U.S. DEPARTMENT OF ENERGY

Voluntary Commitments to Reduce Industrial Energy Intensity

Report to Congress
June 30, 2012

United States Department of Energy
Washington, DC 20585

Message from the Secretary

I am pleased to present the enclosed *Report to Congress on the Voluntary Commitments to Reduce Industrial Energy Intensity* in accordance with the requirements of Section 106 of the Energy Policy Act of 2005. The report identifies the progress reported to date of voluntary commitments by industry in partnership with the U.S. Department of Energy to reduce industrial energy intensity, highlights program accomplishments, and describes the process the Department undertook to verify a sample of energy savings estimates provided by participating firms.

Pursuant to statutory requirements, this report is being provided to the following Members of Congress:

- **The Honorable Joseph R. Biden, Jr.**
  President of the Senate

- **The Honorable John Boehner**
  Speaker of the House of Representatives

- **The Honorable Jeff Bingaman**
  Chairman, Senate Committee on Energy and Natural Resources

- **The Honorable Lisa Murkowski**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Fred Upton**
  Chairman, Committee on Energy and Commerce

- **The Honorable Henry A. Waxman**
  Ranking Member, Committee on Energy and Commerce

If you have any questions or need additional information, please contact me or Mr. Jeff Lane, Assistant Secretary for Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Steven Chu

Executive Summary

Section 106 of the Energy Policy Act of 2005 (Pub. L. No. 109-58) gives the Secretary of Energy the authority to enter into voluntary agreements to reduce the energy intensity of production activities with one or more persons in industrial sectors that consume significant quantities of primary energy for each unit of physical output. The legislation also specifies that the goal of these voluntary agreements is a reduction of energy intensity of not less than 2.5% each year during calendar years 2007 through 2016. The statute further directs the Secretary to submit to Congress a report not later than each of June 30, 2012, and June 30, 2017, that evaluates the success of the voluntary agreements, and provides independent verification of a sample of the energy savings estimates provided by participating firms.

In response to this directive, the U.S. Department of Energy (DOE) in 2009 established a public-private partnership program that aims to: (1) encourage companies to set voluntary energy savings targets, and (2) build capacity within the industrial sector to achieve continuous energy efficiency improvement. Companies joining the program set a 10-year, 25% energy intensity improvement goal, establish an energy intensity baseline, develop an energy management plan, designate an energy manager, and report energy intensity and energy use data to DOE annually. DOE provides technical assistance to help participating companies meet their goals, national recognition to publicize their accomplishments, and access to best practices training taught by technical experts and industrial sector peers.

The program has now grown to include 108 participating companies, representing about 1,400 plants across more than 20 industries. Based on best available data, DOE calculated the weighted average 2010 energy intensity improvement rate (weighted by baseline year energy use) for reporting companies to be 2.84%, which exceeds the annual 2.5% per year program target. Estimated 2010 source energy savings from the reporting companies is about 15 trillion British thermal units, which is equivalent to about $80 million in cost savings, or $800 million total, assuming the 2010 savings persist over the 10 years covered by the program. All energy data provided to DOE are checked for common errors and obvious anomalies, at the same time a sample of the energy savings estimates is subjected to more rigorous verification. In accordance with Section 106 of the Energy Policy Act of 2005, this report details the process and results of the verification process undertaken by DOE.

VOLUNTARY COMMITMENTS TO REDUCE INDUSTRIAL ENERGY INTENSITY

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I. Legislative Language

This report responds to legislative language set forth in Section 106 of the Energy Policy Act of 2005 (Pub. L. No. 109-58), wherein it is stated:

> **SEC. 106. VOLUNTARY COMMITMENTS TO REDUCE INDUSTRIAL ENERGY INTENSITY.**
> (a) DEFINITION OF ENERGY INTENSITY.—In this section, the term ''energy intensity'' means the primary energy consumed for each unit of physical output in an industrial process.
> (b) VOLUNTARY AGREEMENTS.—The Secretary may enter into voluntary agreements with one or more persons in industrial sectors that consume significant quantities of primary energy for each unit of physical output to reduce the energy intensity of the production activities of the persons.
> (c) GOAL.—Voluntary agreements under this section shall have as a goal the reduction of energy intensity by not less than 2.5 percent each year during the period of calendar years 2007 through 2016.
> (d) RECOGNITION.—The Secretary, in cooperation with other appropriate Federal agencies, shall develop mechanisms to recognize and publicize the achievements of participants in voluntary agreements under this section.
> (e) TECHNICAL ASSISTANCE.—A person that enters into an agreement under this section and continues to make a good faith effort to achieve the energy efficiency goals specified in the agreement shall be eligible to receive from the Secretary a grant or technical assistance, as appropriate, to assist in the achievement of those goals.
> (f) REPORT.—Not later than each of June 30, 2012, and June 30, 2017, the Secretary shall submit to Congress a report that—
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> (1) evaluates the success of the voluntary agreements under this section; and
> (2) provides independent verification of a sample of the energy savings estimates provided by participating firms.

II. Introduction

In accordance with the provisions of Section 106 of the Energy Policy Act of 2005 the U.S. Department of Energy (DOE) in 2009 established a voluntary industrial energy savings partnership program that challenges U.S. manufacturers to reduce their energy intensity (energy consumed per unit of production) by 25% over 10 years. The goals of the program are to drive energy savings, and to establish capability within the industrial sector for continuous energy efficiency improvement. As part of this effort, DOE (1) provides technical resources to participating companies to help them meet energy reduction goals, (2) supports public recognition activities to highlight the energy efficiency accomplishments, and (3) provides

participating manufacturers with best practices training taught by technical experts and industrial sector peers.

When launched in 2009, this program was known as the Save Energy Now LEADER Initiative (SENL), but in December of 2011, DOE evolved SENL into the Better Buildings, Better Plants Program and Challenge. In its new form, the program retains the essential goals of SENL, but as part of the transition, DOE established a new partnership framework that provides manufacturers with a wider range of opportunities to participate based on their level of commitment to energy efficiency.

III. Background

All companies with a U.S. manufacturing presence are eligible to participate in the Better Buildings, Better Plants Program and the Better Buildings, Better Plants Challenge. The core requirements of the Better Buildings, Better Plants Program are that companies: set a 10-year target to improve energy intensity by 25%; establish an energy intensity baseline, which reflects the current state against which future progress will be measured; develop an energy management plan consistent with ISO 50001, the newly released international energy management standard; designate an energy manager; take steps to reduce their energy intensity; and report energy intensity and energy use data to DOE annually. Manufacturers can also partner with DOE through the Better Buildings, Better Plants Challenge, which entails additional commitments that are more fully described below. To help companies achieve their energy reduction targets, DOE assigns each company a Technical Account Manager (TAM). TAMs have specific energy efficiency expertise, which allows them to work with the energy managers of their assigned companies to help establish energy baselines, develop energy management plans, and identify additional technical support.

This additional technical support has taken various forms, including access to Energy Savings Assessments (ESAs), hands-on technical training, and energy audits from Industrial Assessment Centers (IACs). ESAs were available only to large facilities consuming more than 0.5 Trillion British thermal units (TBtus) of energy per year, but were phased out in December 2011 because a private sector service industry was developed that adequately meets large-industry needs. In contrast, IAC assessments are reserved for small- and medium-sized manufacturing plants.

DOE continues to provide technical training to partner companies through In-Plant Trainings (IPT). Energy experts lead these 3–4 day sessions at partner facilities to train participants on how to conduct assessments on one or more of the following energy systems: steam, process heating, compressed air, fans, and pumps. While IPTs are conducted at a single plant, host facilities increase the reach of these trainings by inviting personnel from other plants within the company, as well as representatives from their supply chain, and from other companies within the geographic region to participate. Training is also provided on other topics, including the use

of DOE's system-focused software decision support tools, development of energy management systems, and implementation of energy efficiency projects.

Once a year, Better Buildings, Better Plants Program Partners (referred to as "Program Partners" throughout this report) report their energy efficiency progress to DOE through a White House Office of Management and Budget-approved information collection form. Information collected includes companies' energy baselines, as well as their current-year energy consumption broken out by fuel type. Program Partners also calculate energy intensity improvement, both on an annual and cumulative basis (as of their baseline year). Energy intensity is typically calculated as Btu per pound of product, but alternate metrics are occasionally accepted, such as Btu per dollar of revenue, especially for companies with diverse and complex product mixes.

When launched in December 2009, DOE's voluntary industrial energy efficiency partnership program was known as SENL. In December 2011, SENL was renamed the Better Buildings, Better Plants Program for three primary reasons: (1) to provide greater integration of DOE's energy efficiency efforts across the commercial and industrial sectors; (2) to align the program with the Better Buildings Challenge, a national, multi-sector energy efficiency leadership initiative; and (3) to provide manufacturers with a wider range of opportunities to partner with DOE based on their level of commitment to energy efficiency. All companies previously participating under SENL were automatically enrolled in the Better Buildings, Better Plants Program, but given the opportunity to opt out. Only two companies chose to opt out of the program. The program continues to be managed by DOE's Advanced Manufacturing Office (previously the Industrial Technologies Program).

As part of this transition, DOE launched the Better Buildings, Better Plants *Challenge*, which is the industrial component of the broader Better Buildings Challenge, a multi-sector leadership initiative announced by President Obama in February of 2011. Through the Better Buildings, Better Plants Challenge, manufacturers have the opportunity to gain higher-level recognition for exemplary energy efficiency leadership. Challenge Partners set similar energy efficiency goals as Program Partners, but also pledge enhanced levels of transparency and innovation in their approach to energy efficiency. Specifically, Challenge Partners commit to:

- Set a goal to improve energy efficiency by at least 25% over ten years.
- Announce an "implementation model" used to overcome key barriers to energy efficiency within the corporation.
- Conduct a "showcase project" that demonstrates near-term commitment to energy efficiency within a single facility.
- Report and make public on an annual basis corporate-wide energy use and energy intensity improvement.
- Report and make public on a quarterly basis data on implementation models and showcase projects.

The objective of these activities is to identify and publicize a set of key best practices and business models organizations across different sectors of the economy have adopted to overcome persistent barriers to energy efficiency. By leveraging the efforts of leading organizations, the Better Buildings Challenge is developing "blueprints" other organizations can adopt, thereby advancing energy efficiency at less cost to the taxpayer.

IV. Better Buildings, Better Plants Program Status

As of April 2012 there are 108 Program Partners, representing about 1,400 plants. These companies use about 1,100 TBtus of energy annually, which is about 5% of the total U.S. manufacturing energy footprint.[1] The best available data to evaluate the energy savings associated with the program comes from 2010. This is the latest year in which a majority of Program Partners have submitted their annual reports. In 2010, two-thirds of reporting companies recorded an average annual improvement rate greater than or equal to the 2.5% per year target.[2] The weighted average energy intensity improvement rate for these companies is about 2.84%, and estimated 2010 primary energy savings is approximately 15 TBtu, [3] which is equivalent to the amount of primary energy consumed by about 65,000 single-family homes for a year. [4]

DOE's goal is to grow the Better Buildings, Better Plants Program to include 500 Program Partners, representing approximately 7,500 plants, and 25% of the U.S. manufacturing energy footprint, by 2015. If each of these companies meets its 10-year, 25% energy intensity improvement target, this would result in energy savings of approximately 703 TBtu[5], or more than the total energy consumed by the State of Nevada in 2009.[6]

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[1] The U.S. manufacturing sector as a whole consumed 21,644 Tbtus of primary energy in 2006, according to the U.S. Energy Information Administration's 2006 Manufacturing Energy Consumption Survey.

[2] The 2.5% annual rate is approximately double the Energy Information Administration's projected business as usual rate for the U.S. manufacturing sector.

[3] Estimated energy savings in 2010 are calculated by applying the weighted average 2010 energy intensity improvement rate (minus the 1.2% projected EIA business as usual rate) from the partners that have submitted annual reports to the sum of the reported baseline energy use from those same reporting companies. In this case, baseline year energy use for the reporting companies is 908 TBtus, and the 2010 weighted average energy intensity improvement rate is 2.84%, yielding an estimated 2010 energy savings of about 14.9 TBtus (908 * (0.0284-0.012) = 14.9 TBtus).

[4] Home energy savings equivalence is based on the 2005 Residential Energy Consumption Survey, Table-US9. On average, single-family homes consume 225.9 million Btu of primary energy annually.

[5] This number is calculated by first estimating energy use of the 500 projected partners, which in this case is 25% of the 2006 MECS estimate for the manufacturing sector as a whole, or 21,644*0.25= 5,411 TBtus. Projected energy savings are then calculated by applying the 25% energy efficiency target to the estimated energy use, and backing out the EIA's business as usual savings: 5,411 * (0.25-0.12) = 703 TBtus.

[6] Source: Energy Information Administration, State Energy Data. http://205.254.135.7/state/seds/sep_sum/html/pdf/sum_use_tx.pdf

V. Better Buildings, Better Plants Program Partners

The table below lists all 108 Better Buildings, Better Plants Program Partners.

- 3M
- Alcoa
- Amcor Rigid Plastics
- AT&T
- Ball Packaging North America
- Bentley Prince Street, Inc.
- BIC APP North America
- BPM, Inc.
- Bradken
- Bridgestone Americas
- Briggs & Stratton
- Brown Printing Company
- The Buck Company
- Buckeye Technologies, Inc.
- CalPortland
- Cargill Regional Beef of Milwaukee
- Carlton Forge Works
- Carus Chemical Company
- Chippewa Valley Ethanol Company
- Cummins, Inc.
- Dahlgren & Company, Inc.
- Danfoss
- Darigold
- Davisco Foods
- Denison Industries
- Didion Milling
- The Dow Chemical Company
- DSM North America
- Duke Manufacturing Company
- Earth2O
- Eastman Chemical Corporation
- Eaton Corporation
- Eck Industries
- Flambeau River Papers
- Florida's Natural Growers
- Flying Foods Group
- General Dynamics Ordnance and Tactical Systems
- General Motors
- Goodyear Tire and Rubber Company, US Tire Plants
- Gorell Windows & Doors
- Grand River Printing
- Graphic Packaging International
- Harrison Steel Castings Co.
- Haynes International
- HNI Corporation
- Holcim (US) Inc.
- Huntsman Corporation
- Ingersoll Rand
- Intel
- Johnson & Johnson
- JR Simplot
- Kenworth Truck Company
- Land O'Lakes
- Legrand North America
- Lockheed Martin
- Lufkin Industries, Inc.
- Manitowoc Grey Iron Foundry
- Mannington Mills
- Marquis Energy
- McCain Foods USA, Inc.
- McQuay International
- MeadWestvaco (MWV) – Specialty Chemicals Division
- MedImmune
- Metal Industries, Inc.
- Mohawk Industries
- Navistar International Corporation
- Neenah Foundry
- Nissan North America
- OMNOVA Solutions, Inc.
- Osram Sylvania
- Owens Corning
- Owens-Illinois, Inc.
- Patrick Cudahy
- Patriot Foundry & Castings
- PepsiCo
- PPG Industries
- Procter & Gamble
- Quad/Graphics, Inc.
- Raytheon Corporation
- Revstone Castings Fairfield
- Roche Diagnostics Operations
- RockTenn – Harrison
- Saint-Gobain Corporation
- Schneider Electric
- Serious Materials
- Shaw Industries
- Sherwin-Williams
- The Shredder Company
- Solberg Manufacturing, Inc.
- Solutia
- Sony DADC
- Spirax Sarco, Inc.
- Steelcase, Inc.
- The Step2 Company
- Sunoptics Prismatic Skylights
- TE Connectivity
- Textron, Inc.
- Thilmany Papers
- ThyssenKrupp Elevators
- ThyssenKrupp Waupaca
- Toyota Motor Engineering & Manufacturing North America
- Traco
- United Technologies Corporation
- Verso Paper Corporation
- Volvo Trucks North America
- Weyerhaeuser
- Whirlpool Corporation
- World Kitchen, LLC

Industries Engaged

Program Partners represent a variety of U.S. industries, with more than 40% representing the most energy-intensive industries, including chemicals, metals, forest products, and food and beverage products. The table below provides additional detail on the number of Program Partners' by industry classification.

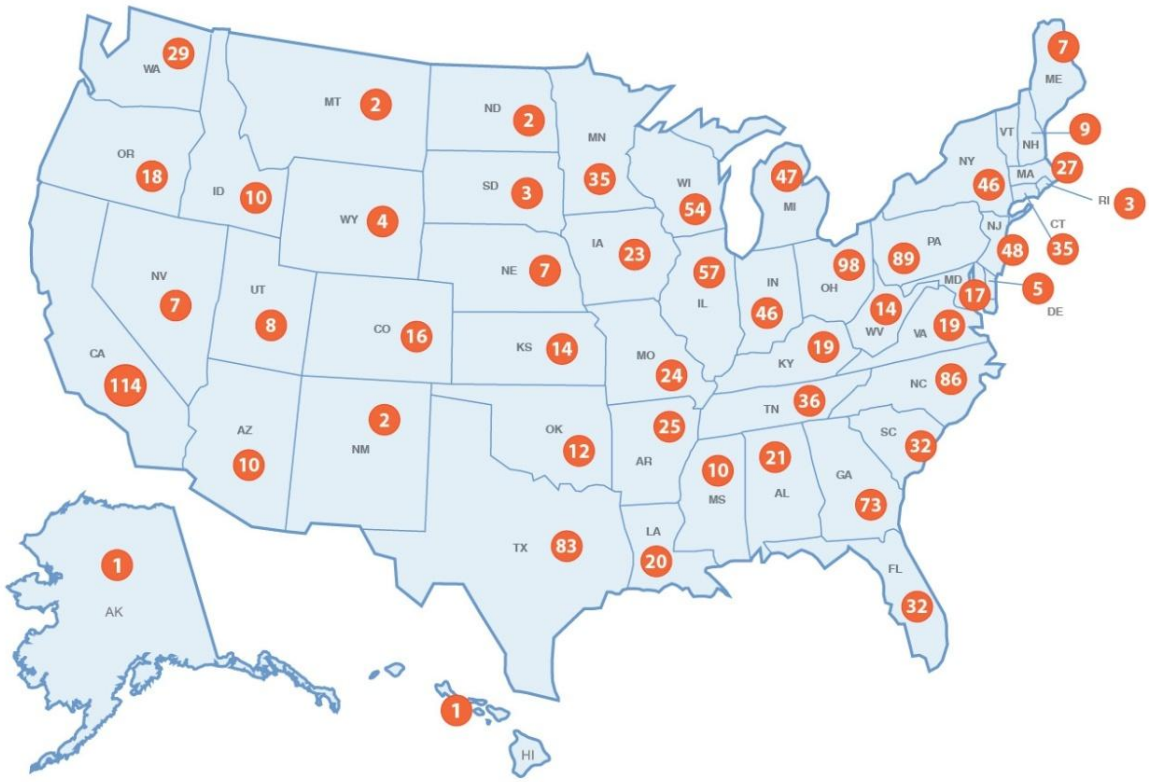
Table 1: Number of Better Buildings, Better Plants Program Partners by Industry Type

Industry	Number of Program Partners
Metals	16
Chemicals	13
Food and Beverage	12
Industrial Machinery	9
Home Equipment, Furnishings	7
Motor Vehicles and Parts	7
Forest and Paper Products	6
Aerospace and Defense	5
Packaging, Containers	5
Construction Materials	5
Electronics, Electrical Equipment	5
Publishing, Printing	3
Semiconductors and Other Electronic Components	2
Pharmaceuticals	2
Other	11
Total	**108**

Size of Companies and Plant Locations

Company size, as measured by energy use, among Program Partners varies. Of the companies that have provided confirmed energy use data: 21 are classified as large, using over 10 TBtu of energy per year; 26 are medium, using between 2 and 10 TBtu; and 27 are small, using less than 2 TBtu. Program Partners have manufacturing facilities located across nearly all 50 states, as shown in Figure 1 below. The states with the greatest concentration of Program Partners include California, Ohio, and Pennsylvania.

Figure 1: Number of Better Buildings, Better Plants Program Partner Facilities by State



VI. Recognition

Program Partners have made significant progress toward meeting their energy reduction goals, and DOE has recognized these accomplishments in several ways. Recognition efforts have included awarding plaques, issuing recognition letters, speaking at Program Partners' events, and publishing case studies that highlight Program Partners' energy saving accomplishments.

In addition, DOE has organized and sponsored several events over the last two-and-a-half years that formally recognized Program Partner accomplishments. These included cost-shared energy management showcases that highlighted energy efficiency successes resulting from companies' partnership with DOE, signing ceremonies that celebrated companies for making the 10-year, 25% energy intensity improvement commitment, and other forums to discuss successful strategies to reduce industrial energy consumption.

Other opportunities for recognition have been provided to Program Partners, including the ability to participate in Web-based best practice sharing events. Between December 2009 and September 2011, AMO hosted 17 webinars for Better Plants Program Partners on topics related to overcoming barriers to implementing energy efficiency projects. High-level corporate executives from Program Partner companies delivered key messages during the webinar series, utilizing a peer-to-peer format to present information to more than 850 total participants.

VII. Verification Process and Results

Program Partners work closely with their assigned TAMs to compile and report energy performance data to DOE on an annual basis. TAMs review Program Partners' annual reports before they are submitted to DOE, checking for common errors such as failure to convert from site to source energy or omission of certain fuel sources. TAMs also use their professional judgment to follow up with companies about any anomalous numbers included within the reports, such as dramatic year-over-year declines in energy use or double-digit improvements in energy intensity.

In many cases, companies share internal documentation with the TAMs—these documents track monthly energy use by plant and by source. Once TAMs are satisfied with the numbers provided by Program Partners, the annual reports are submitted to DOE and stored in a central database. As a result of TAM involvement, DOE has a high degree of confidence in the numbers provided by Program Partners.

In January 2012, DOE initiated a more rigorous process to verify the energy savings estimates provided by a sample of participating companies. DOE requested and reviewed two years of raw energy bill data from eight companies—three small, three medium, and two large—and compared it with the energy data contained in the annual reports submitted to DOE.

In most cases, companies submitted energy bill data for all of the plants participating in the program. In instances where energy bill data was unavailable from all plants, DOE compared the available energy bill data to the internal documents used by the companies to compile their annual reports.

In seven out of eight cases, reported energy use was identical to the energy use recorded in the companies' energy bills. The one observed discrepancy was an approximately 4% difference in the amount of coal use reported by a company to DOE versus the amount recorded in the company's energy bills. The coal discrepancy amounts to a little more than a plus or minus 2% difference in total energy usage reported by this company. Spread out among the sample of companies that participated in the verification exercise, the coal discrepancy amounts to less than a quarter of a percent difference between reported and verified energy data. The limited magnitude of this discrepancy provides confidence that the data presented in the annual reports is accurate, and that it correctly reflects the progress being made by Program Partners.

VIII. Conclusion

Through the Better Buildings, Better Plants Program, DOE is successfully implementing Section 106 of the Energy Policy Act of 2005. The program supports voluntary agreements between DOE and manufacturing companies to reduce energy intensity by at least 2.5% annually. The accomplishments of Program Partners are regularly recognized and publicized, and DOE has provided technical support, as appropriate, to help these companies achieve program goals.

DOE plans to continue to grow the Better Buildings, Better Plants Program over time to drive additional energy savings and build greater capacity for energy efficiency improvement within the manufacturing sector. Additionally, DOE intends to leverage the activities of its Better Buildings, Better Plants Challenge Partners to publicize successful energy efficiency implementation models that U.S. manufacturers can adopt.