# EERE FY 2015 Budget Request

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

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**April 2014**

# Major Administration Energy Goals

- **Reduce GHG emissions** in the range of 17% by 2020*
- **80% electricity from diverse clean energy** by 2035
- **Reduce net oil imports by 50%** by 2020
- **Double energy productivity** by 2030*

*Climate Action Plan Goal

# Office of Energy Efficiency and Renewable Energy

## EERE Vision

A strong and prosperous America powered by clean, affordable, and secure energy

## EERE Mission

To create and sustain American leadership in the transition to a global clean energy economy

# EERE's Guiding Principles

## The 5 EERE Core Questions

1. **IMPACT:** Is this a high impact problem?
2. **ADDITIONALITY:** Will the EERE funding make a large difference relative to existing funding from other sources, including the private sector?
3. **OPENNESS:** Are we focusing on the broad problem we are trying to solve and open to new ideas, approaches, and performers?
4. **ENDURING ECONOMIC IMPACT:** How will EERE funding result in enduring economic impact for the United States?
5. **PROPER ROLE OF GOVERNMENT:** Why is this investment a necessary, proper, and unique role of government rather than something best left to the private sector to address?

## Applying Impact Assessments to All of Our Activities

# Select Recent EERE Accomplishments

**Sustainable TRANSPORTATION**

- **First commercial cellulosic ethanol plant in U.S.**
- **SuperTruck – exceeded goal to develop and demonstrate Class 8 trucks that have a 50% improvement in freight efficiency compared to current models**
- **Battery cost reduction: $325/kWh, based on useable energy, complete packaged battery, and high volume production**

**Renewable ELECTRICITY GENERATION**

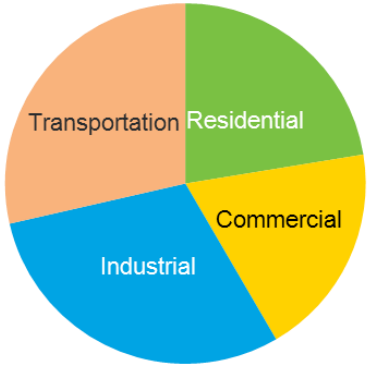
- **First grid connected near-field EGS plant increased power output of nearby operating geothermal field by nearly 38%**
- **Two of the world's largest state-of-the-art wind turbine drivetrain testing facilities open for business**

**Energy Saving HOMES, BUILDINGS, & MANUFACTURING**

- **Since 2009, finalized new efficiency standards for more than 30 household and commercial products, which are estimated to save consumers hundreds of billions of dollars through 2030 and cut greenhouse gas emissions.**

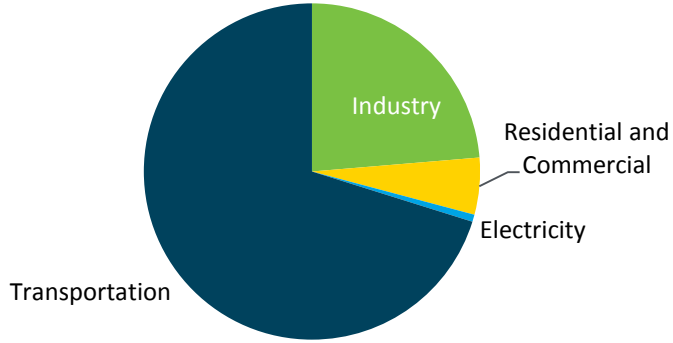
# United States Energy and Petroleum Use

## Primary Energy Use by Sector



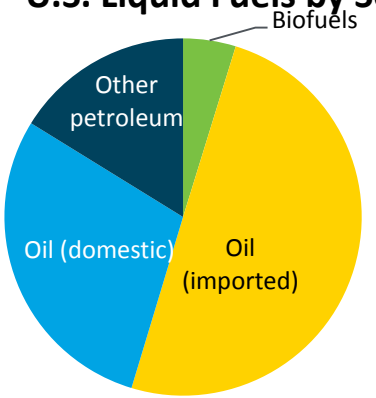

**36% of all U.S. energy use is from petroleum**

## Petroleum Use By Sector



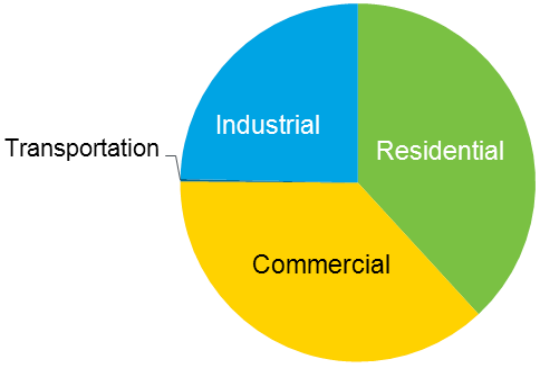

**70% of U.S. petroleum goes to transportation**

## U.S. Liquid Fuels by Source



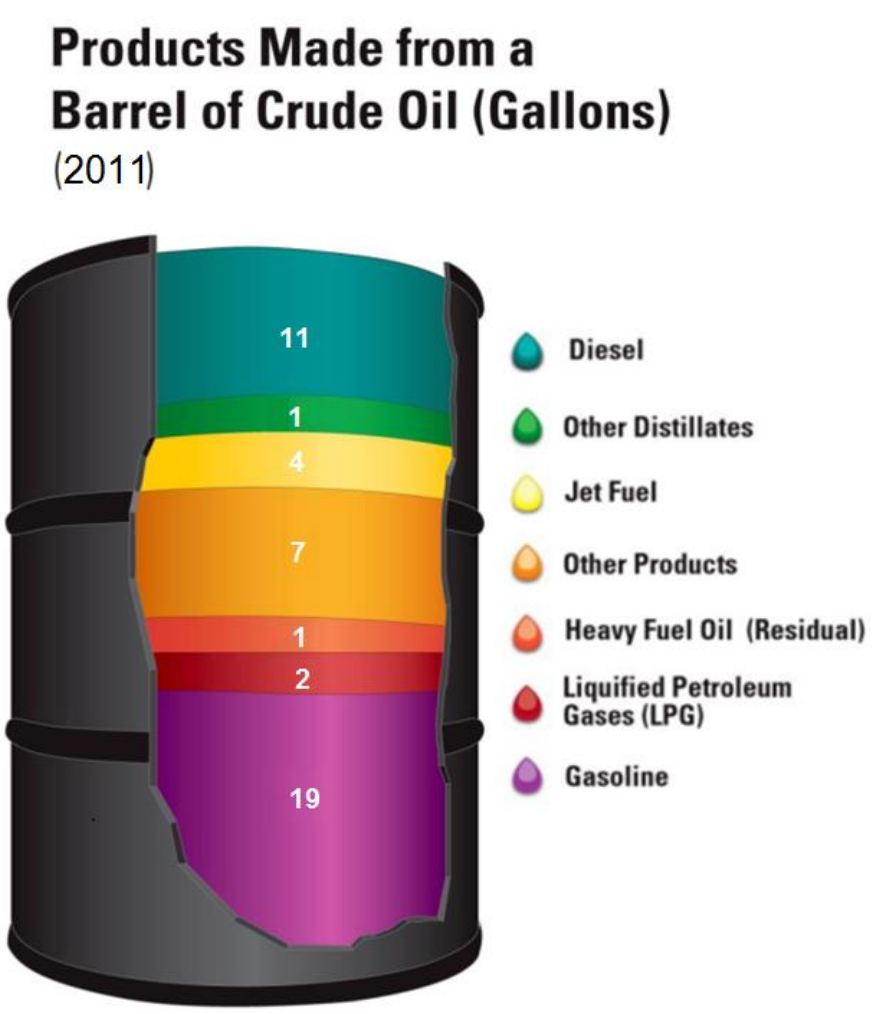

**50% of U.S. petroleum comes from imported oil**

## Electricity Use by Sector




**0.2% electricity used for transportation**

# Replacing the Whole Barrel



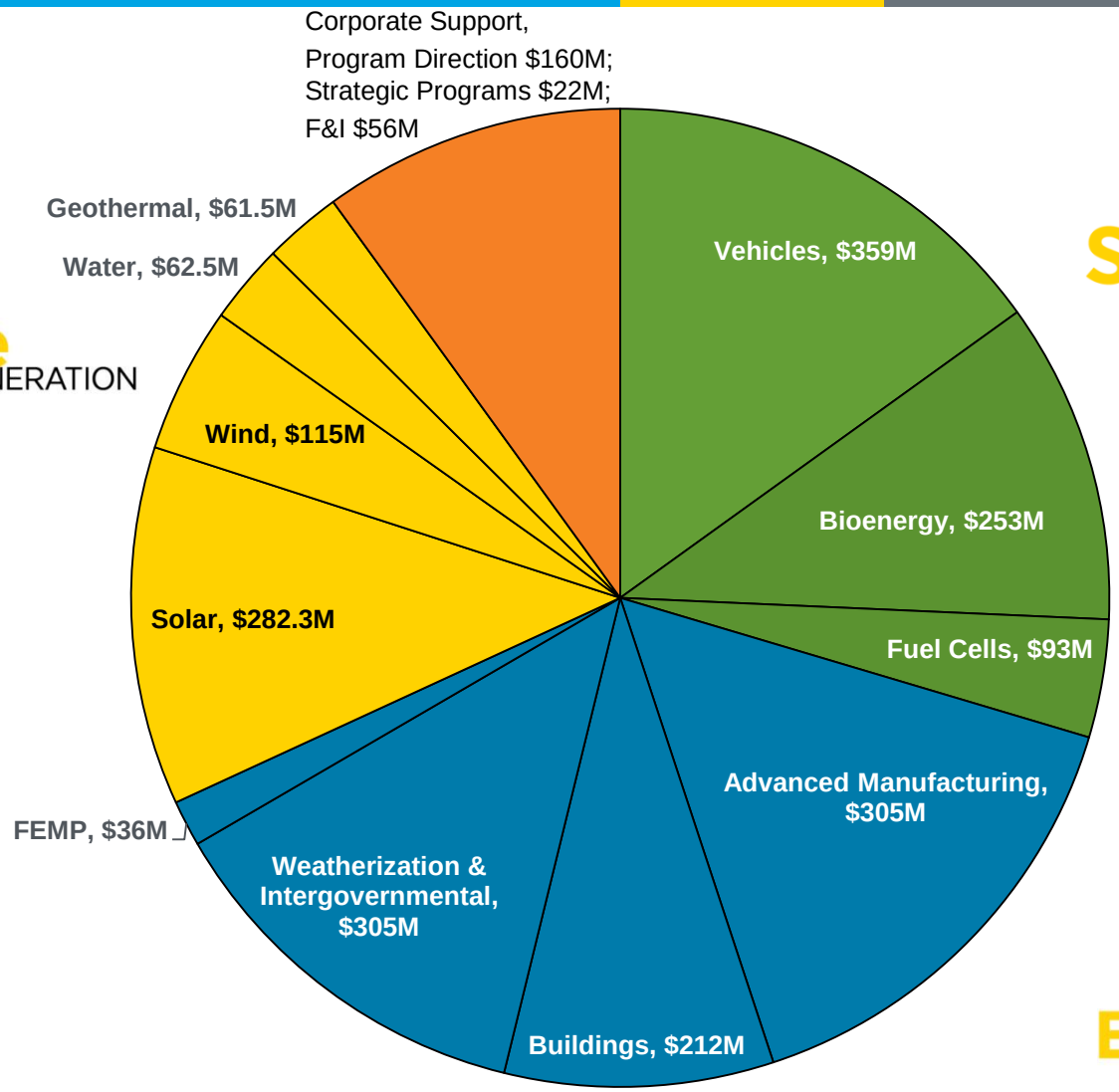

Source: Energy Information Administration (2011)

**Greater focus is needed on RDD&D for a range of technologies to displace the *entire* barrel of petroleum crude**

- U.S. spends about $1B each day on crude oil imports.*
- Only about 40% of a barrel of crude oil is used to produce petroleum gasoline.
- Reducing our dependence on oil also requires replacing diesel, jet fuel, heavy distillates, and a range of other chemicals and products that are currently derived from crude oil.

*American Petroleum Institute

# FY 2015 EERE Budget Request - $2.317B




**Renewable** ELECTRICITY GENERATION **$521M**

**Sustainable** TRANSPORTATION **$705M**

**Energy Saving** HOMES, BUILDINGS, & MANUFACTURING **$858M**

# FY 2015 Budget Summary Table

| Dollars in Thousands | FY 2013 Current | FY 2014 Enacted | FY 2015 Request | FY 2015 vs FY 2014 |
|---|---|---|---|---|
| **Transportation** | **584,199** | **614,955** | **705,183** | **+90,228** |
| - Vehicle Technologies | 303,165 | 289,737 | 359,000 | +69,263 |
| - Bioenergy Technologies | 185,190 | 232,290 | 253,200 | +20,910 |
| - Hydrogen and Fuel Cell Technologies | 95,844 | 92,928 | 92,983 | +55 |
| **Renewable Electricity** | **444,891** | **449,524** | **521,300** | **+71,776** |
| - Solar Energy Technologies | 269,050 | 257,058 | 282,300 | +25,242 |
| - Wind Energy Technologies | 86,129 | 88,126 | 115,000 | +26,874 |
| - Water Power Technologies | 54,687 | 58,565 | 62,500 | +3,935 |
| - Geothermal Technologies | 35,025 | 45,775 | 61,500 | +15,725 |
| **End-Use Efficiency** | **535,354** | **617,449** | **857,700** | **+240,251** |
| - Advanced Manufacturing | 114,254 | 180,471 | 305,100 | +124,629 |
| - Federal Energy Management Program | 28,265 | 28,248 | 36,200 | +7,952 |
| - Building Technologies | 204,601 | 177,868 | 211,700 | +33,832 |
| - Weatherization and Intergovernmental Programs | 188,234 | 230,862 | 304,700 | +73,838 |
| **Corporate Support Programs** | **208,889** | **231,513** | **237,779** | **+6,266** |
| **Subtotal, Energy Efficiency and Renewable Energy** | **1,773,333** | **1,913,441** | **2,321,962** | **+408,521** |
| - Use of Prior Year Balances | -81,576 | -2,382 | -5,213 | N/A |
| - Rescission of Prior Year Balances | 0 | -10,418 | 0 | N/A |
| **Total, Energy Efficiency and Renewable Energy** | **1,691,757** | **1,900,641** | **2,316,749** | **+416,108** |

## Sustainable
TRANSPORTATION

## Renewable
ELECTRICITY GENERATION

## Energy Saving
HOMES, BUILDINGS, & MANUFACTURING

# Sustainable TRANSPORTATION

**Office of Energy Efficiency and Renewable Energy**

U.S. Department of Energy

# Vehicle Technologies - Overview

## Motivation/Focus

- Vehicle Technologies develops and deploys advanced highway transportation technologies that reduce petroleum consumption and greenhouse gas emissions while meeting or exceeding vehicle performance expectations.
- The United States imports 45% of the oil it uses, sending more than $1 billion per day overseas for oil.
- The transportation sector accounts for 2/3 of U.S. petroleum use and on-road vehicles are responsible for 80% of this amount.
- CAFE standards will require a near doubling of fuel economy to 54.5 mpg light-duty average by 2025.

## Achievements

- Reduced the high-volume production cost of high-energy, high-power batteries from $1000/kWh to $325/kWh (2008-2013). Most hybrid electric vehicles sold in the United States today use EERE-developed battery technology.
- Supported the design/construction of a composite vehicle floor panel that saves 13 kg versus the original steel design and enabled the development of a magnesium alloy and processing technique to produce high-strength parts that can absorb crash energy while reducing weight by more than 30%. The newly-developed alloys contain no rare-earth elements, which are typically required for high performance magnesium.
- Enabled the development of an advanced inverter with an integrated controller that already meets Electric Drive R&D 2015 targets—and is being incorporated by a Tier I automotive supplier in their near-term production plans.
- SuperTruck Initiative demonstrated a 22% engine efficiency improvement in the laboratory, and 61% improvement in freight efficiency. All four SuperTruck teams are expected to meet the 50% freight efficiency improvement goal with on-road demonstrations.

## Goals/Metrics

- Cut battery costs from $325/kWh in 2013 to $125/kWh by 2022.
- Eliminate 30% of vehicle weight through lightweighting by 2022, compared to a 2002 baseline.
- Reduce the cost of electric drive systems from $16/kW in 2013 to $8/kW by 2022.
- Improve engine efficiency to demonstrate a 25% fuel economy improvement for passenger vehicles and 20% engine efficiency improvement for commercial vehicles (compared to 2009 baseline) by 2015.

# Vehicle Technologies – FY 2015 Budget Request

| (Dollars in Thousands) | FY 2013 Current | FY 2014 Enacted | FY 2015 Request |
|---|---|---|---|
| Batteries and Electric Drive Technology | 111,663 | 108,935 | 135,531 |
| Vehicle and Systems Simulation & Testing | 44,763 | 43,474 | 39,500 |
| Advanced Combustion Engine R&D | 55,004 | 49,970 | 49,000 |
| Materials Technology | 40,336 | 38,137 | 54,069 |
| Fuels and Lubricant Technologies | 16,960 | 15,990 | 27,400 |
| Outreach, Deployment and Analysis | 34,439 | 31,231 | 50,400 |
| NREL Site-Wide Facility Support | - | 2,000 | 3,100 |
| **Total, Vehicle Technologies** | **303,165** | **289,737** | **359,000** |

# Vehicle Technologies – FY 2015 Budget Highlights

- ***EV Everywhere* Grand Challenge ($209M):** Seeks to enable the United States to produce plug-in electric vehicles (PEV) that are as affordable and convenient as gasoline vehicles by 2022. The companion Workplace Charging Challenge encourages private-sector leadership in the build-out of convenient PEV charging for consumers. *(VTO Subprograms: Batteries and Electric Drive Technology, Vehicle and Systems Simulation & Testing, Materials Technology)*
- **Advanced Combustion R&D ($49M):** Support SuperTruck initiative to increase the fuel efficiency of Class 8 heavy-duty trucks by at least 50%, as well as low temperature combustion regimes that can dramatically increase passenger vehicle fuel economy.
- **Materials Lightweighting ($47M):** Supports greater depth and quantity of ultra lightweight vehicle substructure demonstrations. Emphasis includes improved properties, manufacturability, computational materials science, and enabling technologies for carbon fiber composites, advanced high-strength steels, aluminum alloys, and magnesium alloys.
- **Natural Gas and Drop-in Biofuel ($21.7M):** Expand R&D to eliminate technical barriers to the increased use of alternative and renewable fuels – specifically natural gas and drop-in biofuels. Focus includes natural gas storage and high-efficiency natural gas engines, as well as analysis of optimal biorefinery products for use in fueling infrastructure and vehicles (with EERE Bioenergy Technologies).
- **Alternative Fuel Vehicle Community Partner Projects ($20M)**: Accelerate the adoption of alternative fuels through competitively-awarded projects that deploy alternative fuel vehicles at scale.

# *EV Everywhere* Grand Challenge ($209M)

**President Obama issued the *EV Everywhere* Grand Challenge in March 2012 with the bold goal to enable the United States to produce plug-in electric vehicles (PEVs) that are as affordable and convenient for the average American family as today's gasoline-powered vehicles, within the next 10 years.**

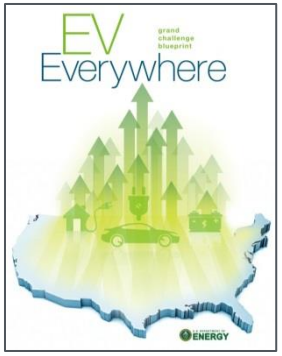
***EV Everywhere* Grand Challenge** *EV Everywhere* focuses on technical targets to reduce PEV cost and directs attention to breaking down the most difficult PEV deployment barriers.

**R&D** Technology performance and cost targets (by 2022):

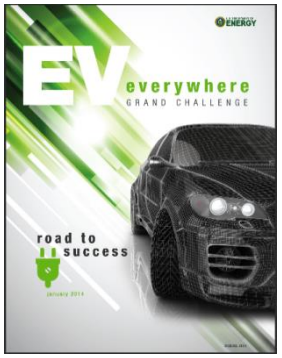
- **Batteries:** $125/kWh cost, 400 Wh/L energy density, 250 Wh/kg specific energy, 200 W/kg specific power
- **Electric drive system:** $8/kW cost, 1.4 kW/kg specific power, 4 kW/L power density, 94% system efficiency (55kW system cost of $440)
- **Materials lightweighting**: Overall weight reduction of almost 30% (35% reduction of body structure weight, 25% reduction of chassis and suspension weight, 5% reduction of interior weight)

Targets will guide DOE investments to reduce combined PEV battery and electric drive system costs by up to 75%. FY15 budget request includes $135.5M from Batteries and Electric Drive Technology, $26.4M from Vehicle and Systems Simulation & Testing, and $47M from Materials Technology.

**Workplace Charging Challenge** Goal is to achieve a tenfold increase in the number of U.S. employers offering workplace charging in the next five years. Leading U.S. employers in all economic sectors are taking the Challenge by committing to install workplace charging.




*EV Everywhere Blueprint (Jan 2013)*




*EV Everywhere Progress Report (Jan 2014)*

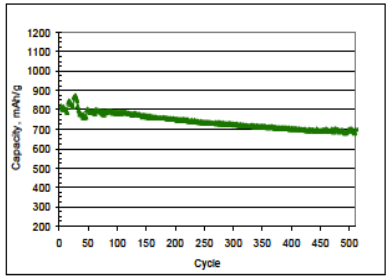
workplace charging challenge

***Now Over 50 Partners***

# Vehicle Technologies Battery R&D ($100M)

## Accomplishments

- FY 2013 cost target met, now at $325/kWh
- Industry awardee demonstrated novel cathode slurry processing techniques that reduced N-Methylpyrrolidone solvent use by 32% and increased coated electrode density by 31%. The awardee also increased cell energy density by 36% and reduced PHEV cell costs to $250/kWh from $420/kWh
- Industry awardee developed a silicon-graphite anode material that demonstrated 850mAh/g of reversible capacity and ~500 cycles
- Established 2.5 million kWh battery manufacturing capacity




**Status**

- On track to meet cost target of $300/kWh in FY 2014
- Calendar life up to 10 - 15 years
- Cycle life between 3,000-5,000 deep discharge

## FY15 Emphasis

Cost reduction, durability, safety, and increased specific energy:

- Develop and demonstrate next generation lithium ion PEV materials and cell technology
  - Develop high voltage, high capacity cathodes
  - Develop silicon composite and metal alloy anodes
  - Develop high voltage electrolytes
- Expand focus on beyond-Lithium-ion technology

**FY 2015 Goal**

Reduce the cost of a PHEV40 battery to $275/kWh

# Alternative Fuel Vehicle Community Partner Projects ($20M)

**Purpose:** Accelerate widespread introduction and adoption of commercially-available advanced technologies to reduce United States dependence on petroleum, increase local fuel diversification, and catalyze adoption of clean transportation technologies in other communities through best practices and collection and sharing of data.

- **Emphasis:**
  - High-impact, community-based partnerships among state and local governments and private sector.
  - Federal funding highly leveraged by private-sector investment; long-term sustainability beyond initial Federal investment.

- **Projects will:**
  - Implement operating policies and procedures and develop infrastructure to displace on-road vehicle petroleum use with alternatives such as natural gas, electricity, or biofuels.
  - Capture data and lessons learned to develop best practices, case studies, and success stories.

DOE will facilitate communities' ability to share experiences, develop essential expertise, and establish local service and support industries more rapidly, demonstrating to others the viability of adopting alternative fuels and advanced vehicles.

# Bioenergy Technologies - Overview

## Motivation/Focus

- The Bioenergy Technologies Office supports targeted research, development, demonstration, and deployment activities to progress the sustainable nationwide production of advanced biofuels that will displace a significant share of petroleum-derived fuels, mitigate climate change, create American jobs, and increase United States' energy security.

## Achievements

- **Feedstock Production and Logistics:** In FY 2013, Bioenergy Technologies' five high-tonnage feedstock logistics projects—which included partnerships with original equipment manufacturers—demonstrated significant reduction of costs. For example, AGCO Corporation reduced corn stover logistics cost $14.79/dry ton, from $51.54/dry ton (conventional systems) to as low as $36.75/dry ton (a 29% cost reduction). Other projects focused on integrated systems that utilize agricultural residues, forest resources, and/or herbaceous and short-rotation energy crops. Cost reductions claimed in all five projects have been independently validated by Oak Ridge National Laboratory researchers.
- **Conversion Technologies:** In FY 2013 and FY 2014, Bioenergy Technologies met technical research targets for the thermochemical conversion pathway that, when modeled, demonstrate a minimum fuel selling price (MFSP) of $5.60/gge for gasoline and diesel blendstock. These technical achievements represent R&D progress toward achieving the cost target of $3.00/gge for gasoline and diesel MFSP by 2017 for a thermochemical conversion pathway.
- **Demonstration and Deployment:** In FY 2013, the United States' first pioneer cellulosic ethanol plant supported by Bioenergy Technologies began production and commercial sale of product. This plant, developed by INEOS Bio, has an annual cellulosic ethanol production capacity of eight million gallons per year (mmgy). Two additional, commercial-scale biorefineries are expected to complete construction and commissioning in 2014. These facilities will add a production capacity of more than 40 mmgy of domestic cellulosic ethanol.

## Goals/Metrics

- Through research, development, demonstration, and deployment, make cellulosic biofuels competitive with petroleum-based fuels at a modeled cost of mature technology of $3.00/gasoline gallon equivalent (gge) ($2011), based on Energy Information Administration projected gasoline wholesale prices in 2017.
- Validate a mature technology plant model cost of ethanol production, of $2.15/gallon based on actual integrated biorefinery project plant performance data.

# Bioenergy Technologies – FY 2015 Budget Request

| (Dollars in Thousands) | FY 2013 Current | FY 2014 Enacted | FY 2015 Request |
|---|---|---|---|
| Feedstocks (including Algae) | 47,359 | 46,972 | 30,500 |
| Conversion Technologies | 75,140 | 101,384 | 100,500 |
| Demonstration and Deployment | 43,630 | 64,790 | 105,000 |
| Strategic Analysis and Cross-Cutting Sustainability | 14,939 | 12,146 | 11,000 |
| Cookstoves | 4,122 | 1,998 | 0 |
| NREL Site-Wide Facility Support | 0 | 5,000 | 6,200 |
| **Total, Bioenergy Technologies** | **185,190** | **232,290** | **253,200** |

# Bioenergy Technologies – FY 2015 Budget Highlights

- **Feedstocks ($30.5M):**
  - **Terrestrial Production and Logistics $16.5M:** Develop strategies, technologies, and systems that can sustainably provide feedstock to a conversion reactor for a total cost of no more than $80/dry ton by FY 2017, while meeting conversion process specifications and providing specific volume to meet demand.
  - **Algae $14M:** Pursue research in advanced biology and carbon dioxide utilization to leverage capabilities at the algae testbed facilities and lay a foundation for breakthroughs needed to meet FY 2022 algae productivity target (5,200 gallons of biofuel intermediate per acre of cultivation per year).
- **Conversion Technologies ($100.5M):** Conduct high-impact conversion technology R&D to demonstrate $3/gasoline gallon equivalent (gge) drop-in hydrocarbon biofuels by 2017 and 2022 using a wide array of feedstock and conversion technologies, with at least 50% greenhouse gas reduction on a lifecycle basis.
- **Demonstration and Deployment ($105M):** Advance biofuel commercial deployment through scale-up of integrated biorefinery demonstrations of high-volume potential hydrocarbon pathways, as well as support of military-specification jet fuel in collaboration with the U.S. Department of Defense and the U.S. Department of Agriculture through the Defense Production Act.
- **Strategic Analysis and Cross-Cutting Sustainability ($11M):** Coordinate with logistics and conversion R&D areas on the goal to set targets for minimizing GHG emissions, air pollutants, and consumptive water use for at least three renewable hydrocarbon pathways by FY 2016.

# Defense Production Act (DPA) Initiative ($60M)

**In July 2011, the Secretaries of Agriculture, Energy, and Navy signed a Memorandum of Understanding to commit $510M ($170M from each agency) to produce hydrocarbon jet and diesel biofuels in the near term. This initiative aims to develop:**

- Multiple, commercial-scale integrated biorefineries
- Biofuel that is cost-competitive with conventional, petroleum-derived fuel (without subsidies)
- Domestically produced fuels from non-food feedstocks
- Drop-in, fully compatible, MILSPEC fuels (F-76, JP-5, JP-8) to help meet the Navy's demand for 1.26 billion gallons of fuel per year

Navy's "Great Green Fleet" demonstration in 2012

**DOE has a $45M appropriation for DPA in FY14 and has requested funding (under BETO's Demonstration and Deployment subprogram) to continue support in FY15.**

The first projects selected under DPA Phase 1 are:

| Company | Location | Feedstock | Conversion Pathway | Capacity (MMgpy) |
|---|---|---|---|---|
| Emerald Biofuels | Gulf Coast | Fats, Oils, and Greases | Hydroprocessed Esters and Fatty Acids (HEFA) | 94.0 |
| Natures BioReserve™ | South Sioux City, NE | Fats, Oils, and Greases | Hydroprocessed Esters and Fatty Acids (HEFA) | 65.8 |
| Fulcrum BIOENERGY | Western United States | Municipal Solid Waste | Gasification – Fischer Tröpsch (FT) | 17.0 |
| Red Rock Biofuels | Lakeview, OR | Woody Biomass | Gasification – Fischer Tröpsch (FT) | 16.0 |

# Fuel Cell Technologies - Overview

## Motivation/Focus

- Through applied research, technology development and demonstration, and diverse efforts to overcome institutional and market challenges, FCTO enables the widespread commercialization of a portfolio of hydrogen and fuel cell technologies.

## Achievements

- Reduced the projected high-volume manufacturing cost of automotive fuel cells to $55/kW at the end of 2013. This represents a more than 30% reduction since 2008 and more than 50% reduction since 2006.
- Improved the catalyst specific power of fuel cells to 6.0 kW/g of platinum group metal in 2013, more than double the 2008 baseline of 2.8 kW/g and approaching the 2020 target of 8.0 kW/g, an 80% reduction in total platinum content in fuel cells since 2005. This has been achieved through breakthrough developments such as nanostructured thin film catalysts and core-shell catalysts.
- Reduced the capital cost of electrolyzer stacks by 80% since 2002.
- Demonstrated the world's first tri-generation (combined heat, hydrogen, and power) fuel cell station, which has shown a combined efficiency of 54% for co-producing hydrogen and power from a stationary fuel cell.
- Successfully stimulated early fuel cell markets and catalyzed industry investment:
  - The cost-shared deployments of approximately 1,600 fuel cell powered lift trucks and backup power systems have led to nearly 9,000 additional orders by industry with *no additional DOE investment*.
  - A sampling of 9 companies shows that industry has realized revenues of >6X the amount of DOE funding and a subset of those companies has invested more than 9X what DOE originally funded.
  - Funding has led to 40 commercial technologies, more than 60 emerging technologies (expected to be commercial within three years) and more than 450 patents.

## Goals/Metrics

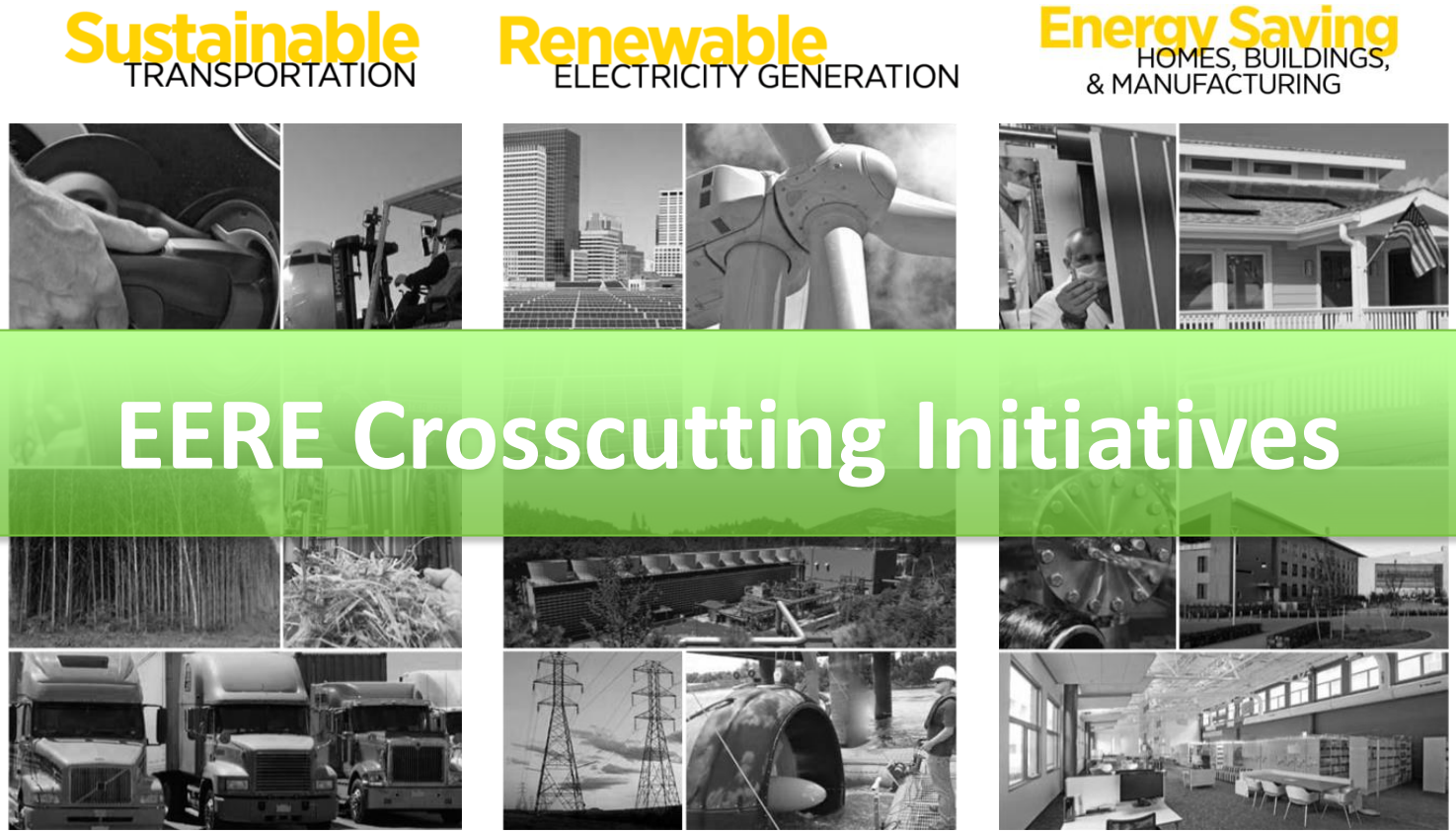
- By 2020, reduce automotive fuel cell system cost to $40/kW (to be competitive with advanced technology vehicles on a $/mile basis), with an ultimate target of $30/kW and improve durability to 5,000 hours (equivalent to 150,000 miles of driving).
- By 2020, reduce the cost of renewably produced hydrogen to less than $4/gge.

# Fuel Cell Technologies – FY 2015 Budget Request

| (Dollars in Thousands) | FY 2013 Current | FY 2014 Enacted | FY 2015 Request |
|---|---|---|---|
| Fuel Cell R&D | 41,266 | 33,383 | 33,000 |
| Hydrogen Fuel R&D | 31,681 | 36,545 | 36,283 |
| Manufacturing R&D | 1,899 | 3,000 | 3,000 |
| Systems Analysis | 2,838 | 3,000 | 3,000 |
| Technology Validation | 8,514 | 6,000 | 6,000 |
| Safety, Codes and Standards | 6,808 | 7,000 | 7,000 |
| Market Transformation | 2,838 | 3,000 | 3,000 |
| NREL Site-Wide Facility Support | 0 | 1,000 | 1,700 |
| **Total, Fuel Cell Technologies** | **95,844** | **92,928** | **92,983** |

# Fuel Cell Technologies – FY 2015 Budget Highlights

- **Fuel Cell R&D ($33M):** Develop and demonstrate innovative technologies to reduce cost and improve durability – e.g., by increasing PEM fuel cell power output per gram of platinum-group metal catalyst to 6.5kW/g in 2015 and 8.0kW/g by 2020 (from 2.8kW/g in 2008).
- **Hydrogen Fuel R&D ($36.3M):** Advance pioneering technologies in materials, components, and processes that will reduce the cost of hydrogen from renewable resources to $6.80/gge (dispensed and untaxed) from $8.00/gge in 2011; and the cost of hydrogen storage systems by 15% compared to the 2013 baseline of $17/kWh.
- **Manufacturing R&D ($3M):** Demonstrate a ground-breaking 3X increase of continuous in-line measurement processes to achieve 100 ft./min for MEA and MEA component roll-to-roll processing.
- **Market Transformation ($3M):** Demonstrate zero-emissions medium-duty fuel cell hybrid electric trucks with a projected range of >100 miles, meeting parcel delivery route requirements, and enable a 5X increase of fuel cell deployments from the 2012 baseline.
- **Technology Validation** (**S6M):** Demonstrate an electrolyzer capable of producing hydrogen for a refueling station with an output pressure of greater than 50 bars, a hydrogen storage and refueling system for a roof-top backup power system capable of providing power for telecommunications equipment, the potential for doubling hydrogen capacity at refueling stations, and integrating water electrolyzers and/or fuel cells with the grid.
- **Safety, Codes and Standards ($7M):** Develop a national hydrogen fueling station template including codes necessary for widespread commercialization of infrastructure, implement standardized training related to the codes.

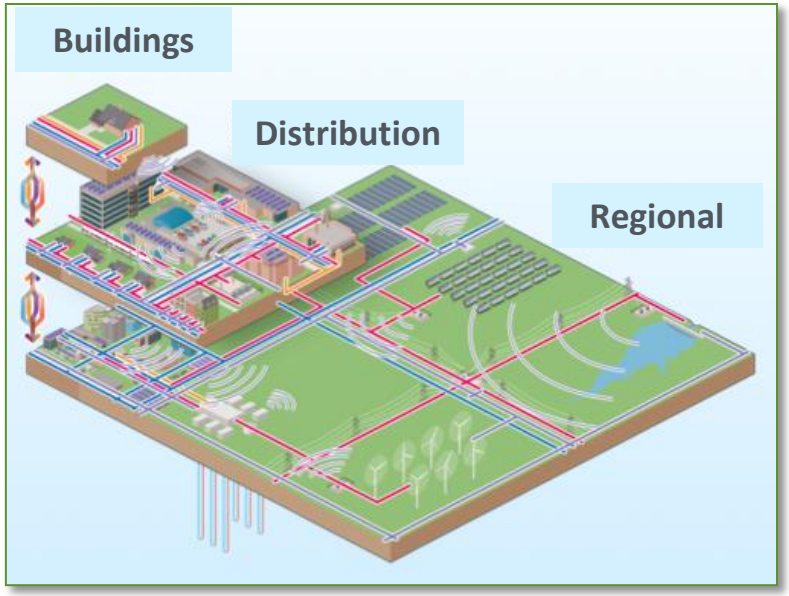



# EERE Crosscutting Initiatives

**Within our technology office budgets, EERE organizes and coordinates investments across our technology sectors around common themes to achieve maximum impact for the U.S. taxpayer.**

# Grid Integration Initiative ($126M)

- To support DOE's cross-cutting grid integration efforts, February 2014 workshop held with industry, universities, utilities, and other stakeholders focused on addressing relevant challenges at the Building, Campus, Distribution, and Regional Scale.
- In FY14, EERE has developed a coordinated effort across the program offices with the Energy Systems Integration Facility (ESIF) which received stakeholder review in February. This will support the joint FY15 activity.
- The FY 2015 request includes a joint (Solar, Buildings ,and Vehicles offices) $19 million funding opportunity announcement to develop and demonstrate technologies and tools enabling improved integration of electric vehicles, distributed renewable generation, and building equipment – optimizing overall performance and improving interactivity with the utility grid to better meet grid requirements .




**Additional High Priority Activities Focused on Challenges at a Variety of Scales**

| Buildings, Campus, and Fleet Scale | Distribution Scale | Regional Scale |
|---|---|---|
| • Transactive Controls: Develop technologies and control systems that not only can optimize energy performance and comfort, but also can support energy-related transactions outside the building envelope. | • Distributed energy storage technologies integrated with distributed solar PV for addressing the variability of the resource and increasing the hosting capacity of PV systems on the grid. | • Continued development of "concurrent cooling" analyses and methodologies to describe the correlation between wind plant generation and wind cooling of transmission lines |

Dollars in Thousands

| EERE Grid Integration Initiative Activities by Program Office | FY 2015 Request |
|---|---|
| Buildings Technologies | 17,000 |
| Fuel Cell Technologies | 1,000 |
| Solar Energy Technologies | 56,900 |
| Vehicle Technologies | 8,500 |
| Water Power Technologies | 4,000 |
| Wind Power Technologies | 8,559 |
| Energy Systems Integration Facility | 30,000 |
| **Total, EERE Grid Integration Initiative** | **125,959** |

# Energy Systems Integration Facility (ESIF) ($30M)

- ESIF will complete the first full year of RD&D in FY14 supported by $20M for staffing and operational cost.
- Numerous AOP, WFO, CRADA, and Cost-shared projects will be conducted with a variety of participants including DOE, Federal and State government, academia, not-for-profit enterprises and commercial businesses.
- A major cross-cutting project titled INTEGRATE was begun with EERE support and continues to deliver results.
- In FY 2015, ESIF will continue normal operations and expand investments to function as a DOE User Facility supporting a group of peer reviewed competitively selected projects addressing a scope of work defined by DOE.

| FY15 ESIF Operating Costs | Labor ($K) | Non-Labor ($K) | FY 2015 Request ($K) |
|---|---|---|---|
| ESIF Administration | 750 | 240 | 990 |
| Scientific Staff | 9,800 | 0 | 9,800 |
| Equipment | 0 | 4,000 | 4,000 |
| Operations & Maintenance | 1,825 | 9,985 | 11,810 |
| Utilities | 0 | 3,400 | 3,400 |
| **Total** | **12,375** | **17,625** | **30,000** |


**Addressing the challenges of integrating clean energy technologies into the energy systems infrastructure at all scales**

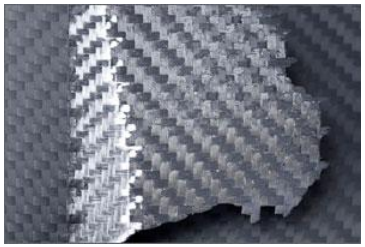
# Clean Energy Manufacturing Initiative ($554M)

Offices across EERE
are collaborating in the
**Clean Energy Manufacturing Initiative**
*to increase U.S. manufacturing competitiveness*

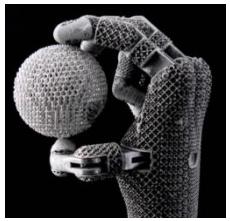
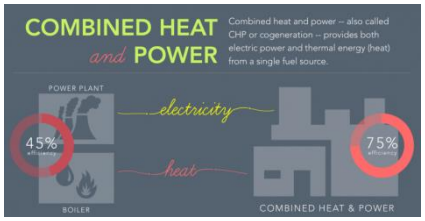
***Objectives***

1. **Increase U.S. competitiveness in the production of clean energy products**





2. **Increase U.S. manufacturing competitiveness across the board by increasing energy productivity**

Dollars in Thousands

| Clean Energy Manufacturing Initiative Activities by Program Office | FY 2015 Request |
|---|---|
| Vehicles Technologies | 35,000 |
| Bioenergy Technologies | 124,500 |
| Hydrogen and Fuel Cell Technologies | 4,000 |
| Solar Energy Technologies | 67,700 |
| Wind Power Technologies | 3,500 |
| Water Power Technologies | 4,000 |
| Advanced Manufacturing | 305,000 |
| Building Technologies | 10,000 |
| **Total, CEMI** | **553,700** |

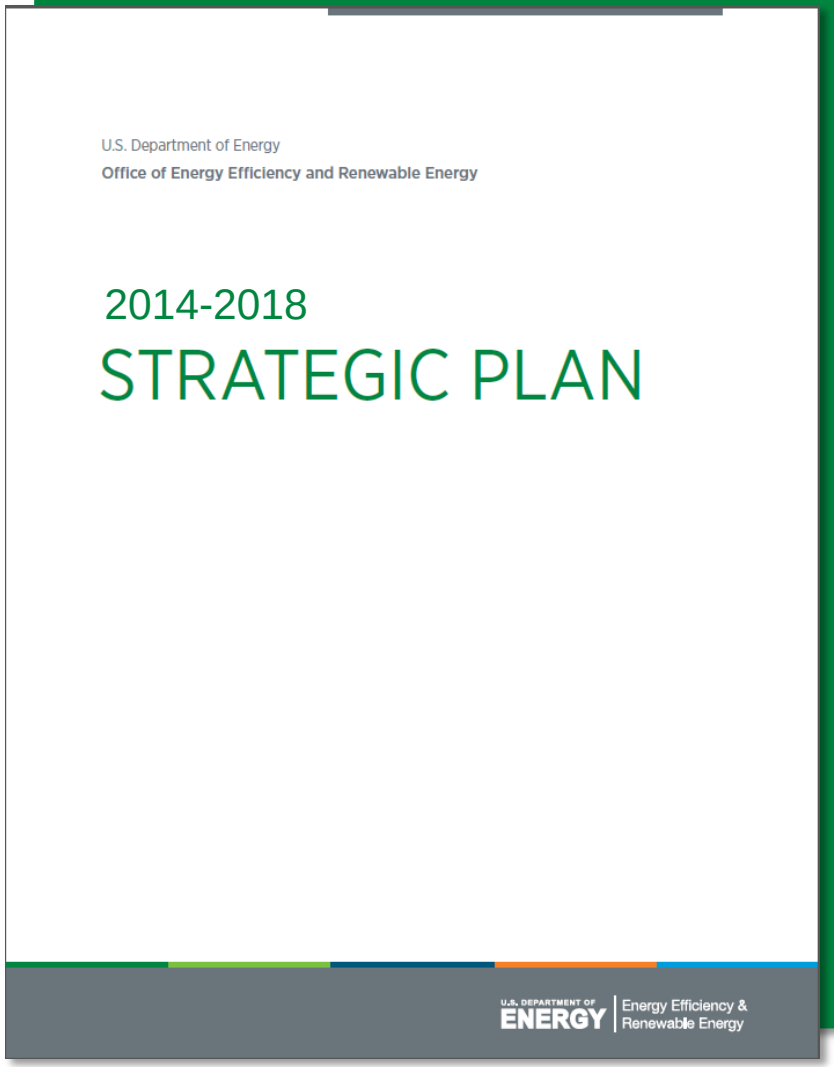
**Approach:**

1. **R&D**
   - For developing processes to produce clean energy technologies
   - For developing cross-cutting manufacturing technologies
2. **NNMI Institutes & Other Facilities**
   - Institutes in the National Network for Manufacturing Innovation
3. **Technical Assistance**
   - For implementing Energy Efficiency in manufacturing
4. **Competitiveness Analysis**
5. **Partnerships and Engagement**

# EERE Strategic Plan

## Purposes of the Strategic Plan

- (Re)Define EERE
- Demonstrate the logical basis for our vision and goals
- Connect to our stakeholders

# QUESTIONS?

EERE Budget documents can be found at:

http://energy.gov/eere/budget/eeres-2015-budget

Contact EERE Stakeholder Engagement at:

SE@ee.doe.gov