



U.S. DEPARTMENT OF
ENERGY

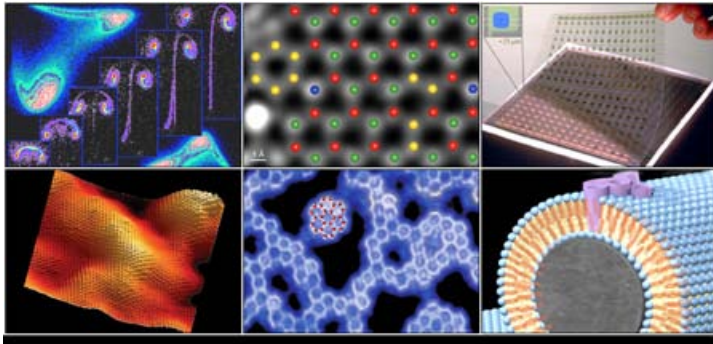
DOE Energy Technology Partnerships

Laurel Miner, PhD

April 13, 2011

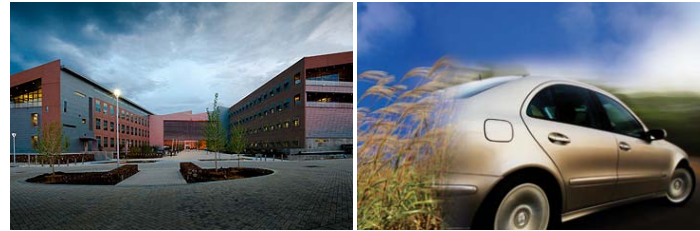
Department of Energy

Basic Science

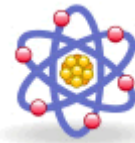


Energy Delivery

Energy Efficiency



Renewable Energy



Nuclear Energy

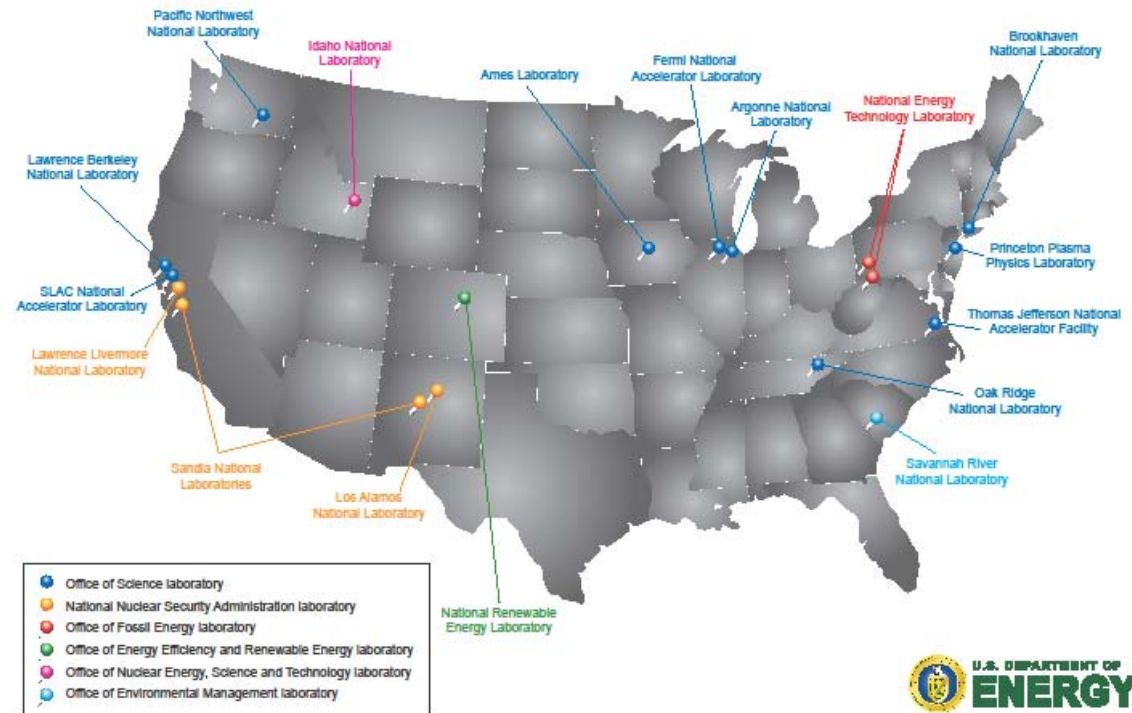


Fossil Energy

Department of Energy

- 17 National Laboratories
- > 60 user facilities
- 15,000 patents

Department of Energy National Laboratories



Reducing Barriers for Entrepreneurs

“When it comes to job creation, start-ups are not everything, they are the **ONLY** thing.”

Carl Schramm, Kauffman Foundation



- Goal: Double number of successful start-ups from DOE National Labs (FY09 →21)
- Strategy: Increase the number of negotiated Option Agreements for start-ups from DOE Labs by lowering transaction costs (time & Money)

America's Next Top Energy Innovator

- Pilot Program from May 2 – December 15, 2011
 - Template option agreement for any DOE patent*
 - \$1,000 up-front fee
 - 12 month option
 - 6 month option with a 6 month no cost extension
 - Portfolio of up to 3 patents for a specific technology from a single laboratory
 - Deferment of patent cost for up to 2 years
 - Optional VC mentoring available
 - Showcased at ARPA-E Innovation Summit

*Majority of DOE patents are held by National Labs, the rest are held by DOE Headquarters



Fine Print

- Fairness of Opportunity (FOO) requirement
 - For patent application or unpublished patents
 - Labs will need to ensure FOO is met (i.e., widely publicizing the technology)
- US Manufacturing Preference/Requirement
- Patent cost deferment excludes ongoing foreign patent cost or out of the ordinary expenses such as interference
- Multiple inquiries for same IP and field of use overlap –Lab will use their current best practices to select Optionee

Process

- Browse DOE's portfolio of technologies
- Submit business plan to appropriate Lab
- Complete template Option with Lab
- Starting working toward agreed upon milestones



<http://techportal.eere.energy.gov/>

FAQ

- **Q1: Are foreign companies eligible?**
 - A1: No, program is limited to newly-created U.S. Start-ups, who submit a business plan to the Lab that hold the IP they are interested in commercializing.
- **Q2: How extensive does the business plan need to be?**
 - A2: It must describe the general market and business opportunity the start-up expects to address; a set of commercialization milestones and the associated financial and personnel requirements to achieve those milestones. A Lab may be willing to allow the start-up to develop a more robust business plan during the first months of the Option, so long as a preliminary plan is submitted with requisite experience and expertise and/or a credible plan for a timely acquisition of that expertise.
- **Q3: Are other government agencies also participating?**
 - A3: Not at this time, this is a pilot program that may be adopted at a later date by other agencies.

FAQ (Cont'd)

- **Q4: Are universities eligible?**
 - A4: No, but they are encourage to promote the program to their students, faculty and staff, especially with respect to IP bundling.
- **Q5: How will DOE handle multiple inquiries for the same technology?**
 - A5: The Labs already have procedures in place to address multiple inquiries. Typically the goal is to deploy the technology as widely as possible. So, limited field of use may be considered. If the interest overlap the competing proposals will be reviewed on their merits.
- **Q6: Is there an advantage to applying early?**
 - A6: Absolutely, inline with their current business practice proposal are reviewed and evaluated as they are received by a Lab. The Labs will make Option/License decisions based on the proposals in hand. We suggest you apply as soon as you have a solid business proposition.

Featured Patents

Apparatus for the Laser Ablative Synthesis of Carbon Nanotubes

Thomas Jefferson National Accelerator Facility

[GO BACK](#)

<http://techportal.eere.energy.gov>

Technology Marketing Summary

This invention can produce copious quantities of carbon nanotubes at rates near grams per hour.


Description

It is an RF-induction heated side-pumped synthesis chamber for the production of carbon nanotubes. Such an apparatus provides a simplified apparatus that allows for greatly reduced heat up and cool down times and flexible flowpaths that modified for production efficiency optimization.

Applications and Industries

One application is as reinforcement for lightweight polymeric structures, especially inflatable structures for use in outer space. Other properties of the SWNTs, their electrical conductivity provides a means of reducing static charge buildup on such devices. Other applications include hydrogen storage at "low", i.e. about atmospheric pressure, although debate still rages as to this application and in NEMO, for example, quantum computing devices.

Intellectual Property Status

ID Number	Title and Abstract
 Patent 7,663,077	<u>Apparatus for the laser ablative synthesis of carbon nanotubes</u> An RF-induction heated side-pumped synthesis chamber for the production of carbon nanotubes. Such an apparatus, while capable of producing large volumes of carbon nanotubes, concurrently provides a simplified apparatus that allows for greatly reduced heat up and cool down times and flexible flowpaths that can be modified for production efficiency optimization.

Featured Patents

Facility Energy Decision System (FEDS™) Software

[Pacific Northwest National Laboratory](#)

[GO BACK](#)

<http://techportal.eere.energy.gov>

Technology Marketing Summary

The Facility Energy Decision System—or FEDS—Software is a user-friendly, menu-driven, Windows-based software program that provides a comprehensive method for quickly and objectively identifying facility energy improvements that offer maximum life-cycle cost savings.

Description

FEDS Software makes assessments and analyzes energy efficiency in single or multiple buildings. Users can quickly compare savings potential across different sites through multiple FEDS runs. It provides an easy-to-use tool for identifying minimum cost retrofits, determining payback, and enabling users to prioritize options.

Benefits

- Calculates lowest life cycle cost-effective energy systems for all building types
- Provides a consistent basis for decision-making on retrofit options
- Reduces time and labor required to collect, analyze, store, and update building data
- Delivers the information necessary for writing project funding proposals
- Serves as an integral part of a cost-savings program

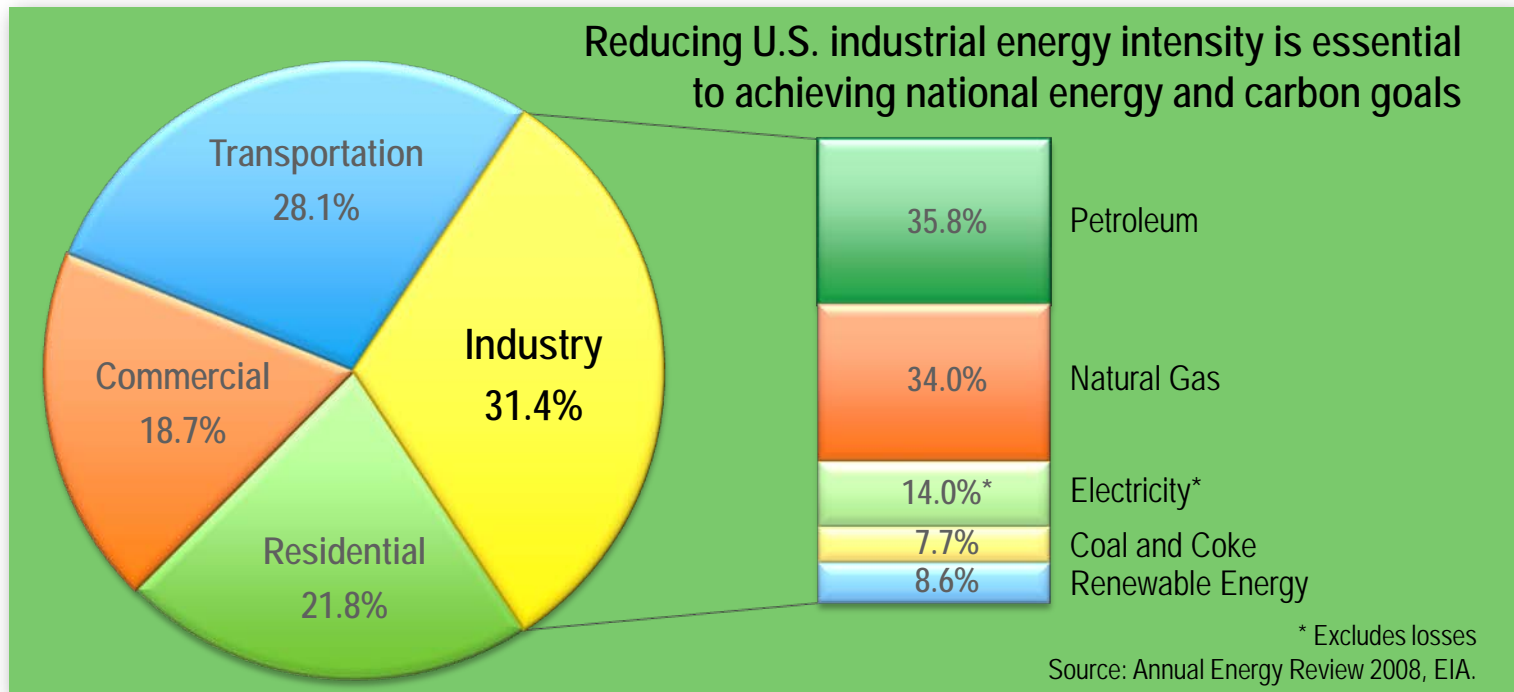
Applications and Industries

- Building energy systems, central energy plants, and thermal loop
- Retrofit and new construction



U.S. Manufacturing Sector

- Employs ~12 million people
- Makes the highest contribution to GDP (~12%)
- Supplies ~55% of U.S. exports, worth ~\$80 billion/month
- Spurs job creation and investment
- Every million dollars in energy cost savings has the potential to create approximately 16–17 new jobs.



* Excludes losses

Source: Annual Energy Review 2008, EIA.



OF
ENERGY

Significant Energy Reduction Potential Exists in Energy Intensive Industries

Energy-intensive Industries		Chemicals	Petroleum Refining	Pulp & Paper	Steel	Aluminum
Industry Average	Btu/\$ shipped	4,860	6,310	13,930	12,480	6,450
<ul style="list-style-type: none"> •Best operational practices to improve actual operating efficiency •Use of best available technologies (equipment and processes) •Capital investment in State of the Art (SOA) equipment and process technologies 						
State of the Art Plant		17%	28%	26%	22%	12%
<i>New technologies via R&D based on current knowledge</i>						
Practical Minimum		42%	38%	39%	39%	38%
<i>New technologies from future scientific frontiers</i>						
Theoretical Minimum		84%	71%	43%	53%	62%

Energy Use

Source: ITP Energy Bandwidth Studies



ITP Delivers Solutions

Improve national energy security, climate, environment, and economic competitiveness by transforming the way U.S. industry uses energy.



Research & Development

Develop advanced technologies addressing the top energy savings opportunities across industry



Technical Assistance

Help plants save energy today by assessing opportunities and facilitating adoption of best energy management practices

Related Authorizations

P.L. 102-486, “Energy Policy Act of 1992”
(industrial assessments, state grants)

P.L. 109-58, “Energy Policy Act of 2005”
(voluntary agreements with industry)

P.L. 110-140, “Energy Independence and Security Act of 2007” (CHP and waste energy, energy-intensive industries program, data centers, motor standards, renewable energy manufacturing)



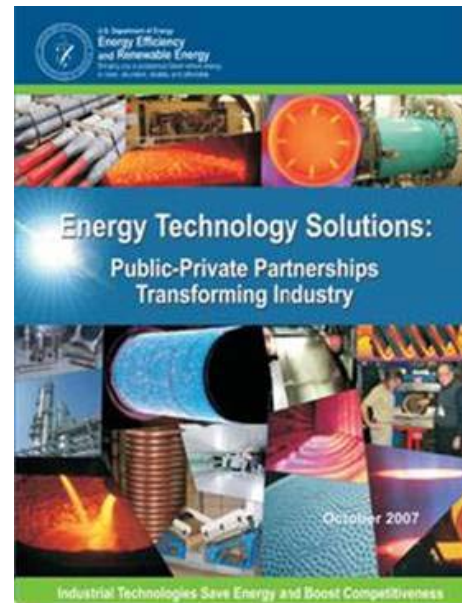
U.S. DEPARTMENT OF
ENERGY

ITP's Track Record of Innovation and Success

ITP: Delivering R&D Results For 30 Years

Working with industry, we have successfully developed and moved cutting-edge technologies and energy-saving measures into practice.

- Produced >220 commercialized technologies
- Resulted in 215 patents between 1994 and 2009
- Received 51 R&D 100 Awards since 1991
- Saved 8.5 quads of energy and reduced carbon emissions by 693 MMT*CO₂



* Million Metric Tons



U.S. DEPARTMENT OF
ENERGY

Crosscutting R&D

Energy Intensive Processes (EIP)

Addressing top opportunities to save energy and reduce carbon emissions across industry

- Reactions & Separations (catalysts, water management)
- Waste Heat Recovery (steam generation, heat utilization)
- High-Temperature Processing (lower-energy approaches)
- Sustainable Manufacturing (material efficiency, ICT, automation/wireless sensors to continuously optimize systems)



Industrial Materials of the Future

Accelerating development of advanced materials for higher efficiency industrial processing and products

- Strategic, High-Performance Materials
- Production Technologies and Structural Materials
- Advanced Processing To Minimize Materials Use



Nanomanufacturing

Enabling manufacture of products to transform energy production, use, and storage

- Manufacturing techniques for cost-competitive, large-scale production of nanomaterials
- Methods to integrate nanomaterials into intermediate and finished products that are less energy-intensive to produce and use

Fuel & Feedstock Flexibility

Energy security through diversification

- Fuel-flexible hardware
- Field testing shows effectiveness of fuel-flexible equipment in displacing fossil feedstocks

Combined Heat and Power (CHP)

Facilitating market uptake of energy efficiency technologies

- Systems recover waste heat to generate electricity and heat at >80% efficiency
- R&D on CHP and other technologies to expand markets

Selected Examples from ITP:

Commercial Successes

- Oxy-fuel firing for Glass Melters
- Ultra-Blue Low-NOx Burners
- Ni₃Al Alloys for High-T Applications
- Laser Ultrasonic Measurement System for Steel Tubing
- Ultracrystalline Diamond Mechanical Seals
- Wireless Sensor Technology for Condition-Based Monitoring
- Mercury 50 Recuperated Gas Turbine Generator Set

Present Activities

- Super Boiler (153 trillion Btu [Tbtu])
- Organic Rankine Cycle for Waste Heat Recovery (22 Tbtu)
- Membrane Solvent Extraction (42 Tbtu)
- Ultra-fast Boring (56 Tbtu)
- Near-Net-Shape Manufacturing of Low-Cost Titanium Powders (15 Tbtu)
- Ultra-Efficient Power-Dense Motors (40 Tbtu)
- Advanced Reciprocating Engines

Future Opportunities

- Low-temperature waste heat recovery
- Ultra-efficient, advanced reciprocating engines
- Advanced steam generation (250 Tbtu)
- Hybrid distillation (240 Tbtu)
- Advanced motor systems (258 Tbtu)
- Low-cost carbon fiber composites
- Ultra-efficient desalination
- Low-water-use industrial processes
- Materials substitution



U.S. DEPARTMENT OF
ENERGY

Thank you!



<http://techtransfer.energy.gov/>



U.S. DEPARTMENT OF
ENERGY