(i)

REDUCTION OF EM FOOTPRINT AND ESTABLISHMENT OF ENERGY PARKS

OFFICE OF ENVIRONMENTAL MANAGEMENT

DECEMBER 2008

EM strategic planning efforts to reduce the legacy footprint of the EM complex.

- Footprint reduction and small site completions will create thousands of new blue collar environmental jobs immediately (within 90-180 days).
- Footprint reduction and small site completions accelerates environmental clean-up in 14 states and reduces life-cycle costs by eliminating years of infrastructure maintenance.
- EM can achieve about ninety percent footprint reduction for a total reduction from 900 square miles to 135 square miles by 2015 or earlier.
- Footprint reduction makes large tracts of EM land and infrastructure available to support new beneficial site missions, such as, the establishment of Energy Parks that will sustain local and regional economies.
- Energy Parks on EM sites will:
  - Increase the supply of secure, diverse, affordable energy for the Nation
  - Increase the supply of green energy to enhance environmental quality and reduce emissions associated with global climate change
- Additional near term investments to support footprint reduction, small site completions and additional investment opportunities of over $6 billion could result in significant life-cycle savings and create over 40,000 man-years of additional contractor jobs (e.g. over 10,000 additional jobs for the next 4 years)

Overview

EM has strategic planning efforts underway to identify ways to reduce the legacy footprint of the EM complex. Footprint reduction will be accomplished by focusing cleanup activities on decontamination and demolition of excess contaminated facilities, soil and groundwater remediation, and solid waste disposition, all of which have proven technologies and an established regulatory framework. Ultimately, completions of these types of environmental cleanup activities reduce the monitoring and maintenance costs associated with managing large tracts of land. This allows EM to focus on dispositioning highly radioactive tank waste, special nuclear materials and/or used (spent) nuclear fuel; none of which lend themselves to quick, inexpensive, or uncomplicated technical or regulatory solutions.

Footprint reduction would allow the utilization of resources such as: large, secure tracts of land; state-of-the-art facilities and technologies; and a highly trained and experienced work force. All of which could then be leveraged in establishing Energy Parks on EM sites to both produce energy and demonstrate advanced technologies; and accelerating their replication across the Nation.

Capabilities and Benefits

EM is using its independently reviewed baselines and out-year planning estimates to establish a basis for strategic planning for the program to evaluate alternatives in policy,

program priorities or consideration of various business cases. Analyses so far indicate that our current baseline planning levels can fully support high risk activities of radioactive tank waste, special nuclear materials and spent nuclear fuel. Additional investments in the program could yield significant environmental cleanup progress and life-cycle savings if directed to *footprint reduction* at our large sites and accelerating *small site completions*. Funding these initiatives means that new appropriations could be quickly deployed to ship wastes for disposal, to cleanup and demolish contaminated buildings, and to remediate contaminated groundwater and soils.

EM is positioned to quickly leverage additional investments that will yield substantial benefits to address National economic, environmental, and energy security objectives.

- EM has on-the-shelf plans to redress past environmental contamination by utilizing existing flexible contract vehicles to accelerate the cleanup and quickly expand environmental cleanup workforces.
  - Established regulatory framework with regulator and community support allow for effective cleanup progress that will enhance environmental compliance posture.

- EM has a proven track record of significant expenditures in the year of appropriation. In FY 2008, EM spent in excess of 75% providing added economic stimulus to some communities already experiencing depressed conditions (e.g. South Carolina, Kentucky, and Ohio).

- EM work has been characterized by Senate staffers as "boots on the ground".
  - Over 80 percent direct labor costs
  - Added jobs will be primarily blue collar environmental workers

- EM can be characterized as a "green initiative" in multiple ways:
  - Fulfilling the Government's responsibility to address nuclear weapons waste,
  - Allowing early completion of legal compliance agreement milestones, and
  - Enabling reuse of Departmental facilities for other energy missions or community reuse.

- EM sites can be used to establish Energy Parks once they are cleaned up:
  - Enable reuse of EM infrastructure for other energy missions or community reuse
  - Ensure long-term mission at environmental cleanup sites—sustain jobs

Status of Footprint Reduction, Small Site Completions, and Additional Investment Opportunities

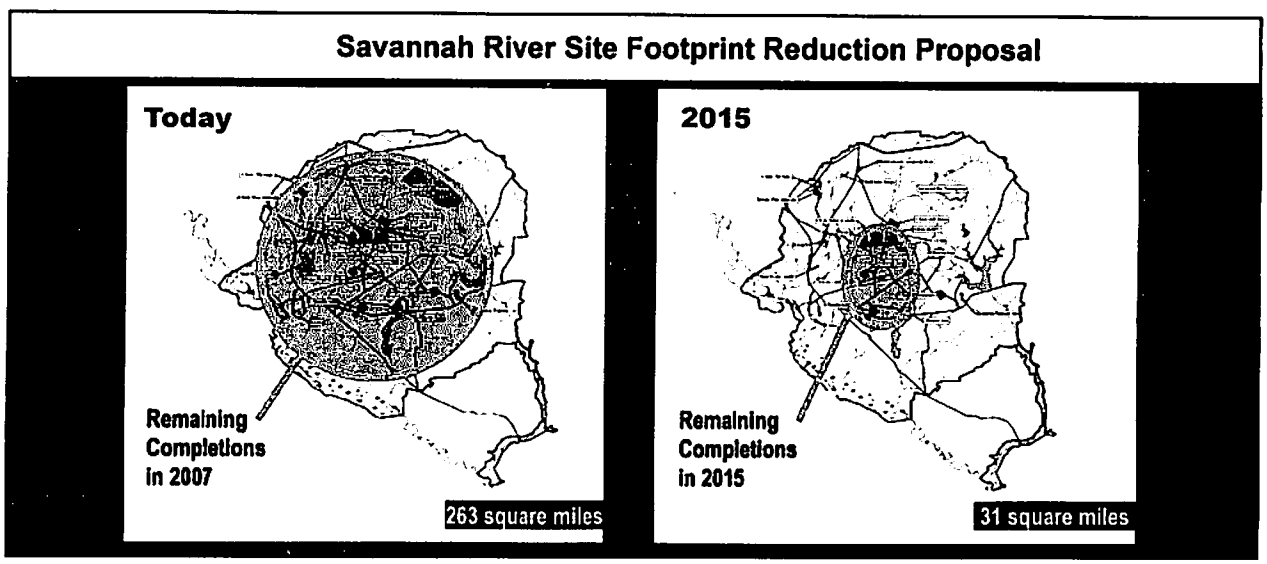
EM directed its sites to identify footprint reduction, small site completion and additional investment opportunities. EM has worked collaboratively with its field sites to define aggressive, but achievable scenarios for accelerating cleanup of distinct and discrete sites or portions of large sites to meet footprint reduction and small site completion objectives. This paper focuses on the footprint reduction and small site completion proposals that

have been independently evaluated as part of EM's intensive year-long strategic planning effort. EM has also identified additional investment opportunities that are currently undergoing evaluation. These additional opportunities should yield similar footprint reduction benefits to those discussed in this paper.

Proposals for Footprint Reduction

EM has identified several footprint reduction and near term completion opportunities. If EM were to successfully implement its footprint reduction initiative it could effectively reduce the EM footprint by approximately 90 percent by 2015 or earlier. EM would need additional funds to achieve its 2015 footprint reduction goals. As a result, the footprint reduction initiative could realize a Return on Investments (ROI) of more than 100 percent at four of its largest sites (Savannah River Site in South Carolina, Hanford Site in Washington, Oak Ridge Reservation in Tennessee, Idaho National Laboratory). We are still analyzing similar opportunities at Portsmouth and Paducah and expect that the savings will also be substantial.

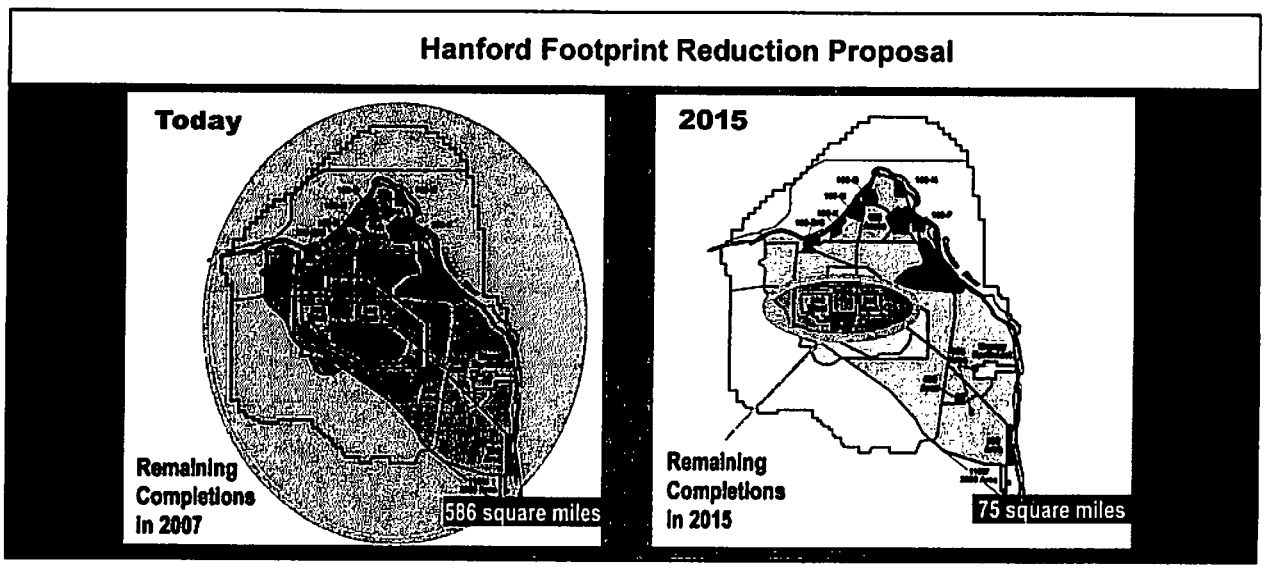
The Savannah River proposal focuses on accelerated cleanup of numerous reactor and industrial areas and associated soil contamination. It would result in approximately 90 percent footprint reduction and the release of a large majority of the entire site from access and security restrictions, nominally more than 200 square miles (see figure below). This land, along with the infrastructure and trained workforce that currently supports major industrial and nuclear operations and chemical processing, would be available for other uses such as advanced energy projects.



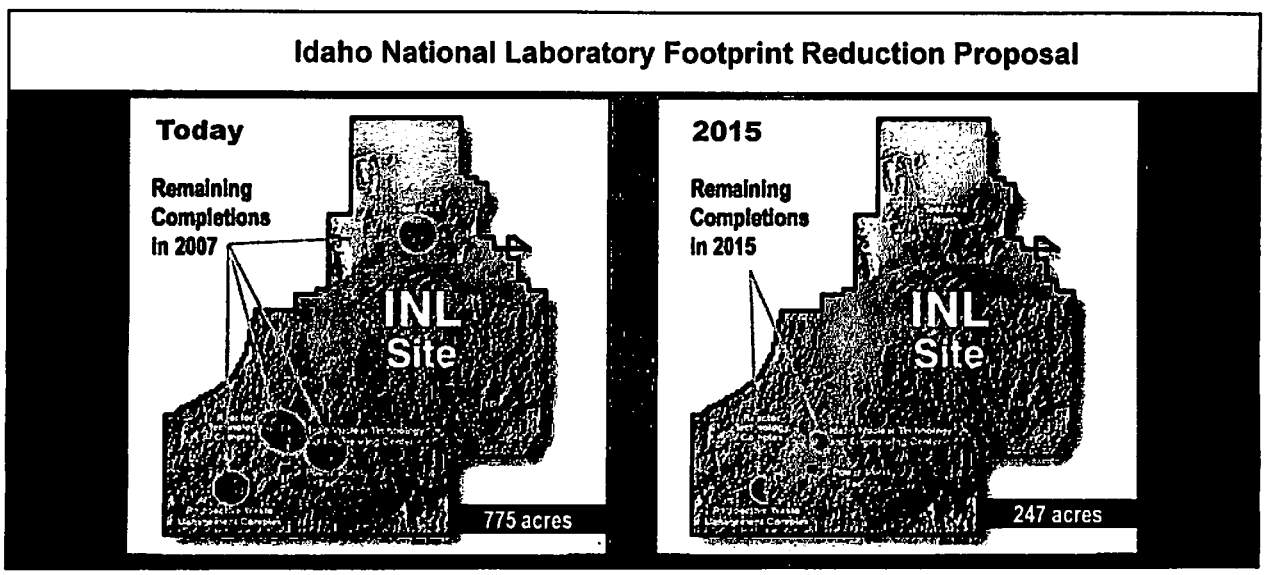
Similar analyses were conducted for the other large sites yielding similar savings and significant reductions in footprint. Those sites are Hanford, Idaho, and Oak Ridge: ORNL, Y-12, and East Tennessee Technology Park.

The Hanford proposal results in approximately 90 percent footprint reduction and is targeted at environmental cleanup and closure of the 100 and 300 Areas which abut the Columbia River. This includes completion of the River Corridor cleanup by 2015 which

reduces significant environmental risk by focusing on ground water remediation and D&D of excess radioactive facilities.



The Idaho proposal results in approximately 70 percent footprint reduction and would focus on accelerated D&D of INTEC facilities, the Materials Test Reactor Complex, and buried waste exhumation which would allow for an accelerated D&D of the Radioactive Waste Management Complex.



At the Oak Ridge Reservation footprint reduction would focus on three primary areas: the Oak Ridge National Laboratory central campus; the Y-12 facility; and the demolition of ETTP buildings K-25 and K-27. These efforts would address some of the highest environmental risks on site and reduce the overall surveillance and maintenance costs across the site.

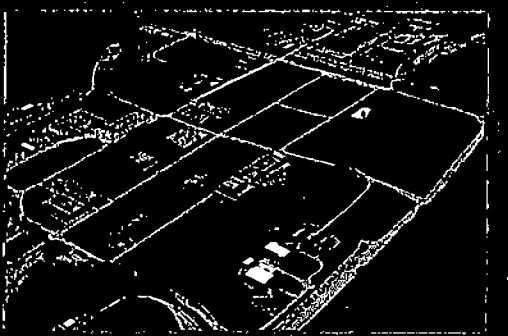
Oak Ridge Reservation Footprint Reduction Proposal

Oak Ridge National Laboratory Central Campus

Today

177 IFDP Facilities

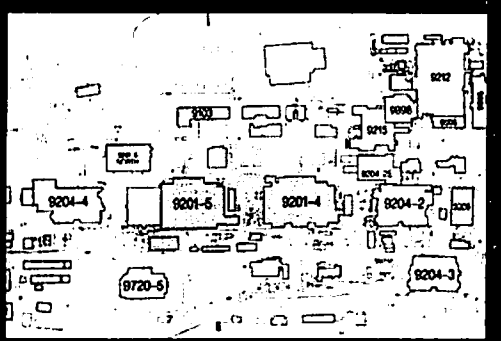
2015



One IFDP Facility

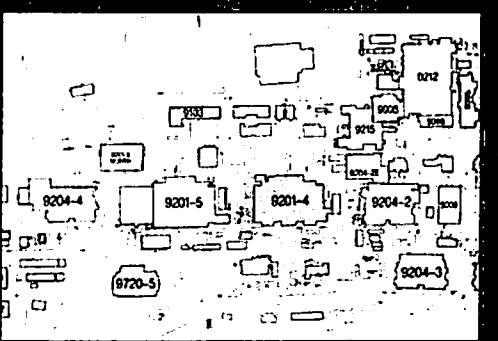
Y-12 National Security Complex

Today



510K sf demolished (Alpha 4)

2015



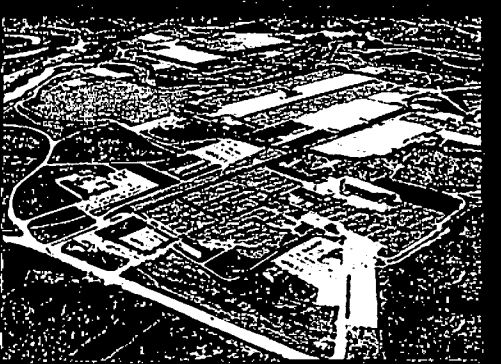
672K sf additional demolished (Alpha 5 & 9206)

East Tennessee Technology Park

Circa 2000

Baseline Completion in 2017

2015



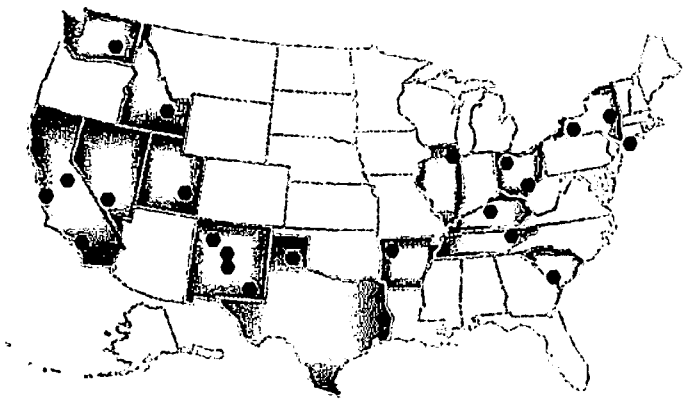
Accelerated Completion in 2015

In addition, EM is proactively examining footprint reduction opportunities at both Gaseous Diffusion plants in Portsmouth, Ohio and Paducah, Kentucky. We anticipate similar results allowing investments to energize these depressed economies and freeing up land for potential reuse

Status of Small Site Completions

Small sites analyzed near-term completion options that accelerate their remaining EM work scope. This footprint reduction would allow management to focus resources on large site cleanup. With additional investments EM can close 12 sites by 2015, 10 of these sites are on schedule to be complete between now and 2015 and two others would be accelerated to 2015. Three other sites would be accelerated from current planning completions – West Valley in New York, Energy Technology Engineering Center (ETEC) in California, and Moab in Utah. As a result of a mission change at Argonne National Laboratory additional environmental cleanup scope has been identified. This work scope is being evaluated for potential acceleration.

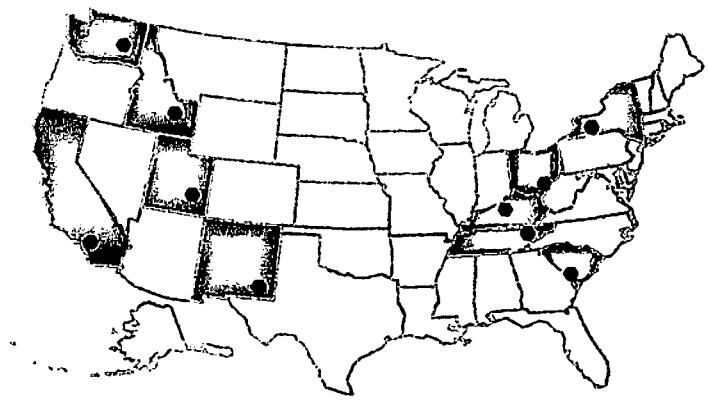
Sites with Active EM Programs as of 2008



Examples of work at sites that can be accelerated:

- Uranium Mill Tailings Remedial Action Project in Moab, Utah, cleanup would be accelerated by 9 years, from 2028 to 2019. This project involves the remediation of the former uranium-ore processing facility which abuts the Colorado River.
- At ETEC, the remaining work is focused on the D&D of nuclear and non-nuclear facilities, remediation of a few soil contamination areas, and one groundwater plume. The scope of this project is being re-evaluated as the result of new legislative requirements.
- The West Valley Demonstration Project is divided into two phases. The first phase involves the relocation of canisters of radioactive tank waste to a newly constructed on-site facility for temporary storage, the remediation of contaminated soil areas, and the decommissioning of several nuclear facilities including the original reprocessing plant and stabilization

Remaining Active EM Sites in 2015



facility. Completion of this work would be accelerated to 2018. The second phase of work would be completed at a later date when a disposition alternative is selected for the high-level waste

Status of Energy Parks Initiative

Department of Energy (DOE) resources, in partnership with industry and regional stakeholders, can be used to establish Energy Parks. Designated tracts of land would be transferred to a third party for rapid development of large scale energy-related facilities, particularly those with potential to significantly influence energy, environment, and economy. Relevant technologies include but are not limited to, wind, solar, biomass, nuclear power, desalinization, geothermal, liquefied natural gas transfer stations, hydrogen generation, central-station coal power with carbon sequestration, and specialty manufacturing capability.

The Nation is facing several significant energy and environmental challenges:

- Providing secure, safe, and affordable energy supplies
- Promoting energy sources to protect the environment

EM has extensive resources that can be applied to address these issues:

- Large tracts of land, including buffer zones
- Site environments that have been well characterized
- Existing infrastructure, including electrical transmission lines, abundant water supplies, roads, and railroads
- On-site resources that can be used to harness energy from renewable resources (e.g. solar, wind, geothermal)
- Nuclear operations and nuclear materials management capabilities
- State-of-the-art technologies and facilities
- Thousands of highly trained and experienced scientists, engineers, craftspeople, and equipment and process
- Established relationships with local and state regulators and surrounding communities

A way to leverage Departmental and EM assets to address the Nation's critical energy and environmental needs is through the Energy Parks Initiative (EPI). Under the EPI, the Department would work with the commercial sector and stakeholders to facilitate the building and operating of commercial energy supply facilities. In addition to the EM resources listed above, the EPI could involve other DOE tools such as loan guarantees to assist in the development of energy facilities.

A significant benefit of implementing the EPI is that states and local communities would see that there are future activities which could provide jobs and a tax base. Without that future, some local stakeholders are concerned of the economic impact to the area once cleanup is complete. Some, including labor unions, view the completion of the EM

mission as a negative event. At some EM sites, like Savannah River, there is already interest by the local community reuse organizations in utilizing part of the site for energy facilities.

Also, very preliminary feedback from some members of the energy industry indicates a significant interest in the energy parks concept, subject to a demonstrable return on investment.

The impact of transforming DOE sites to Energy Parks in all types of clean fuel / green energy production would be:

a. Energy production with clean technologies sited on "brownfields" with existing infrastructure and a trained workforce.
b. Accelerate the siting and permitting of new energy facilities due to extensive meteorological, technical and natural resource data gathered over the past 50 years of DOE Operations; these sites are as close to license ready than any other sites in the US.
c. Transition of the current work force and recruit the future work force to take advantage of the wealth of technical knowledge and operational experience.
d. Potential to create thousands of new jobs for the long term.

The initiative involves four phases: (1) initial evaluation of key assets for which accelerated completion of the EM mission is feasible, and in collaboration with state and local stakeholders, define the boundaries for opportunity; (2) optimizing the value of the assets in relation to opportunity; (3) enabling development by a third party; and (4) participation, as appropriate, in achieving performance objectives.

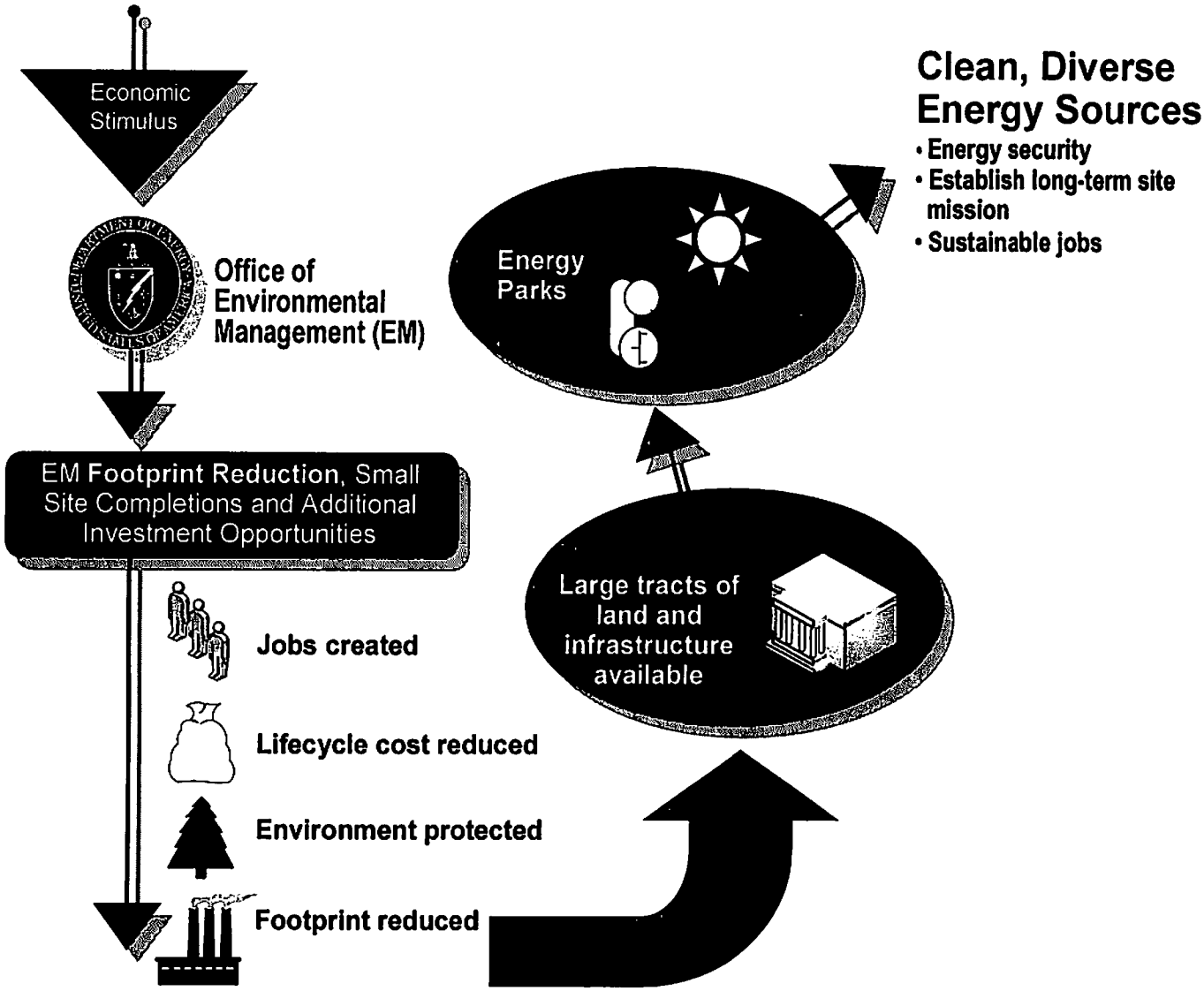
An investment of about $25 million would initiate phases (1), (2) and (3). The approach emphasizes early success, enabling the initiation of the process and public visibility within six months of Secretarial commitment, such as to secure industry commitment to Energy Parks at a DOE site. The Department will explore alternative re-use opportunities with the local communities.

EM has been carrying out preliminary planning activities such as working on a Request for Interest to be able to move out expeditiously if the new Administration chooses to pursue the EPI.

Summary

EM has strategic planning efforts underway to create jobs and stimulate the economy by accelerating cleanup at EM sites and dramatically reducing the legacy footprint of the EM complex. These footprint reduction efforts will lower monitoring and maintenance costs enabling EM to focus on critical long term activities like managing highly radioactive liquid tank waste. They will also enable the leveraging of DOE/EM site assets to address National energy and environmental goals through the Energy Parks Initiatives.

EM Footprint Reduction



U.S. DEPARTMENT OF
ENERGY

(2)

20 Years of Progress in Processing Nuclear Waste

Merle Sykes

Deputy Assistant Secretary

Office of Program Planning and Budget

Weapons Complex Monitor
Waste Management & Cleanup Decisionmaker's Forum
Jacksonville, Florida ❖ October 14-17, 2008

Progress—*EM has made substantial cleanup progress*

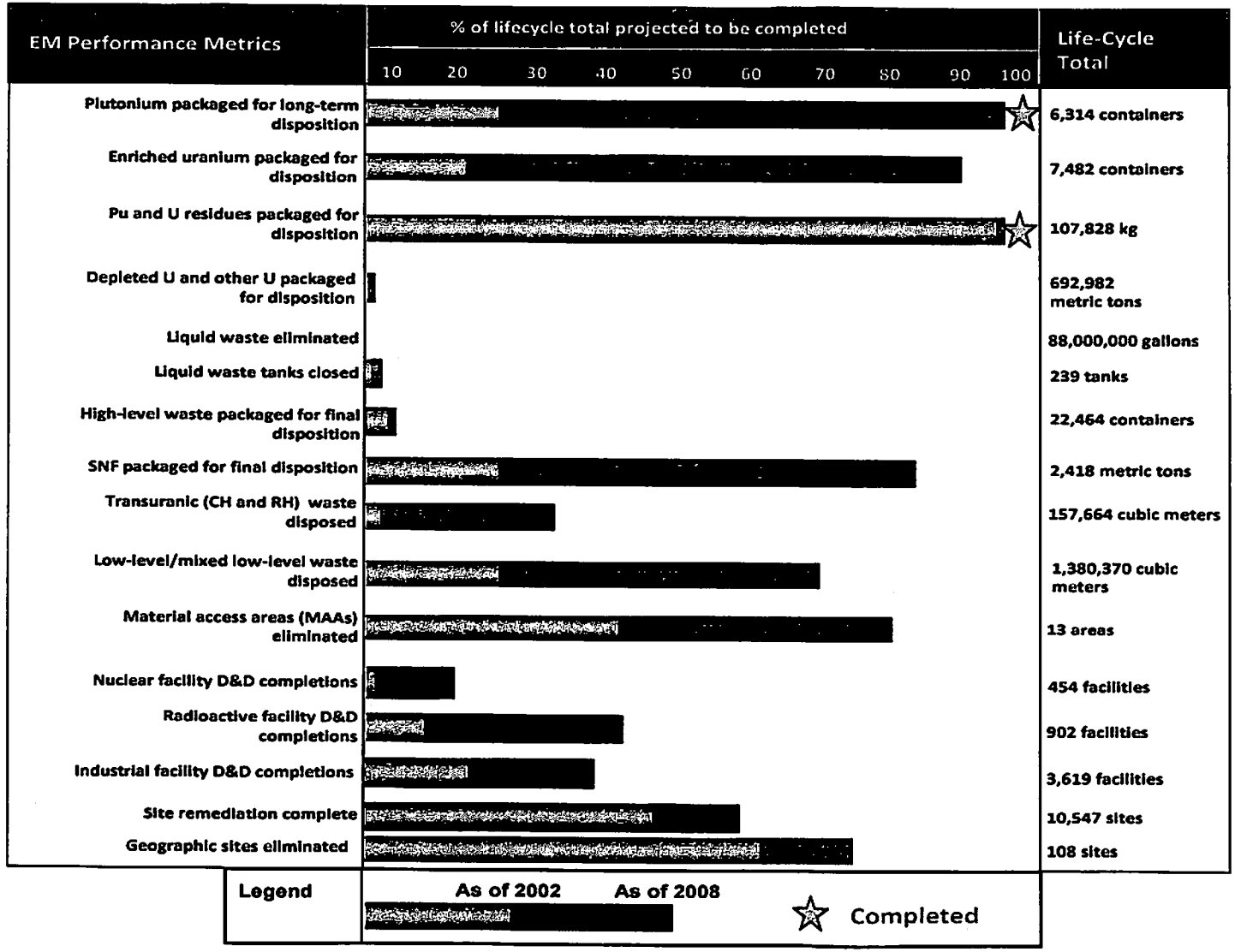
Rocky Flats Nuclear Weapons Component Production Plant | **Cleanup** | **Wildlife Refuge**

Fernald Uranium Processing Facility | **Cleanup** | **Wetlands**

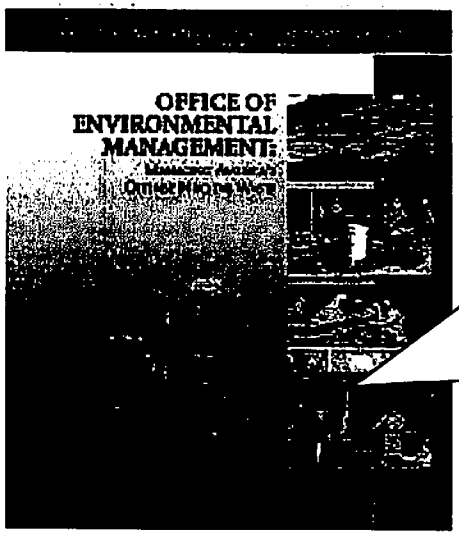
Tremendous Risk Reduction

Plus hundreds of other cleanup success stories

Progress—EM has made substantial cleanup progress



Progress—*EM's progress has been recognized by esteemed national organizations*



"EM is on a solid path to becoming a high-performing organization."

--National Academy of Public Administration

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION®

2006 Project of the Year (Rocky Flats)
2007 Project of the Year (Fernald)

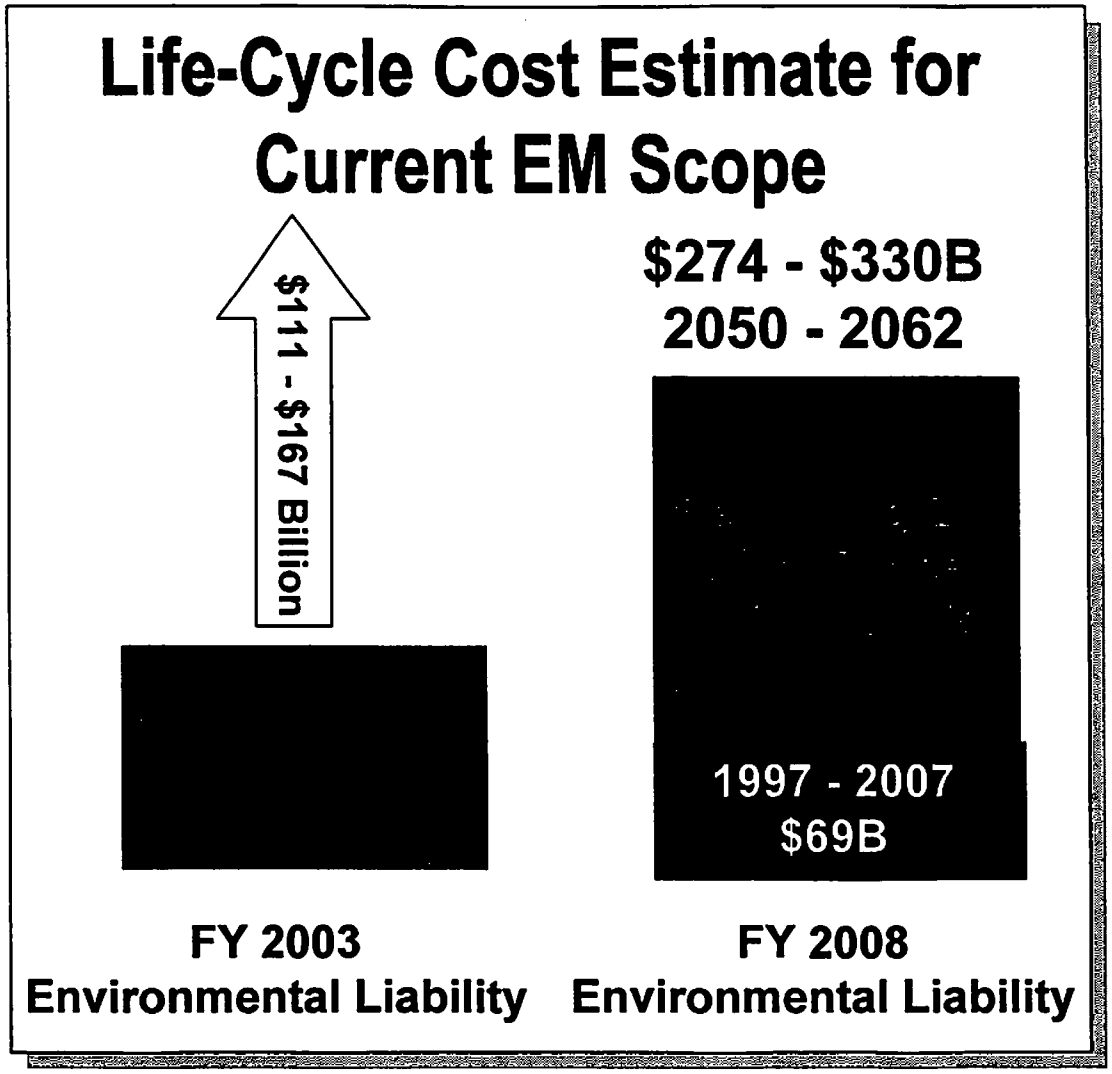
PMI®

Planning and Analysis—*keys to EM's future success*

- Reduce the number of EM sites
- Finish the job: tank waste, nuclear materials, and spent nuclear fuel
- Provide maximum return on money invested in EM

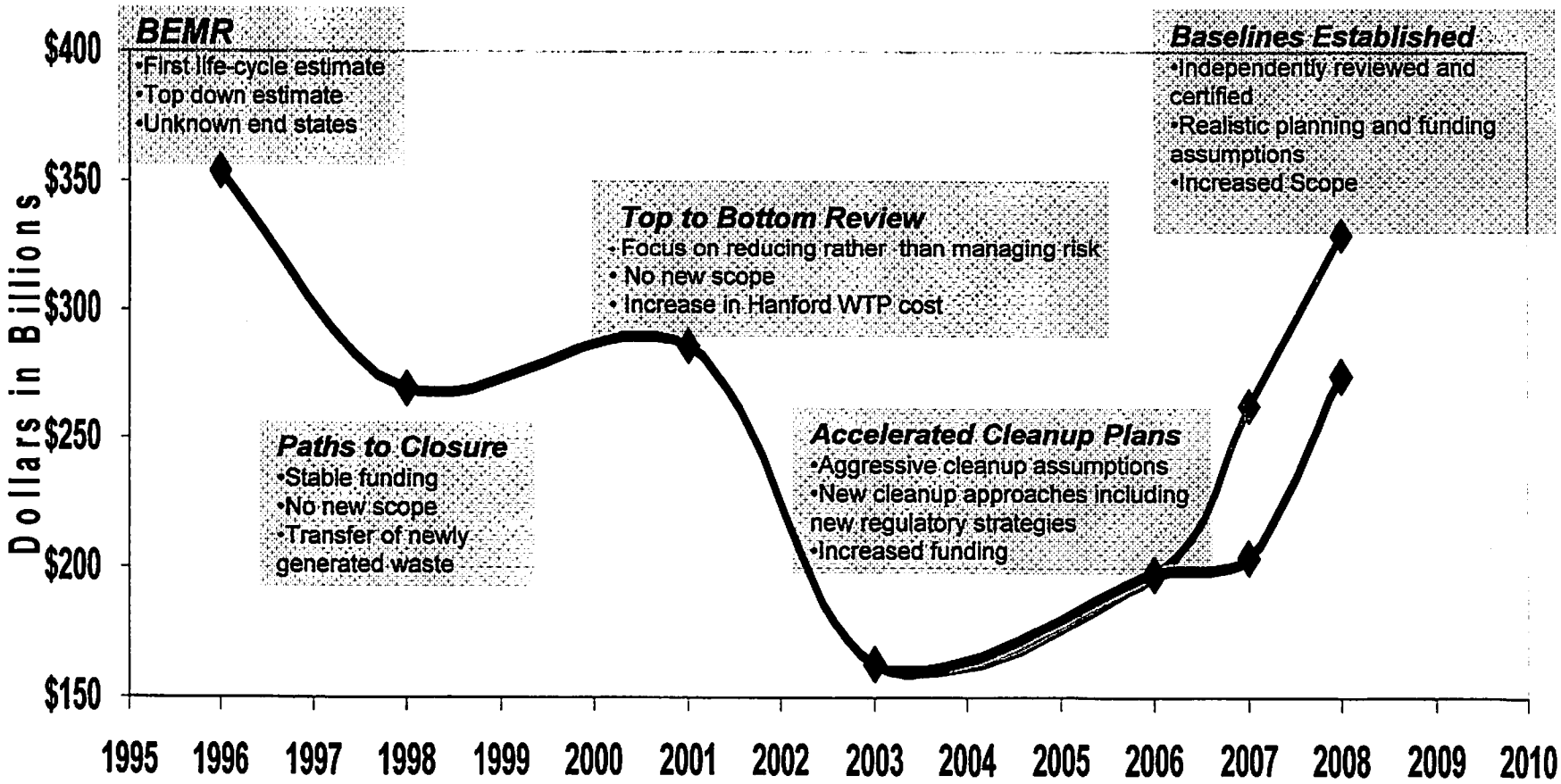
- There is still much to do
- Thoughtful and accurate life-cycle planning and analysis provide the foundation for success

Planning and Analysis – *understand changes in life-cycle cost estimate*



Planning and Analysis – *understand changes in life-cycle cost estimate*

Evolution of EM Life-cycle Cost



80% confidence
50% confidence

Planning and Analysis– *understand changes in life-cycle cost estimate*

Evolution of EM Life-cycle Cost

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

Key Scope Assumptions

BEMR
- First life-cycle estimate
- Top down estimate
- Unknown end states

Paths to Closure
- Stable funding
- No new scope
- Transfer of newly generated waste

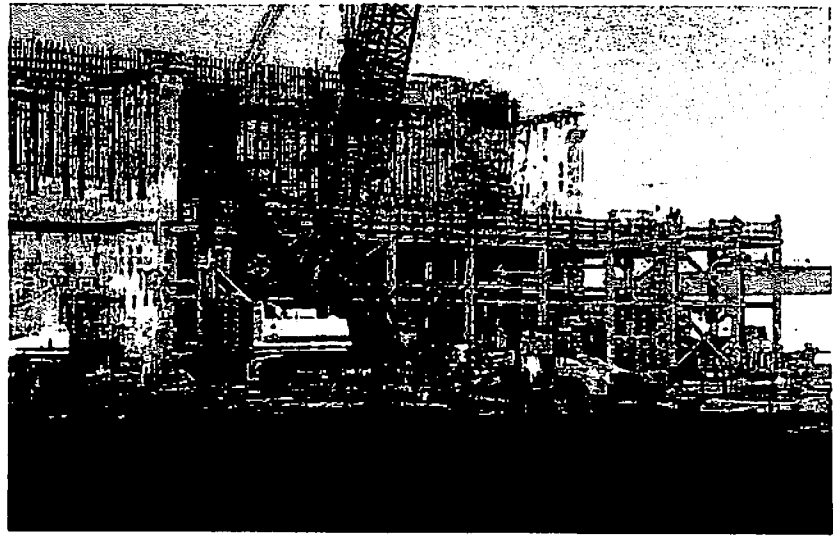
Top to Bottom Review and Accelerated Cleanup Plans
- Aggressive cleanup assumptions
- New cleanup approaches including new regulatory strategies
- Increased funding
- Portsmouth & Paducah GDP D&D removed from scope
- Office of Future Liabilities responsible for any new scope
- Removal of Pu from Hanford
- Low activity tank waste treated/disposed in situ
- Transfer of spent fuel program to RW
- Transfer of H canyon to NNSA in FY2008
- No treatment of Idaho calcine waste

Certified Baselines
- Re-baseline to more realistic funding assumptions
- Increased Scope:
  - Hanford WTP due to changing requirements
  - More robust design criteria for SRS Salt Waste Processing Facility
  - Los Alamos Consent Order
  - Portsmouth & Paducah GDP D&D
  - Pension & benefit liabilities
  - SNF program remains in EM
- New scope:
  - IFDP at Oak Ridge
  - Treatment and disposal of U233 in Building 3019 at Oak Ridge
  - Consolidation of Pu at SRS
  - Disposition of 13 MT of Surplus PU utilizing H-canyon
  - No in tank disposal of low activity waste activity tank
  - Treatment of Idaho calcine waste

Planning and Analysis– understand changes in life-cycle cost estimate

Lessons Learned

- *Credibility—Imperative to use achievable assumptions*
  - *End States*
  - *Scope*
  - *Regulatory Decisions*
  - *Treatment Capability*
  - *Funding Predictability*



- *Auditability*
  - *Baseline development*
  - *Internal controls*

Building Baselines—*realistic planning and funding assumptions*

Independently Reviewed

Baselines

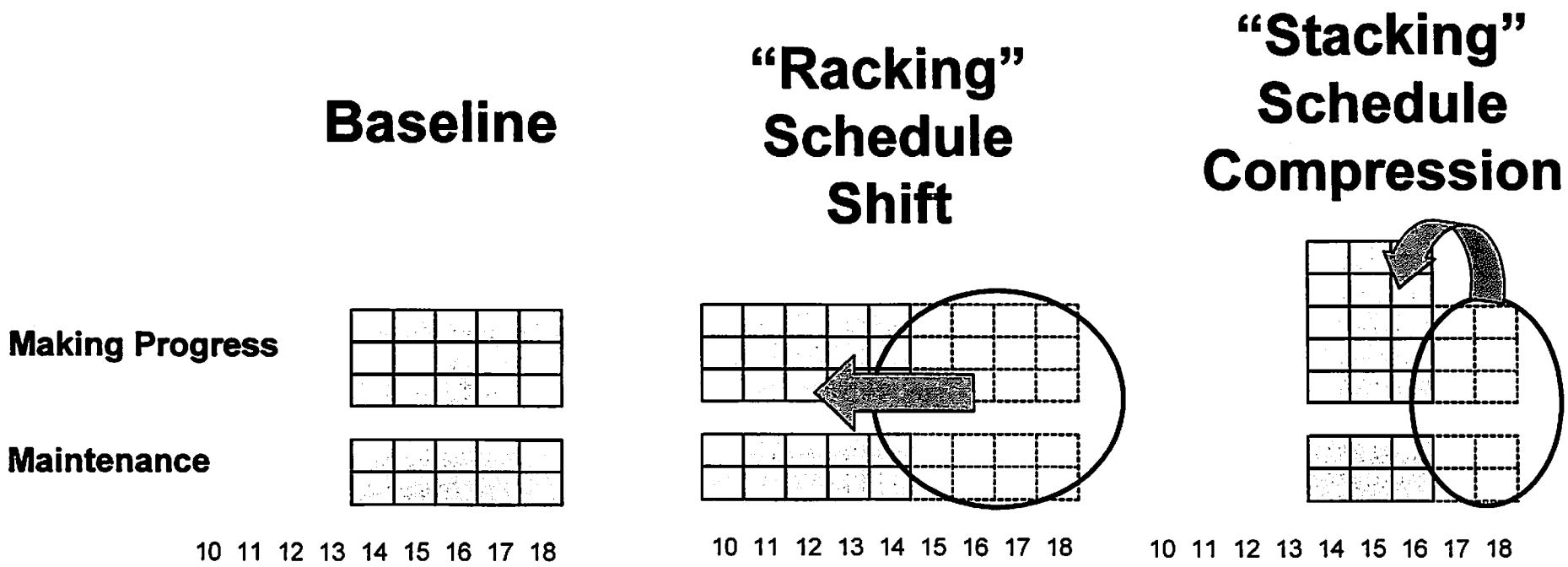
- Well-defined work scope
- Defensible near-term cost and reasonable out-year cost estimate
- Schedule milestones and critical path
- Risks understood

Fiscal Year	08	09	10	11	12	13	14	15>
Scope	•	•	•	•	•	•	•	•
Cost	•	•	•	•	•	•	•	•
Schedule	•	•	•	•	•	•	•	•

Development of Planning Tools – *directly tied to baselines*

- Analytical Building Blocks (ABBs) established within baseline (400)
- Discrete work units tied to certified baselines
- ABBs and their data provide ability to:
  - Integrate life-cycle scope and schedule;
  - Understand and communicate life-cycle cost quantities, and linkage to other programmatic work scope;
  - Identify budget/planning "head room" needed to accept non-EM work scope into the program;
  - Re-sequence ("*rack and stack*") while maintaining linkage to baselines; and
  - Build alternative scenarios and conduct analyses

Development of Planning Tools— *understand life-cycle cost impacts*



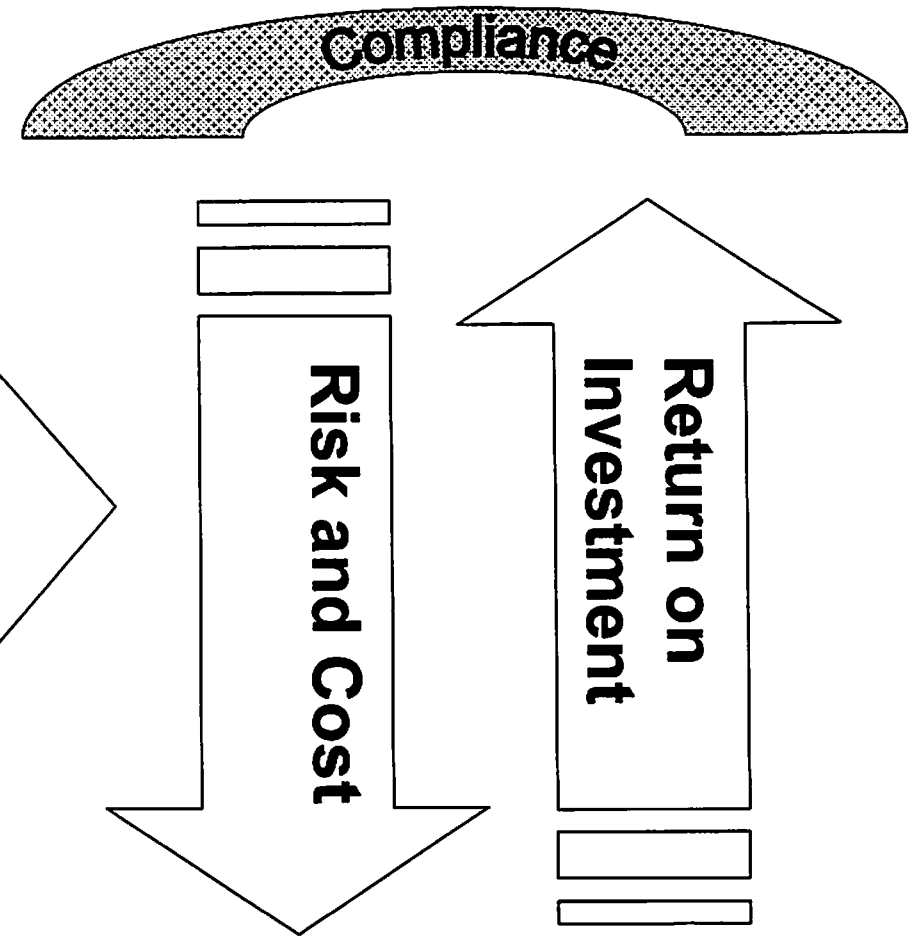
Life-cycle Model based on Assumptions

"Making progress" life-cycle costs assumed to remain equal whether racking and/or stacking

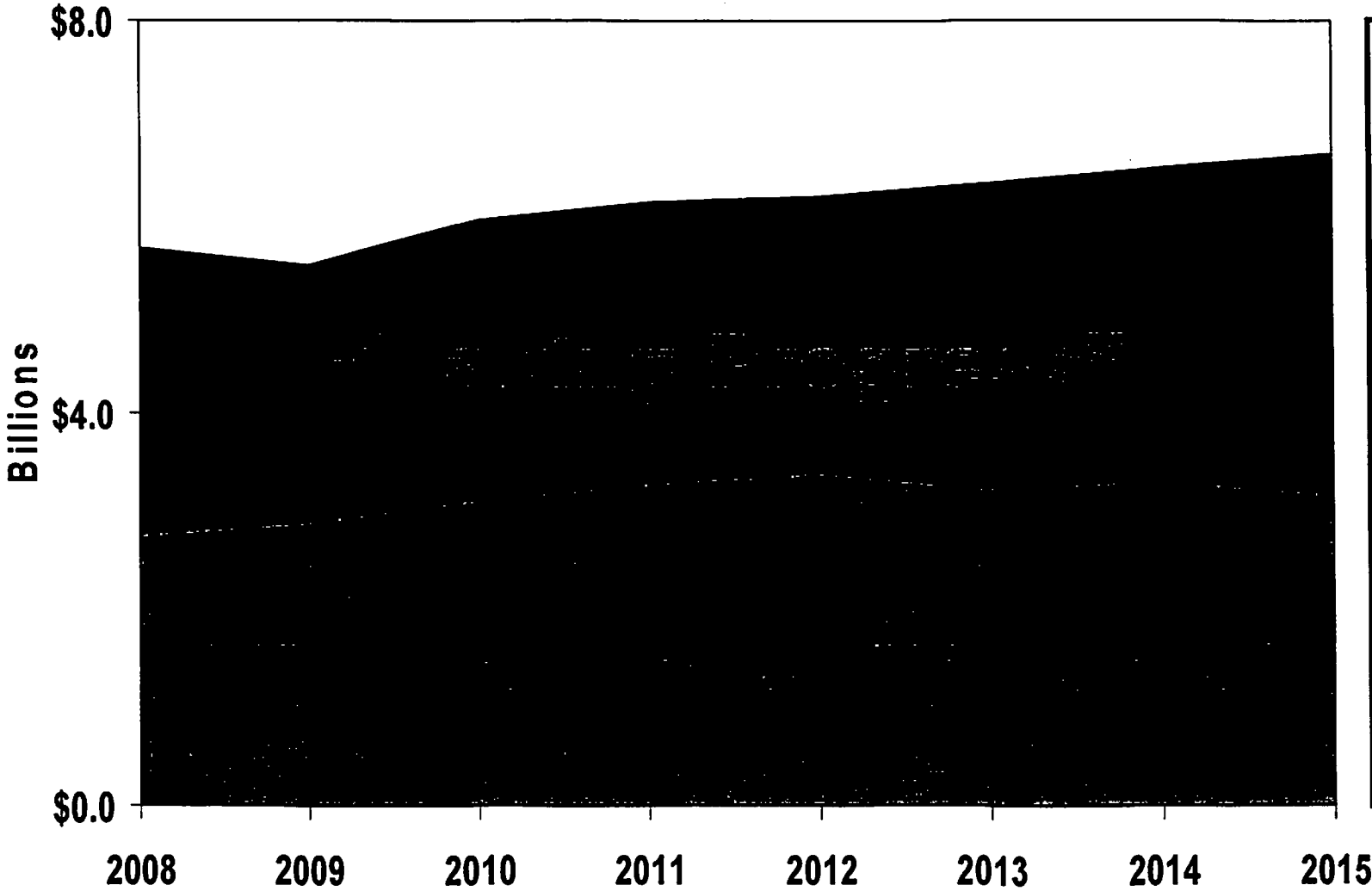
When the schedule is changed, "maintenance costs" will end earlier, resulting in cost savings, or headroom, thereby allowing for acceleration of additional activities

Development of Planning Tools— *support resource allocation decisions*

1. Sound business practices
   - Near-term completions
   - Footprint reduction
2. Alternative approaches to dispositioning tank waste
3. Alternative approaches to dispositioning excess nuclear materials & spent nuclear fuel
4. Alternative management approaches



Development of Planning Tools— *life-cycle cost analysis*

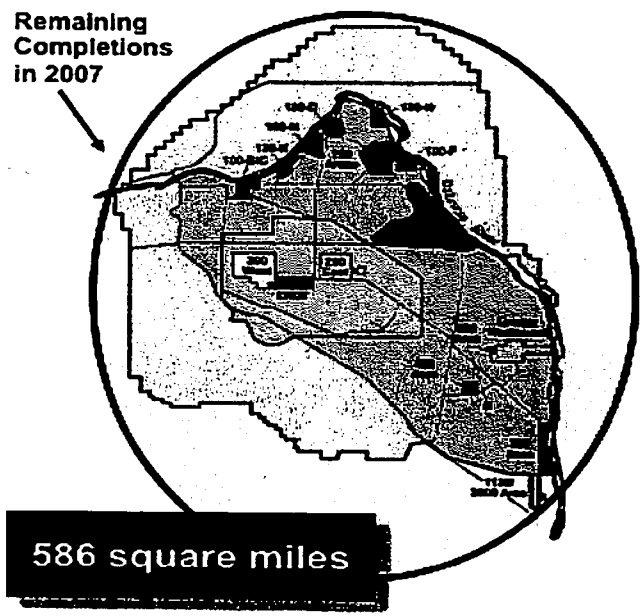


Life Cycle	2008-2015 (avg)
[illegible]	81%
[illegible]	[illegible]

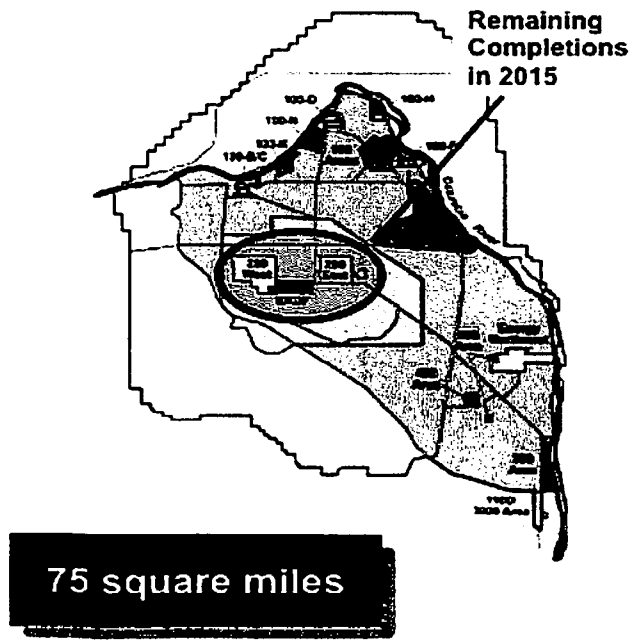
Strategic Planning Outputs—*notional*

- **Hanford Footprint Reduction**
  - **Hanford's footprint reduction scenario to clean up the River Corridor and complete the D&D of the PFP by 2015 results in an 87% reduction of the site footprint. The scenario reduces the highest environmental risk with a large return on investment.**

Today



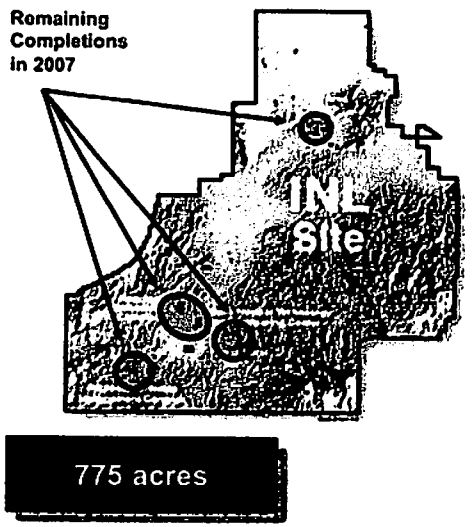
2015



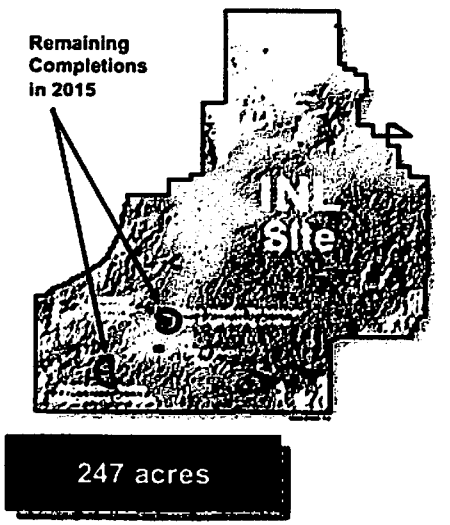
Strategic Planning Outputs— *notional*

- **INL Footprint Reduction**
  - **INL's footprint reduction scenario consists of the acceleration of D&D of facilities from the FY 2021-2030 timeframe to the FY 2012 – 2015. This scenario will result in a 68% footprint reduction and substantial savings from D&D efficiencies resulting from economies of scale.**

Today

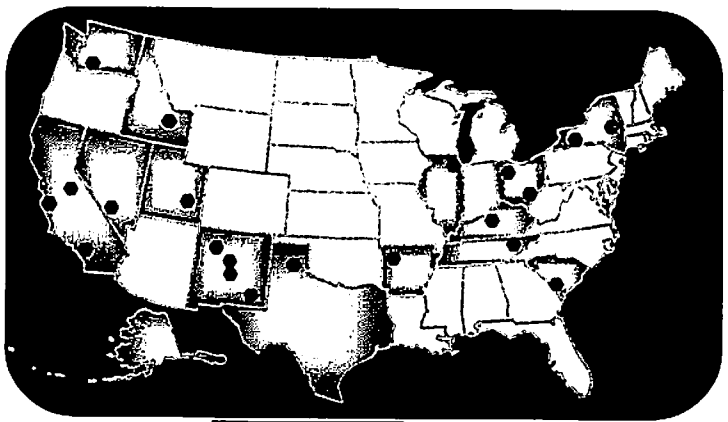


2015

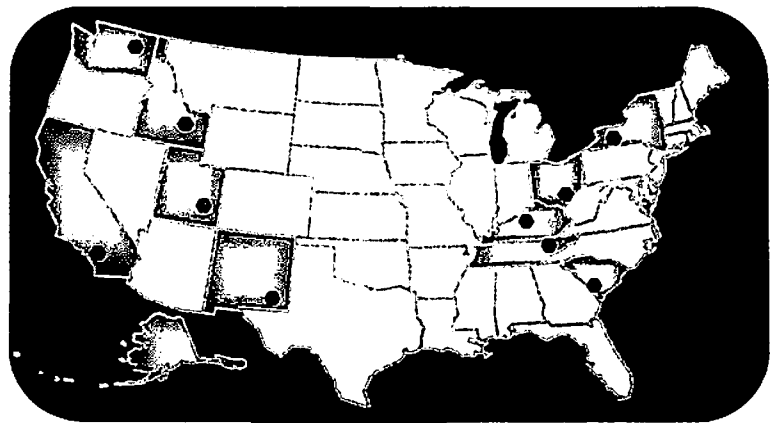


Strategic Planning Outputs —notional

- **Small Site Completions**
  - **EM work from 22 sites in 14 states to 10 sites in 10 states reducing EM's footprint by 750 square miles, which is about the size of the State of Rhode Island. This will result in a significant reduction in the EM Program life- cycle cost and schedule.**



2008

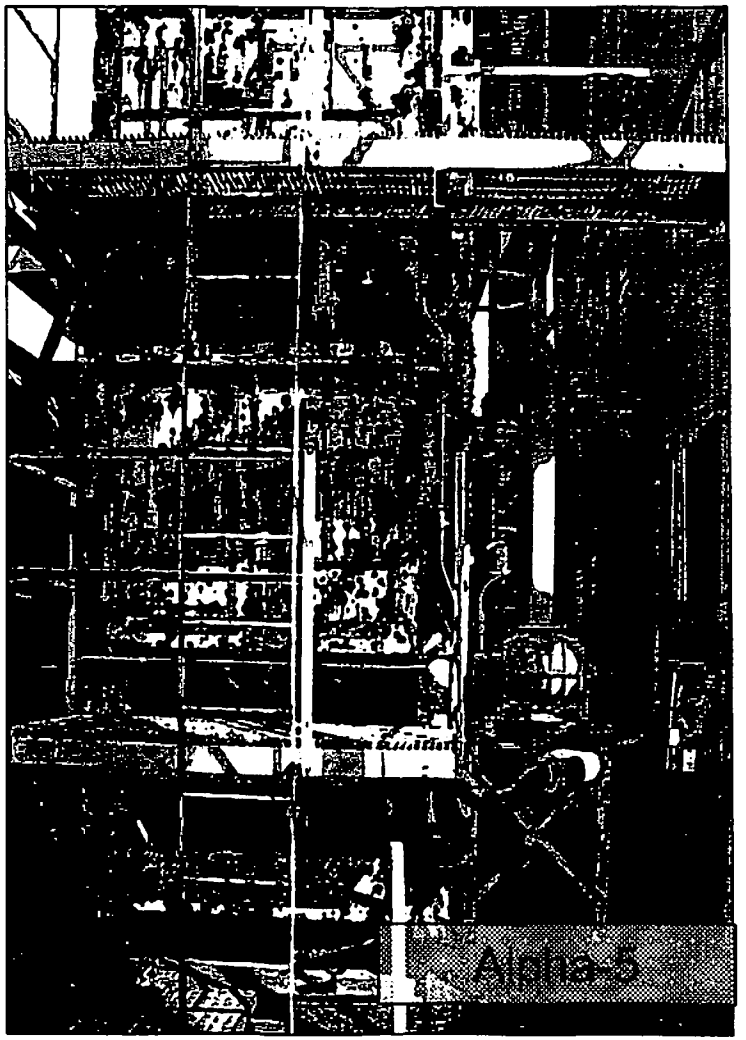


2015

Planning and Analysis– *understand changes in life-cycle cost estimate*

Unfunded Liability

- NNSA, SC and NE identified cleanup work for EM consideration
- 306 surplus facilities
- 34 types of materials
- $3.7B-9.2B Cost estimate



Planning and Analysis– *understand changes in life-cycle cost estimate*

Excess Facilities and Materials Strategy

- Identify excess facilities and materials
- Assess condition of facilities and materials

EXCESS FACLITY AND MATERIAL PLANNING PROCESS

- Surveying condition of excess facilities; establish if excess material resulted from Legacy activities
  - Risk of facility is established and prioritized
  - Determine investment required in order to be "Transfer Ready"
- Establish Mission Need
- Develop MOA for business function transfer procedures
  - Timing of transfer
  - Funds and/or FTE's that will transfer
  - Authorities and accountabilities

Summary

- EM has made substantial cleanup progress
- There is still much to do
- Thorough planning and analysis are keys to our future success
- EM is developing creditable baselines and management tools
- Plans and alternative approaches are being developed to:
  - Reduce risk and achieve compliance
  - Achieve footprint reduction and near-term completions—maximize ROI
  - Sustain progress
  - Finish the job: tank waste; nuclear materials; and spent nuclear fuel

Energy Parks Initiative

SUMMARY

This paper describes an innovative concept to leverage internal US Department of Energy (DOE) resources, and in partnership with industry and regional stakeholders, to establish Energy Parks. Designated tracks of land would be transferred to a third party for rapid development of large scale energy-related facilities, particularly those with potential to significantly influence energy, environment, and economy. Relevant technologies include but are not limited to, wind, solar, biomass, nuclear power, desalinization, geothermal, liquefied natural gas transfer stations, hydrogen generation, central-station coal power with carbon sequestration, and specialty manufacturing capability.

DOE has had limited tools to influence energy production, transmission, and distribution. Globalization however has amplified and accelerated the effects of the interrelationship between energy, economy, and environment. Global developments along with increasing public expectation for leadership on such issues provide DOE a brief window of opportunity to push past the "tipping point" of sustained progress towards energy independence, regional economy, national security, and environmental sustainability.

The mission of the DOE Environmental Management Program (EM) includes environmental remediation of numerous facilities, and their return to beneficial use. Each site is an investment of unique assets and liabilities. Making assets available for use in an Energy Park, involves a case-by-case evaluation, which includes the ability to complete the EM mission at the site, and the return of investment of the particular opportunity. At any given site, completing the EM mission is strongly influenced by the level of state and local support. Essential to maintaining such support is continuation of an enhanced level of funding that enables DOE to meet existing environmental commitments, and advance options for follow-on missions, such as an Energy Park. Completing site remediation reduces the EM "footprint," making more facilities available for other national needs.

The initiative involves four phases: (1) initial evaluation of key assets for which accelerated completion of the EM mission is feasible, and in collaboration with state and local stakeholders, define the boundaries for opportunity; (2) optimizing the value of the assets in relation to opportunity; (3) enabling development by a third party; and (4) participation, as appropriate, in achieving performance objectives.

In essence, DOE would create an inventory of attractive assets, and make the baselines available for external consideration of site development proposals. Early implementation would mark the start of a new and cooperative relationship with stakeholders. The magnitude of the opportunity allows for further development of common interests.

The initiative has enormous applicability and limited risk, and the pace is within departmental control. The effect on energy, economy, and environment, are clear to demonstrate, and lasting.

Energy Parks Initiative

Background

After a decade of relative quiescence, the U.S. power generation market has entered a phase of intensive activity. The increase in power generation lags the ongoing growth in demand due to the long period required for permitting and construction, local opposition to power plants, and general concerns about environmental issues creating unanticipated delays. Economic and population growth have eroded the reserve margin of the national grid for power transmission and distribution. Fast-growing regions of the country face insufficient reserve margins, particularly during emergencies. The power generation and distribution system, like any infrastructure, requires upgrading to meet increasing reliability and load requirements. Previously opposed interests are increasingly recognizing the need to work together in topics such as the capacity and vulnerability of energy infrastructure, the industrial application of innovative technology, energy independence, and sustainability of energy, economy, and environment.

The importance of reliable power generation and energy independence can not be overstated, especially within an environment of a transparent global market economy, in which U.S. interests compete with the rapidly increasing needs of emerging economies and populations. Global events have accelerated the growing domestic realization that globalization amplifies the positive and negative effects of the interrelationships between energy, economy, and environment. While constituents seek aggressive DOE leadership on such issues, the internally available tools are limited, and have been largely inadequate. The alignment of various related factors has provided DOE a window of opportunity to push past the "tipping point" to substantially advance energy independence, regional economy, national security, and environmental sustainability through the facilitation of Energy Parks.

The mission of the DOE Environmental Management Program (EM) includes environmental remediation of numerous facilities, and their return to beneficial use. Each site is an investment with unique assets and liabilities. Making assets available for Energy Parks, involves a case-by-case evaluation, including the ability to complete the EM mission at the site, and the return of investment of the particular opportunity. The ability to complete the EM mission at a site is influenced by state and local support. In order to leverage that support into the realization of Energy Parks, DOE must be able to meet existing environmental commitments, and to operate transparently as a trustworthy partner. Completing site remediation reduces the EM "footprint," and completing the cycle, by enabling the transfer of more facilities.

Nature of the Opportunity

DOE has a unique capability, among federal agencies, to accelerate introduction and application of energy technologies. The EM mission includes the environmental restoration of a DOE sites, and the transition of these sites to other beneficial use. EM holdings include unique valuable property, such as the Hanford Site, Savannah River, parts of the Oak Ridge Reservation and the Idaho National Engineering Laboratory, the Portsmouth and Paducah gaseous diffusion plants, Fernald, the Waste Isolation Pilot Plant, and others. The portfolio includes intellectual resources, real property, human

capital, and management tools (internal authorities, loan guarantees, purchasing power, technology demonstration, etc.) to leverage the taxpayer's investment.

During the initial phase of implementation, DOE would make publicly available a baseline description of the characteristics of selected tracks of land whose environmental remediation could be accelerated, and request interested parties to propose site development approaches.

Assets would be designated for rapid development of large scale energy-related facilities, particularly those with potential to significantly influence energy, environment, and/or the economy. Relevant technologies include but are not limited to, wind, solar, biomass, nuclear power, desalinization, geothermal, liquefied natural gas transfer stations, hydrogen generation, central-station coal power with carbon sequestration, and specialty manufacturing capability

Specific examples of a wide range of asset features include (but are not limited to):

- Infrastructure (e.g., roads, buildings, equipment, utilities, transmission systems, barge and/or rail access, and specialty features and capability)
- Natural Resources (e.g., land, water, and renewable energy)
- Institutional Controls (e.g., clear land title, physical control, security, water rights, NPDES and other operating permits, buffer area, environmental and seismic site characterization, and security)
- Human and Economic Capital (e.g., resident knowledge of the regulatory environment, and a highly trained workforce that facilitates transition to succeeding missions, and helps return valuable assets to the local tax base)
- Diversity, Size, and Remoteness (e.g., allows consideration of a wide range of uses, and protection of critical infrastructure)

Related Activity

At the Hanford Site, in Washington, commercial wind turbines are being installed within sight of nuclear facilities, while on-site locations are likely to provide superior performance. Among applications for new nuclear power generation, 21 out of 22 are at existing nuclear power plants. A commercial nuclear reactor operated by Energy Northwest shares the Hanford Site infrastructure. The site also hosts other activities, including a commercial nuclear waste disposal operation. Pre-existing buffer zones are consistent with security system requirements.

The Savannah River Site has been working with the Savannah River Community Reuse Organization on the establishment of an Energy Park that includes 2,000 acres of leased land for commercial production of electric power and large scale demonstrations for new energy technologies. A site analysis concluded that there is considerable opportunity to leverage the 190,000 acres of land that comprise the site, the $4B investment in site infrastructure, and the excellent institutional and regulatory climate. The site infrastructure includes two manmade lakes, thousands of acres of surface area, a railroad system, 125 miles of electrical transmission lines, close proximity to commercial nuclear stations and

excellent power distribution pathways to the east coast, and a barge slip. Recent studies and assessments indicate significant commercial interest, particularly in relation to nuclear power plants. Many of the operational issues, such as when to convey title, have already been resolved.

The department has transferred land ownership to various other entities. Examples include the: 1998 sale of the Elk Hills Naval Petroleum Reserve to Occidental Petroleum; ongoing conversion of the Mound site in Ohio, to industrial use under the Miamisburg Mound Community Improvement Corporation; conversion of the Fernald site in Ohio, to a nature preserve; and as previously mentioned, at the Hanford and Savannah River sites.

Other Considerations

- The value of the initiative in terms of responsible governance should be apparent to the incoming administration, and attractive for non-partisan support.
- Many of the elements required for success are already in place, including precedent, and the effective use of community redevelopment organizations. .
- Maintaining EM ability to fulfill environmental responsibilities, while collaborating with stakeholders in the common goal of successful transition to new site missions, is predicated on maintaining an appropriate level of funding.
- Interest from the Office of Management and Budget, and other governmental agencies.
- Energy Parks might be positioned as a Secretarial or Presidential initiative.
- Many consider DOE to be an unreliable partner. The Energy Park initiative enables a clean start, as a partner in the common goal of enabling successor missions.
- Energy Parks is a low-cost and low-risk initiative, with the potential for a major payoff that furthers strategic goals for energy, environment, and economy.
- Implementation may enable other major tradeoffs, including regarding the ability of facilities for disposal of various waste forms.

Approach

The initiative involves four phases: (1) initial evaluation of key assets for which accelerated completion of the EM mission is feasible, and in collaboration with state and local stakeholders, define the boundaries for opportunity; (2) optimizing the value of the assets in relation to opportunity; (3) enabling development by a third party; and (4) participation, as appropriate, in achieving performance objectives. Implementing details include:

- Opportunities and tools would be examined to leverage other assets, and accelerate completion of the EM mission at those sites.
- Early implementation would enable DOE to re-start, with a clean slate, of a trusting and cooperative relationship with local, state, and national stakeholders.
- DOE would initiate discussion by offering an inventory of assets at a given site for expressions of interest. Negotiations would determine the extent and method for

transfer of assets, based on the overall impact to energy, economy, and environment. For example, for a specific opportunity, DOE may convey clear title to state authorities or to the private sector, and for others, prefer a lease.

- The approach emphasizes early success, enabling the initiation of the process and public visibility within six months of Secretarial commitment, such as to secure an industry commitment to an Energy Park at a DOE site.

Appendix: EM Site Templates

1) Waste Isolation Pilot Plant, Carlsbad, NM
2) Hanford Site, Richland, WA
3) Idaho National Laboratory, Idaho Falls, ID
4) Oak Ridge National Laboratory, Oak Ridge, TN
5) Portsmouth and Paducah Enrichment Plants, Portsmouth, OH and Paducah, KY
6) Savannah River Site, Central Savannah River Area, SC

Energy Parks Initiative

Appendix: EM Site Templates

1) Waste Isolation Pilot Plant, Carlsbad, NM

Background

In support of the U.S. Department of Energy (DOE) Transformational Energy Action Management (TEAM) Initiative, a renewable energy assessment at the Waste Isolation Pilot Plant (WIPP) was completed by the Department of Energy National Renewable Energy Laboratory in FY 2008. Renewable energy technologies considered in the assessment included photovoltaics, wind, solar thermal, solar ventilation air preheating, biomass thermal, biomass electric, and day lighting. Results of the assessment indicate that the potential exists for the siting of a large central plant photovoltaic (PV) or concentrated solar power (CSP) project on the WIPP Land Withdrawal Area.

Perspective of the EPI Concept

Congress specifically acknowledged the potential use of the WIPP site for purposes other than the disposal of defense TRU waste. Section 4(b) (3) of the WIPP Land Withdrawal Act (Public Law 102-579) allows "such non-WIPP related uses of the Withdrawal as the Secretary determines to be appropriate." The large remotely situated WIPP Site is ideally suited for the location of a solar array for the generation of electrical power to provide for facility power needs and also potentially to provide excess solar-generated power to the local electric utility. Such a project would provide an opportunity to demonstrate the capability of solar technologies to meet future energy needs and is in keeping with the multiple use of the WIPP facility in a way that would benefit the public by providing additional return on the existing investment in this facility.

Site Options

- **Energy generation**: WIPP has extremely oversized transmission lines and transformers serving the site (115kV line, 20 MW transformers to a 4 MW load) and a regional utility infrastructure capable of utilizing any excess power generated. The facility's peak demand is 3754 kW and its annual electric consumption is almost 21 million kWh. Although the electric rate charged to the facility by the utility provider is currently moderate compared to national rates, it is anticipated that sharp increases in this rate will be forthcoming.

- **EIS/EPA requirements already completed?:** In September of 1997 WIPP issued the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (SEIS-II) to provide information on environmental impacts regarding the DOE proposed disposal operations at WIPP. It is anticipated that development of a solar power project at WIPP would require additional NEPA evaluation that can be accomplished through utilizing existing DOE staff and contractor expertise.

- **Commercial power developers:** There is no commercial power production on site currently, however the local electricity provider Xcel Energy has indicated interest in purchasing any excess power that may be generated by solar facilities located at WIPP.

Energy Parks Initiative

General Site Benefits

- **Land ownership**: The WIPP site is located in Eddy County in Southeastern New Mexico on a 16 square mile (approximately 10,240 acres) tract of land that is permanently withdrawn (from BLM lands) and owned by the DOE. The WIPP site surface facilities are located mainly on a 35 acre portion of the withdrawn land.

- **Water/rail availability:** The City of Carlsbad provides water free of consumption charge to the WIPP facility through a 30-mile DOE-owned pipeline under a contract agreement between the DOE and the City that expires in June of 2011. Rail access to the WIPP site can be provided by a rail line connecting with a spur six miles southwest of the site. This section of rail was constructed in 1983, and has not been used or actively maintained by WIPP since its construction.

- **Workforce**: The WIPP facility employs technically qualified, experienced personnel drawn from a diverse base of government and contractor expertise. Additional existing resources in the Carlsbad area include two local national laboratory offices (Los Alamos National Laboratory and Sandia National Laboratories) as well as the Carlsbad Environmental Monitoring Research Center and a branch campus of the New Mexico State University.

- **Site characterizations:** Topography in the vicinity of the WIPP site is relatively flat and is located in a very good solar resource region estimated to be 5.46 kWh/^{m2}/day on the horizontal.

Special Site Considerations

– Related to coal / biofuels: Lack of availability of feedstock in the general area of the WIPP facility precludes the possibility of locating a viable commercial biodiesel and/or ethanol plant onsite. Infrastructure for dispensing biofuels does not presently exist in the Carlsbad area.

– Related to renewables: The characteristics and location of the WIPP land area are generally not conducive to other types of renewable generation such as wind, hydro, geothermal, or biomass.

– Related to nuclear: The remote location of the WIPP site is potentially suited for locating a nuclear power plant provided that such a facility could be sited without impacting the primary mission of WIPP, the disposal of defense TRU waste.

Energy Parks Initiative

2. Hanford Site, Richland, WA

Background

The Hanford Site covers 1517 square kilometers (586 square miles), an area about the size of Rhode Island. It is located along the banks of the Columbia River in the desert of southeastern Washington State. The site is engaged in one of the world's largest environmental cleanup projects, covering more than 53 million gallons of radioactive and chemically hazardous waste in 177 underground storage tanks, 2,300 tons (2,100 metric tons) of spent nuclear fuel, 9 tons (8 metric tons) of plutonium in various forms, about 25 million cubic feet (750,000 cubic meters) of buried or stored solid waste, groundwater contaminated above drinking water standards and spread out over about 80 square miles (208 square kilometers), more than 1,700 waste sites, and about 500 contaminated facilities. Any effort involving Hanford would have to be coordinated with EM-HQ, DOE-Richland Operations, DOE-Office of River Protection and the DOE-Office of Science (Pacific Northwest Site Office).

Perspective of the EPI Concept

Given the vast size of the Hanford site, it is worthy of consideration under the Energy Parks Initiative. Commercial nuclear, coal, natural gas, and bioenergy projects are well-suited to the site, and there is potential opportunity for wind, solar, and in-stream waterpower generation. Multiple commercial power project developers are active in the region. At least two companies are actively looking at plant sites. Hanford's EIS includes the option for industrial development on large tracts of land, which potentially saves 12 – 24 months over sites where no such EIS exists.

Site Options

– Precedents: DOE has demonstrated that alternate mission activities can be done on the Hanford site. Energy Northwest has an operating commercial nuclear reactor on the Hanford site, sharing key infrastructure with the DOE; and the National Science Foundation (NSF) observes gravitational waves of cosmic origin at the Laser Interferometer Gravitational-Wave Observatory (LIGO).

General Site Benefits

- **Land ownership**: DOE has clear ownership of the surface, subsurface, mineral, and water rights. The site is in close proximity to transmission lines, which could shave considerable time/cost off a commercial project. Barge and some rail infrastructure are available. Access to cooling water is a major siting challenge for nuclear and coal-fueled power plants, and it is conceivable that Columbia River water could be used for cooling of conventional plants.

- **Workforce**: The Tri-City area of Washington State has a highly trained workforce including skilled labor, operator, technicians, engineers and scientists. Additionally, this area is home to the Pacific Northwest National Laboratory and Washington State University Tri-Cities.

Energy Parks Initiative

- **Site characterization:** Hanford is one of the best characterized sites in terms of environmental, wind, solar, and biological conditions. DOE spent $200M characterizing basalt geology at Hanford for nuclear fuel storage in the 1980s, making this some of the best characterized geology in the country. The 586-square-mile site, located along the Columbia River in southeastern Washington State, is a plutonium production complex with nine nuclear reactors and associated processing facilities. 500-MW + projects are feasible.

Special Site Considerations

– New coal plants are planned in the region. Washington State is the first state in the nation with special-purpose sequestration siting standards. Hanford geology is suitable for sequestration for a bioenergy, gas, or coal plant. Sequestration could occur with no inference with Hanford clean-up issues. Target formations are 10 to 40 miles away from Hanford clean-up sites and 2000 to 10,000 feet deeper. Sequestration in basalts converts CO2 to a solid, permanent form. Barge infrastructure to support coal and biomass fuel unloading could shave $25M+ off the capital cost of a commercial project. Hanford is located in a heavily agricultural region, creating feedstock opportunities for biofacilities.

– Related to renewable energy: One northwest utility has a solar demonstration plant in the planning stages. There are good wind resources on the northwest portion of the Hanford site (north of the route 24/240 intersection) and potentially in the Saddle Mountain area, although some of this area might be part of the Hanford Reach operated by the Department of Interior (Fish & Wildlife). Also, the NSF LIGO facility may be sensitive to wind turbine vibrations. PNNL's atmospheric capabilities and operation of the Hanford meteorological station could provide a benefit for solar/wind. Washington Initiative 937 requires utilities to supply at least 15% of generation load (i.e., 13 million MWhr/yr) using renewables by 2020, with conventional hydropower excluded from the category. The Columbia River through Hanford is unimpounded, with average flows above 100,000 CFS.

– Related to Nuclear energy: The built, but never commissioned, Fuels and Materials Examination Facility (FMEF) at Hanford could be a valuable asset to industry or an industry/DOE effort to develop and demonstrate a next generation commercial nuclear reactor. DOE-NE has been pursuing the development of a proliferation resistant, economically sustainable recycling facility at an unnamed location, the Advanced Fuel Cycle Facility; but the costs and schedule of such a facility are prohibitive. The Hanford site offers unique infrastructure to house a fuel cycle RD&D center in the Fuels and Materials Examination Facility (FMEF), which was constructed during the early 1980s as an addition to the breeder technology development program. The FMEF could be outfitted and commissioned to meet the needs of fuel cycle closure research and development with significantly reduced cost and schedule relative to a greenfield facility. One of the proposed Generation IV reactors is the sodium-cooled fast reactor. Although a relatively mature Generation IV technology, loop, pump, and steam generator design must be enhanced to make this system economically viable and licensable. At the Hanford 400 Area, facilities exist in which sodium loop tests could likely be conducted at full scale by industry to support commercial prototype design and licensing for Generation IV sodium cooled fast reactors.

Energy Parks Initiative

3. Idaho National Laboratory, Idaho Falls, ID

Background

During August of 2008 a first pass assessment of assets available at the Idaho National Laboratory (INL) that could support Environmental Management (EM) in their quest to improve U.S. energy and manufacturing capabilities was conducted. This paper summarizes infrastructure capabilities available at INL that could address the needs and vision of the Energy Parks Initiative (EPI). As this initiative progresses, additional analyses and/or business cases can be performed to support desired objectives.

Perspective of the EPI Concept

While DOE .Office of Nuclear Energy (DOE-NE) is the Principle Secretarial Office and landlord for INL, the EPI concept has some commonalities with both an element of the core mission, bringing about the nuclear renaissance, as well as improving Energy Security through enhancing energy production and optimizing energy use (including in manufacturing and industrial technology). The large, remotely situated INL site area is well suited for the location of non-polluting nuclear power plants as well as other types of electrical and process heat generation. INL's history is replete with demonstrations of technologies to meet future energy needs.

Site Options

Precedent(s): A number of initiatives have evaluated the use of INL assets in a way that could improve U.S. energy capabilities. Recent assessments include:

- Study of Potential Sites for the Development of New Nuclear Plants in the United States by Dominion Energy, Inc. and the Bechtel Power Corporation
- Site Selection Evaluation for Pebble Bed Modular Reactor (PBMR) Generating Unit by Exelon Generation Company, LLC.
- Idaho National Laboratory; Response to Information Request Pursuant to Section 955 of the Energy Policy Act of 2005

General Site Benefits

Land ownership: INL site land is comprised of DOE "owned" land as well as land withdrawn from the public domain (Department of the Interior) for DOE use. Approximately 90% of INL site land is withdrawn land. NE is the landlord of the overall INL site, but EM and the Naval Nuclear Propulsion Program are large tenant programs having responsibility for groups of facilities and land areas on the site. INL is a designated national environmental research park, functioning as a field laboratory set aside for ecological research and evaluation of the environmental impacts from nuclear energy development. At INL, 72,263 acres have been designated as the Sagebrush-Steppe Ecosystem Reserve. 98% of the site land is undeveloped. The transfer of undeveloped property to a commercial entity for development of a power production facility or other commercial use would require DOE to prepare at least an Environmental Assessment of the transfer. Also, much of the undeveloped land lies in exclusion zones, limiting potential development to limited core areas for which growing demand is anticipated in the future.

Energy Parks Initiative

Workforce: INL has technically qualified, experienced personnel. Existing resources include: a well-maintained computer infrastructure, expertise in atmospheric transport and dispersion consequence assessment modeling with attendant technology, and an emergency management infrastructure with full communication capabilities.
Nuclear activities are accepted and championed by state and local business, civic and political leadership and the populace at large, as evidenced by recent support for the siting of an AREVA fuel enrichment plant adjacent to the INL site (which led to selection of the INL-adjacent site by AREVA).

Site characterizations:

Approximately 570,000 acres or 890 square miles
170 miles of primary, paved roads
111 miles of electrical transmission lines
Access to electrical transmission lines, utility corridors, paved roads and a major rail line (south of the site)
Precedence of private companies establishing infrastructure and rights of way on INL site ground
A full complement of utilities and services
Large, isolated, undeveloped land areas

Electrical reserve margins are narrowing in Idaho, yet a 250 MW coal plant was barred by the Governor and legislature two years ago due to public concerns. The resource plans of the Investor-Owned Utilities now call for the addition of a 250 MW natural gas fired plant in the 2013 time frame in south central Idaho. However, two larger natural gas plants were denied water rights transfers by the State about 5 years ago, based on tightening supplies in northern Idaho. Air permitting and water use will be an issue in any future plant in Idaho.

Special Site Considerations

- Related to coal / biofuels: A commercial biodiesel and/or ethanol plant onsite is a possibility. There is a significant agricultural influence in southeast Idaho, and farmland is abundant immediately adjacent to the site. A biofuels plant in being considered for Blackfoot, Idaho, 30 miles to the Southwest. Siting such a plant at INL as part of EPI may have intrinsic benefits to Idaho and garner additional support.
- Related to renewables: according to the Loan Guarantee Office, the INL site has great potential for these renewable energy sources. Land use questions for siting and associated transmission needs would have to again be addressed in the context of the mission of INL.
- Related to nuclear: The INL is focused on bringing about the nuclear renaissance through both technology development and demonstration. Complete Fuel Cycle capacity and expertise is present at the INL. However, careful consideration would need to be taken with respect to using the expertise and even existing facility infrastructure for industrial efforts rather than research, development, demonstration, and deployment activities. It is not clear to what extent industrialization would be in the best interest of the DOE in using the INL asset.

Energy Parks Initiative

4. Oak Ridge National Laboratory, Oak Ridge, TN
(and other Oak Ridge DOE sites)

Background
ORNL has had a great deal of experience in recent years with creative uses of DOE land, including the fee simple transfer of property to the UT-Battelle Development Corporation to construct privately-financed buildings and, and to the State of Tennessee for state-funded buildings, as well as the transfer of property to East Tennessee's Community Reuse Organization via a long-term lease for the establishment of a private Science and Technology Park.

Perspective of the EPI Concept

As an Office of Science site, DOE has encouraged land uses that are consistent with DOE's science missions. In addition, there are other sites on the DOE Oak Ridge reservation which may offer even better opportunities for large scale energy production consistent with this EPI concept, and they are briefly described below. However, ORNL has established a well-deserved reputation for creativity and solid execution, so if the concept is embraced by DOE there may be an opportunity to involve ORNL in this activity – particularly if the venture has a research and development component strategically aligned with ORNL current directions.

Site Options

- **Energy generation:** ORNL has operated several low-power research reactors (including one that is currently operational). ORNL also has demonstration projects for solar energy, including a large solar array designed to make a 30,000 square foot building a net zero-energy facility. We've also recently announced the conversion of its 50-year old steam plant to bio-energy/bio-mass facility.
- **EIS / EPA requirements already completed?** ORNL has completed Environmental Impact Studies and met other EPA requirements for a number of R&D and pilot scale projects, and has the staff expertise to contribute to a larger EIS if the need presented itself.
- **Commercial power developers** While there is no commercial power production on site currently, there is historical precedent. TVA and DOE partnered to build a large gas cooled reactor for power production on the ORNL reservation.
- **Commercial manufacturers** ORNL has had numerous industrial partnerships over the years with commercial manufacturers such as GE, Cummins, etc. The on-site Oak Ridge Science & Technology Park is home to the Halcyon Commercialization Center – an incubator for commercialization of technology developed in collaboration with ORNL.

General Site Benefits

- **Land ownership:** The Oak Ridge reservation is owned by DOE, but the precedent exists to create and transfer portions of subdivided properties either fee simple or via long-term lease to non-DOE entities for activities consistent with DOE missions.
- **Water / rail availability** The Oak Ridge reservation is bounded by the Clinch River, which is navigable by commercial barge traffic. A barge terminal and rail lines are

within 3 miles of the ORNL campus, and are directly adjacent to the East Tennessee Technology Park, the former location of the K-25 gaseous diffusion plant.

- **Workforce** The East Tennessee region has a highly technically capable work force with skills associated with nuclear power generation, advanced manufacturing, and information technology. Tennessee is a right-to-work state with a very strong historical work ethic.
- **Site characterizations** There are large tracts of land available on the ORNL campus and elsewhere on the DOE reservation - *should DOE embrace the EPI concept as mission-related.*

Special Site Considerations

- **Related to coal / biofuels:** ORNL is one of 2 DOE Bioenergy Science Centers in the U.S. There are two coal-fired TVA plants close to the Oak Ridge reservation.
- **Related to renewable** ORNL has both a solar and geothermal research, development, and deployment experience on site.
- **Related to nuclear** ORNL has existing research reactors and operating isotope separation and hot cell capabilities. It also has an active role in the Global Nuclear Energy program (GNEP). ORNL is in the TVA service area, and TVA is a leading player in the country's nuclear renaissance. Given the history of nuclear activity in Oak Ridge and TVA's strong presence, the region is generally very comfortable with and favorable to nuclear activity.

Additional Site Considerations on the DOE Oak Ridge reservation

- **East Tennessee Technology Park (Former K-25 site)** ETTP sits at the far west end of the Oak Ridge Reservation, approximately 3 miles from the ORNL campus. It is an EM site that is focused on transformation to a brownfield industrial site, using CROET as an intermediary. It may in fact be the best candidate site for the EPI concept in Oak Ridge: it will have large sites available for re-use; it has rail and barge access; it has tremendous electrical transmission capacity since it served as a gaseous diffusion plant site for decades.
- **Former Breeder Reactor site owned by TVA:** There is also an ~1300 acre site on the west end of the DOE reservation owned by TVA, which was originally the site for the proposed Clinch River Breeder Reactor. The site is partially graded and is immediately adjacent to the Clinch River. This site has had a full EIS performed, although it would have to be updated. If TVA was persuaded to become a partner with ORNL and DOE in the Energy Parks Initiative, the former Breeder site could be a very attractive potential location.

Energy Parks Initiative

6. Portsmouth and Paducah Enrichment Plants, Portsmouth, OH and Paducah, KY

Paducah Gaseous Diffusion Plant (PGDP).

Background

DOE owns approximately 3,420 acres of land in Paducah, KY, referred to as the Paducah Gaseous Diffusion Plant (PGDP). Of this land, 1,437 acres are located within the fenced security area or serve as a buffer zone around the secure area. The US Enrichment Corporation (USEC) leases a significant portion of the site. Under that lease, USEC has a right of first refusal to lease real property at PGDP should DOE decide to disposition such property. This leasing relationship would likely impact the speed at which these property interests could be conveyed to any commercial entity. PGDP is the only operating uranium enrichment facility in the US. The remaining 1,983 acres are licensed to the Kentucky Department for Fish and Wildlife Resources (KDFWR), as part of the West Kentucky Wildlife Management Area (WKWMA). Although DOE has initiated the decontamination and decommissioning of PGDP inactive facilities, uranium enrichment activities at the PGDP are currently estimated to continue through at least 2012; however, USEC, not DOE, will determine the date operations actually cease at the site.

The PGDP and buffer zone are bounded to the north, south, east, and west by DOE property that is licensed to the KDFWR, WKWMA (KDFWR-owned) property, and privately-owned property. DOE property that is licensed to KDFWR is also bounded to the north by TVA-owned property.

Perspective of the EPI Concept

Although DOE has encouraged land usage through the licensing or leasing of its property to KDFWR and USEC, the PGDP remains an active gaseous diffusion plant. Once current uranium enrichment activities cease and CERCLA response actions have been addressed, the availability of excess land and infrastructure for privately-funded commercial energy projects can be considered. Although completion of CERCLA response actions may not be required prior to making land available for commercial use, how and when the actions are addressed must be coordinated with lease/license holders and regulators.

Site Options

- **Energy availability** Local power resource facilities include TVA and Electric Energy, Inc. (EEI). The TVA Shawnee Fossil Plant (SFP) is located within 3 miles of the PGDP. The TVA SFP has 10 coal-fired generating units. Electricity is produced by the process of heating water in a boiler to produce steam. EEI is located across the Ohio River from the PGDP in Joppa, IL. It generates 1,000 MW of electrical capacity at its coal-fired power plant and 55 MW at its natural gas fired facility at the same location. TVA and EEI provide power to support activities at the PGDP. The PGDP power capacity runs between 900 MW and 2,000 MW. TVA and EEI's services can continue to be utilized to support the EPI concept.
- **Organizations involved** A partnership currently exists with DOE and the Paducah Uranium Plant Asset Utilization (PUPAU) Task Force. One focus of the PUPAU is to explore and promote new missions for the PGDP that will fully utilize site assets. PUPAU works with DOE to establish a path forward to return value back to the community through the reuse of PGDP assets. The Paducah Area Community Reuse Organization is also actively involved in reuse issues at the site.

Energy Parks Initiative

- **Commercial manufacturers** DOE has proposed disposition (i.e. sale, transfer, grant, or disposal) of approximately 9,700 tons of the nickel metal scrap stored at PGDP. The PGDP is a potential location for private industry to use the contaminated nickel in a controlled manner to make high-quality products (e.g., pure nickel, stainless-steel, or components made from other alloys).

General Site Benefits

- **Land ownership** The PGDP reservation is owned by DOE with portions leased to USEC and KDFWR.
- **Transportation availability** The PGDP reservation is located approximately 10 miles west of the city of Paducah. The city of Paducah is located at the confluence of the Tennessee and Ohio Rivers. The Cumberland and Mississippi Rivers are also within close proximity of the PGDP. The rivers are navigable by commercial barge traffic. The PGDP contains over 9 miles of railroad. An airport and interstate highway are also within close proximity of the PGDP. The airport provides commercial service.
- **Workforce** The region has a technically capable work force with skills associated with nuclear power generation, manufacturing, and information technology.
- **Site characterizations** The PGDP has been extensively characterized over time. Data are available on surface and subsurface soil, geotechnical characteristics, groundwater, and atmospheric conditions, weather patterns, etc., all of which could be used to establish the baseline characteristics needed for new facility siting.

Special Site Considerations

- **Related to coal / biofuels** PGDP is in the TVA and EEI service areas; the TVA and EEI facilities provide energy through fossil fuel.
- **Related to nuclear** The PGDP may be suited for nuclear power plants and other nuclear-related activities. The Office of Nuclear Energy initiated a Global Nuclear Energy Partnership (GNEP) to address DOE strategic needs relative to the nuclear fuel cycle. PGDP was 1 of 11 sites that was identified to receive funding for DOE to study the suitability for hosting GNEP facilities. Given the history of nuclear activity at PGDP, the region is generally accustomed to nuclear activities.

Additional Site Considerations on the DOE PGDP reservation

- Due to the USEC lease, a primary consideration at that site must be that the transfer of real property to any commercial entity would entail first offering the property to USEC under its lease. Further, due to the lease, DOE often does not control when facilities and property are returned to DOE and thereby be available for use by another commercial entity.
- The primary use of a significant portion of the site is wildlife management and any commercial venture that impinged upon that effort may face resistance from the local community.
- There is an existing understanding at the site that, subject to the USEC lease and applicable law, property will be made available to PUPAU/PACRO.
- Generally, the use of PGDP for nuclear application may require the completion of D&D of the GDP buildings. D&D may be able to be tailored to accommodate a nuclear application, e.g. use of existing foundations and disposal cells.

Energy Parks Initiative

Portsmouth Gaseous Diffusion Plant

Background

DOE owns approximately 3770 acres in Piketon, OH, referred to as the Portsmouth Gaseous Diffusion Plant (PORTS). Of the 3,770 acres, 550 acres are located within the PORTS fenced security area. The United States Enrichment Corporation (USEC) currently leases a significant portion of the site. Under that lease, USEC has a right of first refusal to lease real property at PORTS should DOE decide to disposition such property. This leasing relationship would likely impact the speed at which these property interests could be conveyed to any commercial entity. Additionally, USEC, Inc., a USEC affiliate, leases a small portion of the PORTS site where it is developing and constructing the American Centrifuge Plant (ACP). The ACP intends to launch a new means for energy independence using American-developed, designed, and built uranium enrichment technologies. The use of the PORTS site for endeavors such as this demonstrates DOE's efforts to work cooperatively in furtherance of energy security.

Perspective of the EPI Concept

PORTS is actively engaged in site clean-up with one end-state objective for industrial reuse. Energy-related activities of a broad nature are consistent with this industrial reuse objective and will be able to take advantage of PORTS' many proven resources, including its skilled workforce, land and facility assets, cooperative regulatory relationship, partnership with the local Community Reuse Organization (the Southern Ohio Diversification Initiative, or "SODI"), civic relationships on a local, state and federal level, and most importantly, DOE's willingness to take the necessary steps to make the Energy Parks Initiative a reality on the PORTS reservation. DOE is currently considering transferring several hundred acres on the North side of the site to SODI for reindustrialization purposes.

Site Options

Precedence – As noted above, USEC's ACP is under development at the site to engage in uranium enrichment using advanced centrifuge technology. The ACP facilities are privately owned and licensed by the Nuclear Regulatory Commission (NRC). The proven success of the dual regulatory framework (DOE and NRC) on site should facilitate creative approaches to the advancement of energy technologies at PORTS.

Energy availability: DOE currently obtains electricity on site through an agreement with the Ohio Valley Electric Corporation. Certain site services are managed by and obtained through USEC under its lease.

EIS / EPA requirements already completed? PORTS is prepared to support the development of an EA or EIS for future uses such as those contemplated by the EPI. Site environmental data already exist for all types of media and provide both a "snapshot" and longitudinal breadth of information as the site has been studied for decades. PORTS could assist a future user of the site with obtaining the necessary permits by provision of data, documentation, and personnel resources. DOE has begun the process of completing an EA for reindustrialization and commercial uses some of which may be considered uses under the EPI.

Commercial power developers There is no commercial power production on site.

Energy Parks Initiative

General Site Benefits

- **Water / rail availability** PORTS has an extensive on-site rail system with various track configurations available. It is connected to the Norfolk Southern system via a rail spur. Barge access to the Ohio River is available through several nearby ports. Scioto River is located to the West and while not supporting Barge traffic, it in combination with the underground aquifer has supplied water to PORTS and the surrounding area.
- **Workforce** The southern Ohio region has a highly technically capable work force with skills associated with nuclear power generation and in all sectors of manufacturing. The region includes the highest percentage of manufacturing jobs in Ohio and is an outstanding resource for any future use options. The workforce in the region has a long history of supporting nationally important initiatives and is committed to national security interests such as those promoted by the larger goals of EPI.
- **Site characterizations** The PORTS reservation has been extensively characterized over time. Data are available on surface and subsurface soil, geotechnical characteristics, groundwater, and atmospheric conditions, weather patterns, etc., all of which could be used to establish the baseline characteristics needed for new facility siting.

Special Site Considerations

- **Related to coal / biofuels** Ohio is a coal-producing state and clean-coal technologies are of particular interest in southern Ohio. Over 90% of the land area in southern Ohio is either forested or agricultural and could be well-suited to alternative/biofuel research, production, storage, and/or generation.
- **Related to renewable** None at this time, but SODI, DOE's recognized Community Reuse Organization, is committed to identifying all suitable future use options for the site, consistent with the Site's end use objectives.
- **Related to nuclear** Since PORTS has the DUF6 conversion activities and the ACP, one significant concern over the siting of a nuclear facility at PORTS is whether a significant buffer zone is available on site. The Office of Nuclear Energy initiated a Global Nuclear Energy Partnership (GNEP) to address DOE strategic needs relative to the nuclear fuel cycle. PORTS was 1 of 11 sites that was identified to receive funding for DOE to study the suitability for hosting GNEP facilities. Given the history of nuclear activity at PORTS, the region is generally accustomed to nuclear activities occurring.

Additional Site Considerations on the DOE PORTS reservation

- Due to the USEC lease, a primary consideration at that site must be that the transfer of real property to any commercial entity would entail first offering the property to USEC under its lease. Further, due to the lease, DOE often does not control when facilities and property are returned to DOE and thereby be available for use by another commercial entity.
- There is an existing understanding at the site that, subject to the USEC lease, property will be made available to SODI consistent with applicable law/regulation.

Generally, the use of PORTS for nuclear application may require the completion of D&D of the GDP buildings. D&D could be tailored to accommodate a nuclear application, e.g. use of existing foundations and disposal cells.

Energy Parks Initiative

6. Savannah River Site, Central Savannah River Area, SC

Background

During August of 2008 a first pass assessment of assets available at the Savannah River Site (SRS) that could support Environmental Management (EM) in their quest to improve U.S. energy and manufacturing capabilities was conducted by the Savannah River National Laboratory (SRNL). This assessment report discusses infrastructure capabilities available at the SRS that could potentially reduce costs and licensing obstacles. Additionally, both current and ongoing energy initiatives to support improvements in U.S. energy and manufacturing capabilities are detailed along with potential opportunities in Environmental Management, Energy Security, and National Security. As this initiative progresses, additional analyses and/or business cases can be performed to support desired objectives.

SRNL's Perspective of the EPI Concept

In 2001, the Savannah River Site Community Reuse Organization (SRSCRO) proposed the creation of an Energy Park at the Savannah River Site. The large, centrally situated Savannah River Site is ideally suited for the location of non-polluting nuclear power plants for the generation of electrical power to meet our country's current energy supply crisis needs and to demonstrate the new technologies best able to meet future energy needs.

Site Options

Precedent(s): A number of recent past and current initiatives have evaluated the use of SRS assets in a way that could improve U.S. energy and manufacturing capabilities. Recent commercial assessments include:

- Study of Potential Sites for the Development of New Nuclear Plants in the United States by Dominion Energy, Inc. and the Bechtel Power Corporation
- NuStart Energy Assessment of Candidate Sites for the Next Generation of Nuclear Energy
- Savannah River National Laboratory; Response to Information Request Pursuant to Section 955 of the Energy Policy Act of 2005

General Site Benefits

Land ownership: The Savannah River Site is a key Department of Energy (DOE) industrial complex responsible for the safe stabilization, treatment, and disposition of nuclear materials, spent nuclear fuel, and waste. SRS covers approximately 198,000 acres (310 square miles) adjacent to the Savannah River in South Carolina. Facilities account for approximately five percent of the SRS area. DOE has set aside about 14,230 acres to protect rare, threatened, and endangered species and unique habitats.

Workforce: SRS has technically qualified, experienced personnel. Existing resources include: a well-maintained computer facility, extensive expertise in atmospheric transport and dispersion consequence assessment modeling with attendant technology, and an emergency management infrastructure with full communication capabilities.

SRNL operates an atmospheric modeling system and response center that conducts atmospheric forecast modeling routinely in real-time for the southeastern U.S. in support of

operations and emergency response activities at SRS. The Central Savannah River Area (CSRA) has long supported SRS nuclear. Nuclear activities are accepted and championed by state and local business, civic and political leadership and the populace at large.

Site characterizations:

198,344 acres or 310 square miles
129 miles of primary, paved roads
125 miles of electrical transmission lines
62 miles of main steam lines
63 miles of rail track
25 miles of intra-area sewer system piping and 39 of domestic water lines
10,000 managed desktops
115 miles of inter-area and 185 miles of intra-area fiber cables

SRS has its own railroad system, which services all major facilities. The rail network includes a main line of the CSX Railroad and the site wide DOE-owned rail system.

SRS is home to approximately 125 miles of electrical transmission lines operating at 115kV. SRS also has a tie-in line to the Vogtle Electric Generating Plant. This close proximity to a two unit nuclear station and a 500kVA north/south grid line provides an excellent power distribution pathway for the east coast.

On DOE property on the Savannah River is a barge slip which is used for heavy loads and large components.

Special Site Considerations

- Related to coal / biofuels: A commercial biodiesel and/or ethanol plant onsite is a possibility. The largest soybean processor in the southeast is less than 50 miles from the site boundary, and there are farmers with over 10,000 acres committed to grow switch grass or other viable energy crops to support such a facility less than 100 miles from the site.

- Related to renewables: SRS is involved in two renewable generation activities: the wood-fueled powerhouse in A Area to provide steam, and the wood-fueled powerhouse in D Area for electricity and steam. The characteristics of the SRS land area are generally not conducive to other types of renewable generation such as wind, hydro, geothermal, or solar, but additional opportunities exist for biomass.

- Related to nuclear: The Savannah River Site is ideally suited for nuclear power plants, and is endowed with a supportive community and an extensive nuclear infrastructure. The Park is sized to accommodate multiple large reactors.

(5)

EM U.S. Department of Energy
Office Of Environmental Management

The EM Energy Parks Initiative

"Leveraging Assets to increase the Taxpayer's Return on Investment"

EM Environmental Management
safety ❖ performance ❖ cleanup ❖ closure

January 31, 2008

www.em.doe.gov

EM Energy Parks Initiative: Briefing Coverage

- **The Overall Concept**
- Status & Next Steps
- Related Activities

Energy Parks Initiative: A bold and innovative concept

. . . to leverage assets and create opportunity to enable rapid development of large-scale energy-related facilities

. . . particularly those with significant potential of sustained progress towards energy independence, regional economy, national security, environmental sustainability, and other national concerns.

Energy Parks Initiative: Philosophy

- Globalization amplifies and accelerates the effects of the interrelationship between energy, economy, and environment.
- Global developments and increasing expectations for effective governance provide us the opportunity to "push past the tipping point" of progress towards resolving several national concerns.
- EM serves various national interests, and as a key member of the "DOE Enterprise Team."

Energy Parks Initiative: Summary

- A teaming of DOE, industry, and regional stakeholders, to enable rapid development of certain large-scale facilities at specific sites.

- DOE generates opportunity by designating valuable assets (including land), requesting expressions of interest, and negotiating to maximize the value and impact of opportunity.

Energy Parks Initiative: Why EM?

- Facilitates EM mission execution
  - Transition to beneficial use
  - Engages stakeholders as partners
  - Leverages liabilities into opportunity
  - Supports "industrial use" standards
  - Reduces "EM footprint"
  - Averts life-cycle costs
- Attractive assets help meet national goals
- Increases taxpayer return on investment (ROI)

Energy Parks Initiative: Kind of Assets

✓**Infrastructure** (roads, buildings, equipment, utilities, barge & rail access, transmission systems, and specialty features and capability)

✓**Natural Resources** (land, water, and renewable energy).

✓**Institutional Controls** (clear land title, physical control, security, water rights, NPDES and other permits, buffer area, environmental & seismic characterization, and security)

✓**Human and Economic Capital** (knowledge of regulatory environment, highly trained workforce, transition to succeeding missions, and return of valuable assets to the local tax base)

✓**Diversity, Size, and Remoteness** (allows consideration of a many uses, and protection of critical infrastructure)

✓**Applied Tools** (technology, loan guarantees, purchasing power)

Energy Parks Initiative: Technology

Options include conventional & advanced energy technologies, such as:

- ✓ Renewable energy: solar, wind, biomass, geothermal
- ✓ Fossil fuels: clean coal, gas turbines
- ✓ Electricity generation, transmission, & distribution
- ✓ Hydrogen generation
- ✓ Emission controls, carbon sequestration
- ✓ Specialty manufacturing
- ✓ Nuclear: power, fuel cycle, waste management

Energy Parks Initiative: Process

The initiative involves:

- **Asset Review ***
- **Expressions of Interest**
- **Optimization**
- **Contracting**
- **Execution**

*** (e.g., involves a case-by-case evaluation of numerous factors such as relative ROI to the taxpayer, overall feasibility, and impact of timely implementation)**

EM Energy Parks Initiative: Briefing Coverage

- The Overall Concept
- **Status & Next Steps**
- Related Activities

Status & Next Steps: Stakeholder Feedback

"ROI drives industrial interest"

- **Support for "green" power generation** (e.g.: solar, carbon sequestration and alternate biofuels)
- **Support for Nuclear applications** (e.g., hydrogen generation and spent nuclear fuel storage)
- **Licensing & Permitting**
- **Financial risk** (i.e., loan guarantees, capping risk)

Status & Next Steps

Completed:

- ✓ Draft EPI White Paper & Footprint Reduction/EPI Paper
- ✓ Positive informal stakeholder feedback
- ✓ Transition Team briefed by EM-1
- ✓ HQ/Field Coordination Meetings held 4 Dec 08
- ✓ Draft Request for Federal Register Notice: Notice of Public Meetings

Status & Next Steps

Pending:

- **Implementation Decision at hand:**
  - **EM Initiative**
  - **Department-wide Initiative**
  - **National Initiative**
- **Complete detailed Implementation Plan**
- **Meetings with other DOE elements**
- **Regional Meetings (industry & stakeholders)**
- **Develop Implementation Baseline (Scope, Schedule, Outcomes, Resources, Critical Path)**

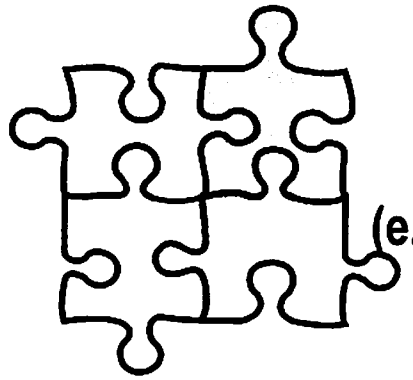
EM Energy Parks Initiative: Briefing Coverage

- The Overall Concept
- Status & Next Steps
- **Related Activities**

Related Activity: Solid historical foundation

Federal Energy Management Program

Transformational Energy Action Management



Energy Saving Performance Contracts

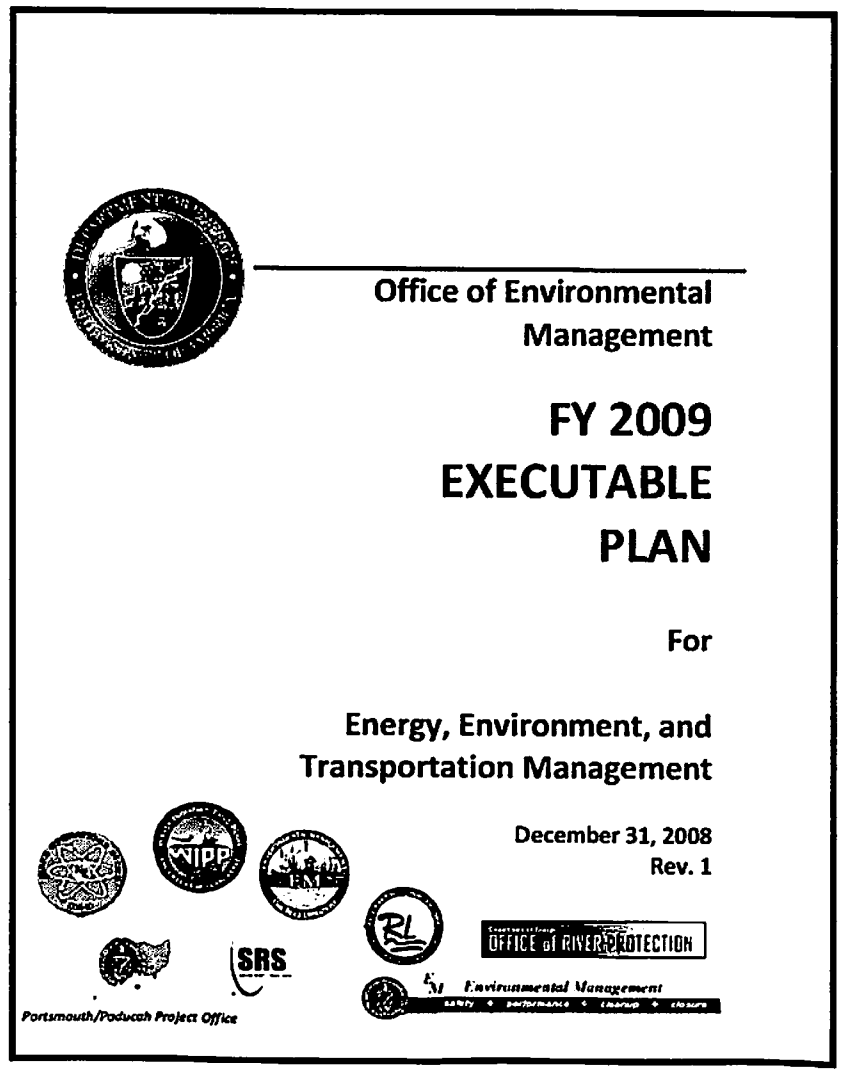
Successful EM transfers
(e.g., Rocky Flats, Mound, & Fernald)

10 CFR 770 transfer of assets (at less than market value) to private sector, meeting DOE needs & promoting economic development (1998 Defense Authorization Act)

Community Reuse Organizations support economic diversification around sites impacted by downsizing (1994 Defense Reauthorization Act)

Sample Related EM Activity

- EM Awarded FEMP Achievement for Lead on *TEAM* Initiatives
- Developed EM's FY2009 Executable Plan
- Operable Biomass Plant at Savannah River
- Awarded ESPC Project at Hanford
- Several Pollution Prevention (P^2) Awards to ETTP, PORTS, and SRS


Office of Environmental Management

FY 2009
EXECUTABLE
PLAN

For

Energy, Environment, and Transportation Management

December 31, 2008
Rev. 1

Related Activity: EM Meeting key TEAM Goals

- **Energy Reduction**: 30% Reduction by FY-2015

  The energy intensity reduction is due largely to the SRS energy efficient biomass cogeneration project and the RL ESPC project initiative.
- **Renewable Energy Use**: Use 7.5% Renewable by FY-2010

  EM exceeds the goal with a current renewable energy generation/use measured at 14.1% (of RE from electrical Mw) and 77.4% (of RE from thermal pounds per year).
- **Water Reduction**: 16% Reduction by FY-2015

  EM's plan, which includes D&D activities at the Idaho Cleanup Project and East Tennessee Technology Park, meets the current 30% reduction of water consumption by FY-2015.

Related Activity: TEAM Goal Challenges

- **Fuel/Transportation:** Various

  EM will meet and exceed all transportation fuel goals established by continuing to obtain as many alternative fuel vehicles and use alternative fuels made available by GSA and vehicle manufacturers.

- **Sustainable Design:** 15% of Footprint meets 100% of Sustainable Guiding Principles

  Approximately $133 M would be required to renovate facilities so that building characteristics meet 100% of the Sustainable Guiding Principles

Related Activity: Supports Energy Parks Initiative

... from "greening" of energy supply,

to teaming with community reuse organizations & industry

- **Hanford:** shares infrastructure with nuclear utility, 71 acres transferred for development
- **Savannah River:** working on leasing 2,500 acres for electric production, large-scale demonstration of new energy technologies & manufacturing of energy generation equipment
- **Oak Ridge:** private-sector business and industrial park, transferred 50 acres, & much site infrastructure
- **WIPP:** RFI for 16 square miles of solar resources
- **Mound & Fernald:** ongoing site conversion

Questions and Answers