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REPORT ON US ENERGY POLICY TODAY: ENERGY, SECURITY, AND CLIMATE

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OCTOBER 2014
GLOBAL ENERGY AND INNOVATION INITIATIVE

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Table of Contents

The development and widespread use of hydraulic fracturing in the US has led to the expansion of US domestic production of oil and natural gas. With the dramatic reduction in installed prices for renewable electricity generation (primarily solar, but also wind), the energy landscape in the US is undergoing rapid technological change. At the same time, regulatory action from the Environmental Protection Agency (EPA) to reduce greenhouse gas emissions (GHG) looks likely to continue a recent trend of falling emissions from the electricity sector.

Increased oil production and lower gasoline prices have coincided with stagnant demand for gasoline from consumers, the latter being partially due to increasing efficiency of the US automobile fleet instigated by the Obama Administration. The increased oil production has resulted in a steadily decreasing share of US oil supplies coming from imports – falling below 50% and reaching only 33% of consumption in 2013, which is the lowest level since 1985.[1] Increased natural gas production has eliminated the need to import natural gas (for now), opened options for greater use of natural gas as an industrial feedstock, and become more prevalent in electricity production. From roughly 21% of US electricity production in 2007 and 2008, natural gas accounted for 30% in 2012 and 27% in 2013; coal's share of US electricity production fell from around 50% to under 40% in 2012 and 2013. Concurrent to the growth of natural gas was an expansion of US electricity production from non-hydro renewables, doubling from 3.1% in 2008 to 6.2% in 2013.[2] As the rules for efficiency and GHG emissions from the electricity generation sector come into force in the coming years, the share of renewables and natural gas is poised to grow.

In short, the US is experiencing rapid shifts in its generation fleet and domestic energy production (both fossil and renewable). Technological change is one of the main drivers of

[1] See http://www.eia.gov/tools/faqs/faq.cfm?id=32&t=6

[2] All data derived from US Energy Information Administration, Table 7.2A Electricity Net Generation, August 2014, http://www.eia.gov/beta/MER/index.cfm?tbl=T07.02A#/?f=A&start=200001

these changes, with economies of scale and learning helping to drive down costs for renewables. Some of the US's largest and most visible businesses are leading the way on renewable energy. At the same time, regulatory action by the Obama Administration on vehicle efficiency and GHG emissions from electricity generation are pushing in a similar direction towards more use of natural gas, more use of renewables, and lower GHG emissions. The following sections detail the state of play in the US energy economy, the regulatory changes taking place, and the actions businesses are taking to build out renewable energy capacity.

STATE OF PLAY IN THE UNITED STATES

Energy policy in the United States can be roughly divided into several categories: electricity production; energy extraction; transportation and transportation fuels; heating/cooling and building efficiency; and industry. While federal level Energy Policy Acts were passed in 2005 and 2007, neither exhibits strong policy guidance, nor do they integrate these various elements of energy policy into a coherent whole. With the exception of traditional pollutants (air, water, ground), industrial energy use remains absent from the national energy discussion, and heating/cooling and building efficiency remain heavily influenced by local policymaking. In terms of electricity regulations, the US states retain most decision-making authority, and this tends to be the case for energy extraction as well. National standards for vehicle efficiency are possible, but they tend to be driven by choices made in California, which has a legislative exemption to enact policies more ambitious than federal rules.

With strong federal-level disagreements between Democrats and Republicans on issues of energy policy – ranging from nuclear energy to renewables, vehicle efficiency, fossil fuel extraction, and climate change – changes to the energy policy landscape in the 2000s were

driven by states and by private industry. Environmental groups and their political allies tried through the 2000s to enact climate change policy by changing energy legislation, but this policy approach was largely unsuccessful at the federal level. They found more success at the state-level, where nearly 40 states have renewable portfolio standards and many have energy efficiency objectives, but even these measures only had limited effects. Politically, this status quo gridlock looks likely to continue.

Some changes have occurred on the federal level, however, through the presidential and judicial branches of government. The Supreme Court's Massachusetts vs. EPA decision in 2007 forced the EPA to consider how to take action to mitigate climate change impacts under the Clean Air Act. This process toward increasing activity was hastened by the advent of the Obama Administration in 2009. The American Recovery and Reinvestment Act of 2009 (the so-called "stimulus package") was the first major step in reshaping energy policy and the energy sector in the US, investing nearly $80 billion over several years in clean energy businesses, energy efficiency, and research.

Following the stimulus package investments, the Obama Administration has systematically pursued policies in the transportation and electricity sectors that encourage conservation, increased use of natural gas and renewable energy, and decreased use of coal. At the same time, the geopolitical implications of the US energy situation remain high on the national agenda, and the importance of energy as a political issue has been reiterated by the crisis in Ukraine, the recent Russia-China natural gas pipeline deal, the on-going civil war in Syria, the emergence of the Islamic State (ISIS) in Syria and Iraq, and the reemergence of civil war in Iraq.

The biggest single development in the American energy landscape over the last decade US has been the rise of hydraulic fracturing, enabled by extensive private sector investment and a

2005 exemption to the US Safe Drinking Water Act. Hydraulic fracturing (known colloquially as "fracking") has altered the trend lines of US natural gas and oil production, drastically reducing US oil imports, precluding the need to import natural gas, and opening long-dormant discussions on exporting oil and gas. Expanded natural gas production has had downward pressure on electricity prices and improved the cost-competitiveness for energy-intensive industries.

Fracking's effect on oil and gas production and the secondary market effects remains mixed and depends heavily on a state's specific resources, the extent to which landowners and businesses are allowed to engage in fracking, and a state's connection to existing transportation infrastructure. The Midwest, with a built-out pipeline and rail infrastructure for transporting both oil and gas from shale formations, has experienced downward price pressures for both oil and gas (and for electricity, where gas is used in substantial amounts), whereas in the Northeast, with limited gas resources, bans on fracking in some places, and incomplete connections to parts of the country with new natural gas supplies, the price and supply effects from the shale boom are difficult to identify and will not plausibly be addressed for years. Lastly, it is important to mention that Congress has yet to lift the existing ban on oil exports, and natural gas exporting facilities are not ready to begin exporting large amounts of liquefied natural gas.

Expanded fracking has also had domestic effects in terms of the electricity production mix and feedstock and electricity costs for some manufacturing. If not for coal exports, the coal industry would find itself in a difficult position. The two regulation tracks for power plants introduced by the Obama Administration – one for new and one for existing plants – leaves only limited room for existing coal plants in the generating fleet. With the strict limits on the emission of carbon dioxide imposed by the rules, a future of new coal facilities in the electricity sector is available only when combined with carbon capture and storage technology, which has not been

economically implemented on the utility scale yet.

On the transportation side, expanded oil production in the US has coincided, at least in recent months, with lower global oil prices, and now lower gasoline prices. With expanded domestic natural gas production and lower natural gas prices, vehicle manufacturers and fleet operators are considering additional options for using natural gas. The Obama Administration's ambitious efficiency regulations for light- and heavy-duty vehicles are beginning to take effect and will have implications for liquid transportation fuel use and needs in the US. Better efficiency will also lead to reduced GHG emissions per vehicle mile travelled.

With freedom to act on many facets of energy policy, US states have been playing a key role in clean energy promotion and are the major enablers for fossil fuel resource development. State-level policy decisions combined with choices by private landholders to allow drilling have opened up vast tracks of shale oil and shale gas for development; particularly noteworthy in this regard are North Dakota (primarily oil), Texas (oil and gas), and Pennsylvania (primarily natural gas). US states in the Northeast operate an emissions trading system for carbon dioxide from electricity generation (the Regional Greenhouse Gas Initiative), while California has a comprehensive energy and climate package, and New York State has announced a process to change regulations to encourage renewable energy and decentralized electricity production. California's package created an economy-wide emissions trading system for greenhouse gas emissions, led to the setting of new, national efficiency standards for automobiles, and is also affecting the emissions profile of transportation fuels. New York's electricity market reform is attempting to promote the expanded use of renewables without relying on heavy subsidization and avoiding electricity price increases. The fractured nature of federal energy policy in the US, to a degree, can be attributed to this disparate nature of state policies: some are promoting fossil fuel production, while others are strongly focusing on greenhouse gas emissions and renewable electricity.

In terms of economic competitiveness, current national- and state-level policies and activities will continue to exert downward pressure on energy import demand. Increased natural gas production with low prices along with stable electricity prices continues to encourage energy intensive industries to consider the US for large-scale investment. Recent decisions by BASF and BMW, to respectively locate a major chemical facility and its largest automobile manufacturing facility in the US, underscore the existing competitive situation enjoyed by the US and envied by some of its competitors – specifically Europeans.

Looking to the future, implementing the EPA's recently announced draft rules for existing power plants will have different effects at the state-level, and some states may see electricity price increases as a result. Nonetheless, the long lead-time of achieving the carbon-intensity goals of the EPA regulations (nearly 15 years) should mitigate some of these effects, and current estimates of cost cannot take technological innovations of the future into account. Further, the geopolitics of energy could manifest itself in the US as well, should oil or natural gas supplies be dramatically impacted by natural disasters or conflict situations. In theory, the US price dividend from increased oil and natural gas production could also be mitigated by allowing exports, although it looks as if this possibility is still a few years away from implementation.

FOCUS SHIFTING TO CLIMATE POLICY

For many years, climate policy in the US was addressed only through piecemeal and disaggregated policies, or left up to the individual states. US energy policy focused nearly exclusively on keeping costs down, encouraging economic competitiveness, ensuring supply, and the geopolitical implications of energy. None of these concerns have gone away, but the Obama Administration's actions on energy policy in recent years indicate a greater consideration of the link between energy and climate. The implications of the fracking boom and dramatically lowered costs for renewable energy systems (both wind and solar) have created space to consider implementing climate change policy more directly through elements of energy policy. This can be seen in the EPA's announced rules for new and existing power plants, as well as the federal level standards for automobiles and heavy duty transport.

If the rules are implemented as currently conceived, the Obama Administration's Clean Power Plan[3] would allow states to pursue emissions trading to meet their respective emission reduction responsibilities. It is far from clear, however, if any new states will choose to take this option. Moreover, there is little evidence to support national implementation of either a cap and trade system or a carbon tax. The apparently irreconcilable interests of Democrats and Republicans on energy and climate policy at the federal level will likely prevent federal legislation in the coming years. As Republicans will hold control of the House and Senate starting in January 2015, there would appear to be limited prospects for new legislation that Democratic President Obama would sign into law. There are a variety of methods by which the rules or executive orders could be changed or not fully enforced, but these possibilities only become worth discussing after the next presidential election. Until then, the EPA will move forward with finalizing and implementing the Clean Power Plan.

[3] For full details of the current draft rules and comments, see the resources and texts provided by the EPA - http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule.

At the state-level, New York and California, among others, are primarily motivated to promote renewable energy, firstly for economic reasons. Distributed electricity generation from renewables, for example, was cited by New York Governor Andrew Cuomo for its positive economic effects – job creation, mitigation day-time peak loads, damping costs for utilities and consumers, and building resilience to the grid. Environmental impacts are typically a secondary or tertiary concern. On the subject of electricity resource and capacity decisions, where most decision-making power and authority resides with the individual states, decisions to encourage the use of natural gas and renewables will be reinforced by the EPA's Clean Power Plan for existing power plants (mentioned above and detailed below) and rules on new power plants.

The US electricity sector will be pushed further away from coal and toward the increased use of natural gas, renewables, and energy efficiency as a result of the various elements of President Barack Obama's US Climate Action Plan, introduced on June 25, 2013. Through executive orders, which do not require the passage of legislation by Congress, and leaning heavily on the power of the Environmental Protection Agency (EPA) to regulate greenhouse gas emissions through the Clean Air Act, the Climate Action Plan is intended to create incentives for investment in renewable energy, improve building efficiency, increase vehicle efficiency standards, and decrease US greenhouse gas emissions. Collectively, the elements of the Climate Action Plan also create the underpinning of the US's actions internationally to mitigate climate change.

Two major components of the Climate Action Plan are rules being developed by the EPA for the allowable amounts of greenhouse gas emissions from new and existing power plants. The Clean Air Act has separate sections addressing these types of power plants, Section 111(b) and Section 111(d) respectively. Draft rules for new power plants were released in June 2013 and those for existing power plants in June 2014. The EPA engaged in extensive outreach to stakeholders on the various options and best approaches before making a proposal for carbon

pollution guidelines for existing power plants. While the rules for new power plants may preclude extensive installation of new coal power plants, the proposed rules for existing power plants and other major industrial facilities has received significant attention in Washington DC and across the country. Examples of source categories subject to 111(d) are existing municipal solid waste landfills, municipal waste combustors, sulfuric acid plants, primary aluminum reduction plants, and the phosphate fertilizer manufacturing facilities. There are currently 1,611 existing facilities that could be affected by the rule.[4] The EPA is engaging with states and a diverse set of partners, including the power sector, environmental groups and the public, to identify innovative, pragmatic approaches that build on the leadership that many states have already shown to cut carbon pollution from the power sector.

The public debate about the 111(d) rulemaking has already been intense, and legal challenges are to be expected. The main point of contention will be whether the EPA has the authority under the Clean Air Act to require that individual states to take actions that reduce greenhouse gas emissions beyond the physical grounds of the affected industrial and power facilities themselves. Contention of the EPA's so-called "beyond the fenceline" approach is significant, with the EPA and environmental groups contending that the EPA has the authority to enforce greenhouse gas regulations in this comprehensive way, while many affected entities believe that the final rules may only apply to actions on the grounds of polluting facilities themselves. This choice of method by the EPA cannot be challenged legally until the rule is finalized in 2015; at that point, legal challenge is likely to reach the Supreme Court for a final decision. One of the most challenging legal sticking points is determining what qualifies as a "system." The main portion of section 111 says that the EPA must use the "best system of emissions reduction" available. To industry officials 'system' refers to a certain technological system that can be applied only to the point of emissions, which are electric power plants themselves. Opponents

[4] See quotes: US EPA, URL: http://www.epa.gov/Region7/air/rules/111d.htm (05/27/2014, 12:04pm)

are concerned that the EPA will use a broader definition that could expand until there was hardly an area (industry, households, and agriculture) that would be outside of the reach of the EPA's regulatory program. At the writing of this article, it remained unclear what the EPA would define as a "system". Moreover, the Supreme Court will again have to decide if the EPA did this properly and will not do so until after the 111(d) rules are finalized in June 2015.

THE GEOPOLITICS OF US ENERGY SECURITY

When discussing energy policy in the United States, one cannot ignore the topic of US energy security: securing affordable supplies of energy, which has been a cornerstone of US economic and foreign policy for decades. Stretching back to the Nixon Administration, the American government has also paid close attention to the related concept of energy independence, as previously innocuous energy market relationships were rocked by the first and second Oil Embargos. Whereas US governmental and military actions could ensure, more or less, the free flow of energy supplies, and the diversity of countries exporting oil to the US grew over time, government policy remained unsuccessful in reaching energy independence. Prior to the advent of fracking, oil and gas production were in (long term) decline, renewable energy production and promotion was disjointed and limited in scope, and policies that encouraged conservation or efficiency were unpopular, time-limited, or lacked ambition. Corporate Vehicle Efficiency Standards (CAFE), passed in the 1980s and intended to improve passenger vehicle efficiency, effectively reduced energy use per mile travelled, but were left unchanged for decades and excluded whole classes of vehicles from consideration. Technological developments were simultaneously marginal and narrow. While the US population continued to grow; energy use per household increased, as did vehicle miles travelled. America's dependence on imported oil and gas grew continuously over the period with no end in sight. Until the late 2000s, the Energy Information Administration was still predicting that domestic US oil and gas production would continue to decline and the gap between production and consumption would widen, requiring even greater levels of imports. This situation had obvious economic implications, but the geopolitical implications were also clear. A US heavily dependent on imported energy, specifically from countries with tense and tenuous political relationships with the US, had fewer options for action.

Three unrelated and rather unforeseen developments stand as inflexion points for the US energy security situation and its subsequent ability to act geopolitically. These developments

were: higher and sustained global prices for oil; real declines in vehicle miles travelled; and the advent of hydraulic fracturing for oil and gas in tight rock formations.[5]

Prices for oil and refined oil products (specifically gasoline and diesel) have been markedly higher than the 1990s and early 2000s for nearly a decade. Global demand for oil has increased during this period, helping to keep prices high despite increased production. The effects of high prices over a longer period of time are predictable; while most consumers could not replace less efficient vehicles in the short term and automakers could not offer them immediately, a trend in this direction is now evident. The Obama Administration's action to substantially improve vehicle efficiency – both personal automobiles and heavy-duty vehicles – reinforces the trend of declining oil use in transport. At the same time, the overall economic effects of the Great Recession and changing attitudes toward driving, particularly among America's youth, have resulted in an absolute decline in vehicle miles travelled. This trend is possibly an effect of higher gasoline prices. These two effects together, however, have helped dampen demand for oil.

At the same time, a supply side change has fundamentally altered the energy security situation both for oil and natural gas. As recently as 2005, the US imported over 60% of its oil. The trend pointed to ever increasing amounts of imported oil, alongside continually increasing demand, while natural gas production in the US was deemed in terminal decline and companies were looking to build natural gas liquefaction facilities to import natural gas to the US The combined processes of hydraulic fracturing and directional drilling (known as "fracking") have changed the import dependence situation in the US for both oil and gas. Production of both products has increased substantially since 2006 for natural gas and 2008 for crude oil. Oil imports have

[5] A fourth factor, the dramatic and continuing decline in systems costs for renewable energy will also have a larger effect on electricity markets and transportation long-term, but these dynamics are of limited for energy security today.

declined as domestic production has risen and consumption has stabilized. Discussions about how to transport natural gas from import facilities, has flipped to thinking through whether and how to enable the export of natural gas. Lifting an export ban on crude oil, in place since the oil embargoes of the 1970s, is also being considered.

These combined effects have made the US markedly less dependent on foreign sources of energy, which has opened up some avenues for action geopolitically. For example, the strength of the US energy situation combined with the economic effects of its sanction regime against Iran helped secure the negotiating position of the US in diplomatic talks with Iran. Yet the strength of this position has not led to success in all recent geopolitical matters and might lessen in the future.[6] The increase in US domestic oil production has had only a marginal effect on some oil prices, which has more to do with differences in refining capacity for different grades of crude in the US and other parts of the world than with new production. Moreover, the cost benefits enjoyed by US electricity and industrial users of natural gas would shrink considerably with a decision to export liquefied natural gas, as the US market would then be open to the global market. US capacity would contribute to lower prices in other parts of the world with prices higher than the current US rates (i.e. Asia, Europe) and the price of natural gas in the US would rise toward a global price, undoing some of the current economic advantages.

[6] Some examples include: The nuclear treaty between the US (and others) and Iran remains unfinished and unsigned as of this writing; the US and Europe were unable to persuade Russia from annexing Crimea and occupying parts of Eastern Ukraine.

THE ROLE OF THE PRIVATE SECTOR

The private sector plays a massive role in the energy, electricity, and transportation sectors in the United States. Further, it is driving innovation in electric vehicles, the extraction of fossil fuel resources, and the adoption of renewable energy and energy efficiency. In many cases, this private sector activity is responding to research funded by the federal or state governments, or is a result of policies and legal frameworks that either require or encourage new solutions. Private drilling companies were able to use technologies developed, in part, with public support in innovative ways to bring about the fracking revolution in the US; federal policies also opened up space for the storage of fracking waste fluids, which then helped spur development. Electric vehicle development in California arose in reaction to a policy mandating that a portion of the state's automobile fleet produce no greenhouse gas emissions. Further, with comprehensive clean energy policy lacking at the federal level and being implemented at several speeds at the state level, US companies provide some of the most innovative examples of leadership in transportation and renewable energy production. Below are a few of the most compelling stories.

TESLA

Tesla Motors (Tesla) is well known for being an upstart in the automobile industry, as the manufacturer and seller of IT-cloud-connected electric vehicles. Further, Tesla has recently announced plans to build the world's largest lithium-ion battery manufacturing facility, which would double worldwide battery production, bringing down the cost of its vehicles battery packs and also opening new options for the storage of renewable electricity from wind and solar facilities.

In cooperation with a group of partners, in particular Panasonic Corp., Tesla intends to build this battery manufacturing facility by 2017. When running at full capacity in 2020, this factory alone is intended to produce as many lithium-ion battery cells as total worldwide production in 2013. Tesla forecasts that by the end of the first year of volume production of their mass market

vehicle, the "Gigafactory" will have driven down the per kWh cost of a battery pack by more than 30%, with additional cost declines in the following years. The factory should be operational by the end of 2017, and full ramp up should occur by 2020, with about 6,500 employees and 50 GWh per year of battery packs produced at peak. The batteries are initially intended for its vehicle fleet, but they could also portend significant developments in battery technology as a storage option for renewable electricity production. Tesla estimates the cost of building the facility to be $4-5 billion, of which Tesla has raised $1.6 billion.[7] Tesla chose to locate the facility in Nevada. This investment is the next step in the successful and profitable launch of the company itself, which has managed to turn a profit exclusively selling electric vehicles. To date, other electric vehicle companies have been unprofitable (e.g. Fisker) or companies sell them as one of many offerings (e.g. Nissan).[8] In order to increase the size of the market of electric vehicles being built and sold, Tesla also recently relinquished control of a variety of patents, releasing the intellectual property to the public domain. In theory, this would aid the technology development process and help Tesla by reorienting the car market toward electric vehicles.

APPLE

Apple Inc. now uses only renewable energy sources to power its data centers, according to an updated report on its environmental policies. The company's data centers run on energy sources such as solar, wind and geothermal, instead of coal or other fossil fuels.[9] In 2012, Greenpeace International ranked Apple poorly on a set of criteria related to sustainability and environmental effects of the electricity infrastructure supporting its cloud computing; this

[7] See: Ben Levisohn: Tesla's Gigafactory: Bigger Than the Battery Industry, Good for Business, Stock to Watch, Feb. 27 2014, URL: http://blogs.barrons.com/stockstowatchtoday/2014/02/27/teslas-gigafactory-bigger-than-the-battery-industry/ (05/27/2014, 3 pm)

[8] See: Neil Winton: New report Says Except for Tesla, Electric-Only Vehicles are failures so far, Forbes, 5/28/2014, URL: http://www.forbes.com/sites/neilwinton/2014/05/28/except-for-tesla-electric-only-vehicles-are-failures-for-now-report/ (05/29/2014)

[9] https://www.apple.com/environment/our-progress/

assessment appeared in the report called "How Clean Is Your Cloud?"[10] In response to this and other assessments, Apply made changes to the sources and transparency of its energy infrastructure. Today, Apple says it met a goal of generating 60% of the energy for the data center on-site. "The power we are using in North Carolina is 100 percent renewable and zero percent coal," Apple's Chief Financial Officer Peter Oppenheimer said. Oppenheimer said Apple would double its solar capacity in Maiden after the construction of another nearby 100-acre solar farm by the end of this year. Apple also said a data center that is under construction in Prineville, Oregon, will run on local renewable energy sources such as wind, hydro, solar and geothermal power. Apple now gets 75% of its total power from renewable sources, up from 35% a year ago. The company's four largest office campuses, in Ireland, Germany, and two in California, now use 100% renewable energy sources, according to Oppenheimer. Oppenheimer declined to disclose how much Apple spent on the equipment to generate its own power. He said Apple will keep investing in green technologies and is not focused on earning a financial return on the investments.

IKEA

IKEA bought a 98 MW wind project in Hoopestown, Illinois. This purchase represents the single largest renewable investment made by IKEA anywhere on the planet. It should bring IKEA closer to its goal of being a net-zero energy user (producing as much energy as it consumes) by 2020. IKEA has dedicated $2 billion to its various energy goals. The Hoopestown project, currently under construction and including 49 of Vestas's 2MW turbines, will be complete by the first half of 2015. Chief Financial Officer of IKEA US, Rob Olson, affirmed the company's commitment to renewable energy for environmental reasons, but "also because it makes good financial sense. We invest in our own renewable energy sources so that we can control our

10

http://www.greenpeace.org/international/Global/international/publications/climate/2012/iCoal/HowCleanisYourCloud.pdf

exposure to fluctuating electricity costs and continue providing great value to our customers."[11] IKEA currently has investments in wind projects in eight countries (with a total of 206 turbines) as well as 550,000 solar panels. In 2013, IKEA renewables produced 1,425,000 megawatt hours of electricity, which is equivalent to 37% of the company's total energy (not just electricity) needs. IKEA has invested heavily in energy efficiency as well.[12]

WALMART

The Solar Energy Industry Association's report *Solar Means Business 2013*, which identifies major commercial solar projects and ranks America's top corporate solar users, rates Walmart as America's commercial leader in solar installation for the second year in a row with 89 megawatts (MW) installed at 250 locations.[13] According to Walmart, these on-site facilities generate between 15 and 30% of electricity use at each store. [14] Walmart also has 42 fuel cell projects in the US, which each provide 40 to 60% of electricity use. Globally, Walmart has over 335 renewable energy projects; these facilities generated approximately 2.2 billion kWh of electricity in 2013. Combined with renewable electricity purchased from the grid, Walmart met over 24% of its electricity needs from renewables. Walmart's 2020 goals include having 1,000 renewable energy projects globally with 7 billion kWh of renewable electricity production by the end of 2020.[15]

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[11] http://www.ikea.com/us/en/about_ikea/newsitem/pr-IKEA-wind-farm-investment

[12] See: Peter Kelly-Detwiller: IKEA continues trend of supplying its own renewable energy, Forbes 04/10/2014, URL: http://www.forbes.com/sites/peterdetwiler/2014/04/10/ikea-purchases-98-mw-us-wind-farm-continues-trend-of-supplying-its-own-renewable-energy/ (05/29/2014)

[13] See Solar Means Business 2013 http://www.seia.org/sites/default/files/resources/3s8h63Gx6oSMB2013.pdf and http://corporate.walmart.com/global-responsibility/environment-sustainability/energy

[14] http://corporate.walmart.com/global-responsibility/environment-sustainability/energy

[15] http://corporate.walmart.com/global-responsibility/environment-sustainability/energy