U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Industrial Assessment Centers:
Continuing Value to the ITP Mission

Industrial Technologies Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Paul Scheihing
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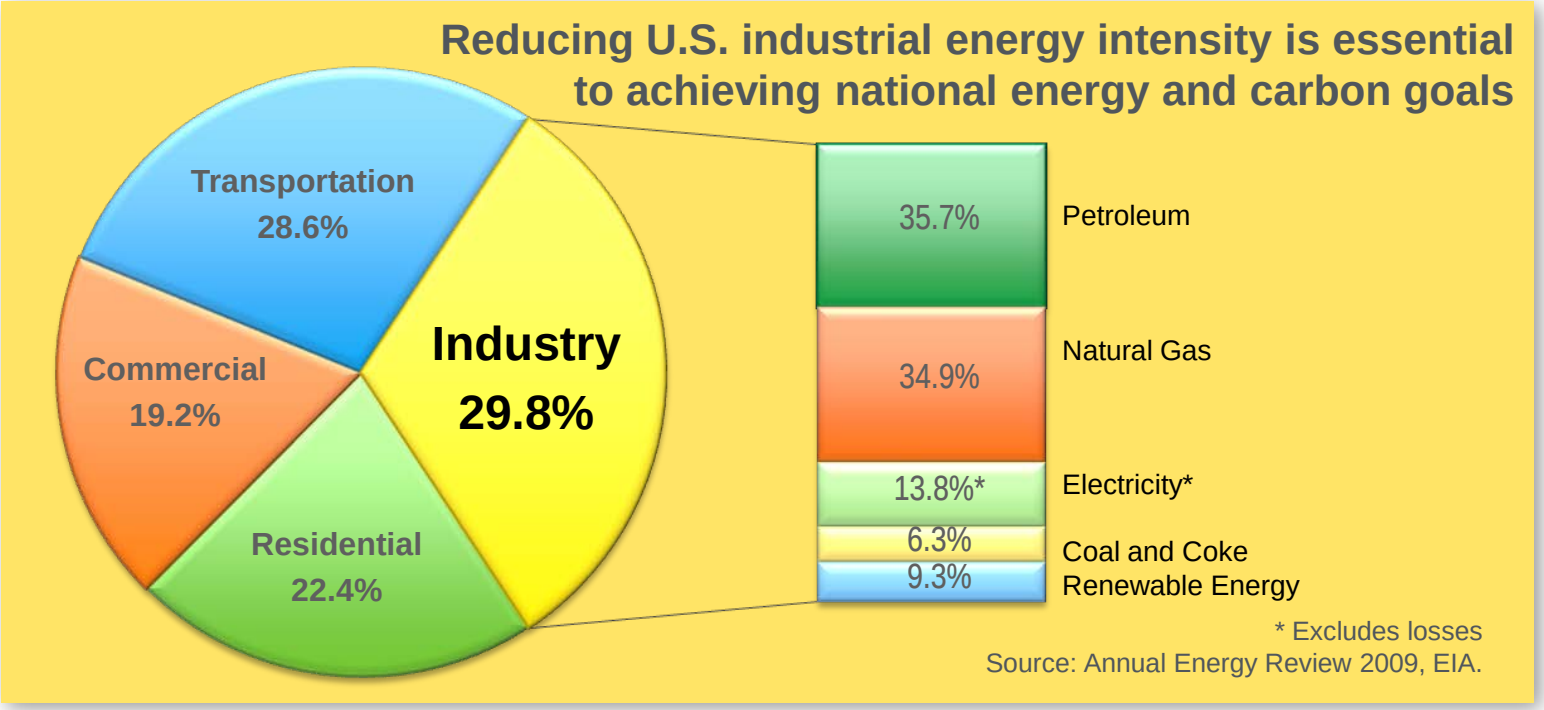
Industry Uses ~30% of U.S. Energy



- Employs ~11 million people
- Makes a significant contribution to GDP (~12%)
- Supplies ~52% of U.S. exports, worth ~$66 billion/month
- Spurs job creation and investment
- Every million dollars in energy cost savings has the potential to create many additional jobs.

Industrial Energy Efficiency Potential

Existing technologies *with an attractive internal rate of return* can cut the growth in global energy demand by half or more within 15 years.

-- *Curbing Global Energy Demand Growth*, McKinsey & Co., May 2007

More than 10% of U.S. industry's energy use could be saved by more broadly adopting existing technologies that yield an internal rate of return greater than 10%.

-- McKinsey, 2007

Industries around the globe can cut CO_2 emissions 19 to 31% using *proven* technologies and practices.

-- International Energy Agency, 2007





Industrial Technologies Program (ITP)

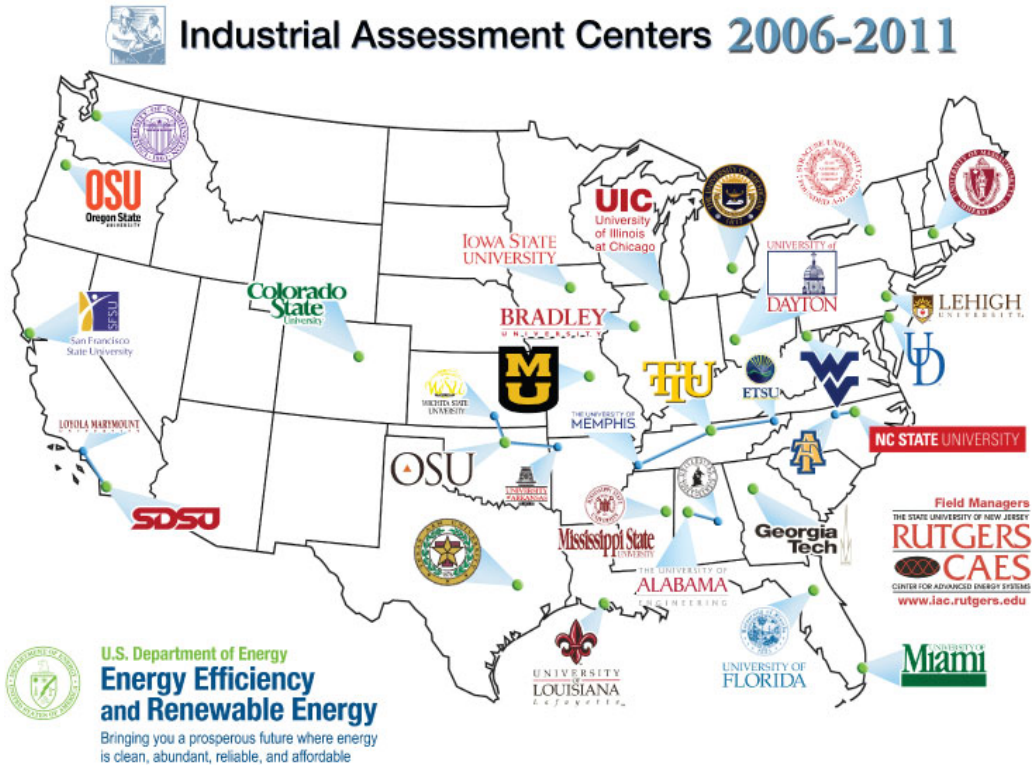
Mission:

Reduce industrial energy and carbon intensity by partnering with industry to research, develop, and deploy advanced manufacturing technologies and energy management practices.

Objectives:

- Develop innovative technology to improve energy diversity, resource efficiency, and carbon mitigation
- Accelerate adoption of today's energy-efficient technologies and practices
- Harness scientific ingenuity, expand resources, and extend our outreach through strategic partnerships

Industrial Assessment Centers



Industrial Assessment Centers (IACs) at 26 universities:

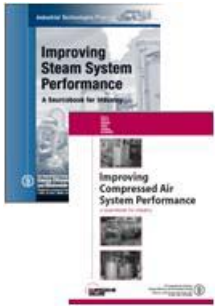
- Serve small and medium size enterprises (<1,055 TJ/yr)
- Have conducted over 1,900 cross-cutting energy assessments since 2006:
  - Identified potential energy cost savings worth more than $402 million
  - Identified opportunities to reduce CO2 emissions by 2.6 million metric tons

Industrial Assessment Center Knowledge Base Website

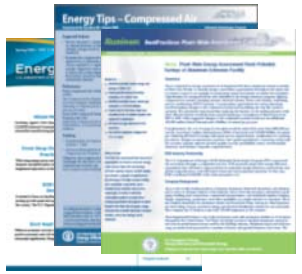
IAC

IAC Results Databases

Energy Manuals



Best Practices & Success Stories

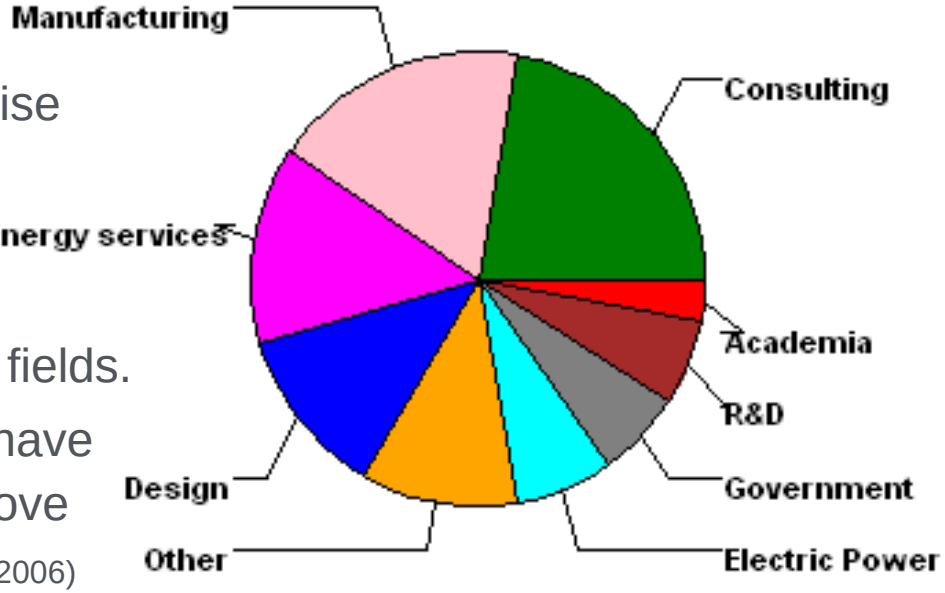


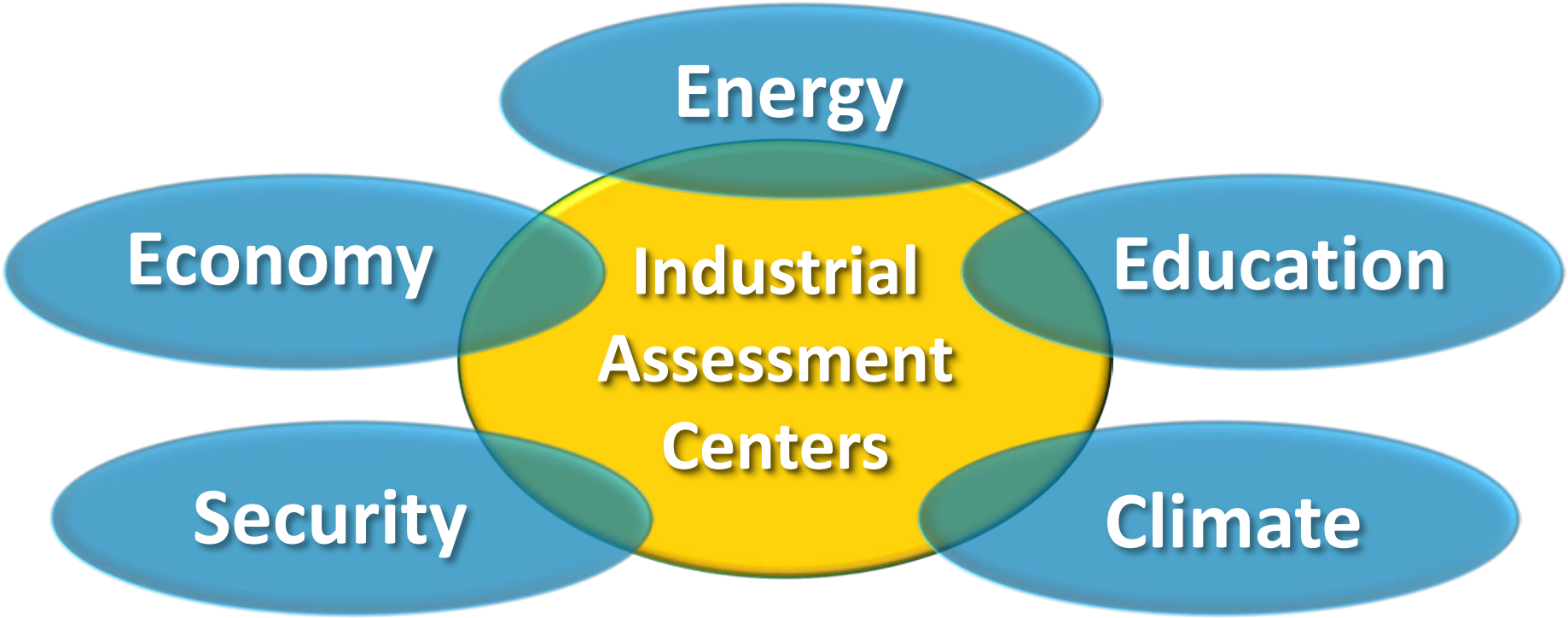
Software Tools & Templates

Training Modules & Curricula

Biggest IAC Success: You

- Since 1977, >2,500 engineering students have participated in the program.
- IAC students are known for their expertise in industrial energy efficiency.
- IAC grads are in *high demand* in the energy-related job market.
- > half pursue careers in energy-related fields.
- More than half of employed IAC grads have starting wage of $50-$99K, which is above average for engineering disciplines (Fall 2006)
- See profiles of IAC graduates online: www.iacforum.org/iac/alumni.jsp





IACs help to address critical challenges.

Government

- Energy savings
- Reduced carbon footprint
- Environmental improvements
- Jobs creation
- Workforce development
- Regional resources for bolstering energy management, training, and economic activity
- Opportunity to explore and leverage resources through industry and other partners
- Increased U.S. competitiveness in global markets

Industry

- Reduced energy costs
- Pathway for continuous improvement
- Increased profits due to savings
- Reduced carbon footprint
- Enhanced community relations
- Opportunity to participate in educating the next generation of energy-savvy industrial personnel
- Participation in energy management initiatives
- Benchmarking across industry sectors through IAC Database.

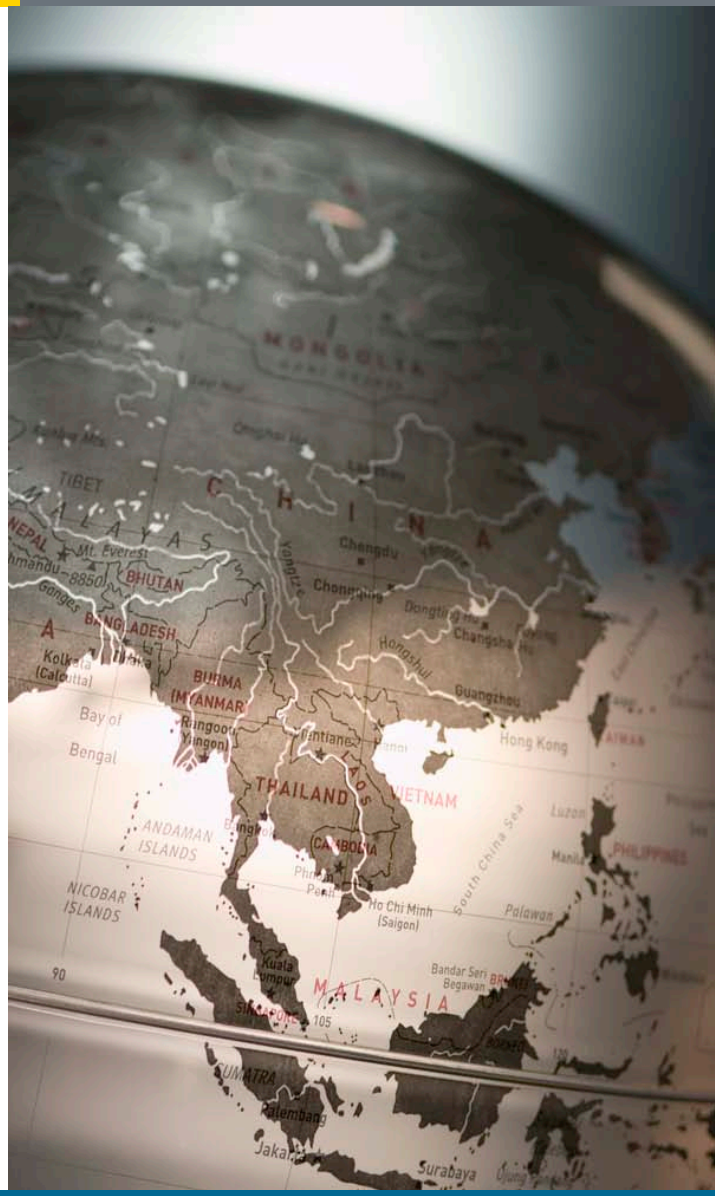
The IAC Students

- In-plant, hands-on training; use of learned engineering concepts in the field
- Experience in performing diagnostics, data collection, and analysis of energy savings opportunities
- Enhanced ability to estimate and make reasonable engineering assumptions
- Opportunities to conduct research, prepare executive-level briefings, and author publications related to technical needs and challenges of industry clients
- Enhanced practical knowledge of a range of industries, energy systems, and solutions
- Close interaction with industry partners, utility representatives, and equipment vendors
- Internships in good companies while studying
- Ability to interact with senior-level plant personnel and observe industrial equipment in operation.
- Ability to obtain “good” jobs” quickly upon graduation

Dayton engineers listening to a plant staff member discuss plant operations

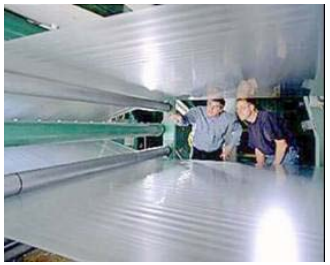
International Interest in IACs

- DOE works with other countries and organizations to provide training, technical information, and assistance to improve industrial energy efficiency and reduce greenhouse gas (GHG) emissions.
- DOE shares industrial assessment tools and protocols.
- DOE fosters replication of the U.S. university-based assessment model to identify opportunities for energy savings and train the next -generation workforce.
  - *Two DOE Laboratories signed MOU concerning the University Alliance for Industrial Energy Efficiency Collaboration* with the University of Science and Technology-Beijing.
  - Workshops held in China in October 2010.



ITP Resources

Leverage state, utility, and local resources to help manufacturers reduce energy use and carbon emissions today—and **create a corporate culture** that fosters continuous improvement.



Technical Assistance

- Tracking and managing energy intensity
- Project feasibility analysis
- Resource referrals

Tools

- Energy and Carbon Baselining
- Software Tools

Training

- Basic
- Advanced
- Qualified Specialists

Assessments

- Industrial Assessment Centers
- Energy savings assessments
- States/Utilities

Standards

- Superior Energy Performance (SEP)
- ISO 50001
- Assessment standards, protocols and metrics

Information

- Tip sheets, case studies
- Website, webcasts, databases
- Emerging technologies
- EERE Information Center

Save Energy Now Strategy

Save ENERGY Now®

Partner with U.S. industry, states, utilities, universities, and others to help manufacturers save energy and money, increase productivity, and reduce environmental impacts:

- Accelerate adoption of energy-efficient technologies and practices
- Conduct vigorous technology R&D
- Support commercialization of emerging technologies
- Provide plants with access to proven technologies, energy assessments, software tools, and other resources
- Promote energy and carbon management

LEADER Requirements

- Pledge to adopt a goal to reduce energy intensity 25% or more over 10 years
  - Designate an energy manager
  - Develop an energy intensity baseline
  - Develop an energy management plan
- Take steps to reduce energy intensity and reduce carbon emissions
- Report energy intensity data and achievements annually to DOE
- Assess operational and financial feasibility

Over 100 companies have signed up.

Pledge Form

Save Energy Now LEADER

Voluntary Pledge

Save ENERGY Now. LEADER

_____ voluntarily agrees to become a *Save Energy Now* LEADER.

Company / Plant Name

We pledge to adopt a goal to reduce energy intensity by 25% or more over 10 years.

- Within 12 months, complete the following:
  - Establish an energy use and energy intensity baseline
  - Develop an energy management plan
  - Designate an energy leader or energy manager
- Take steps to reduce energy intensity and the associated carbon emissions
- Report energy intensity, energy use data, and achievements annually to DOE.

Through the *Save Energy Now* initiative, DOE will provide:

- Tailored technical assistance to assist in developing the energy baseline and energy management plan, plus ongoing access to an energy management expert
- Priority access to energy system assessments on multiple industrial systems
- Waived fees for training workshops on financing options, advanced technology, energy-analysis software, energy management, and other topics
- Easy access to proven, energy-analysis software tools and other technical resources from DOE and partner organizations
- National recognition for pledge participation and achieving reported energy savings
- Additional recognition for validated energy savings.

This pledge is a voluntary agreement. It is strictly for internal management purposes and is not legally enforceable and shall not be construed to create any legal obligation on the part of either party. This agreement can be terminated at any time without prior notification, penalties, or further obligation. DOE agrees to not comment publicly regarding a withdrawal of an agreement. This agreement does not authorize or obligate any party to expend, exchange, or reimburse funds, services or supplies, or transfer or receive anything of value. Companies and plants agree that they will not claim or imply that their participation in the *Save Energy Now* LEADER pledge program constitutes federal government approval or endorsement of anything other than its commitment to energy efficiency and will not make statements or imply that DOE endorses the purchase or sale of products and services or the organization's views. All agreements herein are subject to, and will be carried out in compliance with, all applicable laws, regulations, and other legal requirements.

On behalf of _____, the undersigned company representative understands and agrees to the terms of the *Save Energy Now* LEADER pledge.

Company

Printed Name

Position

Date

U.S. Department of Energy

Printed Name

Position

Date

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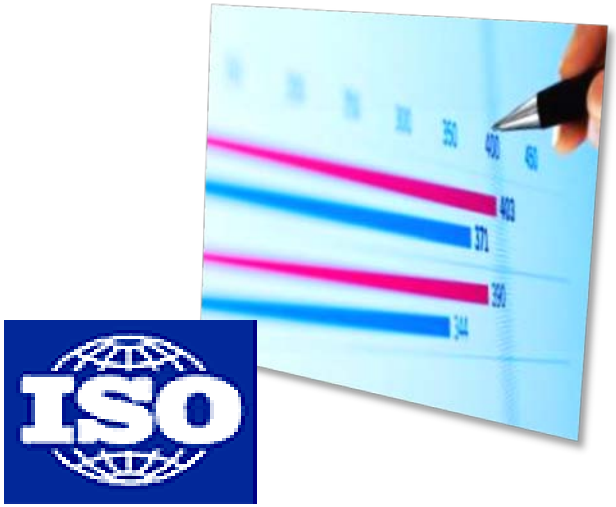
This year, industry gains access to:

- ISO 50001 Energy Management Standard
- Superior Energy Performance Certification



ITP is packaging its resources in new ways, placing greater emphasis on

- Energy Management
- Supply Chain
- Expanded Workforce Training
- Leveraging Partnerships & Resources
- Financing Options

ANSI
ANSI Accredited Certification Program

Energy management is the process of monitoring, controlling, and conserving energy in an industrial facility.

Managing Energy, Gaining Control

- End-users cannot control external factors, such as supply issues, prices, or the global economy, but they *can* control how they use their energy resources.
- An **energy management process** can help users proactively assess, measure, and manage energy usage to continuously improve their energy performance.
- Energy management practices, standards, and resources help to embed energy efficiency in the corporate culture for sustained energy benefits.

Key ISO 50001 Components

ISO 50001 energy management standard will establish a framework for industrial plants, facilities, and organizations to manage energy.

International Organization for Standardization

- Requires an organization to establish and use an **energy management system** for *continual improvement* in energy performance.
- **Does not prescribe specific energy performance criteria.**
- May be used independently or with other management systems (e.g., ISO 9001 and ISO 14001).
- Applicable to all organizations that use energy.

Following the Plan-Do-Check-Act process, features include:

- Energy policy
- Energy management plan
- Cross-divisional management team
- Operating controls and procedures
- Establishing a baseline
- Identification of energy performance indicators
- Objectives and targets
- Action plans
- Periodic reporting of progress (to management)

Superior Energy Performance (SEP)

A *market-based plant certification program* that provides industrial plants and commercial buildings with a roadmap for ***continuously improving*** energy efficiency while boosting competitiveness.

- Uses ISO 50001 standard as foundational tool for energy management
- Develops system to validate energy intensity improvements and management practices
- Encourages broad participation throughout industry, buildings, and public sector

ISO International Organization for Standardization

U.S. Superior Energy Performance launches in 2011

ANSI Accredited Certification Program

Global Superior Energy Performance
announced at Clean Energy Ministerial in July 2010

Workforce Development

Superior Energy Performance (SEP) requires conformance to ISO 50001 energy management standard *and* verified achievement of energy savings. Trained personnel will be needed to verify conformance and achievements.

- ANSI-accredited **Certified Practitioners** provide plant support:
  - Assist in implementing ISO 50001
  - Conduct system-specific assessments according to protocol and establish procedures for continuous system savings
- Third-party **Certified SEP Validation Specialists** and **SEP Lead Auditors** to verify plant conformance to Superior Energy Performance requirements

Energy Management Tool Suite

Upgrades to proven tools and integration with new protocols and standards to facilitate energy management.

Basic and Advanced Levels:

- Steam
- Process Heating
- Pumps
- Fans
- Compressed Air
- Motors

www.eere.energy.gov/industry/

Technology Assistance: Training

Training on a variety of topics at several levels:

- Energy Management Training seminars
- Webinars on relevant topics *(1-2 hours)*
- Awareness workshops *(1-2 hours)*
- End-User BestPractices Training *(1 day)*
- Advanced/Qualified Specialist Training *(3 days)*
- Data Center Workshops

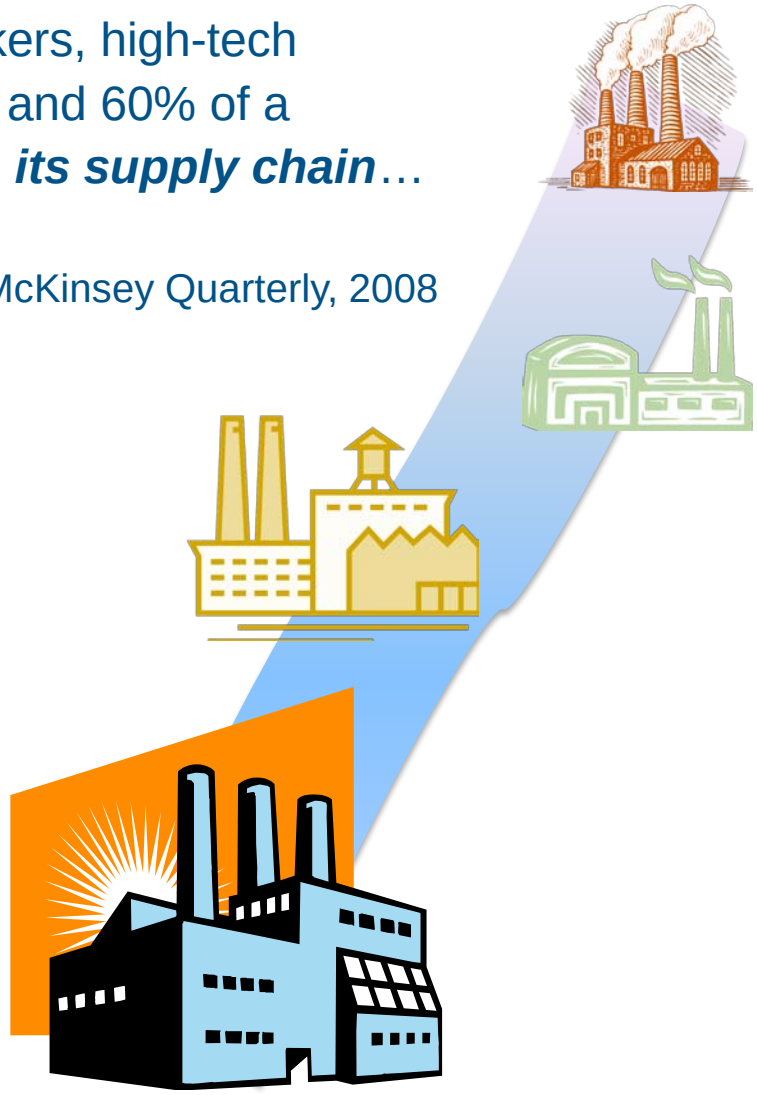
Exploring ways to expand access to training and certification opportunities for existing and future workforce—to enhance industrial energy management and performance.

Supply Chain Energy Efficiency

"Analysis suggests that for consumer goods makers, high-tech players, and other manufacturers, between 40% and 60% of a company's carbon footprint resides ***upstream in its supply chain***… For retailers, the figure can be 80%."

-- McKinsey Quarterly, 2008

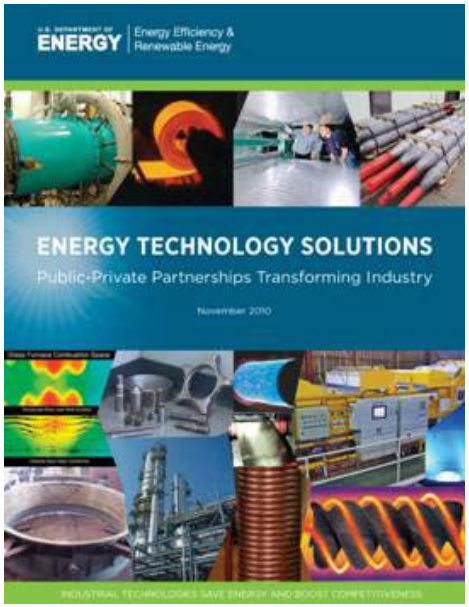
- Upstream suppliers may account for 2-4 times greater energy use.
  - Opportunities are often dispersed and difficult to tap with limited resources.
- ITP resources can assist lead companies to achieve these energy and carbon reduction opportunities.
  - Improves sustainability, reduces risk, builds partnership with suppliers



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 prestigious *R&D 100* awards since 1991
- Saved 9.3 quads (9.8 EJ) of energy and reduced carbon emissions by 755 million tonnes of CO_2



R&D 100

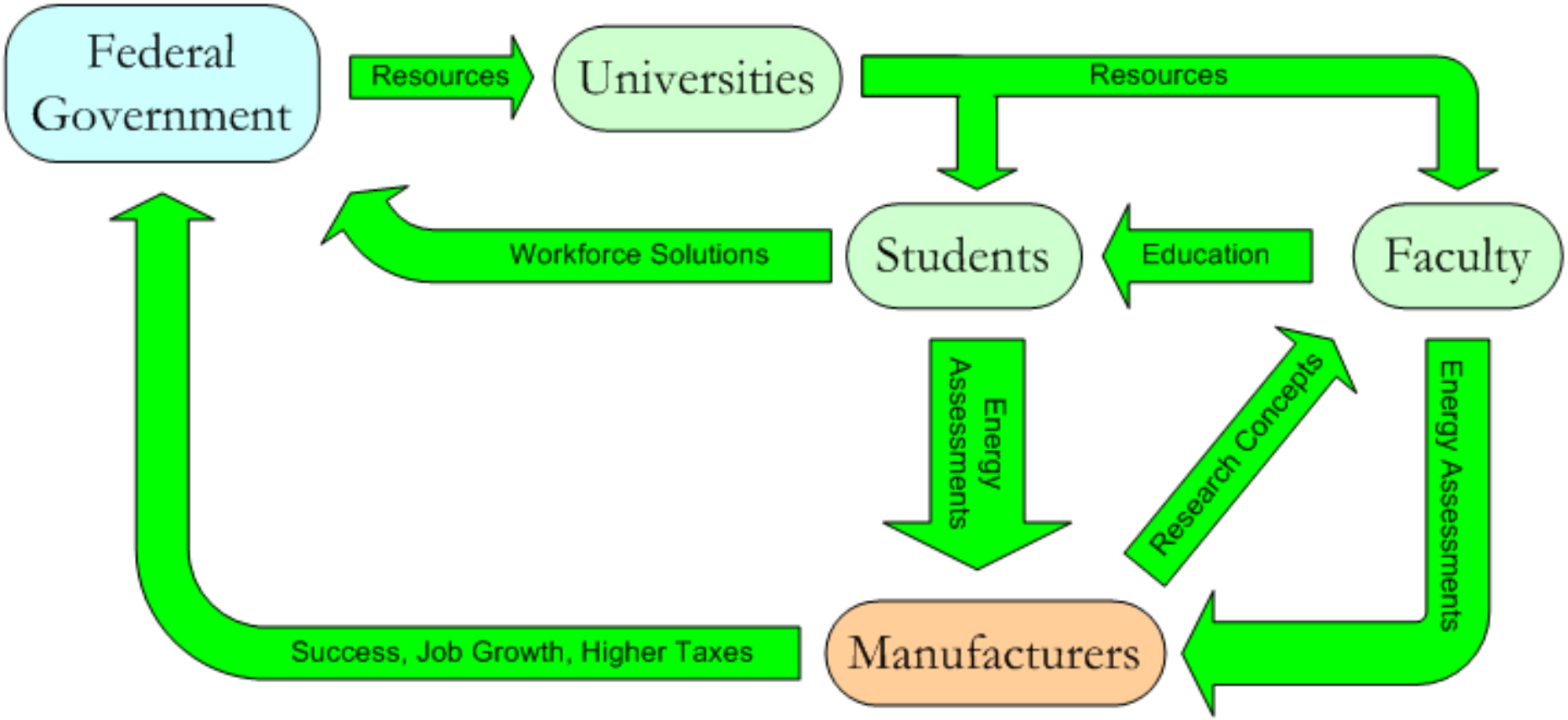
Harness Scientific Ingenuity → Spur Innovation → Leverage Resources → Change Corporate Culture

Path Forward:

- *Leverages* public and private resources to maximize progress toward national goals
- Inspires U.S. companies to embrace a *corporate culture* that places value on good energy management
- Builds technical and *workforce capacity* at state and local levels
  - Establishes a lasting *local infrastructure* to support industrial energy management/savings
- Recognizes significant, verified *energy savings*
  - Targets energy savings in alignment with national goals for energy security, climate, and competitiveness.

Thank You

IACs…Who benefits?



Isothermal Melting (ITM) Process for Aluminum

- Continuous flow system with immersion heaters converts electricity to melting energy with 97% efficiency.

SuperBoiler

- Gas-fired package offers >94% fuel-to-steam conversion efficiency
- Demonstration at fruit processing facility in California

Supply Chain Strategy

The strategy leverages existing tools and partners…

Existing DOE Partners:
Industrial LEADERs, Commercial Building Energy Alliances

New tools & guidance materials facilitate outreach/ engagement process

Suppliers

Pursue continuous improvement in energy & carbon management

Existing DOE Programs, Tools, & Resources
Modified & refocused to target small & medium-sized suppliers

Reduced energy & carbon footprints, reduced risk

… to deliver extended benefits throughout the corporate value chain.

In-Plant Training Workshops

- **Goals**
  - Leverage limited DOE resources
  - Combine assessment and training programs in a plant setting
  - Open to members of multiple companies, plants, or supply chains
  - Demonstrate methodology to find and implement energy-saving opportunities
  - Stress energy management and continuous energy improvement
- **Teach In-Plant Training Participants To:**
  - Identify energy savings using DOE tools and practices in a plant setting
  - Prioritize projects to implement energy-saving opportunities
  - Effectively implement and replicate actual energy-saving projects
  - Integrate assessments into energy management strategy
- **Model Options**
  - Multiple LEADER Companies or multiple plants within a LEADER Company
  - A LEADER Company and its supply chain partners

LEADER Benefits

- ITP will provide tailored technical assistance:
  - Support for developing the energy baseline and energy management plan
  - Access to a Technical Account Manager
- Resources and tools for energy analysis
- Training workshops on financing options, advanced technology, energy management, software tools, etc.
- National recognition for commitments and progress in achieving goals
- Materials for industrial supply chains

Over 100 companies have signed the LEADER Pledge

Large Plant Assessment Results

Since this type of large plant assessment was initiated in January 2006:

- Over 920 energy assessments conducted at large plants
- Over $1.2 billion in identified energy cost savings
- 10 million metric tons of CO_2 emissions reductions identified