



Industrial Energy Efficiency

James Quinn

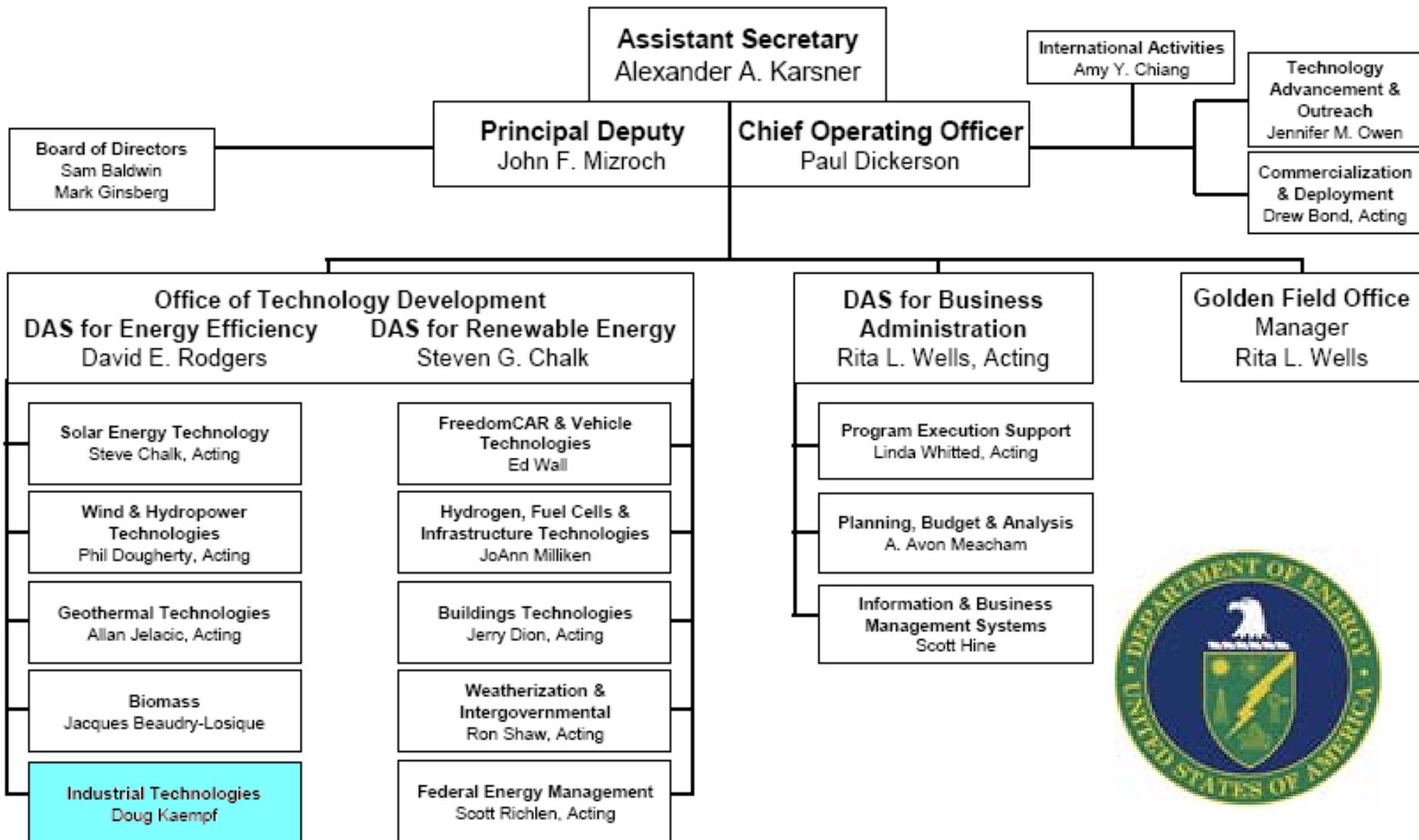
Industrial Technologies Program
U.S. Department of Energy



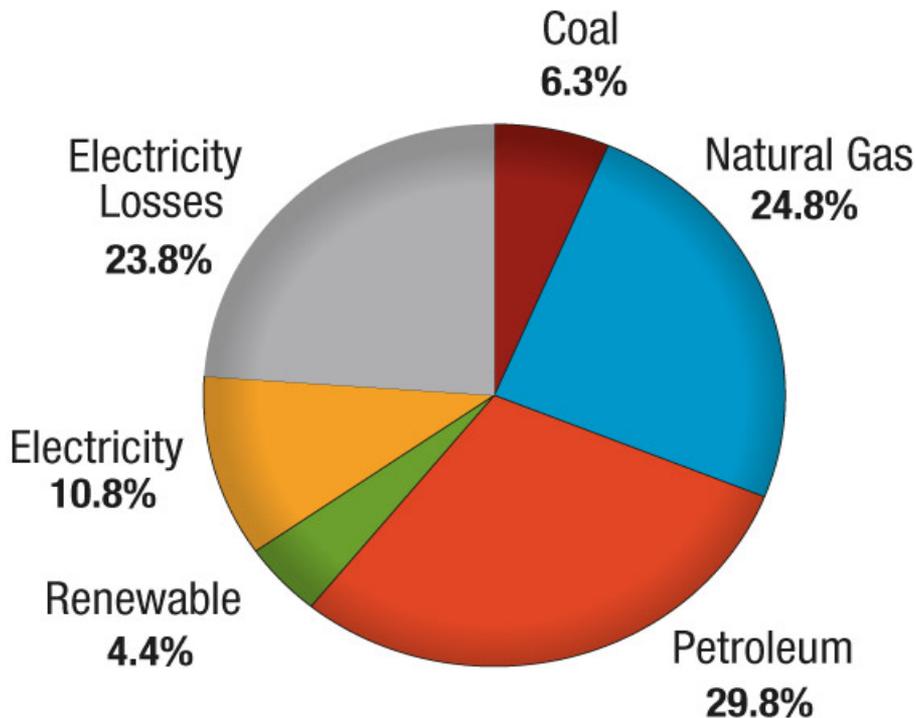
IAC Student Meeting
Washington, DC
February 7, 2008



DOE Office of Energy Efficiency and Renewable Energy



U.S. Industry: Key to energy picture



Industrial Energy Use by Fuel Type

32 quads or ~33% of total U.S. energy consumption

U.S. industry represents:

- 37% of U.S. natural gas demand
- 29% of U.S. electricity demand
- 30% of U.S. greenhouse gas emissions
- More energy use than any other single G8 nation
- Large opportunities for
 - Energy reduction
 - Emissions reductions
 - Fuel flexibility



Industrial Technologies Program

MISSION

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



Industrial Technologies Program

Goal:

Drive a 25% reduction in industrial energy intensity by 2017.

Save
ENERGY
Now

- Helps *all* industrial companies— no matter where they currently stand in terms of energy efficiency
- Provides resources to the **200,000 U.S. manufacturing plants** to identify and implement cost-effective measures



Who We Work With

- Energy-intensive industries, such as chemicals, petroleum, forest products, and metals
- Major value-adding industries, such as food processing, automotive, and fabricated metals
- High-growth industries, such as computers and electronics
- New energy supply industries, such as ethanol production and biorefineries
- Trade associations, States, Utilities and Supply Chain Partners



Industrial Technologies Program Delivers Solutions



Energy Efficiency R&D

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



Technology Delivery

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



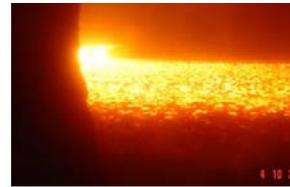
Technology R&D: Focus on Energy Efficiency

Industrial Reaction & Separation



Develop technologies for efficient reaction and separation processes

High-Temperature Processing



Develop energy-efficient, high-temperature process technologies for producing metals and non-metallic minerals

Energy Conversion Systems



Develop high-efficiency steam generation and combustion technologies and improved energy recovery technologies

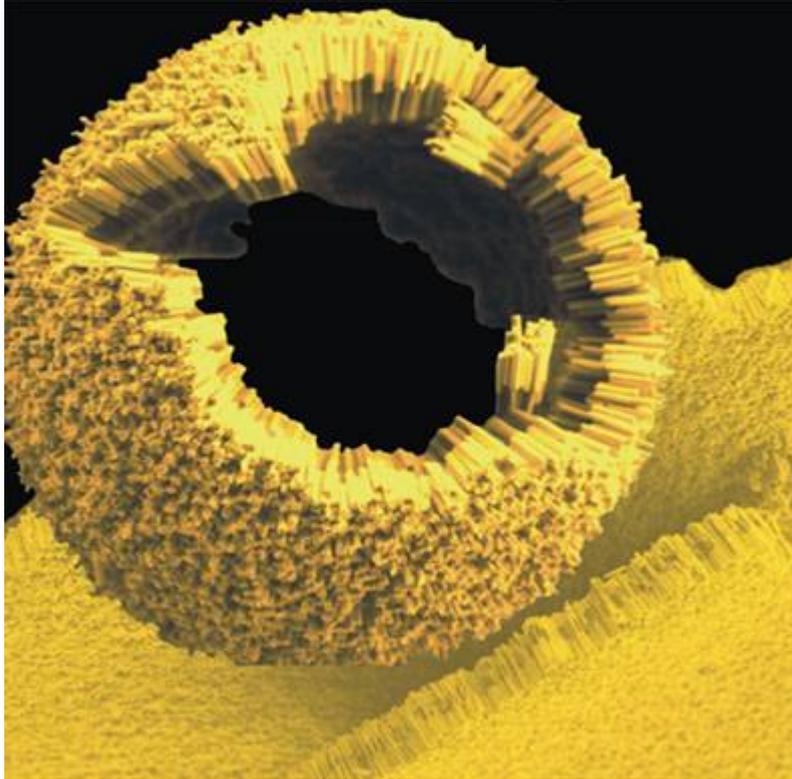
Fabrication & Infrastructure



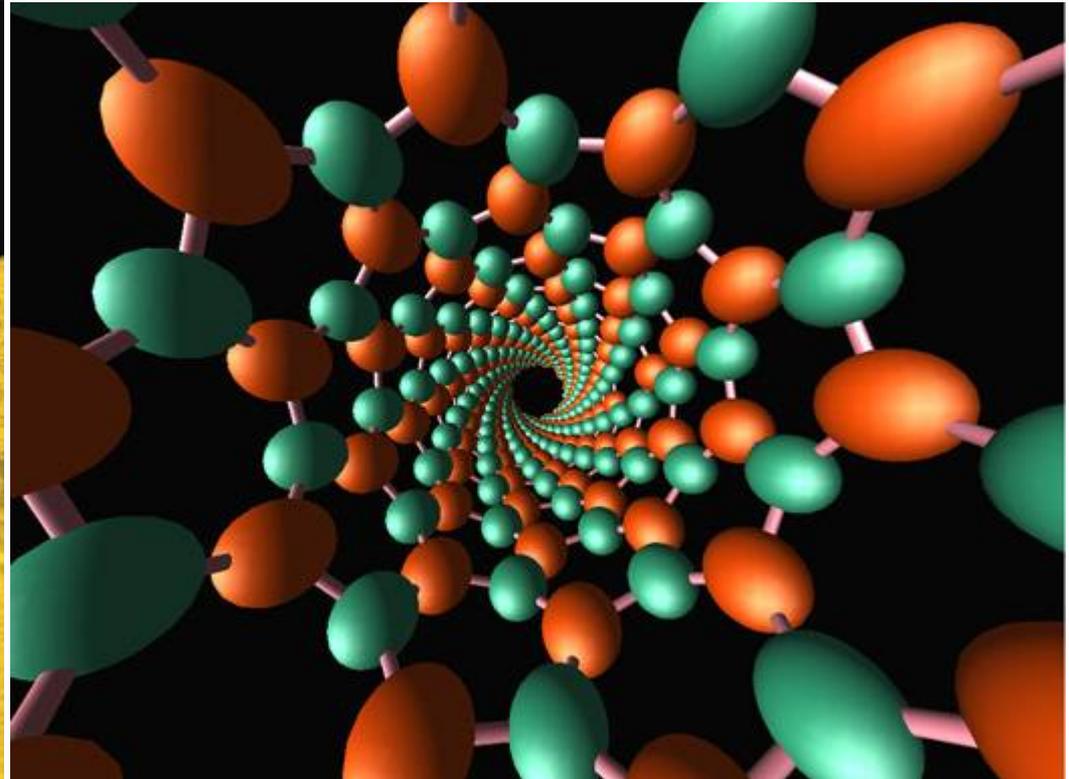
Develop energy-efficient technologies for making near net-shape finished products from basic materials



Nanotechnology for Industry



The self-assembly of polymer nanorods results in a curved structure.



View down middle of a boron nitride nanotube.



Save ENERGY Now

- ❑ Encourage industry to voluntarily reduce its energy usage in a period of tight supplies by working with America's largest energy-intensive plants
- ❑ Create momentum to significantly improve energy efficiency practices throughout the manufacturing sector



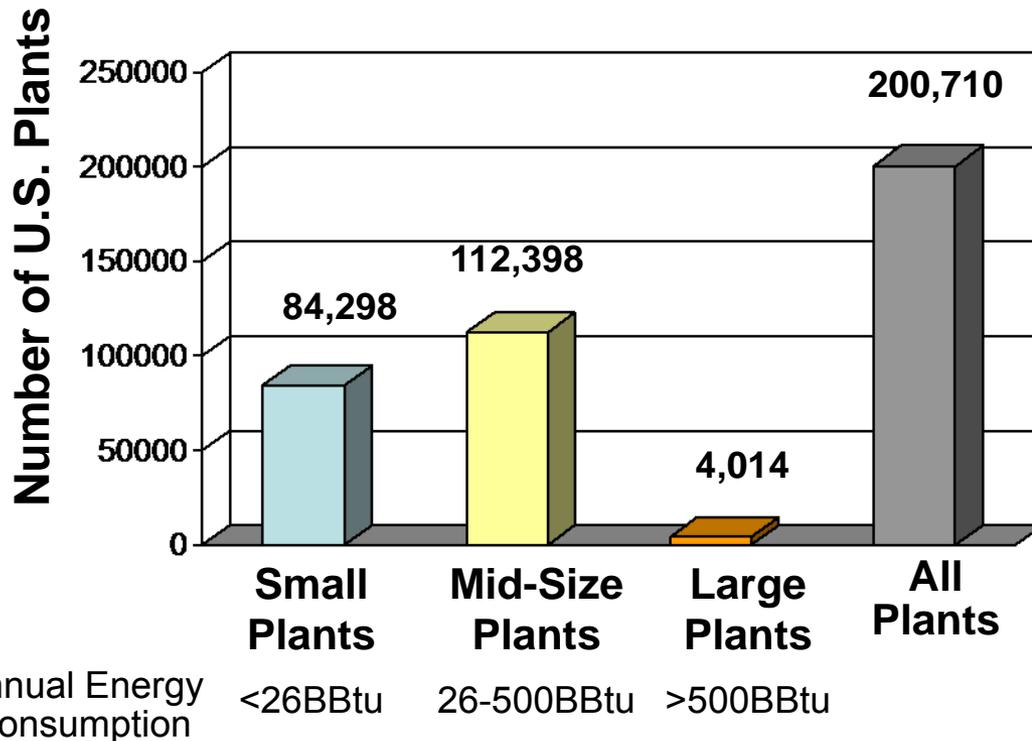
“Our Energy Saving Teams will work with on-site managers on ways to conserve energy and use it more efficiently.”

Secretary of Energy Sam Bodman
October 3, 2005

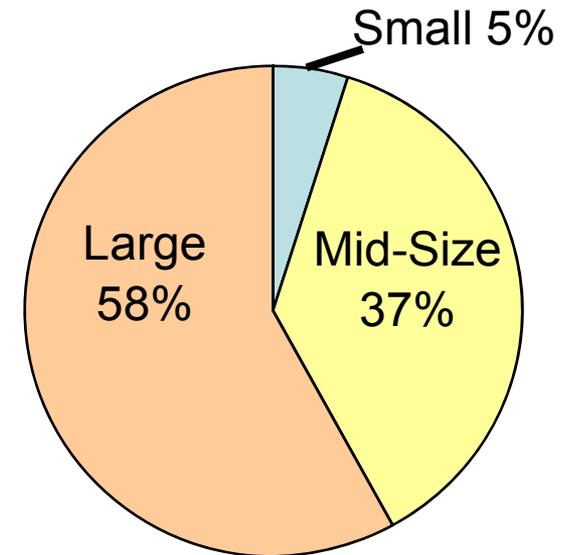


Focus on Plants of All Sizes

U.S. Manufacturing Plants: By Size

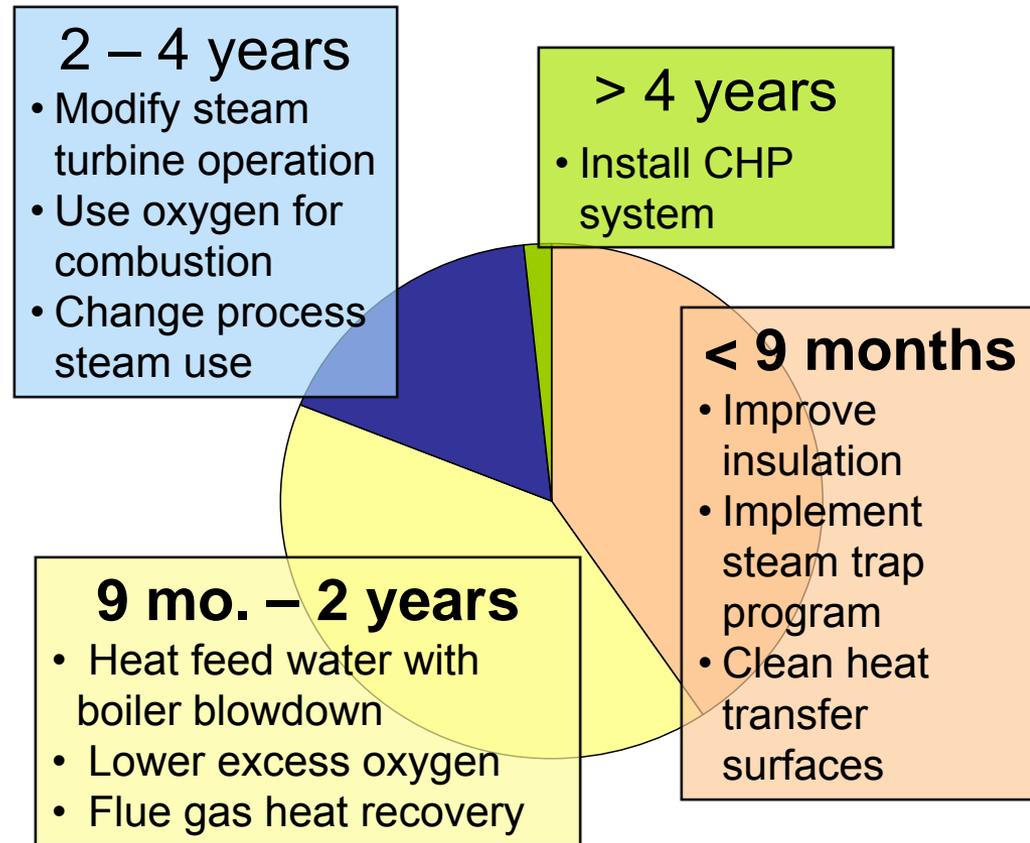


Percent of Total Manufacturing Energy



Energy Assessments Success: 2006-2007

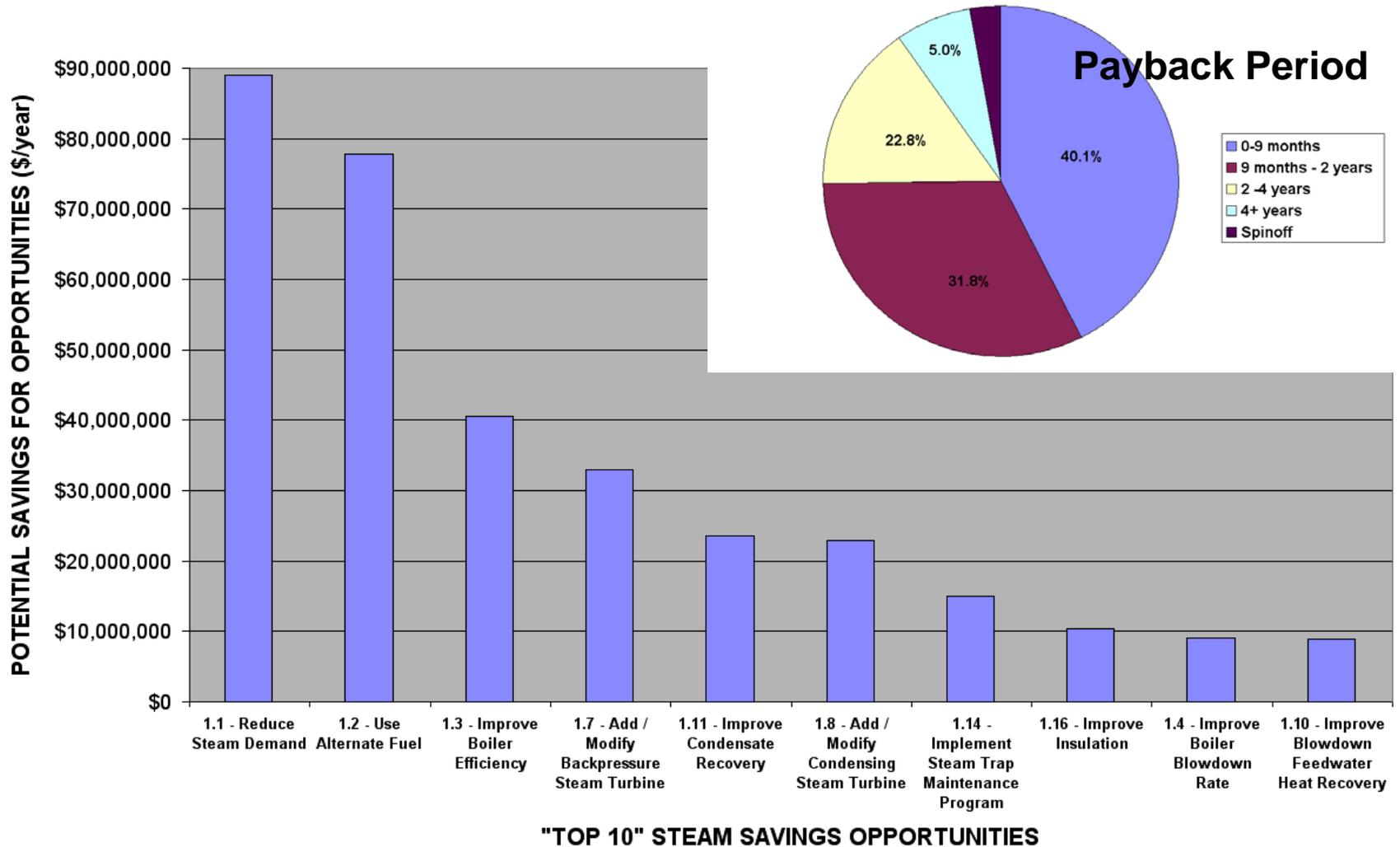
- Large Plant Assessments
- Qualified Energy Experts
- 450 assessments completed
- 350 assessments with completed reports
- Identified energy savings
 - 71.7 TBtu/\$687 million
- Total potential carbon dioxide (CO₂) emissions reduction:
 - 5.6 million metric tons



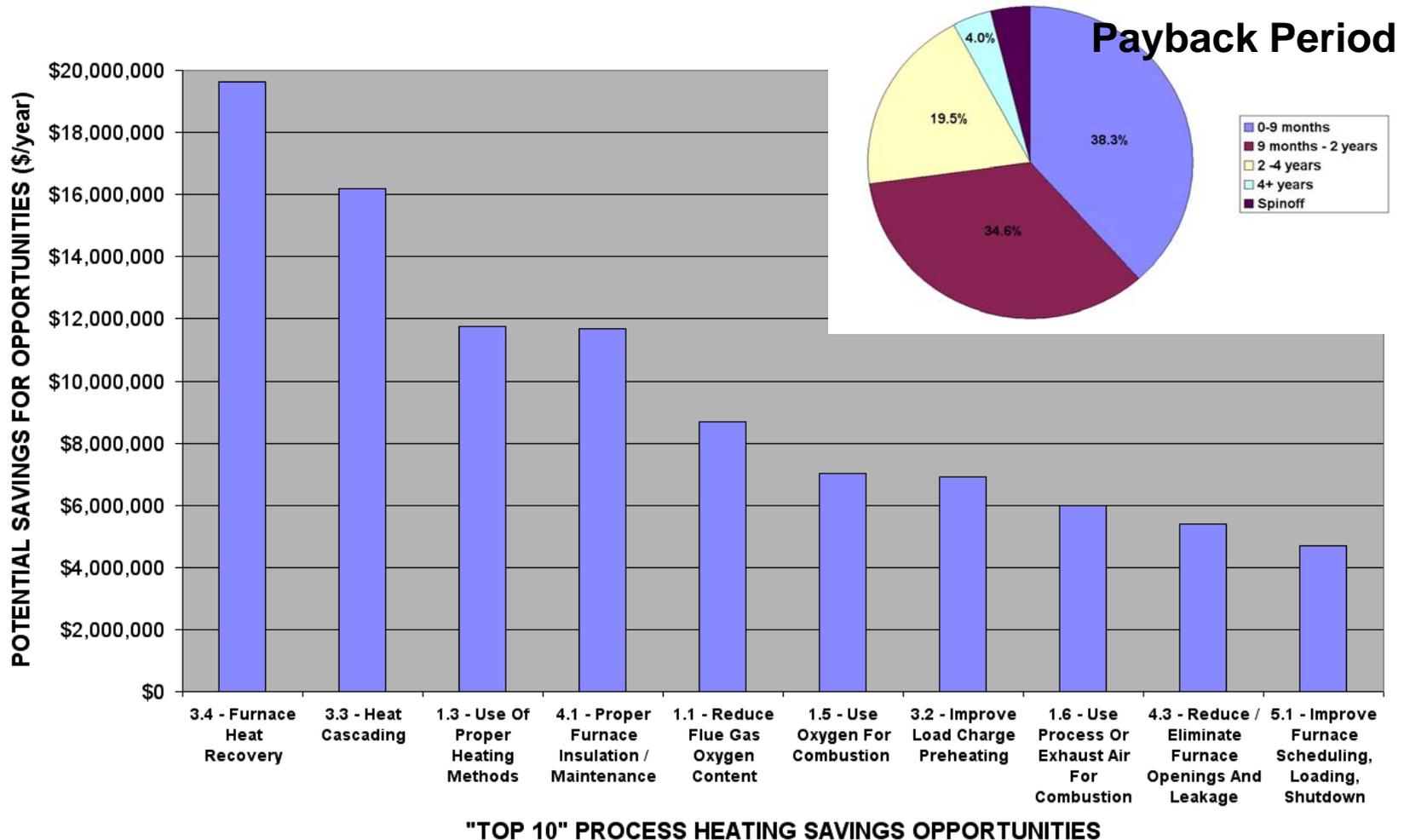
Estimated Payback Periods for Recommended Actions



The Top 10 Steam ESA Opportunities Could Result in \$330 Million/Year of Plant Energy Savings

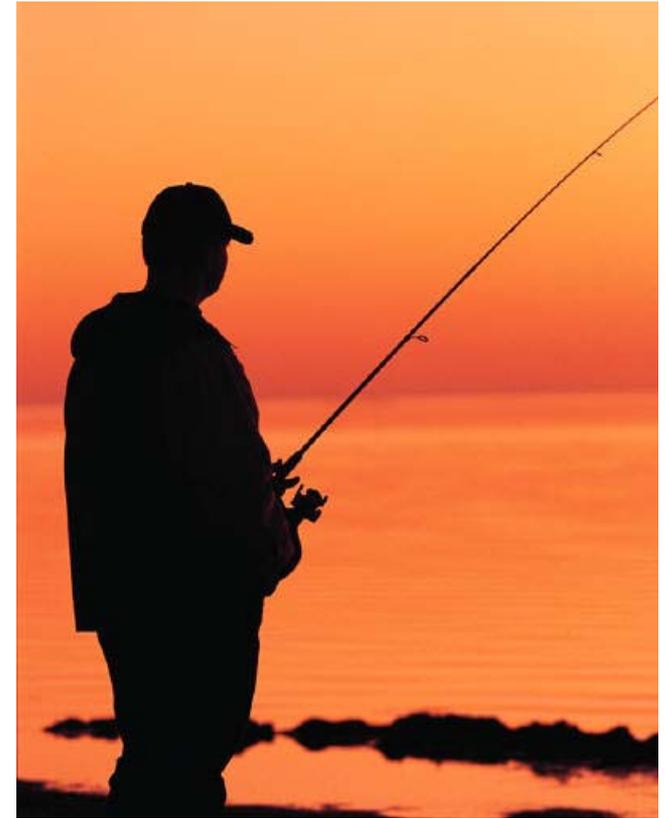


The Top 10 Process Heating ESA Opportunities Could Result in \$98 Million/Year of Plant Energy Savings

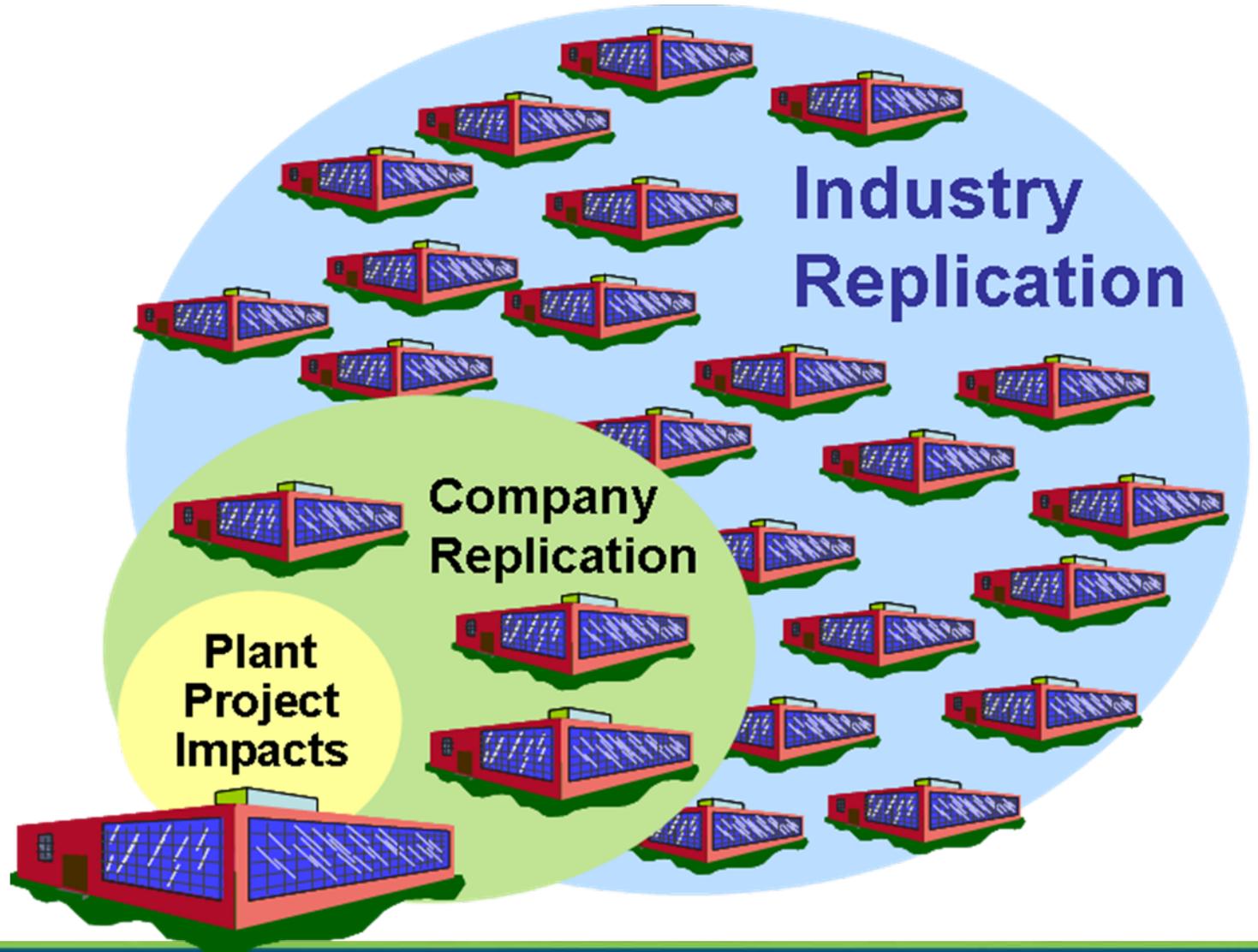


Give a man a fish
and he will eat for
a day

Teach a man to
fish
and he will eat for
a lifetime



Replicating Assessment Savings



IACs a Critical Part of the Save Energy Now Program

- Completed 300 assessments in 2007 [*600 completed in 2006*]
- Have an average per plant energy cost savings of \$115,270/year
- IAC database contains (as of 1/28/08):
 - 13,717 Assessments
 - 101,901 Recommendations
- Other products: IAC Case Studies, mentoring, training

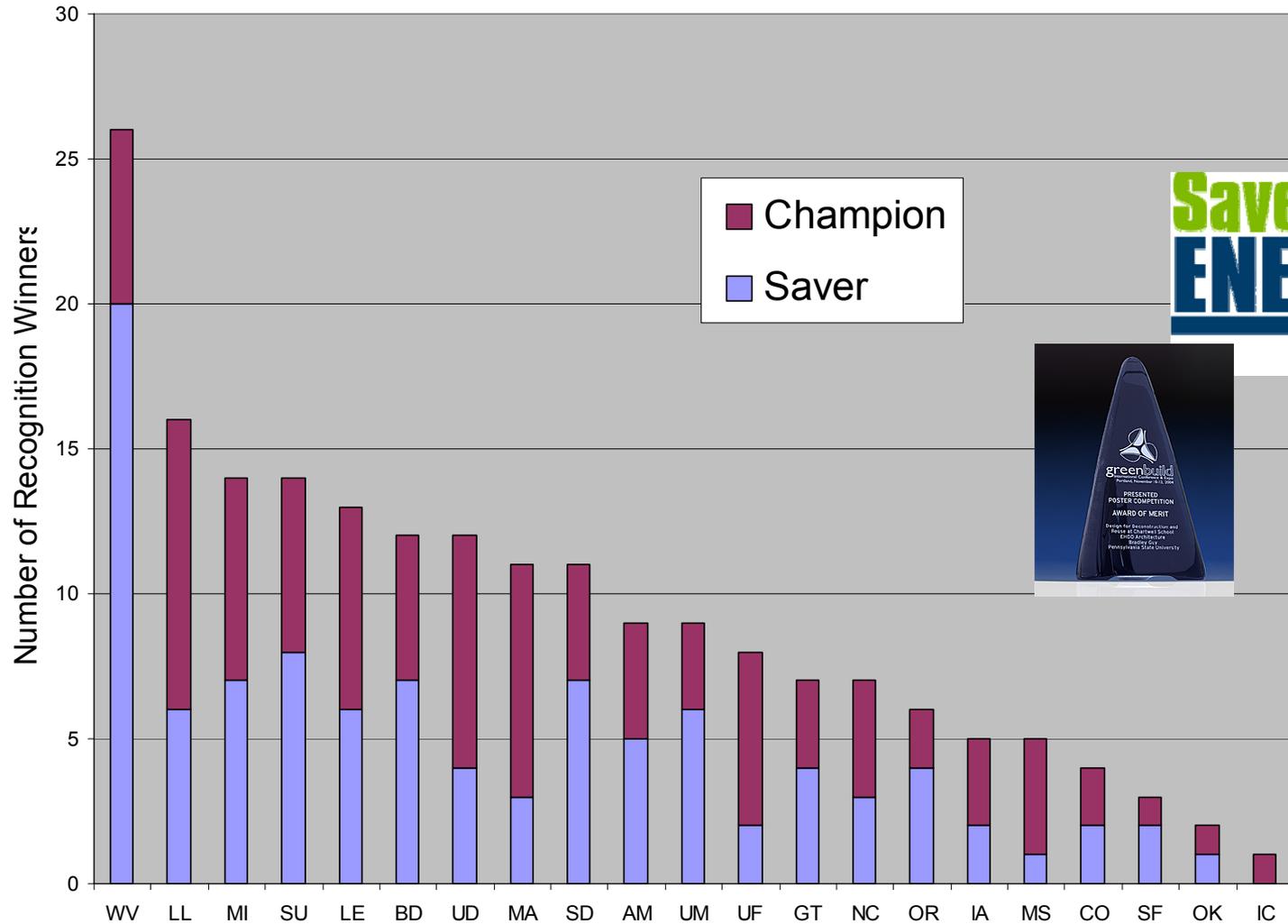
Save
ENERGY
Now



Over 200 IAC-assessed plants are being recognized as:
Energy Savers
Energy Champions



SEN-IAC Recognition Winners by IAC Center

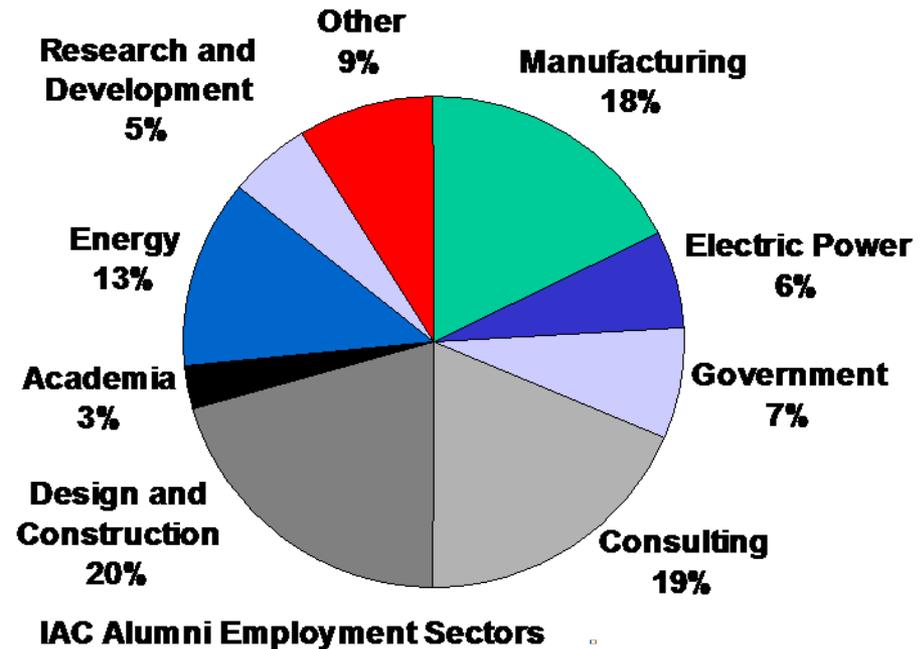


Save
ENERGY
Now



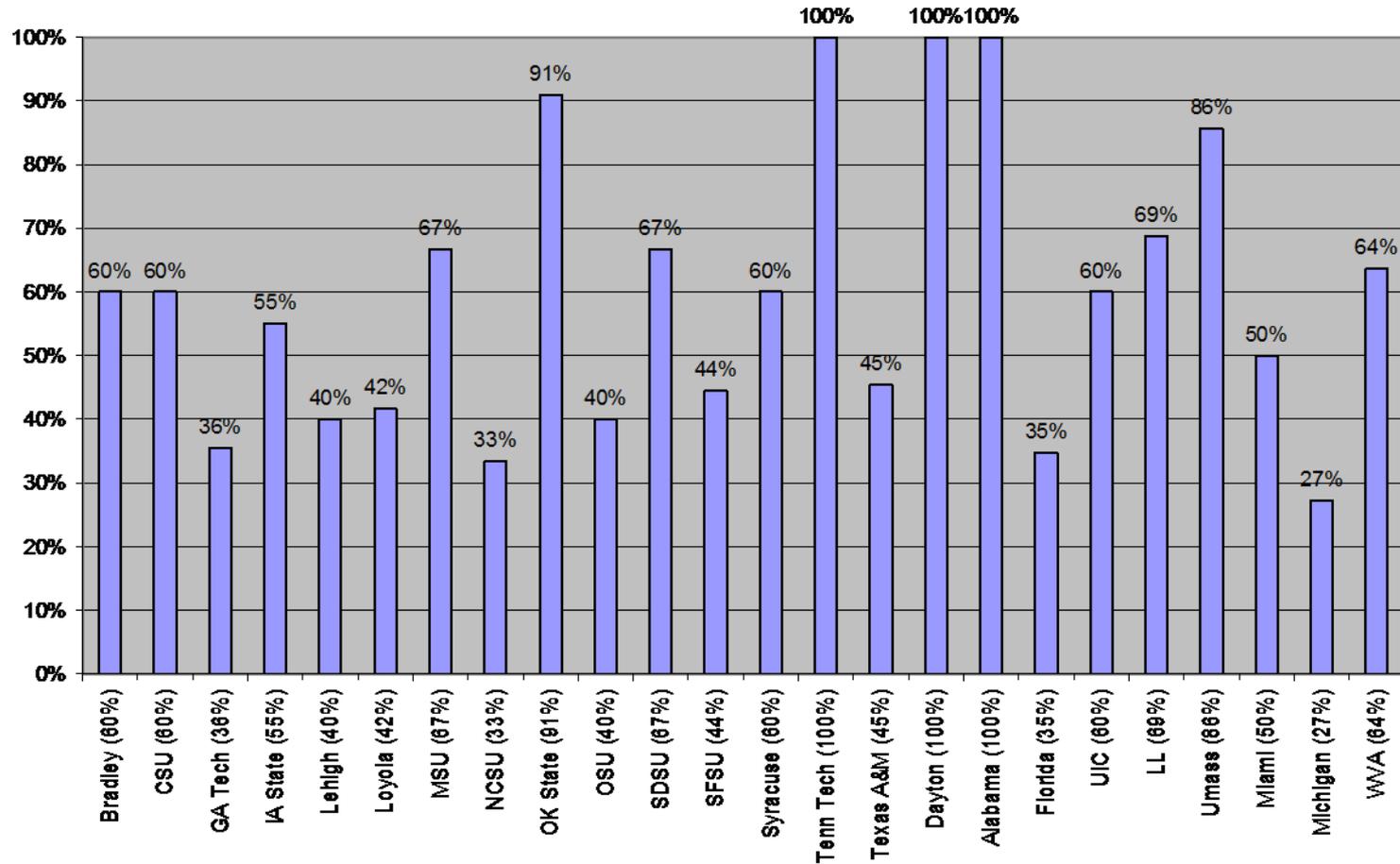
IAC Alumni are the Nation's Premier Talent in Industrial Energy Efficiency

- Since 1977, over 2500 students have participated in the IAC Program
- 37% of IAC participants have attained or are working towards their PE registration
- 46% of IAC participants have successfully completed the Fundamentals of Engineering exam
- Greater than 50% of IAC graduates receive starting salaries between \$50-\$100K [national average for engineering starting salaries is \$50,892].

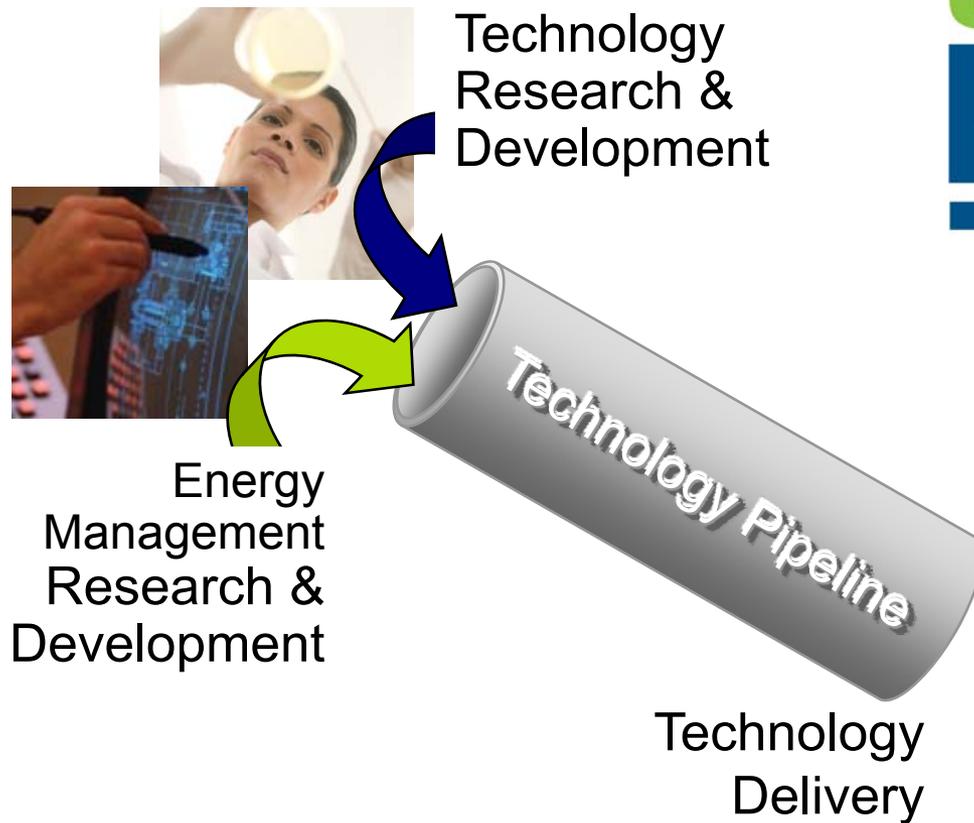


Did you know that more than 1/2 of the IAC students pursue careers in energy fields? Will you?

Percent of Employed Graduates in Energy



Industrial Technologies: Save Energy Now



Save
ENERGY
Now

- Energy Management Practices
 - Plant Certification
- Software Tools
- Training
- Plant Assessments
- Voluntary Agreements
- Info & Resources



Technology Delivery Products and Services

Standards

- Plant Certification



Tools

- Process Heating
- Steam Systems
- Plant Energy Profiler
- Motors & Pumps
- Fans



Information

- Website
- Information Center
- Tip Sheets
- Case studies
- Webcasts
- Emerging Technologies



Training

- Basic
- Advanced
- Qualified Specialist



Assessments

- Energy Savings Assessments
- Industrial Assessment Centers

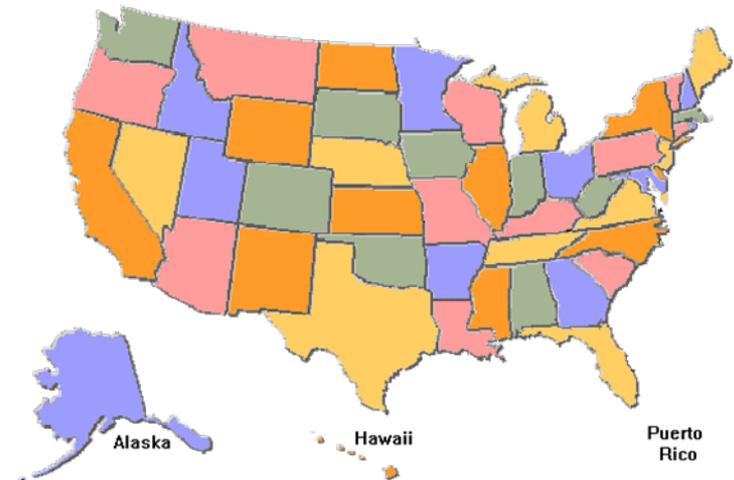


State-Level Save Energy Now

• A partnership of state energy offices, regional energy efficiency organizations, academia, and private companies with the purpose of:

- Working with the states to establish energy assessment capability and expand on the success of the federal program
- Transferring ITP and other energy efficient technologies to the market
- Reducing carbon emissions through energy efficiency

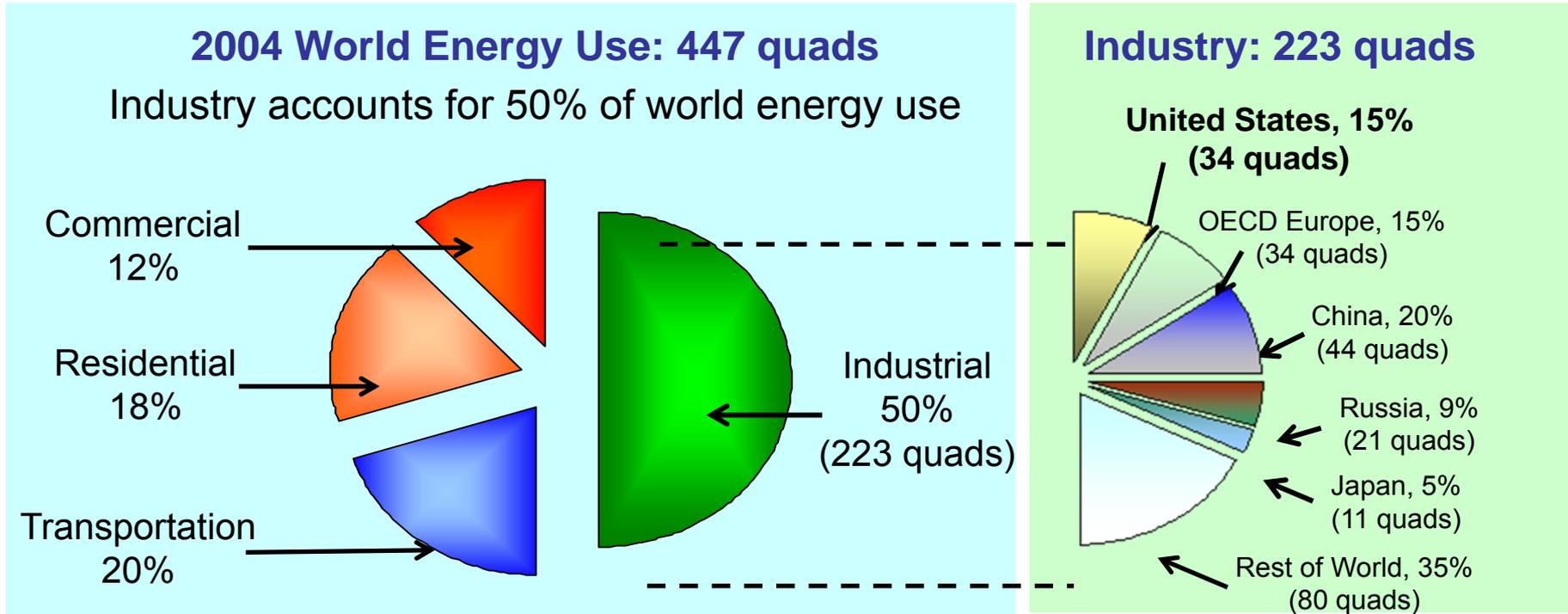
Save
ENERGY
Now



• In FY08, 19 states were selected for the State Industrial Assessment Projects Funding Opportunity.

• Planning for another funding opportunity in FY09 for more states to receive assistance to launch state-level Save Energy Now campaigns.

Industrial Energy = 1/2 World's Energy

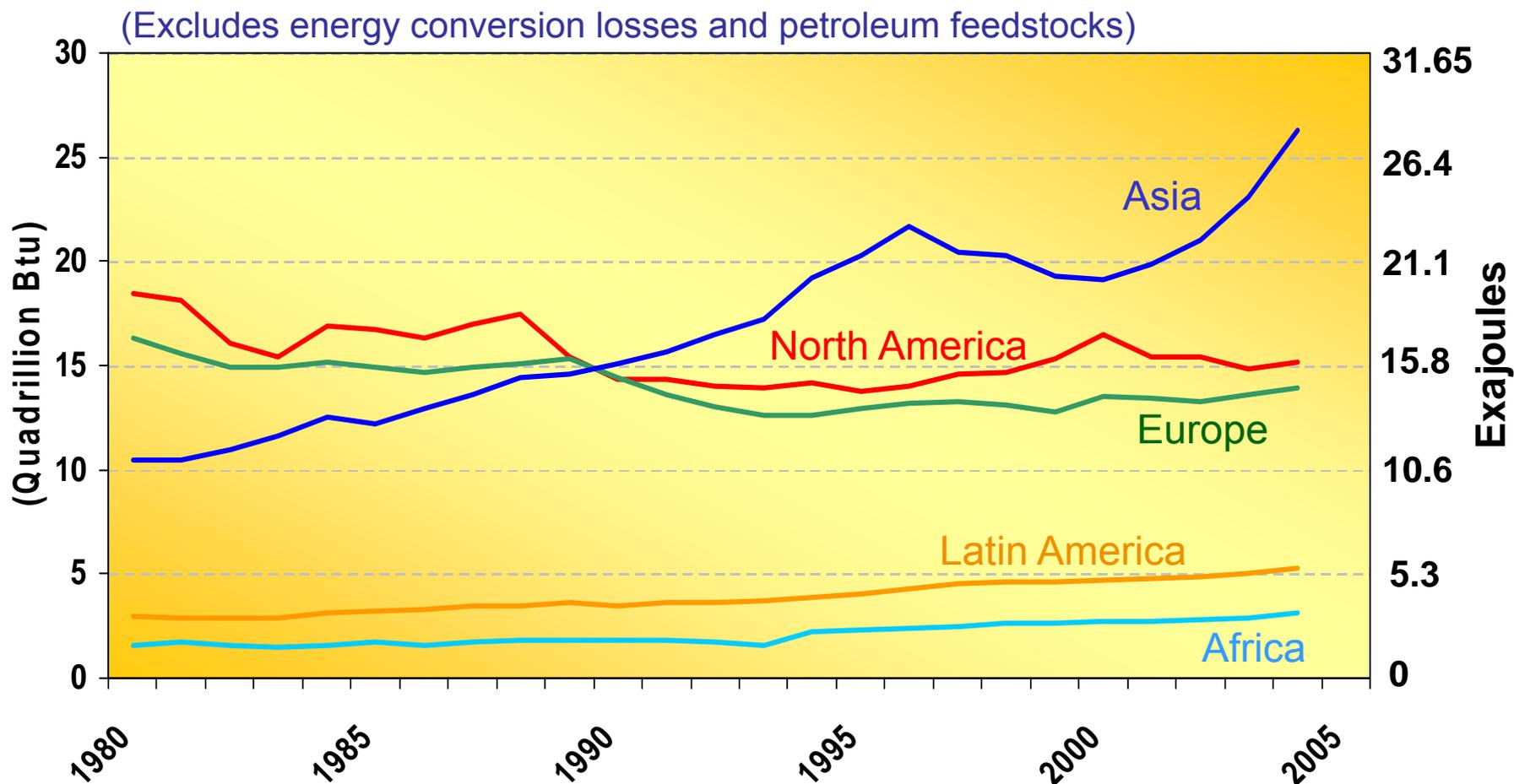


15% of industrial energy is consumed in the United States

Source: EIA/International Energy Outlook 2007



Global Industrial Energy Consumption



Source: International Energy Agency, Online Database (Energy Balances of OECD and Non-OECD Countries
* Includes Mexico



Global Outreach

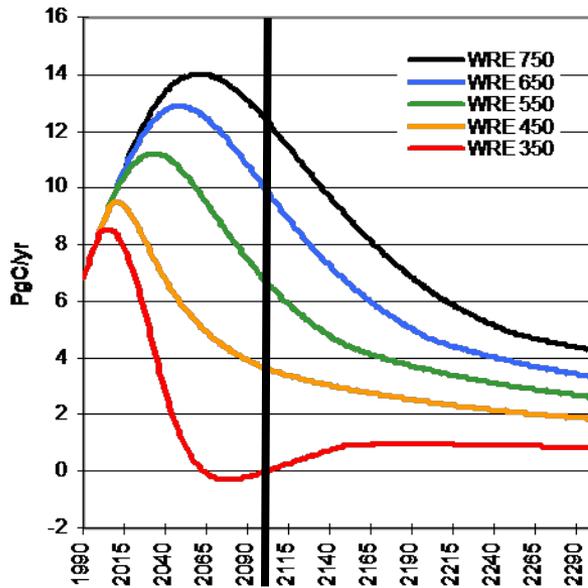
- International versions of major plant software decision tools
- Asia Pacific Partnership – new technology demonstrations, plant assessment and other projects in steel, cement and other industries
- Collaboration with the Chinese government in assisting Chinese industry in meeting China's 2010 energy intensity reduction goal
- Collaboration with India in areas of improved energy efficiency in manufacturing
- International Energy Agency (IEA): Industrial Energy Technologies and Systems Implementing Agreement



Long-Term Challenge

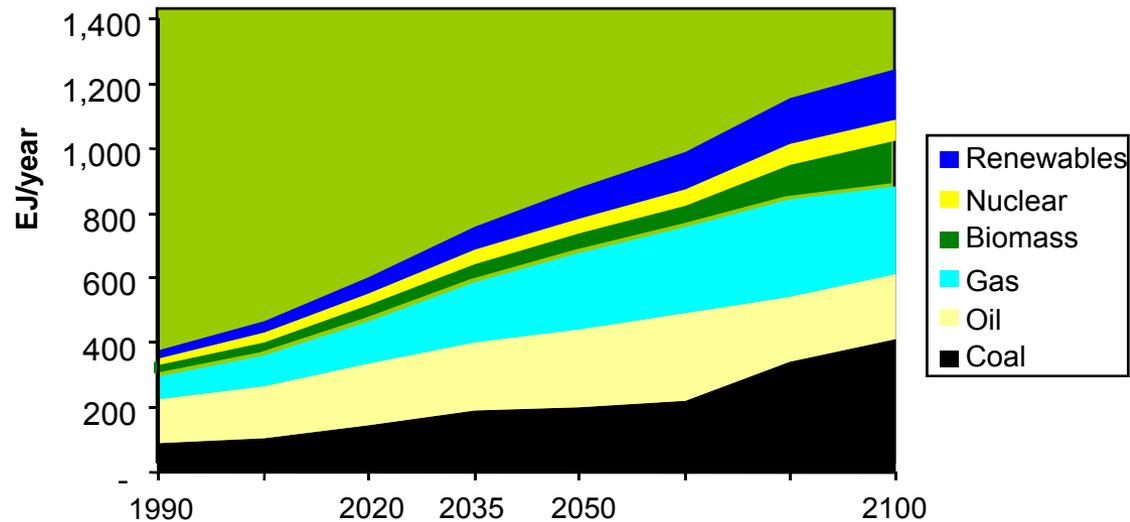
Provide energy for continued economic growth and development while reducing greenhouse gas emissions to stabilize CO₂ levels in the atmosphere

Stabilization Curves



2100

World Primary Energy Demand, 1990-2100: Reference Case





U.S. Department of Energy

Energy Efficiency and Renewable Energy

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