulting in decreased cost to the US program (Estimated cost sharing value). (Efficiency)	N/A	R:3/\$14M T:5/\$24M	R:7/\$36.8M T:8/\$40M	R:9/\$43.8M T: 12/\$66M	T: 14/\$73M	T: N/A	T: N/A	T: N/A	T: N/A	T: N/A	By the end of FY 2011, complete host country cost sharing on approximately 14 Megaports for an estimated value of \$73M. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

¹¹³ FY 2011 Congressional Budget Request performance target of 43 Megaports for FY 2010 was reported incorrectly. The actual performance target is 41. This error was formally corrected in DOE's Performance Measures Manager system.

Fissile Materials Disposition

Mission

The program goal is to eliminate surplus Russian weapon-grade plutonium and surplus United States (U.S.) weapon-grade plutonium and highly enriched uranium.

Overview

The Fissile Materials Disposition program's corporate performance measures support the NNSA goal of "Securing our Nation," and the strategic objectives of reducing global nuclear dangers, enhancing nonproliferation efforts and the security of nuclear materials. These goals and objectives are accomplished by disposing of surplus weapon-grade plutonium and highly enriched uranium in the U.S., and working with Russia to dispose of Russian surplus weapon-grade plutonium under the U.S. - Russia Plutonium Management and Disposition Agreement. The Office of Fissile Materials Disposition is designing and constructing facilities at the Savannah River Site to dispose of at least 34 metric tons of surplus U.S. weapon-grade plutonium through the fabrication and irradiation of mixed oxide fuel in domestic nuclear reactors. The Office of Fissile Materials Disposition also disposes of U.S. highly enriched uranium (HEU) that has been declared surplus to defense needs by down-blending it into low enriched uranium which can no longer be used for nuclear weapons.

Performance Plan

(R = Results; T= Targets)

Strategic Goal: Securing Our Nation: Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Fissile Materials Disposition (NA50)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Mixed Oxide (MOX) Fuel Fabrication Facility: Cumulative percentage of the design, construction, and cold start-up activities completed for the Mixed Oxide (MOX) Fuel Fabrication Facility. (Long-term Output) ¹¹⁴	R: 24% T: 24%	R: 30% T: 30%	R: 38% T: 39%	R: 48% T: 49%	T: 62%	T: 70%	T: 81%	T: 90%	T: 95%	T: 100%	By the end of FY 2016, complete design, construction, and cold start-up activities for the MOX Facility.
Waste Solidification Building: Cumulative percentage of the design, construction, and cold start-up activities completed for the Waste Solidification Building (WSB). (Long-term Output) ¹¹⁵	N/A	N/A	R: 26% T: 30%	R: 47% T: 45%	T: 65%	T: 80%	T: 100%	N/A	N/A	N/A	By the end of FY 2013, complete design, construction, and cold start-up activities for the WSB.

¹¹⁴ Prior to FY 2007, annual MOX performance was derived by multiplying the percent complete for a project phase (R&D, design, construction) by an associated weighting factor. Starting in FY 2007, percent completion is derived by the earned value expressed as a percentage of the Performance Measurement Baseline.

¹¹⁵ The WSB percent complete is measured by the earned value expressed as a percentage of the Performance Measurement Baseline.

Strategic Goal: Securing Our Nation: Enhance nuclear security in defense, nonproliferation, nuclear power, and environmental safeguards

Strategic Objective: Reducing global nuclear dangers

Strategy: Enhance nonproliferation efforts and the security of nuclear materials

Program: Fissile Materials Disposition (NA50)

Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
U.S. Highly Enriched Uranium (HEU) Downblended: Cumulative amount of surplus U.S. highly enriched uranium (HEU) down-blended or shipped for down-blending. (Efficiency)	R:103 MT T:103 MT	R:117 MT T: 112MT	R: 127 MT T: 125 MT	R: 133MT T: 130 MT	T: 136 MT	T: 139 MT	T: 141 MT	T: 143 MT	T: 145 MT	T: 147 MT	By the end of FY 2050, complete disposition of 209 MT of surplus HEU.

Global Threat Reduction Initiative

Mission

The Global Threat Reduction Initiative (GTRI) program reduces and protects vulnerable nuclear and radiological materials located at civilian sites worldwide.

Overview

GTRI's corporate performance measures support the NNSA goal of Securing our Nation, objective of reducing global nuclear dangers, and strategy to enhance nonproliferation efforts and the security of nuclear materials by converting research reactors and isotope production facilities from HEU to LEU, removing and disposing of excess and vulnerable nuclear and radiological material from civilian sites worldwide, and securing high priority nuclear and radiological material from theft and sabotage.

Performance Results and Targets

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Global Threat Reduction Initiative (NA48)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Highly Enriched Uranium (HEU) Reactors Converted or Shutdown: Cumulative number of HEU reactors converted or verified as shutdown prior to conversion. (Long-term Outcome) ¹¹⁶	R: 55 T: 53	R: 62 T: 62	R: 67 T: 68	R:72 T: 71	T: 75	T: 83	T: 90	T: 101	T: 114	T: 129	By 2022, convert or verify the shutdown prior to conversion of 200 HEU reactors.
Nuclear Material Removed: Cumulative number of kilograms of vulnerable nuclear material (HEU and plutonium) removed or disposed. (Efficiency Measure)	R: 1,791 T: 1,671	R: 1,948 T: 2,133	R: 2,317 T: 2,311	R: 2,853 T: 2,767	T: 3,102	T: 3,555	T: 4,289	T: 4,548	T: 4,791	T: 4,801	By 2016, remove or dispose of 4,801 kilograms of vulnerable nuclear material (HEU and plutonium) (enough for more than 190 nuclear bombs). (GTRI will continue to remove U.S.-origin fuel from foreign research reactors until 2019 as an incentive for converting research reactors from HEU to LEU fuel.)
Radiological Sources Removed: Cumulative number of excess domestic radiological sources removed or disposed. (Long-term Outcome)	R:15,503 T: 15,455	R: 18,656 T: 17,500	R: 23,014 T: 22,000	R: 26,172 T: 25,214	T: 28,000	N/A	N/A	N/A	N/A	N/A	Annually, remove at least 1,900 excess domestic radiological sources. This measure will be deleted as a result of the DOE Performance Measures Streamlining Initiative.

¹¹⁶ The program changed the methodology for accounting for cumulative research reactors starting in FY 2007. The metric now includes converted research reactors and research reactors verified as shutdown prior to conversion. The comparable number for FY 2006 using the new methodology would be 47 reactors converted or shutdown.

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Reducing global nuclear dangers Strategy: Enhance nonproliferation efforts and the security of nuclear materials Program: Global Threat Reduction Initiative (NA48)											
Performance Goal	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Nuclear and Radiological Buildings Protected: Cumulative number of buildings with high priority nuclear and radiological materials secured. (Long-term Outcome) ¹¹⁷	R: 426 T: N/A	R: 514 T: N/A	R: 705 T: 694	R: 971 T: 855	T: 1,081	T: 1,239	T: 1,329	T: 1,789	T: 2,130	T: 2,607	By 2025 protect an estimated 8,500 buildings with high-priority nuclear and radiological materials.

¹¹⁷ GTRI changed the methodology for accounting for protection of buildings with high-priority nuclear and radiological materials starting in FY 2009, consistent with the OMB-approved Management Improvement Plan. The metric now includes security upgrades completed at research and test reactors and other vulnerable buildings containing radiological materials. Previously, the number included recoveries of radioisotopic thermoelectric generators (RTGs) but did not include the research and test reactors. RTGs are now better reflected as removed and disposed, resulting in permanent threat reduction.

Naval Reactors

Mission

Naval Reactors is responsible for all naval nuclear propulsion work, beginning with reactor technology development, continuing through reactor operation, and ending with reactor plant disposal. The Program ensures the safe and reliable operation of reactor plants in nuclear-powered submarines and aircraft carriers (constituting 40 percent of the Navy's combatants), and fulfills the Navy's requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Overview

For Department of Energy expenses necessary for naval reactors activities to carry out the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition (by purchase, condemnation, construction, or otherwise) of real property, plant, and capital equipment, facilities, and facility expansion, \$1,153,662,000, to remain available until expended.

Performance Plan

(R = Results; T = Targets)

Strategic Goal: Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards Strategic Objective: Applying DOE's capabilities for other critical national security missions Strategy: Design and develop integrated Navy nuclear propulsion systems Program: Naval Reactors (NA55)										
Performance Goal	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Endpoint Target
Fleet Reactor Plant Operations: Cumulative miles steamed, in millions, of safe, reliable, militarily effective nuclear propulsion plant operation supporting National security requirements. (Long-term Outcome)	R: 140 T: 140	R: 142 T: 142	R:145 T: 144	T: 146	T: 148	T: 150	T: 152	T: 154	N/A	By the end of FY 2015, complete safe steaming of approximately 154 million miles in nuclear-powered ships. (Interim Target)
A1B Reactor Plant Design: Cumulative percentage of completion on the next-generation aircraft carrier reactor plant design. (Long-term Outcome)	R: 85% T: 85%	R: 88% T: 88%	R :91% T: 91%	T: 94%	T : N/A	T : N/A	T : N/A	T : N/A	T : N/A	By the end of FY 2011, complete 94% of the design of the reactor plant for the next-generation aircraft carrier. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.
Program Operations: Annual percentage of Program operations that have no adverse impact on human health or the quality of the environment. (Annual Outcome)	R: 100% T: 100%	R: 100% T: 100%	R :100% T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	T: 100%	Annually, ensure that 100% of Program operations have no adverse impact on human health or the quality of the environment.
Utilization of Test Reactor Plants: Annual utilization factor for operation of test reactor plants. (Efficiency)	R: 92% T: 90%	R: 91% T: 90%	R :95% T: 90%	T: 90%	T : N/A	T : N/A	T : N/A	T : N/A	T : N/A	Annually, achieve a utilization factor of at least 90% for operation of test reactor plants. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.
Naval Reactors Facility Condition Index: Annual Naval Reactors complex-wide aggregate Facility Condition Index (FCI), as measured by deferred maintenance per replacement plant value for all program facilities (Annual Output).	R: 4% T: 5%	R: 4% T: 4%	R :4% T: 4%	T: 4%	T : N/A	T : N/A	T : N/A	T : N/A	T : N/A	Annually, achieve an FCI of 4% or below. This measure has been deleted as a result of the DOE Performance Measures Streamlining Initiative.

Appendix J: Environmental Management

Environmental Management

Mission

Fifty years of nuclear weapons production and energy research generated millions of gallons of liquid radioactive waste, millions of cubic meters of solid radioactive wastes, thousands of tons of spent (used) nuclear fuel and special nuclear material, along with huge quantities of contaminated soil and water. The [Office of Environmental Management](#) (EM) program was established in 1989 to achieve the successful cleanup of this Cold War legacy.

The mission of the EM is to cleanup this environmental legacy brought about from five decades of nuclear weapons development and production, and Government-sponsored nuclear energy research. This cleanup effort is the largest in the world, originally involving two million acres at 110 sites in 35 states and some of the most dangerous materials known to man. At the end of FY 2010, EM is responsible for remaining cleanup at 18 sites in 11 states.

EM is requesting program funds in three appropriation accounts: Defense Environmental Cleanup (FY 2010 \$5,652 million; FY 2012 \$5,410 million); Non-Defense Environmental Completion (FY 2010 \$255 million; FY 2012 \$219 million); and Uranium Enrichment Decontamination and Decommissioning Fund (FY 2010 \$574 million; FY 2012 \$504 million).

Details on DOE's FY 2012 Congressional Budget Request for the Office of Environmental Management are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume5.pdf>.

Performance

The FY 2012 budget request reflects EM's increased focus on improvement in its acquisition, contract, project management through application of the best business practices and management principles related to project size and structure, design maturity, funding stability, peer review, project management information, and cost estimation. Standardization of the acquisition process will ensure improved communication of contract requirements that are better aligned with project management processes. EM will strive to develop contract statements of work and deliverables based on clear project requirements, robust front-end planning and risk analysis, ensuring that nuclear safety requirements are addressed early, and changes to the contract and the project baseline are managed through strict timely change control processes. EM will continue to implement Performance Based Contracts where appropriate.

The EM Base Program Portfolio was restructured using the same project framework used in establishing Recovery Act projects. Base program operations activities have been separated from capital work within a Project Baseline Summary (PBS). Capital Asset Projects will be managed in accordance with DOE Order 413.3B, "Program and Project Management for the Acquisition of Capital Assets." EM is currently developing the policies and guidelines for operations type work scope that is not governed by DOE Order 413.3B.

As a result of the restructuring, EM has sharpened its focus on capital asset projects by separating out the operational activities which will help EM manage project risk in a more effective manner. In addition, EM has implemented a corporate work breakdown structure (CWBS) that defines individual capital asset projects and/or operations activities in a way that

helps organize and define the total work scope at the program level (i.e., tank waste; decontamination and decommissioning (D&D)).

A CWBS provides EM with a consistent framework for cost estimation and schedule control allowing for the tracking and reporting of project cost, schedule, and performance, including earned value data. This data will continue to be reviewed on a monthly and quarterly basis to ensure both Capital Asset projects and operational activities remain within cost and on schedule. By standardizing the CWBS EM has in place a consistent framework enabling the categorization of like scope of work which facilitates analysis and reporting, and simplifies budget formulation and execution.

Overview

EM continues to pursue its cleanup objectives within the overall framework of achieving the greatest risk reduction benefit per radioactive content (wastes that contain the highest concentrations of radionuclides) overlaying regulatory compliance commitments and best business practices to maximize cleanup progress. To support this approach, EM has prioritized its cleanup activities:

- Essential activities to maintain a safe, secure, and compliant posture in the EM complex
- Radioactive tank waste stabilization, treatment, and disposal
- Spent (used) nuclear fuel storage, receipt, and disposition
- Special nuclear material consolidation, stabilization, and disposition
- High-risk soil and groundwater remediation
- Transuranic and mixed/low-level waste disposition
- Soil and groundwater remediation
- Excess facilities deactivation and decommissioning

In addition to these priorities, additional strategies are integrated into cleanup activities that are important to the achievement of EM cleanup progress as well as the stakeholders and states where cleanup sites are located. Most importantly, EM will continue to discharge its responsibilities by conducting cleanup within a “Safety First” culture that integrates environmental, safety, and health requirements and controls into all work activities to ensure protection to the workers, public, and the environment.

In FY 2012, EM will continue to aggressively manage its life-cycle cost and identify opportunities to make strategic investments that reduce the overall cost of the cleanup program as well as the period of execution. Tank waste accounts for approximately one third of the total EM cleanup cost, and is the highest risk driver in the program, and therefore is a major contributor to EM’s overall cleanup liability. In addition, reducing costs at the majority of EM sites requires reducing the number of nuclear and radiological facilities and remediating the contaminated soil and groundwater underneath those facilities. Therefore, two key strategic initiatives on which EM will focus are the development of Enhanced Tank Waste Treatment capabilities and Footprint Reduction.

- EM has formed an Enhanced Tank Waste Strategic Team charged with integrating and focusing efforts to identify and deploy cleanup approaches and

technologies to accelerate the completion of the tank waste mission. EM will focus its technology development and deployment investments to mature the science and technology associated with tank waste processing, treatment, and waste loading. In addition, EM will continue to leverage base funding to optimize tank waste processing capacities to enhance the current tank waste cleanup approaches. Seven major transformational strategies to reduce life-cycle cost and length of program execution have been identified. Several of these strategies have been incorporated into Savannah River's tank waste program while many of these strategies are being considered for incorporation into the Hanford sites tank waste programs.

- **Footprint Reduction**— EM will continue to pursue Footprint Reduction opportunities and small site legacy completions to accelerate environmental cleanup across the cleanup complex. EM has used Recovery Act funding to accelerate disposition of legacy transuranic (TRU) and low-level waste, accomplish soil and groundwater remediation and to perform decontamination, decommissioning, and demolition of areas and facilities years sooner than those activities were scheduled to occur. Recovery Act funding has allowed EM to strategically accelerate cleanup of facilities and contaminated areas in the outer reaches of many sites, accomplishing 40 percent footprint reduction by the end of 2011 and leading to approximately 90 percent reduction by 2015. Management and removal of legacy TRU waste from generator sites directly supports risk reduction and the goal of reducing the EM site footprint. Removing contamination, dispositioning waste, and reducing the site footprint will save funding by reducing security, surveillance, maintenance, infrastructure, and overhead costs that otherwise would continue for years to come. EM estimates that such footprint reduction measures already undertaken with the Recovery Act investment have saved more than \$4 billion and avoided another \$3 billion in life-cycle costs.

EM will continue to develop strategic options to further reduce its life-cycle cost and period of execution.

Annual Performance Results and Targets

EM has developed 16 corporate performance measures to enable the program to monitor annual and life-cycle progress towards meeting the Department's Strategic Plan Goal, objective, and strategies. These corporate performance measures are:

- Certified DOE storage/treatment/disposal 3013 containers (or equivalent) of plutonium metal or oxide packaged ready for long-term storage;
- Certified containers of enriched uranium packaged ready for long-term storage;
- Plutonium or uranium residues packaged for disposition (kg of bulk material);
- Depleted and other uranium packaged for disposition (metric tons);
- Liquid waste eliminated (millions of gallons);
- Number of liquid tanks closed;
- Canisters of high-level waste packaged for final disposition;
- Spent (used) nuclear fuel packaged for final disposition (metric tons of heavy metal);

- Transuranic waste dispositioned (cubic meters);
- Low-level waste/mixed low-level waste disposed (cubic meters);
- Number of material access areas eliminated;
- Number of nuclear facilities completed;
- Number of radioactive facilities completed;
- Number of industrial facilities completed;
- Number of release sites remediated; and,
- Number of geographic sites closed.

Each of these 16 corporate performance measures is quantitative and focuses on the accomplishment of risk-reducing actions and life-cycle reduction. Each measure is tracked in the context of the total measure (life-cycle) necessary to complete each site, as well as, the EM program as a whole. The corporate measures are under configuration control, thereby establishing performance expectations and accountability for those expectations within a given funding level. Through configuration control, EM is able to make corporate decisions that will keep the program on track, monitor and control costs and schedules, and manage site closure expectations. In addition to the corporate measures, performance is also tracked through the implementation of earned value management, which is used to demonstrate whether a project and site are on track to maximize its success for its construction and operations outcomes.

Nuclear Materials

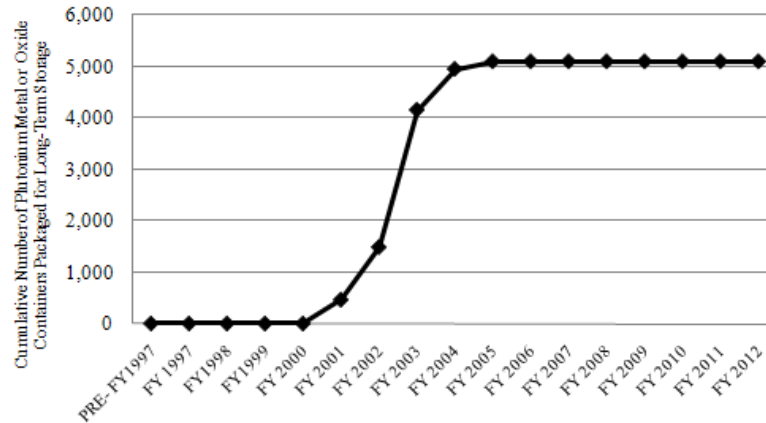
Reducing the inventory of high-risk nuclear materials by preparing it for long-term storage or disposition quantitatively measures EM's progress towards environmental, safety, and security risk reduction. The stabilization and packaging of nuclear materials indicates a reduction in an activity that is a major cost driver for the EM program. The following four corporate performance measures (and the identification of the sites that mainly contribute to each of the measures for which work scope remains) are depicted below.

- Plutonium metal or oxide containers packaged for long-term storage (all work for this corporate performance measure has been completed)
- Enriched uranium containers packaged for long-term storage (Hanford Site, Savannah River Site, and Idaho National Laboratory)¹¹⁸
- Plutonium or uranium residues packaged for disposition (all work for this corporate performance measure has been completed) and
- Depleted and other uranium packaged for disposition (Hanford, Savannah River Site, Paducah, and Portsmouth).

¹¹⁸ Changes in the targets and life-cycle estimate for enriched uranium packaged reflect changes in the estimated activities at the Savannah River Site.

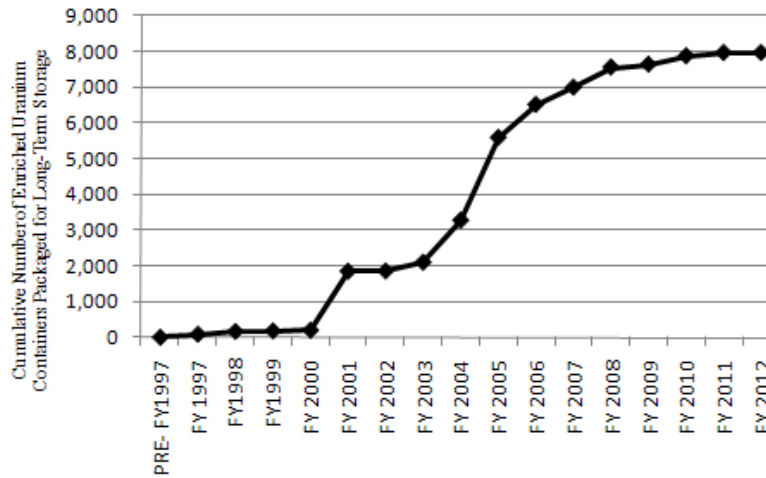
Plutonium Metal or Oxide Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
5,089	Measure Completed			100%	5,089



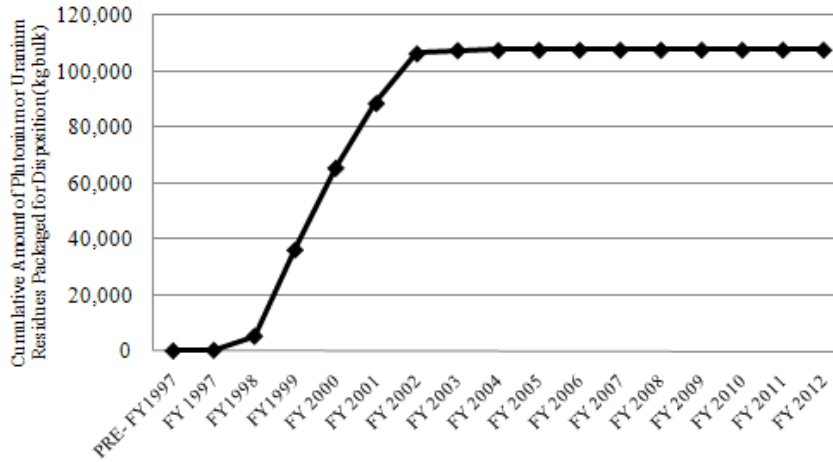
Enriched Uranium Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
7,629	7,863	7,953	7,953	97%	8,171



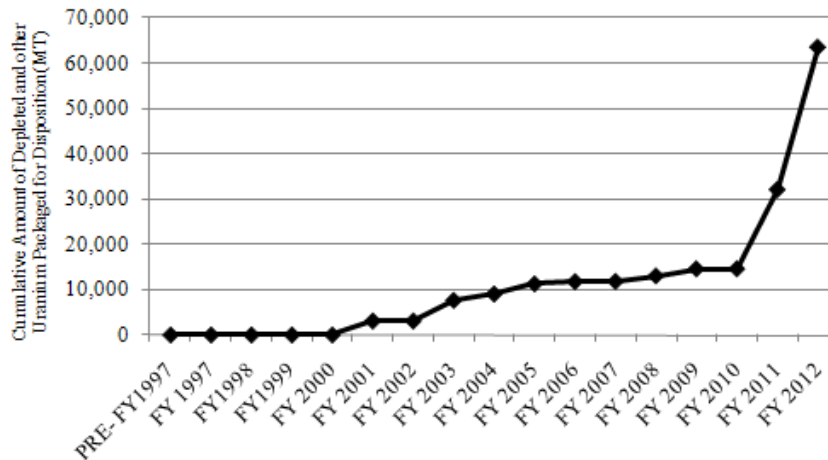
Plutonium or Uranium Residues Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
107,828	Measure Completed			100%	107,828



Depleted and Other Uranium Progress

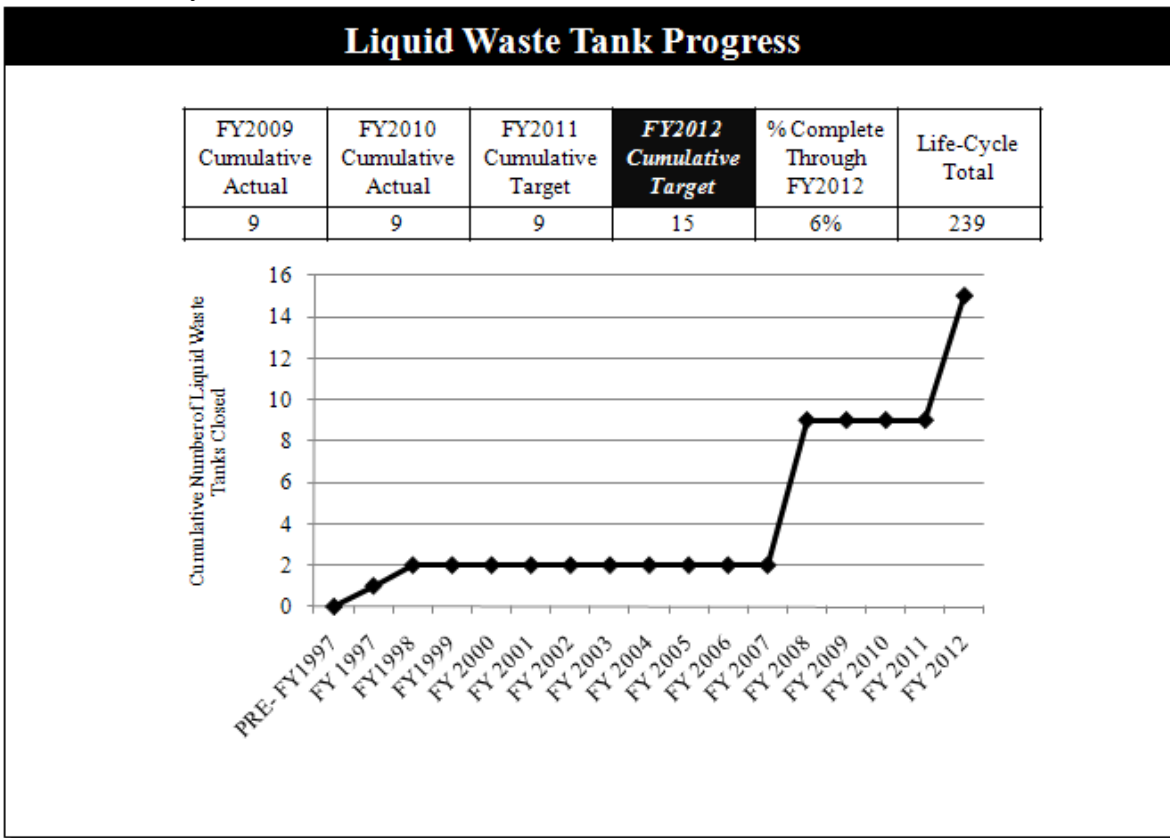
FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
14,636	14,636	32,186	63,686	9%	736,831



Liquid Waste

By reducing the amount of high risk radioactive liquid waste in the inventory and subsequent closing of the liquid waste tanks, EM is demonstrating progress towards the program's goal to reduce the highest risks in the complex first. In addition to eliminating high-risk material, corresponding life-cycle cost reductions are achieved for an activity that is a major cost driver to the EM program. The following two corporate measures (and the identification of the sites that mainly contribute to each of the measures) are depicted below:

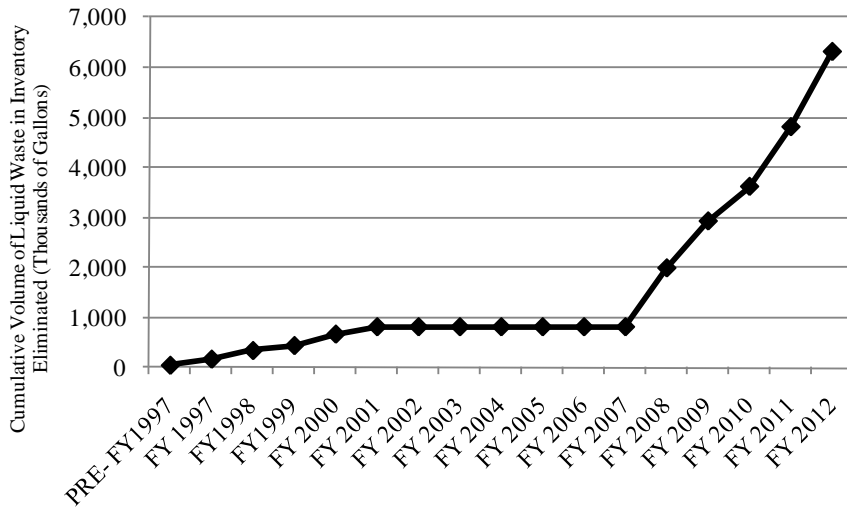
- Liquid waste in inventory eliminated (West Valley, Hanford Site and Savannah River Site) and
- Liquid waste tanks closed¹¹⁹ (Hanford Site, Savannah River Site, and Idaho National Laboratory).



¹¹⁹ Changes in the FY 2011 target for Liquid Waste Tanks Closed reflect changes in the planned activities at the Savannah River Site.

Liquid Waste in Inventory Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	<i>FY2012 Cumulative Target</i>	% Complete Through FY2012	Life-Cycle Total
2,924	3,613	4,505	5,913	7%	88,814



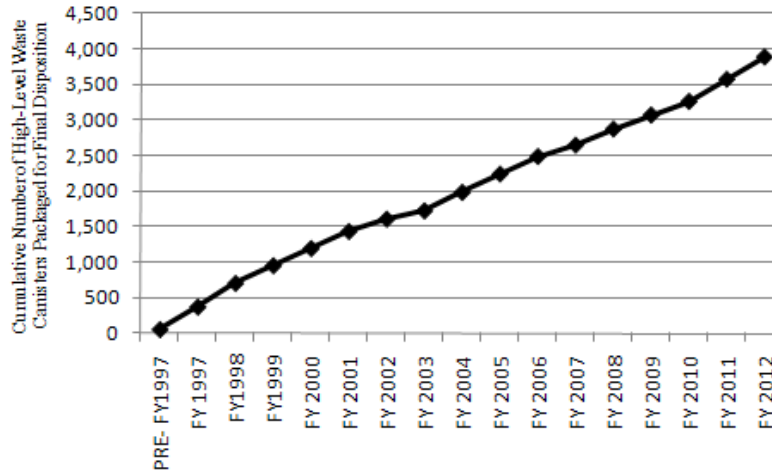
High-Level Waste and Spent (Used) Nuclear Fuel

The EM program is preparing high-level waste¹²⁰ and spent (used) nuclear fuel for final disposition in order to ensure the material is ready for offsite disposal. Completion of high-level waste and spent (used) nuclear fuel activities indicates the reduction of both high risk and cost incurring activities. The Hanford Site, Savannah River Site, and Idaho National Laboratory primarily contribute to both the high-level waste measure and the spent (used) nuclear fuel measure. Both corporate performance measures are depicted below.

¹²⁰ Changes in the targets and life-cycle estimate for High Level Waste packaged reflect changes in the planned activities at the Savannah River Site.

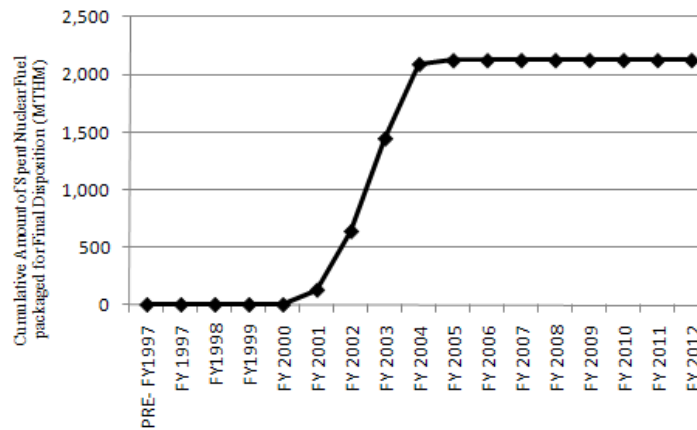
High-Level Waste Canister Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
3,070	3,260	3,571	3,883	16%	24,159



Spent (Used) Nuclear Fuel Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
2,128	2,128	2,128	2,128	87%	2,450

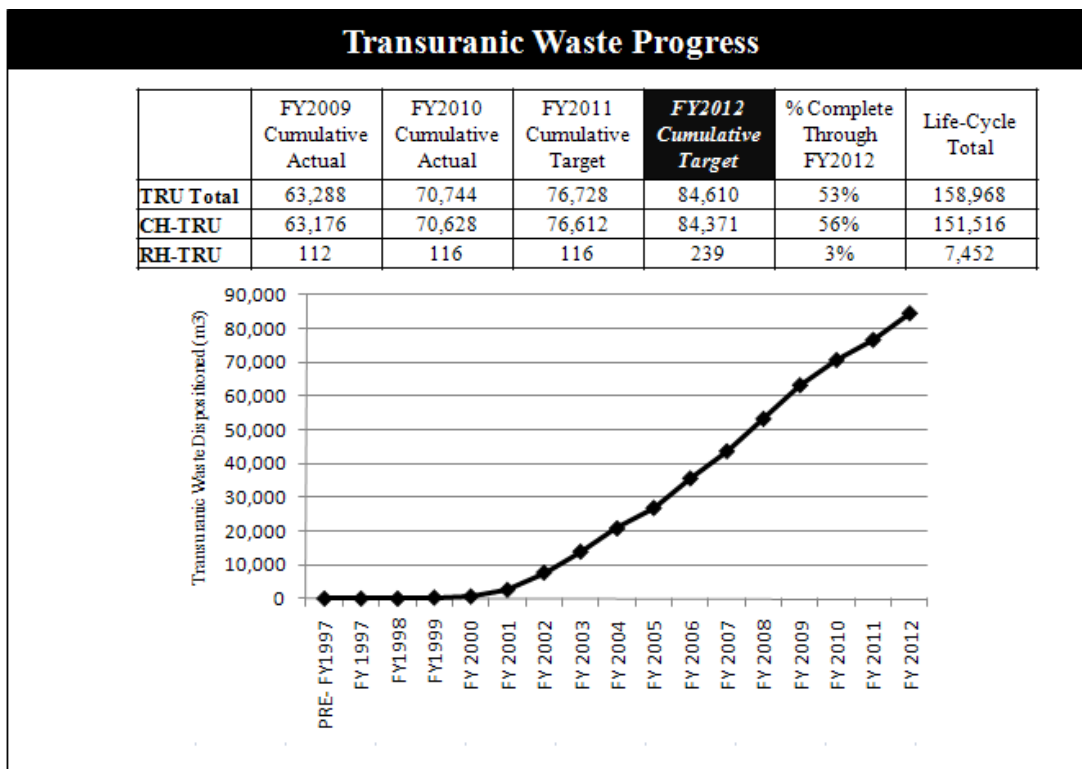


Transuranic Waste and Legacy and Newly Generated Low-Level/Mixed Low-Level Waste

The disposition of transuranic waste metric measures a site's progress toward accelerating cleanup and reducing risk. This measure reflects the progress the generator site has made to manage and prepare its inventory of transuranic (and suspect-transuranic) waste for disposal; it also reflects support from the Department's disposal facilities, in many cases. In FY 2012, the Idaho National Laboratory, Los Alamos National Laboratory, and Oak Ridge are the primary contributors to the transuranic waste corporate measure using funds within this budget request.

¹²¹ This metric also provides information on the disposition of both remote-handled transuranic and contact-handled transuranic waste. It is important to note that the budget request supports the operation of the Waste Isolation Pilot Plant and supporting programs to provide disposal services to these generator sites.

The disposal of legacy and newly generated low-level waste and mixed low-level waste reflects the intensity of cleanup activities at a site. A number of sites contribute to the low-level and mixed low-level waste measure.¹²²

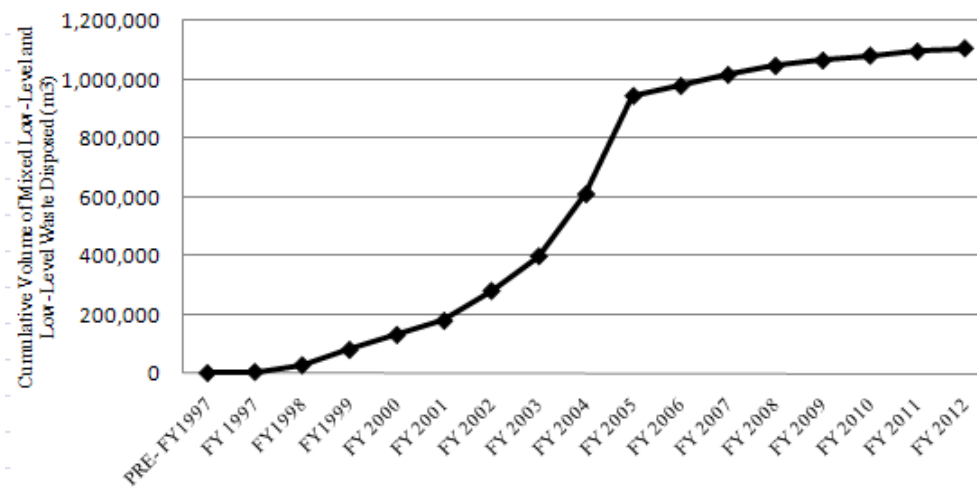


¹²¹ Changes in the targets and life-cycle estimate for transuranic waste dispositioned reflect new developments for shipping priorities as well as the results of Transuranic Waste Processing and characterization for the following sites: West Valley Demonstration Plant, Oak Ridge, Savannah River, and Los Alamos National Laboratory.

¹²² Changes in the targets and life-cycle estimate for legacy and newly generated low-level waste and mixed low-level waste reflect reevaluations for the waste quantities at the following sites: Oak Ridge, Idaho, Savannah River, Hanford, ETEC, and Los Alamos National Laboratory.

Legacy and Newly Generated Low-Level and Mixed Low-Level Waste Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	<i>FY2012 Cumulative Target</i>	% Complete Through FY2012	Life-Cycle Total
1,065,246	1,081,578	1,095,875	1,106,415	77%	1,441,074

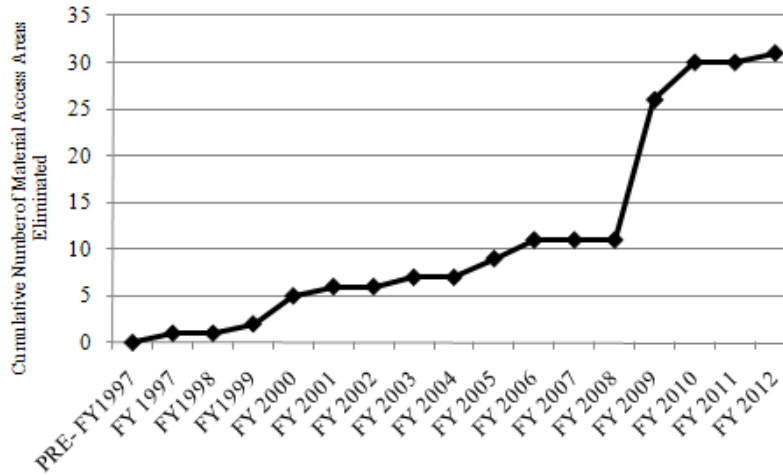


Material Access Areas

The elimination of a material access area indicates the completion of a segment of work that removes the need for safeguards and security in the area. This is an obvious indicator of a site's progress towards reducing risk to workers, the public, and the environment. The Rocky Flats Site and the Idaho National Laboratory completed all work for this measure, while the Savannah River Site will complete this corporate measure in FY 2012, which is depicted below.

Material Access Area Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
26	30	30	31	89%	35



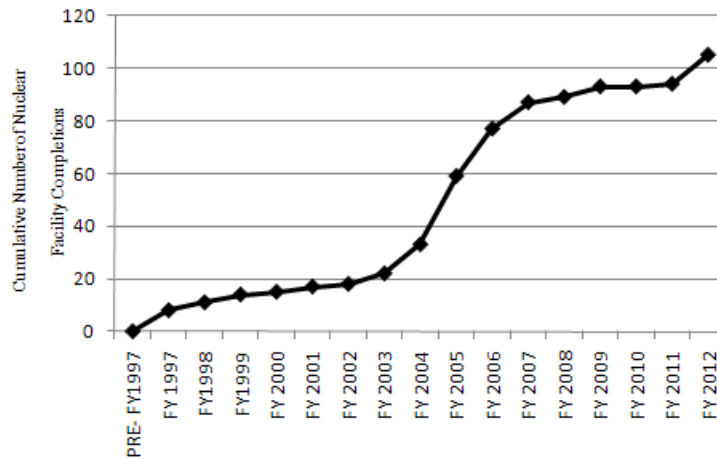
Facility Completions

Three corporate performance measures (i.e., nuclear, radioactive, and industrial facilities) encompass facility completions; measured are the number of facilities that have reached their end state within the EM program.¹²³ The endpoint corresponds to one of the following: decommissioning, deactivation, dismantlement, demolition, or transfer of responsibility to another program or owner. Facility completions are an excellent indicator of EM's progress towards site cleanup. Many sites contribute to facility completions, which are portrayed below.

¹²³ Changes in the targets and life-cycle estimate for facilities completed reflect reevaluations for the accounting of facilities across the complex.

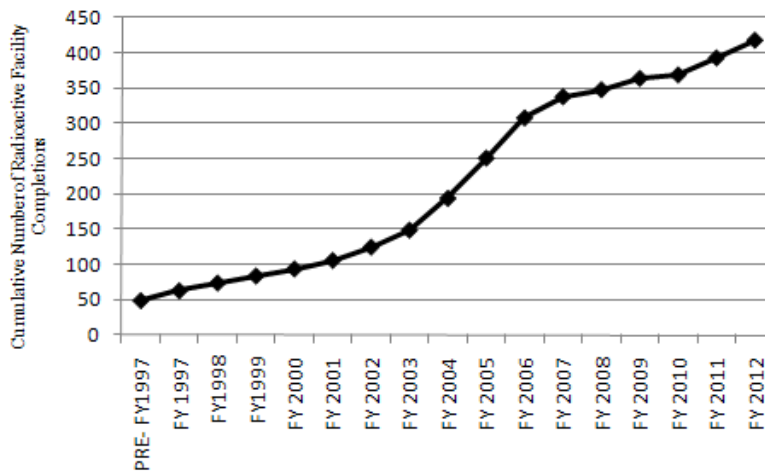
Nuclear Facility Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
93	93	94	105	22%	467



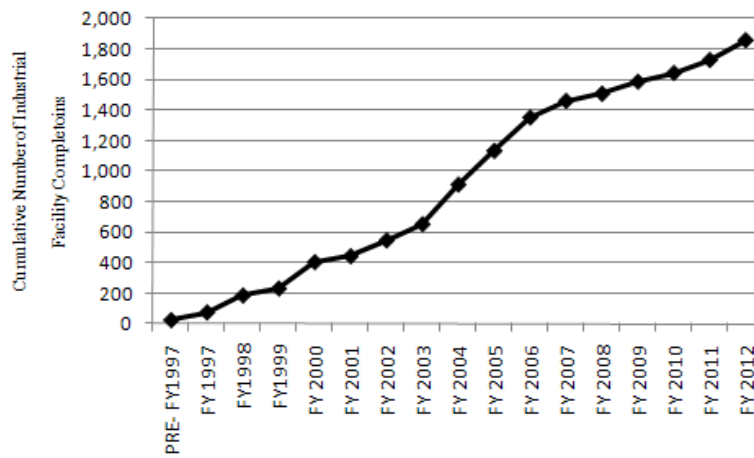
Radioactive Facility Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	FY2012 Cumulative Target	% Complete Through FY2012	Life-Cycle Total
364	369	393	418	39%	1,071



Industrial Facility Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	<i>FY2012 Cumulative Target</i>	% Complete Through FY2012	Life-Cycle Total
1,588	1,645	1,741	1,871	50%	3,686



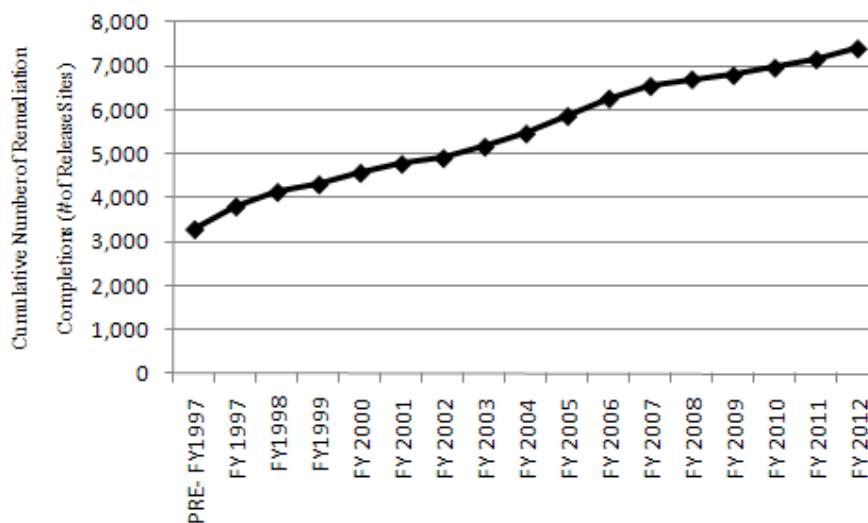
Remediation Completions

The completion of release sites, discrete areas of contamination at a site, is a good indicator of a site's progress towards completions. The measure indicates completion of the activities necessary to evaluate and alleviate the release or possible release of a hazardous substance that may pose a risk to human health or the environment. Many sites contribute to remediation completions, which are portrayed below.¹²⁴

¹²⁴ Changes in the targets and life-cycle estimate for remediation completed reflect reevaluations for the accounting of project plans and regulatory agreements across the complex.

Remediation Completion Progress

FY2009 Cumulative Actual	FY2010 Cumulative Actual	FY2011 Cumulative Target	<i>FY2012 Cumulative Target</i>	% Complete Through FY2012	Life-Cycle Total
6,800	6,970	7,157	7,408	70%	10,596



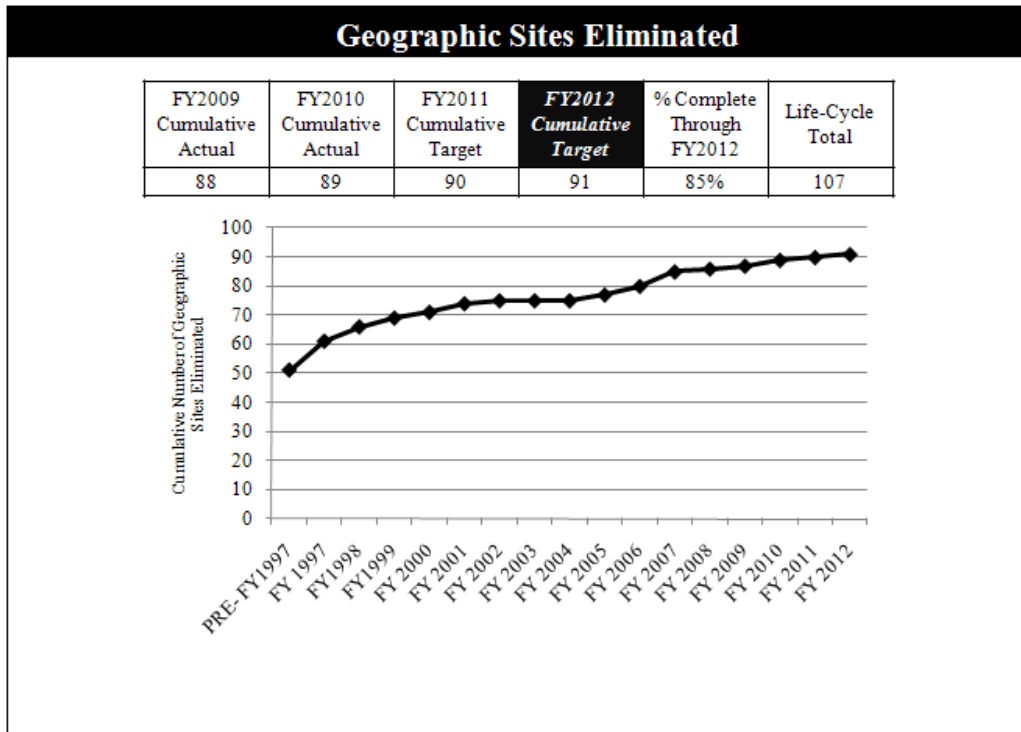
Geographic Site Completions

Completion of a geographic site best reflects EM's goal of accelerating cleanup and reducing risk. A geographic site is considered complete in its entirety when active remediation has been completed in accordance with the terms and conditions of cleanup agreements. In order to complete a geographic site (e.g., Fernald), EM must complete remediation of all release sites present at the site. Stewardship or non-EM activities may be on-going after a site is completed. An early overview of the EM program listed 110 sites across 35 states.¹²⁵ Through a series of site transfers, as well as, newly assigned cleanup sites over the life-cycle of the program, EM currently tracks cleanup responsibilities for 107 contaminated sites across 31 states:

- In FY 2010, EM completed the cleanup at the General Electric Vallecitos Nuclear Center and the physical work at the Inhalation Toxicology Laboratory (ITL).
- In FY 2011, EM will complete the final transfer of ITL to the Office of Legacy Management.
- In FY 2011, with ARRA funding, legacy cleanup scope at the Brookhaven National Laboratory (BNL) and the Stanford Linear Accelerator Center (SLAC) is expected to be accelerated and completed.

¹²⁵ The 1996 Baseline Environmental Management Report.

- In FY 2012, EM's request supports surveillance and maintenance at BNL and SLAC, and the sites will be transferred to the Office of Science in FY 2013 for long-term surveillance and maintenance.
- The geographic site completion corporate performance measure for the EM program is shown below.



Means and Strategies

- The EM program will pursue the following means and strategies to achieve its program goals.
- Work with regulators and stakeholders to ensure compliance and timely implementation of required cleanup actions.
- Eliminate significant environmental, health and safety risks as soon as possible.
 - High-level waste/tank waste stabilization, treatment, disposal
 - Spent (used) nuclear fuel storage, receipt, disposition
 - Special nuclear material consolidation, processing and disposition
 - Higher risk soil and groundwater remediation
 - Solid waste (transuranic waste and low-level waste/mixed low-level waste) storage, treatment, disposal

- Soil and groundwater remediation
 - Decontamination and decommissioning of excess facilities
- Strengthen the integration of acquisition and project management processes so that contract statements of work and deliverables are based on clear project requirements, robust front-end planning and risk analysis, ensuring that nuclear safety requirements are addressed early, and changes to contract and project baseline and the contract are managed through strict and timely change control processes.
- Hold cleanup contractors accountable to high safety standards; and empower them to pursue the most direct path to success.
- Partner with national laboratories, industry, academia, and the Corps of Engineers to ensure the best scientific and engineering resources are used, so that the technologies selected for development and deployment and the design and construction approaches used will help reduce risk, lower cost, and accelerate project completion.
- Project contingency funding will not be requested with the exception of capital projects.
- Streamline EM program activities to focus on risk reduction and cleanup.
- Continue to revitalize human capital as it is only with well-trained and qualified people that EM will be able to accomplish its cleanup mission.

The following external factors could affect EM's ability to achieve its strategic goal:

- **Cleanup Standards:** The end state for cleanup at certain sites is not fully determined. The extent of cleanup greatly affects cost, schedule and scope of work.
- **Uncertain Work Scope:** Uncertainties are inherent in the environmental cleanup program due to the complexity and nature of the work. There are uncertainties in EM's knowledge of the types of contaminants, their extent, and concentrations.
- **Commercially Available Options for Waste Disposition:** Accomplishment of risk reduction and site closure is dependent upon the continued availability of commercial options for mixed low-level waste and low-level waste treatment and disposal.
- **Constrained Flexibility:** New regulations, statutes, orders, or litigation may constrain the program's flexibility in accomplishing the goal of cleanup completion and risk reduction in a fiscally responsible manner.
- **New Mission or Responsibilities:** EM will not initiate additional work scope, associated with cleanup of excess facilities from other DOE programs, until there is room within EM's budget based on risk reduction and business case priorities to accomplish this new work scope or the other DOE programs transfer budget target to EM.

In carrying out the program's risk reduction and cleanup mission, EM performs a variety of collaborative activities:

- **Regulatory Compliance:** DOE negotiates and executes environmental compliance and cleanup agreements with the U.S. Environmental Protection Agency and state regulatory agencies, as appropriate. Key parameters such as required cleanup levels and milestones must be negotiated with the appropriate regulators and stakeholders

for each site. Compliance with environmental laws and agreements continues to be a major cost driver for the EM program.

- Defense Nuclear Facilities Safety Board: EM works with the Board to implement recommendations relating to activities at the Department's nuclear facilities affecting nuclear health and safety.
- Environmental Management Advisory Board: EM solicits advice and guidance from the EM Advisory Board on a wide variety of topics, with special emphasis on difficult corporate issues relative to cleanup.
- EM Site Specific Advisory Boards: EM solicits advice and guidance on site operations from nine Site Specific Advisory Boards across the EM complex.
- National Academy of Public Administration (NAPA): EM works with NAPA on its recommendations regarding organization, managerial and human capital issues.
- National Academy of Science (NAS): EM works with the NAS on its recommendations regarding various technical and scientific issues confronting the EM program.

EM also solicits advice and guidance from other external liaison groups, including the National Governors' Association, National Association of Attorney's General, State and Tribal Governments Working Group, Energy Communities Alliance, and the Environmental Council of the States.

Validation and Verification

To validate and verify program performance, EM will conduct various internal and external reviews and audits. EM's programmatic activities are subject to continuing reviews by the Congress, the Government Accountability Office, the Department's Inspector General, the Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, state environmental and health agencies, the Defense Nuclear Facilities Safety Board, and the Department's Office of Engineering and Construction Management. Each year, the Office of Engineering and Construction Management conducts external independent reviews of selected projects. In addition, various Operations/Field Offices commission external independent reviews of site baselines or portions of both operating and construction project baselines. Additionally, EM Headquarters senior management and Field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget. Headquarters offices conduct routine assessments of baseline performance.

Appendix K: Legacy Management

Legacy Management

Mission

The mission of the [Office of Legacy Management](#) (LM) program is to fulfill the Department's post-closure responsibilities and ensure the future protection of human health and the environment. As part of the mission, LM performs long-term surveillance and maintenance, pension and benefit continuity for former contractor retirees, archives and information management, and asset (real and personal property) management.

The FY 2012 request provides \$170 million to carry out all legacy management functions. Details on DOE's FY 2012 Congressional Budget Request for the Office Legacy Legacy Management are available on the web site of the Chief Financial Officer, Office of Budget, at <http://www.cfo.doe.gov/budget/12budget/Content/Volume2.pdf>.

Overview

The LM program performance measures contribute to the strategy of ensuring a long-term solution to the Cold War's environmental legacy as the final element in the environmental remediation of DOE's legacy sites. LM ensures that remediation on its sites remains effective and does not pose a risk to human health and the environment. Other activities of preserving, protecting, and sharing records and information, meeting commitments to the contractor workforce, and optimizing the use of land and assets provide a comprehensive solution on LM-managed sites. By performing the activities in this strategic goal, LM ensures that the Environmental Management program can focus its resources on accelerating environmental cleanup activities.

Performance Plan

Strategic Goal : Securing our Nation: Enhance nuclear security in defense, non-proliferation, nuclear power, and environmental safeguards					
Strategic Objective: Completing environmental remediation of our legacy and active sites					
Strategy: Ensure a long-term solution to the Cold War's environmental legacy					
Program: Legacy Management (LM65)					
Performance Goal	FY 2009	FY 2010	FY 2011	FY 2012	Endpoint Target
	(T = Target; RR= Result)				
Maintain the protectiveness of installed environmental remedies through inspections and other actions at all sites within LM's responsibility in accordance with legal agreements.	T: 100% R: 100%	T: 100% R: 100%	T: 100%	T: 100%	Ensure the sustainable protection of human health and the environment after DOE cleanup is completed
Reduce the cost of performing long-term surveillance and maintenance activities by 2 percent while meeting all regulatory requirements. Reduction is measured in percent from the life-cycle baseline. Final goal is a 10 percent reduction by FY 2015.	T: 2% R: 3.8%	T: 2% R: 3.5%	T: 2%	T: 4%	Supports long-term stewardship activities (e.g., groundwater monitoring, disposal cell maintenance, records management, and management of natural resources) at sites where active remediation has been completed.

Means and Strategies

The LM program will use various means and strategies to achieve a long-term solution to the Cold War's environmental legacy. However, various external factors may impact the ability to achieve this goal. The program also performs collaborative activities to help meet its goal.

The Department will implement the following means:

- Long-term surveillance and maintenance will be performed in accordance with the regulatory decisions for each site. Activities range from maintaining records to routine inspections and maintenance at sites where remediation measures are substantially completed and the operations and maintenance of remedial action systems.
- Adequate staffing will be maintained to oversee the program. A large portion of the surveillance and maintenance and payment of the contractor pensions and benefits will be performed by contractors.

The Department will implement the following strategies:

- LM will only accept responsibility for a site after all active remedies are in place and operating.
- Cost estimates for contractor pension and post-retirement benefits (medical, Medicare Part B, and life insurance) will use the intermediate estimate of an independent actuary.
- Actuarial estimates will be performed annually in order to consider changes in the circumstances that affect pension contribution, medical, and life insurance costs.
- Records and IT data will be managed in accordance with NARA requirements.

The following external factor could affect LM's ability to achieve its strategic goal:

- Significant changes in remedy performance could cause a site to be returned to EM for further remediation.
- Pending legal action could affect LM's performance of records management and IT functions for the Yucca Mountain and Rocky Flats sites.

In conducting the program's long-term surveillance and maintenance functions, LM performs the following collaborative functions: coordinate with regulators, local communities and other stakeholders.

Validation and Verification

To validate and verify program performance, LM employs various internal and external reviews and audits. The Department measures performance by operating a performance tracking system. The Office of the Chief Financial Officer has developed action plans for the primary functions. Quarterly updates for site inspections are reported using an automated system.

For payments of medical benefits or other activities not tracked by the automated system, LM will obtain quarterly updates to evaluate the progress of those activities.

Information requests have established deadlines for LM to respond to those requests. The number of requests and the processing times are recorded and reported according to Departmental requirements.

The observed results of surveillance and maintenance activities are documented in annual inspection and compliance reports and retained in accordance with Federal requirements. LM's programmatic activities are subject to continuing reviews by the Congress, the General Accountability Office, the Department's Inspector General, the U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, state environmental and health agencies, and the Department's Office of Engineering and Construction Management. Additionally, LM Headquarters senior management conducts quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.