SOUTHEAST INDUSTRIAL ENERGY EFFICIENCY SUMMIT

June 5, 2008

OAK RIDGE
NATIONAL LABORATORY

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EXECUTIVE SUMMARY

The Southeast Industrial Energy Efficiency Summit (Summit) was a *Call to Action* for industries, utilities, states, and regional organizations to work together in reducing the region's overall energy intensity and carbon emissions. Organized by the U.S. Department of Energy (DOE) and hosted for DOE by Oak Ridge National Laboratory, the Summit was designed to provide the momentum to create an organization whose actions will reduce by 25 percent in ten years the energy intensity of the Southeast's industrial sector by pooling and leveraging the group's resources. These actions will not only benefit industries in the Southeast, but will also serve as a model for other regions.

The Summit was an impressive success as was evident in the high-profile gathering of decision-makers at the event, representing 24 major companies, 9 states, and 8 utilities within the Southeast region. Further, the Summit began a healthy dialogue on potential technology and policy needs. Most importantly, the Summit led to the development of *Next Steps* to guide the creation of the "Southeast Industrial Energy Efficiency Coalition" to answer the Summit's *Call to Action*.

The Next Steps

The Summit organizers conceptualized the structure for a "Southeast Industrial Energy Efficiency Coalition" of industrial sectors with utilities, states, and regional organizations and have proposed an action plan for the Coalition formation and progress towards the energy efficiency goals. The action plan includes addressing energy use, energy supply, legislation and policy, and communications.

The Southeast Energy Efficiency Alliance (SEEA) was designated as a champion and catalyst for the Coalition formation. Their resources and strong industrial relationships within the region will serve to promote and coordinate activities under the Coalition. As its first step, a Leadership Group was formed consisting of the industries, utilities, states, and other partners in the region. The Group will provide the framework for creating and implementing the Southeast Industrial Energy Efficiency Coalition.

The Next Steps are essential for implementing the region's energy efficiency strategy.

NEXT STEPS - Southeast Industrial Energy Efficiency Coalition

- Launch the Coalition in a regional meeting to accept goals and structures and to enlist members (August 2008)
- SEEA website posting of the activities and progress of the Collaborative (October 2008)
- Formalize the *Foundation and Structure* for the Coalition, explaining roles and responsibilities of members and Board and proposed goals (October-November 2008)
- Begin action plan to focus the Coalition's energy efficiency activities (November 2008)
- Begin to design metrics for measuring Coalition and Goal progress (November 2008)
- Detailed formal action plans from Subcommittee meetings in key areas (September 2008-February 2009)
- Accept and implement the Subcommittee action plans to reach Coalition goals (April 2009)

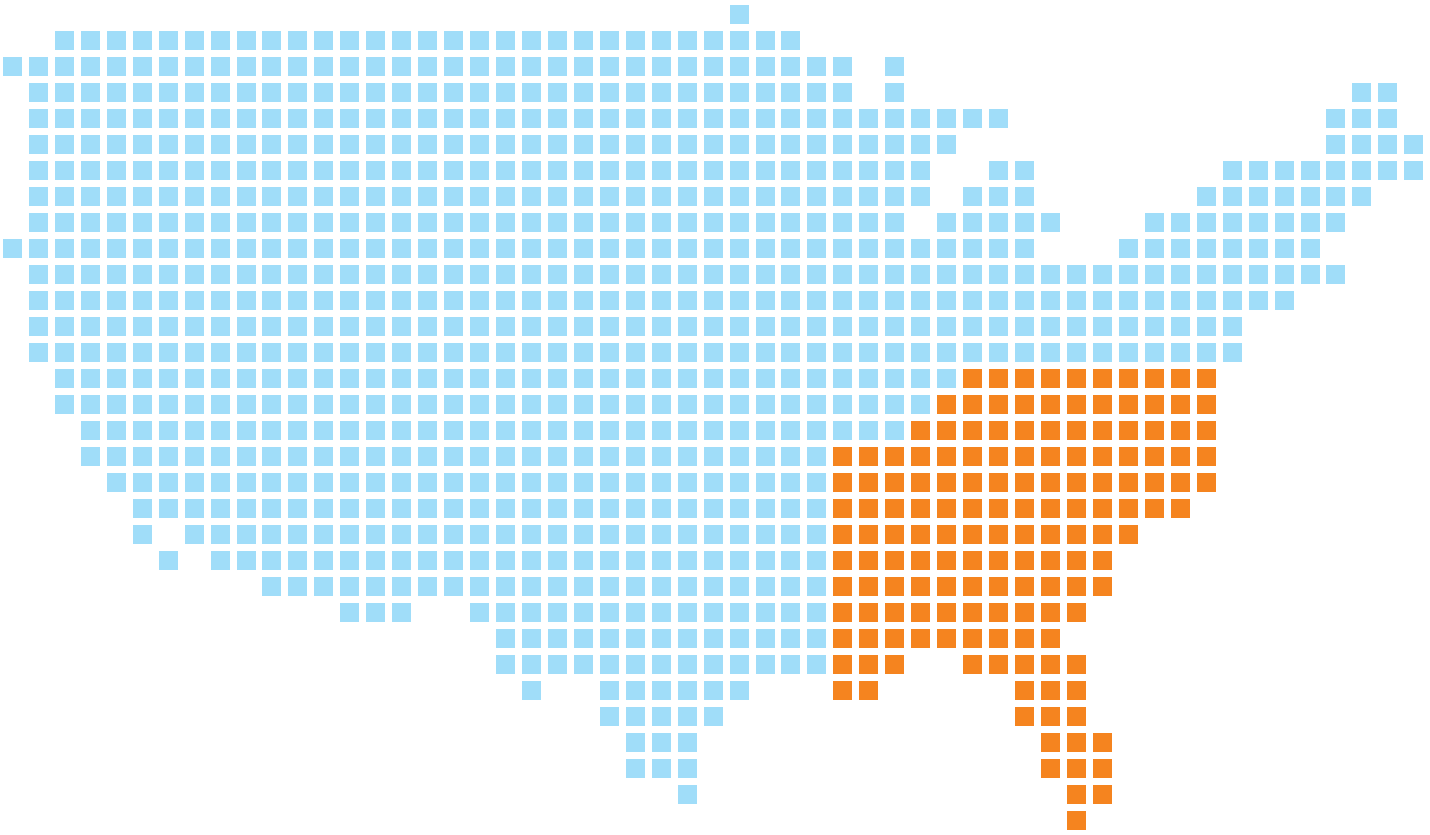
SOUTHEAST INDUSTRIAL ENERGY EFFICIENCY SUMMIT, JUNE 2008

The Southeast Industrial Energy Efficiency Summit (Summit) was a *Call to Action* for industries, utilities, states and regional organizations in the Southeast. The impressive response to the event affirmed recognition of the substantial benefits that can be obtained by working together, leveraging resources, and supporting Coalition actions in developing and implementing industrial energy efficiency strategies in the region. While the strength of the response is reflected in the diverse corporate profiles and the high-level staff that attended the event, the value of the response will be measured by the future commitment of participants to pursue the actions and strategies that evolve from the Summit.

The Summit actions will not only benefit industries in the Southeast, but will also provide a model for Coalition energy efficiency action plans in other regions of the nation. The Summit gathered a prestigious group of individuals from diverse sectors. Participants included:

- 34 representatives from industry, representing 24 companies with a major presence in the Southeast region
- Representatives from nine states in the Southeast region
- Representatives from eight utilities in the Southeast region

The following describes the June 5th Southeast Industrial Energy Efficiency Summit and more importantly the *Next Steps* that will make the Summit a success. These steps create the "Southeast Industrial Energy Efficiency Coalition" to answer the *Call to Action*.



WELCOME

Michelle Buchanan, Associate Laboratory Director for Physical Sciences, welcomed the Summit participants to Oak Ridge National Laboratory (ORNL). ORNL is the largest multi-purpose laboratory in the United States. It operates a portfolio of scientific activities from fundamental to applied research with strong partnerships with industry to commercialize their successes. Key research areas at ORNL are material sciences; biology, biological energy and environmental sciences; computation programming; engineering; neutron scattering; and national security. Director Buchanan emphasized ORNL's commitment to working with others to aid the nation in meeting energy demands and how this Summit is a part of that commitment.

THE DOE PERSPECTIVE

Douglas E. Kaempf, Program Manager of DOE's Office of Energy Efficiency and Renewable Energy's Industrial Technologies Program (ITP), provided an overview of the DOE perspective on working with Southeast industries. Mr. Kaempf highlighted the importance of the Summit and noted that the decision makers from industry, utilities, states, and the federal government were in attendance. Mr. Kaempf talked about the importance of working with the Southeast industrial sector, which consumed more than 9178 trillion Btu or 28 percent of the total industrial energy consumption in 2005,[i] employed 3.1 million people in manufacturing jobs in 2006,[ii] and is essential to the continued economic growth of the region. His goal for the Summit was to develop an action plan to work together to reduce the energy intensity of the industrial sector in the Southeast by 25 percent by pooling and leveraging the resources of industry, government, states, utilities, and other pertinent entities.

Mr. Kaempf went on to elaborate ITP's approach to improving energy efficiency and DOE's plan for the "Pledge." The ITP approach is to help plants save energy today by assessing opportunities and facilitating adoption of best energy management practices and efficient new technologies while pursuing R&D to develop cross-cutting technologies addressing the top energy savings opportunities across industry.

ITP's R&D Strategy

Industry-Specific R&D	Crosscutting R&D
• Aluminum • Chemicals • Food Processing • Forest & Paper Products • Metal Casting • Steel • Glass • Information Technology	• Energy-intensive process R&D in technology platforms that address broad industry needs • Nanomanufacturing R&D to apply nanoscience to 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 Combined Heat and Power (CHP) in industrial applications • Industrial materials R&D to develop breakthrough materials for industrial processes

The assessments and R&D activities are the foundation of ITP's Save Energy Now initiative which seeks commitment from industry to a voluntary pledge to reduce their energy intensity by 25 percent or more over 10 years. Many companies have already committed publicly to this level of reduction. Companies that make this pledge will become a Save Energy Now LEADER. Commitment to the pledge includes developing an energy intensity baseline to provide a yardstick for measuring energy savings, developing an energy management plan, and designating an energy manager or leader. The energy intensity baseline is flexible in terms of base year and whether the pledge is based on a corporation, plant, or a portion of a plant. The energy management plan must include steps to reduce energy intensity and carbon emissions, and annual reports to DOE on energy intensity data and achievements. The implementation of renewable energy to offset use of fossil fuel energy will only count if a reduction in energy intensity is measurable. ITP is aware that many facilities are looking for alternative feedstocks and to become fuel-flexible for their processing. Switching from one feedstock or fuel source to another may impact a facility's efficiency and carbon emissions. ITP is developing a new Fuel and Feedstock Flexibility portfolio to examine new and emerging equipment to help address these concerns. ITP's activities offer real solutions to industry which other programs that promote energy efficiency such as *EnergyStar* do not.

Success of Save Energy Now Assessment Strategy

Identified energy savings:
74 Trillion Btu equivalent to $750 million

Total potential carbon dioxide emissions reduction:
6.4 million metric tons

Implemented energy savings:
18 Trillion Btu worth $112 million

Planned energy savings:
21 Trillion Btu worth $303 million

ITP will work with any facility looking to improve its energy efficiency. ITP also has the ability to perform R&D as industry identifies new technology needs.

ITP will provide the following assistance to those companies who make a commitment to the pledge.

- Priority access to energy system assessments on multiple industrial systems. These three-day assessments of large plants include consultation by a qualified expert, plant management selection of a system of focus (i.e., steam, process heating, pumps, compressed air, fans), and plant staff training in the use of free ITP software tools. Training prepares staff to play a continuing role in assessments, achieves strong staff buy-in for assessment results, and equips a company to replicate assessments at sister plants. On average, plant assessments have identified ways to reduce total energy consumption by about 8 percent with investments that provide rapid paybacks.
- Tailored assistance in developing the energy baseline and energy management plan, plus access to expert advice
- Training workshops on advanced technology, energy management, software tools, etc.
- Easy access to proven energy analysis tools, services, and other resources
- National, high-level recognition for pledge participation and subsequent achievements

Mr. Kaempf then set the tone of the meeting, calling to action the Southeast industrial sector to work together and leverage their resources to implement energy efficiency strategies to reduce the region's energy intensity and related carbon emissions.

Publicly Reported Company Goals

3M
Improve energy efficiency 20% indexed to sales in 2010 (vs. 2005) and improve energy efficiency by 27% indexed to sales in 2005 (vs. 2000)

AMD
Reduce energy use by 30% in 2007 (vs. 2002) and achieve 48% actual savings by 2005

Dow
Reduce energy intensity 25% between 2005 and 2015

Ford
Improve energy efficiency by 14% over 5 years (normalized for production changes) and increase energy efficiency by over 18% in North American facilities between 2000 and 2005

Intel
Reduce energy use by 4% per unit of product per year

Proctor and Gamble
Produce 71% more product per unit of energy in 2004 (vs.1990)

A panel of Southeast industrial leaders provided examples of successful energy efficiency implementations and their thoughts on what makes a successful energy efficiency plan.

Alcoa

Walter Brockway, Manager Regulatory Affairs

Alcoa is the nation's largest producer of aluminum metal and aluminum products. It currently operates eight primary aluminum smelters and associated fabricating facilities in the continental United States. These facilities consume approximately 2500 MW of electric power. Other non-smelter manufacturing locations increase Alcoa's total electricity consumed to more than 2800 MW. Alcoa also domestically consumes 50 million Deca-therms of natural gas each year. Electricity can be as much as 30 percent of production cost. Therefore, energy efficiency is an important part of Alcoa's 2020 Corporate Sustainability Goals.

There are two focus areas to Alcoa's energy efficiency efforts. The first is technology, with the company's Technical Center coordinating specific process efforts in aluminum smelting, carbon baking, and other process applications. The second is a focus on efficiency and conservation in all other (general) energy consumption.

Alcoa's experience shows that successful energy efficiency activities:

- require culture change (similar to what Alcoa accomplished with safety);
- need assignment of accountability, measuring baseline, and measuring improvements;
- must be viewed as continuous improvement effort over long periods;
- require long-term (five-year) strategic investment, which is considered equivalent to sustaining or growth capital;
- will enhance company's public image; and finally,
- are consistent with greenhouse gas neutrality strategy.

Specific Alcoa Sustainability Goals

Base Year 2000	Year-End 2006 Result
Reduce energy intensity by 10% by 2010	Not reported
50% reduction of landfill waste by 2007	57% reported
60% reduction in process water use and discharge by 2009	24% reported
Base Year 2000	**Year-End 2006 Result**
25% reduction in GHG emissions by 2010	26% reported
25% recycled aluminum content in fabricated products by 2010; 50% by 2020	28% reported (a 30% increase from 2004)

LyondellBasell

Brian Goedke, Director Energy Management

LyondellBasell is one of the world's largest polymers, petrochemicals, and fuels companies with combined annual revenues of $44.7 billion. Energy represents a significant manufacturing cost at LyondellBasell, as total annual energy consumption is greater than 30 trillion Btu. LyondellBasell issued a challenge in 2006 for a 10 percent reduction in 5 years. As part of this effort, the company participated in two ITP Save Energy Now assessments and implemented a pilot comprehensive energy study. The following year, LyondellBasell chartered a corporate energy team and conducted ten utility assessments. The company initiated three additional comprehensive energy assessments and appointed site energy champions at their largest sites. Each site is responsible for developing a 5-year plan to achieve a 10 percent reduction in energy consumption.

Assessment results have shown that most locations have a greater than 10 percent energy reduction opportunity. They have identified more than 600 opportunities for energy savings combined. Approximately 25 percent of these opportunities have zero to low cost, 28 percent have only maintenance or low capital costs, and 47 percent need more than $1 million in capital investment.

Their reported progress shows a reduction of energy consumption of 1.9 percent between 2006 and 2007. The company estimates 2008 year-end energy consumption to be 5 percent below the 2006 totals. LyondellBasell is seeing real savings through low-cost projects, and its corporate goal of 10 percent appears achievable without significant capital spending. DOE's Save Energy Now assessments were a catalyst for the company's energy efficiency improvement efforts.

Corning

Patrick Jackson, Manager Global Energy

Corning is a world leader in specialty glass and ceramics. Corning's strategy to manage global energy is through the following efforts:

- Ensuring a reliable energy supply
- Reducing consumption of energy using an integrated, multi-functional approach
- Achieving a positive return on investment
- Utilizing "greener" energy when possible
- Maintaining more efficient and productive buildings
- Improving energy productivity

Corning's "Framework for Energy Productivity" is adopted from the "Loading Order" of California's Energy Action Plan and the European Union's "Trias Energetica." Trias Energetica is a simple and logical concept that helps to achieve energy savings, reduce dependence on fossil fuels, and protect the environment.

The three elements of Corning's Framework are to:

1. maximize energy efficiency,
2. use as much economically viable renewable energy and combined heat and power (cogeneration) as possible, and
3. partner with utilities to maximize the use of existing electric and gas grids.

Corning has a preapproved $5 million budget each year for energy reliability, productivity, measurement, environmental, and demonstration activities. The company measures returns on its entire portfolio. Payback for demonstration projects can be more than two years, while other projects must pay back in less than two years. Measuring and metering are key to Corning's success.

Focus areas for 2008-2009 include the following:

- Proliferation of low- or no-cost programs
- Aggressive implementation of the company's Spend to Save initiative
- Deeper teaming with manufacturing
- Requiring higher levels of efficiency in new buildings
- Major focus on heat recovery
- Designing new products with efficient production in mind
- Embedding energy efficiency in all procurement decisions
- Selecting technology demonstrations
- Maximizing assistance from ITP
- Actively engaging in climate policy development

GE

Jeff Renaud, Director Ecomagination

Ecomagination is a business initiative to help meet customer demand for more energy efficient products and to drive reliable growth for GE. Ecomagination also reflects GE's commitment to invest in innovative solutions to environmental challenges and delivers valuable products and services to customers while generating profitable growth for the company. GE made four commitments by 2010:

- Grow company revenues to $20B
- Double R&D to $1.5B
- Reduce greenhouse gas (GHG) emissions
- Inform the public of the company's plans and initiatives

GE has committed to reducing its GHG emissions and improving energy efficiency through three goals that it refers to as 1-30-30.The 1 equals a 1 percent reduction in absolute GHG emissions by 2012. This reduction is despite projected 25 percent growth over the same timeframe, and in order to compensate for growth, GE will drive GHG reductions in its businesses. GE benchmarked itself against various multinational companies and felt it was essential to have an absolute reduction goal in order to take a leadership position in the marketplace and give the company a seat at the table for discussion with regulators and non-governmental organizations.

GE has also committed to two revenue-based goals including an interim goal of a 30 percent reduction of GHGs per dollar revenue by 2008 and a 30 percent improvement in energy intensity. In 2007, GE made considerable progress on its 1-30-30 commitments.

GE also has a water goal to drive down water consumption at its locations by 20 percent by 2012. The company has identified select sites to showcase GE's water technology and is working with customers to provide that same value and service.

GE began collecting greenhouse gas data in 2002 and chose its baseline for greenhouse gas reduction goals in 2004. GE uses the protocol published by the World Resources Institute and the process defined by the World Business Council for Sustainable Development, and accounts for emissions under Scope 1 and Scope 2 of the program, which include direct and indirect emissions associated with the use of electricity. The company hired an independent, third-party consulting firm to verify the contents of the inventory in the baseline year (2004) and plans to do so in each of its two goal years – 2008 and 2012. GE has published what it believes to be the most extensive disclosure of any GHG accounting process, a copy of which is available at http://www.ecomagination.com.

During 2007, GE certified 45 locations worldwide as eCO_2 Star locations because they each demonstrated a 5 percent absolute GHG reduction in addition to production changes. The sites showed evidence of having solid projects completed to support their metrics and great communication strategies that will

continue to drive employee engagement in order to continue these efforts. GE also awarded 10 locations and teams with eCO_2 Awards; their efforts jointly resulted in nearly a 16 percent emissions reduction from GE's baseline year.

GE's lessons learned for changing the habits and culture toward energy efficiency include the following:

- Enlist senior leadership support
- Engage the workforce
- Work with key stakeholders
- Understand the baseline and business changes
- Group solutions around uses and drive implementation
- Invest time and effort to assure data quality
- Create and leverage a repository of great solutions
- Reward, recognize, and communicate

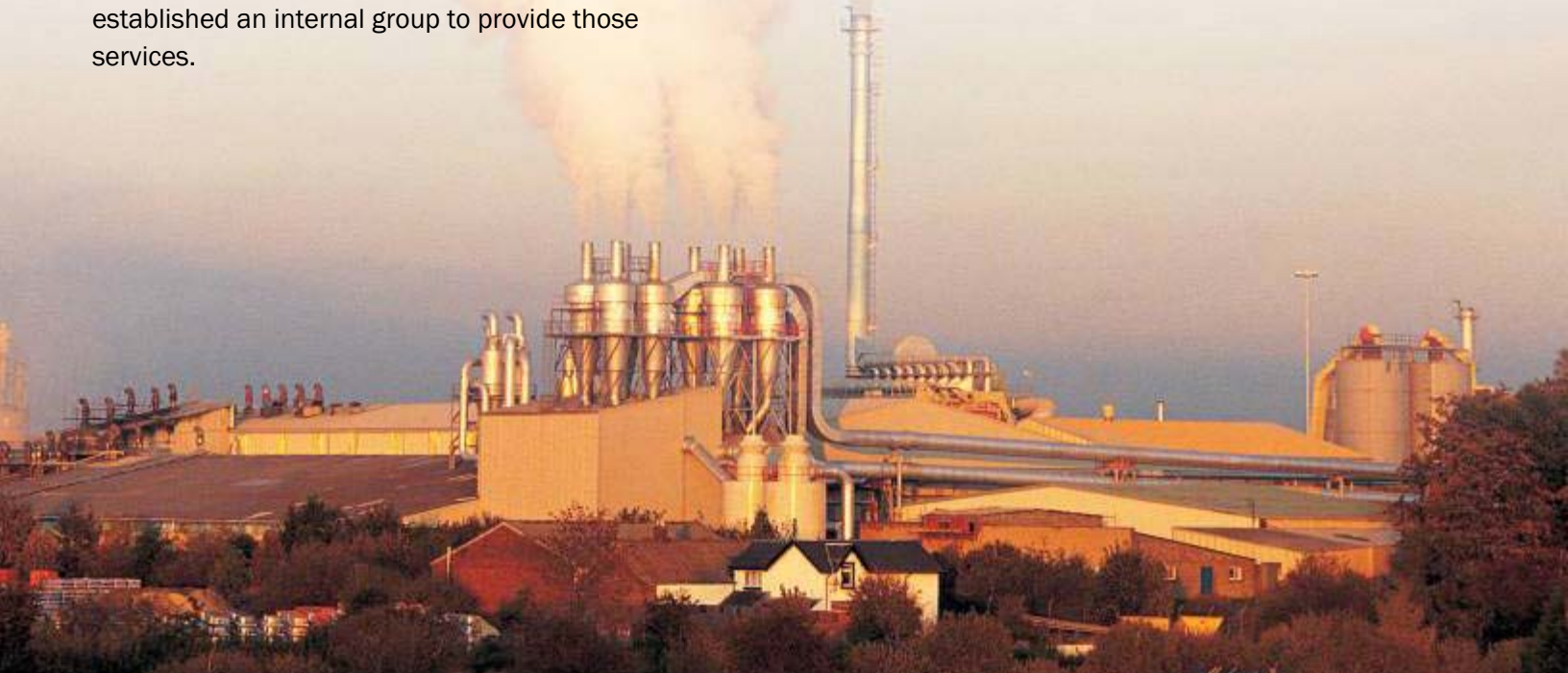
Specific GE Sustainability Goals

Base Year 2004	Year-End 2007 Results
1% absolute GHG reduction	8% reduction
30% energy efficiency improvement by 2012	33% improvement
30% GHG intensity reduction by 2008	34% reduction

Panel and Q&A General Discussion Points

Energy Service Companies (ESCOs): There was not much success or interaction with ESCOs among the panel members. Corning indicated that internationally ESCOs have provided some successes, but have not provided much value in the United States. GE established an internal group to provide those services.

State programs: Interaction with New York State Energy Research and Development Authority had success with large demonstration products. Renewable projects are another area where states provide support.



The ITP perspective and the Industrial Success Panel provided the background to assess the contributions of DOE/ITP activities in meeting industrial energy efficiency goals. Participants broke out into five groups, of which three were comprised of industry participants, one was comprised of utility participants, and the fifth was comprised of state representatives. Each group was asked the same set of questions, with the exception of the utility and state groups; their questions were modified to address how they support their industrial customers and sectors in energy efficiency goals.

The following questions were posed.

- What challenges exist for Southeast industries in meeting their internal energy efficiency goals?
- How have present DOE/ITP programs helped southeast industries to meet these challenges?
- How can DOE/ITP programs continue to partner with southeast industries to meet their energy efficiency improvement goals?

Preliminary Findings:

Two key challenges emerged from the group discussions:

1. Limited resources resulting in slow implementation of energy efficient technologies and practices. These limits include:

   Capital: Capital is tight. The focus of all business is to increase profitability. This focus creates internal competition for capital, i.e., energy efficiency projects compete with projects to expand production lines or create new product lines.

   Clear and simple mechanisms are needed to clearly show the benefits of energy efficiency and the return on investment. It is not always known where the best opportunities are for energy efficiency, and therefore it is difficult to develop a case for energy efficiency projects vs. production projects.

   Expertise: There is a lack of qualified and trained staff at all levels of industry, government, states, and utilities. In many cases when energy efficiency projects are identified with acceptable payback, there is no technical staff available to implement the opportunity.

   Options: Many plants indicated that they believe they have already addressed energy efficiency where it makes the most sense, was easiest to implement, had the largest savings, and had the quickest payback. Some industries in the region estimate that less than 1 percent of energy savings remain after implementing these initial energy efficiency opportunities. It has proven difficult to identify new areas of energy savings opportunities in the plants. Often new ideas are more complex and costly with longer payback periods and therefore unlikely to gain attention at the decision-making level.

   Technology: With many of the easiest energy efficiency tasks implemented, industry is looking for new and proven technologies to meet energy efficiency goals. The Southeast is looking for new, demonstrated, and commercially available technology solutions.

2. Limited commitment to energy efficiency. The lack of commitment is a result of the following:

   Managing Priorities: Companies are balancing many issues including energy efficiency, GHGs, financial goals, and organizational priorities. Plant managers and corporate leaders often do not have the same priorities, and energy efficiency can suffer. This works both ways. Corporate leaders may have

energy efficiency as a priority, but plant managers are evaluated on their production targets, or plant managers sometimes see the benefits of implementing energy efficiency projects on their floors, but corporate management does not see the benefits.

Culture: There has not been a cultural shift in the public or corporate sectors toward energy efficiency. A cultural shift, such as the shift toward industrial safety, would address the lack of commitment facing industry today.

The general report on ITP's programs supporting Southeast industries was thorough. The Save Energy Now Energy Savings Assessments (ESAs) and Industrial Assessment Centers (IACs) were viewed positively. The DOE tools, data, and access to experts are helpful. The DOE cost-shared research on metals and materials has been valuable. The few industries and utilities who are not currently working with ITP either had their own internal tools or were unaware of ITP's services and capabilities.

Strategies for ITP and the Southeast to work together were grouped into the following three areas:

- *Technology Development*: Technology development is one area where ITP can help industry in the Southeast to meet energy efficiency goals. Next-generation technologies that are demonstrated and commercially available to address more difficult energy efficiency opportunities are needed. Waste heat recovery was a technology area that was discussed by a number of industrial participants at the Summit. Combined heat and power was another possible area.
- *Communication*: ITP can work with the southeast industrial sector to improve energy efficiency awareness, education, and outreach. Tools to educate and reinforce the benefits of energy efficiency are needed. These tools can include benchmarking activities, case studies, and a database of successful implementations with positive returns on investment.
- *Expanding Current Efforts*: The energy-saving tools and programs implemented through Save Energy Now are well received by industry and are generating results. Expanding these activities to more industries and plants is needed. Lowering the ESA threshold to include smaller plants would be beneficial. It was noted that not all of the areas in the Southeast have easy access to the IAC program.

A panel of utility companies from the Southeast gave presentations on their programs to assist industrial customers in saving energy.

Tennessee Valley Authority (TVA)

Joe Hoagland, Vice President Energy Efficiency and Demand Response

TVA sells power to 159 local distributors that serve 8.8 million people and 650,000 businesses and industries in the seven-state TVA service area. It covers almost all of Tennessee and parts of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. TVA also sells power to approximately 60 large industrial customers and federal installations. TVA is committed to energy efficiency improvement and peak demand reduction. Its strategic plan states, "In partnership with others, TVA will strive to be a leader in energy-efficiency improvements and peak demand reduction over the next five years....Improving energy efficiency and reducing peak demand are significant actions that help slow demand growth in a cost-effective manner while addressing air pollution and global climate change."

Currently TVA is one of the top performing federal agencies in building energy efficiency. TVA leadership is working with project managers on a multi-year effort to improve lighting efficiency, plant heat rate, and parasitic losses. They are also improving losses in transmission systems and looking to move industry loads to off-peak hours. Currently their off-peak power is supplied by coal facilities, but plans are to build nuclear and gas combined-cycle plants..

TVA tools for industrial/commercial energy efficiency	
• Education and outreach • Aggregation response programs • Pricing products • Time-of-use rates • Reliability options • Economic options	• Audits and technical support • DOE Save Energy Now • Internal/external expertise • Incentives • Reaching effective payback windows • Financing options • Tax breaks

Piedmont

Steve Lisk, Technical Support Services

Piedmont Natural Gas (Piedmont) is primarily engaged in the distribution of natural gas to 1 million residential, commercial, and industrial utility customers in North Carolina, South Carolina, and Tennessee, including 62,000 customers served by municipalities who are wholesale customers. Piedmont offers energy efficiency services to its industrial customers, including plant energy audits, equipment monitoring, combustion analysis, energy studies, and technology reviews. In addition, Piedmont provides education and outreach to industry customers on DOE steam assessments, steam traps, boiler efficiency, HVAC efficiency, process heat, industrial ventilation, and LEED accreditation. Piedmont has worked with the Gas Technology Institute and ITP to develop a clean, efficient, and cost-effective "Super Boiler" with value-added benefits such as 93 percent combustion efficiency, ultra-low NO_x emissions, and recovery and purification of water from the flue gas.

Piedmont is promoting direct use of natural gas. Direct use is the most efficient use of the resource with over 90 percent energy value delivered to the industrial customer. Indirect use (i.e., electricity production) results in only 25 to 45 percent of the energy value delivered to the customer. Direct use has the least environmental impact, reducing carbon emissions. It also results in a downward pressure on energy rates for both natural gas and electricity.

Santee Cooper

Marc Tye, Vice President Conservation and Renewable Energy

Santee Cooper provides power to all 46 counties of South Carolina with a peak of 5,700 MW. The utility has 31 large industrial customers that range from 1 to 400 MW, 5 or 6 of which account for 80 percent of their industrial sales. Santee Cooper recently completed a survey of these top industrial customers on energy efficiency opportunities. The results indicated that the top industrial energy users felt that they captured most of the electric energy efficiency opportunities and that only 0.5 to 1.0 percent remain to be captured. This leaves the question, "How do we get to the next level of energy savings?" These opportunities may be in process improvements. Santee Cooper uses "pure rates," where fixed costs are tied to the demand charge and variable costs are tied to the energy charge. This provides incentive for changes in demand which result in direct rate changes.

Santee Cooper's Board created a new department on conversation energy efficiency and renewable energy. The utility set a goal to be filling 40 percent of their generation needs using conservation, energy efficiency, and non-GHG-emitting fuels or biomass by 2020. Santee Cooper is currently at 10 percent. The utility's plans are to develop nuclear power for an additional 20 percent, leaving the remaining 10 percent gap to be addressed.

Specific Piedmont Sustainability Goals

Targets	2010	2015	2020
Energy Efficiency Improvement (trillion BTU)	200	760	1,100
Reduction in Criteria Air Pollutants, or CAPs (thousands of metric tons per year)	80	304	440
Reduction in GHGs (thousand metric tons CO_2 per year)	11,000	41,500	60,100

Panel Q&A and General Discussion Points

Cogeneration/CHP: Industry sites with high thermal loads have the potential for efficient electricity generation. However, electricity generation is secondary to the plant's steam needs. This creates a dilemma for utilities since electricity production is based on the plant's variable steam needs, it cannot be considered as a reliable resource for grid capacity. TVA is not willing to pay a capacity charge above the cogeneration fee for electricity generated at a plant site. It will pay a premium based on how "clean" the power is i.e., generating additional megawatts without additional carbon. There is a great potential for using CHP in industry; however, there are barriers to overcome to allow industry, gas utilities, and electric utilities to benefit mutually.

ORNL PERSPECTIVE

Jim Roberto, Oak Ridge National Laboratory Deputy Director for Science and Technology, provided an overview of ORNL and its energy mission. Dr. Roberto described energy as the "defining challenge of our time" and called it the major driver for climate change, national security, economic competitiveness, and improvement in the quality of life. ORNL is uniquely qualified to address energy issues with its world-class staff and resources including new neutron scattering, ultrascale computing, and nanoscale R&D facilities. ORNL currently has programs working to increase energy production from a variety of sources, improve energy transmission, and reduce the consumption of energy by industry, transportation, and buildings.

ORNL has the largest national laboratory effort in transportation, industrial technologies, and superconductivity. It is also a significant player in biomass and hydrogen technologies. Dr. Roberto reviewed some examples of successful ORNL industrial technology development and commercialization including the nickel aluminide alloys and rapid infrared heating technologies. ORNL also provides major technical support and performance evaluation for ITP technology delivery by both the Save Energy Now and IAC programs. ORNL has a strong record of commercialization and technology transfer, having launched 79 new companies since 2000 while working with more than 600 industrial partners annually.

ORNL's Leadership

- Spallation Neutron Source is the world's most powerful pulsed neutron source.
- World's most powerful open scientific computing facility
- DOE's first Nanoscale science center
- One of three Bioenergy Science Centers

WORKING TOGETHER – THE ACTION PLAN

Ben Taube, Executive Director of the Southeast Energy Efficiency Alliance (SEEA), provided an overview of a straw-man organizational structure for the creation of a "Southeast Industrial Energy Efficiency Coalition" and its potential key focus areas. This entity will work with industries, utilities, states, and regional organizations in the Southeast to leverage resources and support Coalition actions to develop and implement industrial energy efficiency strategies. The Coalition included the following concepts:

Southeast Energy Efficiency Alliance (SEEA): SEEA will act as a champion and catalyst for the Southeast Industry Energy Efficiency Coalition. SEEA will use its resources and relationships within the region to coordinate activities across the states, utilities, and industrial partners who commit to participating in the Coalition.

ITP/ORNL: ITP can provide partnership and management experience as well as State Energy Office interaction and coordination. ITP can build from its successes in developing public/private partnerships and offer key industrial contacts to assist in developing strong regional initiatives. ITP can provide Coalition members proven technical resources to help them achieve their energy efficiency goals. DOE can also offer regional assistance from ORNL. ORNL can offer technical expertise on industrial energy solutions, meeting facilities, and partnership capabilities to help Coalition members to meet their energy efficiency goals.

Leadership Group: The leadership group will be comprised of volunteers from industry, state, and utility members and a representative from ORNL to provide guidance and direction to the Coalition on key topic areas affecting the Southeast industrial sector. This group will also provide leadership to all industrial members.

Members: Members are those industry, utility, and state organizations who commit to implementing and supporting the Southeast Industrial Energy Efficiency Coalition. They will each provide a point of contact to the Coalition for coordination purposes and provide updates to the Coalition on implemented activities. The members are where the results will be realized.

The following were potential activity areas for the Coalition to improve industrial energy efficiency in the Southeast.

Energy Use

- Best practices
- Advanced technology development

Energy Supply

- Transmission and distribution
- Renewables
- Fuel and feedstock flexibility

Legislation and Policy

- Taxes
- Carbon emission reduction

Communications and Outreach

- Southeast voice to the new federal administration
- Southeast voice to the public

Breakout Group Discussions

Participants formed five breakout groups to discuss the straw-man organizational structure and activity focus of the Southeast Coalition. Each group was comprised of members from industry, states, federal government agencies, and utilities.

Breakout groups were asked:

1. Does the proposed organizational structure meet the needs for the Southeast region to work together to meet energy efficiency goals?
2. What key areas of activities should be initiated immediately by this group?
3. What actions within these key areas are needed to continue the momentum started at this meeting?
4. How can DOE facilitate the implementation of this action plan?

Preliminary Findings

The organizational structure needs to be more defined and all participants from government, states, utilities, and industry need to understand their proposed roles and required commitments. The goals and objectives of the organization need to be finalized. Some of the common suggestions across the breakout groups to improve the organizational structure are listed below.

- Add more industry representation to the leadership group to better represent the range of industrial activities in the Southeast
- Bring in other federal agencies such as the Environmental Protection Agency and Department of Commerce
- Add other groups such as non-governmental organizations, trade groups, and universities
- Consider an alternative structure for the leadership group such as organizing it by key areas of the action plan
- Determine whether the Coalition should include only the largest energy users or be open to all manufacturers in the Southeast

It was suggested by a number of breakout groups that further input is needed to define the proposed activities of the Coalition. Energy efficiency can be viewed in multiple ways. Is this Coalition focused only on efficiency related to plant operations or efficiency related to produced products? Also, is the focus of this organization on technology, policy development, or a mixture of the two? These activities might be defined and could be accomplished at a Southeast workshop with more time set aside for planning or through a series of surveys of interested members. The dialogue of the breakout groups discussing key areas and activities was focused on the following areas:

- **Technology Development**: Conduct activities to provide guidance and direction and to accelerate the development of the next generation of energy-efficient technologies, thus closing the technology-options gap between bench top and best practice. Connect technology solution providers (researchers, vendors) to identified problems within industries in the Southeast. Heat recovery was discussed as a non-competitive area for technology development.
- **Energy Efficiency**: Develop activities to expand and address the opportunities for energy efficiency improvements today. This can be enhanced by benchmarking and data sharing of successes by industry in the Southeast. Also, clear energy efficiency targets and benchmarks with standardized and accepted metrics need to be set to help industries address and measure their energy efficiency progress.
- **Policy**: Develop and promote policies and mechanisms to aid the Southeast industrial sector in achieving energy efficiency gains and strengthening the viability of Southeast industries. Policies that provide early incentives (taxes, credits, rebates, depreciation schedules, etc.) for energy efficiency gains need to be developed. Meaningful and consistent energy intensity

measurement systems are also needed by industry, states, and utilities. A survey on which tax incentives yield the highest energy efficiency improvements could provide guidance to the Coalition. Policy that equates energy efficiency solutions to renewable energy resources is needed.

- **Communications**: Develop a single advocacy voice for Southeast industries to support their positions and promote their energy efficiency achievements. This can include educational programs for communities in which industries operate.

DOE can provide resources to the Coalition such as benchmarking capabilities and meeting and partnership support. DOE can promote the regional Coalition and its successes and provide guidance from a national perspective. DOE can also work toward combining energy efficiency, carbon reduction, and climate change together in the scope of Coalition activities.

Commitments

Overall, support from participants for a Southeast Industrial Energy Coalition was positive. Most Summit attendees indicated that they were interested in actively participating in the Coalition but need a more detailed organizational structure, defined roles and responsibilities, and the mission and objectives of the Coalition before setting their level of commitment.

NEXT STEPS

The Southeast Summit organizers have reviewed the comments and discussions from the workshop and incorporated these thoughts into a proposed organizational structure and action plan for the Southeast Industrial Energy Efficiency Coalition. They are working with Summit participants and others to finalize the organizational structure of the Coalition and to develop an action plan that expands upon the key areas and activities suggested at the Summit. The action plan will guide the Southeast industrial sector to work together so as to leverage their resources with utilities, states, and regional organizations to implement energy efficiency strategies. These activities will reduce the region's energy intensity and related carbon emissions while strengthening its industrial base.

SEEA will create a Leadership Group of the industries in the Southeast and utilities, states, and organization partners. This Group will initially serve as a board of directors for the Coalition. The Group will be tasked with providing leadership and defining the framework and timetable for the development of the Southeast Industrial Energy Efficiency Coalition. The first Group meeting was held in August 2008 in Atlanta, Georgia.

The Summit began a healthy dialogue on potential technology and policy to improve industrial energy efficiency in the region. Now, to answer the *Call to Action*, SEEA with the Leadership Coalition will complete these next steps:

Steps to complete	Date
Web site: SEEA will dedicate a page on its Web site for the Southeast Industrial Energy Efficiency Coalition to post the progress and results of the Leadership Group.	October 2008
Foundation and Structure: The Leadership Group will develop the Coalition's foundation and structure, which will set preliminary Coalition goals, explain organization member rules, roles, and responsibilities, and Coalition board roles and responsibilities.	October – November 2008
Action Focus: The Leadership Group will develop the initial action items related to energy efficiency, policy, communication, and technology development for consideration by the Coalition. The formation of subcommittees on key activities will be developed in the first year.	November 2008
Metrics: Preliminary metrics will be developed that establish clear goals for the Coalition and allow success to be measured and progress to be tracked	November 2008

Steps to complete	Date
Enlistment in the Southeast Industrial Energy Efficiency Coalition: Reunite the Summit participants and newly invited Coalition members in a regional meeting to review the newly developed foundation, structure, goals, focus areas, and metrics for the Coalition, obtain member agreements and commitments, and develop action subcommittees with assigned member staff.	January 2009
Subcommittee Planning Meetings – Conduct meetings and workshops to develop detailed action plans for key subcommittee areas of the Southeast Industrial Energy Efficiency Coalition.	September 2008 - February 2009
Subcommittee Action Plans – Implement the detailed action plans that provide the pathways to achieving designated Coalition goals.	April 2009

APPENDIX A: ATTENDEES

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APPENDIX B: AGENDA

Industrial Energy Efficiency Summit, June 5, 2008

Oak Ridge National Laboratory Conference Center
Building 5200, Tennessee Conference Room (A, B and C)

KEY OBJECTIVE: Energize a Southeast regional partnership to significantly improve Southeast industrial energy efficiency and productivity.

Wednesday, June 4

6:30–7:30 p.m.	Informal Networking Reception (Burchfield's Restaurant at the Doubletree Hotel, Oak Ridge) Welcome Remarks: Catalyzing the Region

- *Michelle Buchanan, ORNL Associate Laboratory Director for Physical Sciences*

Thursday, June 5

7:00 a.m.	Meet in Doubletree hotel lobby for bus transportation to ORNL Conference Center (OPTIONAL)
7:30 a.m.	Sign-in and Networking Breakfast Poster Presentation:

- *Melissa Lapsa, Manager, Communications and Outreach, ORNL EERE Program*

8:30 a.m.	Welcome and Introduction of Participants

- *Douglas Kaempf, Program Manager, Industrial Technologies Program, US Department of Energy*
- *Michelle Buchanan, ORNL Associate Laboratory Director for Physical Sciences*

8:45 a.m.	DOE PERSPECTIVE: The DOE Industrial Technology Program's expanded Save Energy Now efforts (assessments and R&D), the Save Energy Now LEADER Voluntary Pledge initiative.

- *Douglas Kaempf, Program Manager, Industrial Technologies Program, US Department of Energy*

9:15 a.m.	INDUSTRY SUCCESSES: Examples of companies that are successfully reducing energy intensity and lowering operating costs.

- *Walter Brockway, Manager Regulatory Affairs, Alcoa*
- *Brian Goedke, Director Energy Management, LyondellBasell*
- *Patrick Jackson, Manager Global Energy, Corning*
- *Jeff Renaud, Director Ecomagination, General Electric*

10:00 a.m. — Break —

10:15 a.m. THE CUSTOMER PERSPECTIVE – Facilitated Discussion

- *What are the challenges that Southeast Industries have to meet their internal energy efficiency goals?*
- *How have present DOE/ITP programs helped Southeast Industries to meet these challenges?*
- *How can DOE/ITP programs continue to partner with Southeast Industries to meet their energy efficiency improvement goals?*

11:15 a.m. UTILITY PANEL: How Major Utilities in the Southeast support their industrial customers

- *Joe Hoagland, Vice President Energy Efficiency and Demand Response, Tennessee Valley Authority*
- *Steve Lisk, Technical Support Services, Piedmont Natural Gas*
- *Ted Schultz, Vice President Energy Efficiency, Duke Energy*
- *Marc Tye, Vice President Conservation and Renewable Energy, Santee Cooper*

12:00 p.m. — Lunch —

Keynote Speaker:

- *Alexander Karsner, US Department of Energy Assistant Secretary, Energy Efficiency & Renewable Energy*

1:00 p.m. ORNL PERSPECTIVE: How ORNL effectively partners with industry to improve industrial energy efficiency and productivity.

- *Jim Roberto, ORNL Deputy Director for Science and Technology*

1:30 p.m. WORKING TOGETHER – THE ACTION PLAN

Facilitated Discussion: Create a Draft Action Plan to establish Southeast Regional coordination of industrial energy efficiency activities.

- *Ben Taube, Executive Director, Southeast Energy Efficiency Alliance*
- *How can the Southeast Region work together to meet energy efficiency goals?*
- *What action items are needed to move this plan forward and who are they assigned to?*
- *What mechanism (to be developed or existing) should manage these activities?*
- *How can DOE facilitate the implementation of this action plan?*

2:45 p.m. Closing Remarks

- *Douglas Kaempf, Program Manager, Industrial Technologies Program, US Department of Energy*
- *Michelle Buchanan, ORNL Associate Laboratory Director for Physical Sciences*

3:00 p.m. Adjourn - Transportation provided to hotel or Knoxville Airport (OPTIONAL)

3:15 p.m.	ORNL Research Facilities Tour (OPTIONAL)

Will include:

- *Industrial Technologies program laboratories, Ron Ott*
- *Combined Cooling Heat and Power laboratory, Bob DeVault*
- *Building Technologies Integration laboratories, Bill Miller*

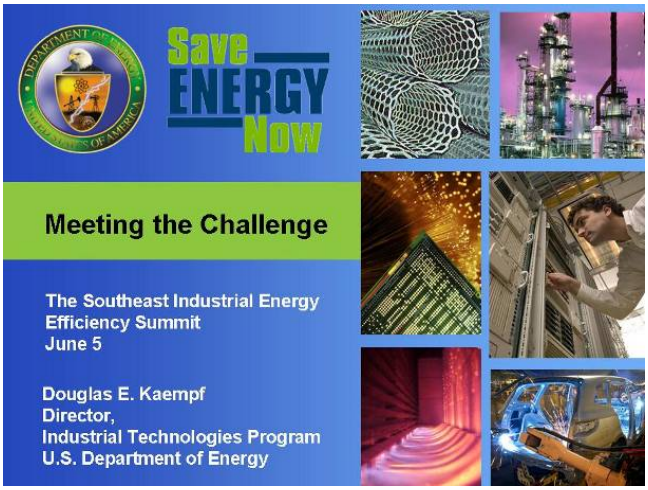
5:00 p.m.	Tour Adjourn – Transportation provided to hotel or Knoxville Airport (OPTIONAL)

APPENDIX C: PRESENTATIONS

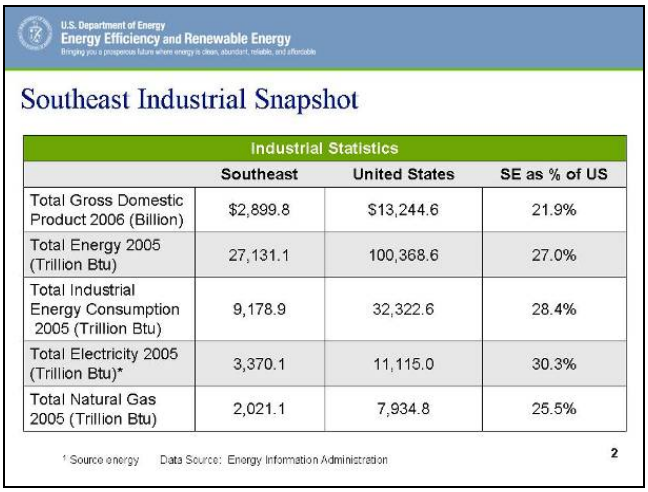
DOE PERSPECTIVE:

Douglas Kaempf, Program Manager, Industrial Technologies Program, US Department of Energy

Slide 1



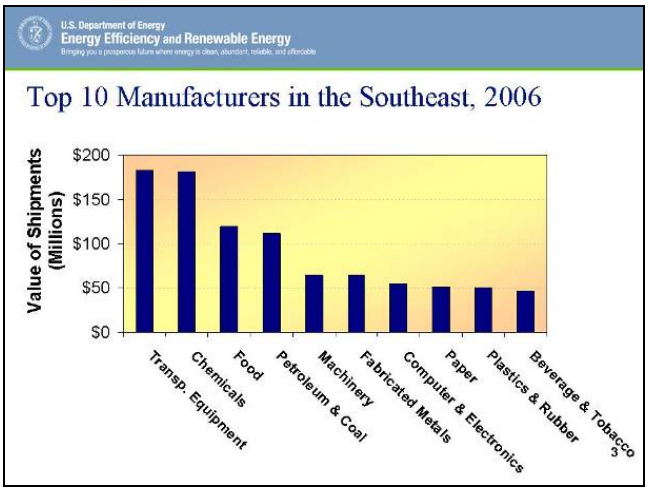
Slide 2



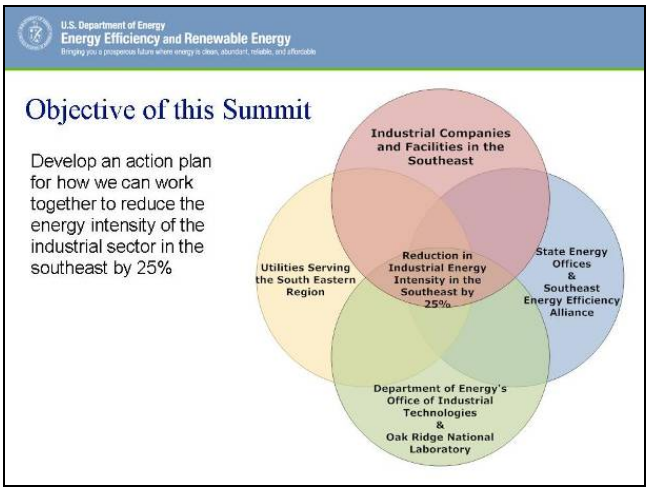
Industrial Statistics			
	Southeast	United States	SE as % of US
Total Gross Domestic Product 2006 (Billion)	$2,899.8	$13,244.6	21.9%
Total Energy 2005 (Trillion Btu)	27,131.1	100,368.6	27.0%
Total Industrial Energy Consumption 2005 (Trillion Btu)	9,178.9	32,322.6	28.4%
Total Electricity 2005 (Trillion Btu)*	3,370.1	11,115.0	30.3%
Total Natural Gas 2005 (Trillion Btu)	2,021.1	7,934.8	25.5%

* Source energy Data Source: Energy Information Administration

Slide 3



Slide 4



Slide 5

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

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

Save ENERGY Now LEADER

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

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Slide 6

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

Industry-Specific R&D

- Industry Specific
  - Supports advanced technologies to reduce energy and carbon intensity of America's energy- and waste-intensive industries
    - Aluminum
    - Chemicals
    - Food Processing
    - Forest & Paper Products
    - Metal Casting
    - Steel
    - Glass
    - Information Technology
- Crosscutting R&D
  - Enabling Technologies that can be used across industries

6

Slide 7

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

Crosscutting Technology R&D

- ***Energy-Intensive Process R&D*** in technology platforms that address broad industry needs
- ***Nanomanufacturing R&D*** to apply nanoscience in 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

Slide 8

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

Voluntary Commitments by Industrial LEADERs

- Voluntarily pledge to reduce energy intensity by 25% or more over 10 years
- Make continuous improvements in energy efficiency and carbon reduction as part of robust business strategy

Save ENERGY Now LEADER

- Gain enhanced access to enabling resources: tailored technical assistance, training, assessments, and more
- Receive high-level recognition for participation and achievements

Reduced energy costs and carbon emissions

8

Slide 9

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

Industry Already Sets Energy Efficiency Goals

Dow
- Reduce energy intensity 25% between 2005-2015

Ford
- Improve energy efficiency by 14% over 5 years (normalized for production changes)
- Increase energy efficiency by over 18% in North American facilities between 2000 and 2005

Intel
- Reduce energy use by 4% per unit of product per year

Proctor and Gamble
- Produce 71% more product per unit of energy in 2004 (vs. 1990)

3M
- Improve energy efficiency 20% indexed to sales in 2010 (vs. 2005)
- Improve energy efficiency by 27% indexed to sales in 2005 (vs. 2000)

AMD
- Reduce energy use by 30% in 2007 (vs. 2002)
- Achieved 48% actual savings by 2005

9

Includes both historic and planned improvements

Slide 10

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

Becoming a *Save Energy Now* LEADER

1. Take pledge and adopt goal to reduce energy intensity 25% or more over 10 years
   - Develop an energy intensity baseline
   - Develop an energy management plan
   - Designate an energy manager or leader
2. Take steps to reduce energy intensity and reduce carbon emissions
3. Report energy intensity data and achievements annually to DOE

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Slide 11

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

What DOE Provides

- Priority access to energy system assessments on multiple industrial systems and emerging advanced technologies
- Tailored assistance in developing the energy baseline and energy management plan, plus access to expert advice
- Training workshops on advanced technology, energy management, software tools, etc.
- Easy access to proven, energy analysis tools, services, and other resources
- National, high-level recognition for pledge participation and subsequent achievements

Save ENERGY Now LEADER

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Slide 12

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

Save Energy Now Assessments

- Scheduled 200 in 2006 and 250 in 2007
- 3-day large plant assessment process:
  - Leadership by qualified expert
  - Plant selects system of focus (e.g., steam, process heating, pumps, compressed, fans)
  - Plant staff trained on use of software tools
- Value of training component:
  - Prepares staff to play continuing role in assessments
  - Achieves strong staff buy-in for assessment results
  - Equips company to replicate assessments at sister plants

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Slide 13

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

Technology Delivery Products and Services

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

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

Assessments
- Energy Savings Assessments
- Industrial Assessment Centers

Standards
- Plant Certification

Training
- Basic
- Advanced
- Qualified Specialist


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Slide 14

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

Energy Assessments Success

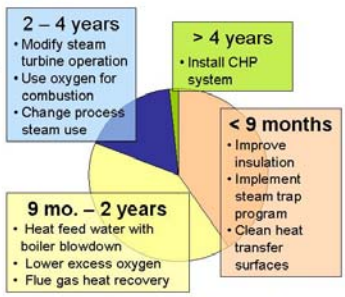
- 526 assessments completed
- Average plant found ways to reduce energy bill by about 8%
- 447 assessments with completed reports

Identified energy savings:
74 TBtu/$750 million

Total potential carbon dioxide emissions reduction:
6.4 million metric tons

Implemented energy savings:
18 TBtu/$112 million

Planned energy savings:
21 TBtu/$303 million



Estimated Payback Periods for Recommended Actions

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Slide 15

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

Partnerships Key to Implementation

DOE is developing partnerships with states, utilities, regional organizations, academia, trade groups, and private companies

- Transfer energy-efficient technologies to the industrial market
- Reduce carbon emissions through energy efficiency

Save ENERGY Now

Government Partners
- NIST, U.S. Dept. of Commerce, Manufacturing Extension Partnership
- Environmental Protection Agency (Energy Star, Climate Leader, and Green Supplier Network)
- State governments and organizations

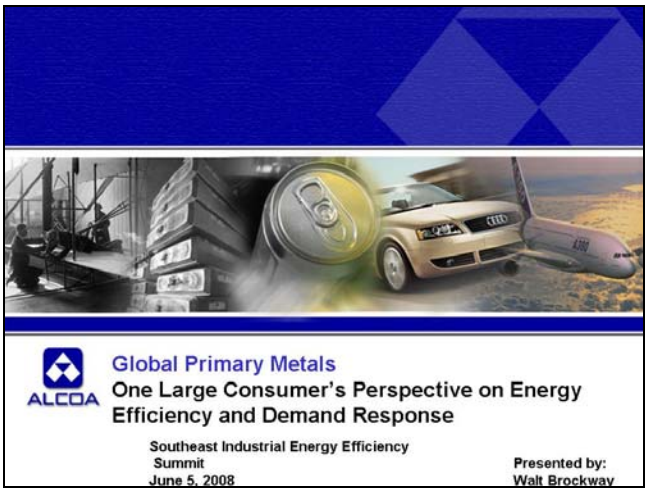
Private Partners
- National Assoc. of Manufacturers
- Green Grid
- Utilities
- Supply chains

15

INDUSTRY SUCCESSES:

Walter Brockway, Manager Regulatory Affairs, Alcoa

Slide 1



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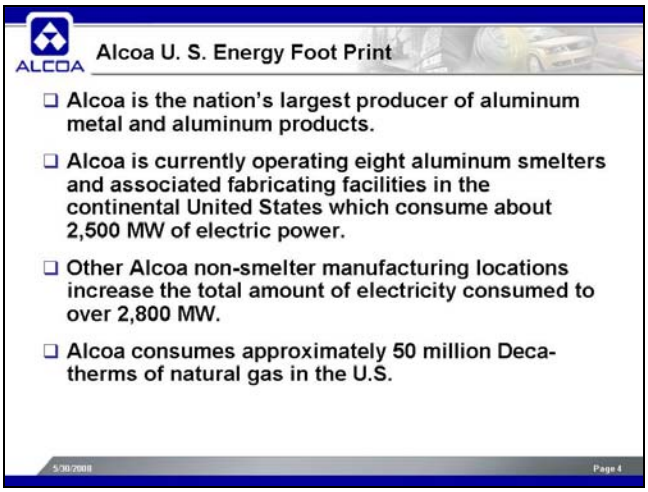


Slide 5

Why are Energy Efficiency and Demand Response Programs Important to Alcoa

- Reduce Costs
  - Electricity can be as much as 30% of production cost
- Reduce Emissions
- Support our 2020 Corporate Sustainability Goals
- Supports Electric Grid Reliability

Slide 6

Specific Alcoa Sustainability Goals

From Base Year 2000	Year End 2006 Results
Reduce energy intensity by 10% by 2010	Not reported
50% reduction landfill waste by 2007	57% reported
60% reduction in process water use and discharge by 2009	24% reported
From Base Year 1990	
25% reduction in GHG emissions by 2010	26% reported
25% recycled aluminum content in fabricated products by 2010; 50% by 2020.	28% reported This is a 30% increase from 2004

Slide 7

Alcoa Energy Efficiency (EE) Approach

There are two focus areas for our EE efforts:

- Technology
  - Alcoa Technical Center coordinates specific process efforts.
  - Aluminum Smelting, Carbon Baking, etc.
- Efficiency and Conservation
  - focuses on all other general energy consumption.

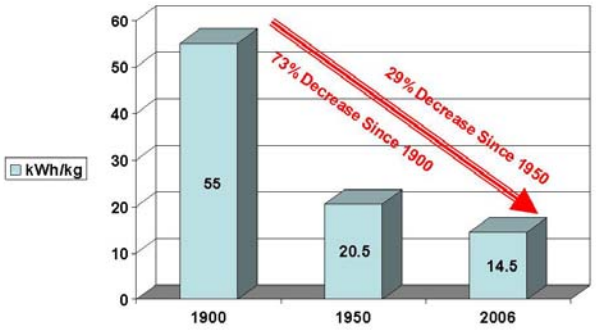
Slide 8

Alcoa Energy Efficiency Network (EEN) Results

- 53 locations surveyed
- $80 MM in potential annual savings identified.
- Over $20 MM in annual savings realized.
- $14 MM in annual savings in 2006.
- 50 best practices identified and communicated to locations.

Slide 9

Overall Alcoa Aluminum Smelting Energy Reductions



Slide 10

Guiding Principles

- EE culture that has Top Level Management Support.
- Provide a roadmap for success
- EE approach is consistent with Alcoa continuous improvement ABS (Alcoa Business System) Principles.
- Partnership with Department of Energy
- A program to train internal Alcoa energy efficiency experts.
- Local plant commitment to energy projects.
- A tracking system to report results company wide.
- Recognition of achievements

Slide 11

Role of DOE and Others

- DOE
  - DOE assisted with initial assessments in Indiana, Tennessee and Massena, NY
    - Provided subject matter experts
    - Partially funded assessments
  - DOE recognized Alcoa in 2003 as a Best Practice Energy Management Program
  - Assisted with technology research
- State
  - State of Tennessee participated in one assessment
  - State of NY (NYSERDA) is funding experimentation in demand response
- Suppliers
  - TVA has offered to perform assessments in conjunction with DOE
  - Midamerican Energy provided funding for assessment in Iowa
- Other
  - As a Supplier to NISSAN you have participated in their supplier partnership program.

Slide 12

Energy Efficiency

- Requires Culture Change (like Safety).
- Needs assignment of accountability, measuring baseline and improvements.
- Must be viewed as continuous improvement effort over long periods.
- Requires long term (5 year) strategic investment, which is considered equivalent to sustaining or growth capital.
- Enhances Alcoa's public image.
- Is consistent with our GHG neutrality strategy.

Slide 13

Next Steps for Alcoa – U.S.

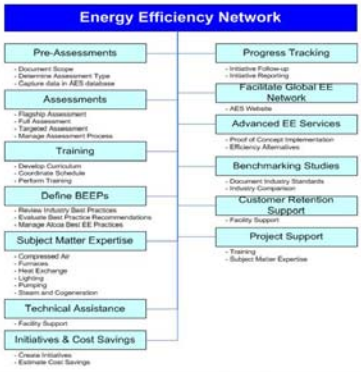
- Revitalize the program
  - Gain management support
  - Gain individual location commitment
- Review past assessments for opportunity
  - With increasing energy costs projects will become viable
  - Technology has improved (particularly metering)
  - Some projects were not completed
- Establish a Network of Location Energy Contacts (SPA's)
  - Share best practices
  - Review project status
- Network with other Regions

Slide 14

THANK YOU

Slide 15

Alcoa Energy Efficiency Network (EEN)



Slide 16

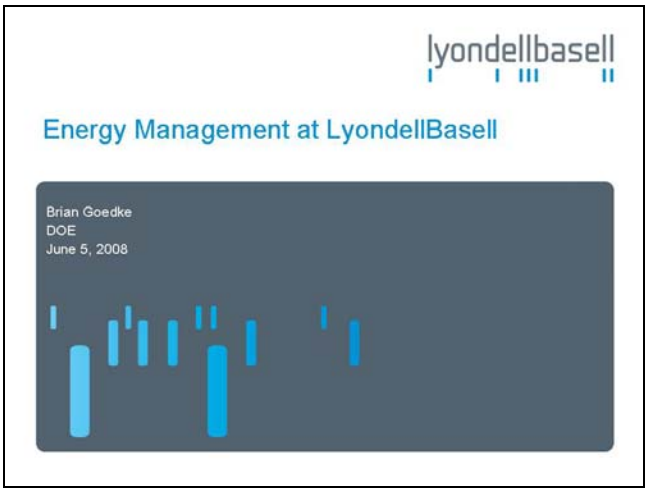
How the EEN Energy Efficiency Assessment Works

- Plant requests an energy efficiency assessment.
- Alcoa Energy conducts a pre-assessment.
- Alcoa Energy and plant jointly develop a specific plan and identify resources for the assessment.
- Typical plant assessment is 2 to 5 days.
- Plant covers cost of external resources, but Alcoa Energy resources are free to plant.
- Plant approves assessment findings prior to final report.
- Recognition for excellence in energy efficiency.
- Energy projects are tracked in intranet database.

INDUSTRY SUCCESSES:

Brian Goedke, Director Energy Management, LyondellBasell

Slide 1



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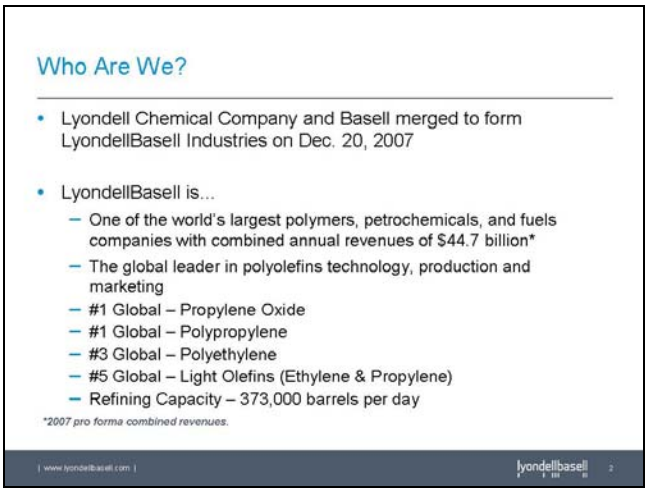

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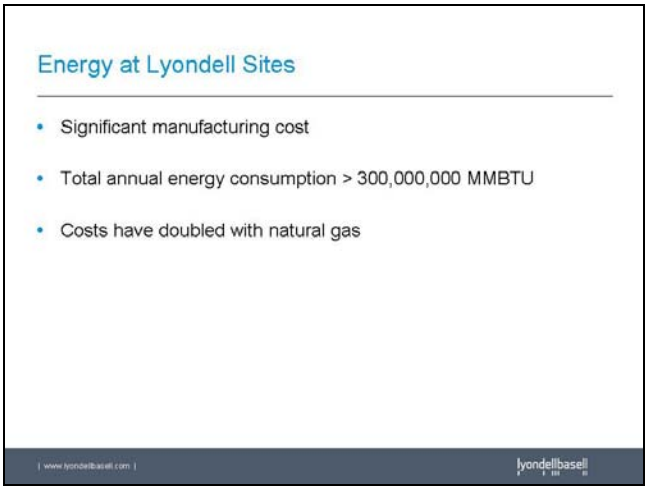


Slide 5

Energy Management Milestones

- 2005
  - Record natural gas prices lead to record energy costs
- 2006
  - Issued 10% in 5 year challenge
  - Conducted 2 DOE Save Energy Now Program Energy Saving Assessments
  - Kicked off pilot comprehensive energy study
- 2007
  - Chartered corporate energy team
  - Conducted 10 utility assessments
  - Kicked off 3 additional comprehensive energy assessments
  - Site energy champions appointed at largest sites
  - Sites develop 5-year plans to achieve 10% reduction

Slide 6

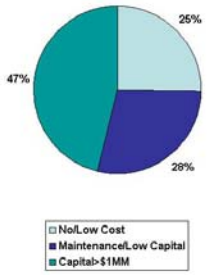
Assessment Common Observations

- Steam leaks repairs ~ 0.5% of site energy
- Steam trap survey and repairs ~ 0.5% of site energy
- Thermal insulation repair ~ 0.75% of site energy, < 1 year payback
- Advanced process control of distillation
- Culture change required for sustainability

Slide 7

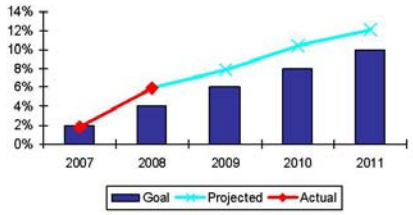
Assessment Results to Date

- Most locations > 10% reduction opportunity
- 600+ Total opportunities identified
- Total potential energy reduction ~ 20%



Slide 8

Progress



- Reduced energy consumption by 1.9% in 2007 vs 2006 base year energy use
- Estimate 2008 year-end energy run rate to be 5% below 2006 base year energy use

Slide 9

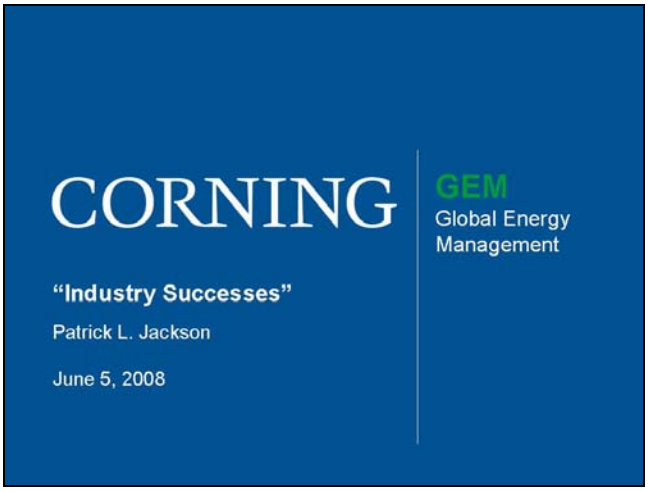
Summary

- DOE Save Energy Now Assessments have been a catalyst for our energy efficiency improvement efforts
- Real savings ($) have been achieved through low cost BTU reduction projects
- Our corporate goal of 10% appears achievable without significant capital spending

INDUSTRY SUCCESSES:

Patrick Jackson, Manager Global Energy, Corning

Slide 1



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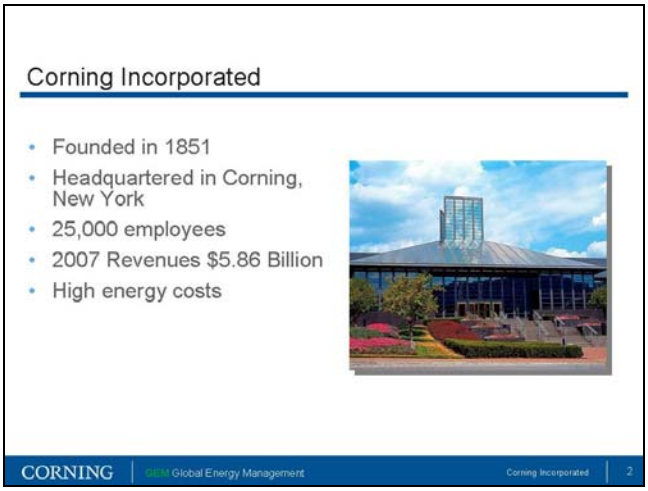

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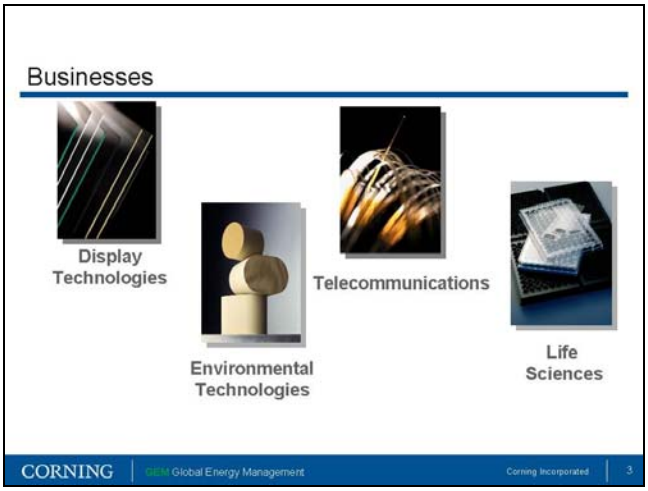

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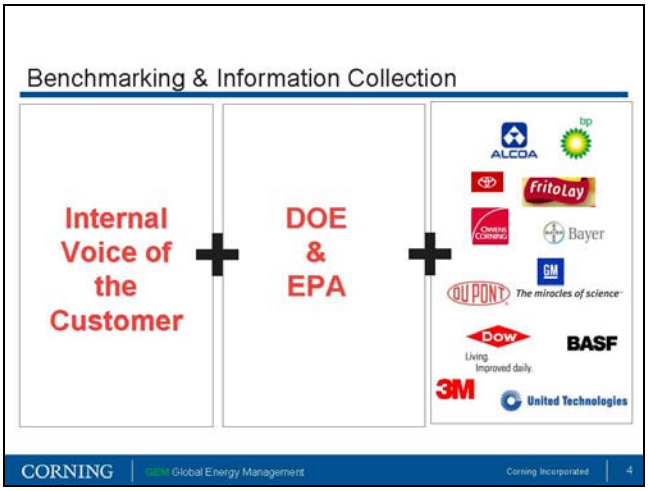


Slide 5

What it takes to be World Class

- Energy Policy
- Global Leader
- Senior Sponsorship
- Active Energy Teams
- Reliable Data
- Baseline Data
- Corporate, Division, and Site Goals
- Available Capital
- Technical Action Plan
- Defined Roles, Resources, and Responsibilities
- Long-Term Energy Master Plan
- Education and Training Programs
- Communications Plan

Slide 6

GEM Objectives

- To Strategically Manage Global Energy By:
  - Ensuring a Reliable Energy Supply
  - Reducing Consumption of Energy using an Integrated, Multi-Functional Approach
  - Achieving a Positive Return On Investment
  - Utilizing "Greener" Energy when Possible
  - Maintaining more Efficient and Productive Buildings
  - Improving Energy Productivity

Slide 7

Corning's Framework for Energy Productivity

Adopted from the California Loading Order and the European Union's "Trias Energetica"

1. Maximize Energy Efficiency
2. Use as much Economically Viable Renewable Energy and Combined Heat and Power (Cogeneration) as possible
3. Partner with Utilities to Maximize the Use of Existing Electric and Gas Grids

Slide 8

Critical Self-Assessment March 2007

- Commitment to Continuous Improvement
- Assess Performance and Opportunities
- Set Performance Goals
- Create Plan
- Implement Plan
- Evaluate progress
- Recognize Achievements

Energy Star Assessment Matrix

Little or no evidence	17 → 0
Some elements	6 → 14
Fully implemented	0 → 9

Slide 9

Accomplishments

Corning Internal Projects

- Introduced concept building commissioning
- Utilized government incentives
- U.S. Dept. of Energy audits
- Developed & Implemented 1st Cogeneration Project
- Developed Integrated Energy Master Plans
- Submitted proposal to utilize landfill gas for energy
- Awarded Certification to the California Climate Registry
- U.S. Green Building Council
- Capital Pool
  - Efficiency, Measurement, Reliability, Demonstration, &Environmental
  - Very good paybacks

Slide 10

On the Horizon

2008 & 2009 Focus Areas

- Proliferation of Low Cost / No Cost programs
- Aggressive implementation of Spend to Save
- Deeper teaming with manufacturing
- Require higher levels of efficiency in new buildings
- Major focus on heat recovery
- Design new products with efficient production in mind
- Embed energy efficiency in all procurement decisions
- Selected technology demos
- Maximize help from Industrial Technology Program
- Actively engage in climate policy development

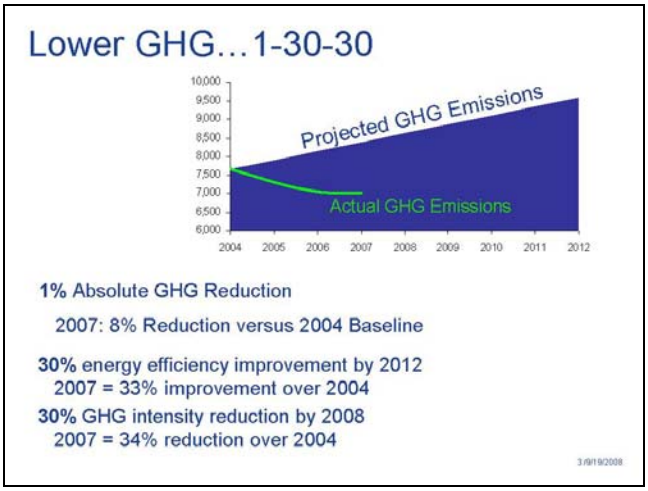
INDUSTRY SUCCESSES:

Jeff Renaud, Director Ecomagination, General Electric

Slide 1

Slide 2

Slide 3



Slide 4

Slide 5

Calculating Footprint

GHG & Water Inventory
- Annually since 2002
- Global, cross-business
- 500+ people involved
- Verified externally
- WRI/WBSCD Protocol for GHG emissions
- PowerSuite™

Includes
- 500+ large Sites
- 4,000 small sites
- Vehicles, aircraft
- Desal plants
- Water= sites >10MM gal

5 /9/17/2008

Slide 6

Energy Treasure Hunts

Leveraged from Toyota
Uses Lean Work-Out Approach
Engages employees, suppliers, and utility providers
Identifies, Quantifies ROI & GHG for energy opportunities

Results:
200 Events since 2005
Over 650,000 MT CO2 /$100MM cost savings identified
5000+ projects
2500+ GE employees trained

6 /9/17/2008

Slide 7

Reducing GHG… Re-Lamping

- 150+ facilities since 2005
- ~2-year payback
- Productivity benefits
- $6.5MM annual savings
- 93MM+ kWh / yr ↓
- 59k tons of CO2 / yr ↓

Mascot, TN

Using our own technology!

7 /9/17/2008

Slide 8

Reducing GHG… Test Emissions

Leaning the Test Process
- Started at Aviation
  - CFM, GE90 products
- Now gas turbines & locomotives
- Transactional Lean techniques + engineering process design

Peebles, Ohio

Results
- ~30% less jet fuel per test
- 24% reduction in hours
- ~1 million gallons jet fuel saved per year

8 /9/17/2008

Slide 9

Rewards & Recognition

E-CO_2 Star
- Site Certification Program for >5% Reductions
- 45 sites in 2007

eCO2 Star Certified Site
ecomagination

E-CO2 Awards
- Innovation & engagement
- Publication, $5000 grant
- 10 winners in 2007

Slide 10

Lessons Learned…. So far

- Enlist senior leadership support
- Engage the workforce
- Work with key stakeholders
- Understand the baseline + business changes
- Group solutions around uses… drive implementation
- Invest the time and effort to assure data quality
- Create & leverage a repository of great solutions
- Reward, recognize & communicate!

10 /9/17/2008

UTILITY PANEL:

Joe Hoagland, Vice President Energy Efficiency and Demand Response, Tennessee Valley Authority

Slide 1

Industrial
Energy Efficiency
Summit

June 5, 2008

Dr. Joe Hoagland, Vice President
Energy Efficiency/Demand Response
TVA Customer Resources

1

Slide 2

TVA Strategic Plan

Energy Efficiency Improvement and Peak Demand Reduction

"In partnership with others, TVA will strive to be a leader in energy-efficiency improvements and peak demand reduction over the next five years."

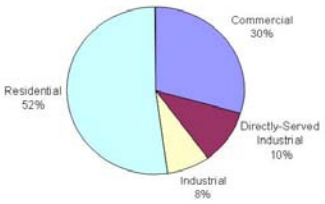
"Improving energy efficiency and reducing peak demand are significant actions that help slow demand growth in a cost-effective manner while addressing air pollution and global climate change."

2

Slide 3

TVA Customer Percentages

System Coincident Peak
Summer peak = 33,441 MW

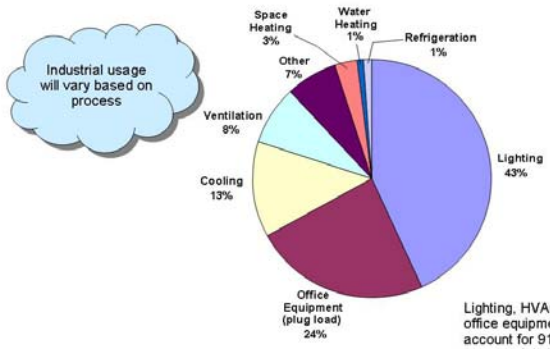


Sector	Customers	Annual Usage (GWh)	Use Per Customer (kWh/year)
Residential	3,790,341	60,526	15,968
Commercial	1,414,721	55,342	39,119
Industrial	540	19,173	35,533,393
Total	5,205,601	135,041	

3

Slide 4

Typical Commercial Building Energy Use



Lighting, HVAC and office equipment account for 91% of commercial electricity use.

4

Slide 5

Tools for Industrial/Commercial – Energy Efficiency

- Education and outreach
- Audits and technical support
  - DOE Save Energy Now
  - Internal/external expertise

Audits should be comprehensive!!

- Incentives
  - Reaching effective payback windows
  - Financing options
  - Tax breaks

18 – 24 month payback

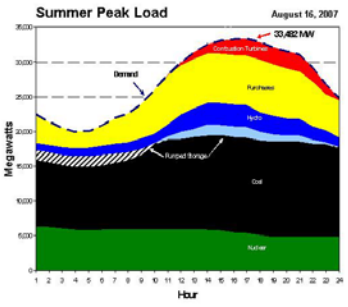
$ $ $ $

5

Slide 6

Tools for Industrial/Commercial – Demand Response

- Pricing products
  - TOU rates
  - Reliability options
  - Economic options
- Aggregation response programs



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Slide 7

Tools for Industrial/Commercial – End-Use Generation

- Focus on clean technologies
  - Reduced carbon intensity
  - Biomass or process waste
  - Solar
  - …
  - …
  - …

Incentivize being green

7

Slide 8

TVA's Internal Efforts – Walking the Talk

- One of the top performing federal agencies in building energy efficiency
- Working with project managers on a multi-year effort to improve lighting efficiency
- Improving plant heat-rate and parasitic losses
- Improving losses in transmission systems

8

Slide 9

Summary

-- It's about the business --

- ***Understanding of benefits***
- ***Tools***
- ***Good business case***

9

Slide 10

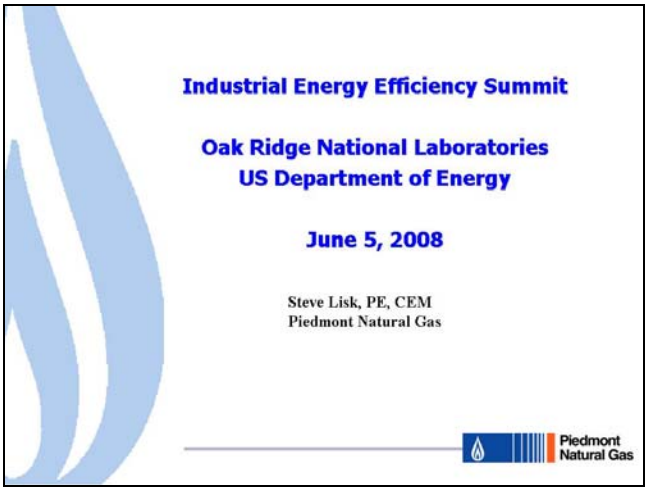
www.tva.com

10

UTILITY PANEL:

Steve Lisk, Technical Support Services, Piedmont Natural Gas

Slide 1



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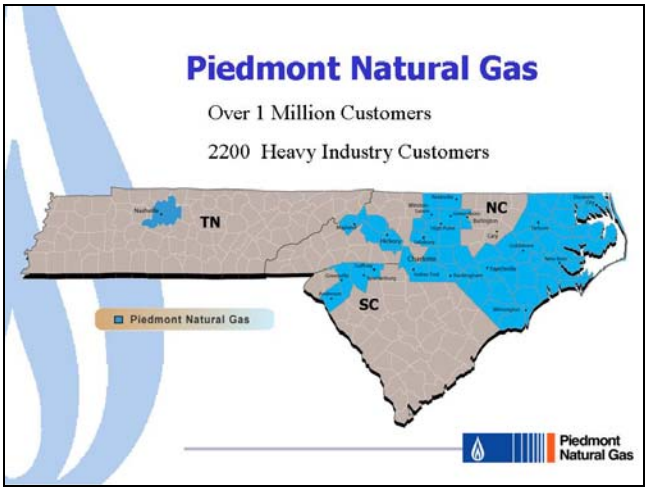

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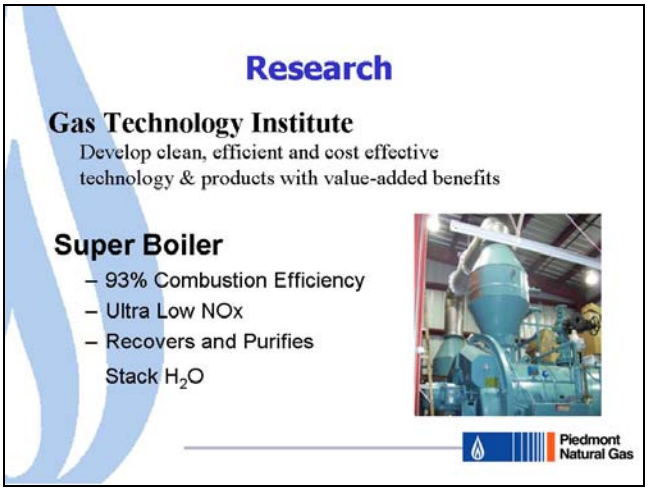


Slide 5

Education Outreach

- DOE Steam Assessment
- Steam Traps
- Boiler Efficiency
- HVAC Efficiency
- Process Heat
- Industrial Ventilation
- LEED Accreditation

Piedmont Natural Gas

Slide 6

Internal Utility Operations

Automated Meter Reading

Completed 2007

Eliminated
153 Service Vehicles

Piedmont Natural Gas

Slide 7

Internal Utility Operations

LEED Certified Facilities

Piedmont Natural Gas

Slide 8

Priorities for Clean, Efficient Natural Gas Industrial Applications

January 2008

Enhanced agenda for the Industrial Technologies Program at DOE

Reduce approximately

- 14% of all industrial natural gas consumption (1.1 TCF)
- over 440,000 metric tons in criteria air pollutants (CAPs)
- Over 60 million metric tons of greenhouse gases (GHGs)

Piedmont Natural Gas

Slide 9

Priorities for Clean, Efficient Natural Gas Industrial Applications

January 2008

Targets	2010	2015	2020
Energy Efficiency Improvement (trillion BTU)	200	760	1100
Reduction in Criteria Air Pollutants, or CAPs (thousands of metric tons per year)	80	304	440
Reduction in Greenhouse Gases, or GHGs (thousands of metric tons CO_2 per year)	11,000	41,500	60,100

Piedmont Natural Gas

Slide 10

Promote Direct Use of Natural Gas

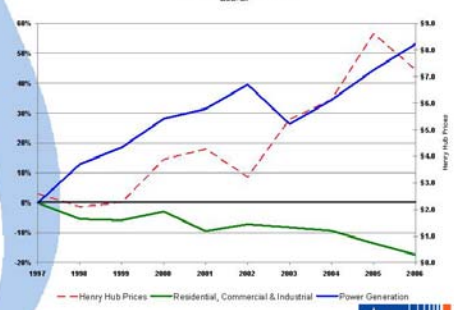
- Most Efficient Use of Resource
  - Direct Use
    - Over 90% Energy Value Delivered to Customer
  - Indirect Use
    - 25 - 45% Energy Value Delivered to Customer
- Least Environmental Impact
  - Less Carbon
  - Less Losses
  - Less Emissions
- Downward Pressure on Energy Rates
  - Natural Gas
  - Electricity

Piedmont Natural Gas

Slide 11

Promote Direct Use of Natural Gas

Percent Change in US Natural Gas Consumption
vs Natural Gas Prices

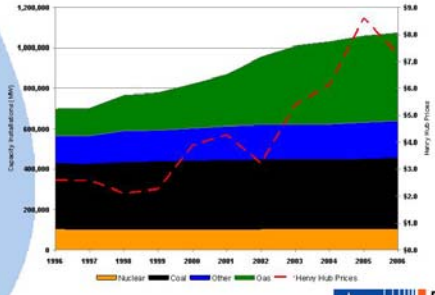


Piedmont Natural Gas

Slide 12

Promote Direct Use of Natural Gas

Net Electric Generation Capacity by Fuel Type
vs Natural Gas Prices



Piedmont Natural Gas

Slide 13

Energy Rate Design

- Create Customer Incentives for Energy Conservation and Efficiency
- Create Utility Incentives to Promote Energy Efficiency

Piedmont Natural Gas

Slide 14

Additional Information

Piedmont Natural Gas	www.piedmontng.com
Natural Gas Answers	www.naturalgasanswers.com
American Gas Association	www.aga.org
Gas Technology Institute	www.gastechnology.org
American Gas Foundation	www.gasfoundation.org

Piedmont Natural Gas

Slide 15

Thank You !

Steve Lisk,PE, CEM
Piedmont Natural Gas

704-731-4614

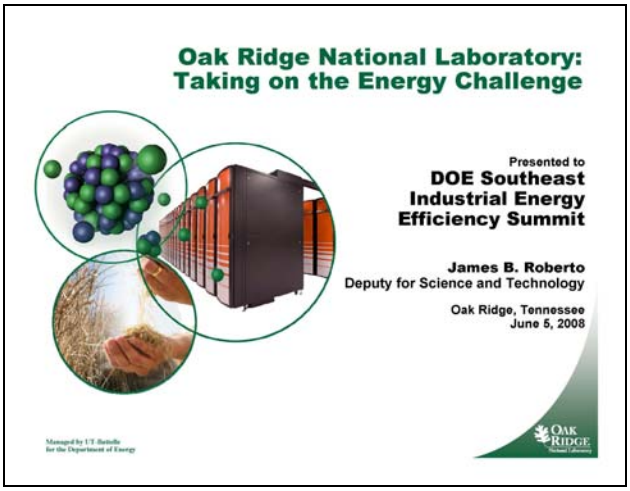
Steve.lisk@piedmontng.com

Piedmont Natural Gas

ORNL PERSPECTIVE:

Jim Roberto, ORNL Deputy Director for Science and Technology

Slide 1



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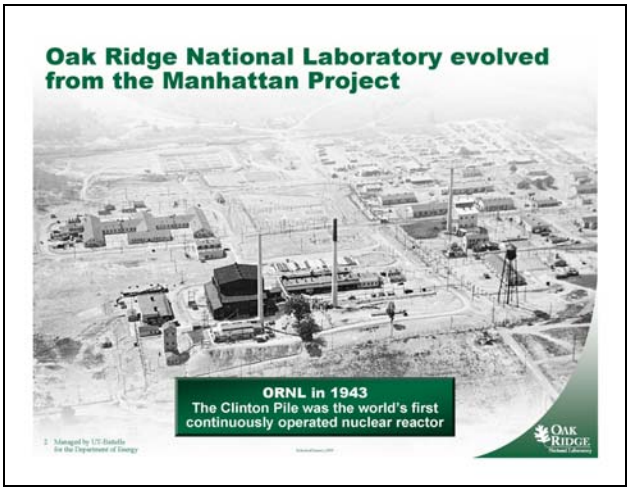
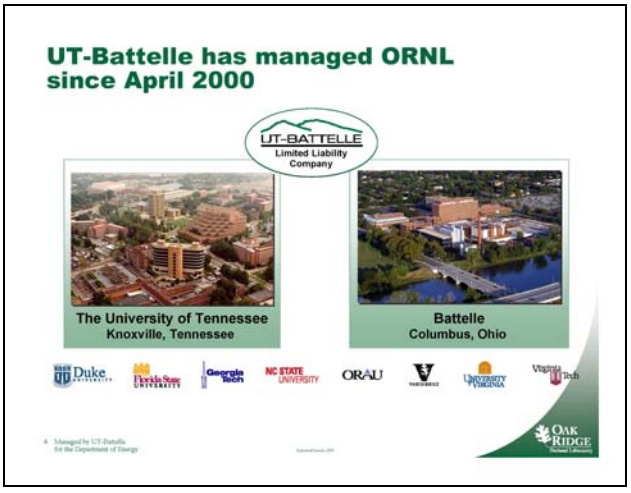


Slide 3

Slide 4



Slide 5

Energy is the defining challenge of our time

- The major driver for
  - Climate change
  - National security
  - Economic competitiveness
  - Quality of life
- The underpinning mission of ORNL
  - "A very big and difficult problem"
  - Critically dependent on the best science and technology

Slide 6

ORNL is uniquely positioned to deliver science and technology for energy

We have an extraordinary set of assets

- Outstanding tools for materials R&D
- World's most powerful system for open scientific computing
- New Bioenergy Science Center
- The nation's broadest portfolio of energy programs
- Unique resources for nuclear technology
- Robust national security programs

Our challenge: Use these assets to deliver results that are significant on both the national and the international scale

Slide 7

Studying materials with the world's best resources for neutron scattering

The $1.4 billion Spallation Neutron Source is the world's most powerful pulsed neutron source

The upgraded High Flux Isotope Reactor offers complementary capabilities including the world's brightest cold source

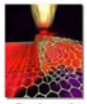
Thousands of researchers will come to Tennessee each year to use these facilities

The UT-ORNL Joint Institute for Neutron Sciences provides a user gateway for SNS and HFIR

Slide 8

Leading the world in ultrascale computing

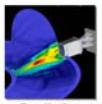
- World's most powerful open scientific computing facility
- Currently operating at 263 teraflops (1000 TF late this year)
- Focus on computationally intensive projects of large scale and high scientific impact
- Teamed with UT to win a second petaflop computer funded by NSF



Design of innovative nanomaterials

Understanding of molecular systems

Climate simulations to support policy decisions



Predictive simulations of fusion devices

Slide 9

World-class tools for nanoscale R&D

- DOE's first nanoscale science center
- Leverages neutron scattering and leadership computing capabilities at ORNL
- Unique facilities for:
  - Nanofabrication
  - Nanoscale characterization
  - Materials synthesis and chemistry at the nanoscale
- Understanding materials and chemistry at the length scale where properties are determined

Slide 10

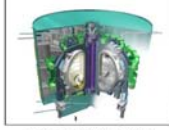
Transforming the new biology into bioenergy

- Developing bio-based solutions for energy, the environment, and carbon sequestration
- Managing a $135M DOE grant for cellulosic ethanol research
  - One of three Bioenergy Science Centers nationwide
- A $73M investment in bioenergy by the state of Tennessee brings ORNL, UT, and industry together
  - Includes bioenergy research, a 5M gal/year pilot plant, and agricultural incentives for switchgrass (co-funded by EERE)

Slide 11

Addressing the energy challenges of today . . . and tomorrow

Generation	Distribution	Consumption
Fossil Fission Renewables Fusion	Transmission technology Hydrogen Distributed energy resources	Buildings Industry Transportation



International fusion experiment

Superconducting cable

Net-zero-energy houses

Slide 12

ITER is the next step toward fusion power

- Joint international R&D project aimed at demonstrating the scientific and technical feasibility of fusion power
- To be built in Cadarache, France, with operation set to begin by the end of the next decade
- Total cost: About $12 billion
  - ORNL is managing the billion-dollar U.S. ITER Project

Slide 13

ORNL has a large and growing energy efficiency, renewable energy, and electricity delivery portfolio

- Over $100M in FY 2007: Largest national lab effort in transportation and industrial technologies (EERE) and superconductivity (OE)
- Significant growth in fuel cells, biomass, and grid visualization/modeling
- Major national facilities including High Temperature Materials Laboratory, National Transportation Research Center, and Buildings Technology Center

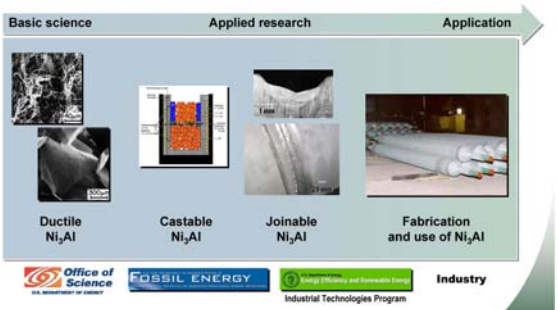
Lightweight carbon fiber materials from lignin

"Zero-energy" homes

Triaxial superconducting cable installed at AEP Bixby

Slide 14

Enhanced properties of nickel aluminide (Ni_3Al): A science-to-energy success story



Slide 15

ORNL's nickel aluminide rolls dramatically improve steel furnace operation

Welding of Ni_3Al: ORNL R&D successfully applied in industry

- Total energy savings at Burns Harbor (after 6 years of service): 186 billion Btu
- 30% increase in furnace energy efficiency
- Cost savings to date: $8.5M
- Total CO_2 savings: 11,000 tons
- Increased yield and product quality

Slide 16

Rapid infrared heating technology: Low-cost, energy-efficient heating process with significant enhancement in material properties

Atom probe results: Larger volume fraction of nanosize Al_2CuMg precipitates in infrared heated forgings

Full-scale production: Infrared furnace operating at Queen City Forging Company

Final product: Machined impellers, 10,000 parts/month

Slide 17

Rapid infrared heating technology: Substantial energy savings

- 3x improvement in energy efficiency, 2.5x better fatigue life
- Order of magnitude decrease in preheating time for billets, 4x improvement in production rate
- Estimated potential national energy savings: ~2 trillion Btu/year
  - Up to 1.1 trillion Btu/year for aluminum forgings
  - Similar savings for Cu, brass, and Ti
- Funding: DOE EERE Industrial Technologies Program, LDRD, industry
- Partners: Forging Industry Association, Queen City Forging Company, KomTek Technologies, Infrared Heating Technologies, LLC

Slide 18

Technical support and performance evaluation for ITP technology delivery

Save Energy Now

- Managed inaugural SEN assessments in 2006:
  - 200 assessments in process heating and steam systems
  - Identified $519M/year in savings ($2.5M/year per plant)
- Software and training development, 2006:
  - 930 plants trained: Energy savings of $17.5M/year
  - 3,500 plants using software: Energy savings of $52M/year

Industrial Assessment Centers

- Student development
  - Transitioning IAC students into the energy workforce
  - Approximately 150 newly qualified energy engineers entering the marketplace annually

Slide 19

Strong university partnerships are critical to ORNL's success

Major projects	• Bioenergy Science Center • NSF Track 2 computer • 4 SNS instruments led by university consortia
Collaborative research	• More than 200 universities
Joint hiring	• 61 joint faculty with 8 universities
Joint institutes	• Heavy ion research • Neutron sciences • Biological sciences • Computational sciences • Materials sciences
User facilities	• Thousands of university users

Slide 20

We use our R&D assets to create economic growth

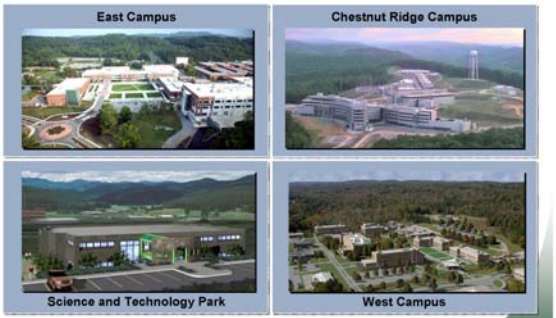
- Technology portfolios
- Entrepreneurial support
- Partnerships with industry and universities
- Local and regional economic development

- 416 US patent applications filed in past 5 years; 250 patents issued
- 96 active technology licenses
- 79 new companies since April 2000
- Strategic partnerships
  - UT, TVA, Southern Growth Policies Board, Tech 2020, Tennessee Valley Corridor, ETEC, Battelle Ventures, Innovation Valley Partners, and many others
  - S&T Park at ORNL
  - Working with more than 600 industries annually

Innovation Valley Partners · Battelle Ventures · CEG

Slide 21

We are transforming the laboratory



Slide 22

Oak Ridge National Laboratory: Science and technology for energy

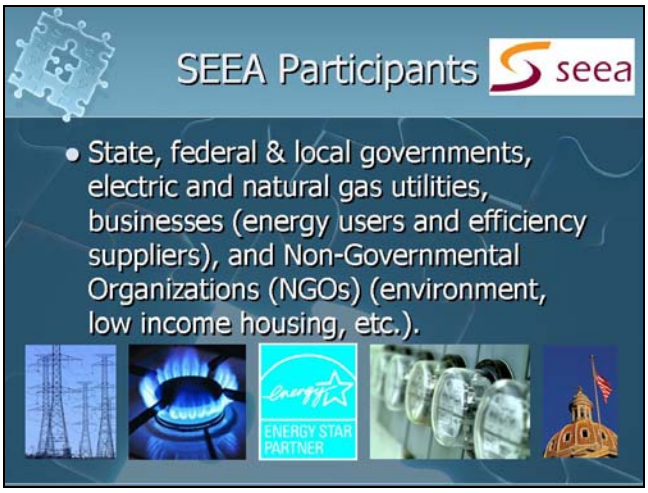
WORKING TOGETHER – THE ACTION PLAN

Ben Taube, Executive Director, Southeast Energy Efficiency Alliance

Slide 1

Slide 2

Slide 3



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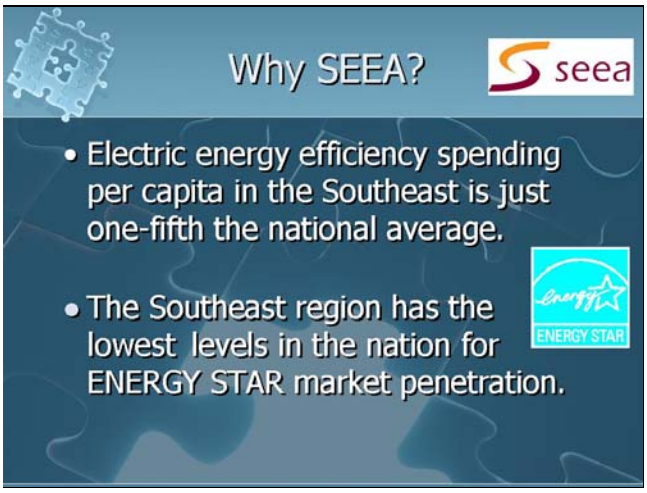

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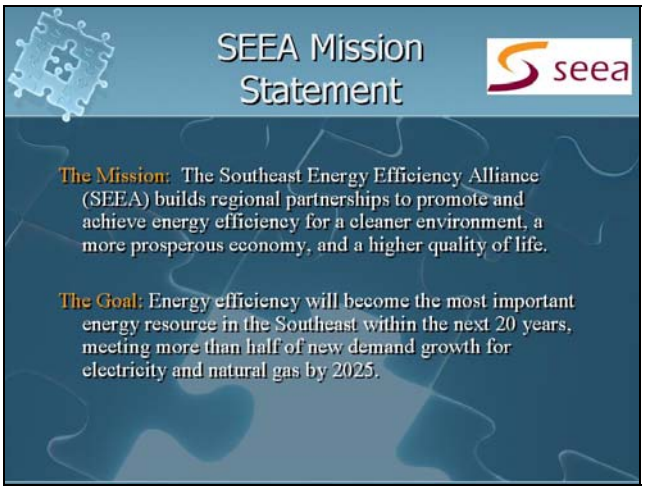

[i] Energy Information Administration. "Table S1. Energy Consumption Estimates by Source and End-Use Sector, 2005." Downloaded from http://www.eia.doe.gov/emeu/states/sep_sum/html/pdf/sum_btu_1.pdf. Accessed on May 27, 2008.

[ii] U.S. Census Bureau. "2006 Annual Survey of Manufacturers." Downloaded from http://factfinder.census.gov/servlet/IBQTable?_bm=y&-_lowValue=&-filter=YEAR:in:2006&-ds_name=AM0631AS101&-_highValue=&-geo_id=04000US01&-geo_id=04000US05&-geo_id=04000US12&-geo_id=04000US13&-geo_id=04000US21&-geo_id=04000US22&-geo_id=04000US28&-geo_id=04000US37&-geo_id=04000US45&-geo_id=04000US47&-geo_id=04000US51&-search_results=01000US&-_filterValue=2006&-_selOp=eq. Accessed on May 27, 2008.