



**U.S. Department of Energy**  
**Energy Efficiency and Renewable Energy**

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

# The Industrial Technologies Program: Overview

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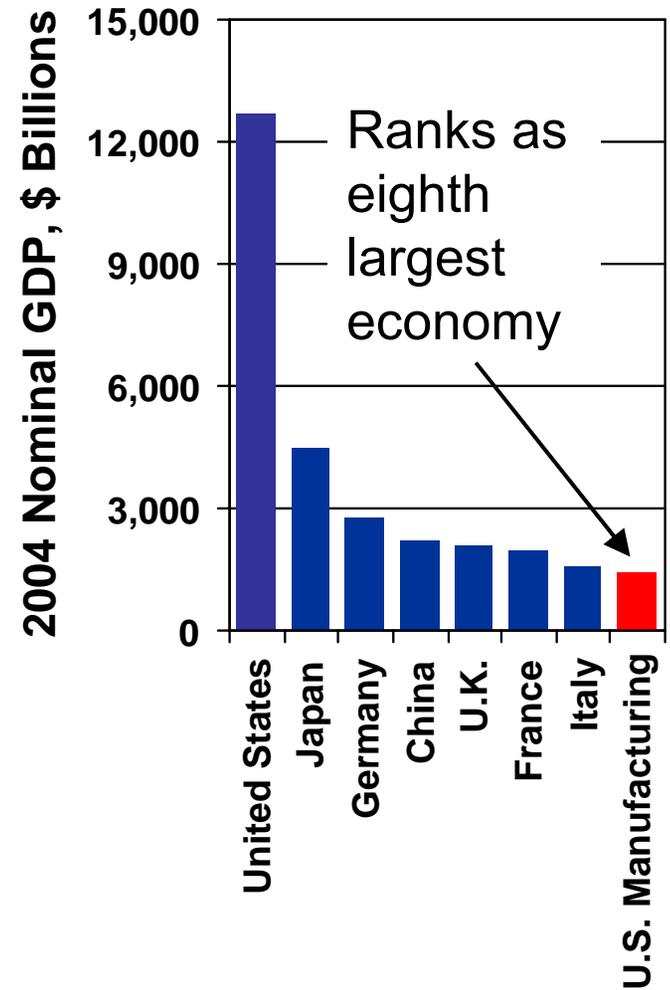




# Industry: Critical to U.S. Energy Security & Economy

## *The U.S. manufacturing sector*

- Consumes more energy than any sector of the economy
- Makes highest contribution to GDP (12%)
- Produces nearly 1/4<sup>th</sup> of world manufacturing output
- Supplies >60% of US exports, worth \$50 billion/month
- Employs 14 million people
- Spurs job creation and investment in other sectors





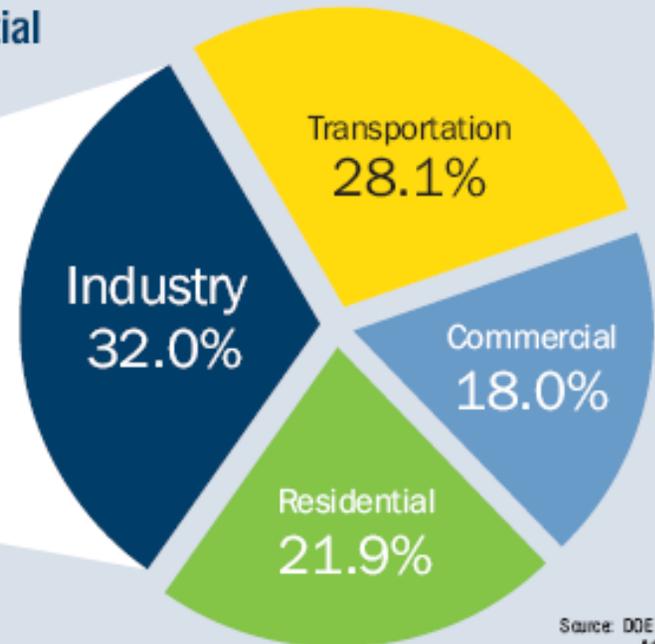
# ITP's Mission

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

**Reducing U.S. industrial energy intensity is essential to achieving national energy and carbon goals**

Petroleum	38.1%
Natural Gas	33.3%
Electricity*	13.5%
Coal and Coke	8.5%
Renewable Energy	6.6%

\* Excludes losses

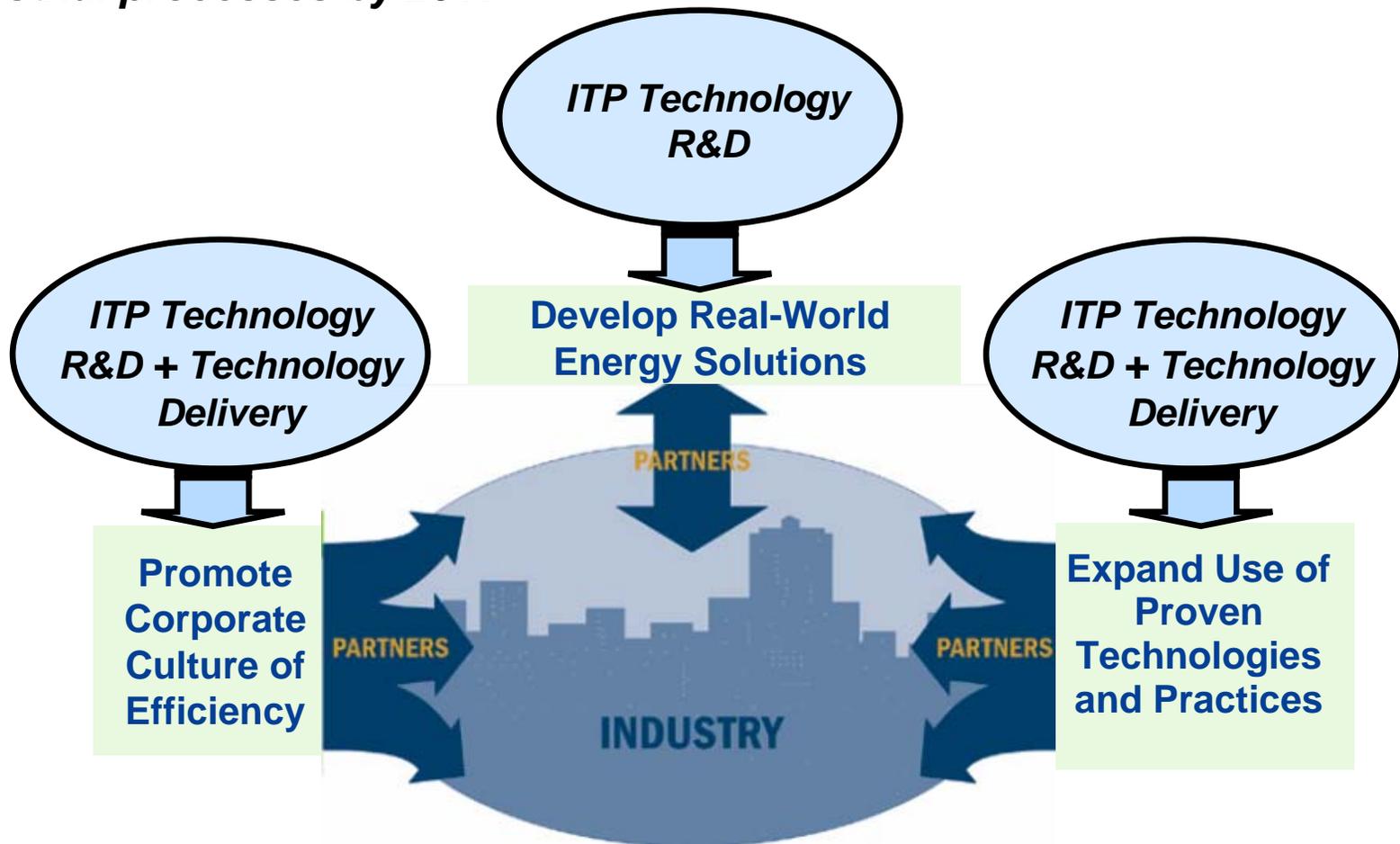


Source: DOE Energy Information Administration, 2006.



# ITP's Goal and Strategy

**Goal: Contribute to a 25% reduction in the energy intensity of U.S. industrial processes by 2017**





# Delivering Technology Solutions



**Stakeholder  
Collaboration**



## ***Energy Efficiency R&D***

Develop cross-cutting technologies addressing the top energy savings opportunities across industry



## ***Fuel and Feedstock Flexibility***

Accelerate market penetration of emerging options for alternative fuels and feedstock



## ***Technology Delivery***

Help plants save energy today by facilitating adoption of best energy management practices and efficient new technologies



# R&D Program Structure

## Industry Specific Applications

- Aluminum
- Chemicals
- Forest and Paper Products
- Metal Casting
- Steel
- Information Technology

***Advanced technologies for specific, energy-intensive industries***

## Crosscutting Technologies

- Materials, Sensors, and Combustion
- Energy-Intensive Process R&D
- Nanomanufacturing & Other Interagency Manufacturing R&D
- Fuel and Feedstock Flexibility
- Distributed Energy (CHP and Reciprocating Engines)
- Inventions & Innovations

***Crosscutting technologies for diverse, energy-intensive manufacturing processes***



## Industry-Specific R&D

- Supports advanced technologies to reduce energy and carbon intensity of America's energy- and waste-intensive industries
- ITP engages with its industry partners – trade and technical associations – to gain perspective on R&D planning
- Objective is to bring industry together to address common technical issues and identify potential solutions

- Aluminum
- Chemicals
- Forest & Paper Products

- Metal Casting
- Steel
- Information Technology





# Crosscutting Technology R&D

- ***Energy-Intensive Process R&D*** in technology platforms that address broad industry needs
- ***Nanomanufacturing R&D*** to transform nanoscience into industrial processes and products
- ***Fuel and feedstock flexibility activities*** to facilitate the use of non-traditional fuels and feedstocks
- ***Clean distributed energy activities*** to promote the use of CHP in industrial applications
- ***Industrial materials R&D*** to develop breakthrough materials for industrial processes



## ITP Technology Platforms

- Waste Heat Minimization and Recovery
- Industrial Reactions and Separations
- High-Temperature Processes
- Sustainable Manufacturing



## Technology Example: Super Boiler

- Today's best boilers are about 85% efficient
- The Super Boiler offers a fuel-to-steam conversion efficiency of more than 94%
- Has applications in almost every industrial subsector
- By 2020, this technology could
  - Save over \$1 billion a year in energy costs
  - Dramatically cut NO<sub>x</sub> and greenhouse gas emissions

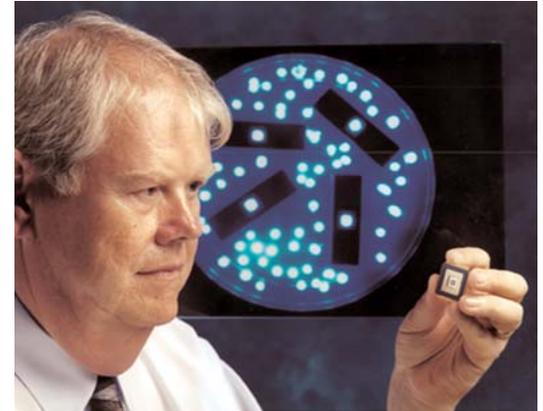


Gas-fired package boiler uses advanced combustion concepts in economical, compact design with fuel-to-steam efficiency of 94% or better. Licensed to Cleaver-Brooks



# Technology Example: Low-Cost Wireless Sensors to Revolutionize Motor Maintenance

- DOE cost-shared development of novel, low-cost, standards-based wireless sensor networks for two-way communications in industrial equipment monitoring
- Mesh networking software that eliminates signal interference and integrates the wireless network into the existing plant network.
- Industry now developing AGA 12 Standard to support “plug & play”
- Early industry adopters are using sensors to connect numerous small motors to powerful maintenance software
- Sensor installation pays for itself the first time that a motor failure and attendant downtime are avoided





# On-line Plant Energy Profiler “QuickPEP”

## INPUTS

- Plant description
- Utility supply data –electricity, fuel & steam
- Energy consuming system information
- Scorecard responses

ITP BestPractices: Quick PEP - Home Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

test.ee.doe.gov/QuickPEP/

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**Industrial Technologies Program**

**Profiler**

The Quick Plant Energy Profiler, or Quick PEP, is an online software tool provided by the U.S. Department of Energy to help industrial plant managers in the United States identify how energy is being purchased and consumed at their plant and also identify potential energy and cost savings. Quick PEP is designed so that the user can complete a plant profile in about an hour. The Quick PEP [online tutorial](#) will explain what plant information you need to complete a Quick PEP case. When you complete a Quick PEP case Quick PEP will provide you with a customized, printable report that shows the details of energy purchases at your plant, how energy is consumed at your plant, potential cost and energy savings at your plant, and a list of [actions](#) you can follow to get you started saving energy at your plant.

**Get started Now!**

It's easy to get started with the Quick PEP tool. Use one of the links below to view the online tutorial, start a new case or

- **Online Tutorial** - If you're new to Quick PEP, view the [online tutorial](#). It's the easiest way to learn how to use Quick PEP.
- **Start a New Case or Open a Case** - If you've got ready, just [click here](#) to start a new Quick PEP case [saved](#) case.

Username  
Password

## OUTPUTS

- Overall picture of plant energy use
- Summary of energy cost distributions
- Preliminary assessment & comparison
- Areas for energy efficiency improvement
- Energy cost reduction potential



# New Initiatives To Broaden ITP's Global Impact

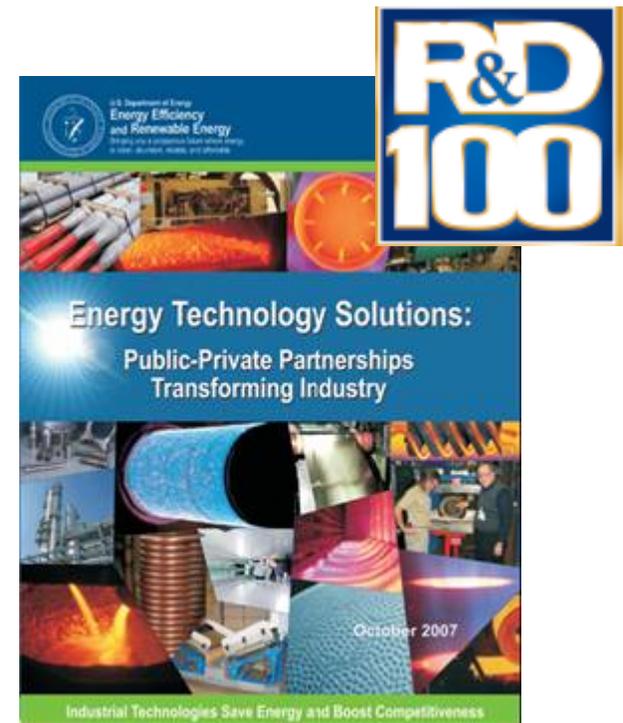
- Plant Recognition Program
  - Reward companies that have adopted energy-saving technologies and practices to achieve a high level of energy efficiency
- Plant Energy Certification Program
  - Independently certify the energy efficiency performance of industrial facilities
- Bilateral Agreement with China on Energy Savings Assessments
  - Conduct 8 pilot assessments
  - Create model to transfer to top 1,000 plants
- International Energy Agency (IEA)
  - Industrial Energy Related Technologies & Systems (IETS) agreement
    - ♦ Annexes on separations, benchmarking, combustion, membranes
- World Bank – Environmental group
  - Discussion on plant assessments in Latin America – Mexico pilot
- Develop international versions of ITP software tools and assessment protocols for diverse plants and industries



# ITP Delivers Results

*Together with industry, we have successfully put cutting-edge technologies and energy-saving measures into practice*

- Received 42 R&D 100 awards between 1991 and 2007
- Commercialized over 220 technologies since program inception
  - 5 quads of energy savings
  - 86 MMTc reduction
- Over 16,000 U.S. manufacturing plants using ITP software and best practices
- Obtained 156 patents between 1994 and 2005





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**Back-up Slides**



# Global Outreach

- Supporting Asia Pacific Partnership
- Bilateral Agreement with China on Energy Savings Assessments
- International Energy Agency (IEA)
- World Bank – Environmental group
  - Discussion on plant assessments in Latin America (Mexico pilot)
- Develop international versions of ITP software tools & assessment protocols for diverse plants and industries





# China 1,000 Enterprise

- Energy Efficiency and Renewable Energy Protocol renewed by Secretary Bodman and Minister Xu in December 2006
- Cooperating to advance clean technology, including solar, wind, and biomass; focuses include cooperation in industrial energy efficiency; energy efficient building technologies; and joint research on biofuels.
- DOE to provide training for energy experts to conduct energy assessments at 1,000 industrial plants in China
  - Conduct 8 pilot assessments
  - Create model to transfer to top 1,000 plants





# IEA Implementing Agreements (Industrial)

## Industrial Energy-Related Technologies and Systems (IETS):

To enhance knowledge of cost-effective new industrial technologies and system layouts that enable increased productivity and better product quality while improving energy efficiency and sustainability. Annexes on separations, benchmarking, combustion, membranes.

## Emissions Reduction in Combustion:

To accelerate development of combustion technologies for use by industry, demonstrate reduced fuel consumption, and lower pollutant emissions such as nitrogen oxides.

The mission of IETS is to foster international co-operation among OECD and non-OECD countries for accelerated research and technology development of industrial energy-related technologies and systems



## Tools Available via Our Web Site

- **Motor Master +** Aids in energy-efficient motor selection and management.
- **Pumping System Assessment Tool** Assesses efficiency of pumping system operations.
- **Steam System Assessment Tool** Assists in assessing potential benefits of specific steam-system improvements.
- **Combined Heat & Power Application Tool** Enables users to evaluate the feasibility of CHP for heating systems.
- **NOx and Energy Assessment Tool** Assesses NOx emissions and applications of energy efficiency improvements at petroleum refining and chemical plants.
- **Air Master+** Provides comprehensive info on assessing compressed air systems.
- **3EPlus Insulation Assessment Tool** Calculates most economical thickness of insulation for various operating conditions.
- **Fan System Assessment Tool** Assesses efficiency of fan system operations and quantifies benefits of system optimization.
- **Plant Energy Profiler** Helps plants assess plant-wide operation to identify savings and efficiency opportunities.
- **Process Heating Assessment and Survey Tool** Helps assess energy use in furnaces and identifies ways to improve performance.