

# Office of Atmospheric Programs Climate Protection Partnerships

## 2014 Annual Report



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## REFLECTING ON 2014 CLIMATE PROTECTION PARTNERSHIP ACHIEVEMENTS



Climate change is one of the most important issues we face. It's a global challenge, a local challenge, and it's personal to all of us. It affects our kids, our communities, and our ability to earn a decent living. Science clearly shows that climate change is driven in large part by carbon pollution, and it leads to more extreme heat, cold, storms, fires, and floods.

For farmers strained by drought, for families with homes in the path of a wildfire, and for small businesses along our coastlines, climate change is indeed very personal. And carbon pollution comes packaged with smog-forming pollutants that can lead to lung and heart disease that directly threaten our kids' health. So no matter who you are, where you live, or what you care about, climate change is affecting you and your family today.

That's why the U.S. Environmental Protection Agency (EPA) is implementing President Obama's Climate Action Plan to cut the carbon pollution that fuels climate change, prepare U.S. communities for its impacts, and lead international efforts to address global climate change. Under this plan, EPA has taken critical steps forward, including in August 2015, finalizing our historic Clean Power Plan to cut carbon pollution from power plants—our nation's biggest driver of climate change. The Clean Power Plan is an opportunity to modernize our power

sector and build a low-carbon economy that will fuel growth for decades to come. At the same time, we're improving the fuel efficiency of our cars and trucks, cutting energy waste in half by 2030, and leveraging new opportunities to reduce pollution from highly potent greenhouse gases, such as hydrofluorocarbons and methane.

The story of energy progress is already being written by companies across America that are proud to partner with EPA, including our Office of Atmospheric Programs. Our partners are choosing to reduce greenhouse gas emissions, cut wasted energy, and save money, all while helping achieve the goals of the Clean Power Plan. Here's a sample of the impressive achievements already realized as of 2014:

- With the help of ENERGY STAR, more than 283 million metric tons of greenhouse gas emissions (see Table 1, pg. 3) were prevented in 2014 alone, providing more than \$11 billion in benefits to society.
- Since the Green Power Partnership was introduced in 2001, more than 1,200 organizations have committed to using more than 33 billion kilowatt-hours of clean, renewable green power each year.
- More than 480 partners have installed more than 6,800 megawatts of new combined heat and power since the Combined Heat and Power Partnership launched in 2001.
- In 2014, the EPA's methane and fluorinated greenhouse gas program partners prevented emissions equal to the annual electricity use from more than 13 million homes.
- In total, more than 19,000 organizations and millions of Americans partnered with the EPA through the Office of Atmospheric Programs' climate partnerships and produced significant environmental benefits, including preventing more than 416 million metric tons of greenhouse gas emissions, equal to the annual electricity use of more than 57 million homes.

Together with our partners in cities, states, communities, businesses, and stakeholder groups across the country, we have already achieved meaningful reductions in greenhouse gas emissions, and we have high expectations for continued success. Like so many other environmental challenges, climate change can't be addressed by government action alone. Everyone has a voice at the table and a role to play in bringing about a healthier environment, a cleaner economy, and a stronger future.

We look forward to building on the success of these partnerships to address climate change through comprehensive, common-sense actions that benefit the planet and all Americans today and for generations to come.

Sincerely,

A handwritten signature in black ink, appearing to read "Gina McCarthy".

Gina McCarthy

# EXECUTIVE SUMMARY

Overwhelmingly, the best scientists in the world, relying on troves of data and millions of measurements collected over the course of decades on land, in air and water, at sea and from space, are telling us that our activities are causing climate change.

The most vulnerable among us—including children, older adults, people with heart or lung disease and people living in poverty—may be most at risk from the impacts of climate change.

Taking action now is critical. Driving investment in clean energy technology and strategies that reduce carbon dioxide (CO<sub>2</sub>), is an essential step in lessening the impacts of climate change and providing a more certain future for our health, our environment, and future generations.

In order to successfully change the course of this global threat, we can join together and bring residential, commercial, and industrial sectors into the fold. Successful partnerships between EPA and various public and private organizations have already been working to change the world through practical, cost-effective means of reducing GHG emissions. Cutting-edge technological innovation combined with collaboration between manufacturers, utilities, retailers, businesses, and individuals represents our greatest hope for a cleaner, greener future.

Since 1992, EPA has worked with its climate protection partners to dismantle market barriers by developing tools, offering technical assistance, and sharing best practices. The success of these efforts is undeniable—year after year, the investments made by these partnerships drive significant reductions in GHG emissions. Additionally, because of these successes, the market today has created jobs, stimulated the economy, and is more hospitable to climate-protection initiatives than it was more than 20 years ago when the programs started. EPA and its partners continue to make headway into new terrain and transform the market through significant investments in energy efficiency, clean energy technology, and other climate-friendly practices.

In 2014, EPA's climate protection partnerships produced impressive results.<sup>1</sup> More than 19,000 organizations across the United States partnered with EPA to reduce emissions and achieve significant environmental and economic benefits (see Table 1)<sup>2</sup>:

- Preventing more than 416 million metric tons of U.S. GHG emissions (in MMTCO<sub>2</sub>e) (see Figure 2, pg. 5)—equivalent to the emissions from the annual electricity use of over 57 million homes—providing over \$16 billion in benefits to society due to reducing damages from climate change.<sup>3</sup>
- Reducing net energy bills by more than \$31 billion and reductions in methane emissions valued at \$7.7 billion in 2014 alone.
- Investing over \$165 billion in energy-efficient technologies and practices through 2014.
- Preventing more than 4,100 MMTCO<sub>2</sub>e of GHG emissions cumulatively due to investments made through 2014.

<sup>1</sup> This report provides results for the Climate Protection Partnership Programs operated by the Office of Atmospheric Programs at EPA. It does not include emissions reductions attributable to regulatory programs, such as the Significant New Alternatives Policy Program, nor other voluntary climate programs operated by other EPA offices which are also part of EPA's comprehensive climate program. EPA estimates the reduction in greenhouse gas emissions across active programs in the buildings and industrial sectors to exceed 909 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>e) in 2014.

<sup>2</sup> Benefits include domestic GHG reductions only. In addition, Global Methane Initiative supported projects reduced international methane emissions by approximately 33 MMTCO<sub>2</sub>e in 2014.

<sup>3</sup> Societal benefits are based on the social cost of carbon, which monetizes the damages associated with an incremental increase in carbon emissions in a given year, including (but not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services. \$12.5 billion and \$3.7 billion of the societal benefits are from CO<sub>2</sub> and non-CO<sub>2</sub> emissions, respectively. The non-CO<sub>2</sub> emissions were converted to CO<sub>2</sub>-equivalents, assuming global warming potentials from the IPCC Fourth Assessment Report.

**TABLE 1. Summary of OAP Climate Protection Partnership Programs' Benefits and Goals (in Billions of 2014 Dollars and MMTCO<sub>2</sub>e)**

PROGRAM	ECONOMIC BENEFITS (BILLION \$) <sup>1</sup>		ENVIRONMENTAL BENEFITS: GHG EMISSIONS AVOIDED (MMTCO <sub>2</sub> e)		ANNUAL GOALS: GHG EMISSIONS AVOIDED (MMTCO <sub>2</sub> e)	
	ANNUAL BENEFITS FOR 2014	CUMULATIVE BENEFITS (1992-2014)	ANNUAL BENEFITS FOR 2014	CUMULATIVE BENEFITS (1992-2014)	2015 GOALS	2020 GOALS
<b>ENERGY STAR Program Total</b>	<b>\$31.5</b>	<b>\$362.0</b>	<b>283.2</b>	<b>2,480.8</b>	<b>217.4</b>	<b>275.1</b>
Products and Homes	\$20.5	\$208.7	149.0	1,112.2	116.8	145.0
Buildings	\$7.6	\$122.9	93.2	974.2	75.0	93.5
Industrial	\$3.4	\$30.5	41.0	394.4	25.6	36.6
<b>Energy Supply Programs</b>	—	—	37.1	263.2	44.0	73.3
<b>Methane Programs<sup>2</sup></b>	<b>\$7.7</b>	<b>\$247.4</b>	<b>76.4</b>	<b>1,139.4</b>	<b>58.7</b>	<b>62.1</b>
<b>Fluorinated GHG Programs<sup>3</sup></b>	—	—	19.6	232.8	14.3	19.1
<b>TOTAL</b>	<b>—</b>	<b>—</b>	<b>416.3</b>	<b>4,116.2</b>	<b>334.4</b>	<b>429.6</b>

Note: Information listed in this table and provided in this report includes partnership programs within EPA's Office of Atmospheric Programs. For more information on EPA's other climate partnership programs, see [www.epa.gov/climatechange/EPAactivities/voluntaryprograms.html](http://www.epa.gov/climatechange/EPAactivities/voluntaryprograms.html). See the Measuring Results chapter (pg. 32) for the methodologies used to calculate annual and cumulative benefits and goals.

<sup>1</sup> The economic benefits for the ENERGY STAR Program represent the present value of the estimated net energy bill savings for consumers and businesses. Net energy bill savings are the difference between total consumer energy bill savings and the incremental additional investment in energy-efficient technologies and services. The economic benefits for the Methane Programs represent the present value of the estimated value of gas mitigated.

<sup>2</sup> Program goals include only direct GHG emissions reductions. In 2014, Methane programs accounted for over 67 MMTCO<sub>2</sub>e of direct GHG emissions reductions.

<sup>3</sup> Includes the Voluntary Aluminum Industrial Partnership, SF<sub>6</sub> Emissions Reduction Partnership for Electric Power Systems, Responsible Appliance Disposal Program, and GreenChill Partnership.

—: Not applicable

## HIGHLIGHTS OF 2014

### Promoting Energy Efficiency Through ENERGY STAR

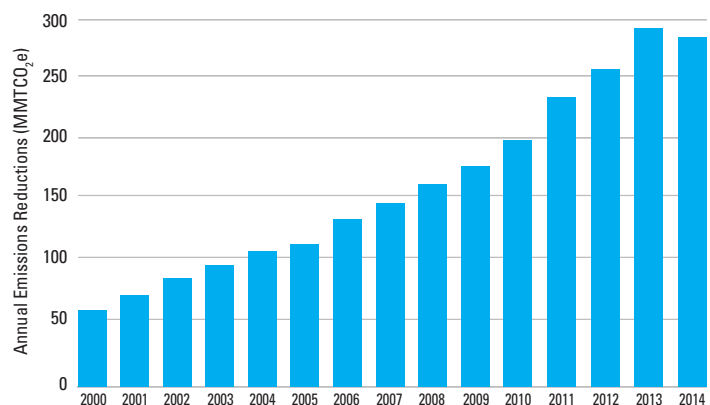
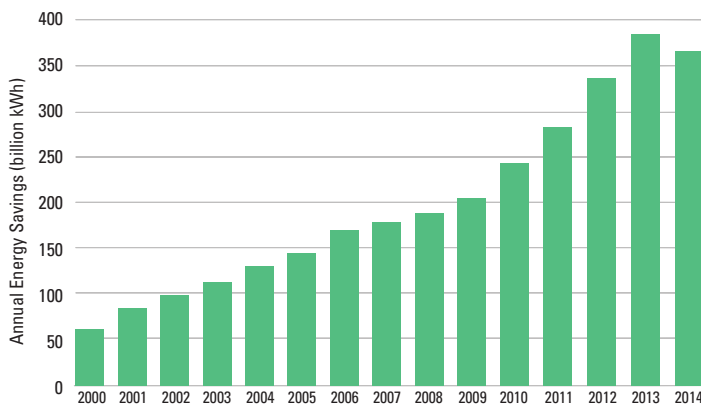
Since 1992, the ENERGY STAR® program has served as a trusted resource for voluntary standards and unbiased information for products, homes, commercial buildings, and industrial plants to help consumers, government, organizations, and businesses across the country adopt energy-efficient products and practices as cost-effective strategies for reducing GHG emissions and protecting our climate. Through ENERGY STAR, EPA continues to promote energy efficiency across the residential, commercial, and industrial sectors. In 2014, EPA's ENERGY STAR efforts helped Americans:

- Save more than 360 billion kilowatt-hours (kWh)—about 5 percent of U.S. electricity demand.
- Prevent more than 283 million metric tons of GHGs—equivalent to the annual electricity use of 38 million homes (see Figure 1, pg. 4).
- Save more than \$31 billion on their energy bills.

#### Cost Effectiveness of the ENERGY STAR Program

EPA's ENERGY STAR is a highly cost-effective program that helps Americans reduce greenhouse gas emissions while saving energy and money. Since 2000:

- For every incremental dollar Americans invested in energy efficiency through ENERGY STAR, they saved, on average, \$4.50 on their energy bills and prevented more than 35 pounds of greenhouse gas emissions.
- For every metric ton of greenhouse gas emissions reduced through ENERGY STAR, Americans saved more than \$145 on their energy bills.

**FIGURE 1. ENERGY STAR Annual Benefits**

## Transforming the Energy Supply Marketplace

EPA's Carbon Dioxide Reducing Energy Supply Programs—the Green Power Partnership and the Combined Heat and Power Partnership (CHPP)—are designed to increase the nation's supply of clean energy and accelerate the adoption of clean energy supply technologies throughout the United States. Since 2001, both programs have provided technical assistance and recognized significant leadership in end-use efficiency and use of renewable energy. By engaging more than 1,290 partners in the purchase of about 33.6 billion kWh of green power annually and more than 480 partners in the installation of more than 6,800 megawatts (MW) of new CHP capacity, the energy supply programs reduced GHG emissions by over 37 MMTCo<sub>2</sub>e in 2014 alone.

## Reducing Methane Emissions and Recovering an Energy Resource

Methane (CH<sub>4</sub>) is both a potent GHG and a highly desirable clean fuel. EPA's methane programs continued to reduce emissions—from landfills, agriculture (manure management), oil and natural gas systems, and coal mines—and develop projects to recover and use the methane whenever feasible. The programs avoided GHG emissions of 76.4 MMTCo<sub>2</sub>e in 2014, exceeding their reduction goals.

## Reducing Fluorinated GHG Emissions

Many of the fluorinated gases—including chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>)—are extremely powerful and persistent GHGs. The combined efforts of the fluorinated GHG partnerships have helped partners maintain their emissions below baseline levels. Together in 2014, these programs avoided 19.6 MMTCo<sub>2</sub>e of GHG emissions.

## Facilitating Cross-Cutting Emissions Reductions Programs

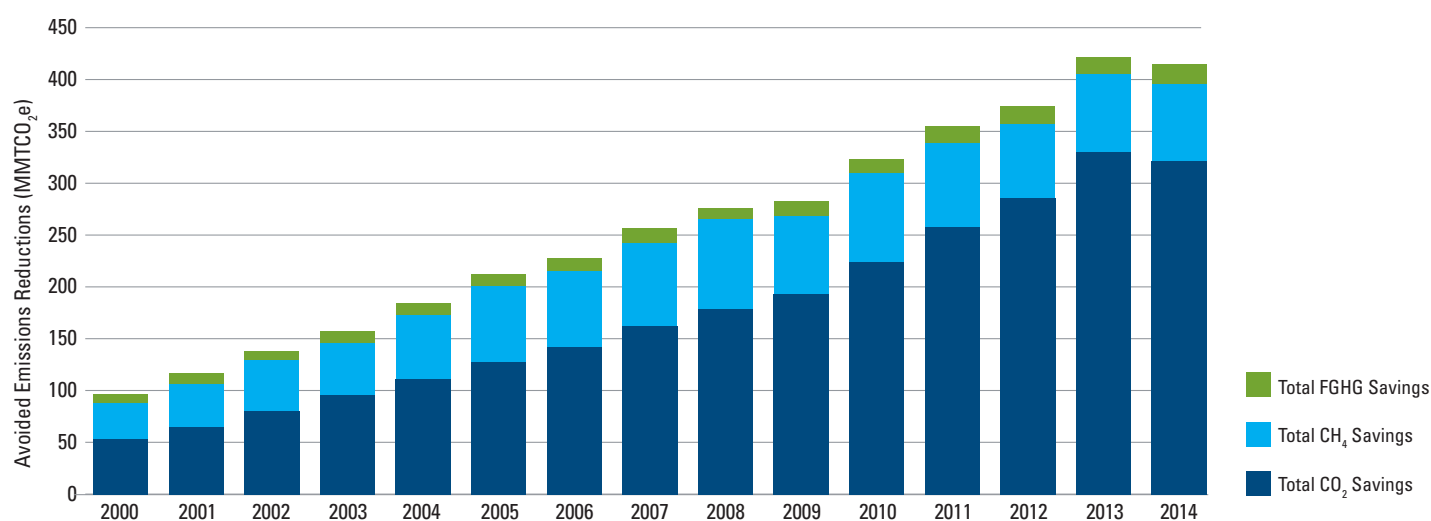
EPA launched the Center for Corporate Climate Leadership as a resource for all organizations interested in measuring and managing their GHG emissions. The Center works with non-governmental organization partners to recognize superior climate achievements through the Climate Leadership Awards. EPA also works with state and local governments to overcome barriers that can limit the development of energy efficiency and clean energy policies that reduce emissions. In 2014, EPA continued to support the 50 Climate Showcase Communities and promote the lessons learned from pilot projects to other communities.

## Honoring Partner Accomplishments

EPA recognized the accomplishments of many outstanding partners in its climate protection partnership programs with the following awards:

- ENERGY STAR Awards
- Green Power Leadership Awards
- ENERGY STAR CHPP Awards
- Landfill Methane Outreach Program Awards
- GreenChill Achievement Awards

A list of the 2014 award winners can be found in Appendix A on page 40.

**FIGURE 2. Annual GHG Emissions Reductions Exceed 416 MMTCO<sub>2</sub>e**

## The 2014 Annual Report

The partnership programs within EPA's Office of Atmospheric Programs continue to advance GHG reduction goals and deliver significant benefits. This annual report presents detailed information on EPA's 2014 efforts within each of the partnerships summarized in Table 2, page 6. Individual program sections include a program overview, environmental and economic benefits achieved in 2014, and summaries of the major tools and resources offered by the program.

EPA is committed to documenting quantifiable program results and using well-established methods to estimate the benefits of its climate partnerships. Specific approaches vary by program strategy, sector, availability of data, and market characteristics. These methods are documented in the Measuring Results section of the report on page 32.

**TABLE 2. Summary of OAP Climate Protection Partnership Programs**

PROGRAM	DESCRIPTION	START DATE	NUMBER OF PARTNERS	2014 EMISSIONS REDUCTIONS (MMTCO <sub>2</sub> e)	WEBSITE
ENERGY STAR	Helps businesses and individuals save money and protect our climate through superior energy efficiency in the residential, commercial, and industrial sectors.	1992	16,000	283.2	<a href="http://www.energystar.gov">www.energystar.gov</a>
Green Power Partnership (GPP)	Encourages organizations to use green power as a way to reduce the environmental impacts associated with conventional electricity use.	2001	1,292	37.1	<a href="http://www.epa.gov/greenpower">www.epa.gov/greenpower</a>
Combined Heat & Power Partnership (CHPP)	Promotes increased use of combined heat and power, a cleaner and more efficient alternative to separately produced electricity and thermal energy, such as steam and hot water.	2001	480		<a href="http://www.epa.gov/chp">www.epa.gov/chp</a>
Natural Gas STAR	Collaborates with oil and natural gas companies, designed to spur the adoption of cost-effective technologies and practices that reduce methane emissions.	1993	134	25.6	<a href="http://www.epa.gov/gasstar">www.epa.gov/gasstar</a>
AgSTAR	Provides tools and information to the nation's agriculture industry to reduce methane emissions by promoting the use of biogas recovery systems to manage animal waste.	1994	25	1.2	<a href="http://www.epa.gov/agstar">www.epa.gov/agstar</a>
Landfill Methane Outreach Program (LMOP)	Provides technical assistance to both smaller landfills not covered by EPA regulations and larger, regulated operations that are combusting their gas but not yet using it as a clean energy source.	1994	1,100 <sup>1</sup>	39.5	<a href="http://www.epa.gov/lmop">www.epa.gov/lmop</a>
Coalbed Methane Outreach Program (CMOP)	Works cooperatively with the coal mining industry to reduce methane emissions from coal mining activities.	1994	—	10.1	<a href="http://www.epa.gov/cmop">www.epa.gov/cmop</a>
Voluntary Aluminum Industrial Partnership (VAIP)	Facilitates reductions of perfluorocarbon (PFC) emissions from aluminum production.	1995	3	6.5	<a href="http://www.epa.gov/highgwp/aluminum-pfc">www.epa.gov/highgwp/aluminum-pfc</a>
SF <sub>6</sub> Reduction Partnership for Electric Power Systems (EPS)	Shares information with electric power companies regarding best practices and cost-effective operational improvements to actively address climate change.	1999	87	5.5	<a href="http://www.epa.gov/highgwp/electricpower-sf6">www.epa.gov/highgwp/electricpower-sf6</a>
Responsible Appliance Disposal Program (RAD)	Partners with utilities, retailers, and manufacturers to help protect the ozone layer and reduce emissions of greenhouse gases through environmentally-conscious recycling practices. <sup>2</sup>	2006	54	0.2	<a href="http://www.epa.gov/rad">www.epa.gov/rad</a>
GreenChill Partnership	Collaborates with the supermarket industry to transition to environmentally friendlier refrigerants and adopt green refrigeration technologies and best practices. <sup>2</sup>	2007	23	7.4	<a href="http://www.epa.gov/greenchill">www.epa.gov/greenchill</a>
State and Local Climate and Energy Program	Helps state and local governments develop policies and programs that can reduce greenhouse gas emissions, lower energy costs, improve air quality and public health, and help achieve economic development goals.	1990	—	—	<a href="http://www.epa.gov/statelocalclimate">www.epa.gov/statelocalclimate</a>
Center for Corporate Climate Leadership	Serves as a resource center for all organizations looking to expand their work in the area of GHG measurement and management.	2012	—	—	<a href="http://www.epa.gov/climateleadership">www.epa.gov/climateleadership</a>

<sup>1</sup> Includes partners and endorsers.<sup>2</sup> The GHGs addressed by RAD and GreenChill include HFCs. The numbers reflected do not incorporate climate benefits from ozone-depleting substances, which would result in an increase of 2.1 MMTCO<sub>2</sub>e for the RAD Program and 1.7 MMTCO<sub>2</sub>e for the GreenChill Partnership.



Advancements in energy-efficient products, practices, and services help individuals and organizations protect the climate and public health while strengthening the economy. The U.S. Environmental Protection Agency (EPA) supports innovative environmental solutions through public-private partnerships such as ENERGY STAR. Since 1992, the ENERGY STAR program has reduced GHG emissions with real-world, cost-effective approaches. Together with its partners, ENERGY STAR continues to drive energy waste reductions and advance markets for widespread energy efficiency throughout the residential, commercial, and industrial sectors.

ENERGY STAR is a key part of EPA's ongoing efforts to develop national programs, policies, and regulations for reducing air pollution. ENERGY STAR is the simple choice for energy efficiency. Behind each blue label is a product, building, or home that is independently certified to use less energy and cause fewer of the emissions that contribute to climate change. Today, with awareness at more than 85 percent, ENERGY STAR is a widely recognized symbol for energy efficiency, helping families and businesses save \$362 billion on utility bills, while reducing greenhouse gas emissions by more than 2.4 billion metric tons since 1992.

In 2014, millions of consumers and 16,000 partners tapped the value of ENERGY STAR and achieved impressive financial and environmental results. Their investments in energy-efficient technologies and practices reduced utility bills by more than \$31 billion and will continue to provide cost savings for years to come. Americans, with the help of ENERGY STAR, prevented more than 283 million metric tons of GHG emissions (see Fig. 1) in 2014 alone—providing over \$11 billion in benefits to society due to reducing damages from climate change.

## ENERGY STAR Certified Products

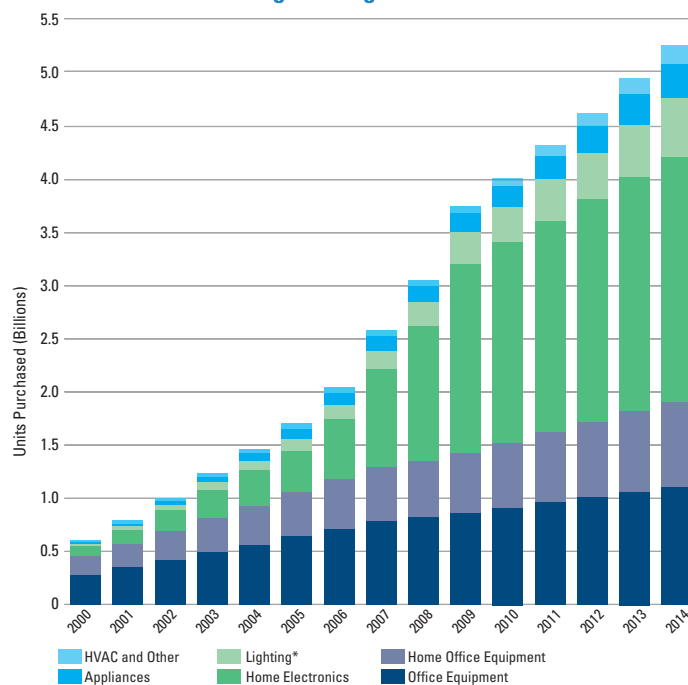
As the simple choice for energy efficiency, ENERGY STAR makes it easy for consumers and businesses to purchase products that save them money and protect the environment. EPA remains focused on maintaining program integrity, while expanding ENERGY STAR's role as a trusted resource in the fight against climate change. In 2014, Americans purchased more than 320 million products that earned the ENERGY STAR label across more than 70 product categories (see Table 3, pg. 8) for a cumulative total of more than 5.2 billion ENERGY STAR certified products purchased since the program began (see Figure 3). Certified products—including appliances, heating and cooling equipment, consumer electronics, office equipment, lighting, commercial food service, data center equipment, and more—offer consumers savings of as much as 70 percent relative to standard models, while providing the features and functionality they expect.

### Achievements in 2014

#### Keeping ENERGY STAR Requirements Up To Date

EPA updated performance requirements for clothes washers, set-top boxes, windows/doors/skylights, residential water heaters, central air conditioners, air source heat pumps, ventilating fans, and televisions. The ENERGY STAR specification for battery charging systems was sunset. Clothes dryers were added to the program (see Tables 4 and 5).

**FIGURE 3. More Than 5.2 Billion ENERGY STAR Certified Products Purchased Since the Program Began**



**TABLE 3. ENERGY STAR Key Program Indicators, 2000 and 2014**

KEY INDICATORS	YEAR OF RESULTS	
	2000	2014
Annual Emissions Reductions (MMTCO <sub>2</sub> e)	54	> 283
Cumulative Emissions Reductions (MMTCO <sub>2</sub> e)	> 160 million	> 2.4 billion
Annual Net Energy Bill Savings <sup>1</sup>	\$10 billion	> \$31 billion
Cumulative Utility Bill Savings <sup>1</sup>	\$19 billion	\$362 billion
Annual Societal Benefits <sup>1</sup>	—	\$11 billion
Electricity Savings as % of Total U.S. Electricity Demand	>1%	~ 5%
Brand Awareness Among American Households	40%	> 85%
Cumulative Individuals Taking the ENERGY STAR Pledge	—	> 3.2 million
<b>ENERGY STAR CERTIFIED PRODUCTS</b>		
Cumulative Certified Products Sold <sup>2</sup>	600 million	> 5.2 billion <sup>3</sup>
Annual Certified Products Sold	171 million	> 320 million
Individual Certified Product Models	11,000	> 45,000
Product Categories Eligible for ENERGY STAR	33	> 70
Manufacturing Partners	1,600	> 1,600
Retail Partners	550	> 2,600
<b>ENERGY STAR RESIDENTIAL</b>		
Home Builder Partners	1,600	> 2,300
Cumulative Number of Certified New Homes Built	25,000	1.6 million
Annual Certified New Homes Built	> 13,000	> 87,000
Annual Certified Homes Built as Percent of New U.S. Home Starts	< 1%	12%
Cumulative Number of Certified Manufactured Homes	—	> 63,000
Cumulative Completion of Certified New Multifamily High-Rise Apartments <sup>4</sup>	2	> 8,600
Cumulative Number of Homes Improved Through Home Performance with ENERGY STAR <sup>5</sup>	—	> 400,000
<b>ENERGY STAR COMMERCIAL</b>		
Cumulative Number of Certified Buildings	4,200	> 25,000
Annual Certified Buildings (includes re-labels)	—	6,800
Building Types Eligible for the ENERGY STAR	2	18
Cumulative Number of Buildings Benchmarked in Portfolio Manager	> 4,000	> 400,000
Cumulative Square Footage Benchmarked	> 400 million	> 35 billion
Number of Buildings in Battle of the Buildings	—	> 5,500
Cumulative Number of Buildings Designed to Earn the ENERGY STAR	—	643
<b>ENERGY STAR INDUSTRIAL</b>		
Cumulative Number of Facilities Certified <sup>6</sup>	—	139
Industrial Sectors & Subsectors <sup>6</sup>	—	30
Facility Types Eligible for the ENERGY STAR <sup>6</sup>	—	12
Number of Industrial Challenge Sites Achieving 10% Reduction in Energy Intensity in 5 years or Less <sup>6</sup>	—	306

<sup>1</sup> Financial benefits are presented in 2014 dollars and present value terms.

<sup>2</sup> The cumulative total of product sales across the entire ENERGY STAR program from 1992 through 2014, including those from the efforts of the U.S. Department of Energy. The results for energy saved and the resulting environmental and economic benefits represent EPA efforts alone.

<sup>3</sup> Light bulbs are not included in the number of ENERGY STAR certified products sold.

<sup>4</sup> Apartments in new multifamily high-rise buildings first became eligible to earn the ENERGY STAR in 2011, therefore there is no data for the year 2000.

<sup>5</sup> Home Performance with ENERGY STAR launched in 2001, therefore there is no data for the year 2000.

<sup>6</sup> The following industrial program initiatives began in years post 2000, therefore no data are presented—industrial facility certification 2006; industrial sector focuses 2001; Industrial Challenge 2010.

**TABLE 4. EPA Maintains Efficiency Standards with Product Specifications and Revisions**

PRODUCT TYPE	NUMBER OF PRODUCT TYPES	NUMBER OF SPECIFICATIONS COVERING THESE PRODUCTS	NUMBER OF SPECIFICATION CHANGES EFFECTIVE OVER LAST 3 YEARS (REVISED AND NEW)	NUMBER OF SPECIFICATIONS COMPLETED IN 2014
Consumer Electronics	21	6	5	3
Office Equipment	14	8	7	0
HVAC	9	7	2	2
Commercial Food Service Equipment	9	8	4	0
Lighting	4	3	2	0
Building Envelope	5	3	0	1
Appliances	9	8	7	3
Other	3	3	3	0

## Inspiring Consumer Action

Through public outreach, EPA encourages Americans to make energy-efficient changes at home, at work, and in their communities. The ENERGY STAR program's approach highlights both the financial and environmental benefits of energy efficiency and provides a platform for others to help drive behavior change. The following initiatives reached millions of people through print, broadcast, and social media channels; events nationwide; and grassroots-to-national partnerships:

- Retailers, manufacturers, and efficiency program sponsors worked together to exceed EPA's challenge to sell 20 million ENERGY STAR certified LED bulbs.
- The national *Change the World, Start with ENERGY STAR* campaign—supported by hundreds of participating organizations (pledge drivers)—continued to ask people to take simple energy-saving steps at home that can make a big difference in protecting the climate. Through 2014, more than 3.2 million individuals took the ENERGY STAR Pledge to make energy-efficient changes at home, representing more than 15 billion pounds of GHG emissions reductions. Increased use of social (Facebook and Twitter) and online media, along with traditional media, spread the ENERGY STAR message and garnered more than 144 million impressions.
- The 2014 ENERGY STAR Change the World Tour brought public and private organizations together for a series of community-based service projects to make a difference in people's lives and the environment through energy efficiency. With the help of ENERGY STAR, these projects lowered utility bills, upgraded low-income housing and community buildings, and educated communities about the importance of energy efficiency, demonstrating how energy efficiency can be a pathway to positive change.

- Continuing into 2014, Team ENERGY STAR featured themes from the Sony Pictures film, *The Amazing Spider-Man 2*. Thousands of kids from Boys & Girls Clubs of America, representing the Torch Clubs, participated in projects to save energy at their clubs and throughout the community as part of their quest to "Be Your Own Amazing with ENERGY STAR."

Today, more than 85 percent of American households recognize the ENERGY STAR label, and about 45 percent knowingly purchased an ENERGY STAR certified product in the past year (see Figure 4, pg. 10).<sup>4</sup> Of those purchasers, about 77 percent reported the label as influential in their purchasing decision; about 75 percent also reported they are likely to recommend products that have earned the ENERGY STAR to friends.

## ENERGY STAR Emerging Technology Award

The ENERGY STAR Emerging Technology Award raises the profile of innovative technologies that have the potential to significantly reduce greenhouse gas emissions once they are more widely adopted. Emerging tech is focused on products that are not yet firmly in the U.S. market and, as such, are premature for federal standards. In 2014, the Award continued to recognize advanced, heat pump clothes dryers, as the ground work was laid for introducing a new recognition category—demand control kitchen ventilation—in 2015.

<sup>4</sup>For more information, see *National Awareness of ENERGY STAR for 2014: Analysis of CEE Household Survey*.

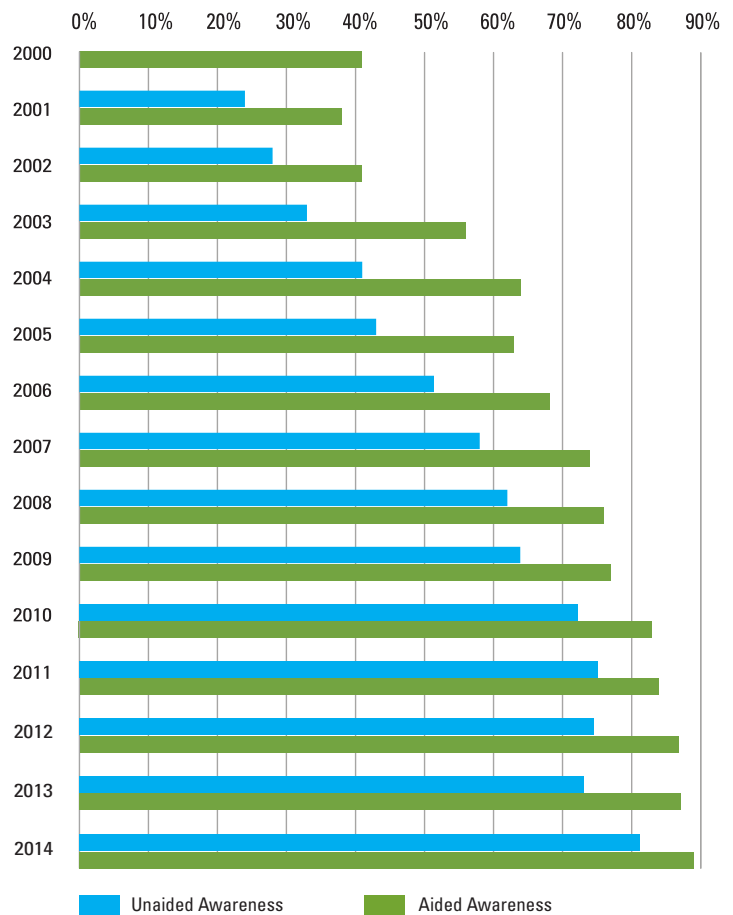
## Maintaining a Valuable Consumer Experience

The ENERGY STAR label is backed by a robust, state-of-the-art system for third-party certification. This system includes a worldwide network of nearly 600 laboratories testing products, complemented by 24 independent, accredited certification organizations reviewing results. All products that earn the ENERGY STAR are subject to strict testing and certification requirements before they can carry the label. By the end of 2014, there were more than 50,000 certified product models. Each year, a subset of products is also subject to verification testing administered by EPA-recognized certification bodies. In 2014, EPA disqualified 57 models based on the results of this post-market testing. The program's emphasis on testing and third-party product review ensures that consumers can trust ENERGY STAR certified products to deliver the energy savings promised by the label.

## ENERGY STAR Most Efficient 2014

ENERGY STAR Most Efficient is a distinction that recognizes products that deliver cutting edge energy efficiency along with the latest in technological innovation. It is recognition that represents the best of ENERGY STAR each year. By the end of 2014, more than 1,800 models from 164 manufacturers were recognized as ENERGY STAR Most Efficient. Categories included televisions, computer monitors, clothes washers, refrigerators, dishwashers, heating and cooling equipment, ventilation and ceiling fans, and windows.

**FIGURE 4. Awareness of ENERGY STAR Growing in the United States**



*Note: When a consumer recognizes the ENERGY STAR label before it is shown, it is defined as "unaided awareness." When a consumer recognizes the ENERGY STAR label after being shown the label, it is defined as "aided awareness."*

*Source: National Awareness of ENERGY STAR for 2014: Analysis of CEE Household Survey. U.S. EPA 2015b.*

**TABLE 5. ENERGY STAR Product Specifications Added, Revised, and In Process**

PRODUCT CATEGORY	YEAR INTRODUCED (AND REVISED)	STATUS OF ACTIVITY IN 2014
<b>2014 NEW SPECIFICATIONS</b>		
Clothes Dryers	2014	Completed. Effective January 1, 2015
<b>2014 REVISIONS COMPLETED</b>		
Clothes Washers	1997 (2007, 2009, 2011, 2013, 2015)	Revised specification to take effect March 7, 2015
Set-top Boxes	2001 (2005, 2009, 2011, 2014)	Revised specification took effect December 19, 2014
Battery Chargers	2006 (2014)	Specification sunset effective December 30, 2014 <sup>1</sup>
Window/Doors/Skylights	1998 (2010, 2015)	Revised specification to take effect January 1, 2015
Water Heaters	2009 (2010, 2013, 2015)	Revised specification to take effect April 16, 2015
Central Air Conditioners/Heat Pumps	1995 (2002, 2006, 2009, 2015)	Revised specification to take effect September 15, 2015
Ventilation Fans	2001 (2003, 2009, 2011, 2015)	Revised specification to take effect October 1, 2015
Televisions	1998 (2002, 2005, 2008, 2010, 2011, 2013, 2015)	Revised specification to take effect October 30, 2015
<b>2014 REVISIONS IN PROCESS</b>		
Dishwashers	1996 (2007, 2009, 2012)	In process in 2014, completed in 2015
Room Air Conditioners	1996 (2001, 2003, 2005, 2013)	In process in 2014, completed in 2015
Displays	1992 (1995, 1998, 1999, 2005, 2006, 2009, 2010, 2013)	In process in 2014, completed in 2015
Luminaires	1997 (2001, 2002, 2003, 2005, 2008, 2009, 2012)	In process in 2014, completed in 2015
Commercial Ovens	2009 (2014)	In process in 2014, completed in 2015
<b>NEW SPECIFICATIONS IN DEVELOPMENT</b>		
Lab Grade Refrigerators/Freezers		New specification to be completed in 2016
Large Network Equipment		New specification to be completed in 2015
Climate Controls		New specification to be completed in 2016

<sup>1</sup> EPA determined, with stakeholder input, that there was not sufficient product differentiation beyond minimum efficiency standards to warrant a strengthening of the ENERGY STAR specification and so these specifications were suspended.

## ENERGY STAR in the Residential Sector

More than 16 percent of the GHGs emitted in the United States are attributed to the energy we use to heat, cool, and light our homes, as well as power the appliances and electronics in them.<sup>5</sup> By making energy-efficient choices in the construction of new homes and the improvement of existing homes, American homeowners, renters, homebuilders, and home remodelers can lower utility bills while helping to protect the environment. Through ENERGY STAR, EPA offers an array of tools and resources to households and the housing industry to cost-effectively increase the energy efficiency of the nation's housing stock.

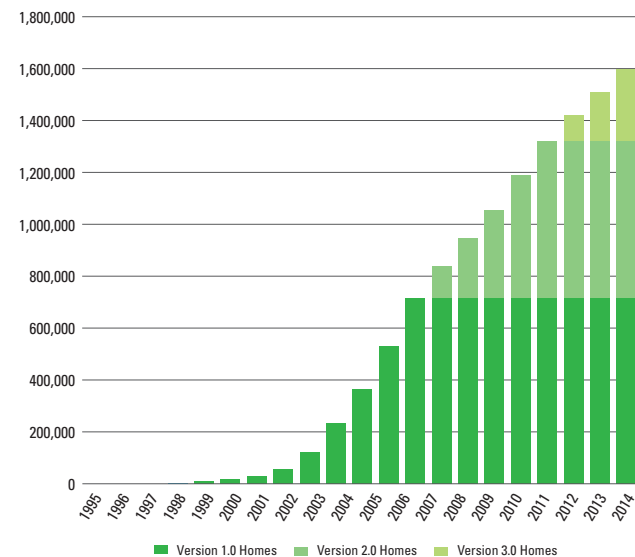
### Achievements in 2014

#### ENERGY STAR Certified Homes

##### ENERGY STAR Certified Homes Help Reduce GHG Emissions.

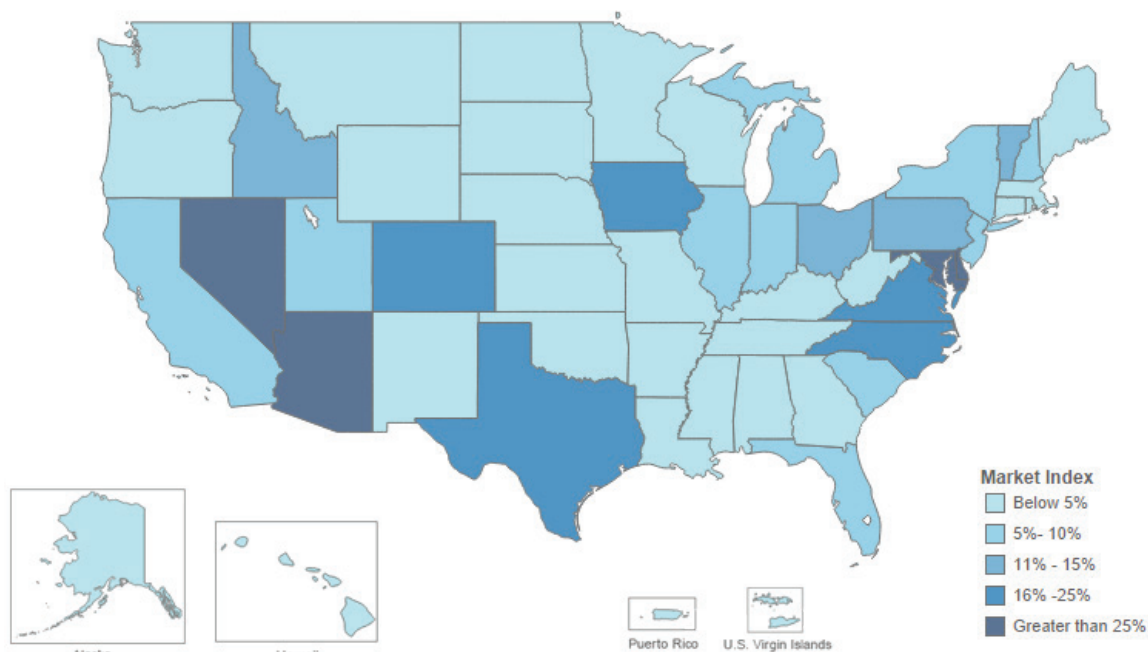
More than 87,000 new homes earned the ENERGY STAR in 2014, bringing the total number of certified homes to 1.6 million (see Figure 5). In addition, with support from partners, 12 percent of all site-built, single-family homes completed in the U.S. in 2014 earned the ENERGY STAR (see Figure 6). Since EPA began labeling new homes in 1995, American homeowners have saved over \$4.7 billion on their energy bills and reduced GHG emissions by more than 24 million metric tons. In 2014 alone, families living in ENERGY STAR certified homes saved in excess of \$590 million on their utility bills and prevented 3.2 million metric tons of GHG emissions. Homes certified under these requirements are at least 15 percent more efficient than those built to code and include additional energy-saving features to deliver a performance advantage of up to 30 percent compared to typical new homes.

**FIGURE 5. 1.6 Million Homes Nationwide Have Earned the ENERGY STAR Label\***



\*Both homes and apartments in low-rise multifamily buildings are included in Figure 5 numbers: one home equals either one single-family home or one apartment unit. Version 1.0 requirements were implemented from 1995-2006. In 2007, these were replaced with Version 2.0 requirements. The current Version 3.0 requirements were implemented starting in 2012.

**FIGURE 6. 12 Percent of New Homes Nationwide Earned the ENERGY STAR Label in 2014\***



\*Based on the number of single-family, site-built ENERGY STAR certified homes compared to U.S. Census one unit housing permit data adjusted for starts and completions.

<sup>5</sup> For more information, see Appendix D: References (p. 46), U.S. EPA 2015a.

### ENERGY STAR Certified Apartments in New Multifamily

**High-Rise Buildings.** Since apartments in new multifamily high-rise buildings first became eligible to earn the ENERGY STAR label in 2011, over 8,600 apartments have been certified in 94 buildings. These projects must meet EPA's energy efficiency requirements and are designed to be at least 15 percent more efficient than the building energy code. In 2014, more than 2,000 multifamily high-rise apartments in 23 buildings were certified. When combined with apartments in new multifamily low-rise buildings, more than 122,000 apartments have been certified to date.

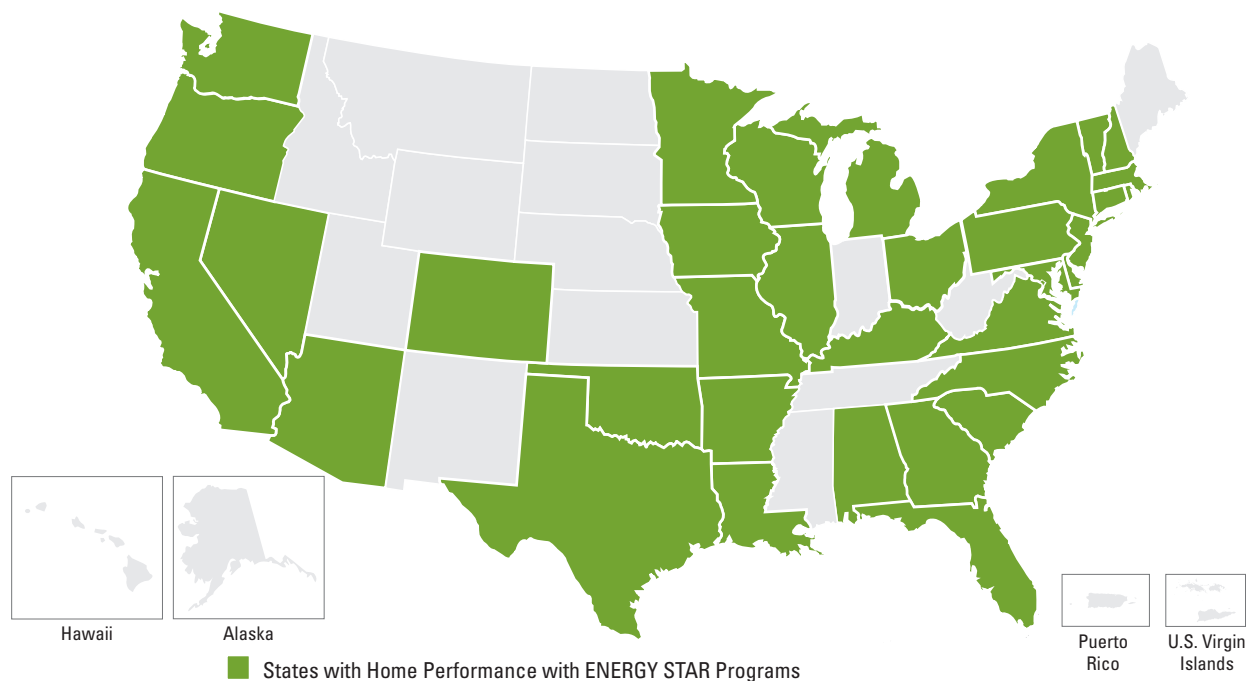
**Making Affordable Housing More Energy-Efficient.** EPA continued working with a variety of stakeholders to improve the energy efficiency of the nation's affordable housing stock, while reducing the utility bills of families living in those homes. In fiscal year 2014,<sup>6</sup> approximately 4,800 ENERGY STAR certified homes were built within the affordable housing sector using funding from the U.S. Department of Housing and Urban Development's HOME Investment Partnerships Program. Also, nearly 6,000 manufactured homes earned the ENERGY STAR label in 2014, for a cumulative total of over 63,000. In addition, more than 13,000 ENERGY STAR certified homes have been built by Habitat for Humanity, including nearly 1,100 homes built in 2014 by 132 Habitat for Humanity affiliates nationwide.

### ENERGY STAR Home Improvement

**Home Performance with ENERGY STAR.** In 2014, 93,000 homes were improved through Home Performance with ENERGY STAR (HPwES), a systematic approach to improving energy efficiency. This work was performed by 48 locally sponsored programs and more than 1,800 participating contractors across the nation (see Figure 7). Since the program's inception, more than 400,000 homes have been improved through HPwES. The HPwES program is administered by the U.S. Department of Energy, with support from EPA.

**Energy Efficiency Guidance and Tools for Homeowners.** In 2014, Americans visited the ENERGY STAR website nearly 2 million times to find information about home efficiency improvements. They also used EPA's Home Energy Yardstick and Home Energy Advisor tools to assess their homes' energy use and get recommendations to help reduce utility bills and improve comfort.<sup>7</sup> EPA improved the functionality of the ENERGY STAR Home Energy Advisor in 2014 to provide homeowners customized, prioritized recommendations for energy improvements and to allow them to track their progress.

**FIGURE 7. Home Performance With ENERGY STAR Spreads Across the Country in 2014**



<sup>6</sup> Given in fiscal year (FY), not calendar year, due to data availability; fiscal year is from October 1 to September 30.

<sup>7</sup> For more information, see [www.energystar.gov/yardstick](http://www.energystar.gov/yardstick) and [www.energystar.gov/homeadvisor](http://www.energystar.gov/homeadvisor).

## ENERGY STAR in the Commercial Sector

More than 7,400 organizations have partnered with EPA to deliver GHG emissions reductions, advance their sustainability goals, and increase financial value through the ENERGY STAR commercial buildings program. These ENERGY STAR partners demonstrate practical and proven solutions to increase the efficiency of buildings and serve as examples for others to follow.

### Achievements in 2014

**ENERGY STAR Certification for Top Performance.** To celebrate 15 years of ENERGY STAR certification for buildings, EPA launched special recognition for multiple-building certifications. More than 300 organizations achieved membership in Certification Nation, with 11 organizations certifying more than 150 buildings each. In total, more than 25,000 buildings (see Figure 9) and 130 industrial plants had earned ENERGY STAR certification by the end of 2014. More than 120 new design projects designated as Designed to Earn the ENERGY STAR were also certified as ENERGY STAR through 2014.

**Benchmarking: Now Standard Practice in Commercial Buildings.** By the end of 2014, more than 400,000 properties were benchmarked using ENERGY STAR® Portfolio Manager® as a standard way to measure, track, assess, and report on the energy and water consumption across more than 40 percent of the nation's commercial building space (see Figure 8). With an increasing number of cities leveraging EPA's Portfolio Manager tool to implement their own climate and sustainability policies, benchmarking energy use has become a standard practice for many organizations across the nation.

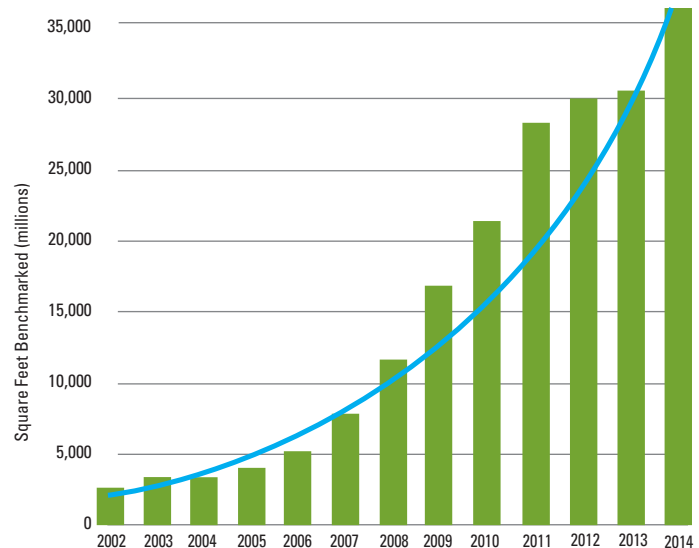
#### 1-100 ENERGY STAR Score Launched for Multifamily Properties.

EPA debuted a new 1-100 ENERGY STAR score for multifamily properties, made possible through a multi-year partnership with Fannie Mae. The unprecedented launch enables existing apartment and condominium properties, which house 30 percent of the U.S. population, to measure energy performance. ENERGY STAR certification became available in the fall of 2014, and more than 20 properties had earned this designation by the year's end.

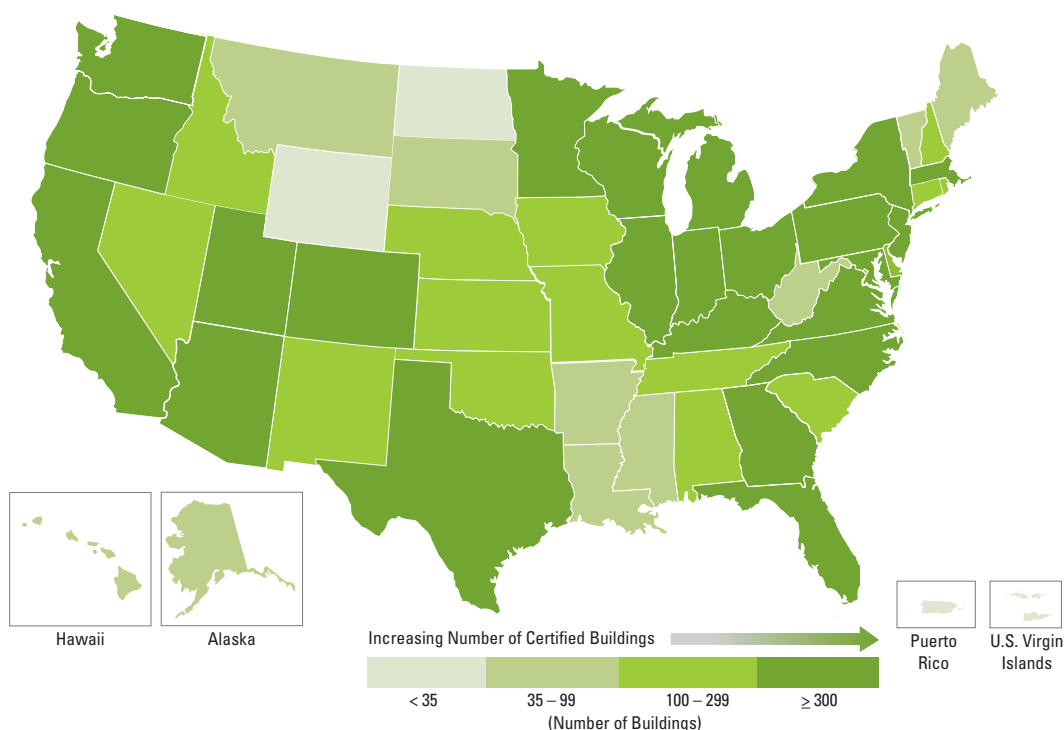
#### Battle of the Buildings Competitors Team Up to Power Down.

The 2014 competition hosted a field of more than 100 teams, who worked to cut energy waste across their participating buildings. Teams ranged in size from five to more than 2,000 buildings. The town of Woodville, Alabama (population 741) led the team competition, with 25 percent energy savings across five buildings. The town's chapel reduced energy use almost 70 percent in one year. Other top team finishers included Walgreens and Sears, each reducing energy use by more than 17 percent.

**FIGURE 8. Cumulative Square Feet Benchmarked in Portfolio Manager**



*\*Only buildings that can receive a 1-100 energy performance score are included in the data from 2001 to 2008. Beginning in 2009, buildings for which there is not yet a 1-100 score available were included in the count of total buildings benchmarked.*

**FIGURE 9. More than 25,000 Buildings Earned the ENERGY STAR Through 2014**

## ENERGY STAR in the Industrial Sector

The industrial sector is a vital part of the U.S. economy. Sales of manufacturing goods are valued at just over \$5.8 trillion, make up about 12 percent of the U.S. Gross Domestic Product (GDP), and provide more than 11.08 million jobs paying an average of \$54,400 annually.<sup>8</sup> This sector also generates more than a quarter of the nation's annual GHG emissions.<sup>9</sup> Through ENERGY STAR, EPA provides the industrial sector with tools and strategies for improving energy efficiency within its operations and for cost-effectively reducing GHG emissions by removing energy management barriers.

### Achievements in 2014

#### Improving Performance—The ENERGY STAR Focus Industries

EPA works jointly with specific industries to provide advanced tools that help companies learn to manage energy use and build long-term, productive energy programs (see Table 6, pg. 17). In 2014, the number of ENERGY STAR Focus Industries grew to 30 with the addition of automobile engine plants and automobile transmission plants.

**New Measures of Plant Energy Performance.** Objective measurement of plant energy performance is key to improving industrial energy management. Most companies are unable to assess a plant's energy performance relative to the industry and do not know if a plant is meeting its efficiency potential. ENERGY STAR plant energy performance indicators (EPIs) overcome that barrier by empowering

companies to evaluate good energy performance within the industry and set strong performance goals for their plants. In 2014, EPA worked with industry stakeholders to continue testing and revision of the draft EPIs for integrated steel mills, investment steel casting, carbon alloy steel casting, aluminum casting, commercial bakeries and dairies.

**New Guidance for Improving Energy Efficiency in Industrial Sectors.** ENERGY STAR energy guides identify ways to improve energy efficiency in a specific industry. In 2014, the draft guide for the metal casting industry was submitted to industry for review. The growing library of energy guides continued to help industrial managers identify areas for energy efficiency improvements.

<sup>8</sup> For more information, see Appendix D: References (p. 46), U.S. Census Bureau, 2015.

<sup>9</sup> For more information, see Appendix D: References (p. 46), U.S. EPA, 2015a.

## Building Capacity to Enable Greater Industry Participation

Through the ENERGY STAR partnership, service and product providers, utility companies, energy efficiency program administrators, and federal, state, and local governments continue to use ENERGY STAR tools to connect customers and stakeholders with the value of pursuing energy reductions. Six service and product providers joined with ENERGY STAR industrial partners to share their collective experiences through public profiles in saving energy in partner manufacturing plants.

**Industrial Plants Challenged to Improve.** EPA's ENERGY STAR Challenge for Industry helps manufacturers improve the energy efficiency of their sites by 10 percent within five years or less through the fundamental energy management practices of establishing baselines, setting reduction goals, and tracking and managing energy use over time. By the end of 2014, the number of industrial sites committed to the ENERGY STAR Challenge for Industry grew, while 306 sites met or exceeded their targets by achieving an average 20-percent reduction in energy intensity.

**Supporting National Collaboration.** EPA continued to support the implementation of the President's Executive Order 13624, "Accelerating Investment in Industrial Energy Efficiency," to extend ENERGY STAR

resources to new portions of the industrial market.<sup>10</sup> Further, EPA prepared new informational resources, "Industry Insights," to assist states and other entities in understanding the energy profiles of the auto assembly and cement industries. In addition, based on work with industry through the ENERGY STAR Partner of the Year award, EPA produced "Emerging Themes in Energy Management" to share new trends in energy management seen among leading awardees.

**Industrial Efficiency Gets Boost from Treasure Hunts.** EPA released a new tool, the ENERGY STAR Treasure Hunt Guide, as an important way to engage employees in identifying low-cost energy-saving opportunities from behavioral, operational, and maintenance actions. This popular guidebook is increasingly adopted by organizations as step-by-step guidance on how to organize and execute an energy treasure hunt to find significant energy savings in their facilities.

## Continuing to Earn ENERGY STAR Certification

In 2014, 70 plants earned the ENERGY STAR certification by achieving energy performance in the top quartile nationally, bringing the cumulative number of certified plants to 139. The cement, cookie and cracker baking, and auto assembly sectors earned the greatest number of certifications among the industrial sectors. ENERGY STAR certification is valued by industry as it differentiates high performing plants.

TABLE 6. EPA ENERGY STAR Industrial Focuses on Energy

FOCUS	PEER EXCHANGE NETWORK	INDUSTRIAL ENERGY GUIDE	ENERGY PERFORMANCE INDICATOR	ENERGY STAR CERTIFICATION
<b>Cement Manufacturing</b>	●	Published	Released 2006, Updated 2011	★
<b>Concrete Manufacturing</b>	●	Published	Draft under review	
<b>Corn Refining</b>	●	Published	Released 2006, Updated 2012	★
<b>Dairy</b>				
• Ice Cream	●	Published	Draft under review	
• Fluid Milk			Draft under review	
• Cheese making			Draft under review	
<b>Food Processing</b>				
• Bread and Rolls	●	Published	Draft under review	★
• Cookies & Crackers			Released 2011	★
• Juice			Released 2009	★
• Frozen Fried Potato Products			Released 2009	★
• Tomato Products			Draft under review	
<b>Glass Manufacturing</b>				
• Fiberglass	●	Published	Draft under review	
• Flat glass			Released 2009	★
• Container glass			Released 2009	★
<b>Metal Casting</b>				
• Aluminum Casting	●	Draft	Draft under review	
• Iron			Draft under review	
• Investment Steel Casting			Draft under review	
• Carbon/Alloy Casting			Draft under review	
<b>Motor Vehicle Manufacturing</b>				
• Auto Assembly	●	Published	Released 2006	★
• Engine Plants			Updated 2010	
• Transmission Plants			In progress	
			In progress	
<b>Petrochemical Manufacturing</b>	●	Published	Draft under review	
<b>Petroleum Industry</b>	●	Published	Private System recognized by EPA	★
<b>Pharmaceuticals</b>	●	Published	Released 2008	★
<b>Printing</b>	●	Draft	Draft under review	
<b>Pulp &amp; Paper</b>				
• Pulp Mill	●	Published	Released 2010	★
• Integrated Mill			Released 2012	★
<b>Steel</b>				
• Mini Mills	●	Published	Draft under review	
• Integrated			Draft under review	

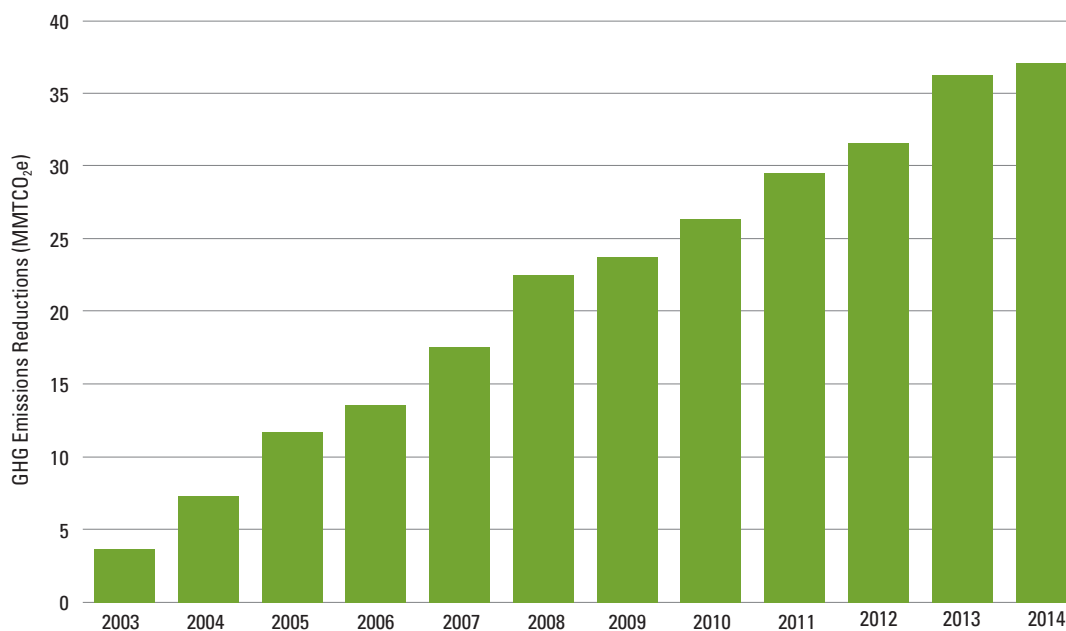
# CARBON DIOXIDE REDUCING ENERGY SUPPLY PROGRAMS

EPA launched the Green Power Partnership (GPP) and Combined Heat and Power Partnership (CHPP) in 2001 to facilitate the growth of green power generation and environmentally beneficial CHP across the nation.

For the past 13 years, both programs have made remarkable progress in dismantling market barriers to green power purchasing and CHP use by helping hundreds of partners find cost-effective solutions to meet their energy needs. By offering technical resources, developing nationally accepted standards, providing access to expertise, and recognizing environmental leadership, these clean energy supply programs continually bring value to partners and to the broader clean energy community through program websites and public webinars.

In turn, partner investments in clean energy yield significant environmental benefits by reducing GHG emissions and a variety of air pollutants. CHPP and GPP partners are transforming the marketplace by increasing the local, regional, and national demand for clean energy supply technologies. The programs' achievements have been impressive. In 2014 alone, EPA's energy supply programs reduced GHG emissions by 37.1 MMTCO<sub>2</sub>e (see Figure 10).

**FIGURE 10. Annual GHG Emissions Reductions by the Carbon Dioxide Reducing Energy Supply Programs**



## GREEN POWER PARTNERSHIP (GPP)

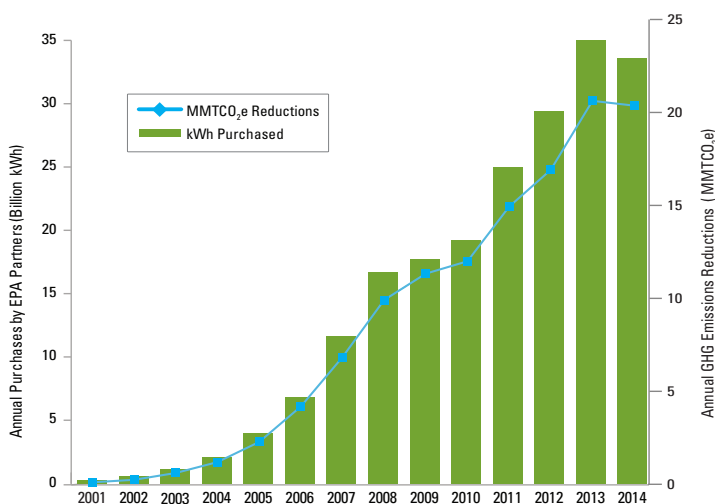


EPA's Green Power Partnership is a voluntary program that encourages organizations to buy green power to reduce the environmental impacts associated with purchased electricity use and, in so doing, demonstrate their environmental leadership.<sup>11</sup> EPA's Green Power partners include a wide variety of forward-thinking organizations, such as Fortune 500® companies; small and medium-sized businesses; local, state, and federal government agencies; and colleges and universities. The voluntary commitments of these partners to promote green power made 2014 another exceptional year for EPA's Green Power Partnership.

### Achievements in 2014

- Added 206 new partners, bringing the total to more than 1,290. These organizations have committed to buying about 33.6 billion kWh of green power annually—enough electricity to run more than three million average American homes for one year (see Figure 11).
- Organized seven webinars on important topics such as power purchase agreements, best practices in solar deployment, and how companies can influence their supply chain to adopt green power.
- Developed a solar procurement toolkit designed to provide specific strategic and tactical guidance for higher education institutions interested in pursuing options for solar power at their facilities.
- In support of President Obama's Climate Action Plan, the Green Power Partnership launched the On-site Renewables Challenge, with a goal to double the use of on-site green power by Green Power partners by the end of the decade. At the time of the launch in May 2014, partners had on-site green power use totaling more than 980 million kWh.
- Acknowledged 78 partners in EPA's College & University 2013–2014 Green Power Challenge. EPA ranked the green power purchases of individual schools against others within their athletic conferences and calculated cumulative purchases among competing conferences. The Big 10 Conference topped the list with the largest total purchase (nearly 310 million kWh of annual green power use) and earned recognition as the 2013–2014 Collective Conference Champion.
- Presented 19 Green Power Leadership Awards to top purchasers of green power and on-site renewable power systems, and four awards to green power suppliers (see Appendix A, pg. 41).

**FIGURE 11. Green Power Purchased and GHG Emissions Reductions**



### Green Power—Energizing Communities Across the Country

Innovative municipalities across the country are partnering with EPA to become Green Power Communities (GPCs). Towns, villages, cities, counties, and tribal governments become GPCs when local governments, businesses, and residents collectively use green power in amounts that meet or exceed EPA's GPP community usage requirements. In 2014, 56 communities mobilized to reduce their carbon footprints by buying and using green power totaling nearly six billion kWh. Their green power use is equivalent to the electricity used in more than 545,000 average American homes for a year.

<sup>11</sup> For additional information on GPP, see [www.epa.gov/greenpower/](http://www.epa.gov/greenpower/).

## COMBINED HEAT AND POWER PARTNERSHIP (CHPP)



EPA's CHP Partnership encourages the use of CHP, which is typically cleaner than separately produced electricity and thermal energy such as steam and hot water. By capturing and using the heat from electricity generation, a byproduct which is typically wasted, CHP projects are up to 80 percent more efficient than traditional separate heat and power generation. They also reduce reliance on grid-supplied electricity, increase the reliability of the U.S. electricity supply, and lessen the need to build new transmission and distribution capacity.<sup>12</sup>

To promote increased use of CHP, EPA works closely with energy users; the CHP industry; state, local, and tribal governments; and other stakeholders to develop new CHP projects and promote their environmental, economic, and other benefits. Since its inception, the CHP Partnership has made a significant impact on U.S. CHP capacity, annually assisting up to 60 percent of the new CHP capacity additions.

### Achievements in 2014

- Assisted in the deployment of more than 300 MW of new CHP nationwide (of out 847 MW of new nationwide capacity), bringing the cumulative impact of the program to over 6,868 MW of new CHP (see Table 7).
- Welcomed 50 new partners, bringing the total to more than 480.
- Responded to nearly 100 technical assistance requests from organizations across the country such as project developers and consultants, water and energy utilities, multi-family building developers, health institutions, technology companies, data centers, farms and hotels.
- Added two new key policy categories to the Partnership's online database (*dCHPP*) where users can search for CHP policies and incentives by state or at the federal level.<sup>13</sup>
- Developed a fact sheet on financing CHP projects at Wastewater Treatment Facilities using low interest loans from the Clean Water State Revolving Fund.
- Completed a fact sheet on the approaches states have taken to streamline air permitting for CHP systems, which includes observations on the process for developing these state programs, as well as the outcomes achieved.
- Updated the handbook titled, *Output-Based Regulations: Handbook for Air Regulators*, which was originally released in 2004. This handbook is designed to help air regulators develop output-based regulations, which recognize the pollution prevention benefits of efficient energy generation technologies, such as CHP and renewable energy technologies. It is also intended to help CHP project owners better understand and comply with output-based environmental regulations. The updated handbook includes a new section on how to comply with output-based regulations, updated information on current state and federal output-based regulations, and a description of the two primary approaches to developing output-based regulations for CHP.<sup>14</sup>
- Updated one of the program's most popular resources, the *Catalog of CHP Technologies*, with current cost and performance characteristics of the five prime mover technologies, technology developments that have gained wider commercial use in the past five years, and information on water usage of CHP systems compared to separate heat and power systems.<sup>15</sup>
- Released a CHP-focused climate and energy strategy guide for local governments as part of the Local Government Climate and Energy Strategy Series.
- Honored three highly efficient CHP systems with the ENERGY STAR CHP awards (see Appendix A, pg. 41): a 200 MW CHP system at the Eastman Chemical Company Tennessee Operations; a 3.8 MW system at Janssen Research & Development, LLC; and 38 MW system at the Merck West Point CoGen3 Facility.

**TABLE 7. U.S. CHP Capacity and Partnership Market Share**

YEAR	TOTAL NEW CHP CAPACITY (MW)	NEW CHP CAPACITY CREDITABLE TO THE PARTNERSHIP (MW)
2002	5,910	620 (10%)
2003	4,033	548 (14%)
2004	3,745	1,963 (52%)
2005	1,801	852 (47%)
2006	591	138 (23%)
2007	636	343 (54%)
2008	444	198 (45%)
2009	721	407 (56%)
2010	710	295 (42%)
2011	714	417 (58%)
2012	950	368 (39%)
2013	679	409 (60%)
2014	847	310 (37%)
<b>Total</b>	<b>21,781</b>	<b>6,868 (32%)</b>

<sup>12</sup> For additional information on CHPP, see [www.epa.gov/chp/basic/efficiency.html](http://www.epa.gov/chp/basic/efficiency.html).

<sup>13</sup> For additional information, see [www.epa.gov/chp/dchpp-chp-policies-and-incentives-database](http://www.epa.gov/chp/dchpp-chp-policies-and-incentives-database).

<sup>14</sup> For additional information, see [www.epa.gov/chp/output-based-regulations-handbook-air-regulators](http://www.epa.gov/chp/output-based-regulations-handbook-air-regulators).

<sup>15</sup> For additional information, see [www.epa.gov/chp/catalog-chp-technologies](http://www.epa.gov/chp/catalog-chp-technologies).

# METHANE EMISSIONS REDUCTION PROGRAMS

Methane programs offer excellent opportunities for reducing the concentration of GHGs in the atmosphere and providing a clean energy resource in the process. Methane is the second most significant GHG behind CO<sub>2</sub> by annual emissions and currently contributes one third of all anthropogenic (man-made) GHG emissions to climate change.<sup>16</sup> It also has a relatively short atmospheric lifetime of about 9 – 15 years, which means that reductions made today will yield positive results in the near term.<sup>17</sup> And unlike other GHGs, methane is an important energy resource that allows for cost-effective mitigation. There are many opportunities to recover and re-use or sell methane from the agriculture (manure management), coal mining, oil and gas systems, and landfill sectors.

EPA has established partnership programs with industry to reduce methane emissions from some of the largest sources by encouraging the recovery and use of methane as energy. EPA's programs—Natural Gas STAR, AgSTAR, the Coalbed Methane Outreach Program, and the Landfill Methane Outreach Program—strive to remove market barriers and increase investment in cost-effective emissions reduction technologies and practices. Together, these programs reduced U.S. emissions by 76.4 MMTCO<sub>2</sub>e in 2014 (see Table 2, pg. 6).

## NATURAL GAS STAR PROGRAM



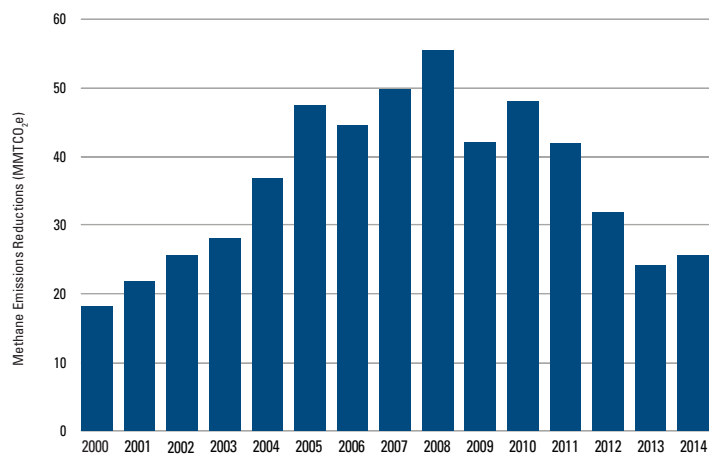
Natural Gas STAR is a flexible, collaborative partnership between EPA and oil and natural gas companies, designed to spur the adoption of cost-effective technologies and practices that reduce methane emissions. By working with both domestic and international companies involved in oil production and all sectors of the natural gas supply chain, Natural Gas STAR helps lower methane emissions, improve operational efficiency, increase natural gas supply, and contribute to a healthier global environment.

The program offers a full array of tools and resources—including technology transfer workshops, Lessons Learned studies, Partner Reported Opportunities fact sheets, technical reports and studies, and peer networking fora—to assist companies in implementing a wide range of cost-effective best management practices and technologies to reduce emissions.<sup>18</sup>

### Achievements in 2014

- Reduced U.S. methane emissions by 25.6 MMTCO<sub>2</sub>e through efforts undertaken and reported by domestic partners for 2014 (see Figure 12), achieving cumulative program reductions of 608.5 MMTCO<sub>2</sub>e.
- Hosted two well-attended technology transfer workshops and the Annual Implementation Workshop in San Antonio, TX.
- Welcomed three domestic companies and four international companies into the program.

FIGURE 12. Natural Gas STAR Annual Methane Emissions Reductions



<sup>16</sup> For more information, see Appendix D: References (p. 46), U.S. EPA 2015a.

<sup>17</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>18</sup> For additional information on Natural Gas STAR and 2013 accomplishments, see [www.epa.gov/gasstar/accomplishments/index.html](http://www.epa.gov/gasstar/accomplishments/index.html).



## AgSTAR PROGRAM

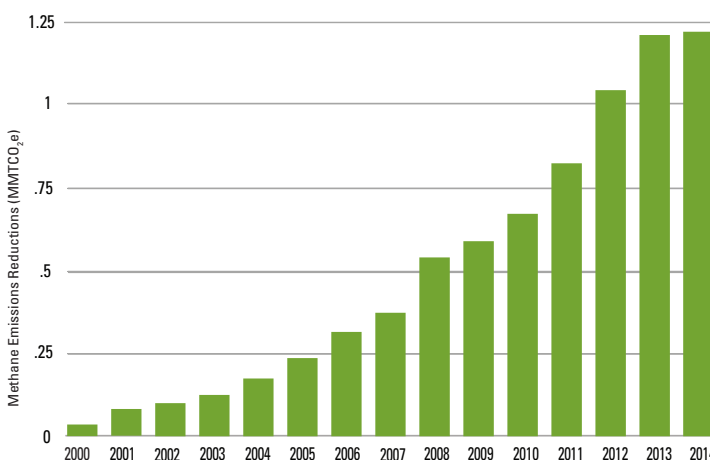
Biogas recovery systems help reduce GHG emissions by enabling the recovery and use of methane from animal manure and other organic wastes. A biogas recovery system is anchored by a manure digester that manages waste and captures biogas to produce electricity, fuel, heat, or hot water. In addition to avoiding methane emissions, digester systems also reduce local water and air pollution, act as a source of renewable energy, provide rural economic development, better manage nutrients, and generate value-added products (e.g., animal bedding, plant growing medium, fertilizer) that improve farm revenues.

Through the AgSTAR Program, EPA partners with the U.S. Department of Agriculture (USDA) and the nation's livestock industry to reduce methane emissions by promoting the use of biogas recovery systems to manage animal waste. EPA offers an array of tools and information designed to assist livestock producers in evaluating and implementing methane recovery systems.<sup>19</sup>

### Achievements in 2014

- Reduced direct methane emissions from approximately 250 livestock farms by 0.99 MMTCO<sub>2</sub>e and avoided approximately 0.24 MMTCO<sub>2</sub>e in fossil fuel emissions, producing total emission reductions of 1.2 MMTCO<sub>2</sub>e in 2014 (see Figure 13). Cumulatively, anaerobic digesters on livestock farms have reduced emissions by 7.0 MMTCO<sub>2</sub>e in the past decade.
- Doubled the number of Program Partners.
- Updated and re-vamped key programmatic tools, including the AgSTAR website, project mapping database, and project development guidance.
- Held National AgSTAR Workshop in conjunction with BioCycle REFOR 2014 Conference.
- Provided technical guidance to USDA relative to manure digester system funding opportunities.
- Collaborated with DOE and USDA, the Innovation Center for U.S. Dairy, and the American Biogas Council to release the *Biogas Opportunities Roadmap: Voluntary Actions to Reduce Methane Emissions and Increase Energy Independence*.

**FIGURE 13. AgSTAR Annual Methane Emissions Reductions**





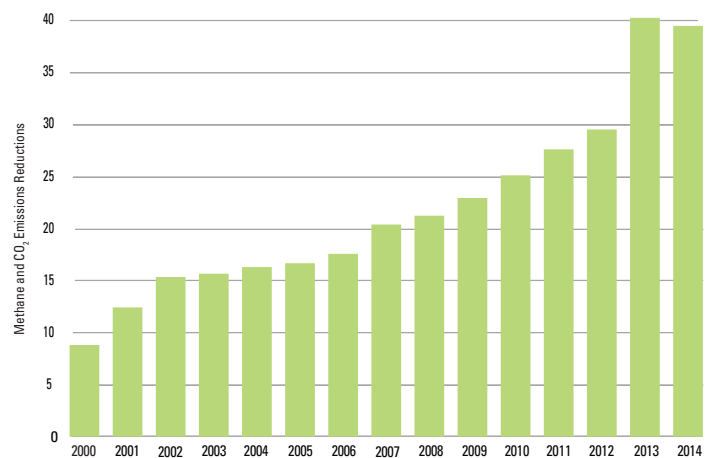
## LANDFILL METHANE OUTREACH PROGRAM (LMOP)

Landfill gas (LFG) energy projects prevent direct methane emissions from landfills and reduce indirect CO<sub>2</sub> emissions by displacing energy generated from the burning of fossil fuels with LFG, an alternative energy source. Through the Landfill Methane Outreach Program (LMOP), EPA provides landfill owners and operators a suite of tools and technical resources to help them overcome the obstacles to developing LFG energy projects. LMOP provides technical assistance to both smaller landfills not covered by EPA regulations and larger, regulated operations that are combusting their gas but not yet using it as a clean energy source.<sup>20</sup> Annually, EPA recognizes outstanding partners for their work on LFG energy projects. See the full list of 2014 winners in Appendix A, page 42.

### Achievements in 2014

- Reduced methane emissions from hundreds of U.S. landfills and avoided CO<sub>2</sub> emissions totaling approximately 39.5 MMTCO<sub>2</sub>e in 2014 (see Figure 14). Over the past 20 years, LMOP has assisted 632 LFG energy projects and the nationwide total reached 652 currently operational projects in 2014. The 632 LMOP-assisted projects have collectively reduced and avoided more than 345 MMTCO<sub>2</sub>e since the program began.
- Welcomed 30 new partners and endorsers, bringing the total to 1,100 LMOP partners and endorsers.
- Hosted the Annual LMOP Conference and Project Expo, attracting more than 600 people.
- Published two articles, hosted a webinar on using landfill gas as vehicle fuel, and participated in national, state, and regional conferences on LFG energy and LFG energy project development.
- Collaborated with the Mississippi Chapter of the Solid Waste Association of North America to present information on LFG energy project development at their 2014 Fall Conference.

**FIGURE 14. LMOP Annual Methane and CO<sub>2</sub> Emissions Reductions**



<sup>20</sup> For additional information on LMOP and 2014 accomplishments, see [www.epa.gov/lmop/](http://www.epa.gov/lmop/).

## U.S. LEADERSHIP IN INTERNATIONAL METHANE INITIATIVES

### GLOBAL METHANE INITIATIVE

The Global Methane Initiative (GMI) is a voluntary, multilateral partnership that aims to reduce methane emissions and advance the recovery and use of methane as a valuable clean energy source. GMI created an international capacity building network to help develop strategies, transform markets, and remove barriers to methane reduction project development in partner countries such as Brazil, Bulgaria, China, Chile, India, Indonesia, Kazakhstan, Mexico, Thailand, and Peru. EPA leads USG efforts supporting GMI and partners with other agencies including Department of State, DOE, and USDA.<sup>21</sup>



#### Achievements in 2014

- Since 2004, the U.S. has provided technical, financial, and capacity-building support to approximately 1000 global methane projects that have reduced methane emissions cumulatively by over 234 MMTCO<sub>2</sub>e.
- U.S. investment of approximately \$84 million in this Initiative since 2004 has leveraged nearly \$550 million in contributions of in-kind services from other partners or Project Network members.
- During 2014, the U.S. supported project development-related activities (e.g., assessment, capacity building, partnership, information sharing) across 20 Partner Countries in four regions: Asia, Europe, and North and South America—including a Tri-Sector workshop in Brazil that attracted more than 340 participants. These, and past efforts, contributed to methane emission reductions of more than 33 MMTCO<sub>2</sub>e in 2014 alone.

### CLIMATE AND CLEAN AIR COALITION

The Climate and Clean Air Coalition (CCAC) to Reduce Short Lived Climate Pollutants (SLCPs) is an initiative the U.S. launched in February 2012, along with the governments of Bangladesh, Canada, Ghana, Mexico, and Sweden and the United Nations Environment Programme (UNEP). CCAC membership has grown rapidly and the partnership now includes over 100 state and non-state partners. The Coalition is the first effort to treat short-lived climate pollutants (black carbon, methane, and hydrofluorocarbons or HFCs) as a collective challenge. Addressing these short-lived climate pollutants can have

immediate, multiple benefits. Reducing them will protect human health and the environment now and slow the rate of climate change within the first half of this century. The Coalition's objectives are to address short-lived climate pollutants by:

1. Raising awareness of short-lived climate pollutant impacts and mitigation strategies;
2. Enhancing and developing new national and regional actions, including by identifying and overcoming barriers, enhancing capacity, and mobilizing support;
3. Promoting best practices and showcasing successful efforts; and
4. Improving scientific understanding of short-lived climate pollutant impacts and mitigation strategies.

In its first years, the CCAC has approved 11 rapid implementation initiatives targeted to accelerate action against climate-damaging emissions of short-lived climate pollutants. EPA provides leadership and critical technical support for several of these initiatives, allowing EPA to expand the impact of its work internationally.

- Reducing Black Carbon Emissions from Heavy Duty Diesel Vehicles and Engines
- Mitigating Black Carbon and Other Pollutants From Brick Production
- Mitigating SLCPs from the Municipal Solid Waste Sector
- Promoting HFC Alternative Technology and Standards
- Accelerating Methane and Black Carbon Reductions from Oil and Natural Gas Production
- Addressing SLCPs from Agriculture
- Reducing SLCPs from Household Cooking and Domestic Heating
- Financing of SLCP mitigation
- Supporting National Planning for action on SLCPs
- Regional Assessments of SLCPs
- Urban Health Initiative

<sup>21</sup> For additional information on GMI and 2014 accomplishments, see [www.epa.gov/globalmethane/accompreport.htm](http://www.epa.gov/globalmethane/accompreport.htm).



## COALBED METHANE OUTREACH PROGRAM (CMOP)

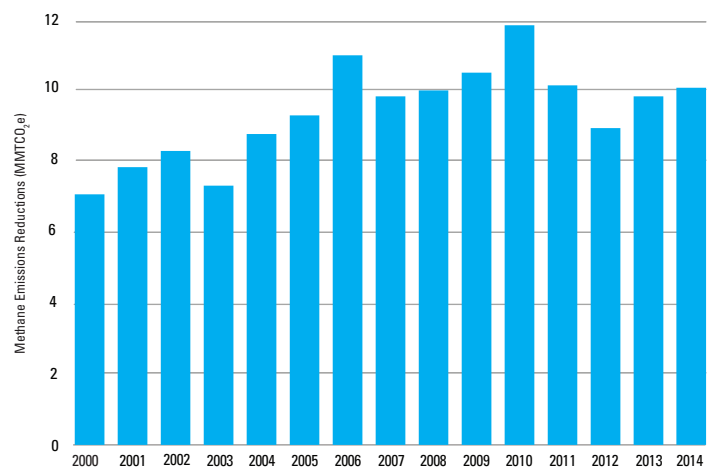
The Coalbed Methane Outreach Program (CMOP) strives to reduce methane emissions from coal mining activities. Coal mine methane (CMM) is a potent GHG and can be an explosive hazard inside mines. But if CMM is recovered safely and used for energy, it is a valuable, clean-burning fuel source. CMOP collaborates with coal companies and related industries to lower emissions through the development of environmentally beneficial, cost-effective CMM recovery and utilization projects.

The program primarily focuses on mitigating U.S. emissions from underground coal mines, both from degasification systems and from mine ventilation systems, as well as from abandoned (closed) underground mines and active surface mines. CMOP provides high-quality, mine-specific information and technical assistance to the coal mining industry and project developers, including identifying project sites, analyzing and demonstrating technologies, conducting mine-specific project pre-feasibility assessments and market evaluations, and analyzing financial incentives and regulatory hurdles.<sup>22</sup>

### Achievements in 2014

- CMOP reduced CMM emissions by 10.1 MMTCO<sub>2</sub>e in 2014 (see Figure 15),<sup>23</sup> and since the program began in 1994 it has achieved cumulative reductions of 177.8 MMTCO<sub>2</sub>e.
- Held successful U.S. Coal Mine Methane Conference, attracting attendees from across the country, including coal mine representatives, project developers, technology suppliers, and carbon offset developers.
- Led U.S. Government CMM Roundtable with the Bureau of Land Management, Mine Safety and Health Administration, U.S. Fish and Wildlife Service, and the U.S. Department of Energy.
- Held targeted outreach meetings with BHP San Juan mine, Illinois and Indiana Coal associations, and numerous coal companies in the Illinois and Appalachia coal basins.
- Provided technical analysis to proactively engage U.S. coal mines and industry representatives to stimulate further domestic CMM project development.
- Supported 17 operating coal mine methane projects in the U.S.: 16 using drained gas from active underground mines, one mitigating dilute ventilation air methane (VAM) at an active underground mine, and 17 projects using abandoned mine methane gas.

FIGURE 15. CMOP Annual Methane Emissions Reductions



<sup>22</sup> For additional information on CMOP and 2014 accomplishments, see [www.epa.gov/cmop/](http://www.epa.gov/cmop/).

<sup>23</sup> Emission reductions are draft, pending the final 2014 CMM Inventory Numbers.

# FLUORINATED GREENHOUSE GAS EMISSIONS REDUCTION PROGRAMS

EPA's fluorinated greenhouse gas (FGHG) partnership programs continue to make significant reductions in potent GHG emissions. The fluorinated gases—including perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), nitrogen trifluoride (NF<sub>3</sub>), and sulfur hexafluoride (SF<sub>6</sub>)—are in several cases byproducts of certain U.S. industrial operations. HFCs, on the other hand, are principally used as replacements for GHGs that also deplete the ozone layer. Ozone-depleting substances, including chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), are used in refrigerators, air conditioners, insulating foams, and other products, but are being phased out globally under the Montreal Protocol on Substances that Deplete the Ozone Layer.

Through its partnership programs, EPA works closely with participating industries to identify cost-effective emissions reduction opportunities, recognize industry accomplishments, and facilitate the transition toward environmentally friendlier technologies and chemicals and best environmental practices. Although FGHGs account for a small portion of total U.S. GHG emissions, they have very high global warming potentials (GWPs). Emissions of HFC-23, PFCs, NF<sub>3</sub>, and SF<sub>6</sub> on a per-facility basis tend to be high. FGHGs trap substantially more heat in the atmosphere than does CO<sub>2</sub> on a per-mass basis, and some can have much longer atmospheric lifetimes than CO<sub>2</sub>.<sup>24</sup>

The combined efforts of the FGHG partnerships have helped partners maintain their emissions substantially below baseline levels—an impressive achievement given the sizable growth in many of these industries. In 2014, FGHG emissions reductions across the partnership programs totaled 19.6 MMTCO<sub>2</sub>e as EPA continued to support partners in their efforts to improve industrial processes and share best practices.<sup>25</sup>

<sup>24</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>25</sup> These are emissions reductions from voluntary programs and do not include reductions from regulatory programs such as the Significant New Alternatives Policy (SNAP) program.

## THE VOLUNTARY ALUMINUM INDUSTRIAL PARTNERSHIP (VAIP)

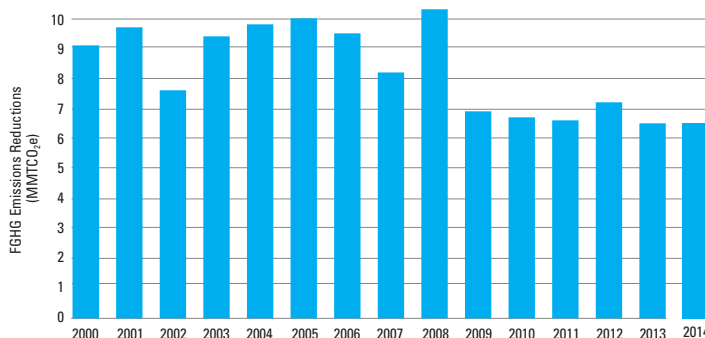


Since 1995, EPA and the U.S. primary aluminum industry have worked together through the Voluntary Aluminum Industrial Partnership (VAIP), which represents 98 percent of U.S. production capacity, to reduce perfluorocarbon (PFC) emissions from aluminum production.<sup>26</sup> PFC emissions of perfluoromethane (CF<sub>4</sub>) and perfluoroethane (C<sub>2</sub>F<sub>6</sub>) are inadvertent byproducts of the smelting process, and are 7,390 and 12,200 times more potent warming agents than CO<sub>2</sub>.<sup>27</sup> EPA supports partners by providing technical assistance to evaluate the factors that influence PFC emissions, sharing best practices, and recognizing partners for their commitment to cutting emissions. All aluminum manufacturers now report data through the Greenhouse Gas Reporting Program.<sup>28</sup>

### Achievements in 2014

- Reduced PFC emissions on a per ton basis by more than 30 percent and absolute emissions by 6.5 MMTCO<sub>2</sub>e compared to the industry's 1990 baseline (see Figure 16).<sup>29</sup>
- Completed comprehensive facility-specific data review with partners
- Reviewed EPA/International Aluminium Institute (IAI) PFC Measurement Protocol
- Participated in IAI Non-proliferating Anode Effect Workgroup.

FIGURE 16. VAIP Annual Emissions Reductions



## SF<sub>6</sub> EMISSIONS REDUCTION PARTNERSHIP FOR ELECTRIC POWER SYSTEMS (EPS)

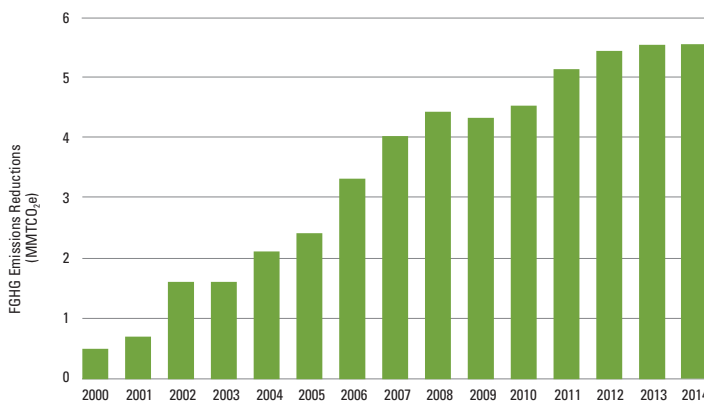


SF<sub>6</sub> is the most potent and persistent GHG—it traps 22,800 times more infrared radiation than the equivalent amount of CO<sub>2</sub>.<sup>30</sup> Used primarily by electric utilities, SF<sub>6</sub> is a gaseous dielectric for high-voltage circuit breakers and gas-insulated substations. Utilities nationwide have the opportunity to make a big difference in the nation's emissions of SF<sub>6</sub>. EPA partners with 85 electric power companies through the voluntary SF<sub>6</sub> Emissions Reduction Partnership for Electric Power Systems. EPA works with the industry to share information about best management practices and cost-effective operational improvements, such as detecting and repairing leaks, using recycling equipment, and educating and training employees. In addition to providing a means to actively address climate change, this program has helped partner companies reap financial savings through reduced SF<sub>6</sub> gas purchases. Partners represent 48 percent of the total U.S. transmission system.<sup>31</sup>

### Achievements in 2014

- Reduced emissions by 5.5 MMTCO<sub>2</sub>e, bringing average SF<sub>6</sub> emissions rates down to 2.4 percent of the total equipment nameplate capacity (see Figure 17).<sup>32</sup>
- Held successful emission reduction workshop with record attendance.
- Formed Nameplate Capacity stakeholder group (gas producers, gas distributors, equipment manufacturers, recovery/recycle companies, Voluntary Partners) to explore data accuracy.
- Held technical webinars on the Greenhouse Gas Reporting Program and best practices for equipment installation.
- Added two new partners: Entergy, Vermont Electric Cooperative.

FIGURE 17. EPS Annual Emissions Reductions



<sup>26</sup> For additional information about the Voluntary Aluminum Industrial Partnership and 2014 accomplishments, see [www.epa.gov/highgwp/aluminum-pfc](http://www.epa.gov/highgwp/aluminum-pfc).

<sup>27</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>28</sup> For more information, see [www.epa.gov/ghgreporting/](http://www.epa.gov/ghgreporting/).

<sup>29</sup> 2014 values are estimated based on 2013 values. 2014 values are anticipated to be very similar to 2013 because primary aluminum production has remained relatively flat in recent years.

<sup>30</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>31</sup> For additional information about the SF<sub>6</sub> Emission Reduction Partnership for Electric Power Systems and 2014 accomplishments, see [www.epa.gov/highgwp/electricpower-sf6/index.html](http://www.epa.gov/highgwp/electricpower-sf6/index.html).

<sup>32</sup> 2014 values are estimated based on 2013 values. 2014 values are anticipated to be very similar to 2013 because total nameplate capacity has remained relatively flat in recent years.



## RESPONSIBLE APPLIANCE DISPOSAL PROGRAM (RAD)

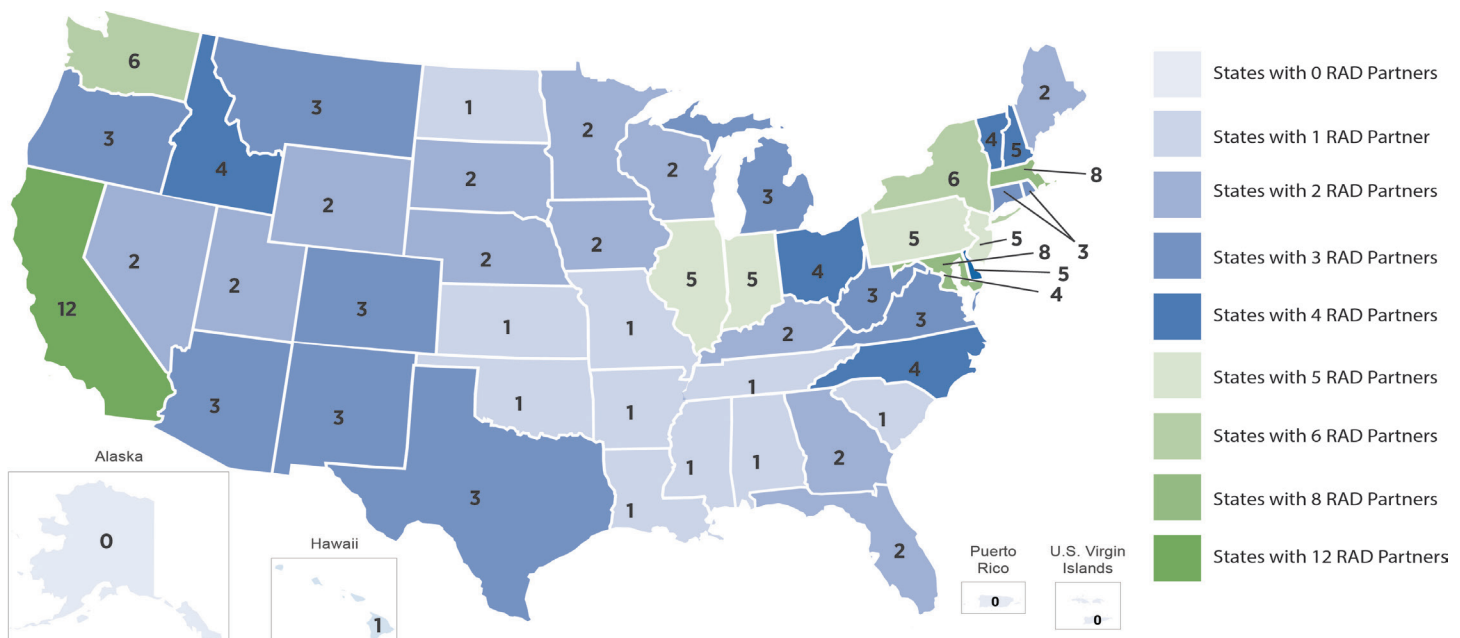
EPA launched the Responsible Appliance Disposal (RAD) Program in October 2006 to help protect the ozone layer and reduce GHG emissions. Partners go beyond Clean Air Act Section 608 regulatory requirements<sup>33</sup> by ensuring that old refrigerators, freezers, window air conditioners, and dehumidifiers are recycled using the best environmental practices available. Partners recover not only refrigerant, as required by law, but also ozone-depleting and high-GWP chemicals from the insulating foam. Foam is recovered and destroyed, or the blowing agent is recovered and reclaimed. Further, while regulations only require the final disposer (i.e., a landfill or scrap recycler) to ensure that refrigerant has been recovered at an appliance's end of life, RAD utility, retailer, state, and manufacturer partners as well as state affiliates commit to responsible recycling as part of their energy efficiency and corporate sustainability programs. EPA also works with partners to prevent the release of hazardous materials like mercury and polychlorinated biphenyls (PCBs), as well as to save landfill space and energy by recycling durable materials—eliminating the need to produce virgin materials. The RAD Program invites utilities, retailers, manufacturers, state and local governments, universities, and other qualifying organizations to become partners and has partner representation in 49 states (see Figure 18).<sup>34</sup>

EPA calculates stratospheric ozone benefits, climate benefits, and energy savings achieved by RAD partners. HFC refrigerant and foams in disposed-of appliances are about 1,000 times more potent global warmers than CO<sub>2</sub>.<sup>35</sup> EPA also serves as a technical clearing house on responsible appliance program development and implementation and provides partner recognition for achievement, such as through press releases, brochures, and articles.

### Achievements in 2014

- Avoided emissions of 0.19 MMTCO<sub>2</sub>e and more than 599,000 pounds of ozone-depleting substances (207 ODP weighted metric tons) through the proper disposal of approximately 940,000 refrigerant-containing appliances.
- Recovered 313,136 pounds of refrigerants and 351,500 pounds of blowing agent.
- Prevented the following materials from going to a landfill: 123 million pounds of ferrous metals; 6 million pounds of non-ferrous metals; 23 million pounds of plastic; and 4 million pounds of glass.
- Properly handled the following toxic or hazardous substances: 76,000 gallons of used oil; 42,700 PCB-containing capacitors; and 17,600 mercury-containing components.

FIGURE 18. RAD Representation by State



<sup>33</sup> For additional information, see [www3.epa.gov/ozone/title6/608/index.html](http://www3.epa.gov/ozone/title6/608/index.html) or [www.epa.gov/ozone/title6/downloads/Section\\_608\\_FactSheet2010.pdf](http://www.epa.gov/ozone/title6/downloads/Section_608_FactSheet2010.pdf).

<sup>34</sup> For additional information on RAD and 2014 accomplishments, see [www.epa.gov/rad](http://www.epa.gov/rad).

<sup>35</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.



## GREENCHILL PARTNERSHIP

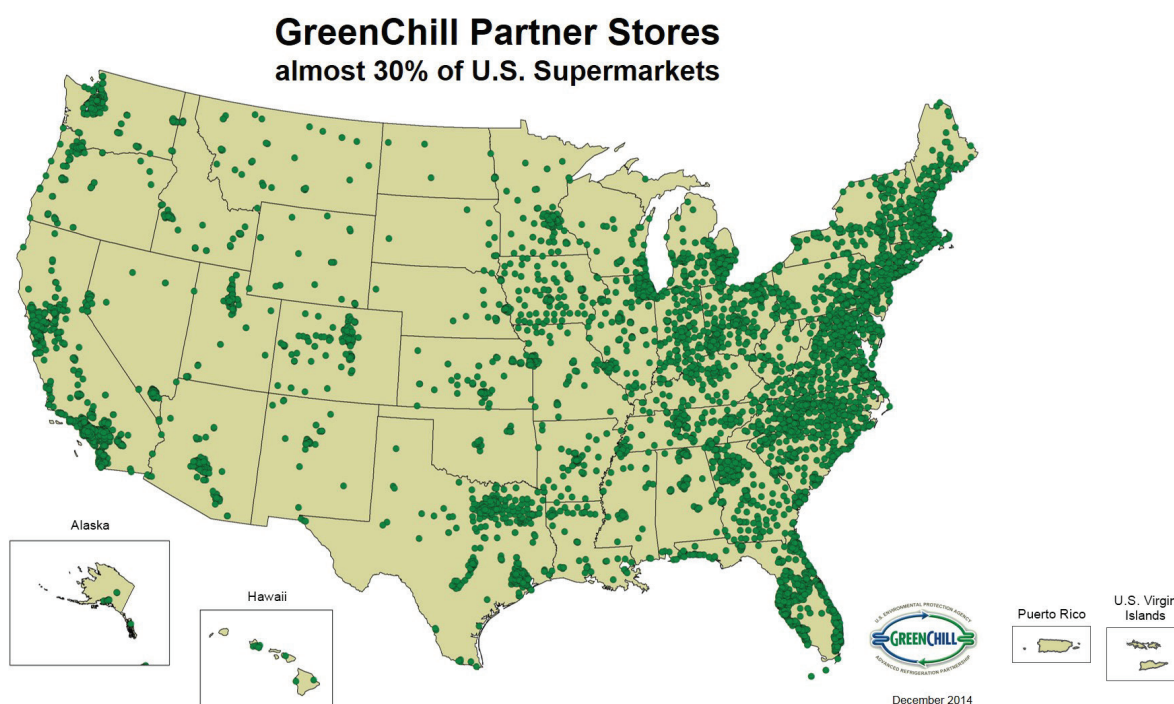
EPA's GreenChill Partnership works with the supermarket industry to reduce refrigerant emissions that harm the ozone layer and contribute to climate change. The refrigerants used in supermarkets are generally 1,800 to 4,000 times more potent global warmers than CO<sub>2</sub>.<sup>36</sup> Supermarkets leak about 38 million pounds of these refrigerants annually. GreenChill partners go beyond regulatory requirements by tracking the use and emissions of all their refrigerants, not just the ozone-depleting substances required to be monitored by Clean Air Act Section 608.<sup>37</sup> GreenChill helps supermarkets transition to refrigerants that are more environmentally friendly, significantly reduce the amount of refrigerant used, appreciably lower refrigerant leak rates, and adopt green refrigeration technologies and best environmental practices.<sup>38</sup>

GreenChill's Corporate Emissions Reduction Program asks supermarkets in the Partnership (see Figure 19) to set corporate emission reduction goals each year. In 2014, the supermarket partners reduced the amount of refrigerant in their commercial systems by about 37 percent compared to the industry average. The Store Certification Program encourages emissions reductions by setting standards for individual store refrigerant leak rates, the types of refrigerant used, and the amount of refrigerant used. Stores that achieve GreenChill's certification emit at least 65 percent less refrigerant than a typical store.

### Achievements in 2014

- GreenChill partners had an average annual leak rate (12.7 percent) that was at least 48 percent lower than the national average annual leak rate (25 percent).
- Of the 23 GreenChill partners who have been in the partnership for more than a year
  - 19 have reduced their emissions rate since joining the partnership
  - 13 have reduced their emissions rate by more than 10%
- 2 have reduced their emissions rate by more than 40%
- 4 have lowered their emissions rates in 3 or more consecutive years
- 109 GreenChill stores were certified in 2014 for advanced refrigeration technology that prevents refrigerant leaks—5 platinum, 36 gold, and 68 silver. Stores with a platinum, gold, or silver certification prevented at least 95 percent, 75 percent, or 65 percent, respectively, of the refrigerant leaks from a typical store.

**FIGURE 19. GreenChill Partner Stores in 2014**



<sup>36</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>37</sup> For additional information, see [www3.epa.gov/ozone/title6/608/index.html](http://www3.epa.gov/ozone/title6/608/index.html) or [www.epa.gov/ozone/title6/downloads/Section\\_608\\_FactSheet2010.pdf](http://www.epa.gov/ozone/title6/downloads/Section_608_FactSheet2010.pdf).

<sup>38</sup> For additional information about GreenChill and 2014 accomplishments, see [www.epa.gov/greenchill](http://www.epa.gov/greenchill).

# CROSS-CUTTING EMISSIONS REDUCTION PROGRAMS

EPA supports several additional programs that cut across multiple policy areas to contribute to sustained emissions reductions. Many organizations have already established sustainability or climate objectives to identify and achieve cost-effective GHG reduction strategies. In 2012, EPA launched the Center for Corporate Climate Leadership to serve as a resource for those organizations interested in reducing their environmental impacts associated with climate change. The Center also strives to help more advanced organizations continue to improve their GHG reduction strategies and serve as influencers to drive change in their supply chains and beyond.

State and local governments have a unique opportunity to implement renewable energy and energy efficiency policies and programs, reduce carbon and other pollutant emissions through their own policies, and set an example for other jurisdictions. EPA established the State and Local Climate and Energy Program to help state and local governments meet sustainability and environmental goals.

Through these cross-cutting programs, EPA provides partners with technical assistance, analytical tools, and peer exchange opportunities to help them develop and implement cost-effective solutions to reduce GHG emissions.

## CENTER FOR CORPORATE CLIMATE LEADERSHIP



Launched in 2012, the Center for Corporate Climate Leadership (The Center) serves as a resource for organizations of all sizes in measuring and managing their GHG emissions. The Center provides technical tools, ground-tested guidance, educational resources, opportunities for information sharing, and a platform for peer exchange. The Center also promotes practices and innovative approaches, drawing upon the successes of Climate Leadership Award recipients and former Climate Leaders partners.<sup>39</sup>

### Achievements in 2014

- Hosted a webinar series called *What is Climate Leadership?*<sup>40</sup> highlighting greenhouse gas management resources for small businesses; organizational leadership; supply chain management; and navigating the Climate Leadership Awards application process.
- Served as the headline sponsor of the third annual Climate Leadership Conference—an exchange for addressing global climate change through innovation and business solutions. The conference brought together more than 400 forward-thinking leaders from business, government, academia, and the nonprofit community who shared best practices for integrating GHG reductions, as well as climate risk and resilience strategies, into their organizations' operations. The leadership awards were presented during the conference.
- Organized and sponsored the third annual Climate Leadership Awards (CLA), a national awards program that recognizes and incentivizes exemplary corporate, organizational, and individual leadership in response to climate change. In 2014, the awards were presented to two individuals and 15 organizations from across the United States who have been leading the way in the management and reduction of GHG emissions—both in internal operations and throughout the supply chain. The Center co-sponsored the Awards with three NGO partners: the Association of Climate Change Officers, the Center for Climate and Energy Solutions (C2ES), and The Climate Registry (see Appendix A, pg. 43).

<sup>39</sup> For additional information on The Center, see [www.epa.gov/climateleadership/](http://www.epa.gov/climateleadership/).

<sup>40</sup> For additional information, see [www.epa.gov/climateleadership/events/index.html](http://www.epa.gov/climateleadership/events/index.html).

- Updated and promoted the program’s technical resources housed on The Center’s website, including: Direct Fugitive Emissions from Refrigeration, Air Conditioning, Fire Suppression, and Industrial Gases; Corporate GHG Goal Evaluation Model; Simplified GHG Emissions (Small Business); and the Emission Factors Hub for Greenhouse Gas Inventories.
- Updated the “sector spotlight” in the Supply Chain section on The Center’s website for organizations interested in reducing their supply chain emissions. Specifically, content focused on flat panel display suppliers’ efforts to reduce F-GHG emissions in flat panel manufacturing in the electronics sector.
- Climate Leadership Award winners and The Center’s resources received coverage in several media outlets, including *Environmental Leader* and *TriplePundit*.



## STATE AND LOCAL CLIMATE AND ENERGY PROGRAM

EPA helps state, local, and tribal governments use renewable energy, energy efficiency, and other policies to reduce carbon and other air pollution and to achieve related environmental, energy system, and economic goals. The program provides technical assistance, analytical tools, and peer exchange opportunities for state, local, and tribal officials.

EPA also supports state and local governments by working with DOE to co-facilitate the State and Local Energy Efficiency Action Network (SEE Action).<sup>41</sup> SEE Action offers information resources and technical assistance to state and local decision makers to support efforts to provide cost-effective energy efficiency in their communities.

### Achievements in 2014

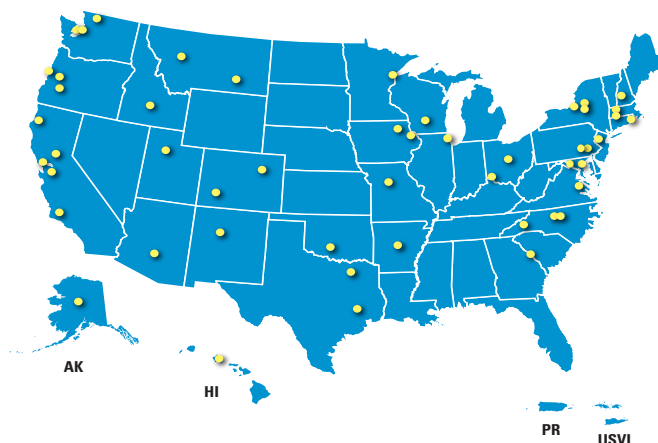
#### STATE CLIMATE AND ENERGY PROGRAM

- Played an integral role in involving states and utilities in an extensive external engagement process that contributed to EPA’s Clean Power Plan for Existing Power Plants.
- Released AVERT, the AVOIDed Emissions and geneRation Tool, which states can use to quantify and promote the impacts of renewable energy and energy efficiency policies and programs. Launch was supported by a webcast and online training.
- Hosted a webcast for local governments on tracking and evaluating local sustainability projects.
- Released three guides for local governments on developing and implementing greenhouse gas reduction programs. These guides provide comprehensive information for local and tribal government staff on green power procurement, on-site renewable energy generation, and combined heat and power.<sup>42</sup>

#### LOCAL CLIMATE AND ENERGY PROGRAM

- Hosted the first Climate Showcase Communities Replication workshop, highlighting successful local and tribal government climate and energy projects that can be replicated in communities across the United States. All 50 original Climate Showcase Communities were invited to participate. The second day of the workshop was open to all interested communities who wanted to attend and learn more about replicating successful Climate Showcase Community projects.

**FIGURE 20. EPA Supports 50 Climate Showcase Communities**



<sup>41</sup> For additional information, see [www.epa.gov/climateleadership/events/index.html](http://www.epa.gov/climateleadership/events/index.html).

<sup>42</sup> For additional information, see [www1.eere.energy.gov/seeaction/](http://www1.eere.energy.gov/seeaction/).

# MEASURING RESULTS: REPORT METHODOLOGY

## Measuring Results of the Climate Protection Partnership Programs

EPA's climate protection partnerships are important components of the U.S. Government's strategy to address climate change. EPA is committed to documenting quantifiable program results and using well-established methods to estimate the benefits of its programs. To present the most realistic estimates of program benefits, EPA employs a common analytical framework across all of the individual program approaches. However, the specific approach will vary by program strategy, sector, availability of data, and market characteristics.

- The benefits discussed represent the results attributable to EPA efforts above pre-existing trends or business-as-usual (BAU) scenarios.
- Program methods address data quality, potential double counting with other federal programs, the efforts of third-party actors, and other program-specific market effects.
- Where uncertainty exists, EPA uses the best available information and practices that yield conservative benefit estimates.
- Annual benefits reflect investments that occurred during the year, as well as those benefits that persist during that year from investments made in previous years.
- Cumulative benefits are the sum total of annual benefits through 2014. Cumulative benefits do not include the benefits expected in future years, such as benefits that will persist over the lifetime of an investment or expectations of future investments. Cumulative reductions from EPA programs include only active programs in 2014.
- Greenhouse gas (GHG) emissions reductions are estimated for the operational phase of affected measures, and global warming potentials are based on the Intergovernmental Panel on Climate Change's *Fourth Assessment Report*.<sup>43</sup>
- Societal benefits are calculated based on the social cost of carbon, which monetizes the damages associated with an incremental increase in carbon emissions in a given year.<sup>44</sup>

The 2014 annual and cumulative environmental and financial benefits are summarized in Table 1 on page 3. The historical and projected environmental benefits of these programs are summarized in Table 8 on page 33. The information presented in this report is similar to EPA budget information provided by EPA to the U.S. Office of Management and Budget (OMB).

<sup>43</sup> For more information, see Appendix D: References (p. 46), IPCC 2007.

<sup>44</sup> Damages associated with an incremental increase in carbon emissions in a given year may include, but are not limited to, changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services. \$12.5 billion and \$3.7 billion of the societal benefits are from CO<sub>2</sub> and non-CO<sub>2</sub> emissions, respectively. The non-CO<sub>2</sub> emissions were converted to CO<sub>2</sub>-equivalents, assuming global warming potentials from the IPCC Fourth Assessment Report before applying the social cost of CO<sub>2</sub>. For more information, see Interagency Working Group on Social Cost of Carbon, United States Government. Revised 2015.

**TABLE 8. Overview of OAP Climate Protection Partnership Programs with GHG Reductions and Program Goals**

PROGRAM	GREENHOUSE GASES ADDRESSED	KEY SECTORS	MARKET PENETRATION INDICATORS AS OF 2014	START YEAR	ANNUAL EMISSIONS REDUCTIONS (MMTCO <sub>2</sub> e)						
					2010	2011	2012	2013	2014	2015 GOAL	2020 GOAL
ENERGY STAR PROGRAMS											
Certified Products	CO <sub>2</sub>	Residential, Commercial	More than 70 product categories	1992	81.4	107.4	129.2	155.1	145.8	113.6	141.2
Residential	CO <sub>2</sub>	Residential	12% of new home market	1995	2.4	2.7	2.9	3.1	3.2	3.2	3.8
Commercial	CO <sub>2</sub>	Commercial	More than 25,000 labeled buildings across 16 building types	1995	81.2	86.6	89.8	96.0	93.2	75	93.5
Industrial	CO <sub>2</sub>	Industrial	139 labeled plants across 30 Industrial sectors and subsectors	1995	33.2	32.2	32.7	39.7	41.0	25.6	36.6
CARBON DIOXIDE REDUCING ENERGY SUPPLY PARTNERSHIPS <sup>1</sup>											
Green Power Partnership	CO <sub>2</sub>	State & Local Government, Commercial, Industrial	Over 1,200 partners	2001	26.4	29.6	31.6	36.3	37.1	44	73.3
Combined Heat and Power Partnership	CO <sub>2</sub>	Commercial, Industrial	Over 480 partners, 37% of new CHP capacity creditable to CHPP	2001							
METHANE PROGRAMS											
Natural Gas STAR	CH <sub>4</sub>	Natural Gas	134 US and International partners	1993	48.1	42.0	31.9	24.1	25.6	30.1	31.8
AgSTAR <sup>2</sup>	CH <sub>4</sub>	Agriculture	239 anaerobic digester systems	1994	0.7	0.8	1.1	1.2	1.2	1.1	1.1
Landfill Methane Outreach Program (LMOP) <sup>2</sup>	CH <sub>4</sub>	Waste Management	1,100 partners and endorsers	1994	25.1	27.6	29.6	40.3	39.5	17.0	18.7
Coalbed Methane Outreach Program (CMOP)	CH <sub>4</sub>	Coal Mining	17 operating coal mine methane projects in the US	1994	11.9	10.2	9.0	9.9	10.1	10.5	10.5
FLUORINATED GREENHOUSE GAS PROGRAMS											
Voluntary Aluminum Industrial Partnership	PFCs	Aluminum Smelting	98% of Industry	1995	6.7	6.6	7.2	6.5	6.5	0.4	0.4
SF <sub>6</sub> Emission Reduction Partnerships for Electric Power Systems	SF <sub>6</sub>	Electric Power Systems	48% of US transmission system	1999	4.5	5.1	5.4	5.5	5.5	5.4	5.0
RAD <sup>3</sup>	HFCs	Utility, Retail, Manufacturer, State & Local Government	54 partners servicing 49 states	2006	0.3	0.3	0.2	0.2	0.2	0.3	0.6
GreenChill <sup>3</sup>	HFCs	Supermarket Industry	Partners represent almost 30% of U.S. supermarkets	2007	2.5	4.6	4.9	4.4	7.4	8.2	13.2

Note: Historic annual reductions reflect the most up-to-date data collected from EPA partners and may differ from reductions reported in previous annual reports. All program benefits reflect GHG emissions reductions attributable to EPA efforts that are above pre-existing trends, any existing regulatory requirements, or BAU scenarios. EPA also makes adjustments to avoid double counting with other federal or state policies or programs. GHG emissions reductions assume global warming potentials based on the Intergovernmental Panel on Climate Change's Fourth Assessment Report (IPCC 2007). See each individual program write-up in this section for additional details.

<sup>1</sup> GHG reductions and goals are for both the Green Power Partnership and Combined Heat and Power Partnership.

<sup>2</sup> Program goals include only direct GHG emissions reductions. In 2014, direct emissions reductions were 1.2 MMTCO<sub>2</sub>e for AgSTAR and 30.4 MMTCO<sub>2</sub>e for LMOP.

<sup>3</sup> Does not incorporate climate benefits from ozone-depleting substances, which would result in an increase of 2.1 MMTCO<sub>2</sub>e for RAD and 1.7 MMTCO<sub>2</sub>e for GreenChill per year.

## ENERGY STAR PROGRAMS TO REDUCE CARBON DIOXIDE EMISSIONS

Through the ENERGY STAR program, EPA helps U.S. businesses and consumers save money and reduce GHG emissions by labeling energy-efficient products, raising the bar of energy efficiency in new home construction, and encouraging superior energy management practices in the commercial and industrial sectors.

EPA calculates GHG emissions benefits of the ENERGY STAR program by applying CO<sub>2</sub> emissions factors, as applicable, to net annual electricity and fossil fuel savings attributable to the program. For electricity, a national marginal carbon emissions factor is assumed to reflect power plants that will run less due to energy efficiency. Emissions factors applied to fossil fuel savings are based on on-site fuel combustion.

The financial benefits for the ENERGY STAR program are placed in present value terms. The GDP Implicit Price Deflator Index is used to convert nominal dollars to constant current reporting year dollars.<sup>45</sup> EPA's calculations assume sector-specific, national-average prices, including electricity and fossil fuel prices published by the Energy Information Administration (EIA).<sup>46</sup> A private sector real discount rate is used as the interest rate for financing purchases of new technologies and practices since the majority of EPA partners making the investments are in the private sector.

The methods for estimating actual and projected energy savings from each of these strategies are described below.

### ENERGY STAR Certified Products

- Sales of products due to the ENERGY STAR program are determined as those above and beyond BAU purchases of these products.<sup>47</sup> These sales are estimated by:
  - Collecting annual sales data on ENERGY STAR certified products from participating product manufacturers, provided to EPA as a condition of partnership, and comparing these data to industry reports on total annual product sales. EPA screens the data and investigates and resolves issues when market penetration is not as expected.
  - Establishing BAU baselines for annual product sales for each product category based on the benefit/cost ratio for the product and a characterization of the market barriers for the product.
- Annual energy savings are calculated using established values for the difference in annual energy use between a single ENERGY STAR product and a typically purchased product. For these values, EPA:
  - Assumes that ENERGY STAR certified products just meet the ENERGY STAR thresholds, even though there are some products that exceed those levels.
  - Assumes the typically purchased product meets minimum efficiency standards where standards exist. If standards do not exist, assumes the average energy use of available products within a category prior to the introduction of an ENERGY STAR specification. EPA reviewed the baseline assumptions for key products in 2014.
  - Supports primary data collection, such as product metering to collect power use information, where additional information is necessary to estimate energy savings.
- Uses product-specific lifetimes that vary from 4 to 20 years.
- Subtracts out the savings associated with products used in ENERGY STAR Certified New Homes to avoid double counting savings.
- Net energy bill savings is the present value (PV) of energy bill savings minus the PV of any incremental cost of purchasing an ENERGY STAR certified product above a standard model over the product lifetimes discussed above.<sup>48</sup>
- Energy savings goals are estimated based on market projections for future product sales applied to net annual energy savings for product types in the program. EPA regularly reassesses key factors, such as energy consumption of standard non-ENERGY STAR products, changes in market sales, and new and revised ENERGY STAR product specifications.

### ENERGY STAR Certified New Homes

- EPA receives data quarterly from third-party Home Energy Rating Providers certified by the Residential Energy Services Network (RESNET) on the number of homes they have verified to be ENERGY STAR, provided as a condition of program partnership. These raters abide by a set of quality assurance practices to ensure data quality. In addition, EPA reviews the submitted data and resolves any data irregularities.
- EPA recognizes that some new homes that qualify for ENERGY STAR are not a direct result of the program and that many homes built to ENERGY STAR levels due to the program are not labeled or reported to the program. Currently, EPA estimates the former number of homes to be lower than the latter.

<sup>45</sup> For more information, see Appendix D: References (p. 46), U.S. Department of Commerce 2015.

<sup>46</sup> For more information, see Appendix D: References (p. 46), Energy Information Administration 2015.

<sup>47</sup> For more details on many aspects of this method, see Appendix D: References (p. 46), DNV GL Energy & Sustainability 2015.

<sup>48</sup> Calculated using a 7% discount rate and 2015 perspective.

- To account for the energy savings resulting from the operation of ENERGY STAR certified homes across a range of climates, sizes, and fuel types, EPA developed composite estimates by determining the energy consumption of a standard (i.e., code-minimum) home constructed in each of seven climate zones, taking into account regional construction characteristics (e.g., foundation type, typical fuel use profile) and configuring the home to the national model energy code. EPA then applied ENERGY STAR requirements to each modeled home to determine the estimated annual energy savings achieved (for both electricity and natural gas) as compared to the standard home. This approach avoids double counting of energy savings from building energy codes.
- Net energy bill savings are calculated using an approach similar to that used for ENERGY STAR products, where gross energy bill savings are reduced by the incremental cost of purchasing an ENERGY STAR certified home. National average energy prices for the residential sector and a 30-year average lifetime of a home are assumed.
- The number of ENERGY STAR certified homes to be constructed in future years is estimated by applying the annualized average growth of ENERGY STAR certified homes since 1994 to 2012 actuals.

## ENERGY STAR Commercial Buildings

- To calculate the national impacts of ENERGY STAR for Commercial Buildings, EPA uses historical energy consumption data from the U.S. Energy Information Administration, and other publically available data, to estimate the differential effects of voluntary energy efficiency programs on electricity and natural gas consumption in states with the strongest commitments to voluntary energy efficiency programs, as identified by ACEEE's annual state scorecards. The technical details of the impact estimation methodology, including the econometric models and statistical tests, are published in double-blind, peer-reviewed scientific journals.<sup>49</sup>
- Cumulative annual energy savings for the current year for ENERGY STAR for Commercial Buildings, defined as the accomplishments from current year activities as well as from previous year program activities, are derived after controlling for the uptake in new equipment, including ENERGY STAR products, in commercial buildings. In addition, ENERGY STAR for Commercial Buildings program accomplishments take into account the energy savings impacts from demand side management programs, state and third-party public benefits energy efficiency programs, state building codes and appliance standards programs, and related EERE programs. Being comprehensive in scope, ENERGY STAR for

Commercial Buildings impact estimates incorporate other notable secondary effects, including spillover and market transformation savings.<sup>50</sup>

- ENERGY STAR for Commercial Buildings annual energy savings goals are estimated by applying a steady growth rate to program savings based on an examination of the opportunity for emissions reductions in the commercial sector.

## ENERGY STAR for Industry

- To calculate the national impacts of ENERGY STAR for Industry, EPA uses historical energy consumption data from the U.S. Energy Information Administration, and other publically available data, to develop multivariate statistical models that estimate aggregate, state-level changes in electricity, natural gas, coal, and petroleum consumption resulting from voluntary energy efficiency programs. The technical details of the impact estimation methodology, including the econometric models and statistical tests, are published in double-blind, peer-reviewed scientific journals.<sup>51</sup>
- Cumulative annual energy savings for the current year for ENERGY STAR for Industry, defined as the accomplishments from current year activities as well as from previous year program activities, are derived after controlling for the uptake in new equipment, including ENERGY STAR products, in industrial facilities. In addition, ENERGY STAR for Industry program accomplishments take into account the energy savings impacts from demand side management programs, state and third-party public benefits energy efficiency programs, and related EERE programs. Being comprehensive in scope, ENERGY STAR for Industry impact estimates incorporate other notable secondary effects, including spillover and market transformation savings.<sup>52</sup>
- ENERGY STAR for Industry annual energy savings goals are estimated by applying a steady growth rate to program savings based on an examination of the opportunity for emissions reductions in the industrial sector.

## Program Cost-Effectiveness

EPA estimates the cost-effectiveness of the ENERGY STAR Program for each dollar invested and metric ton of GHG emissions reduced. For incremental investment ratios, total bill savings and total GHG emissions reductions are divided by the additional cost (if any) to partners and consumers of investments in energy efficiency, adjusted for current reporting year dollars. EPA also calculates the ratio of cumulative net bill savings and cumulative GHG emissions attributable to ENERGY STAR, also adjusted for current reporting year dollars.

<sup>49</sup> For more details on this method, see Appendix D: References (p. 46), Horowitz 2007.

<sup>50</sup> For more details on this method, see Appendix D: References (p. 46), Horowitz 2015b.

<sup>51</sup> For more details on this method, see Appendix D: References (p. 46), Horowitz 2015a.

<sup>52</sup> For more details on many aspects of this method, see Appendix D: References (p. 46), Horowitz 2001, 2007, and 2015c.

## CARBON DIOXIDE REDUCING ENERGY SUPPLY PROGRAMS

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OAP Carbon Dioxide Reducing Energy Supply Programs include the Green Power Partnership and Combined Heat and Power Partnership. The Green Power Partnership boosts supply of clean energy by helping U.S. organizations purchase electricity from eligible renewable generation sources and install and use green power on-site. The CHP Partnership dismantles the market barriers preventing investment in environmentally beneficial CHP projects.

The benefits analyses for both energy supply programs are limited to GHG emissions benefits for these programs. Consistent CO<sub>2</sub> emissions factors are assumed across OAP programs for electricity and fossil fuel savings attributable to the programs.

Energy savings goals are estimated by applying a steady growth rate to program savings based on an examination of the opportunity for emissions reductions from green power and CHP.

### Combined Heat and Power Partnership (CHPP)    Green Power Partnership (GPP)

The CHP Partnership's annual GHG emissions reductions are calculated by subtracting the emissions from specific CHP systems from the emissions avoided when CHP outputs replace electricity from the power grid and thermal energy from on-site boilers. CHP system emissions are calculated using fuel-specific emissions factors, project-specific data and typical performance parameters. Program partners voluntarily provide project-specific information on operational CHP projects to EPA and the data is screened and evaluated before being used to calculate GHG emissions reductions.

Each CHP system's GHG emissions reductions are calculated individually for each year of operation, accounting for its actual start-up date. Emissions reductions account for avoided transmission and distribution (T&D) losses, based on a published national loss factor.

Only the GHG emissions reductions from CHP systems that meet the assistance criteria for the program are included in the program benefit estimates. The Partnership utilizes procedures to exclude emissions reductions from projects receiving assistance from other OAP Partnership programs.

EPA CHP partners may also receive assistance from other programs, including those receiving funding through federal grant programs. No adjustments are made for such double counting, as the magnitude of potential overlap is estimated to be equal to or less than projects not reported to EPA, though influenced by the partnership's broader market transformation efforts.

As a condition of partnership, GPP partners submit data annually on their purchases of qualifying green power products. These data are screened and any issues resolved.

The potential for double counting, such as counting green power purchases that may be required as part of a renewable portfolio standard or that rely on resources that are already part of the system mix, is addressed through a partnership requirement that green power purchases be incremental to what is already required.

EPA estimates that the majority of the green power purchases made by program partners are due to the partnership, as partners comply with aggressive green power procurement requirements (often at incremental cost) to remain in the program. Further, EPA estimates that its efforts to foster a growing voluntary green power market have likely led to additional market transformation benefits, leading to additional voluntary green power purchases that are not included in the program's GHG emissions reduction estimates.

## THE METHANE EMISSIONS REDUCTION PROGRAMS

EPA's methane programs facilitate recovery of methane from landfills, oil and natural gas systems, agriculture (manure management), and coal mines, as well as use of methane as a clean energy resource. Value of gas mitigated assumes all methane mitigated is sold as natural gas, using the average annual gas price from EIA.<sup>53</sup> In order to estimate program goals, OAP relies on a marginal abatement cost (MAC) curve analysis to estimate future program impacts.

### Natural Gas STAR Program

The Natural Gas STAR Program calculates its achieved annual emissions reductions based on 100 percent of the emissions reductions reported to the Program by program partners, who submit methane emission reduction data to EPA annually. These data are used to determine Program emissions reduction totals and measure the overall effectiveness of the Natural Gas STAR Program. The Natural Gas STAR Program focuses on implementation of best management practices (BMPs) and partner reported opportunities (PROs) that are undertaken by companies voluntarily. Partner companies have the option of using default calculation methodologies or company-specific methodologies, which must be documented on their annual reports. Reported reductions must be voluntary in nature and cannot be attributable to compliance with existing regulations. Each annual report is reviewed to ensure that all reductions data are accurate and non-regulatory in nature. Any inconsistencies are resolved through direct correspondence with the appropriate partner company. As appropriate, these data are omitted or adjusted prior to their inclusion in the Natural Gas STAR Program annual totals.

### AgSTAR Program

AgSTAR maintains a database of commercially operational, planned and shutdown anaerobic digester systems at livestock facilities in the United States. AgSTAR follows the Intergovernmental Panel on Climate Change (IPCC) methodology to estimate methane emissions reductions from these projects and counts both direct and indirect reductions from anaerobic digester systems in its annual program accomplishments.

Anaerobic digesters reduce GHG emissions in two ways. The first is the direct methane emissions reduction from the capture and use of biogas that otherwise would escape into the atmosphere from livestock manure management systems. For projects that generate energy, a second benefit is the avoided GHG emissions (CO<sub>2</sub> and nitrous oxide) and other pollutants from the use of biogas methane to displace fossil fuels that otherwise would be used to generate energy.

### Landfill Methane Outreach Program (LMOP)

LMOP uses methodology for estimating direct methane and indirect CO<sub>2</sub> emission reductions from LFG energy projects. The direct reductions represent the collection and destruction of methane generated from landfill waste, whereas indirect reductions represent offsets from the combustion of fossil fuels that emit anthropogenic CO<sub>2</sub>. LMOP calculates

annual reductions from projects for which LMOP provides assistance, technical information, and/or where there is partner involvement in implementing the project. Reductions of methane that are the result of compliance with EPA's air regulations are not included in the program estimates. In addition, only emission reductions from projects that meet the LMOP assistance criteria are included in the program benefit estimates.

LMOP maintains a comprehensive database of municipal solid waste landfills and LFG energy projects in the United States. These data are updated frequently based on information gathered from partners, LMOP's outreach efforts, and other various sources. In 2011, the Greenhouse Gas Reporting Program began providing annual facility level data related to LFG emissions, which have been incorporated into the LMOP database. For operational LFG energy projects, the LMOP database includes the estimated MW capacity of each electricity project and the estimated amount of LFG utilized by each direct-use project, which are used in the calculations to determine annual emission reductions.

### Coalbed Methane Outreach Program (CMOP)

CMOP annually measures the program's accomplishments using a metric of emissions reductions achieved from coal mine methane recovery projects in the United States. Emissions reductions attributable to program activities are distinguished from emissions reductions that would have occurred without the program. CMOP updated its methodology in calendar year 2005 to apply a tiered system to total emissions reductions from active underground and abandoned mines. This tiered approach gives weightings of 90 percent, 70 percent, and 40 percent, depending on the extent of the program's involvement in the specific project or the type of project. For example, ventilation air methane (VAM) emission reduction projects are assigned the highest weighting because of the program's instrumental role in promoting and demonstrating this innovative emissions reduction technology. Similarly, projects where direct technical assistance was provided by CMOP are also given a high weighting. In 2012, the Greenhouse Gas Reporting Program began providing annual facility-level emissions and other data from this sector, which can be used in the calculation of CMOP accomplishments.

<sup>53</sup> For more information, see Appendix D: References (p. 46), Energy Information Administration 2015.

## THE FLUORINATED GREENHOUSE GAS EMISSIONS REDUCTION PROGRAMS

Through fluorinated greenhouse gas (FGHG) partnership programs, EPA identifies cost-effective emissions reductions opportunities, recognizes industry accomplishments, and facilitates the transition toward best environmental practices and technologies that are more environmentally friendly.

### Voluntary Aluminum Industrial Partnership (VAIP)

Historically, VAIP has used a methodology to estimate emissions of PFCs based on the smelter-specific correlation between measured PFC emissions and operating parameters, weighted by activity data. VAIP participants reported a smelter-specific emissions coefficient derived from stack measurements and annual operating parameter data (frequency and duration of anode effects) and production data. EPA calculated the VAIP program achievements as the difference between annual estimated emissions under BAU practices (based on emissions rates from 1990) and current annual emissions as reported under the program. In 2011, the Greenhouse Gas Reporting Program began providing annual facility-level emissions data from this sector from both partners and non-partners. These data replace the partnership-collected data. In order to estimate program goals, OAP relies on a marginal abatement cost (MAC) curve analysis to estimate future program impacts.

provided by the partners in annual reports disaggregated by chemical, are multiplied by their global warming potential and summed. Only hydrofluorocarbons (HFCs) are included in the totals; the ozone-depleting substances (ODS) are not included. The destruction or reclamation of these chemicals is not required by law; however, partners voluntarily undertake these emissions reductions pursuant to their agreement as RAD program partners.

A projection of the number of appliances collected and processed by RAD partners is made. To estimate future emissions reductions, the past emissions reductions are scaled based on the number of appliances collected and processed by RAD partners in those years. In addition, it is assumed that the chemicals whose emissions are avoided will change over time due to the projected ODS to HFC transition.

Finally, these results are adjusted to account for the recycling of durable components (metal, plastic, glass) that also occurs under the RAD program. EPA's Waste Reduction Model (WARM) is used to estimate this factor for each year data were reported, and the weighted average of those calculations is used for future projections.<sup>54</sup>

### SF<sub>6</sub> Emissions Reduction Partnership for Electric Power Systems (EPS)

The SF<sub>6</sub> Emissions Reduction Partnership for Electric Power Systems has been estimating emissions of SF<sub>6</sub> using a facility-specific mass-balance methodology. The mass-balance method works by tracking and systematically accounting for all company uses of SF<sub>6</sub> during the reporting year. This method is provided by the 2006 IPCC Guidelines as the Tier 3 approach for estimating emissions from electrical transmission and distribution facilities. EPA calculates program achievements as the difference between annual estimated emissions under BAU practices and annual reported emissions under the program.

In 2012, the Greenhouse Gas Reporting Program began providing annual facility-level emissions data from this sector, from both partners and non-partners. In most cases, these data replace the partnership-collected data since the majority of partner facilities are subject to mandatory reporting through the Greenhouse Gas Reporting Program. In order to estimate program goals, OAP relies on a marginal abatement cost (MAC) curve analysis to estimate future program impacts.

### Responsible Appliance Disposal Program (RAD)

To estimate emissions reductions, the masses of individual refrigerant and foam-blowing agents reclaimed or destroyed by RAD partners,

### GreenChill Partnership

To determine emissions reductions from the GreenChill Partnership, partners provide annual reports of their corporate banks of refrigerant (i.e., refrigerant contained in equipment owned by the partner) as well as emissions. EPA analyzes this information from partners, extrapolates trends, and compares the results to typical U.S. non-GreenChill supermarkets. GreenChill partners provide emissions data disaggregated by chemical. These data are used to calculate emissions of HFCs in CO<sub>2</sub> equivalents and to determine the weighted average emissions rate of the GreenChill partners. To ensure calculations are correct, each partner is given a report it can use to double-check its corporate-wide emissions rates, and partnership averages are provided so that partners can assess the reasonableness of those averages, benchmark their own emissions rates, and set goals to improve.

The average partner emissions are then compared to the national average for typical U.S. supermarkets, based on information from EPA's Vintaging Model, the partners, and other industry experts. The past emissions reductions from the partnership are then taken as the difference of the emissions from the typical U.S. store and the partnership average store, multiplied by the number of stores represented by the data provided by the partners.

Due to phaseout regulations for ozone-depleting substances under CAA Title VI, it is assumed that the types of refrigerant used by all

supermarkets, including GreenChill partners, will change over time, replacing ozone-depleting substances with alternatives (primarily HFCs). To be conservative, it is assumed that the average GWP of the alternatives used today will stay the same in the future.

In addition, GreenChill has fostered leak reductions amongst the partnership. Annual emissions rates as calculated above (total partner emissions divided by total partner banks) change from year to year. The average reduction in emissions rates achieved during past years is then assumed to continue annually into the future, on a percent reduction basis (i.e., so that future leak rates never reach or go below zero percent).

GreenChill assumes that the market share represented by all GreenChill partners increases annually based on the historic growth rate. To be conservative, it is assumed that individual GreenChill partners do not increase their market share, even though promotion and monetary savings through the partnership may help them do so.

### Key Changes to Results Measurements for the 2014 Annual Report

- Global warming potentials from the Intergovernmental Panel on Climate Change *Fourth Assessment Report* are applied to all GHG estimates.
- Historical values in Table 8 have changed since the 2013 Annual Report for Methane and Fluorinated Greenhouse Gas programs to reflect additional information received from program partners and the *Fourth Assessment Report* global warming potentials.
- ENERGY STAR program cost-effectiveness metrics updated for year 2014 reporting.

# APPENDIX A

## ENERGY STAR Award Winners for Achievements in 2014

### PARTNER OF THE YEAR – SUSTAINED EXCELLENCE

AEP Ohio  
*Columbus, OH*

AEP Texas Central  
*Corpus Christi, TX*

Allergan, Inc.  
*Irvine, CA*

Arizona Public Service  
*Phoenix, AZ*

Baltimore Gas and Electric Company  
*Baltimore, MD*

Beacon Capital Partners, LLC  
*Boston, MA*

Bentall Kennedy  
*Seattle, WA*

Brandywine Realty Trust  
*Radnor, PA*

BOMA International  
*Washington, DC*

Burton Energy Group  
*Alpharetta, GA*

CalPortland Company  
*Glendora, CA*

CBRE Group, Inc.  
*Los Angeles, CA*

Cenergistic  
*Dallas, TX*

CenterPoint Energy  
*Houston, TX*

Colgate-Palmolive Company  
*New York, NY*

Columbia Gas of Ohio  
*Columbus, OH*

ComEd  
*Chicago, IL*

Des Moines Public Schools  
*Des Moines, IA*

DIRECTV  
*El Segundo, CA*

DTZ  
*Washington, DC*

Eastman Chemical Company  
*Kingsport, TN*

Ecova  
*Spokane, WA*

EnergyCAP, Inc.  
*State College, PA*

Energy Inspectors  
*Las Vegas, NV*

Evergreen Public Schools  
*Vancouver, WA*

Fanning Howey  
*Celina, OH*

Focus on Energy  
*Madison, WI*

Food Lion  
*Salisbury, NC*

General Motors Company  
*Detroit, MI*

Habitat for Humanity of Greater Nashville  
*Nashville, TN*

Habitat for Humanity of Metro Denver  
*Denver, CO*

Hanesbrands Inc.  
*Winston Salem, NC*

Hines  
*Houston, TX*

Hoshizaki America, Inc.  
*Peachtree City, GA*

Houston Habitat For Humanity  
*Houston, TX*

ITW Food Equipment Group  
*Glenview, IL*

J.C. Penney Company, Inc.  
*Plano, TX*

JLL  
*Chicago, IL*

KB Home  
*Los Angeles, CA*

Kenton County School District  
*Ft. Wright, KY*

Kohl's Department Stores  
*Menomonee Falls, WI*

LG Electronics  
*Englewood Cliffs, NJ*

Liberty Property Trust  
*Malvern, PA*

Loudoun County Public Schools  
*Broadlands, VA*

Manitowoc Foodservice  
*New Port Richey, FL*

Memorial Hermann Health System  
*Houston, TX*

Merck & Co., Inc.  
*Kenilworth, NJ*

Meritage Homes Corporation  
*Scottsdale, AZ*

Milford Housing Development Corporation  
*Milford, DE*

Nationwide Marketing Group  
*Winston Salem, NC*

New Jersey Board of Public Utilities  
*Trenton, NJ*

New York State Energy Research and Development Authority  
*Albany, NY*

NewYork-Presbyterian Hospital  
*New York, NY*

Nissan North America, Inc.  
*Franklin, TN*

North Penn School District  
*Lansdale, PA*

Northeast Energy Efficiency Partnerships (NEEP)  
*Lexington, MA*

Panasonic Eco Solutions  
*Newark, NJ*

Pella Corporation  
*Pella, IA*

PepsiCo, Inc.  
*Purchase, NY*

Philips  
*Somerset, NJ*

PSEG Long Island  
*Uniondale, NY*

Raytheon Company  
*Waltham, MA*

Saint-Gobain  
*Valley Forge, PA*

Samsung Electronics  
*Seoul, South Korea*

Sears Holdings Corporation  
*Hoffman Estates, IL*

Servidyne  
*Atlanta, GA*

Southern California Edison  
*Rosemead, CA*

Southern Maryland Electric Cooperative (SMECO)  
*Hughesville, MD*

Staples, Inc.  
*Framingham, MA*

The Boeing Company  
*Chicago, IL*

The Home Depot  
*Atlanta, GA*

The NH Energy Efficiency Team  
*Manchester, NH*

TIAA-CREF  
*New York, NY*

Toyota Motor Engineering & Manufacturing North America, Inc.  
*Erlanger, KY*

TRANSWESTERN  
*Houston, TX*

USAA Real Estate Company  
*San Antonio, TX*

Verizon  
*New York, NY*

Vornado Realty Trust  
*New York, NY*

### PARTNER OF THE YEAR – CLIMATE COMMUNICATIONS

Des Moines Public Schools  
*Des Moines, IA*

General Motors Company  
*Detroit, MI*

JLL  
*Chicago, IL*

KB Home  
*Los Angeles, CA*

LG Electronics  
*Englewood Cliffs, NJ*

Metro Lighting  
*Brentwood, MO*

Samsung Electronics Co.  
*Seoul, South Korea*

### PARTNER OF THE YEAR

AEP Southwestern Electric Power Company (SWEPCO)  
*Shreveport, LA*

Best Buy Co., Inc.  
*Richfield, MN*

Brighton Homes  
*Boise, ID*

Bristol-Myers Squibb  
*New York, NY*

Building Energy, Inc.  
*Star, ID*

Cherokee County Schools  
*Murphy, NC*

Cobblestone Homes  
*Saginaw, MI*

Consumers Energy  
*Jackson, MI*

Corning Incorporated  
*Corning, NY*

Eaton's Cooper Lighting Business  
*Peachtree City, GA*

Efficiency Vermont  
*Burlington, VT*

EnergyPrint  
*St. Paul, MN*

Enersafe, LLC  
*Linwood, MI*

Fannie Mae Multifamily  
*Washington, DC*

Fulton Homes  
*Tempe, AZ*

Goby  
*Chicago, IL*

Good Earth Lighting  
*Mount Prospect, IL*

Illinois Energy & Recycling Office at the Department of Commerce and Economic Opportunity  
*Springfield, IL*

Intertape Polymer Group, Inc.  
*Sarasota, FL*

Jacksonville Building Science, LLC  
*Jacksonville, FL*

Kentucky School Boards Association  
*Frankfort, KY*

Kilroy Realty Corporation  
*Los Angeles, CA*

Mansfield Independent School District  
*Mansfield, TX*

MaxLite  
*West Caldwell, NJ*

New Mexico Gas Company, a TECO Energy Company  
*Albuquerque, NM*

Parmenter  
*Miami, FL*

PECO  
*Philadelphia, PA*

PEG  
*Fairfax, VA*

Pentair Aquatic Systems  
*Sanford, NC*

Potomac Electric Power Company ("Pepco")  
*Washington, DC*

PPL Electric Utilities  
*Allentown, PA*

Providence Homes  
*Jacksonville, FL*

Sacramento Municipal Utility District  
*Sacramento, CA*

Salt River Project Agricultural Improvement and Power District  
*Tempe, AZ*

Scott County Schools  
*Georgetown, KY*

SkyeTec  
*Jacksonville, FL*

SL Green Realty Corp  
*New York, NY*

SoCalGas  
*Los Angeles, CA*

Soft-Lite Windows  
*Streetsboro, OH*

The Kroger Co.  
*Cincinnati, OH*

The Lighting & Products Sponsors of Mass Save®  
*Westwood, MA*

Tishman Speyer  
*New York, NY*

TopBuild Home Services  
*Daytona Beach, FL*

Whirlpool Corporation  
*Benton Harbor, MI*

### AWARDS FOR EXCELLENCE

#### ENERGY STAR Promotion

Columbia Association  
*Columbia, MD*

National Grid  
*Waltham, MA*

ProVia  
*Sugarcreek, OH*

The United Illuminating Company  
*Orange, CT*

#### Retailing

Metro Lighting  
*Brentwood, MO*

#### Affordable Housing

NeighborWorks® TOLEDO REGION  
*Toledo, OH*

## AWARDS

### 2014 Green Power Leadership Awards

#### PARTNER OF THE YEAR

Apple Inc.	<i>Cupertino, CA</i>
BD	<i>Franklin Lakes, NJ</i>
Google Inc.	<i>Mountain View, CA</i>
Oklahoma State University	<i>Stillwater, OK</i>

#### GREEN POWER PURCHASING

City of Beaverton, OR	<i>Beaverton, OR</i>
City of Houston, TX	<i>Houston, TX</i>
Herman Miller, Inc.	<i>Zeeland, MI</i>
June Key Delta Community Center	<i>Portland, OR</i>
Philadelphia Insurance Companies	<i>Bala Cynwyd, PA</i>
REI	<i>Kent, WA</i>
Steelcase Inc.	<i>Grand Rapids, MI</i>
Town of Peterborough, New Hampshire	<i>Peterborough, NH</i>

#### ON-SITE GENERATION

City of Las Vegas, NV	<i>Las Vegas, NV</i>
City of Philadelphia, PA	<i>Philadelphia, PA</i>

#### SUSTAINED EXCELLENCE IN GREEN POWER

Intel Corporation	<i>Santa Clara, CA</i>
Kohl's Department Stores	<i>Menomonee Falls, WI</i>

#### GREEN POWER COMMUNITY OF THE YEAR

Medford, OR Community	<i>Medford, OR</i>
Oak Ridge, TN Community	<i>Oak Ridge, TN</i>

#### GREEN POWER SUPPLIER OF THE YEAR

3Degrees Group, Inc.	<i>San Francisco, CA</i>
Portland General Electric	<i>Portland, OR</i>
Renewable Choice Energy	<i>Boulder, CO</i>
Washington Gas Energy Services	<i>Washington, DC</i>

### 2014 ENERGY STAR Combined Heat and Power Awards

#### CHPP PROJECT

Eastman Chemical Company, Tennessee Operations
Janssen Research & Development, LLC
Merck West Point CoGen3 Facility

#### LOCATION

<i>Kingsport, TN</i>
<i>Spring House, PA</i>
<i>West Point, PA</i>

#### CONTRIBUTING EPA CHPP PARTNERS

ABB, GE Power and Water
Caterpillar
Burns & Roe, GE Power and Water

## AWARDS

### 2014 Landfill Methane Outreach Program Projects and Partner of the Year Awards

#### PROJECTS AND PARTNER OF THE YEAR

Seneca Energy II Renewable Natural Gas Facility	<i>Waterloo, NY</i>
Sand Valley Landfill Gas to Electric Plant	<i>Collinsville, AL</i>
Hancock County (2014 Community Partner of the Year)	<i>Findlay, OH</i>

### 2014 GreenChill Achievement Awards

#### SUPERIOR GOAL ACHIEVEMENT

Hannaford  
Harris Teeter  
Hy-Vee  
King Kullen

#### EXCEPTIONAL GOAL ACHIEVEMENT

Hy-Vee  
King Kullen

#### MOST IMPROVED EMISSIONS RATE

Brookshire Grocery Company (since baseline year)  
Harris Teeter (year-to-year)

#### BEST EMISSIONS RATE

Port Townsend Food Co-op  
Stater Bros. Supermarkets

#### BEST OF THE BEST

Sprouts Farmers Market- Dunwoody, GA

#### STORE CERTIFICATION EXCELLENCE (SUPERMARKET PARTNER)

Sprouts Farmers Market

#### STORE CERTIFICATION EXCELLENCE (NON-SUPERMARKET PARTNER)

Hillphoenix

#### STORE RE-CERTIFICATION EXCELLENCE (SUPERMARKET PARTNER)

Sprouts Farmers Market - San Diego, CA  
Stater Bros. Supermarkets - Carlsbad, CA  
Stater Bros. Supermarkets - Cathedral City, CA  
Stater Bros. Supermarkets - Moreno Valley, CA  
Wegmans - Lanham, MD  
Whole Foods Market - Santa Rosa, CA

#### DISTINGUISHED PARTNER

Food Lion

## AWARDS

### 2014 Climate Leadership Award Winners

#### ORGANIZATIONAL LEADERSHIP AWARD

City of Chula Vista, CA

Sprint

University of California, Irvine

#### INDIVIDUAL LEADERSHIP AWARD

Sam Brooks, Associate Director, D.C. Department  
of General Services

Robert Taylor, Energy Manager, Washington Suburban  
Sanitary Commission

#### SUPPLY CHAIN LEADERSHIP AWARD

Sprint

#### EXCELLENCE IN GHG MANAGEMENT (GOAL ACHIEVEMENT AWARD)

The Boeing Company

Caesars Entertainment

Cisco Systems, Inc.

Ecolab

The Hartford

IBM

Johnson Controls

Kohl's Department Stores

Mack Trucks

Novelis

#### EXCELLENCE IN GHG MANAGEMENT (GOAL SETTING CERTIFICATE)

Fruit of the Loom, Inc.

Hasbro, Inc.

Kohl's Department Stores

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