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SOME HITS ... SOME MISSES

ALL-IN-ALL ... TO BE TAKEN WITH A GRAIN OF SALT

An Analysis of EIA's Short-Term Projections in 2015 for Renewable Electrical Generation

(December 17, 2015)

INTRODUCTION:

Each year, typically in spring, the U.S. Energy Information Administration (EIA) issues its "Annual Energy Outlook" (AEO) with multiple scenarios and projections for U.S. energy production and consumption, on an energy source-by-energy source basis, for roughly a quarter-century into the future.

In recent years, EIA's forecasts for the growth of renewable energy - particularly solar and wind - have been criticized by sustainable energy advocates and others as being unduly conservative and inconsistent with recent growth rates. (See, for example, "EIA Continues to Lowball Its Renewable Energy Forecast" by Katherine Tweed [GreenTechMedia.com, December 18, 2013; http://www.greentechmedia.com/articles/read/EIA-Continues-to-Lowball-Renewable-Energy-Forecast] and "Why Are the Government's Energy Forecasts So Bad?" by Michael Grunwald [Politico.com, June 2015; http://www.politico.com/agenda/story/2015/06/why-are-the-federal-governments-energy-forecasts-so-bad-000111]).

Moreover, critics have argued that low-balling the potential for renewable energy sources (i.e., biomass, geothermal, hydropower, solar, wind) can adversely affect decisions made by policy-makers and potential investors as well the media's and public's perception of these technologies' ability to meet the nation's energy needs or to address pressing problems such as climate change.

However, not usually considered or examined by such critiques of the AEO are the monthly "Short-Term Energy Outlook"(STEO) reports also issued by EIA. These shorter and less-detailed analyses regularly provide the agency's energy projections for the balance of the current year and the year to come. (The most recent monthly edition can be found at: http://www.eia.gov/forecasts/steo .)

Given the short time-frame involved, one might assume that their forecasts would hue pretty close to actual developments. But, to date, that assumption has not been analyzed.

This paper, therefore, takes a look at the projections made by EIA in its twelve monthly STEO reports issued in 2015 to see how they evolved during the course of the year and to review how close they came to correctly forecasting electrical generation by renewable energy sources -- particularly, hydropower, solar, and wind.

METHODOLOGY:

Verbatim or near-verbatim excerpts are provided in this analysis from EIA's twelve monthly STEO reports issued in 2015 of the projections addressing EIA's expectations for renewably-generated electricity in 2015 and 2016.

To provide some additional perspective, the relevant sections from EIA's January 2014 and December 2014 STEO reports are also provided.

These are followed by the most recent actual data provided by the Federal Energy Regulatory Commission (FERC) and the EIA respectively for renewable energy generating capacity and net electrical generation. For actual capacity, the most recent FERC data is current up through October 31, 2015. For actual net electrical generation, the most recent EIA data is current up through September 30, 2015.

While FERC and EIA provide actual data for geothermal and biomass as well as hydropower, solar, and wind, the STEO reports focus almost exclusively on the last three. Typically, geothermal and biomass are simply lumped - along with solar and wind - into the larger grouping of "nonhydropower renewables" whereas EIA does address solar and wind individually as well.

It is assumed that EIA does not foresee dramatic changes in the contribution of biomass and geothermal to the nation's electrical generation supply. That may be reasonable -- both sources have experienced relatively consistent and modest growth most years during the past decade or longer but have rarely displayed large monthly or annual deviations from those historic growth patterns.

On the other hand, wind and solar have both experienced dramatic growth rates in recent years with wind becoming the second largest source of renewably-generated electricity, behind only hydropower. And hydropower is individually reported on because, as the largest source of renewable electricity (roughly 6-7% of the annual total), significant percentage changes have a far greater impact on the total amount of U.S. electricity generated.

ANALYSIS/FINDINGS:

Hydropower - EIA began its 2015 forecasts with decidedly optimistic forecasts for positive growth by hydropower this year. Beginning with a projection of 2.1% annual growth issued in January, EIA's monthly forecasts grew during the spring until they reached a high forecast in April of 6.3% annual growth. Thereafter, they shifted into the negative range with ever-worsening forecasts, the worst being in September which foresaw a 10.4% drop in hydropower's output in 2015.

In reality, hydropower did begin the year generating more electricity than reported in 2014. However, due to severe and prolonged drought conditions affecting several hydropower markets, that changed dramatically in May and in the months that followed. By December, EIA was forecasting an annual decline in hydropower output for the year of over 8.2%. That may prove to be overly pessimistic. By the end of the third quarter, hydropower had rebounded a bit and, year-to-date (YTD), was only 4.7% behind the level recorded for the same nine-month period in 2014.

Wind - EIA began the calendar year with a strong forecast for growth in new wind capacity, suggesting that it would increase by 16.1% by the end of 2015. The agency subsequently tempered its outlook with subsequent forecasts that ranged from a low of 11.4% growth this year (issued in March) to 13.0% (issued during each of the last three months).

EIA's forecast may come close to the mark. By the end of October, actual U.S. wind capacity was nearly 70 GW -- 11.2% higher than a year earlier. And the American Wind Energy Association reports that more than 13 GW of new wind capacity is presently under construction
(see: http://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=8042) suggesting that EIA's figure of 13% annual growth in 2015 may yet prove correct.

In January 2014, EIA had forecast wind to provide more than 5% of total electricity generation by the end of 2015. By the end of 2014,however, EIA had tempered that forecast to 4.7% and has not offered a precise percentage in the STEO reports published in 2015, although several did foresee wind providing over 5% (and as much as 5.3%) in 2016. In reality, actual generation from wind in 2015 dipped below 2014 YTD levels for much of the year and only reached parity with 2014 YTD levels in September 2015. As of the end of the first three-quarters of 2015, wind was providing 4.3% of net U.S. electrical generation ... but moving on a decidedly upward trajectory.

Solar - EIA's forecasts for solar have slowly grown more aggressive during the course of the past twelve months. In the beginning of the year, EIA predicted utility-scale solar to comprise only 0.6 - 0.7% of total U.S. electricity generation by the end of 2016. In reality, by September 30, 2015, utility-scale solar was already contributing 0.66% of electrical generation - suggesting that it could reach and possibly surpass the 0.7% figure by the end of 2015, i.e., a full year earlier than EIA earlier forecast.

Perhaps acknowledging the faster-than-predicted growth rate for solar, EIA forecast in August that utility-scale solar capacity would increase by 10 GW between the end of 2014

and the end of 2016. A month later, it had revised that forecast to 11 GW and for the past two months has predicted 12 GW.

(For comparison, Mercom Capital Group has just released its own forecast predicting 13 GW of new U.S. solar capacity in 2016; see: http://mercomcapital.com/global-solar-installations-forecast-to-reach-approximately-64.7-gw-in-2016-reports-mercom-capital-group . And GTM Research and the Solar Energy Industries Association forecast cumulative PV installations to nearly double between now and the end of 2016; see: http://www.greentechmedia.com/articles/read/us-solar-market-prepares-for-biggest-quarter-in-history .)

EIA generally did not provide forecasts for distributed solar (e.g., rooftop solar) in its 2015 STEO forecasts but, as of its most recent "Electric Power Monthly" report (with data for September 2015), has begun to report estimates of electricity generated by small-scale solar. Combined, small-scale and utility-scale solar are estimated by EIA to provide the equivalent of about 1.0% of total reported electricity generation from all utility-scale sources.

Nonhydropower Renewables - EIA's monthly forecasts have generally projected increases for 2015 in the electricity from the combination of nonhydropower renewables (i.e., biomass, geothermal, solar, wind) with lower estimates of 1.4% (March STEO) and 1.9% (April STEO) to a high estimate of 6.9% (June STEO). The average predicted rate of growth from the STEO reports issued in the last quarter has been 4.2%.

As of September 30, the YTD growth in nonhydropower renewables has been 4.5% -- a figure that has been more-or-less steadily growing throughout the year ... suggesting that the actual end-of-the-year growth rate may exceed all but EIA's most optimistic projections.

Renewables Including Hydropower - EIA began 2015 with optimistic growth forecasts for the electricity to be generated by the combination of conventional hydropower and nonhydropower renewables -- most STEO forecasts during the first half of the year saw an average growth of about 3%. However, for the past five months, EIA has predicted a net decrease ranging from 2.7% (October STEO) to 1.8% (December STEO) -- although the trend line for the last quarter has been more optimistic.

In reality, as of the end of September 2015, after falling behind 2014 levels throughout the summer, renewably-generated electricity for 2015 YTD had pulled almost even with 2014 and appeared to be on course to exceed, albeit only modestly, last year's levels.

CONCLUSIONS:

Overall, while EIA's short-term forecasts for 2015 have generally followed the actual pattern of ups-and-downs in rates of electricity generation from renewable energy sources throughout the year, they have - with some monthly exceptions - underestimated the actual overall growth in renewables. That is, EIA's predictions for new capacity from, and electricity generated by, renewables in 2015 have generally been lower than has ultimately proven to be the case.

In particular, EIA has continued to fail to capture the magnitude of the rapid growth rates being enjoyed by utility-scale (and possibly distributed, small-scale) solar. Its forecasts for both 2015 and 2016 seem likely to be exceeded by actual growth -- and maybe by fairly large margins. EIA's 2016 predictions for solar's share of total U.S. electrical generation will very possibly be met a year earlier.

EIA's 2015 STEO reports began the year much more optimistic about the prospects for both hydropower and wind than has proven to be the case. By spring, output from both sources had fallen significantly below expectations. On the other hand, generation by wind and hydropower now appears to be bouncing back - at least somewhat. Consequently, EIA's more recent pessimistic forecasts for both of these sources for 2015 probably underestimate the generation that will actually be recorded this year.

As a result, the actual end-of-the-year figures for electricity generated by both nonhydropower renewables, and renewables including conventional hydropower, will likely exceed EIA's predictions by at least modest levels.

Not including small-scale, distributed renewables (e.g., rooftop solar), renewables will likely provide about 13% of net U.S. electrical generation in 2015. Generation by non-hydro renewables could be about 4.5% higher than 2014 levels -- a bit more than EIA anticipates. Generation from all renewables, including hydropower, will probably be at roughly 2014 levels - again, slightly better than EIA forecasts - notwithstanding this year's fall-off in hydro output. It is almost certain that the majority of new electrical generating capacity installed during 2015 will be from renewables and renewables will account for more than 17.5% of total installed U.S. operating generating capacity by year's end.

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EXCERPTS FROM EIA's 2015 MONTHLY "SHORT-TERM ENERGY OUTLOOK" REPORTS:

The excerpts below are taken either verbatim - or close to it - from the monthly STEO reports issued by EIA during 2015.

EIA Short-Term Energy Outlook for Electricity from Renewables - January:
U.S. Energy Information Administration, January 13, 2015
http://www.eia.gov/forecasts/steo/archives/jan15.pdf
EIA projects that total renewables used for electricity and heat generation will grow by 3.3% in 2015. Conventional hydropower generation increases by 2.1%, while non-hydropower renewables generation increases by 3.9%. In 2016, total renewables consumption for electric power and heat generation increases by 4.8% as a result of a 1.1% increase in hydropower and a 6.6% increase in non-hydropower renewables. In 2014, 6.4% of generation came from hydropower and 6.7% from non-hydropower renewables. The electricity generation share from non-hydropower renewables will rise to 7.9% by 2016, and the hydropower share remaining at 6.4%. Wind is the largest source of non-hydropower renewable generation, and it is projected to contribute 5.3% of total electricity generation

in 2016. Despite the growth, solar power remains just 0.7% of total U.S. utility-scale generation in 2016. EIA expects that utility-scale solar capacity will increase more than 60% between the end of 2014 and the end of 2016. Wind capacity is forecast to increase by about 23% between 2014 and 2016. The absolute amount of the increase in wind capacity will be more than twice that of solar: 15 gigawatts of wind versus 6 gigawatts of utility-scale solar.

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EIA Short-Term Energy Outlook for Electricity from Renewables - February:
U.S. Energy Information Administration, February 10, 2015
http://www.eia.gov/forecasts/steo/archives/feb15.pdf
EIA projects that total renewables used for electricity and heat generation will grow by 3.8% in 2015. Conventional hydropower generation increases by 5.7%, while non-hydropower renewables generation increases by 2.9%. In 2016, total renewables consumption for electric power and heat generation increases by 2.9% as a result of a 3.2% decline in hydropower and a 6.0% increase in non-hydropower renewables. The electricity generation share from non-hydropower renewables is expected to rise from 6.9% in 2014 to 7.9% by 2016, and the hydropower share remaining near 6.5%. Wind is forecast to increase by 16.1% in 2015 and by another 6.5% in 2016 and contribute 5.2% of total electricity generation in 2016. EIA expects that utility-scale solar capacity will increase by more than 60% between the end of 2014 and the end of 2016 but still average only 0.7% of total U.S. electricity generation in 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - March:
U.S. Energy Information Administration, March 10, 2015
http://www.eia.gov/forecasts/steo/archives/mar15.pdf
EIA projects that total renewables used for electricity and heat generation will grow by 2.9% in 2015. Conventional hydropower generation increases by 6.0%, while nonhydropower renewables generation increases by 1.4%. In 2016, total renewables consumption for electric power and heat generation increases by 1.8% as a result of a 3.6% decline in hydropower and a 4.6% increase in nonhydropower renewables. Wind is the largest source of nonhydropower renewable generation, and it is projected to contribute 5.0% of total electricity generation in 2016. Wind capacity, which grew by 7.6% in 2014, is forecast to increase by 11.4% in 2015 and by another 11.0% in 2016. EIA expects continued growth in utility-scale solar power generation, which is projected to average 74 gigawatthours per day in 2016. Despite this growth, utility-scale solar power averages only 0.6% of total U.S. electricity generation in 2016. EIA expects that utility-scale solar capacity will increase by more than 60% between the end of 2014 and the end of 2016. The absolute amount of the increase in wind capacity is more than twice that of solar: 15 GW of wind compared with 6 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - April:
U.S. Energy Information Administration, April 7, 2015
http://www.eia.gov/forecasts/steo/archives/apr15.pdf
EIA projects that total renewables used for electricity and heat generation will grow by 3.4% in 2015. Conventional hydropower generation increases by 6.3%, while non-hydropower renewables generation increases by 1.9%. In 2016, total renewables consumption for electric power and heat generation increases by 2.6% as a result of a 2.5% decline in hydropower and a 5.2% increase in non-hydropower renewables. EIA expects continued growth in utility-scale solar power generation, which is projected to average 80 gigawatthours per day in 2016. Utility-scale solar capacity will increase by 75% between the end of 2014 and the end of 2016. Despite this growth, utility-scale solar power averages only 0.7% of total U.S. electricity generation in 2016. Wind capacity, which grew by 8.1% in 2014, is forecast to increase by 13.1% in 2015 and by another 10.9% in 2016. The absolute amount of the increase in capacity is more than twice that of solar: 17 GW of wind compared with 8 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - May:
U.S. Energy Information Administration, May 12, 2015
http://www.eia.gov/forecasts/steo/archives/may15.pdf
EIA expects renewables used in the electric power sector will grow by 3.0% in 2015 as conventional hydropower generation decreases by 0.9%, while non-hydropower renewable power generation increases 6.8%. EIA expects continued growth in utility-scale solar power generation, which is projected to average 83 GWh/d in 2016. Despite this growth, utility-scale solar power averages only 0.7% of total U.S. electricity generation in 2016. Although solar growth has historically been concentrated in customer-sited distributed generation installations, EIA expects utility-scale solar capacity will increase by 84% between the end of 2014 and the end of 2016, with about half of this new capacity being built in California. Wind capacity, which grew by 8.1% in 2014, is forecast to increase by 13.0% in 2015 and by another 11.3% in 2016. Because wind is starting from a much larger base than solar, even though the growth rate is lower, the absolute increase in wind capacity is more than twice that of solar: 17 GW of wind compared with 8 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - June:
U.S. Energy Information Administration, June 9, 2015
http://www.eia.gov/forecasts/steo/archives/jun15.pdf
EIA expects renewables used in the electric power sector will grow by 2.6% in 2015, as conventional hydropower generation decreases by 1.9%, while non-hydropower renewable power generation increases 6.9%. Generation from hydropower is expected to increase by 5.4% in 2016. Total renewables consumption for electric power and heat generation decreases by 1.1% in 2015 but increases by 5.6% in 2016. EIA expects utility-scale solar capacity to increase by 86% between the end of 2014 and the end of 2016, which is projected to average 85 GWh/d in 2016. with more than half of the new capacity being built

in California. However, utility-scale solar power will average only 0.8% of total U.S. electricity generation in 2016. Wind capacity, which grew by 8.2% in 2014, is forecast to increase by 12.9% in 2015 and by 12.0% in 2016. Even though the growth rate is lower, the absolute increase in wind capacity is almost twice that of solar: 17 GW of wind compared with 9 GW of utility-scale solar between 2014 and 2016

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EIA Short-Term Energy Outlook for Electricity from Renewables - July:
U.S. Energy Information Administration, July 7, 2015
http://www.eia.gov/forecasts/steo/archives/jul15.pdf
EIA expects renewables used in the electric power sector will grow by 1.8% in 2015; conventional hydropower generation decreases by 2.0% and non-hydropower renewable power generation increases by 5.5%. Generation from hydropower is expected to increase by 5.4% in 2016. Total renewables consumption for electric power and heat generation decreases by 1.2% in 2015 and increases by 5.5% in 2016. EIA projects utility-scale solar power generation to average 86 gigawatt-hours per day in 2016 but will average only 0.8% of total U.S. electricity generation. EIA expects utility-scale solar capacity will increase by 90% between the end of 2014 and the end of 2016. Wind capacity, which grew by 8.3% in 2014, is forecast to increase by 12.8% in 2015 and by 13.0% in 2016. Because wind is starting from a much larger base than solar, the absolute increase in wind capacity is twice that of solar: 18 GW of wind compared with 9 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - August:
U.S. Energy Information Administration, August 11, 2015
http://www.eia.gov/forecasts/steo/archives/aug15.pdf
EIA expects total renewables used in the electric power sector will decrease by 2.6% in 2015. Conventional hydropower generation is forecast to decrease by 9.9%, and non-hydropower renewable power generation is forecast to increase by 4.5%. Generation from hydropower in the electric power sector is expected to increase by 12.3% in 2016. Total renewables consumption for electric power and heat generation decreases by 4.0% in 2015 and increases by 7.6% in 2016. EIA expects continued growth in utility-scale solar power generation, which is projected to average 87 gigawatthours per day in 2016. EIA expects utility-scale solar capacity will increase by almost 100% (10 GW) between the end of 2014 and the end of 2016, with 3.9 GW of this new capacity being built in California. Wind capacity, which grew by 8% in 2014, is forecast to increase by 12% in 2015 and by 14% in 2016. Because wind is starting from a much larger base than solar, even though the growth rate is lower, the absolute increase in wind capacity is twice that of solar: 18 GW of wind compared with 10 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - September:
U.S. Energy Information Administration, September 9, 2015
http://www.eia.gov/forecasts/steo/archives/sep15.pdf
EIA expects total renewables used in the electric power sector will decrease by 3.5% in 2015. Conventional hydropower generation is forecast to decrease by 10.4%, and non-hydropower renewable power generation is forecast to increase by 3.2%. Forecast generation from hydropower in the electric power sector increases by 9.2% in 2016. EIA expects continued growth in utility-scale solar power generation, which is projected to average 89 gigawatthours per day in 2016 and to averages 0.8% of total U.S. electricity generation next year. EIA also expects utility-scale solar capacity will increase by more than 100% (11 GW) between the end of 2014 and the end of 2016. Wind capacity, which grew by 8% in 2014, is forecast to increase by 12% in 2015 and by 13% in 2016. The absolute increase in wind capacity is twice that of solar: 18 GW of wind compared with 11 GW of utility-scale solar between 2014 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - October:
U.S. Energy Information Administration, October 6, 2015
http://www.eia.gov/forecasts/steo/archives/oct15.pdf
EIA expects total renewables used in the electric power sector to decrease by 2.7% in 2015. Conventional hydropower generation is forecast to decrease by 9.7%, and non-hydropower renewable power generation is forecast to increase by 4.0%. Forecast generation from hydropower in the electric power sector increases by 7.3% in 2016. EIA expects continued growth in utility-scale solar power generation, which is projected to average 89 gigawatt-hours per day (GWh/d) and 0.8% of total U.S. electricity generation in 2016. EIA expects utility-scale solar capacity will increase by more than 100% (11 GW) between the end of 2014 and the end of 2016, with 4.4 GW of new capacity being built in California. Wind capacity, which starts from a significantly larger installed capacity base than solar, grew by 8% in 2014, and is forecast to increase by 13% annually in both 2015 and 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - November:
U.S. Energy Information Administration, November 10, 2015
http://www.eia.gov/forecasts/steo/archives/nov15.pdf
EIA expects total renewables used in the electric power sector to decrease by 2.0% in 2015. Hydropower generation is forecast to decrease by 8.6%, and non-hydropower renewable power generation is forecast to increase by 4.4%. Forecast hydropower generation in the electric power sector increases by 7.0% in 2016. EIA expects continued growth in utility-scale solar power generation, which is projected to average 90 gigawatt-hours per day in 2016 and averages 0.8% of total U.S. electricity generation in 2016. EIA expects utility-scale solar capacity will increase by 118% (12 GW) between the end of 2014 and the end of 2016. Wind capacity is forecast to increase by 13% in 2015 and 14% in 2016.

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EIA Short-Term Energy Outlook for Electricity from Renewables - December:
U.S. Energy Information Administration, December 9, 2015
http://www.eia.gov/forecasts/steo/archives/dec15.pdf
EIA expects total renewables used in the electric power sector to decrease by 1.8% in 2015. Hydropower generation is forecast to decrease by 8.2%, and non-hydropower renewable power generation is forecast to increase by 4.2%. EIA expects utility-scale solar capacity will increase by 123% (12 GW) between the end of 2014 and the end of 2016, with 4.7 GW of new capacity being built in California. Wind capacity, which starts from a significantly larger installed capacity base than solar, grew by 8% in 2014, and it is forecast to increase by 13% in 2015 and by 14% in 2016.

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SOME ADDITIONAL EIA PROJECTIONS MADE IN 2014 FOR 2015:

EIA Short-Term Energy Outlook for Electricity from Renewables - December 2014:
U.S. Energy Information Administration, December xx, 2014
http://www.eia.gov/forecasts/steo/archives/dec14.pdf
EIA projects total renewables consumption for electric power and heat generation increases in 2015, by 4.3% as a result of similar increases in both hydropower and nonhydropower renewables. Electricity generation from wind is projected to contribute 4.7% of total electricity generation in 2015. EIA expects continued growth in utility-scale solar power generation, which is projected to average more than 60 gigawatthours per day in 2015. Despite the growth, this remains just 0.6% of total U.S. generation. While solar growth has historically been concentrated in customer-sited distributed generation installations, utility-scale solar capacity slightly more than doubled in 2013. EIA expects that utility-scale solar capacity will nearly double again between the end of 2013 and the end of 2015.

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EIA Short-Term Energy Outlook for Electricity from Renewables - January 2014:
U.S. Energy Information Administration, January xx, 2014
http://www.eia.gov/forecasts/steo/archives/jan14.pdf
EIA projects the growth in renewables consumption for electric power and heat generation in 2015, to continue at a rate of 4.7%, as a 2.2% increase in hydropower is combined with a 6.1% increase in nonhydropower renewables. EIA estimates that wind capacity will increase by 8.8% in 2014 to about 66 gigawatts by the end of the year and will increase 14.6% to total more than 75 GW at the end of 2015. Electricity generation from wind is projected to increase by 2.2% in 2014 and by 11.4% in 2015, contributing more than 5% of total electricity generation by the end of 2015. EIA expects continued robust growth in the generation of solar electricity generation, although the amount of utility-scale generation remains a small share of total U.S. generation at about 0.4% by 2015. EIA currently projects that utility-scale solar capacity will increase by approximately 40% between year-end 2013 and year-end 2015, with photovoltaic capacity accounting for about 85% of that growth. However, customer-sited PV capacity growth, which the STEO does not forecast, is still projected to exceed utility-scale solar growth between 2013 and 2015. EIA projects that

solar PV electric capacity will continue to grow in 2014 and 2015 in both the electric power and end-use sectors, and will dominate growth in solar thermal electric capacity.

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ACTUAL CAPACITY AND GENERATION FIGURES FOR 2015 TO DATE:

Total Installed Operating Generating Capacity (GW):
(based on the Federal Energy Regulatory Commission's "Energy Infrastructure Update" - latest report issued on December 3, 2015 with data through October 31, 2015; see table "Total Installed Operating Generating Capacity" -- http://www.ferc.gov/legal/staff-reports/2015/oct-infrastructure.pdf)

Hydropower	100.06
Wind	69.84
Biomass	16.65
Solar	13.40
Geothermal	3.91
Total	203.86 (this equals 17.5% of all installed U.S. generating capacity)

Note: These figures do not appear to include distributed renewables (e.g., rooftop solar)

Percentage Change in Operating Capacity - October 2015 Compared to October 2014:
(based on the Federal Energy Regulatory Commission's "Energy Infrastructure Update" - latest report issued on December 3, 2015 with data through October 31, 2015; see table "Total Installed Operating Generating Capacity" -- http://www.ferc.gov/legal/staff-reports/2015/oct-infrastructure.pdf ; corresponding October 2014 data can be found at: http://www.ferc.gov/legal/staff-reports/2014/oct-infrastructure.pdf)

Hydropower	+ 1.7%
Wind	+ 11.2%
Biomass	+ 3.5%
Solar	+ 35.8%
Geothermal	+ 1.0%

During the first ten months of 2015, renewables accounted for 63% of the 9,575 MW of new electrical generation placed in service.

Note: These figures do not appear to include distributed renewables (e.g., rooftop solar)

Net Generation (Thousand Megawatt-hours):
(based on the U.S. Energy Information Administration's "Electric Power Monthly" - latest report issue on December 1, 2015 with year-to-date data through September 30, 2015; see Table ES1.B -- http://www.eia.gov/electricity/monthly)

Hydropower	191,738
Wind	134,518
Biomass	48,233
Solar	20,892
Geothermal	12,643
Total	408,024

Note: These figures do not appear to include distributed renewables (e.g., rooftop solar)

Share of Total U.S. Net Electrical Generation:
(based on the U.S. Energy Information Administration's "Electric Power Monthly" - latest report issue on December 1, 2015 with year-to-date data through September 30, 2015; see Table ES1.B -- http://www.eia.gov/electricity/monthly)

Hydropower	6.09%
Wind	4.28%
Biomass	1.53%
Solar	0.66% *
Geothermal	0.40%
Total	12.97% (rounding accounts for difference of .01%)

* This figure does not include small-scale distributed solar PV generation. Starting in December 2015, the U.S. Energy Information Administration began including monthly estimates of small-scale distributed solar PV capacity and generation. EIA estimates that total U.S. solar generation (PV and thermal) was 3.6 million megawatt-hours in September 2015, with 33% of that total coming from small-scale solar PV. Overall, U.S. solar generation, including both small-scale distributed PV and utility-scale PV and thermal solar generation, was equivalent to about 1.0% of total reported electricity generation from all utility-scale sources in September 2015. (see: http://www.eia.gov/todayinenergy/detail.cfm?id=23972)

Percentage Change in Net Generation - September 2015 YTD Compared to September 2014 YTD:
(based on the U.S. Energy Information Administration's "Electric Power Monthly" - latest report issue on December 1, 2015 with year-to-date data through September 30, 2015; see Table ES1.B -- http://www.eia.gov/electricity/monthly)

Hydropower	- 4.7%
Wind	+ 0.7%

Biomass	+ 0.2%
Solar	+ 54.0%
Geothermal	+ 7.2%
Non-Hydro RE	+ 4.5%
Hydro + Non-Hydro	- 0.1%

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