

# EERE FY 2015 Budget Webinar

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy



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# 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

## **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**

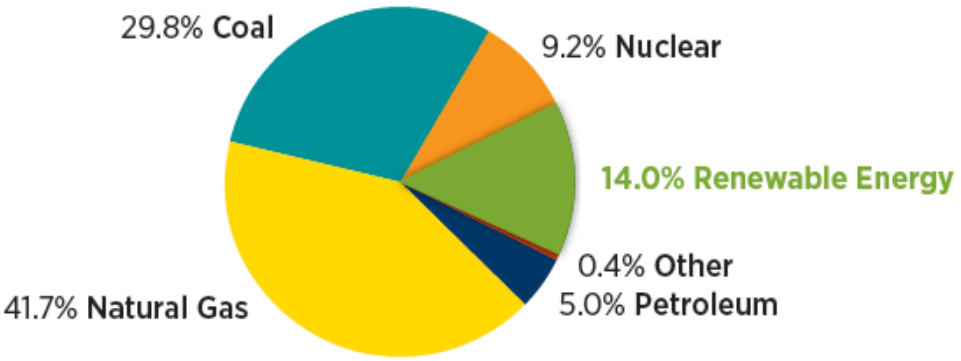
## Energy Saving HOMES, BUILDINGS, & MANUFACTURING

- 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.

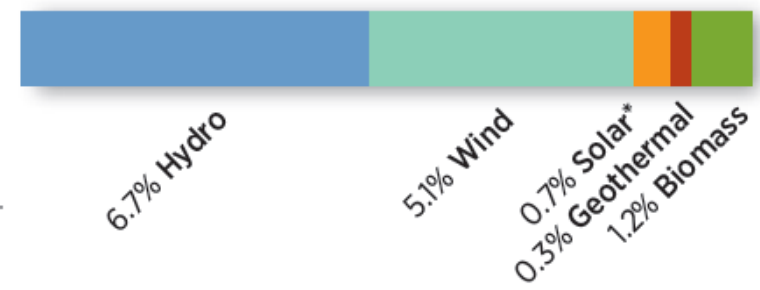


# U.S. Electricity Nameplate Capacity and Generation (2012)

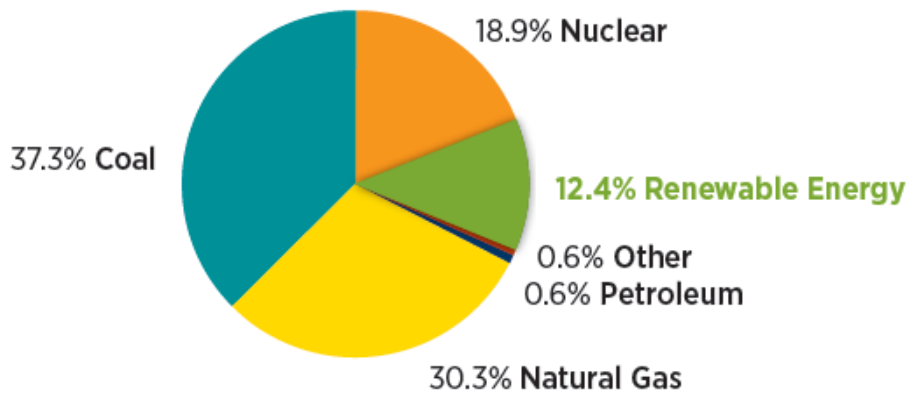
U.S. Electric Nameplate Capacity (2012): 1,168 GW



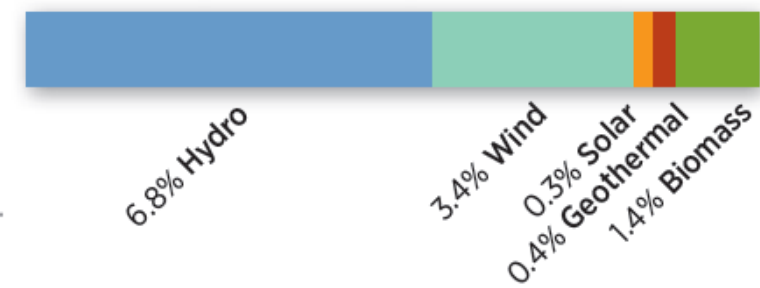
U.S. Renewable Capacity: 164 GW



U.S. Electric Net Generation (2012): 4,068 TWh



U.S. Renewable Generation: 504 TWh



Source: Renewable Energy Data Book 2012

# SunShot Initiative – Solar Grid Parity by 2020

2010

2013

2020

## MAJOR PROGRESS

## PRIORITY AREAS



60% progress towards 2020 objectives



More than 10 GW of PV on the nation's grid, 4.3 GW added in 2013: 10x growth rate from 2009



Unprecedented job growth (143k jobs, 20% growth year-over-year)



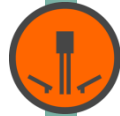
SunShot Incubator spurring small business growth, private sector investment: \$18 in private follow-on funding for every \$1 of DOE investment



Soft costs reduction: 64% of cost of a residential system



Grid integration with higher penetration of solar and other renewables

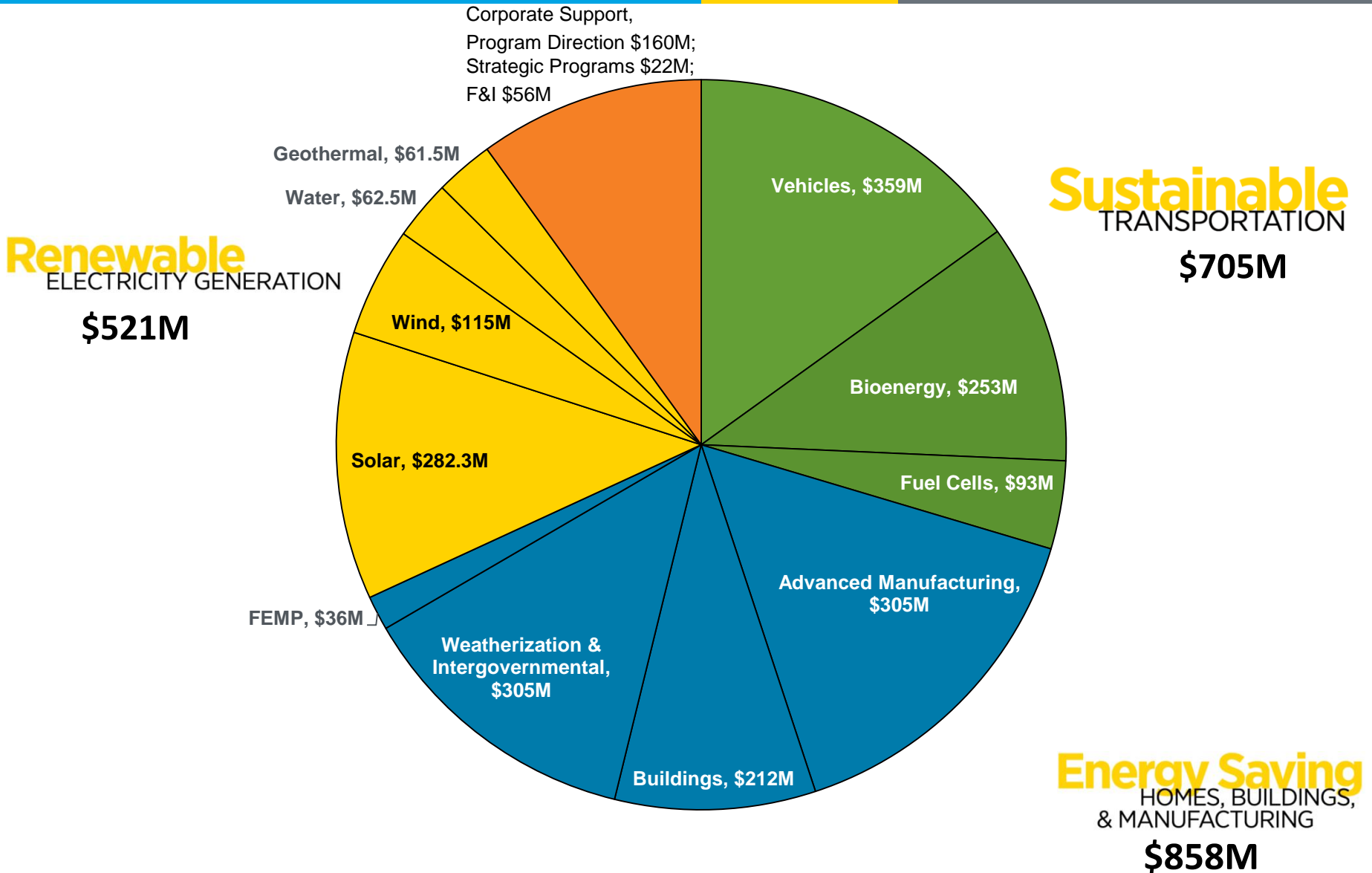


CSP to provide more dispatchable renewable power, thanks to thermal storage; Supercritical CO2 to advance CSP performance



As part of CEMI, capture a greater portion of the global value add

# FY 2015 EERE Budget Request - \$2.317B





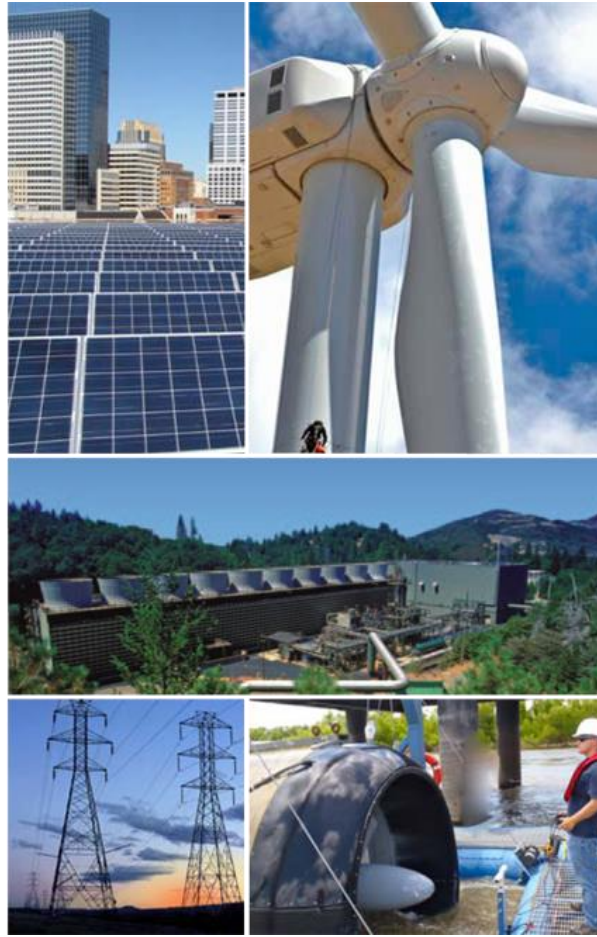
# FY 2015 Budget Summary Table

Dollars in Thousands	FY 2013 Current	FY 2014 Enacted	FY 2015 Request	FY 2015 vs FY 2014
<b>Transportation</b>	<b>584,199</b>	<b>614,955</b>	<b>705,183</b>	<b>+90,228</b>
- 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
<b>Renewable Electricity</b>	<b>444,891</b>	<b>449,524</b>	<b>521,300</b>	<b>+71,776</b>
- 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
<b>End-Use Efficiency</b>	<b>535,354</b>	<b>617,449</b>	<b>857,700</b>	<b>+240,251</b>
- 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
<b>Corporate Support Programs</b>	<b>208,889</b>	<b>231,513</b>	<b>237,779</b>	<b>+6,266</b>
<b>Subtotal, Energy Efficiency and Renewable Energy</b>	<b>1,773,333</b>	<b>1,913,441</b>	<b>2,321,962</b>	<b>+408,521</b>
- Use of Prior Year Balances	-81,576	-2,382	-5,213	N/A
- Rescission of Prior Year Balances	0	-10,418	0	N/A
<b>Total, Energy Efficiency and Renewable Energy</b>	<b>1,691,757</b>	<b>1,900,641</b>	<b>2,316,749</b>	<b>+416,108</b>

# Sustainable TRANSPORTATION



# Renewable ELECTRICITY GENERATION



# Energy Saving HOMES, BUILDINGS, & MANUFACTURING





# Renewable ELECTRICITY GENERATION

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





# Solar Energy Technologies - Overview

## Motivation/Focus

SunShot Initiative's goal is to develop solar energy technologies to be **cost-competitive without subsidies** with conventional energy sources by 2020. Reducing the total installed cost for utility-scale solar electricity to roughly \$.06/kWh will enable rapid, large-scale adoption of solar electricity. We aim to re-establish **American technological and market leadership** in solar energy, improve the Nation's **energy security**, **reduce environmental impacts** of electricity generation, and strengthen **U.S. economic competitiveness**.

## Achievements

- **Commercialization of DOE supported technologies in CSP:** Technologies developed with DOE investments over the years have led to large scale commercial deployment of CSP systems in the US totaling over 1.3 GW.
- **R&D leadership:** Over the past 35 years, DOE R&D funding at our nation's academic, national, and industrial laboratories has resulted in over 50% of the world records for solar cell efficiency.
- **Enabling higher levels of renewables integration:** R&D supported by the program helped inform the final Small Generator Interconnection Procedures that will streamline the interconnection of residential and commercial solar.
- **Cutting Red Tape:** Engagement with state and local government as well as businesses through the Rooftop Solar Challenge I and II programs saved Americans nearly 800 years of red tape related to roadblocks (1 week saved across 40,000 systems (600MW of residential and commercial solar) installed in first year and shortened permitting time by 40% and reduced permitting fees by 12%.
- **SunShot Incubator:** Since 2007, the SunShot Incubator program has provided early stage assistance to small businesses to rapidly bring new products and services to the marketplace. Approximately \$104M invested since the inception of this program has resulted in over \$1.7B in follow on private capital financing of these businesses.
- **Supporting a trained workforce:** The Solar Instructor Training Network of almost 400 community colleges across the nation helps meet the growing demand for workers in the solar industry with a focus on recruiting returning veterans. This network has so far trained over 22,000 workers to enter the solar field.

## Goals/Metrics

- By 2020, achieve cost competitiveness without subsidies. For PV systems, this goal translates to approximately:
  - Utility-scale installed system price:  $\$1.00/W_{dc}$  from a 2010 baseline of  $\$3.80/W_{dc}$
  - Commercial-scale installed system price:  $\$1.25/W_{dc}$  from a 2010 baseline of  $\$5.00/W_{dc}$
  - Residential-scale installed system price:  $\$1.50/W_{dc}$  from a 2010 baseline of  $\$6.80/W_{dc}$
- By 2020, for CSP, the goal of \$.06/kWh translates to about \$3.50/W including 16 hours of thermal storage.
- By the end of 2013, progress 60% of the way to the 2020 objectives have been achieved.

# Solar Energy Technologies – FY 2015 Budget Request

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Concentrating Solar Power	43,080	48,571	61,400
Photovoltaic R&D	150,580	56,641	42,000
Systems Integration	45,773	52,816	56,900
Balance of Systems Soft Cost Reduction	29,617	42,558	45,100
Innovations in Manufacturing Competitiveness	0	44,472	67,700
NREL Site-Wide Facility Support	0	12,000	9,200
<b>Total, Solar Energy Technologies Office</b>	<b>269,050</b>	<b>257,058</b>	<b>282,300</b>

# Solar Energy Technologies – FY 2015 Budget Highlights

- **Concentrating Solar Power (\$61.4M):** Significant progress in CSP has enabled reductions in LCOE from \$0.21/kWh in 2010 down to \$0.13/kWh in 2013 with a goal of reaching \$0.06/kWh by 2020. Higher temperatures and thermal storage will be required to achieve the 2020 goals. An increased effort on Supercritical CO<sub>2</sub> Brayton power cycles will advance CSP system efficiencies towards the SunShot targets.
- **Photovoltaic R&D (\$42M):** Continued focus on advancing PV performance in our nation's laboratories where the DOE has supported US leadership in technology advancement to enable a globally competitive US industry. New effort on developing PV recycling technology.
- **System Integrations (\$56.9M):** Costs of PV systems have fallen by more than 50% since 2010 and the office is now about 60% of the way towards the 2020 SunShot target of grid parity. Lower systems costs are resulting in record growth in deployment but the grid will be challenged with higher levels of renewables. In coordination with other DOE offices, new efforts to develop technologies to integrate solar with buildings and vehicle will create systems that enable higher levels of renewables integration while contributing to a reliable and resilient power grid.
- **Balance of Systems Soft Cost Reduction (\$45.1M):** Non hardware "soft costs" remain one of the largest challenges in achieving the 2020 SunShot targets. These soft costs now account for 64% of the total cost of residential systems. Increased focus on engagement with state and local governments and small businesses as well as community colleges will help reduce the "soft costs" as well as enable a trained and efficient solar workforce that now numbers over 142,000 jobs in America, a 20% year over year growth rate.
- **Innovations in Manufacturing Competitiveness (\$67.7M):** Focus on supporting manufacturing R&D that could help US industries reduce manufacturing costs for global competitiveness. Solar products have the near term potential to reach over \$100B in global trade, enabling a greater US share of that trade is critical to long term competitiveness of the US industry. The President's budget request increases funding for the successful SunShot Incubator program that has provided 18 to 1 leverage of federal funds with private follow on investments.



# Wind Power Technologies - Overview

## Motivation/Focus

- EERE's Wind Power Technologies Office invests in high impact technology innovations to drive continuing cost reductions in wind power. DOE additionally provides a national testing platform, drives improvements in permitting, and generates methodologies and data needed to address market barriers and grid integration.
- There are 90 quads of U.S. land-based wind potential and 50 quads of U.S. offshore wind potential, which, combined, are more than 10 times the total current U.S. delivered electricity consumption.
- The office's FY 15 approach is to:
  - Optimize wind plant cost of energy reduction through complex aerodynamics R&D, advanced component development, wind plant reliability improvement and resource characterization
  - Help establish a competitive U.S. offshore wind industry through offshore targeted research activities and full-scale demonstrations
  - Eliminate and reduce market barriers through accelerated siting and deployment strategies and advance wind system grid integration through integration studies and operational forecasting tool development
  - Inform wind techno-economic impact assessment and support development of a US wind industry roadmap out to 2050 through modeling and analysis of wind LCOE, electric sector capacity expansion, and technology deployment and annual reporting of wind market installation, performance and cost trends.

## Achievements

- The unsubsidized cost of U.S. wind energy has decreased by 86%—from more than \$0.57 /kilowatt hour (kWh) in 1980 to \$0.077 /kWh in 2012 (\$2013)—and has decreased by 37% over just the last 5 years.
- Wind deployment has grown substantially in the last decade, from 6.6 GW in 2004 to 60 GW in 2013, doubling in the last 5 years and providing over 4% of total U.S. electricity generation in 2013.

## Goals/Metrics

- Reduce the unsubsidized market LCOE for utility-scale land wind energy systems from a reference wind cost of \$.074/kWh in 2012 to \$.057/kWh by 2020 and \$.042/kWh by 2030\*
- Reduce the unsubsidized market LCOE for offshore fixed-bottom wind energy systems from a reference of \$.20/kWh in 2012 to \$.17/kWh by 2020 and \$.14/kWh by 2030\*
- Meeting the office's LCOE goals will enable meeting the office's deployment goal of total U.S. wind installed capacity in of 300 GW by 2030, estimated to be able to meet 20 percent of U.S. electricity demand in 2030.

# Wind Power Technologies – FY 2015 Budget Request

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Resource Characterization and Technology RD&T (Land, Offshore, Distributed)	0	0	38,416
Technology Validation and Market Transformation	0	0	42,613
Mitigate Market Barriers	0	0	17,209
Modeling and Analysis	0	0	12,062
NREL Site Wide Facility Support	0	9,000	4,700
Technology Development and Testing	62,399	61,006	0
Technology Application	23,730	18,120	0
<b>Total, Wind Power Technologies</b>	<b>86,129</b>	<b>88,126</b>	<b>115,000</b>

## Comparable Funding

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Resource Characterization & Technology RD&T (Land, Offshore, Distributed)	52,939	34,409	38,416
Technology Validation and Market Transformation	8,000	21,049	42,613
Mitigate Market Barriers	11,301	10,129	17,209
Modeling and Analysis	13,889	13,539	12,062
NREL Site Wide Facility Support	0	9,000	4,700
<b>Total, Wind Power Technologies</b>	<b>86,129</b>	<b>88,126</b>	<b>115,000</b>

# Wind Power Technologies – FY 2015 Budget Highlights

- **Promote Offshore Wind (\$46.7M):** Key component technology development and validation to increase the viability of offshore wind systems; multi-year program to perform pioneering U.S. offshore wind demonstration projects; and offshore renewable initiative on analysis and development of next-generation offshore wind substructure elements. *(WPTO subprogram: Technology Validation and Market Transformation)*
- **Atmosphere to Electrons (A2e) initiative (\$14.4M):** Comprehensive R&D initiative to address wind plant performance improvement opportunities. Key research institutions and computational assets will be leveraged to conduct high fidelity modeling activities to understand the complex flow of the resource in wind farms to increase wind farm energy capture, reduce annual operational costs and improve project financing terms. *(WPTO subprogram: Resource Characterization & Technology RD&T (Land, Offshore, Distributed) )*
- **Manufacturing Competitiveness (\$3.5M):** R&D to address logistical and transportation constraints of very tall wind towers (120 meters and above) and very large (~100 meter) turbine blades, enabling access to better wind resources, lower energy costs, and improve domestic manufacturing competitiveness. *(WPTO subprogram: Resource Characterization & Technology RD&T (Land, Offshore, Distributed) )*
- **Market Barriers (\$17.2M):** Facilitate environmentally responsible deployment of wind technologies through continued multi-year efforts to overcome permitting challenges associated with wind-wildlife interactions; collaboration with Federal agencies on mitigating the effects of wind turbines on long range surveillance and terminal radars; and system reserves and power markets evaluation, next-generation wind integration studies, and development of grid operational tools. *(WPTO subprogram: Mitigate Market Barriers)*

# Offshore Wind (\$46.7M)

**Consistent with DOE/DOI's the *National Offshore Wind Strategy*, Offshore Wind activities will support research that is expected to simultaneously improve offshore wind power plant performance, reduce capital and operational costs and reduce market barriers—directly contributing to the office goal of lowering the cost of energy. This activity supports a multi-year program to facilitate the creation of U.S. offshore wind industry.**

- Tremendous U.S. offshore wind resource, exceeding 50 quads (4,000 GW), which is more than three times the Nation's current annual electricity production.
- The Offshore Wind Demonstration Funding Opportunity is a 5-year initiative
- In 2014, will down select to three of seven projects to move to final design, construction, and installation activities based on:
  - Project progress in 2013 and 2014
  - Innovations and their potential reductions on the cost of energy
  - Likelihood of project success as well as advancement of the national knowledge base and commercial impact in the United States.
- Projects are anticipated to complete construction and be in operation by the end of 2017, and will represent some of the very first at-scale deployments in the United States.



# Water Power Technologies - Overview

## Motivation/Focus

- The mission of EERE's Water Power Technologies Office is to research, develop, test, demonstrate, and deploy innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from U.S. water resources at an accelerated pace.
  - **Marine and Hydrokinetic (MHK):** MHK technologies generate energy from highly forecastable waves and currents (tidal, ocean, river). With more than 50% of the American population living within 50 miles of the U.S. coastline, a cost-effective MHK industry could provide a substantial amount of electricity for the nation.
  - **Hydropower** is a proven renewable resource that provides the largest share of U.S. renewable generation. Significant opportunities remain to expand hydropower generation in the United States. Hydropower also provides strategically valuable ancillary benefits uniquely suited to support further integration of variable renewable energy technologies.

## Achievements

- **Wave Energy Testing and Demonstration:** The Northwest National Marine Renewable Energy Center (one of three Marine Renewable Energy Centers in the United States) launched the Ocean Sentinel, a mobile ocean testing platform, which obtains critical technical and cost performance data for a variety of technologies.
- **International Environmental Database:** DOE collaborated with the International Energy Agency's Ocean Energy Systems group to create the Tethys database which catalogues and shares environmental research from around the world to enable sustainable development and expansion of clean, renewable energy and ocean power.
- **Increased Hydropower Generation** resulting from the American Recovery and Reinvestment Act-funded hydroelectric modernization projects is estimated to exceed 135,000 MWh annually; enough to meet the annual electric usage of more than 10,000 average U.S. homes at an estimated incremental cost of less than \$0.04 per kilowatt hour.
- **Water Use Optimization Toolset:** Led by DOE's Argonne National Laboratory, the Water Use Optimization Toolset allows for the joint optimization of generation, ancillary service provision, and environmental objectives. This novel energy-environmental optimization approach will simultaneously increase energy and grid services from available water, and enhance environmental benefits from improved hydropower operations and planning.

## Goals/Metrics

- Compress technology development timelines with the goal of reducing the LCOE for MHK devices to local coastal hurdle rates of \$0.12-\$0.15 per kWh by 2030.
- Invigorate hydropower industry innovation, identify or enable opportunities, and solve unique challenges in the United States to support the goal of doubling the contribution of hydropower to the U.S. electricity system by 2030 ( an additional 300 TWh).

# Water Power Technologies – FY 2015 Budget Request

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Marine and Hydrokinetic (MHK) Technologies	35,456	41,275	30,500
Hydropower Technologies	19,231	17,290	31,500
NREL Site-Wide Facility Support	0	0	500
<b>Total, Water Power Technologies</b>	<b>54,687</b>	<b>58,565</b>	<b>62,500</b>



# Water Power Technologies – FY 2015 Budget Highlights

- **HydroNEXT (\$20.0M):** This a new initiative aims to double the current contribution of hydropower in the United States. Activities will focus on improvements to performance and increasing generation at existing water resources infrastructure, in addition to the development and demonstration of technologies to lower the cost, improve the performance, and reduce the environmental impacts of hydropower available at new stream-reach development.
- **Modular Pumped-Storage Hydropower (\$4.0M):** Building on the Modular Pumped Storage Feasibility Study conducted in FY 2014, the office will begin developing innovative m-PSH system designs that exhibit cost-competitiveness with existing large-scale system designs.
- **MHK Research and Design (\$12.5M):** To advance system designs of marine energy conversion devices, the office will conduct applied MHK research & development; integrate innovative component technologies into advance system designs; and will demonstrate the viability of MHK systems at a pre-permitted site.
- **Validate Open-Source Advanced Design Tools (\$6.0M):** Compile, analyze, and disseminate performance data from device testing to enable the validation and improvement of numerical modeling tools. These datasets will be freely available to entrepreneurs and industry to allow for the simulation of device array designs and array impacts.

# HydroNEXT (\$20M)

The new **HydroNEXT** initiative will focus on accelerating the use of hydropower through development and demonstration of technologies to lower cost, improve performance, and reduce environmental impacts of hydropower.



- **HydroMax:** Capturing near-term growth opportunities through R&D on technologies to cost-effectively improve performance and increase sustainable generation at existing water resources infrastructure.
- **Low Impact New Development (LIND):** A new set of hydro technologies is needed to capture the wide range of low impact development opportunities that are currently available from new stream-reach development. These technologies are acutely directed to address the dual barriers currently limiting new hydropower – high capital costs & environmental sustainability.
- **Environmental Performance Analysis + Regulatory Process Improvement:** High-level, predictive analysis is needed to assess LIND designs and inform future design requirements to meet environmental performance needs and ease the permitting processes for future deployments of LIND technologies. DOE will also develop a tool to reduce permitting barriers and increase efficiency and transparency of federal permitting processes.



Through HydroNEXT, the Energy Department aims to **double hydropower generation in the U.S.** by 2030 (an additional 300 TWh) to create a large and enduring economic and environmental benefit to the U.S.

# Geothermal Technologies - Overview

## Motivation/Focus

- Geothermal Technologies accelerates the development and deployment of clean, domestic geothermal energy. It supports innovative technologies that reduce both the risks and costs of bringing geothermal power online. As a key component of our clean energy mix, geothermal is a renewable energy that generates power around the clock.

## Achievements

- **Successful EGS Demonstrations**
  - At the Desert Peak enhanced geothermal system (EGS) demonstration project in Nevada, multi-stage stimulation of an existing yet underperforming well was completed, making it the **first grid-connected EGS project in America** to generate commercial electricity by providing an additional 1.7 MW at the existing well-field.
  - In FY 2013, **The Geysers EGS** demonstration in the U.S. successfully yielded a clearly demonstrated, commercial-strength 5 MW resource.
- **Successful Hydrothermal R&D in the field**
  - **In FY 2013, Caldwell Ranch** in California confirmed an initial **11.4 MW** of equivalent steam—50% more than early estimates—from three previously abandoned wells. The **first geothermal project** where an abandoned steam field has been successfully re-opened for production after approximately 20 years of thermal regeneration
  - The Office completed a project that takes advantage of **emission-free geothermal power generation**—as a thermal byproduct of gold mining—to generate electricity for **less than 6 cents/kWh**. A **first of its kind** for additive geothermal power.
- **Reducing Deployment Barriers**
  - In FY 2013, Geothermal Technologies issued a **Geothermal Regulatory Roadmap** for ten geothermal-rich states to help developers navigate regulatory requirements to deploy geothermal energy projects.

## Goals/Metrics

- Demonstrate capability to create and sustain a 5MW Enhanced Geothermal Systems (EGS) reservoir by 2020.
- Lower the levelized cost of electricity from newly developed geothermal systems to \$0.06/kWh by 2030.

# Geothermal Technologies – FY 2015 Budget Request

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Enhanced Geothermal Systems	20,103	27,084	33,500
Hydrothermal	8,092	10,285	17,500
Low Temperature and Coproduced Resources	2,942	4,708	6,000
Systems Analysis	3,888	3,698	4,000
NREL Site-Wide Facility Support	0	0	500
<b>Total, Geothermal Technologies</b>	<b>35,025</b>	<b>45,775</b>	<b>61,500</b>

# Geothermal Technologies – FY 2015 Budget Highlights

- **Frontier Observatory for Research in Geothermal Energy (FORGE), (\$29M):** Site characterization for FORGE, a dedicated site for testing and validating cutting-edge EGS technologies and techniques that will create an accelerated commercial pathway to large-scale EGS power generation in the U.S.
- **Play Fairway Analysis (\$4.5M):** Validation of the Play Fairway Analysis effort competitively launched in FY 2014. Play Fairway analysis and mapping assesses exploration risk and the probability of finding new resources on a regional scale, identifying the most prospective areas for new geothermal exploration and development.
- **Strategic Materials (\$4M):** Advancement of the Strategic Materials effort competitively launched in FY 2014. The most successful feasibility studies will transition to technology prototype development or field demonstration projects.
- **Subsurface Crosscut Roadmapping and R&D (\$6M):** Collaborative R&D effort with Program Offices across DOE—including the Office of Fossil Energy, the Office of Nuclear Energy, the Office of Science, and the Office of Environmental Management—that will engage the National Labs, industry and other stakeholders on crosscutting geology and engineering initiatives within the geothermal portfolio that maximize leverage of DOE investments.

# Frontier Observatory for Research in Geothermal Energy (FORGE) (\$29M)

- The FORGE initiative promotes transformative science and engineering to validate and optimize enhanced geothermal systems (EGS) technology
- FORGE intends to create an accelerated commercial pathway to large-scale EGS power generation in the U.S.

## Value Proposition

### Subsurface “Roadmap”

- Fundamental understanding of how to create large-scale subsurface heat exchange systems
- Reproducible in different geologic settings
- Sustainable

### Successfully test new technologies in controlled environment

- Demonstration of path to lower costs
- Identify highest performing/most reliable methods and tools

### Data Sharing

- Capture of high-fidelity information and measurements
- Immediate distribution to sector stakeholders

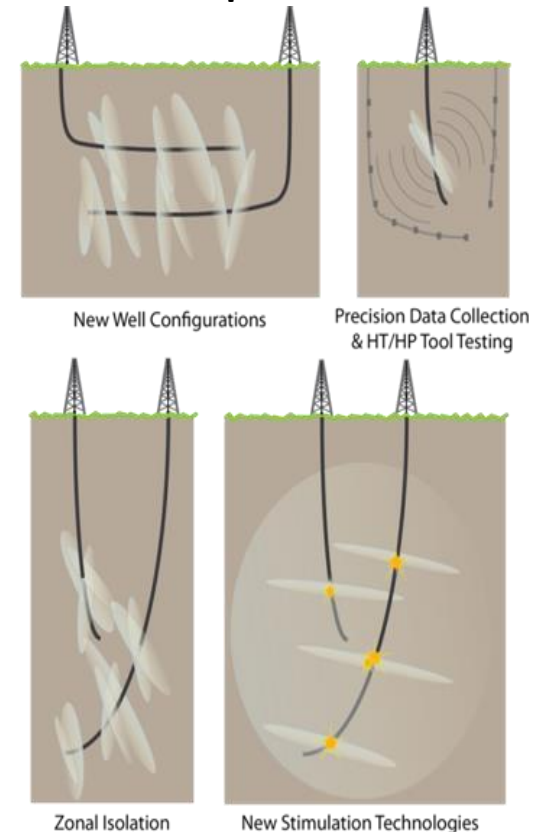
### Increased private investor funding due to lower risk and costs

- Leads to lower financing costs
- Major opportunity for new entrants into the industry

**Global leadership in a new renewable energy sector – with expectation of accelerated domestic and international adoption of EGS**

*Commercial pathway to large-scale EGS power generation  
Geothermal broadly distributed throughout the U.S.*

## Examples of Novel Technologies and Techniques to be Tested





## Sustainable TRANSPORTATION



## Renewable ELECTRICITY GENERATION



## Energy Saving HOMES, BUILDINGS, & MANUFACTURING



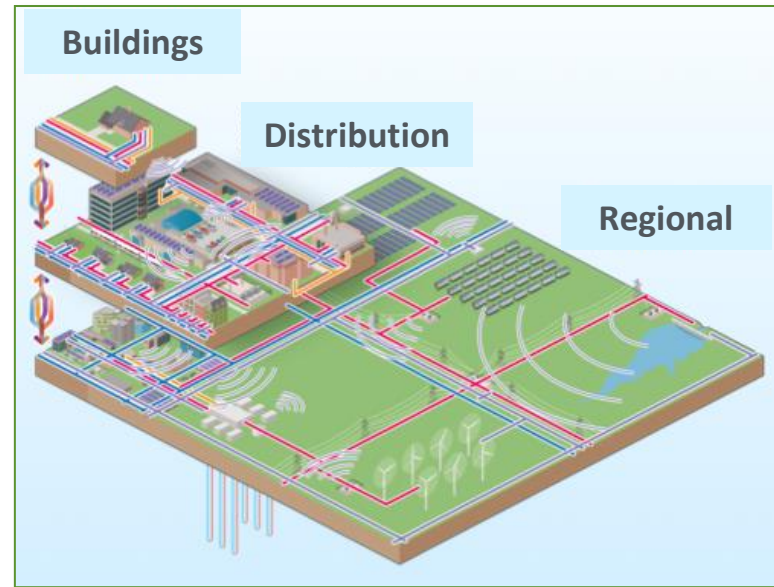
# EERE Crosscutting Initiatives



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

- 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.

### Distribution Scale

- 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.

### Regional Scale

- 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
<b>Total, EERE Grid Integration Initiative</b>	<b>125,959</b>

# 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
<b>Total</b>	<b>12,375</b>	<b>17,625</b>	<b>30,000</b>



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

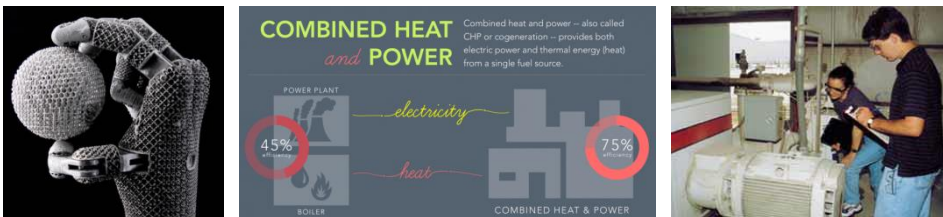
**Clean Energy Manufacturing Initiative**  
*to increase U.S. manufacturing competitiveness*

## 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
<b>Total, CEMI</b>	<b>553,700</b>

## 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

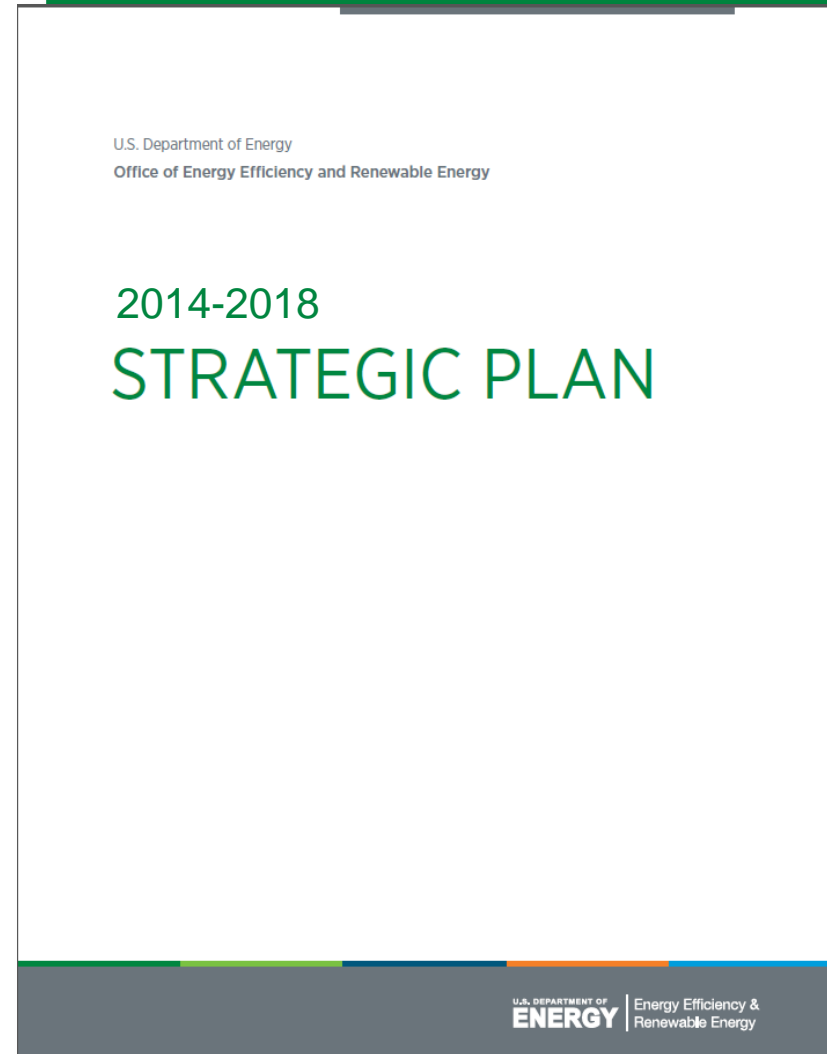
### 5. Partnerships and Engagement



# 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](mailto:SE@ee.doe.gov)