# State energy factsheet: Minnesota

## Contents



This report provides a fact-based overview of Minnesota's power sector. It presents key metrics, highlights recent trends and discusses the state's progress toward compliance under the EPA's Clean Power Plan.

**Findings**

- Minnesota (MN) is a net importer of electricity; its retail electricity prices are below the US average; and its generation profile is more carbon-intensive than the US average (despite the fact that the state has substantial renewable energy capacity).
- Coal is the largest generation source, but natural gas is becoming more important in MN's power mix, providing 14% of electricity and accounting for 33% installed capacity in 2012, while coal is trending downwards. Coal-fired electricity generation fell from 59% in 2008 to 46% in 2013, and 396MW of coal plants have announced plans to retire between 2015 and 2017.
- Meanwhile, renewable energy generation is trending upwards (it grew from 12% to 21% of annual generation from 2008 to 2013) on the back of strong state policy support. Between 2008 and 2012, MN built 1.7GW of utility-scale renewable capacity (mostly wind), and we estimate that the state's investor-owned utilities (IOUs) will require 644MW of solar by 2020.
- MN is among the nation's leaders in terms of energy efficiency: its energy efficiency mandates have driven state utilities to outspend many of their peers in neighbouring states.
- MN has already made significant progress toward achieving its Clean Power Plan (CPP) targets for 2030, based on current and pipeline emission reduction activities.

**Table 1: Key power system metrics, Minnesota versus US average, 2013**

| Metric | Units | Minnesota | US average | Comment | Rank |
|---|---|---|---|---|---|
| Total retail electricity sales | TWh | 67 | 72 | ***Below average*** electricity demand | 23 |
| Total generation | TWh | 51 | 80 | ***Below average*** in-state generation | 31 |
| Retail electricity sales per capita | MWh | 12.4 | 11.6 | ***Above average*** per capita demand | 28 |
| Retail electricity prices | ¢/kWh | 9.5 | 10.1 | ***Below average*** electricity prices | 23 |
| Generation from gas | % | 13 | 28 | ***Below average*** reliance on gas for electricity | 32 |
| Generation from gas and renewables | % | 33 | 41 | ***Below average*** on gas and renewables | 26 |
| Energy efficiency score | ACEEE index | 25.5 | 19.2 | ***Above average*** on efficiency efforts | 11 |
| Utility energy efficiency budget | % state revenue | 2.42 | 1.13 | ***Above average*** utility efficiency budget | 14 |
| CO2 emissions rate | tCO2/ MWh | 0.56 | 0.52 | ***Dirtier than average*** generation profile | 21 |
| 2030 CPP CO2 emissions reductions-mass goal | % cut from 2012 | 35 | 23 | ***Above average*** 'ask' for CPP mass reduction goal | 6 |

*Source: Bloomberg New Energy Finance, EIA, US Census Bureau, ACEEE Notes: US ranks are in descending order (ie, 1 being highest, 50 being lowest). For some metrics it is 'good' to have a high ranking (eg, generation from renewables, energy efficiency score); for other metrics it is 'good' to have a low ranking (eg, retail electricity prices, CO2 emissions rate).*

**Nathan Serota**
Analyst, US Power and Clean Energy Economics

**Rachel Jiang**
Analyst, US Power and Environmental Markets

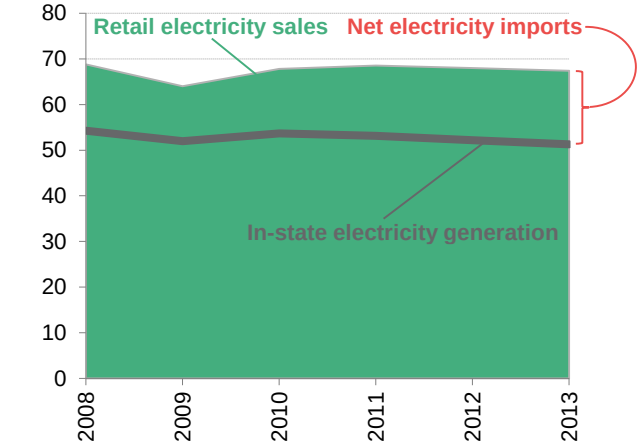
© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

## 1. BIRD'S EYE VIEW OF MINNESOTA'S POWER SECTOR

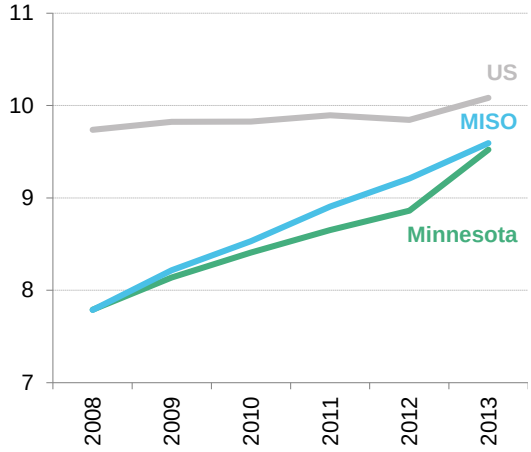
Minnesota (MN) consumes more electricity than it produces (67TWh of consumption versus 51TWh of generation in 2013), making it a net importer of electricity from its neighbours. And MN is growing its domestic generation gap: between 2008 and 2013, the difference between retail electricity sales and in-state generation increased at a compound annual growth rate (CAGR) of 2.1% (Figure 1).

**Figure 1: MN electricity sales and generation, 2008-13 (TWh)**




*Source: Bloomberg New Energy Finance, EIA*

**Figure 2: MN electricity prices relative to regional (MISO) and US averages, 2008-13 (¢/kWh)**

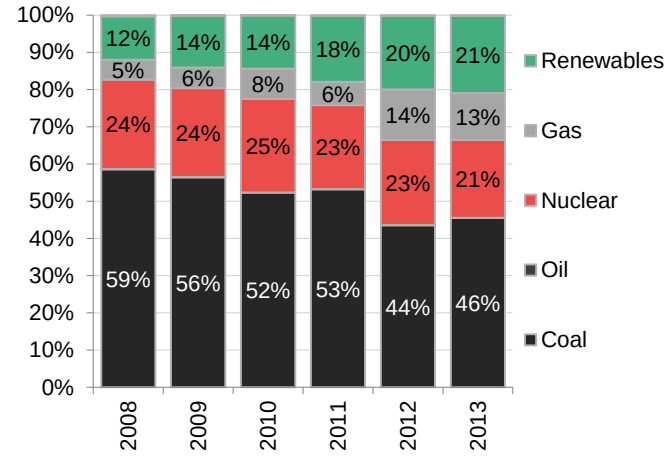



*Source: Bloomberg New Energy Finance, EIA Notes: MISO is the electric power market in the Midwest, comprised of part or all of 16 states, including Minnesota.*

The retail price of electricity in MN was 9¢/kWh in 2013, 23% higher than in 2008, and on par with the regional average which is below the US average (Figure 2).

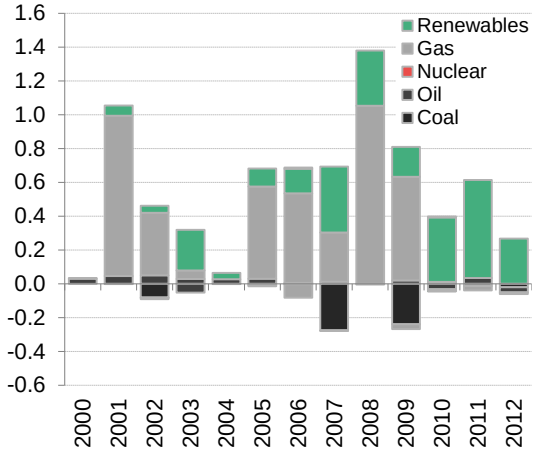
Gas is becoming more important in MN's power mix: gas-fired plants provided 14% of electricity in 2012, up from just 5% in 2008 (Figure 3). Gas plants accounted for 33% of installed nameplate capacity as of the end of 2012, up from 15% in 2000, owing to the addition of 4.4GW of gas capacity (and the retirement of 0.6GW of coal capacity) over that period (Figure 4).

**Figure 3: MN electricity generation mix by technology (%)**




*Source: Bloomberg New Energy Finance, EIA*

**Figure 4: MN utility-scale capacity additions (build, above x-axis) and retirements (below x-axis), 2000-12 (GW)**




*Source: Bloomberg New Energy Finance, EIA*

© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

At the same time, renewable energy generation is trending upwards (it grew from 12% to 21% of annual generation between 2008 and 2013, driven by wind) and coal generation is trending downwards (it fell from 59% to 46% over that period) (Figure 3). Over 1.5GW of coal retirements have been announced between 2015 and 2017 in the Midwestern ISO (MISO), the transmission system operator for many Midwestern states including MN. Three of these plants, totalling 396MW, are in MN.

**Table 2: MN policies relevant to sustainable energy sectors**

| Renewables |
|---|
| **Renewable energy standard (RES)** |
| Requires all electric utilities to obtain 25% of electricity from renewable sources by 2025 (30% by 2020 for Xcel Energy) |
| **Solar energy standard** |
| Requires IOUs to have 1.5% of retail electric sales from solar by 2020. |
| **Net metering** |
| Provides customers with net excess generation (NEG) from eligible systems (<1000kW) with a kWh credit on their bill |
| **Value of solar tariff (VOST)** |
| Alternative to net metering compensates customers for net value of solar PV on the distribution system |
| **Energy efficiency** |
| **Energy efficiency resource standard (EERS)** |
| Yearly energy savings goal for utilities of 1.5% of average retail sales beginning in 2010 (no statutory end date) |
| **Property assessed clean energy (PACE)** |
| Authorises certain MN local governments to provide property owners with upfront capital for energy efficiency improvements, which is in turn repaid through additional charges on homeowner property taxes |

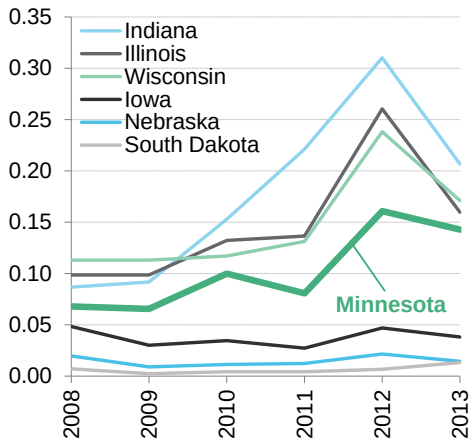
*Source: Bloomberg New Energy Finance, DSIRE, Minnesota Department of Commerce*

## 2. SUSTAINABLE ENERGY DEPLOYMENT

### 2.1. Natural gas

The amount of gas burned for power generation in MN grew at a CAGR of 16% from 2008-13 (a similar trend has occurred in neighbouring states, as shown in Figure 5). Increased natural gas production flowing out of the Northeast has driven gas prices down nationwide (including MN, Figure 6), improving the economics of the state's gas fleet.

**Figure 5: MN and neighbouring states' natural gas consumption from the power sector, 2008-13 (Bcfd)**




*Source: Bloomberg New Energy Finance, EIA*

**Figure 6: MN natural gas price (citygate), 2008-13 ($/MMBtu)**


*Source: Bloomberg New Energy Finance, EIA*

Historically, gas plants in MN have run primarily to meet peak electricity demand – as opposed to baseload demand – so their operations remained largely concentrated on summer months, when hot temperatures call for high electricity use. However, low gas prices have allowed gas-fired generators to underprice coal even for baseload during certain periods in recent years. This trend, combined with impending coal retirements, will serve to reduce MN's dependence on coal and will increase its reliance on alternative sources of electricity such as natural gas and renewables.

### 2.2. Renewables

MN has a *mandatory* renewable energy standard that requires most of the state's investor-owned utilities (IOUs)[1] to obtain 25% of energy from renewable sources by 2025 (Table 2). In 2013, renewables provided 21% of electricity generation, and nearly all of this came from wind. Between 2008 and 2012, MN built 1.7GW of utility-scale renewable capacity (1.6GW of wind, 35MW of

1 Xcel Energy has an even more stringent mandate than other IOUs in the state: its target is 30% by 2020.

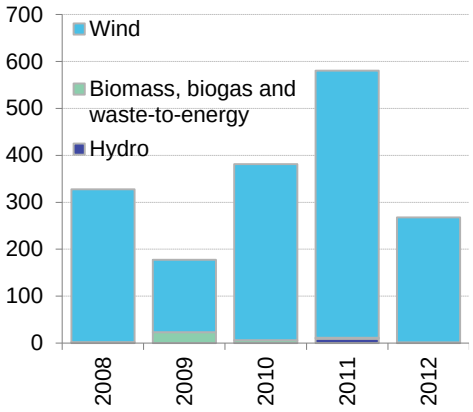
© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

biomass and 10MW of hydro; Figure 7), bringing cumulative installed utility-scale renewable capacity to 3.5GW in 2012 (Figure 8). Notably, MN is home to 9 waste-to-energy facilities.

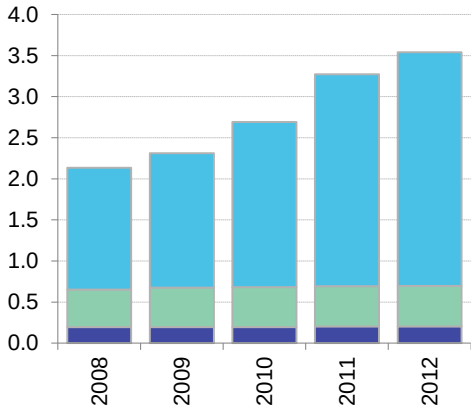
**MN has nearly 3GW of utility-scale wind installed, and three utility-scale solar projects were recently approved by the state PUC**

**Figure 7: MN utility-scale renewable capacity additions, 2008-12 (MW)**



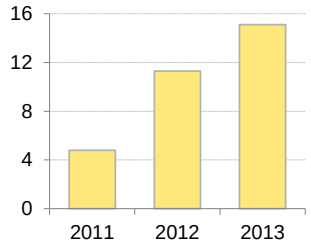

*Source: Bloomberg New Energy Finance, EIA*

**Figure 8: MN cumulative utility-scale renewable capacity, 2008-12 (GW)**




*Source: Bloomberg New Energy Finance, EIA*

**Figure 9: MN cumulative installed residential and commercial solar capacity, 2011-13 (MW)**




*Source: Bloomberg New Energy Finance, IREC*

Nearly 16MW of residential and commercial-scale (ie, distributed) solar capacity was installed in MN through 2013 (not visible in Figure 7 and Figure 8, but shown in Figure 9). State policy requires IOUs to have 1.5% of electric sales from solar by 2020. To meet this, we estimate that the state's IOUs will require 644MW of solar capacity, of which 64MW is required to be distributed solar.

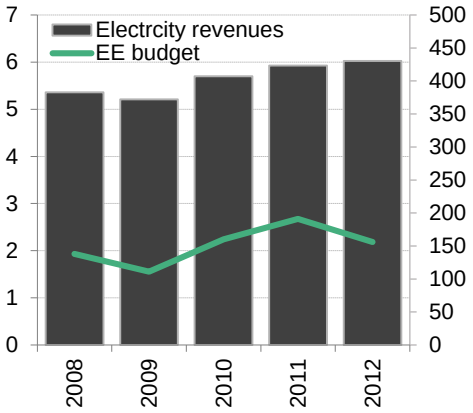
## 2.3. Energy efficiency

MN is a leader in terms of its overall energy efficiency efforts. The American Council for an Energy Efficient Economy (ACEEE) gave the state its fifth highest score (14 out of 20) for utility and public benefits programs and policies in 2013. Figure 10 shows MN's annual electricity revenues (black bars, left axis, $bn) and energy efficiency budget (green line, right axis, $m) from 2008 to 2012. The state dedicates noteworthy percentages of electricity revenues towards efficiency spending. Figure 11 shows how MN stacks up versus nearby states in terms of efficiency spending. MN dedicated 2.4% of its state-wide revenues to efficiency in 2013, relatively high for the region.

**MN spends more than some neighbors on energy efficiency**

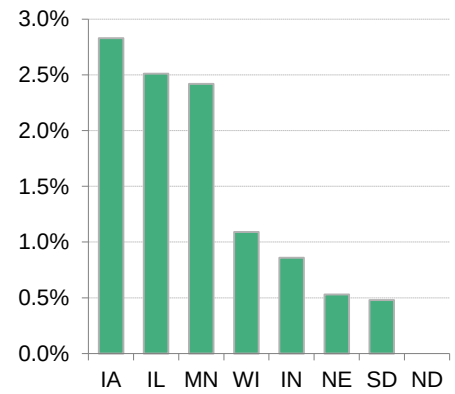
**And it ranks 12th in the US for registered energy efficiency patents**

**Figure 10: MN utility electricity revenues (left axis, $bn) and electricity efficiency budget (right axis, $m), 2008-12**




*Source: ACEEE*

**Figure 11: States' utility electricity efficiency budgets as a fraction of state-wide electricity revenue, 2013 (%)**




*Source: ACEEE*

© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

This efficiency spending helped pave the way for MN to achieve the savings required by its annual 1.5% energy efficiency resource standard (EERS). In 2011, incremental annual electric savings (ie, first-year savings from new efficiency efforts) summed across all of the state's utilities measured 965GWh at a cost of $10/MWh-saved on average in 2011, according to the Minnesota Department of Commerce.[2]

## 3. CLEAN POWER PLAN

The US Environmental Protection Agency (EPA) released the finalised Clean Power Plan (CPP), its landmark power sector regulation, on 3 August 2015. Under the final CPP, Minnesota's 2030 emissions rate goal is less stringent than what had been proposed in the draft Plan. The final rule requires the state to reach an emissions rate of 0.55tCO2/MWh by 2030, marking a 42% reduction from the 2012 baseline rate of 0.94tCO2/MWh. The draft rule required the state to meet an emissions target of 0.40tCO2/MWh. Minnesota's new interim goal, to be met on average during 2022-2029, is now 0.64tCO2/MWh—less strict than the proposed 0.41tCO2/MWh. The state's revised interim goal reflects EPA's efforts to provide a 'smoother glide path' and eliminate the 'cliff' at the start of the program.

The final plan also provides mass targets, which states may choose as their compliance standards instead of emission rate goals. Minnesota's 2030 mass goal is 20.6MtCO2, reflecting a 35% decline from the 2012 baseline value of 31.5MtCO2.

**Minnesota has already made significant progress toward achieving both its rate-based and mass-based CPP goals for 2030.**

Given its current and scheduled emission reduction activities, Minnesota has already made significant progress toward meeting its final compliance goals, especially on the mass-based side. The state has already completed 28% of the reductions required to meet its 2030 mass target based on current and planned retirements from its fossil fleet. Under rate-based targets, Minnesota is 23% of the way towards achieving its 2030 target based solely on recent and pipeline fossil fuel plant retirements as well as renewables build.

## 4. OPPORTUNITIES

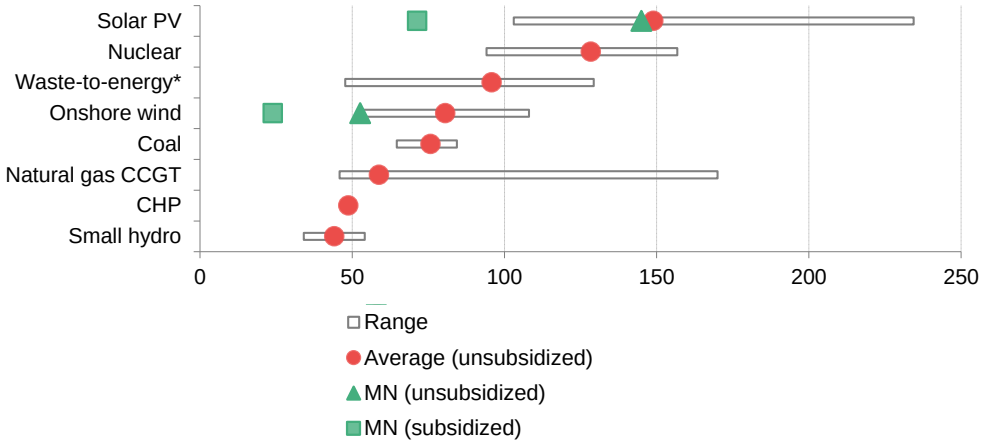
The Bloomberg New Energy Finance levelised cost of electricity (LCOE) analysis compares the cost of producing electricity from different technologies in the US (Figure 12). The red circles in the following chart show US averages (prior to the inclusion of policy – ie, unsubsidized); the green triangles and squares show subsidized and unsubsidized Minnesota-specific LCOEs, respectively, for onshore wind and solar PV.

2 For comparison, annual electric savings were 826GWh (which is just short of MN's 1.5% EERS target, in percentage terms) and cost $14/MWh-saved on average in 2010.

© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

**Figure 12: Unsubsidized levelised cost of electricity (LCOE) of select technologies in the US compared to subsidized and unsubsidized LCOE of onshore wind and solar PV in MN, H2 2014 ($/MWh)**




*Source: Bloomberg New Energy Finance Notes: *LCOE for waste-to-energy in this report is a global estimate, as opposed to all other LCOEs in Figure 12, which are either US or MN-specific. Variations in MN versus US average result from variations in capacity factor, capex and financing rates. Bars indicate the range of unsubsidized LCOE for each technology in the US. Key policies such as the $23/MWh Production Tax Credit (PTC) and accelerated depreciated (MACRS) bring down unsubsidized LCOEs to subsidized levels. LCOE for combined heat and power (CHP) is for reciprocating engines with CHP. LCOE for small hydro assumes 60% capacity factor, but this can vary significantly depending on annual rainfall conditions.*

**Wind and solar PV are already, or on the verge of being, economically viable in Minnesota**

**A state study suggests MN can increase its 2030 RES to 40% without sacrificing reliability[3]**

### Renewables

- MN has a broad scope of renewable technologies to consider. The LCOE analysis indicates that, in MN, wind is already economic without incentives (unsubsidized LCOE below CCGT) and is even more viable after accounting for incentives.
- Based on LCOE, solar PV (subsidized) is cheaper than nuclear and nearly cheaper than CCGT in MN, and small hydro and CHP are similarly attractive.
- Other renewables like waste-to-energy, hydro and biomass could potentially do well in the state if these technologies received similar policy and price support as other renewables.

### Natural gas

- The LCOE analysis also highlights the economic merit of natural gas CCGT, especially as increased natural gas production in the Northeast pushes down gas prices nationwide. MN imports most of its gas from Canada – and will continue to do so – but as Northeast production increasingly displaces other sources of demand for Canadian gas, more abundant – and potentially more stable – natural gas supplies could be on the horizon for MN.

### Energy efficiency

- As MN's *cumulative* energy savings goal grows (its 1.5% EERS compounds annually), electric utilities may have to expand existing customer programs and pilot new projects to meet goals.
- While MN leads other states on efficiency, it has even further room for improvement: for example, a study prepared for Xcel Energy, the state's largest utility, places technically and economically achievable cumulative annual energy savings in MN at 10TWh and 7TWh per year by 2020, respectively.

3 According to the Minnesota Renewable Energy Integration and Transmission Study (31 October 2014).

© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

# About Us

## Subscription details

sales.bnef@bloomberg.net

## Contributors

Nathan Serota
Analyst, US Power and Clean Energy Economics

Rachel Jiang
Analyst, US Power and Environmental Markets

William Nelson
Head of Analysis, North America

## Copyright

© Bloomberg Finance L.P. 2015. Developed in partnership with The Business Council for Sustainable Energy. No portion of this publication may be photocopied, reproduced, scanned into an electronic system or transmitted, forwarded or distributed in any way without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy.

© Bloomberg Finance L.P.2015. Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.

## Disclaimer

This service is derived from selected public sources. Bloomberg Finance L.P. and its affiliates, in providing the service, believe that the information it uses comes from reliable sources, but do not guarantee the accuracy or completeness of this information, which is subject to change without notice, and nothing in this document shall be construed as such a guarantee. The statements in this service reflect the current judgment of the authors of the relevant articles or features, and do not necessarily reflect the opinion of Bloomberg Finance L.P., Bloomberg L.P. or any of their affiliates ("Bloomberg"). Bloomberg disclaims any liability arising from use of this document and/or its contents, and this service. Nothing herein shall constitute or be construed as an offering of financial instruments or as investment advice or recommendations by Bloomberg of an investment or other strategy (e.g., whether or not to "buy", "sell", or "hold" an investment). The information available through this service is not based on consideration of a subscriber's individual circumstances and should not be considered as information sufficient upon which to base an investment decision. BLOOMBERG, BLOOMBERG PROFESSIONAL, BLOOMBERG MARKETS, BLOOMBERG NEWS, BLOOMBERG ANYWHERE, BLOOMBERG TRADEBOOK, BLOOMBERG BONDTRADER, BLOOMBERG TELEVISION, BLOOMBERG RADIO, BLOOMBERG PRESS, BLOOMBERG.COM, BLOOMBERG NEW ENERGY FINANCE and NEW ENERGY FINANCE are trademarks and service marks of Bloomberg Finance L.P. or its subsidiaries.

This service is provided by Bloomberg Finance L.P. and its affiliates. The data contained within this document, its contents and/or this service do not express an opinion on the future or projected value of any financial instrument and are not research recommendations (i.e., recommendations as to whether or not to "buy", "sell", "hold", or to enter or not to enter into any other transaction involving any specific interest) or a recommendation as to an investment or other strategy. No aspect of this service is based on the consideration of a customer's individual circumstances. You should determine on your own whether you agree with the content of this document and any other data provided through this service. Employees involved in this service may hold positions in the companies covered by this service.

© Bloomberg Finance L.P.2015.
Developed in partnership with The Business Council for Sustainable Energy.

No portion of this document may be reproduced, scanned into an electronic system, distributed, publicly displayed or used as the basis of derivative works without attributing Bloomberg New Energy Finance and The Business Council for Sustainable Energy. For more information on terms of use, please contact sales.bnef@bloomberg.net. Copyright and Disclaimer notice on page 8 applies throughout.