Industrial Technologies

Funding Profile by Subprogram

(dollars in thousands)

	FY 2008 Current Appropriation[a]	FY 2009 Original Appropriation	FY 2009 Additional Appropriation	FY 2010 Request
Industrial Technologies				
Industries of the Future (Specific)	10,969	15,575	–	12,627
Industries of the Future (Crosscutting – Including Inventions and Innovations)	52,223	74,425	–	87,373
Efficiency of Information and Communications Technology and Standards	–	–	50,000	–
Total, Industrial Technologies	63,192	90,000	50,000	100,000

Public Law Authorizations:

P.L. 94-163, "Energy Policy and Conservation Act" (EPCA) (1975)
P.L. 94-385, "Energy Supply and Production Act" (ECPA) (1976)
P.L. 95-91, "Department of Energy Organization Act" (1977)
P.L. 95-619, "National Energy Supply Policy Act" (NECPA) (1978)
P.L. 95-620, "Powerplants and Industrial Fuel Use Act" (1978)
P.L. 96-294, "Energy Security Act" (1980)
P.L. 101-218, "Renewable Energy and Energy Efficiency Technology Competitiveness Act" (1989)
P.L. 102-486, "Energy Policy Act" (1992)
P.L. 109-58, "Energy Policy Act of 2005" (2005)
P.L. 110-140, "Energy Independence and Security Act of 2007" (2007)

Mission

The mission of the Industrial Technologies Program (ITP) is to significantly reduce the intensity of energy use (energy per unit of output) by the U.S. industrial sector through research, development, and demonstration (RD&D) of next-generation manufacturing technologies.

Benefits

Reducing energy intensity leads to lower greenhouse gas (GHG) emissions as 94 percent of industrial carbon emissions are the direct result of energy use.[b] Improving industry's energy efficiency directly supports the Secretarial goals of stimulating the Nation's economy, mitigating climate impacts, and achieving a clean, secure energy future. ITP is leading the Federal Government's efforts in industrial energy efficiency, leveraging the knowledge and expertise of the National Laboratories and broadening existing private-sector partnerships. The program's activities help our Nation's industries advance their global competitiveness, keeping jobs in America and reducing reliance on imported oil and other goods while also abating GHG emissions.

ITP estimates that technologies developed and activities undertaken since 1977 have cumulatively saved more than 103 million metric tons of carbon equivalent (MMTCe). Cumulative tracked energy savings over that period are estimated to be over 5.6 Quads. In 2006, the most recent year for which complete

[a]SBIR/STTR funding was transferred to the Science Appropriation in FY 2008, which includes a reduction of $1,084,000 that was transferred to the SBIR program, and $132,000 that was transferred to the STTR program.
[b] Emissions of Greenhouse Gases in the United States 2007 report, December, 2008.

data are available, the program directly contributed to industrial energy savings of almost 500 trillion Btu worth about $5.5 billion.[a b] The direct reduction in both total industrial energy use and the use of fossil fuels contributes to the goal of Section 106 of the Energy Policy Act of 2005 (EPACT 2005), which mandates a 25-percent reduction in industrial energy intensity by 2020

ITP's RD&D activities heavily leverage the intellectual property and knowledge at the National Laboratories. ITP also leverages its resources with DOE's Office of Science Basic Energy Sciences to translate scientific discoveries in nanotechnology, chemistry, and materials science into technology solutions for the Nation's manufacturers. The program also partners with other EERE programs to develop viable manufacturing technologies for advanced energy technologies, including Wind Energy and Vehicle Technologies. ITP participates with the National Science and Technology Council interagency working group on nanomanufacturing, and with NIST, DOD, and other agencies on areas of common interest such as advanced materials like titanium and carbon fiber composites.

In addition to RD&D, the program works with industrial companies, trade and technical associations, states, utilities, and other stakeholders to accelerate adoption of proven technologies and practices through cost-shared, energy-saving plant assessments and other technology delivery activities.

The FY 2010 Budget investments complement Recovery Act funds that are accelerating achievement of program goals. For current and specific Recovery Act project information, please visit DOE's Recovery Website at: http://www.energy.gov/recovery/index.htm

ITP pursues its mission through the set of integrated activities proposed in this budget that are designed to increase the use of energy efficiency technologies and domestic renewable resources. We expect that these improvements will continue to provide concomitant economic, environmental and security benefits. We expect the most significant benefits to be a growth of innovative crosscutting technologies that deliver significant impacts across diverse industries, including high-efficiency steam generation, cost-effective waste heat recovery and reuse, and advanced materials.

Climate Change

ITP RD&D activities support the achievement of a national reduction in greenhouse gas (GHG) emissions. ITP's approach is designed to deliver increased benefits to the U.S. industry in the form of energy cost savings, carbon reduction, and enhanced competitiveness. The program will continue to leverage the program's strong industrial and National Laboratories partnerships to transform the way industry uses energy, thereby reducing reliance on imported oil and cutting emissions of GHGs. As shown in the table below, EERE's GPRA models currently predict a cumulative reduction by 2030 of more than 3 Gigatons of CO_2 due to ITP efforts.

Energy Security

Through its targeted efforts to reduce energy consumption associated with industrial processes, ITP reduces national dependence on foreign energy sources. The technical and process innovation resulting from program efforts also enhances domestic economic security through efficiency and self-reliance, providing our domestic partners with a competitive edge in the green industrial revolution underway. As shown in the modeling data displayed below, it is currently projected that by 2030 a cumulative

[a] See 2008 Impacts report at http://www1.eere.energy.gov/industry/about/pdfs/impacts2006_intro.pdf

[b] Constant 2006 dollar values for energy savings shown in this budget are based upon Energy Information Administration data from the State Energy Data System 2006: Prices and Expenditures report. Average industrial energy prices per million Btu were $11.33 for 2006 (Source: Table S4A, available at http://www.eia.doe.gov/emeu/states/sep_sum/html/pdf/sum_pr_ind.pdf).

reduction of up to 12.7 trillion cubic foot (Tcf) in natural gas and 800 million barrels in oil imports will result from ITP efforts.

Economic Impact

As shown in the tables below, it is currently projected that ITP activities result in a cumulative consumer savings of roughly $300 billion and cumulative savings in the electric power industry of approximately $125 billion.

The benefits tables following show the estimated benefits from 2015 through 2050 that would result from realization of the program's goals. These benefits are achieved by targeted Federal investments in technology research and development through industrial partnerships with major energy-consuming sectors such as steel and chemicals, integrated manufacturing industries such as automobile and aerospace equipment manufacturers, technology and equipment suppliers, other Federal agencies, State government agencies, universities, National Laboratories, and other stakeholders. These partnerships facilitate the technical coordination of activities and attract cost sharing to provide leveraged benefits.

The benefits table also reflects the increasing market share of advanced-technology industries over time as their projected incremental cost relative to conventional industries declines, and as their efficiency relative to conventional industries increases. The expected benefits reflect solely the achievement of the program's goals. Not included are any policies, regulatory mechanisms, or other incentives not already in existence that might be expected to support or accelerate the achievement of the program goals. In addition, some technologies show diminishing annual benefits by 2050 due to the assumption built into the analysis that industry progress, as reflected in the baseline, will eventually catch up with the more accelerated progress associated with EERE program success.

The program goal case is modeled along with a "baseline" case in which no DOE R&D exists. The baseline case is intended to represent the future without the effect of the Industrial Technologies Program, and is identical for all DOE applied energy R&D programs, thereby ensuring that all program benefits are estimated using the same assumptions for external factors such as economic growth, energy prices, and levels of energy demand. The expected outcome benefits are calculated using the same fundamental methodology across EERE and across all of DOE's applied energy R&D programs, and the metrics by which expected outcome benefits are measured are identical. This standardization of method and metrics has been undertaken as part of DOE's efforts to make all program stated benefits comparable.

Prospective benefits are calculated as the arithmetic difference between the baseline case and the program goal case, and the resulting economic, environmental and security benefits attributed to the program's activities. This approach of calculating the benefits as an incremental improvement to the baseline helps ensure that improvements in industrial technologies that would occur in the absence of the program are not counted as part of the program's benefits. In addition to technology and process advances due to the program's activities, energy market policies, such as state and Federal tax policies, facilitate the development and deployment of clean energy technologies. The expected impacts of current legislated policies in the baseline case are included so that the expected benefits calculated reflect as much as possible the effects of activities funded by the program.

The benefits are generated by modeling both the program goal and baseline cases within two energy-economy models: NEMS-GPRA10 for benefits through 2030, and MARKAL-GPRA10 for benefits through 2050. The full list of modeled benefits appears below.

Primary Metrics for FY 2010 Budget Request

(Incorporates Approximate Impacts of EISA 2007)

	Metric[1]	Model	Year			
			2015	2020	2030	2050
Energy Security	Oil Imports Reduction, cumulative[2] (Bil bbl)	NEMS	ns	ns	0.4	N/A
		MARKAL	ns	ns	0.8	3.7
	Natural Gas Imports Reduction, cumulative (Tcf)	NEMS	0.7	2.4	9.5	N/A
		MARKAL	1.9	5.1	12.7	34.9
	Reduction in Share of Highway Fuel Demand Derived from Crude Oil[3] (%)	NEMS	ns	ns	ns	N/A
		MARKAL	ns	ns	ns	ns
Environmental Impacts	CO_2 Emissions Reduction, cumulative (Mil $mtCO_2$)	NEMS	226	950	3760	N/A
		MARKAL	207	886	3579	11286
	SO_2 Allowance Price Reduction[4] ($/ton)	NEMS	ns	ns	ns	N/A
		MARKAL	N/A	N/A	N/A	N/A
	NO_x Allowance Price Reduction ($/ton)	NEMS	ns	353	649	N/A
		MARKAL	N/A	N/A	N/A	N/A
	Hg Allowance Price Reduction (thousand $/lb)	NEMS	ns	ns	ns	N/A
		MARKAL	N/A	N/A	N/A	N/A
Economic Impacts	Consumer Savings, cumulative[5] (Bil $)	NEMS	36	101	293	N/A
		MARKAL	34	122	333	792
	Electric Power Industry Savings, cumulative (Bil $)	NEMS	18	50	124	N/A
		MARKAL	12	48	126	269
	Household Energy Expenditures Reduction ($/household/yr)	NEMS	ns	40	50	N/A
		MARKAL	7	18	17	ns

1. "Reductions" and "savings" are calculated as the difference between results from the baseline case (i.e. no DOE technology) and the technology case (i.e. all DOE technology R&D programs are successful).
2. All cumulative metrics are based on results beginning in 2010.
3. Metric includes oil-derived fuel use by light-duty vehicles, commercial light trucks and freight trucks; the metric excludes buses. Reported oil use is adjusted to exclude ethanol, biodiesel and CTL.
4. All monetary metrics are in 2006$.
5. Cumulative monetary metrics are in 2006$ that are discounted to 2010 using a 3% discount rate.

ns - Not significant
NA - Not yet available
N/A - Not applicable

Secondary Metrics for FY 2010 Budget Request

(Incorporates Approximate Impacts of EISA 2007)

	Metric[1]	Model	Year			
			2015	2020	2030	2050
Energy Security	Oil Imports Reduction, annual (Mbpd)	NEMS	ns	ns	0.2	N/A
		MARKAL	ns	0.1	0.3	0.4
	Natural Gas Imports Reduction, annual (Tcf)	NEMS	0.2	0.4	0.8	N/A
		MARKAL	0.6	0.7	0.8	1.0
	MPG Improvement[2] (%)	NEMS	ns	ns	ns	N/A
		MARKAL	ns	ns	ns	ns
Environmental Impacts	CO_2 Intensity Reduction of US Economy (Kg CO2/$GDP)	NEMS	ns	ns	ns	N/A
		MARKAL	ns	0.01	0.02	0.01
	CO_2 Intensity Reduction of US Power Sector[3] (Kg CO2/kWh)	NEMS	ns	ns	ns	N/A
		MARKAL	ns	ns	0.02	0.01
	CO_2 Intensity Reduction of US Transportation Sector[4] (Kg CO2/mile)	NEMS	ns	ns	ns	N/A
		MARKAL	ns	ns	ns	ns
Economic Impacts	Consumer Savings, annual[5] (Bil $)	NEMS	12	23	37	N/A
		MARKAL	13	30	41	76
	Electric Power Industry Savings, annual (Bil $)	NEMS	7	10	13	N/A
		MARKAL	4	13	15	24
	Energy Intensity of US Economy (energy/$GDP)	NEMS	0.08	0.18	0.23	N/A
		MARKAL	0.07	0.17	0.24	0.18
	Net Energy System Cost Reduction, cumulative (Bil $)	NEMS	N/A	N/A	N/A	N/A
		MARKAL	122	310	647	1159

1. "Reductions" and "savings" are calculated as the difference between results from the baseline case (i.e. no DOE technology) and the technology case (i.e. all DOE technology R&D programs are successful).
2. Change in light duty vehicles miles traveled per gallon of oil, where oil is only that derived from petroleum.
3. Emissions include all power sector emissions. Generation calculated as total net generation adjusted for estimated T&D losses.
4. Emissions calculated using highway fuel use and related carbon emission factor. Miles calculated as highway miles traveled, excluding buses.
5. All monetary metrics are in 2006$.

ns - Not significant
NA - Not yet available
N/A - Not applicable

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;
- Labor and material costs, capital investment requirements, and cost of technologies;
- 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 that might affect the choice of energy sources.

Contribution to the Secretary's Priorities

ITP contributes to several of the Secretary's priorities as enumerated below. The principal focus areas are:

Priority 1: Science and Discovery – Invest in science to achieve transformational discoveries

ITP brings together the top minds, facilities, and resources from industry, National Laboratories, and academia to spur innovations that provide tangible energy efficiency improvements in real industrial environments. The program's National Laboratory teams maximize the synergy inherent in cooperative projects with industry and academia, while the program also leverages competitive awards and cost-sharing to magnify its impact. Through the forging of such strong industry partnerships, the Industrial Technologies Program ensures the relevance of the technology in real-world application (e.g., effective operation in harsh industrial environments) critical for accelerating technology commercialization.

ITP is working with a range of countries to support international training initiatives, the development of an independent (ANSI/ISO) plant energy certification program. In addition, the program partners with the World Bank (discussion on plant assessments in Latin America) and IEA (Industrial Energy Related Technologies & Systems), while also supporting targeted training exercises in developing Nations such as India and China that focus on energy savings. For example, ITP is engaged in a bilateral agreement with China on Energy Savings Assessments that will create a model to transfer to the top 1,000 plants.

ITP builds research networks across departments, government, Nations and the globe, and is working with the Wind and Vehicles Technologies Programs to develop new manufacturing processes for advanced wind and auto technology, in addition to partnering with other agencies (National Nanotechnology Initiative) to help emerging technologies bridge the gap between mission-oriented science and real world industrial use.

Priority 2: Clean Energy – Change the landscape of energy demand and supply

ITP's key contribution to achieving a clean, secure energy future is through improving energy efficiency and directly reducing the demand for oil and other fuels. Industrial energy savings stimulate economic activity and reduce carbon impacts on climate today, while building U.S. technology leadership and contributing to improved energy and carbon management in the future. Significant gaps between current energy use and the practical minimum energy use for most industrial processes suggest that the industrial sector will continue to offer excellent opportunities to change the landscape of domestic energy demand through industrial energy efficiency.

The program's Industries of the Future partnerships with the most energy-intensive industries result in tangible improvements demonstrating the power of such innovation. At the same time, the ITP technology deployment activities and extensive outreach, communication, and training efforts cultivate a corporate culture of energy efficiency within the Nation's manufacturing sector.

ITP advances next generation energy technology innovation at the cutting edge in areas such as nanomanufacturing, waste heat recovery and reuse, novel chemical production routes, fuel and feedstock flexibility, and a host of other potentially revolutionary technologies. These innovations eliminate process steps, advance the use of non-fossil fuel feedstocks, or, in the case of nanomanufacturing, represent an entirely new paradigm for industrial processes.

ITP focuses on areas in industry where targeted RD&D can help science find application in the market (chemical synthesis, nanomanufacturing, etc.). Through strong collaborative partnerships that link scientists at the National Laboratories and in academia with industry, the economic fruits of successful real-world application are brought to bear.

Priority 3: Economic Prosperity – Create millions of green jobs and increase competitiveness

Reduce energy demand

Through tangible industrial energy efficiency and demand reduction improvements ITP supports the development of cost-effective technology solutions for direct real-world industrial application (in combustion, distributed generation, nanomanufacturing, and other specific industrial processes).

ITP is training the next-generation of energy engineers at university-based Industrial Assessment Centers (IACs) and supporting qualified expert training for industrial plant personnel in areas such as steam systems, motors, process heating, and compressed-air. The program's IACs send engineering students into the field to work with established experts and plant personnel to perform energy efficiency audits of a wide variety of industrial facilities. A large percentage of these students have gone on to work as industrial energy engineers, helping to found the green workforce of the future. The program also conducts training of plant staff and others to become "qualified experts" in performing energy assessments.

Priority 5: Lower GHG Emissions – Position U.S. to lead on climate change policy, technology, and science

ITP is currently developing highly energy efficient technologies that result in tangible carbon emission decreases. In addition, ITP is working to develop an ANSI/ISO standard that would independently certify the energy efficiency performance of industrial facilities.

ITP participates in international efforts to transfer certain best energy management practices to the most energy intensive sectors in China and other developing nations, while also participating in IEA annexes on industrial energy efficiency (separations, benchmarking, combustion, membranes).

Contribution to GPRA Unit Program Goal 1.3.19.00 (Industrial Technologies)

Between 2002 and 2015, industrial technologies will contribute to an 14.9 percent reduction in energy intensity (Btu per unit of industrial output as compared to 2002) in the energy-intensive Industries of the Future (a potential savings of 2.7 quads, an additional 1.0 quads above projected baseline efficiency improvements); between 2004 and 2012, target industries and RD&D partners will commercialize over 35 energy-efficiency technologies developed through the ITP partnerships.

ITP develops real-world energy solutions throughout the manufacturing value chain and helps American manufacturers uncover affordable energy saving and carbon reducing opportunities. For example, ITP's

Save Energy Now effort conducted 2,053 assessments from 2006 through March 2009 that identified large energy and cost savings for all types of manufacturers. The 1,873 plants with completed reports identified more than $1.2 billion in cost savings per year, with $190 million per year already implemented and $372 million per year underway or scheduled.

ITP continues to reduce energy use through efficiency improvements and concurrent activities that are sponsored by ITP. The program's goal reflects the increasing adoption of technologies by industry from the program's research, development and deployment portfolio over time, as the program's goals are met. The table below illustrates ITP's continuing contribution to the commercialization of technologies that result in a reduction in industrial energy intensity.

Performance Indicators:

	Historic						Planned	
	2003	2004	2005	2006	2007	2008	2009	2010
Performance Indicators								
Annual number of technologies commercialized (after 2006, that achieve 10 percent improvement in energy efficiency)								
Target	–[a]	-4	3	3	3	3	3	2
Actual	–	-6-	3	7	3	3	–	–
Annual energy savings from Industrial Technologies Program activities in partnership with industry (trillion Btu)								
Target	290	220	220	180	180	180	180	180
Actual	352	366	402	489	533	–	–	–
Annual energy savings from ITP technical assistance activities (trillion Btu)								
Target	200	200	200	200	200	100	100	100
Actual	231	255	303	399	450	–	–	–
Annual number of energy-intensive plants impacted by the program[b]								
Target	600	600	200	200	1,000	400	600	600
Actual	1,647	2,089	2,634	2,146	1,407	–	–	–
Percentage change in energy intensity from 2002								
Target	-1.2	-2.4	-3.7	-4.8	-6.0	-7.2	-8.3	-9.4
Actual	-1.3	-5.1	-8.7	-9.6	-9.1	-8.1 Est.	–	–

[a] For the purpose of establishing PART goals, the cumulative count of commercialized technologies from ITP R&D efforts was restarted, beginning with 2004 efforts. There were actually 5 commercialized technologies in 2003.

[b] "Impacted" refers to the number of unique plants receiving EERE energy efficiency information or applying EERE energy technologies and practices.

Means and Strategies

ITP's activities stimulate innovative technology research and accelerate market uptake of highly energy-efficient industrial technologies and practices. "Means" include operational processes, resources, information, and the development of technologies, and "strategies" include program, policy, management and legislative initiatives and approaches. ITP's three-part strategy is to:

- Sponsor collaborative RD&D of high risk, high impact industrial technologies and processes that radically reduce energy intensity and carbon emissions;
- Conduct technology delivery activities to help plants access and apply today's most efficient technologies and energy management practices, while at the same time training engineering students to build a green workforce for the future; and
- Promote a corporate culture of energy efficiency and carbon management within industry.

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

- Investing in pre-competitive and high-risk RD&D that individual companies are unable to undertake without Government support;
- Cost-sharing of projects with multiple industrial and academic partners. Sharing project costs (industrial partners typically contribute 30 to 50 percent) leverages 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. ITP activities are moving from a focus on predominantly industry-specific R&D toward more technology development applicable to multiple industries; and
- Using expert technical staff from the National Laboratories to help identify priorities and develop strategies within their areas of expertise.

The program implements the following strategies to achieve its goals:

- Identify industrial energy savings opportunities with the highest potentials for saving energy and reducing carbon;
- Collaborate with industries on the development of technology roadmaps that identify their top priorities, and determine where those priorities align with ITP's mission and goals;
- Cost-sharing for reduced private partner risk in high-return R&D to innovate transformational technologies such as an entirely new processing route to achieve much lower energy use than current processes; and
- Conduct market transformation activities to accelerate the adoption of combined heat and power and other clean energy technologies.

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 continuing review by, for example, the Congress, the General Accountability Office, the DOE Inspector General, the U.S. Environmental Protection Agency, and state environmental agencies. ITP will also undertake analyses to address Government Performance and Results Act (GPRA).

The table below summarizes validation and verification activities. Progress toward annual performance targets and results are also tracked on a quarterly basis through the DOE management system, Joule.

Data Sources: Energy intensity is calculated from the Energy Information Administration's (EIA's) Annual Energy Outlook, Manufacturing Energy Consumption Survey (MECS), and Department of Commerce data. The number of technologies and their energy savings are ascertained through interviews with technology developers and suppliers. Energy savings for the technical assistance programs are estimated based upon past reported participant data. Project financial data is tracked through the EERE Corporate Planning System.

Evaluation: In carrying out the program's mission, the Industrial Technologies Program 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 both the program and subprogram portfolios;
- Annual internal Technical Program Review of the Industrial Technologies 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 performance through Joule (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 benefits for GPRA.

Baselines: The following are the key baselines used in ITP for contributions to its program goal:

- Industrial energy intensity (2002) 14,000 Btu/$1996 value of shipments of energy intensive industry output; and
- The baseline for the cumulative count of new commercialized technologies that achieve 10 percent improvement in energy efficiency is zero in 2003.

Frequency: EIA/MECS collects energy intensity data once every 4 years, and ITP makes annual estimates based upon data from annual Department of Commerce surveys. ITP collects data on energy savings and technologies commercialized annually.

Data Storage: Energy intensity information is contained in EIA's computer database. Data on energy savings and technologies commercialized are stored in ITP's Impacts Database and are available on the internet at http://www1.eere.energy.gov/industry/about/pdfs/impacts2006_intro.pdf. Data on the counts and impacts of plants contacted 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 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 has conducted reviews of the impacts of

several technical programs and assistance programs have also been reviewed several times.

Annual Performance Results and Targets

FY 2005 Results	FY 2006 Results	FY 2007 Results	FY 2008 Targets	FY 2009 Targets	FY 2010 Targets
GPRA Unit Program Goal 1.3.19.00 (Industrial Technologies)					
Industries of the Future (Specific)					
Commercialize 3 new technologies in partnership with the most energy-intensive industries. [MET]	Commercialize 3 new technologies in partnership with the most energy-intensive industries. [MET]	Commercialize 3 new technologies in partnership with the most energy-intensive industries that improve energy efficiency of an industrial process or product by at least 10 percent. [MET]	Commercialize 3 new technologies in partnership with the most energy-intensive industries that improve energy efficiency of an industrial process or product by at least 10 percent. [MET]	Commercialize 3 new technologies in partnership with the most energy-intensive industries that improve energy efficiency of an industrial process or product by at least 10 percent.	Commercialize 2 new technologies in partnership with the most energy-intensive industries that improve energy efficiency of an industrial process or product by at least 10 percent.
Industries of the Future (Crosscutting)					
An additional 200 (leading to a cumulative 7,000) energy intensive U.S. plants will apply EERE technologies and services. [MET]	An additional 200 (leading to a cumulative 8,600) energy intensive U.S. plants will apply EERE technologies and services contributing to the goal of a 20 percent reduction in energy intensity from 2002 levels by 2020. [MET]	An estimated 125 trillion Btus saved by an additional 1,000 energy intensive U.S. plants applying EERE technologies and services [MET]	An estimated 100 trillion Btus energy savings from applying EERE technologies and services to 400 energy-intensive U.S. plants. [MET]	An estimated 100 trillion Btus energy savings from applying EERE technologies and services to 600 energy-intensive U.S. plants.	An estimated 100 trillion Btus energy savings from applying EERE technologies and services to 600 energy-intensive U.S. plants.
Contribute proportionately to EERE's corporate goal of reducing corporate and program adjusted uncosted obligated balances to a range of 20-25 percent by reducing program annual adjusted uncosteds by 10 percent in 2005 relative to the program FY 2004 end of year adjusted uncosted baseline ($40,741K) until the target range is met. [MET]	Maintain total administrative overhead costs (defined as Program Direction and Program Support excluding earmarks) in relation to total program costs of less than 12 percent. [MET]	Maintain total administrative overhead costs (defined as Program Direction and Program Support excluding earmarks) in relation to total program costs of less than 12 percent. [MET]	Maintain administrative costs as a percent of total program costs less than 12 percent. [MET].	Maintain administrative costs as a percent of total program costs less than 12 percent.	Maintain administrative costs as a percent of total program costs less than 12 percent[a].

[a] Administrative costs are comprised of Program Direction and elements of Program Support (Technology Advancement and Outreach; and Planning, Analysis and Evaluation), baseline and targets under development.

Industries of the Future (Specific)

Funding Schedule by Activity

(dollars in thousands)

	FY 2008	FY 2009	FY 2010
Industries of the Future (Specific)			
Forest and Paper Products Industry	1,742	1,449	1,488
Steel Industry	3,576	4,380	4,500
Aluminum Industry	1,741	2,139	1,922
Metal Casting Industry	192	1,946	0
Glass Industry	0	973	0
Chemicals Industry	3,718	4,273	4,390
SBIR/STTR	—[a]	415	327
Total, Industries of the Future (Specific)	10,969	15,575	12,627

Description

The Industries of the Future (IOF) (Specific) subprogram supports cost-shared RD&D of advanced technologies to improve the energy and environmental performance of America's most energy-intensive industries. ITP partners with the most energy-intensive U.S. industries – industries that are also critical to the Nation's economic prosperity and national security – to develop solutions to their top technological challenges.

The IOF Specific subprogram has a history of strong partnerships with its industry partners - individual companies as well as trade and technical associations - that contributes to its success. These partnerships produced technology roadmaps that helped identify top industrial energy efficiency R&D priorities to pursue. Industry-specific projects sponsored by ITP have won 12 prestigious *R&D 100* awards in the past five years. Award-winners are selected by an independent panel of judges under the aegis of R&D Magazine based on the technical significance, uniqueness and usefulness of projects and technologies from across industry, government, and academia. The IOF Specific subprogram also has an excellent track record of moving innovative energy-efficient technologies from R&D through demonstration and eventual introduction to their respective markets.

In FY 2010, ITP will continue conducting critical industry-specific RD&D in partnership with key domestic industries, developing transformational technologies that dramatically reduce the energy and carbon intensity of commonly used energy-intensive processes. Specifically, the program's FY 2010 activities will include:

- Transformational RD&D on next-generation manufacturing technologies that eliminate energy-intensive process steps, including cokeless iron making, grand challenge project to create a carbon-neutral pulp mill by decreasing or eliminating fossil fuels in pulping operations, high efficiency water removal for pulp, microchannel reactors for producing high value chemicals, and hybrid membrane/distillation technologies for chemical production;

[a] SBIR/STTR funding was transferred to the Science Appropriation in FY 2008.

- Development of low- and zero-carbon processes such as carbon-neutral pulping to help key domestic industries compete in a carbon-constrained world; and
- RD&D on new high-yield, low-waste methods of manufacturing commodities like chemicals and metals, as well as metal parts and other components for downstream industries like auto manufacturing.

Energy, environmental, and productivity improvements resulting from IOF Specific RD&D will enhance the competitive position of our Nation's critical industries, and preserve jobs while significantly contributing to mitigating global climate change.

Benefits

ITP's IOF Specific RD&D is reducing the energy intensity and carbon emissions of some of the most energy-intensive processes in the Nation's major industries. The combined 2025 energy savings for IOF Specific is estimated at 266 trillion Btus. Carbon savings for that same year are estimated at 2.37 million metric tons of carbon equivalent (MMTCe).

Based on DOE modeling, by 2015 ITP will contribute to a 14.9 percent reduction in energy intensity as compared to 2002 in the energy-intensive Industries of the Future (primarily chemicals, steel, and forest products).

Detailed Justification

(dollars in thousands)

	FY 2008	FY 2009	FY 2010
Forest and Paper Products Industry	**1,742**	**1,449**	**1,488**

In FY 2010, this activity will continue to focus on accelerating the completion of research including high efficiency pulping. In addition, this key activity will focus on a grand challenge project to create a carbon-neutral pulp mill by decreasing or eliminating fossil fuels in pulping operations. Estimated annual energy savings in the year 2025 are 34 trillion Btus with carbon savings of 0.23 MMTCe.

The activity will continue to support the American Forest & Paper Association and other industry organizations to improve their member companies' energy efficiency and environmental performance through the industry's Agenda 2020 partnership. Collaborative activities will include the continuation of cost-shared RD&D, as well as the utilization of new and improved energy technologies, industrial energy efficiency tools, and energy management best practices.

Steel Industry	**3,576**	**4,380**	**4,500**

In FY 2010, this activity will continue to improve energy efficiency in iron- and steel-making and to investigate recovery of valuable components of steel industry wastes, through continuing projects that were initiated in FY 2009 through competitively-selected awards. The activity will continue developing cokeless iron making technologies and will conduct advanced process development for improvements in steel manufacturing that can be broadly adopted. Activities range from blast furnace optimization to transformational iron making processes to thermochemical energy recovery in high temperature steel furnaces. Estimated annual energy savings in 2025 are 33 trillion Btus with carbon savings of 0.64 MMTCe.

	(dollars in thousands)		
	FY 2008	FY 2009	FY 2010

The activity will continue to support the American Iron and Steel Institute, the Steel Manufacturers' Association, and other industry organizations to improve their member companies' energy efficiency and environmental performance. The collaborative activities will include the continuation of cost-shared RD&D on, as well as the utilization of, new improved energy technologies, industrial energy efficiency tools, and energy management best practices.

Aluminum Industry	**1,741**	**2,139**	**1,922**

In FY 2010, key activities will focus on the areas of efficient melting and forming. Estimated annual energy savings in 2025 are 13 trillion Btus with carbon savings of 0.12 MMTCe.

Metal Casting Industry	**192**	**1,946**	**0**

In FY 2010, this activity will complete ongoing development of advanced melting technologies, efficient net-shape manufacturing processes, and technologies and practices that reduce scrap generation and increase process yields.

Glass Industry	**0**	**973**	**0**

In FY 2010, ITP will complete efforts to advance next generation melting and refining systems for glassmaking.

Chemicals Industry	**3,718**	**4,273**	**4,390**

In FY 2010, this key activity will focus on projects addressing alternative processes for chemical production, oxidation reactions, hybrid distillation processes, and micro-reactors. New activities will include work on game-changing technology for dramatic efficiency improvements for industrial process equipment, alternative chemical feedstocks, leveraging scientific discovery of new chemistries and its potential applications for chemical processes. RD&D in these areas will result in improved conversion of chemical processes, reduced feedstock consumption, and reduced generation of unneeded by-products and wastes. Estimated annual energy savings in 2025 are 178 trillion Btus and carbon savings of 1.31 MMTCe.

SBIR/STTR	**—**	**415**	**327**

In FY 2008, $246,000 and $30,000 were transferred to the SBIR and STTR programs respectively. The FY 2009 and 2010 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Total, Industries of the Future (Specific)	**10,969**	**15,575**	**12,627**

Explanation of Funding Changes

	FY 2010 vs. FY 2009 ($000)
Forest and Paper Products Industry	
No significant change.	+39
Steel Industry	
This increase reflects increased funding to accommodate projects selected in FY09 to improve energy recovery in steel furnaces.	+120
Aluminum Industry	
This decrease reflects reduced funding levels for advanced melting technology development currently in demonstration testing.	-217
Metal Casting Industry	
This decrease is due to decreased FY 2010 project needs given the cost schedules of ongoing mutli-year projects and a FY 2010 focus on other ITP priorities for new project initiation.	-1946
Glass Industry	
This decrease is due to decreased FY 2010 project needs given the cost schedules of ongoing mutli-year projects and a FY 2010 focus on other ITP priorities for new project initiation.	-973
Chemicals Industry	
This increase would support new awards resulting from a FY 2010 solicitation focused on reducing chemical industry dependency on imported energy sources.	+117
SBIR/STTR	
Changes in the SBIR/STTR funding are a direct result of changes in the funding of program activities.	-88
Total Funding Change, Industries of the Future (Specific)	**-2,948**

Industries of the Future (Crosscutting)

Funding Schedule by Activity (Non-Comparable, or as-Appropriated, Structure)

(dollars in thousands)

	FY 2008	FY 2009	FY 2010
Industries of the Future (Crosscutting)			
Industrial Materials of the Future	4,727	4,653	4,781
Combustion	643	814	–[a]
Sensors and Automation	1,808	0	0
Industrial Technical Assistance			
Industrial Assessment Centers	3,998	4,035	4,035
Best Practices	8,753	15,532	28,125
Total, Industrial Technical Assistance	12,751	19,567	32,160
Energy-Intensive Process R&D	7,201	14,847	15,252
Fuel and Feedstock Flexibility	2,811	3,889	3,889
Nanomanufacturing and Other Interagency Manufacturing R&D	4,833	4,861	4,861
Industrial Distributed Energy	14,498	24,405	25,000
Energy Efficient Information Technologies	2,950	0	0
SBIR/STTR	–[b]	1,389	1,430
Total, Industries of the Future (Crosscutting)	52,222	74,425	87,373

Description

Modifications were made to the budget structure to better reflect the Industries of the Future (Crosscutting) subprogram's activities in FY 2010. The Combustion key activity is proposed to be transferred to the crosscutting Energy-Intensive Process R&D activity in FY 2010 to better integrate combustion R&D throughout Waste Energy Minimization and Recovery activities.

Industries of the Future (IOF) Crosscutting R&D provides the means for developing technologies with broad benefit across a wide base of industries, as well as for RD&D of enabling technologies not within practical developmental reach of an individual industry. These technologies continue to be used across multiple industries, providing widespread economic, energy and environmental benefits. In just the past three years, crosscutting technologies developed by ITP have won 7 prestigious *R&D 100* awards. ITP's partners on these crosscutting activities include the National Laboratories, academia, industrial companies, and equipment suppliers across many industries.

In FY 2010, ITP will:

- Accelerate the adoption of Combined Heat and Power (CHP) in industry, a technology that can improve energy efficiency, simultaneously creates green jobs, reduce GHG emissions, and improve the efficiency of U.S. industry.

[a] Prior to FY 2010, Combustion was funded as a key activity under Industries of the Future (Crosscutting). The work under this activity will be transferred to the crosscutting Energy-Intensive Process R&D activity in FY 2010.
[b] SBIR/STTR funding was transferred to the Science Appropriation in FY 2008.

- Support cutting-edge research in the Energy Intensive Processes (EIP) portfolio, initiated in 2008, to develop transformational technologies with applications across a broad spectrum of markets.
- Continue Industrial Materials of the Future RD&D.
- Focus Nanomanufacturing and Other Interagency Manufacturing RD&D activities on enabling processes for building on scientific discoveries from the National Laboratories and DOE's Basic Energy Sciences, including the mass production and application of nano-scale materials, structures, devices and systems.
- Conduct Fuel and Feedstock Flexibility activities leading to the development and adoption of alternative fuel and feedstock technologies to reduce reliance on imported oil.

ITP will also continue to promote the use of energy-efficient technologies and practices throughout industry. Deployment efforts such as the university-based Industrial Assessment Centers (IACs) and the Best Practices activities will continue conducting plant energy assessments and audits, and delivering other ITP services, technologies, and products to industrial plants nationwide. Along with transferring energy-efficient, environmentally sound practices and technologies to U.S. industries, the IACs are also preparing world-class engineers for the U.S. workforce. The program will continue coordinating the development of a voluntary accredited certification process for plant energy management, as well as energy efficiency improvement, and will continue working with the International Organization for Standardization (ISO) to develop a new international energy management standard (ISO 50001).

Benefits

ITP's IOF Crosscutting RD&D achieves energy savings and carbon reductions by:

- Improving the efficiency of widely used industrial processes (e.g., steam generation, water removal);
- Accelerating the adoption of clean, efficient distributed energy systems like CHP;
- Developing innovative new materials that can be used to make more durable manufacturing equipment and new high-value products;
- Developing economically viable nanomanufacturing methods for advanced clean energy technologies through applied RD&D on recent scientific discoveries in the field of nanotechnology; and,
- Helping companies across the country identify and address affordable energy-saving and carbon-reducing opportunities in their plants through the Save Energy Now (SEN) initiative.

Between Save Energy Now's inception in 2006 and February 2009, the initiative has conducted over 2,000 assessments at the Nation's most energy-intensive industrial facilities. For the nearly 1,875 assessments where reporting is available, opportunities were identified that could save more than 131 trillion Btus of natural gas, the amount used by nearly 2 million average U.S. homes. If fully implemented, the improvements could save over $1.2 billion dollars per year and reduce carbon dioxide emissions by 10.3 MMTCe annually.

The combined 2025 energy savings for IOF Crosscutting is estimated at 3,628 trillion Btus, or 3.63 quads. Carbon savings for that same year are estimated at 61.80 MMTCe. Of the total 2025 energy savings, 34 percent will come from longer-term research including crosscutting R&D (including EIP, industrial materials, combustion, nanomanufacturing, information technologies, industrial distributed energy and fuel and fuel/feedstock flexibility and SBIR); and 66 percent from nearer-term Industrial Technical Assistance activities.

Detailed Justification

(dollars in thousands)

	FY 2008	FY 2009	FY 2010
Industrial Materials of the Future	**4,727**	**4,653**	**4,781**

In FY 2010, ITP will continue to develop nanocomposites and nanocoatings, materials for energy systems and materials for separations, and advanced materials solutions such as membranes for waste energy recovery; and, refractories for industrial systems. ITP will also conduct RD&D on new high temperature corrosion-resistant materials for energy intensive applications and advanced manufacturing processes such as low-cost titanium production. New activities will include advanced energy-efficient methods for manufacture of carbon fiber composites at reduced energy and cost. Estimated potential energy savings per year from these activities in 2025 are 73 trillion Btus and carbon savings of 1.32 MMTCe.

Combustion	**643**	**814**	**–**

In FY 2010, work in this activity to develop and demonstrate ultra-high efficiency industrial boiler systems will be transferred to the crosscutting Energy-Intensive Process R&D activity.

Sensors and Automation	**1,808**	**–**	**–**

Sensors and automation projects are now covered under the crosscutting Energy-Intensive Process R&D activity, which focuses on crosscutting RD&D.

Industrial Technical Assistance

▪ **Industrial Assessment Centers (IAC)**	**3,998**	**4,035**	**4,035**

The IAC activity funds a network of universities that deploy undergraduate and graduate engineering students to conduct free energy audits of small and medium-sized manufacturers. The audits identify a range of efficiency improvements, including no-cost and low-cost recommendations, providing assistance to U.S. manufacturers struggling to cope with high energy prices. This activity also supports the President's goal of training more engineers and scientists in the energy field. IAC alumni are very much in demand by top firms as energy managers with real-world knowledge and experience, ready to work on projects immediately and improve the bottom line.

In FY 2010, this activity is expected to yield annual energy savings of 119 trillion Btus in 2025 and carbon savings of 2.49 MMTCe.

▪ **Best Practices**	**8,753**	**15,532**	**28,125**

Through the SEN initiative, ITP continues to partner with leading industrial companies, plants, and supply chains to reduce their energy intensity by 25 percent over a 10 year period in alignment with EPACT 2005, Section 106 (reduce energy intensity by 2.5 percent per year from 2006 to 2016). SEN will help energy-intensive plants and new emerging sectors (such as data centers) implement cost-effective energy-saving and carbon-reducing technology solutions through the dissemination of energy assessments, tools, information, and training either directly or through state, utility and local partners. ITP will continue to provide industrial process application tools for evaluating major energy systems such as, steam, pumping, process heating, and compressed air systems emphasizing system-level improvements. ITP will build off the success of over 700 completed Energy Savings Assessments (ESAs), which have identified nearly $1 billion per year in potential energy cost savings since 2006.

(dollars in thousands)

	FY 2008	FY 2009	FY 2010

In FY 2010, ITP will expand its partnership with leading corporations in energy management and pilot a new voluntary ANSI-accredited[a] standard to certify a manufacturing facility for energy efficiency through a third-party verification process. As part of SEN, ITP will continue sending energy experts to the Nation's most energy-intensive manufacturing facilities to identify immediate opportunities for saving energy and money. Best Practices activities are estimated to result in energy savings in 2025 of 2,269 trillion Btus and carbon savings of 47.5 MMTCe.

Total, Industrial Technical Assistance	**12,751**	**19,567**	**32,160**
Energy-Intensive Process R&D	**7,201**	**14,847**	**15,252**

In FY 2008, ITP began to transition from predominantly industry-specific R&D to more crosscutting research. To help establish priorities for this activity, ITP conducted a collaborative program planning effort with the DOE National Laboratory system and industry stakeholders to identify the major technological challenges for manufacturers. The results helped to create the EIP R&D activity, which capitalizes on the institutional knowledge and expertise of the National Laboratories, builds cross-lab teams with appropriate industry partners, and leverages industry resources to exploit opportunities. The EIP activity supports multi-industry R&D in four platform areas: Waste Energy Minimization and Recovery (this type of work used to be done under the Combustion Key Activity and includes high efficiency steam generation and improved energy recovery technologies); Industrial Reaction and Separation (including advanced water removal); High-Temperature Processing (including low-energy, high-temperature materials processing); and, Sustainable Manufacturing (including near net shape casting and forming). This shift toward larger targets of energy savings opportunities will benefit a broad set of industries, including those identified by the National Association of Manufacturers as contributing significantly to U.S. GDP (e.g., food & beverage, computer and electronic, and fabricated metal products), in the near- to mid-term time horizon (3 to 10 years). Estimated annual energy savings in 2025 are 353 trillion Btus and carbon savings of 3.16 MMTCe.

Fuel and Feedstock Flexibility	**2,811**	**3,889**	**3,889**

ITP will seek to displace industrial petroleum and natural gas use through a targeted, application-focused technology development and demonstration initiative that links industrial users with advanced fuel development activities taking place throughout DOE (EERE's Biomass Program, the Office of Fossil Energy, etc.) and the National Laboratories. This activity will assist industry in integrating alternative fuels into manufacturing processes; improving fuel flexibility to reduce the damaging effects of fossil fuel price hikes; facilitate the manufacture, handling, and processing of alternative feedstocks; developing technologies that facilitate the use of alternative feedstocks by industry; and, demonstrating the feasibility of using alternative feedstocks in industrial processes. In 2010, the Fuel and Feedstock Flexibility effort will continue work initiated in earlier years. Estimated annual energy savings in 2025 are 90 trillion Btus and carbon savings of 0.81 MMTCe.

Nanomanufacturing and Other Interagency Manufacturing R&D	**4,833**	**4,861**	**4,861**

ITP is helping lead the charge to transform nanotechnology science into real-world energy solutions.

[a] ANSI refers to the American National Standards Institute

(dollars in thousands)

FY 2008	FY 2009	FY 2010

As part of the 25-agency National Nanotechnology Initiative, ITP complements DOE's significant investment in nanoscience by focusing on bridging the divide between mission-oriented science and the applied research necessary to catalyze market innovation and enhance the competitiveness of American manufacturers. The early success of ITP's Nanomanufacturing Initiative positions the new program as a crucial link between the National Laboratories and research universities and, a market eager to lay a new foundation for national prosperity.

Twenty projects (9 concept definition studies and 11 process/prototype projects) were selected for funding in a FY 2008 solicitation. This initial work includes development of new technologies and techniques to manufacture novel nano-catalysts and -lubricants, nano-coatings, and nano-composites; and nano-enabled processes for photovoltaic material production, and energy storage applications. Estimated annual energy savings in 2025 are 113 trillion Btus and carbon savings of 1.01 MMTCe.

Industrial Distributed Energy **14,498** **24,405** **25,000**

In FY 2008, Congress re-established a distributed energy (DE) activity within ITP, including Combined Heat and Power (CHP).

In FY 2010, ITP will support the development and adoption of DE technologies to include research for clean, efficient and fuel-flexible DE/CHP systems for non-traditional CHP applications, and untapped markets in the industrial sector, including food processing plants and the growing data center sector. ITP will also pursue the growth opportunity in traditional industry CHP applications below 20 MW, including medium-sized plants that require both power and process heat. Specific activities will include the development of alternative/dual fuel capability for turbines and engines that meet the most stringent NOx and CO regulations (e.g., those in southern California); development of thermally activated technologies such as heat pumps; absorption cooling/refrigeration to address food processing and data center industry cooling needs; advanced microturbine R&D and demonstration; and innovative systems integration to optimize overall CHP system efficiency and reduce capital and O&M costs by 20 to 30 percent. Market transformation would be accomplished through a comprehensive public-private strategic partnership for CHP led by ITP, including expansion of the DOE Clean Energy Application Centers, and more aggressive use of existing partnerships (and development of new state, local, and utility partnerships) to address market, regulatory, and policy barriers. These activities are estimated to contribute as much as 579 trillion Btus of displaced energy and 5.18 MMTCe in carbon savings per year by 2025.

Energy-Efficient Information Technologies **2,950** **0** **0**

Recovery Act funds will be used to collaborate with the information and communications technology industry to increase the energy efficiency of this high growth industry and to improve its energy footprint for processes ranging from equipment hardware manufacture to data center application. Activities aimed at improving the energy efficiency of data centers will continue through the Best Practices activity.

SBIR/STTR **—** **1,389** **1,430**

In FY 2008, $839,000 and $101,000 were transferred to the SBIR and STTR programs respectively. The FY 2009 and 2010 amounts shown are estimated requirements for the continuation of the SBIR

	(dollars in thousands)		
	FY 2008	FY 2009	FY 2010
and STTR program.			
Total, Industries of the Future (Crosscutting)	**52,223**	**74,425**	**87,373**

Explanation of Funding Changes

	FY 2010 vs. FY 2009 ($000)
Industrial Materials of the Future	
The increase will enable increased R&D on carbon fibers, a critical material for improving the performance capabilities and efficiency of multiple advanced renewable and energy efficiency technologies.	+128
Combustion	
The decrease reflects a transition of efforts to the Energy-Intensive Process R&D activity.	-814
Sensors and Automation	
No change.	0
Industrial Technical Assistance	
▪ **Industrial Assessment Centers**	
No change.	0
▪ **Best Practices**	
This increase reflects a strategic expansion of Save Energy Now (SEN) activities through new targeted corporate outreach efforts with the most energy intensive industries in order to achieve significantly enhanced results.	+12,593
Energy Intensive Process R&D	
This increase reflects expanded activities transferred from other program elements.	+405
Fuel and Feedstock Flexibility	
No change.	0
Nanomanufacturing and Other Interagency Manufacturing R&D	
No change.	0
Industrial Distributed Energy	
This decrease reflects an expansion of activities by the DOE CHP Regional	+595

	FY 2010 vs. FY 2009 ($000)
Application Centers.	
Energy-Efficient Information Technologies	
No change.	0
SBIR/STTR	
Changes in the SBIR/STTR funding are a direct result of changes in the funding of program activities.	+41
Total Funding Change, Industries of the Future (Crosscutting)	**+12,948**