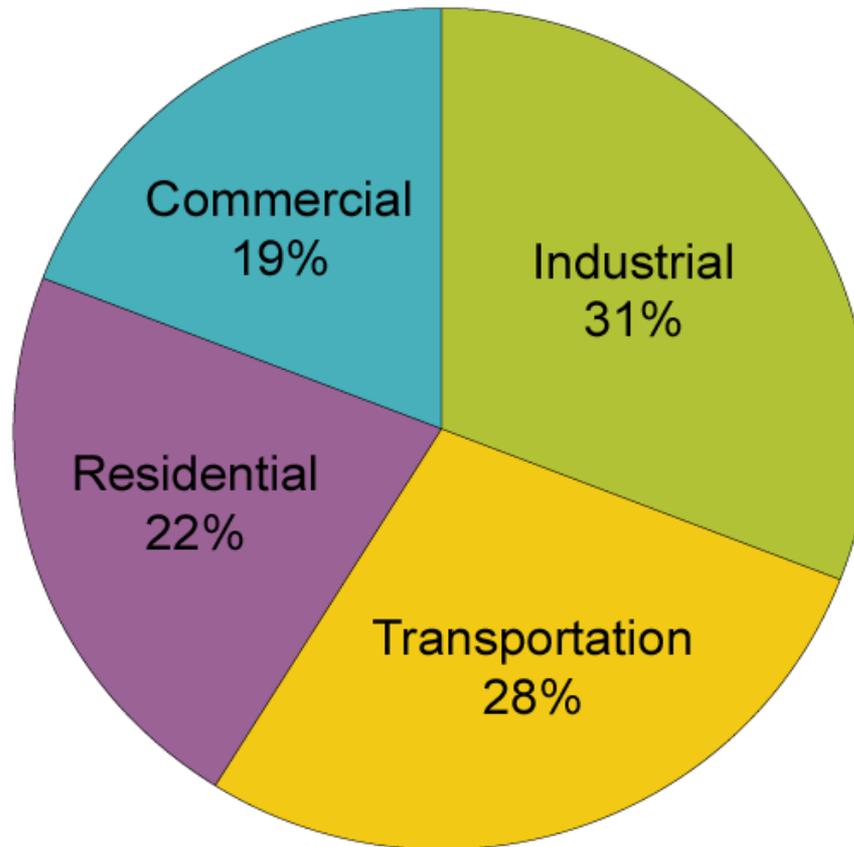


Bill Prymak
Industrial Technologies Program
U.S. Department of Energy
February 4, 2010



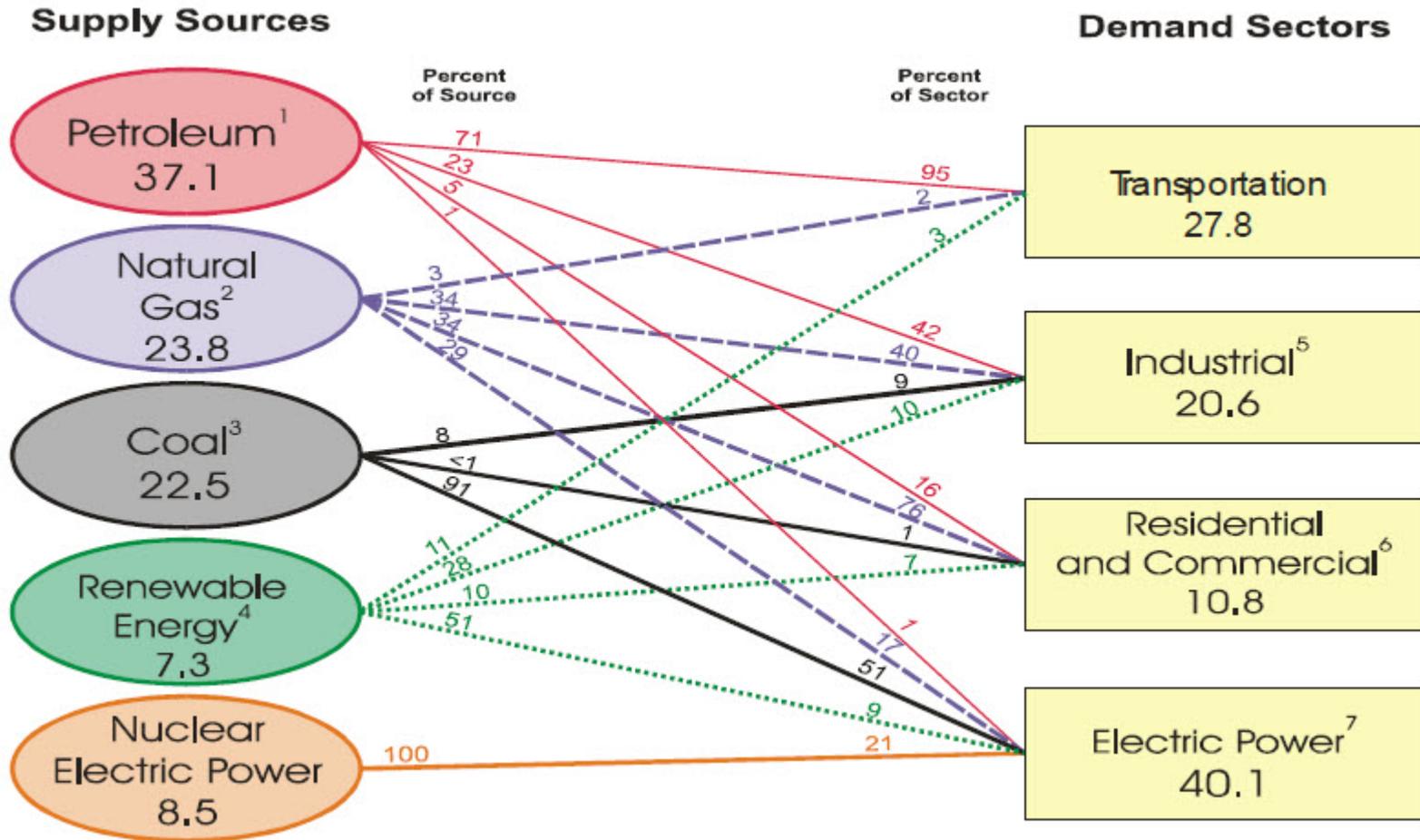
- Program Overview:
 - Energy Efficiency and carbon reduction potential in the Industrial Sector
 - Barriers to Best Practices Adoption and how ITP activities address them
 - Program goals, accomplishments, and budget history
- Research & Development Portfolio:
 - Near Term Industrial Efficiency Potential
 - Barriers to Achieving Opportunity
 - ITP Research & Development Portfolio, Strategy and Analysis
 - Grand Challenge
- Industrial Technical Assistance:
 - Save Energy Now
 - Energy Savings Assessments results and process
 - Industrial Assessment Centers
 - Tools, Training and Information
 - Energy Management
 - Barriers and Strategic Pathways for Overcoming Barriers

Share of Energy Consumed by Major Sectors of the Economy, 2008



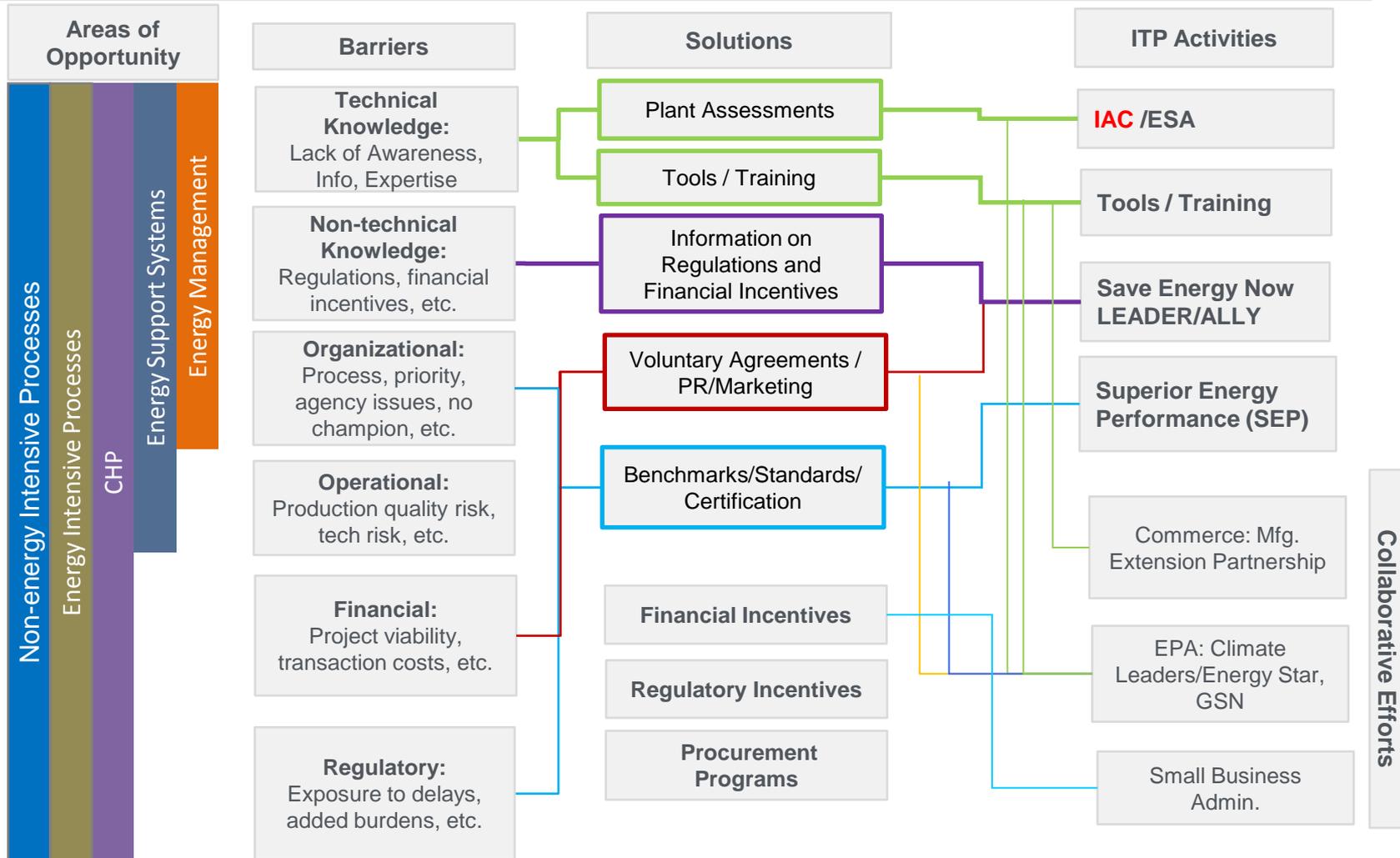
Source: Energy Information Administration, *Annual Energy Review 2008*.

U.S. Primary Energy Consumption by Source and Sector, 2008 (Quadrillion Btu) (EIA)



Barriers to Best Practices Adoption

ITPs historical Tech Delivery activities have focused on removing barriers critical to adoption of Energy Management and Support System projects. Newer programs are designed to incent energy reductions in all project categories.



DOE's Strategic Goal

To protect our national and economic security by promoting a diverse supply of reliable, affordable, and environmentally sound diverse supply of reliable, affordable, and environmentally sound energy

EERE Strategic Goals

Increase the Efficiency/Reduce the Energy Intensity of Industry

ITP Program Goals

Energy Goal: Contribute to a reduction in the industrial sectors energy intensity by 25 percent in 10 years

Carbon Goal: Contribute to 2030 goal of 70% reduction in GHG emissions (from 2005 levels)

Contribute to 2050 goal of 80% reduction in GHG emissions (from 2005 levels)

Energy Management Goal: Establish the U.S. as the global leader in energy management

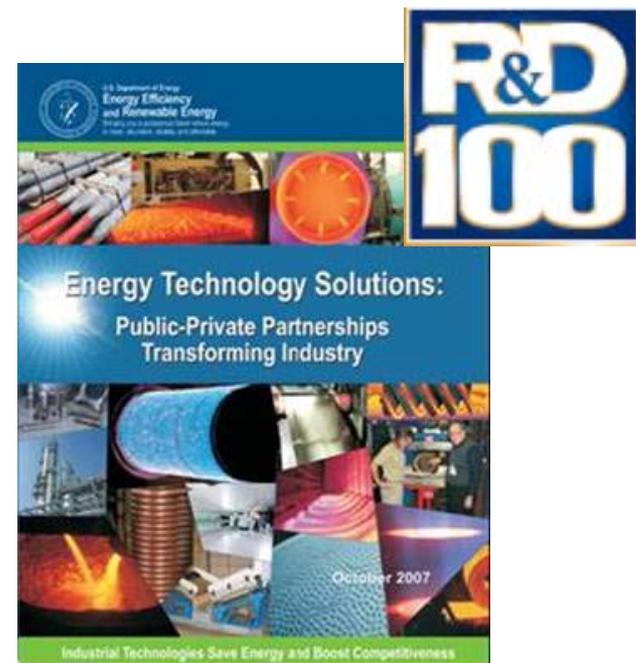
Intermediate Goals

- Annually 100 new **Save-Energy-Now Leaders** pledge a 2.5% energy intensity reduction
- 2010: ITP has established an accepted business plan and methodology to deliver on the 25-in-10 goal and has established of the Save-Energy-Now Leaders partnerships to foster U.S. Industries leadership in Energy Management
- ISO 50001 and ANSI Energy Management Standards are complete and validated

- **48 R&D 100 awards** between 1991 and 2008
- **Over 220 technologies** commercialized since program inception
- **5.7 quads** of energy saved
- **103 MMTcE** avoided
- Since 2006, over **2,400 plant energy assessments** completed (**~1600 done by IACs**)

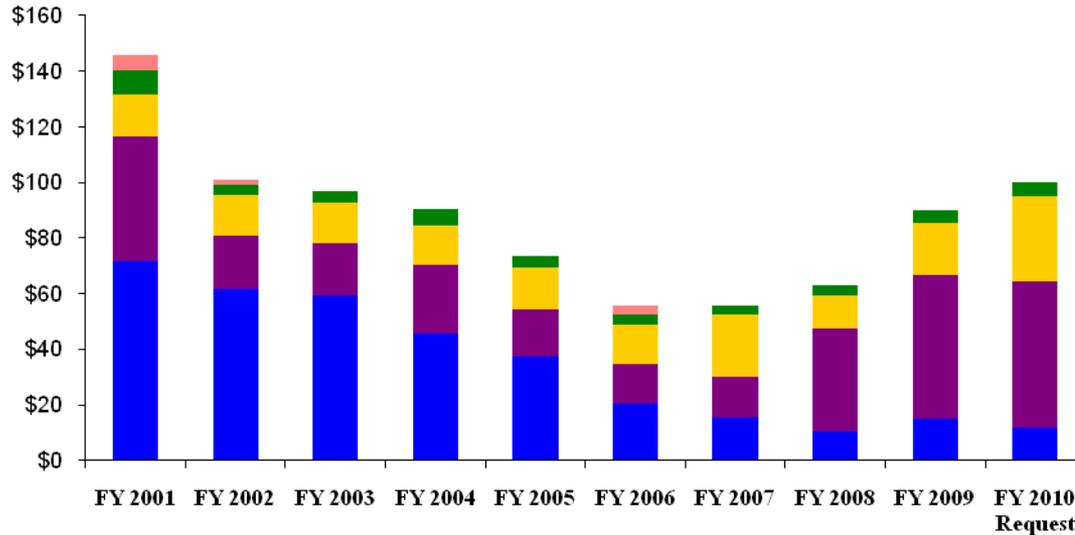
Other Accomplishments

- MOU with the NIST Manufacturing Extension Partnership (MEP) to conduct energy assessments at an additional 2,500 manufacturers each year
- MOU with the National Association of Manufacturers to reach 11,000 NAM member companies
- Grants awarded to 30 states to conduct local energy assessments



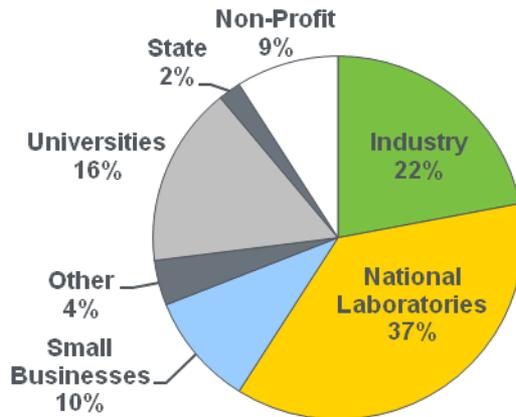
Program Budget History

ITP Budget History FY 01 – FY 10*



- Industry-Specific R&D
- Crosscutting R&D
- Industrial Technical Assistance
- Program Support
- Additional Earmarks

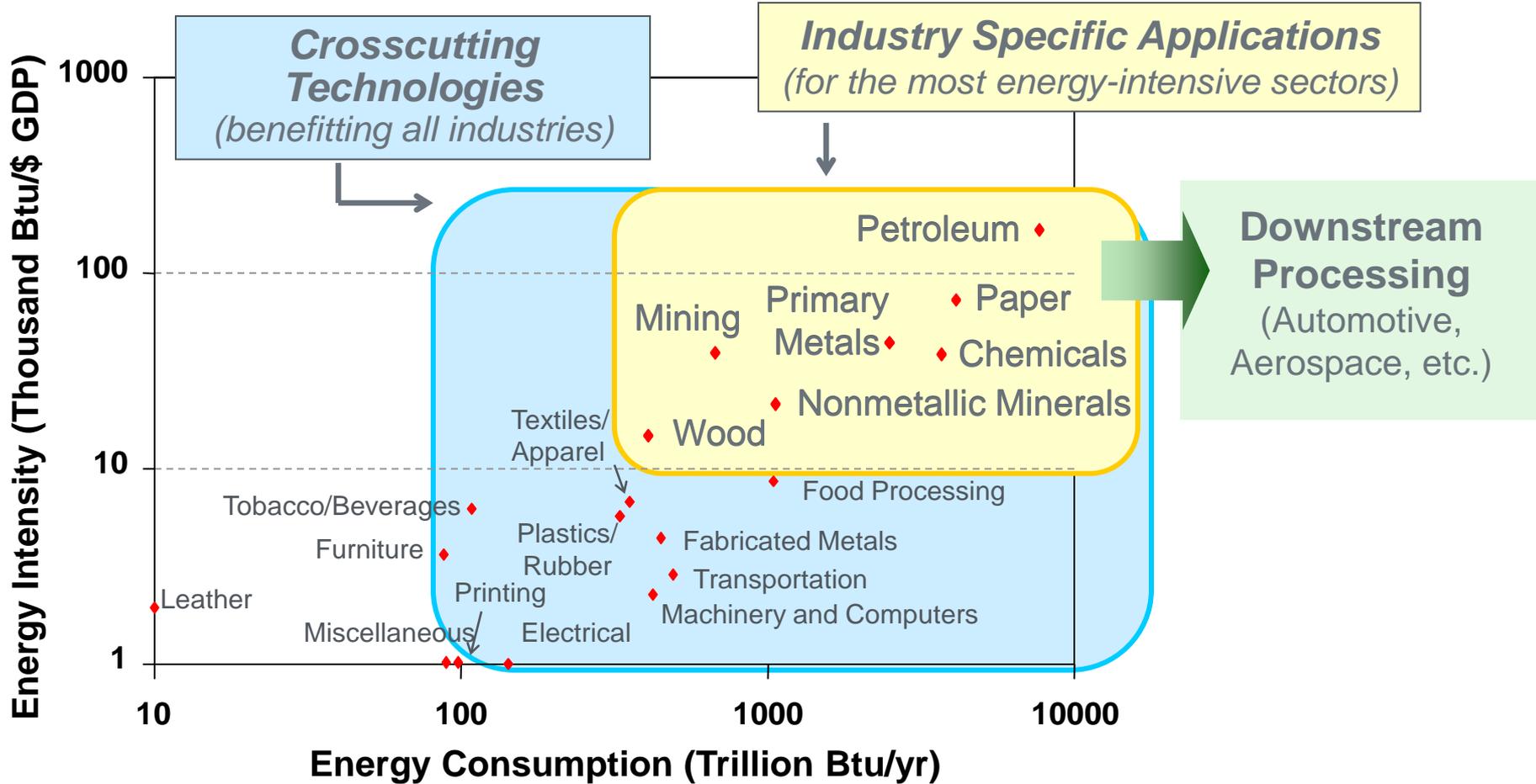
ITP Average Funding By Partner FY 2004-FY09*



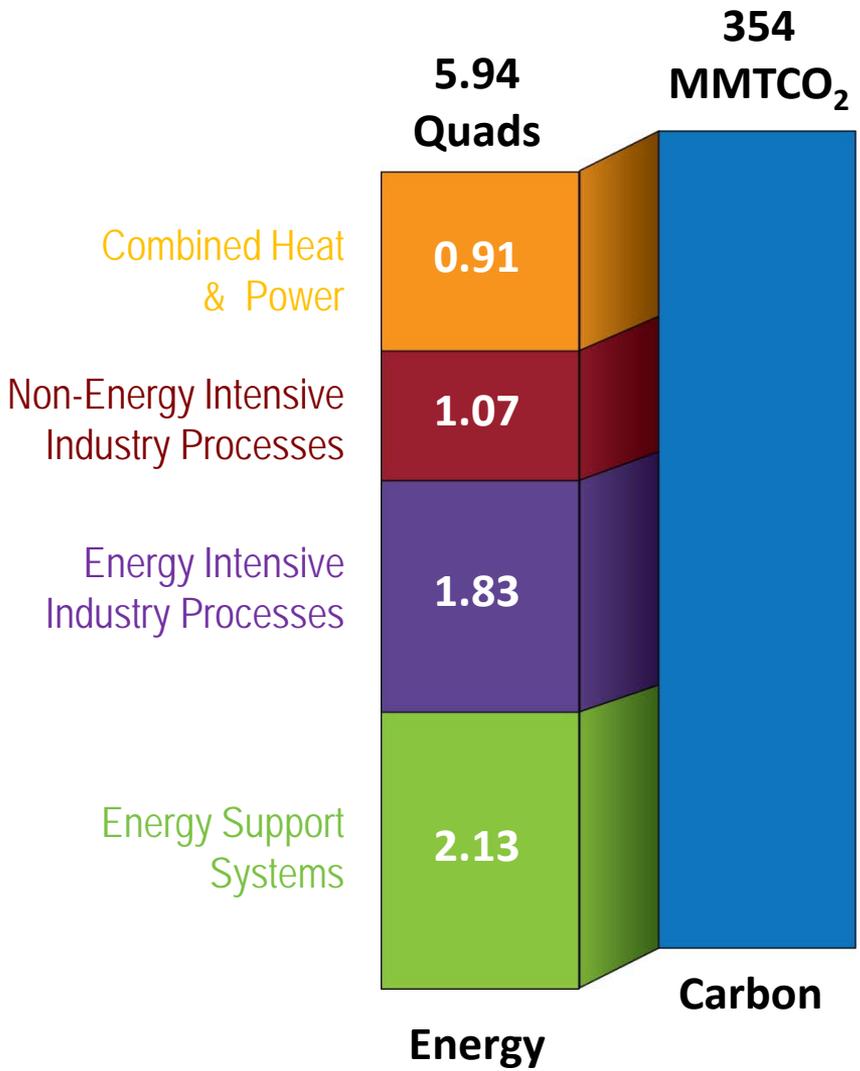
* ARRA funding not included

- R&D Focus Shift, Methodology and Analysis
- Near Term Industrial Efficiency Potential
- Barriers to Achieving Opportunity
- ITP Research & Development Portfolio, Strategy and Analysis
- Industries of the Future (IOF)
- Grand Challenge



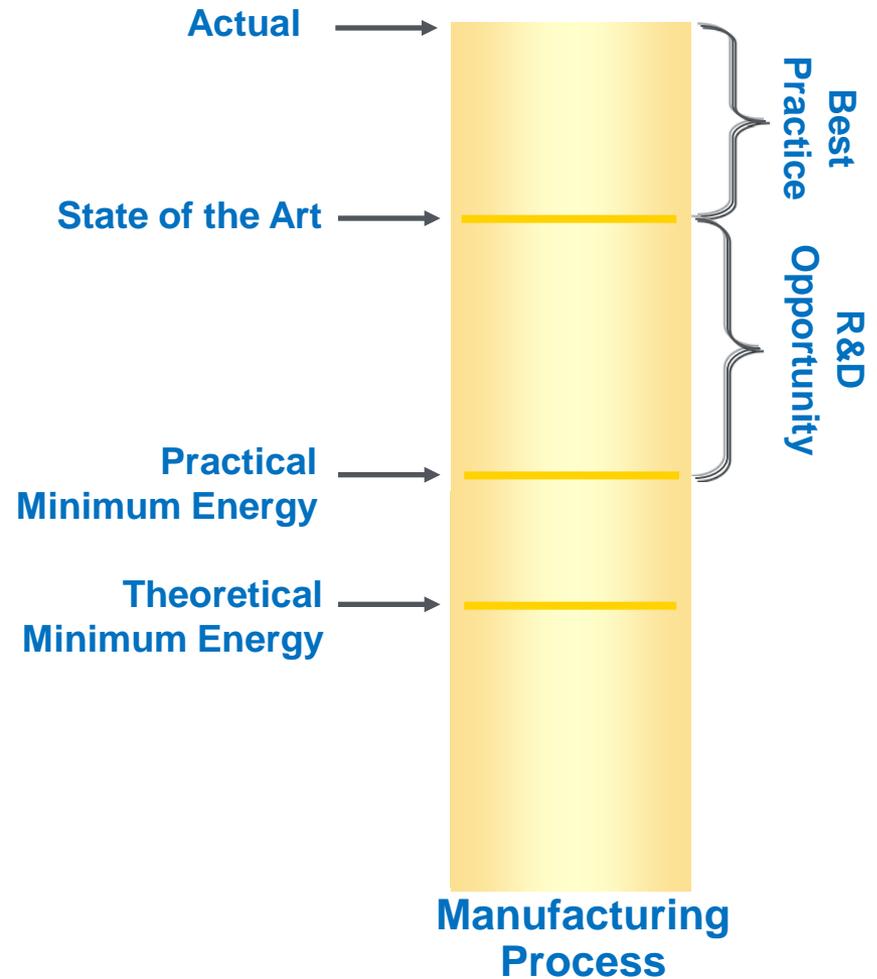


- Based on McKinsey & Company's *Unlocking Energy Efficiency in the U.S. Economy* report
- Industrial energy savings potential by 2020 in 5.94 quadrillion Btu
- Carbon mitigation through these energy savings is 354 million metric tons of CO₂
- This energy-savings opportunity would lead to an annual cost savings of \$47 billion in 2020, potentially creating or saving over 500,000 jobs



Energy Bandwidth Analysis Clarifies Potential

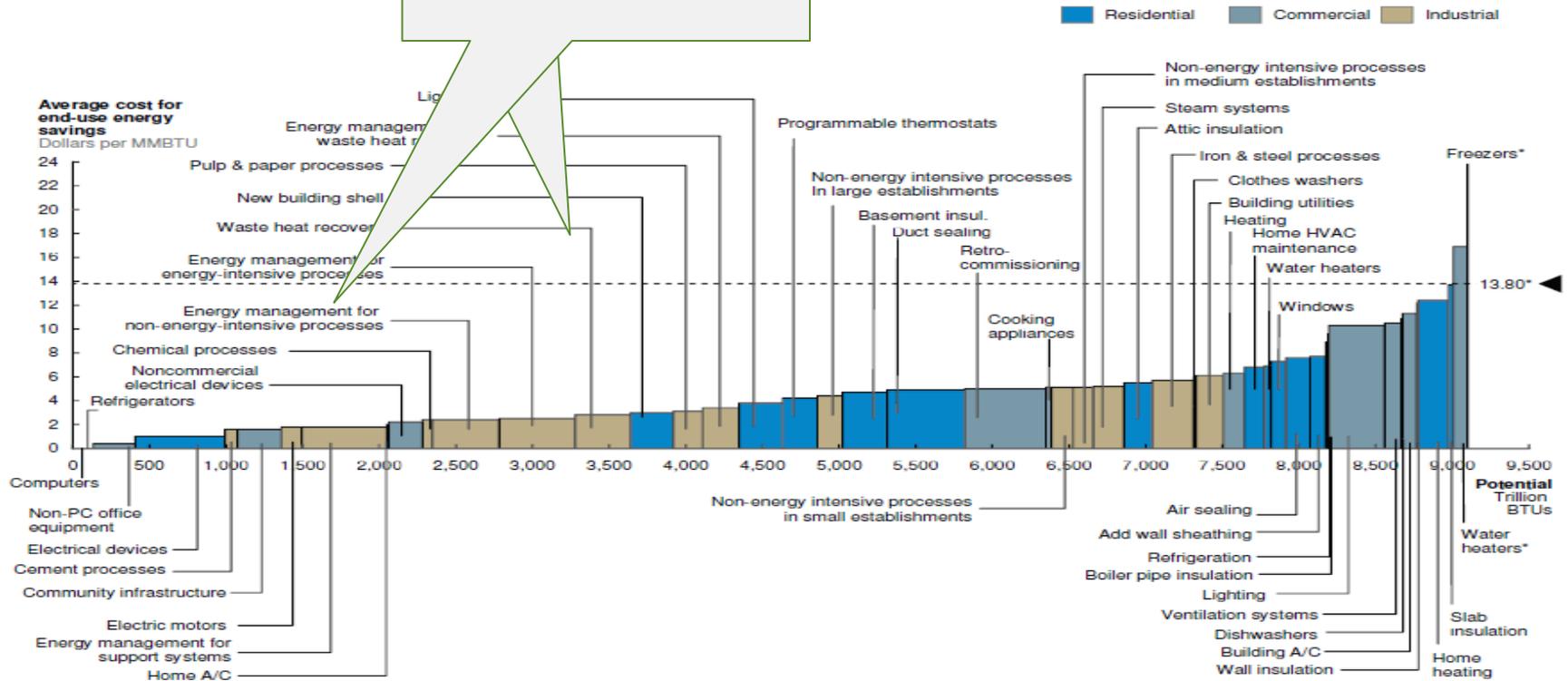
- Provides snapshot of opportunity for energy savings through R&D and BAT
- Quantifies differences among:
 - Theoretical minimum energy required for a process
 - Practical minimum energy required for a process
 - Actual energy requirement for a process based on average values in today's manufacturing environment



End-use Energy Savings

McK (2009)

Many high-impact, low-cost opportunities in the industrial sector



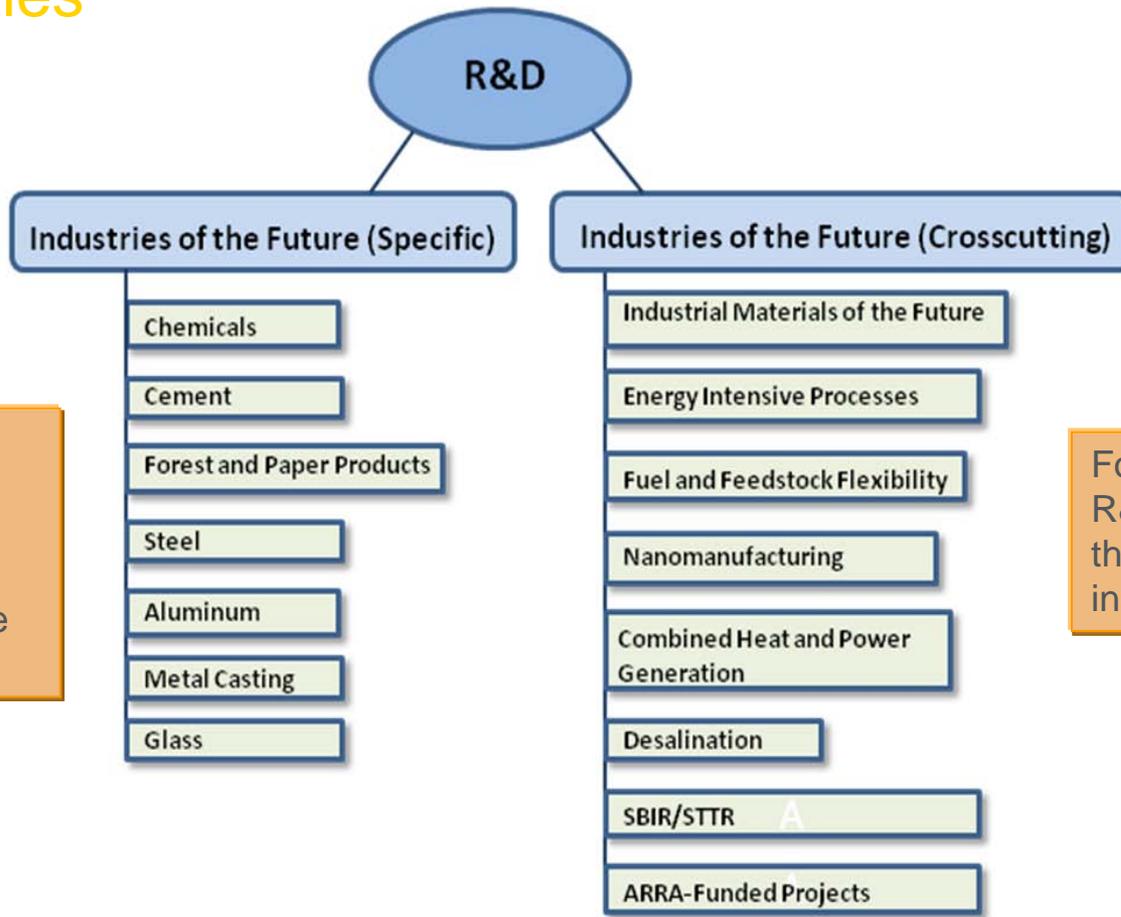
R&D Barriers

- **Technical Risk:** Pursuing unproven, high risk, technologies and practices
- **Investment Scale:** Development of next generation technologies requires significant investment in fundamental science, engineering and demonstration that one company could not accomplish on its own
- **Scalability:** Significant advancements are required to bridge the gap between basic science, and end-use applications.

Implementation Barriers

- **Technical Knowledge:** Lack of awareness; information and expertise
- **Non-Technical Knowledge:** Lack of knowledge regarding regulations, financial incentives, etc.
- **Organizational:** Internal agency issues, lack of a champion
- **Operational:** Production quality risk, technology risk
- **Financial:** Project finance fundamentals, transaction costs, ROI, etc.
- **Regulatory:** Exposure to delays, additional requirements

ITP Research Targets Top Industry-Specific and Crosscutting Opportunities



Improve the performance of America's most energy- and carbon-intensive industries.

Focus on high-impact R&D with applications throughout the industrial sector.

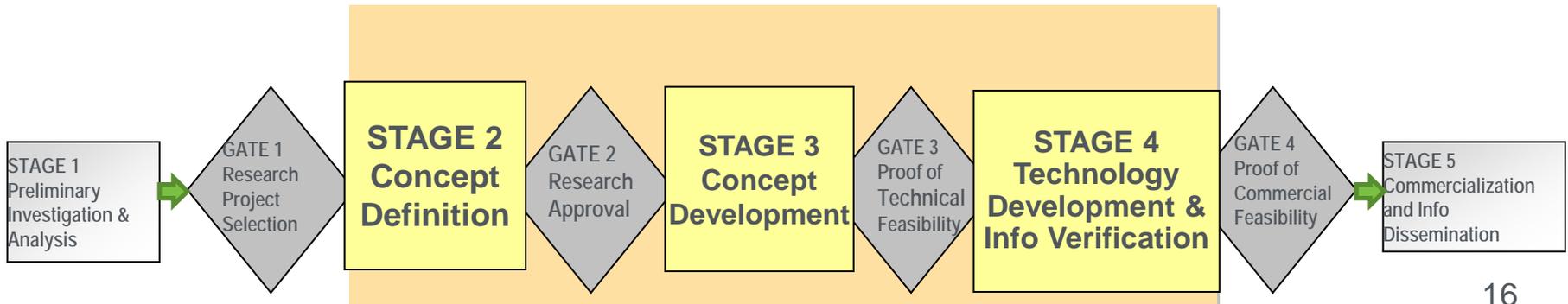
ITP's R&D Strategy

1. Improve today's manufacturing processes
2. Transform the future of manufacturing

R&D Guiding Principles

- **Target** opportunities to achieve the greatest impact with limited resources
- **Invest** where we can add the most value in the R&D cycle
- **Partner** with the private sector to ensure successful technology transfer and commercialization

ITP currently focuses on Stage 2 & 3 projects, with select Stage 4 activities in strategic areas



- Offer revolutionary and dramatic improvement
- Involve high-risk/high-reward R&D
- Tackle Industry's greatest energy and GHG challenges
- Refill DOE's transformational technology pipeline

ITP's "Grand Challenge"

Develop transformational industrial processes or technologies that reduce system energy intensity or GHG emissions by at least 25%.



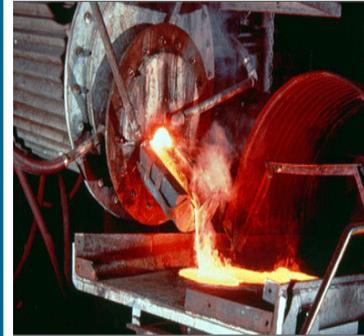
Next Generation Manufacturing

- *Replace conventional manufacturing processes in the most energy intensive industries*



Energy Intensive Processes

- *Reactions & Separations*
- *High-temperature Processing*
- *Waste Heat Minimization & Recovery*
- *Sustainable Manufacturing*



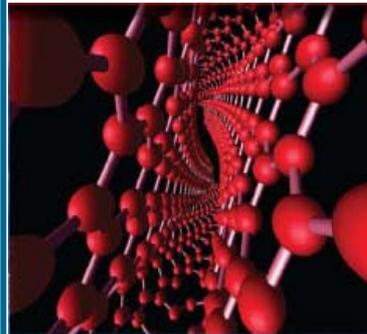
Advanced Materials

- *Thermal & Degradation Resistant Materials that increase lifetime at least 10x*
- *Materials for Energy Systems that improve performance (by at least 50%) of energy production and energy transfer equipment*



Industrial GHG Emissions Reduction

- *Advanced manufacturing technologies*
- *Innovative enabling technologies*
- *Sensors and controls, catalysis, nanotech, micro-manufacturing, and other areas*



- *Save Energy Now*
- *Energy Savings Assessments results and process*
- *Industrial Assessment Centers*
- *Tools, Training and Information*
- *Energy Management*
- *Barriers and Strategic Pathways for Overcoming Barriers*

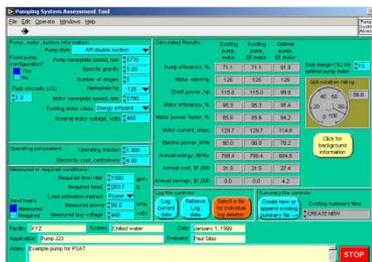
Save Energy Now: A national initiative to drive a 25% reduction in industrial energy intensity by 2020.

- The *Energy Policy Act of 2005*, Section 106 establishes a goal of reducing energy intensity by 25 percent in 10 years.

Objectives:

- Expand resources available to help companies achieve ambitious energy goals
- Encourage industry to voluntarily reduce its energy use
- Work with a wide range of industrial stakeholders to engage industry in improving energy management
- Create momentum to significantly improve energy efficiency practices throughout the manufacturing sector





Tools

- Baseline/Plant Energy Profiler
- Process Heating
- Steam Systems
- Motors, Pumps, Fans, and more

Training

- Awareness
- Tool User
- System/Topic
- Qualified Specialists

Assessments

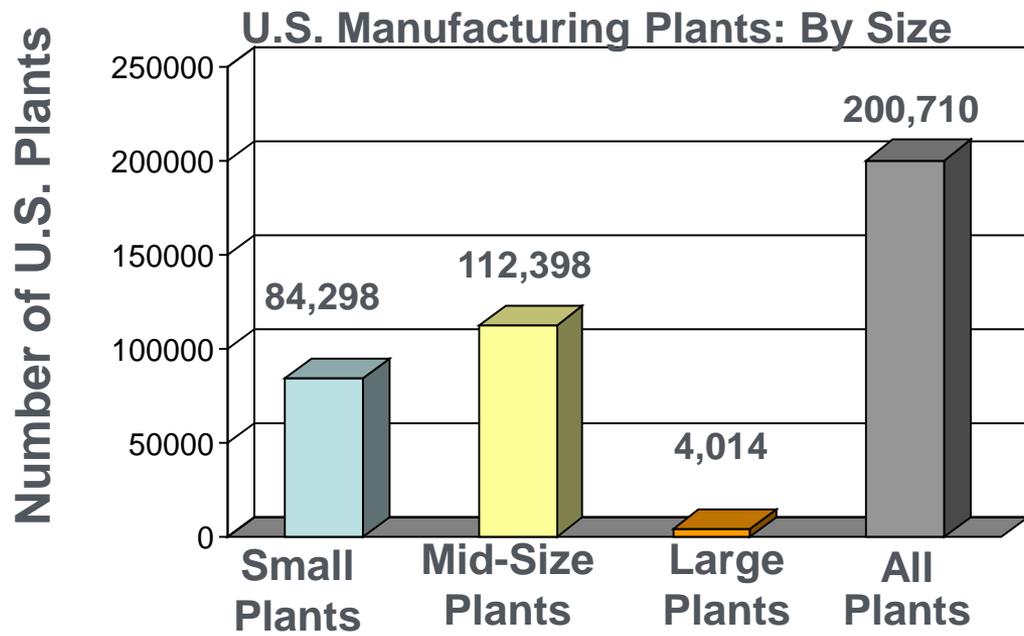
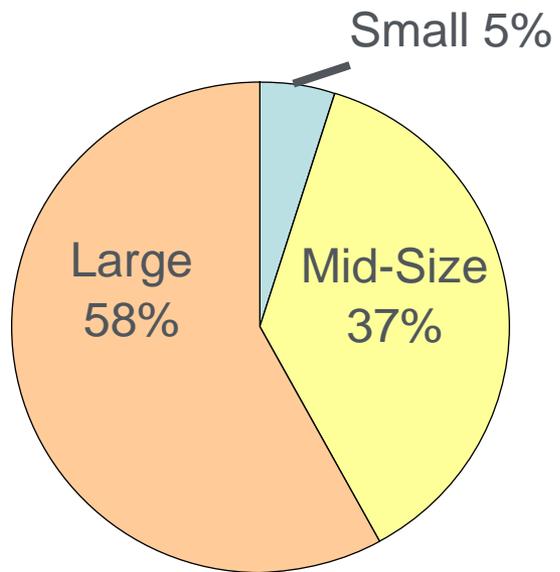
- Large plants are eligible to participate in three-day, process-specific assessments
- Small plants qualify to participate in a one-day, full-plant assessment conducted by **university-based IACs**

Information

- Supply Chain energy efficiency
- Tip Sheets/Case studies
- Source Books
- Website and webcasts
- On-line data bases
- Information Center

Industrial Customers

Percent of Total Manufacturing Energy



Annual Energy Consumption <26BBtu 26-500BBtu >500BBtu
1 BBtu = 1.055 MJ



Save Energy Now LEADER: 37 companies including 3M, AT&T, Dow, Honeywell, Intel, Sherwin Williams, and Volvo

Save Energy Now ALLY: 20 organizations have committed to Save Energy Now ALLY, including Alliance to Save Energy, American Public Power Association, and the Tennessee Valley Authority

States: 23 State Awards (five are regional), all 50 State Energy Offices, and others

Supply Chain: Supply Chain pilot projects through Save Energy Now LEADER

International Collaboration: Collaboration with China, India, International Energy Agency, and the Asia-Pacific Partnership on Energy & Climate

Utilities: TVA, Bonneville Power Administration, Southern California Edison, Western Area Power Administration and numerous others

Interagency Coordination: Environmental Protection Agency; Department of Commerce; Small Business Administration; Department of Labor

- ❖ **States and Regional:** Increase the set of resources available to industry and to transfer ITP's assessments tools, and services to the local level.
 - 12 three-year State awards and 11 ARRA awards to deliver robust industrial energy efficiency programs
 - 12 of the Industrial Assessment Centers (IACs) leveraged their knowledge and expertise to either be involved in or lead the work being delivered through the State awards.
 - 5 Regional project awards with ARRA funding

- ❖ **Utilities:** First line of contact for energy use and management for industry, to reinforce the value of efficiency to industry and utilities, and to support strong industrial efficiency incentive programs.
 - Exhibit at 5 utility events to inform and educate utilities about ITP resources
 - Conduct Webinars with and for utility partners
 - Develop and deliver 25 assessments supported by utility rebates or M&V programs
 - Develop and pilot a utility-focused plant assessment training program to support tailored technical assistance and rebates

- DOE's 26 university-based Industrial Assessment Centers (IACs) train engineering students for careers in industrial energy efficiency
- IACs serve 300 plants per year and typically identify savings of 8%-10% or roughly \$115,000/plant
- 15 of the IACs were selected to receive ARRA funding this year to provide enhanced assessments and technical assistance to industrial clients. Assessments will be targeted to new medium and large clients; technical assistance will be provided to previous IAC clients to support increased adoption of recommended savings opportunities.



IACs Additional Activities

Center	Base	ARRA	State
Texas A&M, College Station	X	X	
Bradley University	X	X	
Colorado State University	X		X
University of Delaware	X	X	
Georgia Institute of Technology	X	X	X
Iowa State University	X		
University of Illinois, Chicago	X		X
Lehigh University	X	X	
University of Louisiana, Lafayette	X	X	X
University of Massachusetts	X		X
University of Miami	X		
Mississippi State	X	X	X
University of Missouri-Columbia	X		
North Carolina State	X	X	
Oklahoma State University	X	X	
Oregon State University	X		
San Diego State University	X	X	
San Francisco State University	X		
Syracuse University	X		X
Tennessee Technological University	X	X	
University of Alabama	X	X	X
University of Dayton	X	X	
University of Florida	X		
University of Michigan	X	X	X
University of Washington	X		
West Virginia University	X	X	X



Software Decision Tools

- Plant Energy Profiler
- Steam System Tool Suite
- Process Heating Assessment Tool
- AIRMaster+
- Fan System Assessment Tool
- MotorMaster+
- Pump System Assessment Tool
- Combined Heat and Power Tool
- Data Center Pro Tool

Information Resources

- Fact Sheets
- Newsletters
- Tip Sheets
- Reports
- Case Studies
- Software Tools
- Data Bases
- Ongoing Activities



Training

- Webinars on important topics (1-2 hours)
- Awareness workshops (usually 1-2 hours)
- 1-day End User Tool Training
- 2/3-day Advanced / Qualified Specialists Training

Info Center: 1-877-337-3463

www.eere.energy.gov/industry/

Key elements of an energy management system framework

- Upper-management endorsed energy efficiency goal
- Energy management plan
- Cross-divisional management team with assigned responsibility
- Energy policies and procedures
- Implemented projects
- Identification of key performance indicators
- Periodic reporting to management, and
- Management review and corrective action



CERTIFIED

ISO 50001 -Global Energy Management Standard

- ISO 50001 standard: specifies the requirements for an energy management system, which enables an organization to take a systematic approach to the continual improvement of energy efficiency and energy performance.
- US and Brazil co-leading development of ISO 50001 - an international energy management standard through ISO Project Committee 242 with 40 participating countries
- ISO 50001 standard scheduled for publication Spring 2011; to be compatible with ISO 9001 (quality) and 14001 (environmental) standards

Thank you for all your hard work!

Questions?

