

Rating the States on Their Risk of Natural Gas Overreliance

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Rating the States on Their Risk of Natural Gas Overreliance presents the results of an analysis of the current and future potential for natural gas overreliance in the power sector for each of the 50 states. An earlier UCS work (Deyette et al. 2015) examined a range of issues around the risks of natural gas overreliance for electricity generation nationally. This analysis builds on that work with a focus on individual states and a subset of natural gas risks, using multiple metrics to assess those risks.

The text below explains the focus of the analysis, the multiple-metric approach, the details for each metric, and the summary graphics. It also includes a discussion of notes and limitations, and reference materials.

Focus

Rating the States is focused on the financial risks to consumers associated with excessive use of natural gas for electricity generation, with analysis carried out at the state level.

- **Power sector.** The power sector is a subset of the broad range of uses for natural gas, from heating homes and businesses to powering buses to serving as a feedstock for various industrial processes. The power sector has seen rapid change with regard to natural gas usage in recent decades, both in absolute terms and in terms of change within the sector (its portion of overall electricity generation, for example). It has also been the target of substantial investment in new infrastructure due to growing interest in natural gas—in terms of power plants and the pipelines that serve them.
- **Financial risks to consumers.** Natural gas for electricity generation offers potential benefits but also challenges, including environmental and financial, both near- and long-term. For electric ratepayers, financial risks can include those stemming from the volatility of the fuel price, the costs of carbon pollution, and the possibility that investments in natural gas infrastructure (power plants and pipelines) will not pay off, and therefore ratepayers will incur additional costs for such “stranded assets.” In some states, vertically integrated electric utilities both generate electricity and serve end users, while other states have restructured their electricity markets to allow for competition in power generation. In theory, the latter approach insulates customers from some generation risks, leaving them instead to be borne by shareholders of generator companies. The distinction between the two types of state markets is not black and white, however, and either type can lead to customers—rather than utility companies, generators, or shareholders—bearing the bulk of the consequences of natural gas overreliance.¹
- **States.** Some aspects of the energy sector are multi-state, and are therefore the responsibility of the federal government (approval of interstate pipelines and transmission lines, for example). However, many of the signals provided to the private sector about the role of natural gas in the power sector come from state legislatures, governors, public utility commissions, and others (support for fossil fuels, renewable energy, or energy efficiency, for example). Such decisions can influence the scale and scope of private-sector investment in natural gas or other forms of energy.

Ratings

This analysis assesses states based on five metrics focused on natural gas generation, natural gas capacity, and carbon emissions, either in absolute terms or as a function of some other parameter (overall electricity generation, for example). For each metric, threshold levels identify a high level of risk of overreliance associated with the metric, a moderate level, and a low level.

Rather than attempting to identify what an ideal state looks like with regard to low-risk natural gas use, this analysis points to some aspects of risk of natural gas overreliance, and examines which states exhibit characteristics that suggest higher levels of such risk.

¹ In December 2014, for example, Florida’s public service commission allowed Florida Power & Light Co. to pass on to electricity customers costs (or savings) associated with an investment in natural gas hydraulic fracturing operations in Oklahoma (Testa 2014). In October 2015, the Massachusetts Department of Public Utilities found that electric utilities in that state can enter into long-term contracts with natural gas pipeline companies (Sullivan 2015).

Metrics

The metrics selected for this analysis are aimed at assessing a range of aspects of each state's current and prospective natural gas usage for electricity generation.

METRIC 1. NATURAL GAS GENERATION AS A SHARE OF IN-STATE ELECTRICITY PRODUCTION (2014)

Electricity can be generated from a range of fuels, and most states—like the nation as a whole—produce electricity using a mix of resources, including coal, natural gas, nuclear, and renewables. One indicator of how reliant a state is on natural gas is to compare how much of its in-state electricity generation comes from natural gas versus all other fuels. The more a state's electricity mix is dominated by natural gas, the more consumers in that area can expect to be exposed to the fuel's near- and long-term economic risks, including price volatility. This metric involves calculating the portion of each state's in-state electricity production generated using natural gas.

Source: Electricity Information Administration (EIA 2015a)

Data: Net generation from electricity power plants, annual, by state and fuel type, 2014 (preliminary)

Analysis: For each state, we calculated the percent of electricity generation from natural gas in 2014 by dividing the megawatt-hours (MWh) generated using natural gas by the total MWh generated using all fuels. In 2014, the EIA reported only one region (Washington, DC) not generating any electricity, and two regions not generating electricity from natural gas (Hawaii and Washington, DC). Wyoming was listed as “NM” for “not meaningful” natural gas generation based on preliminary 2014 results.² We assigned Hawaii, Washington, DC, and Wyoming a risk rating of “Low.”

Threshold setting: States with 50 percent or more of their 2014 in-state electricity generation coming from natural gas were assigned a risk rating of “High.” State portfolios ranging from 25 to 49 percent were rated as “Moderate,” and states with less than 25 percent of their in-state electricity generation coming from natural gas were rated as “Low.” Overall, 26.2 percent of the electricity generated in the United States in 2014 came from natural gas.

METRIC 2. INCREASE IN PERCENT OF IN-STATE ELECTRICITY GENERATION FUELED BY NATURAL GAS (2008–2014)

Natural gas has undergone rapid growth in the electric power sector over the past decade, including to replace large amounts of coal to serve electricity needs on a fairly constant basis (that is, to provide “baseload” generation). From 2008 to 2014, natural gas jumped from generating 20.2 percent of the national electricity mix to 26.2 percent, while coal slid from 49.5 percent to 39.9 percent over the same period. In some states, the shift in natural gas generation was even greater. As a result, electricity consumers in these states now have a rapidly growing share of their electricity coming from a historically volatile fuel, which increases their exposure to natural gas price volatility. This metric measures the change in percent of natural gas in a state's electricity generation portfolio from 2008 to 2014.

Source: Electricity Information Administration (EIA 2015a)

Data: Net generation from electricity power plants, annual, by state and fuel type, 2008 and 2014 (preliminary)

Analysis: For each state, we calculated the percent of electricity generation from natural gas in 2008 and 2014 by dividing the MWh generated using natural gas by the total MWh generated using all fuels. We then subtracted the 2008 value from the 2014 value to arrive at the change in percent. In 2014, the EIA reported only one region (Washington, DC) not generating any electricity, and two regions not generating electricity from natural gas (Hawaii and Washington, DC).

² For reference, over the previous five years Wyoming's generation from natural gas ranged from 37 to 99 MWh per year, representing less than 1 percent of its total annual electricity generation.

Wyoming was listed as “NM” for “not meaningful” natural gas generation based on preliminary 2014 results. In 2008, Hawaii, North Dakota, and Washington, DC, were all recorded as not generating electricity from natural gas. We assigned Hawaii, North Dakota, Washington, DC, and Wyoming a risk rating of “Low.”

Threshold setting: States increasing the share of natural gas in their electricity generation portfolios by 10 or more percentage points between 2008 and 2014 were assigned a risk rating of “High.” States with gains ranging from 5 to 9 percentage points were rated as “Moderate,” and states undergoing a change of less than 5 percentage points were rated as “Low.” Overall, the percent of natural gas in the national generation mix increased by about 6 points over the same period.

METRIC 3. NATURAL GAS CAPACITY AS A SHARE OF POWER PLANTS BEING BUILT (2014–2017)

Power providers, regulators, and elected officials in each state need to plan their future electricity resource mix based on projected increases in demand, scheduled power plant retirements, and reliability needs. One indication of an increasing reliance on natural gas can be captured by analyzing the share of new electricity generating capacity based on natural gas that is expected to come online within the next several years. Significant additions of natural gas capacity may lock states in to investments in power plants and pipelines, whose costs and losses when idled, underused, or abandoned may be passed through to customers. This metric assesses the portion of new power plant capacity coming online between 2014 and 2017 that is fueled by natural gas.

Source: SNL Financial (2015)

Data: Asset data for power plant units scheduled to be in service between 2014 and 2017, with a build phase development status of “Completed,” “Construction Begun,” or “Advanced Development;” asset data for power plant units undergoing fuel conversion from coal to natural gas between 2014 and 2017.

Analysis: For each state, we calculated the generating capacity from natural gas power plant units being built and expected to be in service between 2014 and 2017. We also calculated the additional generating capacity as a result of power plant unit conversions from coal to natural gas during the same period. We then added these two values and divided the result by the total new generating capacity and coal-to-gas conversions between 2014 and 2017. The result is the percentage of natural gas as a share of new generating capacity.

Threshold setting: States in which 50 percent or more of new capacity is to be based on natural gas (new power plants or coal-to-gas conversions) between 2014 and 2017 were assigned a risk rating of “High.” States ranging from 25 to 49 percent were rated as “Moderate,” and states with natural gas accounting for less than 25 percent of new in-state capacity were rated as “Low.” Overall, 56 percent of the generating capacity being built in the United States during this time frame is expected to be fueled by natural gas.

METRIC 4. TOTAL PROJECTED NATURAL GAS CAPACITY IN 2017

Some states already have a significant amount of natural gas capacity, and this total is set to increase in many states given the construction of new natural gas power plants and coal-to-gas conversions already under way. By looking at the absolute value of electricity generating capacity fueled by natural gas, this metric shows several states at risk of relying heavily on natural gas. The greater the generation capacity based on natural gas, the more consumers are at risk of exposure to the negative consequences associated with plants and other infrastructure becoming underused, idled, or even abandoned over time. This metric is based on each state’s total projected natural gas capacity in 2017.

Source: Electricity Information Administration (EIA 2015b), SNL Financial (2015)

Data: From the EIA, “Existing capacity by energy source, by producer, by state back to 2000 (annual data from the EIA-860);” from SNL, asset data for power plant units in service between 2014 and 2017 with a status of “Completed,”

“Construction Begun,” or “Advanced Development;” asset data for power plant units switching from coal to gas between 2014 and 2017.

Analysis: For each state, we calculated existing natural gas capacity in 2013 across the entire electric power sector, generating capacity from natural gas being built and expected to be in service between 2014 and 2017, and generating capacity that will be in service between 2014 and 2017 as a result of conversions from coal to natural gas. We added these three values to arrive at the total electric capacity projected to be fueled by natural gas in 2017.

Threshold setting: States with a total natural gas generating capacity of 10,000 megawatts (MW) or more were assigned a risk rating of “High.” For reference, 10,000 MW of natural gas generating capacity is capable of powering several million households. States ranging from 5,000 to 9,999 MW were rated as “Moderate,” and states with less than 5,000 MW of total natural gas generating capacity in 2017 were rated as “Low.”

METRIC 5. POWER SECTOR CARBON DIOXIDE EMISSIONS (2013)

As the single largest contributor of global warming emissions in the United States (and with a range of viable low-carbon alternatives available to it), the electric power sector has a major role to play in reducing the carbon intensity of the national economy. With the recent issuance of the Environmental Protection Agency’s Clean Power Plan, states must now choose how they will meet the plan’s carbon-reduction requirements for power plant emissions. Critically, although natural gas burns cleaner than coal for electricity generation, even a wholesale shift from coal to natural gas would be insufficient to meet long-term climate goals, as natural gas still emits significant emissions upon combustion (Fleischman, Sattler, and Clemmer 2013). For states with particularly high carbon emissions, then, an existing or developing overreliance on natural gas means that more drastic action will be required over the long term to continue reducing carbon emissions. In the interim, electricity consumers in those states will be forced to pay for shortsighted decisions their states are making today. This metric assesses the total carbon dioxide emissions released by the electric power sector in each state in 2013.

Source: Electricity Information Administration (EIA 2015c)

Data: U.S. electric power industry estimated emissions by state, 1990–2013 (EIA-767, EIA-906, EIA-920, EIA-923)

Analysis: For each state, the EIA provides annual data on carbon dioxide, sulfur dioxide, and nitrogen oxide emissions released by type of power producer and energy source. We pulled carbon dioxide data for the entire electric power industry across all energy sources in 2013. Each data point was converted from metric tons to million metric tons (MMT).

Threshold setting: States with total electric power industry emissions of 50 MMT or more of carbon dioxide in 2013 were assigned a risk rating of “High,” while states emitting between 25 and 49 MMT were rated as “Moderate,” and those emitting less than 25 MMT were rated as “Low.”

SUMMARY METRIC: STATES AT HIGHEST RISK OF NATURAL GAS OVERRELIANCE

Each metric within this analysis is intended to stand on its own as an indicator of a state’s exposure to one of the multiple risks associated with natural gas overreliance. However, the metrics can also be viewed in aggregate to better appreciate the constellation of risk factors that a state may face. Because the metrics are designed to gauge different aspects of risk exposure, a state with multiple “High” risk ratings may be exposing its electricity consumers to more risks associated with natural gas than a state with a single “High” risk rating.

Further, there are some states that just miss a “High” rating but are still exposing their consumers to greater risks than others; therefore, a consideration of states’ “Moderate” ratings in combination with their “High” designations can provide a more complete picture of their potential for overreliance on natural gas.

Data Table

Dark red indicates “High” risk rating, medium red indicates “Moderate”, and pink indicates “Low”.

State	Metric 1	Metric 2	Metric 3	Metric 4	Metric 5	Number of "High" Risk Ratings	Number of "Moderate" Risk Ratings
Alabama	32%	17.2	98%	14,200	67.0	4	1
Alaska	51%	-9.9	89%	1,400	3.8	2	-
Arizona	24%	-8.3	66%	14,600	55.3	3	-
Arkansas	16%	0.3	0%	6,200	37.3	-	2
California	58%	2.5	22%	46,300	57.3	3	-
Colorado	23%	-2.6	53%	6,600	39.4	1	2
Connecticut	42%	16.2	6%	3,100	8.7	1	1
Delaware	83%	63.4	100%	2,600	4.7	3	-
District of Columbia	NA	0.0	0%	-	0.0	-	-
Florida	62%	14.1	89%	39,500	108.4	5	-
Georgia	33%	23.4	56%	16,700	56.8	4	1
Hawaii	0%	0.0	0%	-	7.4	-	-
Idaho	17%	2.2	4%	1,100	1.9	-	-
Illinois	2%	0.5	73%	15,600	97.8	3	-
Indiana	8%	5.6	75%	7,000	98.9	2	2
Iowa	2%	-1.7	52%	3,700	39.2	1	1
Kansas	3%	-1.5	23%	4,800	33.1	-	1
Kentucky	3%	1.7	86%	6,900	85.3	2	1
Louisiana	43%	7.4	100%	20,100	58.3	3	2
Maine	35%	-10.4	0%	1,700	3.7	-	1
Maryland	6%	1.8	87%	4,100	18.9	1	-
Massachusetts	58%	7.9	71%	6,700	14.7	2	2
Michigan	11%	2.1	71%	12,200	67.2	3	-
Minnesota	7%	1.5	19%	5,100	29.3	-	2
Mississippi	60%	16.0	94%	12,000	22.6	4	-
Missouri	4%	-1.3	49%	5,500	78.3	1	2
Montana	2%	1.6	7%	400	17.0	-	-
Nebraska	1%	-1.3	0%	1,900	28.0	-	1
Nevada	63%	-5.0	0%	7,400	15.7	1	1
New Hampshire	22%	-8.6	0%	1,200	3.4	-	-
New Jersey	45%	13.4	95%	12,800	15.8	3	1
New Mexico	27%	6.0	13%	3,400	28.5	-	3
New York	40%	8.3	73%	19,500	33.5	2	3
North Carolina	23%	19.3	0%	10,700	56.9	3	-
North Dakota	0%	0.0	31%	600	30.3	-	2
Ohio	18%	15.9	89%	11,900	102.5	4	-
Oklahoma	38%	-6.1	21%	14,200	46.3	1	2
Oregon	21%	-7.6	82%	3,700	9.5	1	-
Pennsylvania	24%	15.2	97%	15,800	108.7	4	-
Rhode Island	95%	-2.4	0%	1,700	2.8	1	-
South Carolina	12%	6.0	99%	5,800	28.8	1	3
South Dakota	4%	0.4	0%	1,000	3.2	-	-
Tennessee	8%	7.3	1%	5,200	38.1	-	3
Texas	42%	-1.5	58%	77,000	257.5	3	1
Utah	18%	2.5	42%	2,700	35.7	-	2
Vermont	0%	0.0	0%	-	0.0	-	-
Virginia	28%	14.3	98%	12,500	34.7	3	2
Washington	10%	0.7	0%	3,400	12.5	-	-
West Virginia	1%	0.6	0%	1,100	68.9	1	-
Wisconsin	13%	5.1	94%	6,500	47.7	1	3
Wyoming	NM	NA	100%	300	50.7	2	-

Notes and Limitations

This analysis is focused on the financial risks facing consumers living in states that are, or are moving toward being, overly reliant on natural gas for electricity generation. The analysis focuses on the state level because, as noted above, many of the decisions that shape the electric sector are made at the state level. States are not, for the most part, islands when it comes to electricity generation and consumption, however; indeed, states commonly import and export electricity across state lines. Data about such imports and exports are generally available only as net flows, however, without a breakdown of shares of specific fuel sources in such flows (that is, what type of power plant generated the electricity flowing across a particular state boundary). A state's electricity generation portfolio may therefore not be perfectly representative of the fuel mix of electricity actually consumed within a state's borders, and consumers may be exposed to fewer or greater risks of natural gas overreliance than their state's own generation portfolio would suggest.

The purposefully tight scope of this analysis means that indicators are also limited in their capacity to capture broader risks to consumers from their state's overreliance on natural gas, making the analysis a conservative estimate of the risks facing consumers. Major environmental challenges associated with natural gas production and transport, for example, are not included. Should the issue of methane leakage over the life cycle of natural gas use remain insufficiently resolved, for example, states (and their consumers) may need to contend with higher costs due to higher greenhouse gas emissions being associated with the fuel.

This analysis also does not attempt to identify the ideal role for natural gas within a state's generation portfolio. Instead, it works to identify those states in—or heading toward—a position of overreliance. Given that, indicators actively identify those states exhibiting the highest risk levels, but do not identify any states as definitively “overreliant” on natural gas. Conversely, states without broad indications of risk of overreliance on natural gas are not necessarily free of reliance and risk. Also, states with low natural gas usage (and risk) by most measures may be in such a position because of heavy dependence on coal generation, which presents a host of problems and risks of its own.

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