



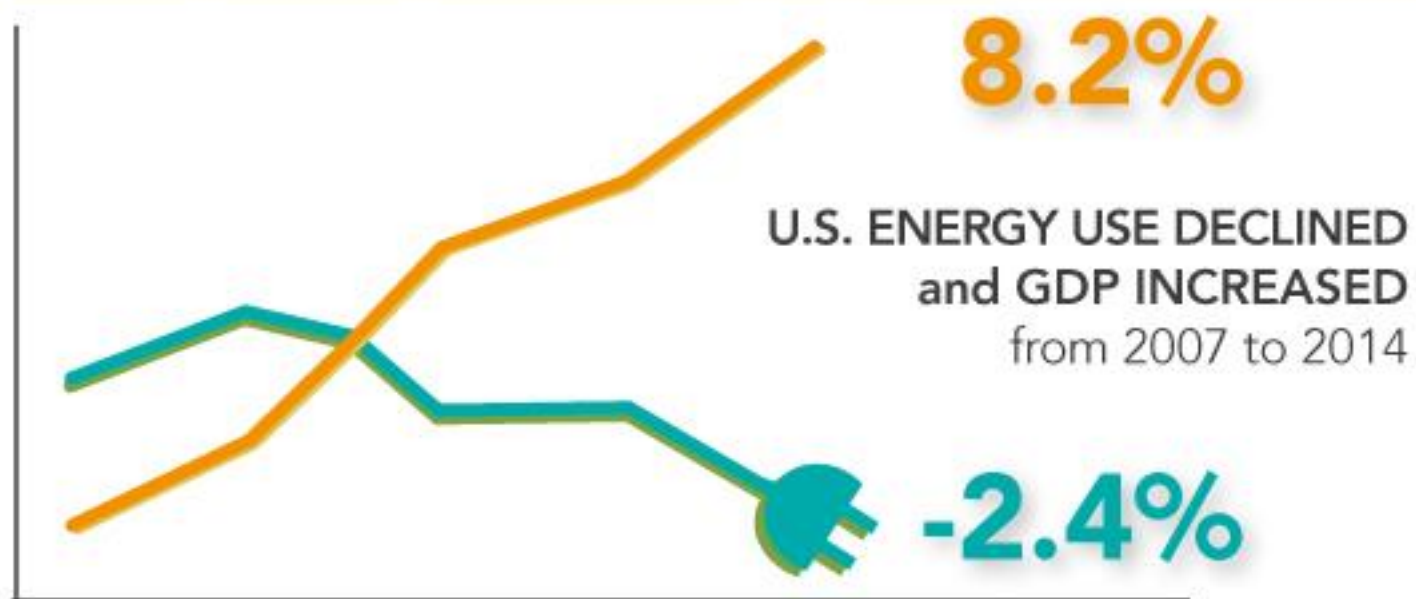
# The Stella Group, Ltd.

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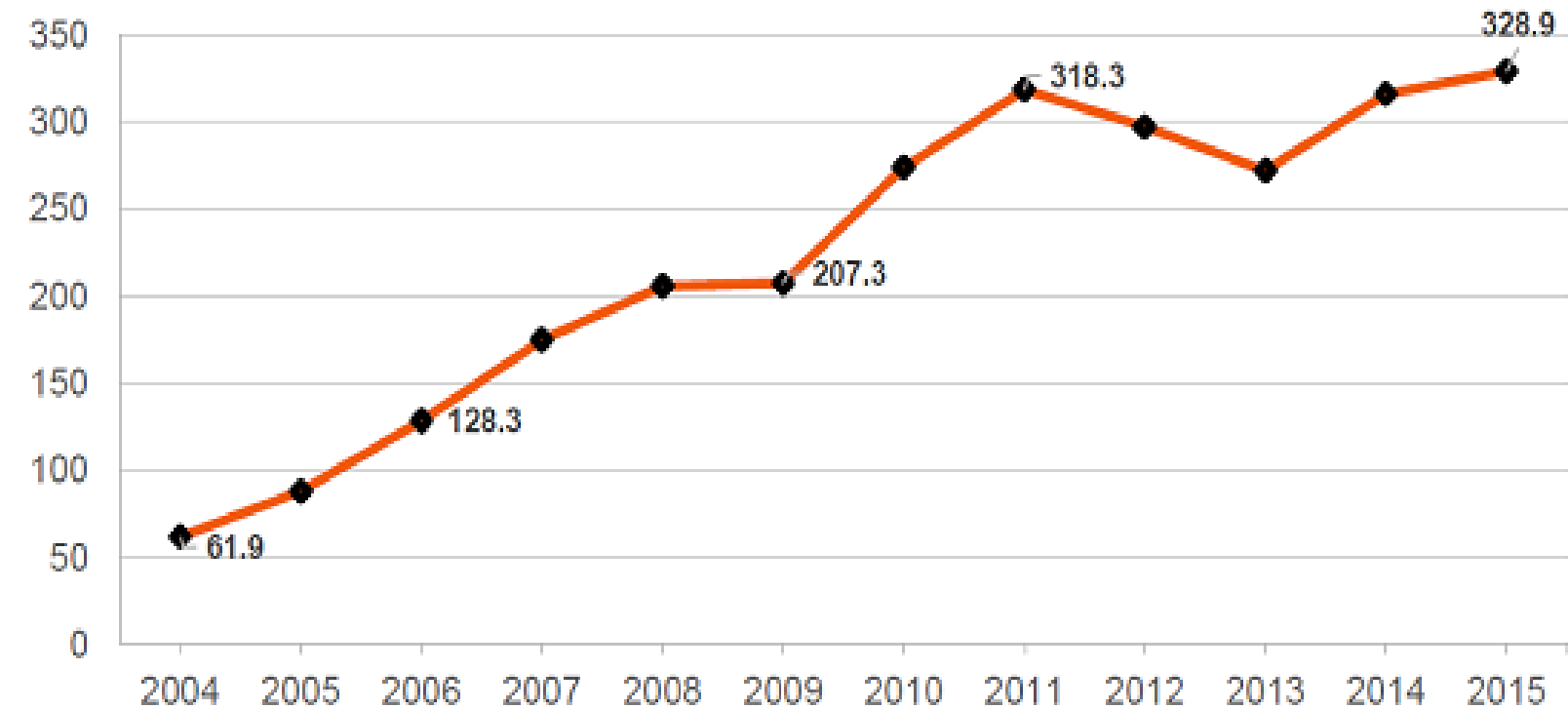
*The Stella Group, Ltd.. is a strategic technology optimization and policy firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, geexchange, heat engines, microhydropower (including tidal and wave), modular biomass, photovoltaics, small wind, and solar thermal (including CSP, daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). The Stella Group, Ltd. blends distributed energy technologies, aggregates financing with a focus on system standardization. Scott Sklar serves as Steering Committee Chair of the Sustainable Energy Coalition, composed of the renewable and energy efficiency associations and analytical groups, and sits on the national Boards of Directors of the non-profit Business Council for Sustainable Energy and The Solar Foundation, teaches two unique interdisciplinary sustainable energy courses at George Washington University, and affiliated professor with CATIE, graduate university (Costa Rica), and was re-appointed to the US Department of Commerce Renewable Energy and Energy Efficiency Advisory Committee (RE&EEAC), where he serves as its Chair, term ending in June 2016.*

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## ENERGY USE AND GROSS DOMESTIC PRODUCT



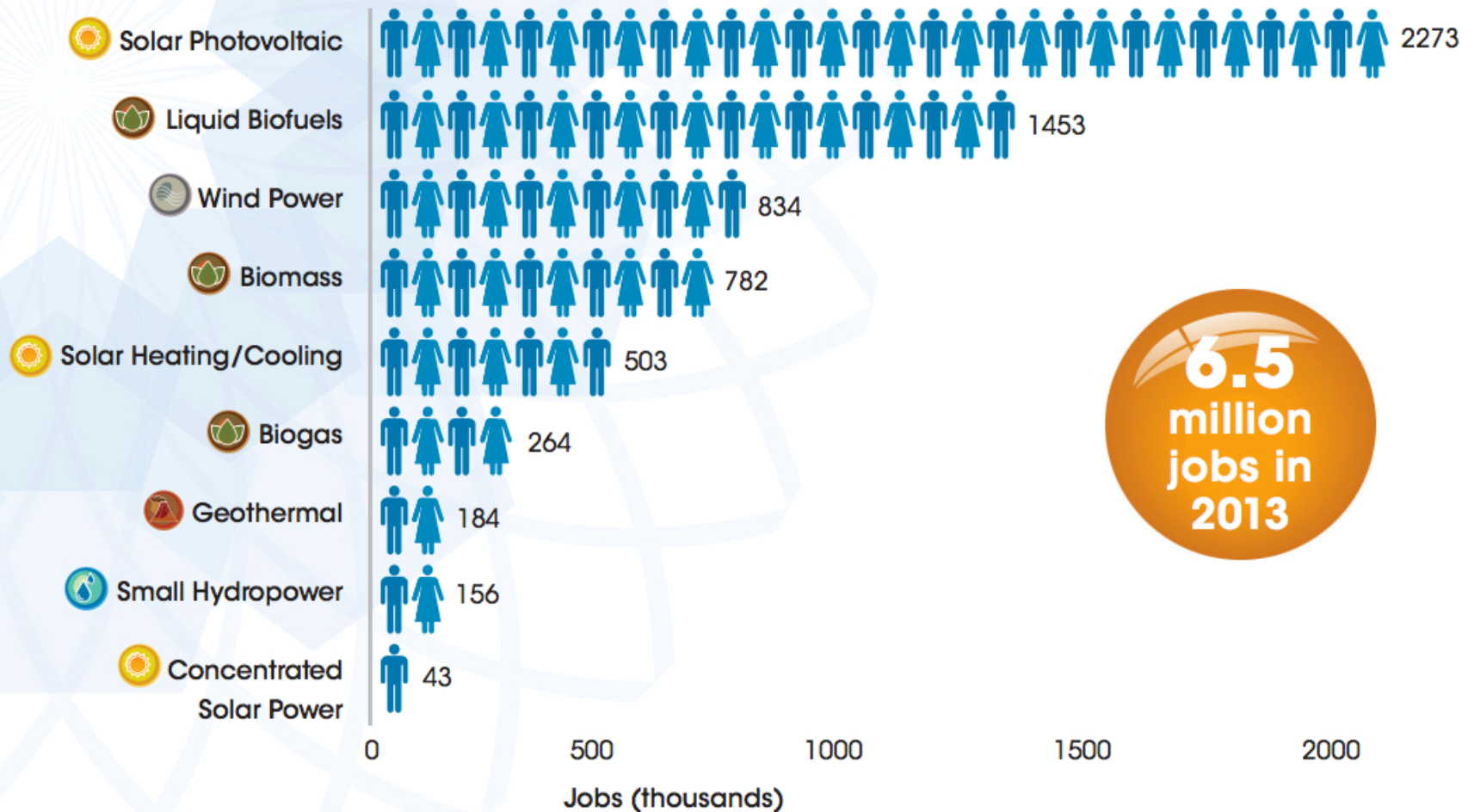
## Clean energy investments in 2015 hit a new record of \$329 billion



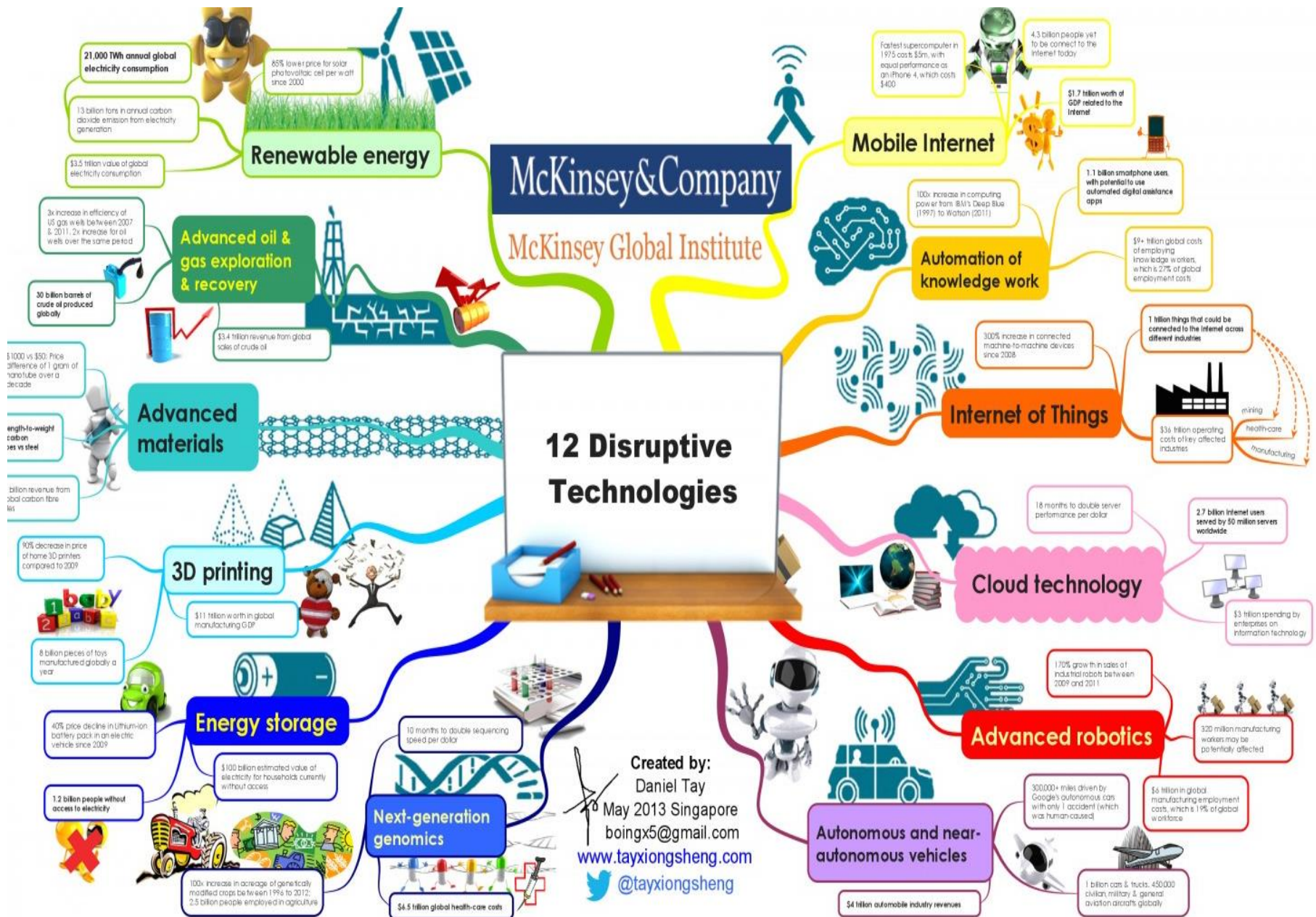
Source: Bloomberg New Energy Finance

<http://www.eqmagpro.com/clean-energy-investments-in-2015-hit-a-new-record-of-329bn/>

FIGURE 1. RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY



Global jobs: source: IRENA – International Renewable Energy Agency, June 2014



The source of information in this Mind Map comes from [http://www.mckinsey.com/insights/business\\_technology/disruptive\\_technologies](http://www.mckinsey.com/insights/business_technology/disruptive_technologies)

## WHY FUND ENERGY RD&D ?

- single largest cause of our trade debt
- single largest cause of air & water pollution, and GHG emissions
- single largest of income for terrorism
- largest user (and waster) of water

## WHAT DO WE GET OUT OF IT ?

- national security .. reduce terrorism, reduce embargo threat
- geographically-dispersed employment
- immense emissions reductions – CWA, CAA and GHG's
- electric power reliability and electric grid resiliency
- electric power quality
- transportation fuels diversification – synthetic or drop-in fuels, biofuels (blended or trade out), electric vehicles
- water resource sustainability
- economic growth and stability – globalization (gaming of resources), new businesses (technologies and services)



*The investment in energy efficiency continues to pay dividends for the U.S. economy. American energy productivity – the ratio of U.S. GDP to energy consumed - has increased by 13% from 2007 to 2015. The U.S. economy has now grown by 10% since 2007, while primary energy consumption has fallen by 2.4. Sixty percent of the energy intensity improvements seen since 1980 are due to efficiency gains, with only 40% the result of structural changes in the economy.*

*Renewable energy is a prominent part (20%) of the U.S. power fleet, with 222GW of installed capacity across the country, a 57% increase over 2008 levels. Hydropower is the largest source of U.S. renewable energy capacity at 79GW (excluding pumped storage).*

*Non-hydropower renewables now account for 7.1% of U.S. electricity, up from 6.8% the previous year. This figure has grown every year since 2005, when non-hydro renewables generated only 2.5% of U.S. electricity. Wind and solar have quadrupled in capacity since 2008 (from 26GW to 103GW). Biogas, biomass, geothermal and waste-to-energy represent 17GW of U.S. capacity and can provide power 24/7. While these technologies have comparable economics in terms of unsubsidized costs, they have lacked access to the same incentives as the fast growing sectors.*

In the first 2016 issue of its monthly "Energy Infrastructure Update" report, the Federal Energy Regulatory Commission notes that five new "units" of wind (468 MW) and 6 new units of solar (145 MW) accounted for 100% of new electrical generation brought into service in January. No new capacity for nuclear, coal, gas, or oil was reported. Renewables now account for 17.93% of total installed operating generating capacity in the U.S.: hydropower (8.56%), wind (6.37%), biomass (1.43%), solar (1.24%), and geothermal (0.33%). In fact, installed capacity for non-hydro renewables alone (9.37%) now exceeds that for either nuclear (9.15%) or oil (3.84%). \*\*

The new renewable energy capacity added in January is continuing a trend. Just a month earlier, FERC's December 2015 "Energy Infrastructure Update, revealed that renewables had accounted for 64% of new electrical generating capacity installed last year.

Separately, the U.S. Energy Information Administration has issued its latest "Electric Power Monthly" (covering all twelve months of 2015) indicating that electricity generated by renewable energy sources (i.e., biomass, geothermal, hydropower, solar, wind) grew by over 2% compared to 2014 and accounted for almost 13.5% of "utility-scale" electrical output in the U.S. last year.

For Release: Monday - March 7, 2016     [sun-day-campaign@hotmail.com](mailto:sun-day-campaign@hotmail.com)  
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## FUNDING BY ORGANIZATION

	(\$K)					
	FY 2015	FY 2015	FY 2016	FY 2017	FY 2017 vs. FY 2016	
	Enacted	Current	Enacted	Request <sup>1</sup>	\$	%
<b>Department of Energy Budget by Organization</b>						
<b>Energy</b>						
Energy Efficiency and Renewable Energy	1,914,195	1,840,847	2,069,194	2,898,400	+829,206	+40.1%
Electricity Delivery and Energy Reliability	146,975	143,901	206,000	262,300	+56,300	+27.3%
Fossil Energy	791,117	783,829	869,100	878,450	+9,350	+1.1%
<i>Use of Prior Year Balances</i>	0	0	0	-240,000	-240,000	N/A
Nuclear Energy	833,379	821,883	986,161	993,896	+7,735	+0.8%
Office of Indian Energy Policy and Programs	16,000	16,000	16,000	22,930	+6,930	+43.3%
Office of Technology Transitions	0	0	0	8,400	+8,400	N/A
21st Century Clean Transportation Plan Investments	0	0	0	1,335,000	+1,335,000	N/A
<b>Total, Energy</b>	<b>3,701,666</b>	<b>3,606,460</b>	<b>4,146,455</b>	<b>6,159,376</b>	<b>+2,012,921</b>	<b>+48.5%</b>
<b>Total, Funding by Organization</b>	<b>27,402,312</b>	<b>27,391,205</b>	<b>29,602,691</b>	<b>32,498,955</b>	<b>+2,896,264</b>	<b>+9.8%</b>

DOE Energy Efficiency and Renewable Energy Budget (Dollars in thousands)			
Program	FY 2015 Current	FY 2016 Enacted	FY 2017 Budget Request
Vehicle Technologies	272,526	310,000	468,500
Bioenergy Technologies	175,915	225,000	278,900
Hydrogen and Fuel Cell Technologies	94,830	100,950	105,500
<b>Total, Sustainable Transportation</b>	<b>543,271</b>	<b>635,950</b>	<b>852,900</b>
Solar Energy	230,800	241,600	285,100
Wind Energy	105,936	95,450	156,000
Water Power	59,999	70,000	80,000
Geothermal Technology	54,288	71,000	99,500
<b>Total, Renewable Energy</b>	<b>451,023</b>	<b>478,050</b>	<b>620,600</b>
Advanced Manufacturing	194,175	228,500	261,000
Federal Energy Management Program	27,000	27,000	43,000
Building Technologies	168,153	200,500	289,000
Weatherization and Intergovernmental Programs	243,000	265,000	326,000
<b>Total, Energy Efficiency</b>	<b>632,328</b>	<b>721,000</b>	<b>919,000</b>
Facilities and Infrastructure (NREL)	56,000	62,000	92,000
Program Direction	160,750	155,000	170,900
Strategic Programs	21,000	21,000	28,000
<b>Total, Corporate Support</b>	<b>237,750</b>	<b>238,000</b>	<b>290,900</b>
Crosscutting Innovation Initiatives	0	0	215,000
<b>Subtotal EERE</b>	<b>1,864,372</b>	<b>2,073,000</b>	<b>2,898,400</b>
Adjustments (Inc. Use & Rescission of Prior Year Balances)	-23,525	-3,806	0
<b>Total EERE (discretionary)</b>	<b>1,840,847</b>	<b>2,069,194</b>	<b>2,898,400</b>
21 <sup>st</sup> Century Clean Transportation Plan Investments (mandatory)	0	0	1,335,000
<b>Total (mandatory and discretionary)</b>	<b>1,840,847</b>	<b>2,069,194</b>	<b>4,233,400</b>

## **Renewable energy programs:**

**An 18 percent increase in funding for the Solar Energy program to \$285 million, to help the SunShot Initiative achieve its goal of a solar energy price of \$0.06/kWh without subsidies by 2020, and to support the DOE's crosscutting goal of grid modernization.**

**A 63 percent increase in funding for the Wind Energy program to \$156 million, to support three offshore wind demonstration projects and R&D to achieve \$0.167/kWh offshore wind generation by 2020.**

**A 14 percent increase in funding for the Water Power program to \$80 million, to continue funding for HydroNEXT, a project that researches and develops ways to increase hydropower on pre-existing dams, water conveyance systems, and streams, as well as research marine and hydrokinetic technologies.**

**A 40 percent increase in funding for the Geothermal Technologies program to \$100 million, to fully implement the Frontier Observatory for Research in Geothermal Energy (FORGE), a site that tests innovative geothermal technologies. The request also supports the Subsurface Technology and Engineering RD&D crosscut, an effort to decrease the risks and costs of geothermal development by using lessons learned in other subsurface sectors.**

## Sustainable transportation programs:

*A 5 percent increase in funding for the Hydrogen and Fuel Cell Technologies program to \$106 million, which will focus on cutting the cost of fuel cells used in the transportation sector to \$40/kWh, and increasing their durability to 5,000 hours (equal to 150,000 miles), by 2020. The request also supports efforts to more cheaply source hydrogen from renewable resources.*

*A 51 percent increase in funding for the Vehicle Technologies program to \$469 million, in support of the "EV Everywhere Grand Challenge" to cut the combined cost of battery and electric drive systems in electric vehicles by up to 50 percent by 2022. The proposed budget supports research in battery storage, advanced power electronics and electric drive R&D; studying lightweight materials and manufacturing processes for the Advanced Materials crosscut; and a new "Transportation as a System" initiative to research system-level energy efficiency opportunities in vehicles.*

*A 24 percent increase for the Bioenergy Technologies program to \$279 million, to develop advanced cellulosic and algal-based gasoline, jet and diesel fuel (i.e., non-food sourced "drop-in" biofuels) at a price of \$3 per gallon gasoline equivalent (gge). The funding will also support a competition to create demonstration projects for advanced biofuels.*

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### ***Energy efficiency programs:***

***A 23 percent increase for the Weatherization and Intergovernmental Assistance Program to \$326 million, to fund low-income weatherization services for about 35,700 homes in FY 2017, and to support the State Energy Program, which will help state and local government facilities and operations share best practices to decrease their annual energy use two percent by 2020. A 59 percent increase in funding for the Federal Energy Management program to \$43 million, to assist all Federal agencies in achieving the Administration's ambitious energy, water, emissions and general sustainability goals through the use of commercially available energy efficiency technologies.***

***A 14 percent increase for the Advanced Manufacturing program to \$261 million, which will fully fund one new Clean Energy Manufacturing Innovation Institute, while continuing funding for the five existing institutes. These institutes will be part of an interagency National Network of Manufacturing Institutes, focused on convening universities, companies, and the government to solve industry problems and improve U.S. competitiveness. The request also funds R&D in industrial efficiency and clean energy manufacturing technologies.***

***A 44 percent increase in funding for the Building Technologies program to \$289 million, to support R&D on emerging technologies in lighting, heating and cooling, and building envelopes, in order to achieve the goal of cutting national energy use 50 percent. The funding would also create an integrated Low-Global Warming Potential (Low-GWP) Advanced Cooling (HVAC) R&D program to study short and long-term ways to mitigate the climate impact of refrigerants. The proposed budget also funds a Metropolitan Systems project to help cities become more affordable, low-carbon, livable, economically viable, and resilient to natural disasters.***



The Alliance to Save Energy on the FY'17 budget: letter stresses the importance of mission innovation, cross-cutting programs, and keeping riders out of the process.

Energy efficiency is our nation's most abundant energy resource. Without the gains in energy efficiency made since 1973, the U.S. economy would today require 60% more energy than we currently consume. Savings from energy efficiency over this 43-year period have reduced our national energy bill by about \$700 billion. The importance of U.S DOE in research, technical assistance, and market integration efforts that have driven gains in energy efficiency cannot be overstated. For example, support for EERE core programs has driven meaningful results across the spectrum from more than \$539 billion in consumer savings from energy efficiency standards to a 94% decline in the cost of light-emitting diode (LED) lighting since 2008.

**Building Technologies Office - request \$289 million for the Building Technologies Office (BTO), which develops critical technologies, tools, and solutions that help U.S. consumers and businesses achieve peak efficiency performance in their buildings across all sectors of our economy.**

**Within the Buildings Technology R&D account, request funding allocations for the following priorities:**

- \$169 million for the Emerging Technologies Program,**
- \$54 million for the Equipment and Building Standards Program,**
- \$28 million for Commercial Building Integration, and**
- 23 million for Residential Building Integration.**

**Advanced Manufacturing Office request \$261 million for this Office to enable the important research, development, demonstration, and deployment of industrial efficiency and clean energy manufacturing technologies. Support funding of Clean Energy Manufacturing Innovation Institutes and the deployment of energy efficient manufacturing technologies. This is a key part of the vision for a larger multi-agency National Network for Manufacturing Innovation (NNMI).Federal Energy Management Program.**

**continued –**

**Request \$43 million for the Federal Energy Management Program (FEMP) to provide policy and project expertise to all federal agencies. This support is critical to help ensure compliance with energy management goals enacted by Congress or authorized by executive orders: Bush, Obama**

**Weatherization and Intergovernmental request \$326 million for Weatherization and Intergovernmental Activities. These programs support the deployment of energy efficiency and clean energy technologies and practices in partnership with state, local, and territorial governments. Within this account, request funding allocations for the following priorities:**

- \$230 million for the Weatherization Assistance Program,**
- \$70 million for the State Energy Program, and**
- \$26 million for the Cities, Counties, and Communities Energy Program.**

**Continued –**

**State Energy Productivity Innovation Challenge request \$175 million for the State Energy Productivity Innovation Challenge, which provides awards to states to promote the goal of doubling the productivity of electric and thermal energy. This program has been known in past fiscal years as the “Race to the Top” initiative. (This program was not included in the President’s FY2017 Budget Request.)**

**Vehicle Technologies Program**

- request \$468.5 million for the Vehicle Technology Program, which contributes to advancements in battery storage, lightweight materials, and freight truck**

National Hydropower Association (NHA) is pleased that it represents the largest request ever made for the Water Power program. \$80 million overall, with \$55 million to marine energy and \$25 million to hydro/pumped storage. It is \$10 million above that which Congress provided the program at the end of the year. That said, this request would still be the smallest of the RE technologies in EERE for a program that represents the largest single provider of renewable electricity in the country.

The plus up is basically all directed to the marine hydrokinetic (MHK side), with the hydropower side flat. NHA wanted to make you aware of a Dear Colleague that is going around the Hill for sign on requesting \$125 million for the Water Power program overall, though does not designate a split between the two accounts.

NHA recommends a split of \$80 million MHK, \$45 million hydro/pumped storage.

USDOE is currently working to release a Hydropower Vision Report this July (similar to what they did for wind a few years back). NHA anticipates that there will be plenty of follow-up R&D recommendations and ideas that could support the investment in the hydro/PS side. And for MHK, as an industry that is still looking to commercialize many of the technology applications, and NHA believes a larger investment is justified there as well. Not to mention how the U.S. has lagged behind Europe in funding MHK R&D.

Please note that NHA is hosting three upcoming conferences in April here in DC:

NHA's Annual Conference

The International Marine Energy Conference (IMREC)

The Marine Energy Technology Symposium (METS). METS is supported by DOE.

<http://www.nationalhydroconference.com/index.html?cmpid=nha>



Wind power is two-thirds cheaper than just six years ago, thanks to innovative technology and effective policy. Wind power benefits rural economies too, with 73,000 good jobs.

The American Wind Energy Association requests FY 2017 funding of \$156 million for the U.S. Department of Energy (DOE)'s Wind Energy Program. With this level of funding, wind power can stay on the path of supplying 10 percent of U.S. electricity by 2020 and 20 percent by 2030 – and become one of America's top sources of electricity by 2050, according to DOE's 2015 update of its Wind Vision report.

The drop-off in funding from 2015 to 2016 has already led to worker layoffs in new technology RD&D. Anything less than the FY 2015 level of \$107 million for the DOE Wind Energy Program would limit the United States' ability to continue making the needed technological improvements to reduce electricity costs for millions of Americans. To maximize America's wind energy potential, a funding level of \$156 million in FY 2017 is appropriate for this important research program.

Wind RD&D program - RD&D sub-program points .....

## **Wind resource characterization**

### **(DOE's A2e initiative [Atmosphere to Electrons])**

This DOE initiative seeks to research, analyze, and validate the aerodynamic effects of complex atmospheric conditions, variable terrain, and machine wakes. It is a large challenge that will be a critical element of enabling the industry address imperfect predictions and better optimize turbine design, farm layout, and operation. These improvements will reduce the cost of energy.

## **Renewable energy integration on the grid**

DOE studies have been important in showing how greater amounts of wind energy can be integrated onto the power grid. Such studies need to continue to support the industry along with DOE's Grid Modernization Multi- Year Plan. Widespread location of turbines contributes to reliability, since power output changes gradually and is predictable many hours in advance. More transmission and interconnections for renewable energy are vital.

## **Advanced technology and components**

Further advances in components – improved drive trains, taller towers, longer blades, and better controls and sensors – have enormous potential to drive down costs and increase reliability even further, both on land and offshore.

- continued -

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study the interactions between wind energy and wildlife. DOE's research and focus on seeking technologies that can mitigate these issues is important to the industry. DOE has been successful in mitigating important radar issues and is now focused on wildlife issues such as bats and eagles.

### **Offshore Wind Demonstration Projects**

DOE support for demonstration projects is critically important to foster the development of offshore wind projects in the U.S.



Good planets are hard to find.

**THERE ARE NO DUMB QUESTIONS -**

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