Are US gas utilities nearing the end of their golden age?

State-level decarbonization efforts could threaten the business model.

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A number of American states have committed themselves to lowering their greenhouse-gas (GHG) emissions and reducing their reliance on fossil fuels, such as natural gas and coal. If successful, these efforts could disrupt the local distribution companies (LDCs) that use pipelines to deliver natural gas to consumers.

The growth prospects of gas-distribution utilities seem secure in the medium term. However, state-level decarbonization policies, combined with the improved cost competitiveness of technologies that run on electricity (such as heat pumps and water heating), could pose a challenge in some states as early as 2026 and in most of them by 2030—a date that is well within the investment horizon for gas-infrastructure investments.

That would be a big change. The past decade has, for three reasons, been something of a golden age for US-based gas LDCs. First, the successful extraction of shale assets led to a sharp increase in natural-gas production and to all-time low prices. This trend will probably continue: the US Energy Information Administration has projected record natural-gas production of 81.3 billion cubic feet a day this year. Second, as higher production pushed down prices, electric utilities and other users switched to natural gas, raising demand and revenues. In 2017, natural gas accounted for 31.7 percent of US electricity generation and coal for 30.1 percent; a decade before, the figures were 21 percent and 49 percent, respectively.

Finally, after the 2010 gas-pipeline explosion in San Bruno, California, many US jurisdictions required gas LDCs to upgrade their aging asset base to ensure the integrity of pipelines and public safety. Capital investment rose by an average of 12 percent a year from 2010 to 2016. Because the returns of gas utilities are based in part on capital deployed, the combination of high demand, low prices, and huge investments has generated healthy returns for gas utilities, at a level outpacing that of their electric counterparts (Exhibit 1).

Changing times

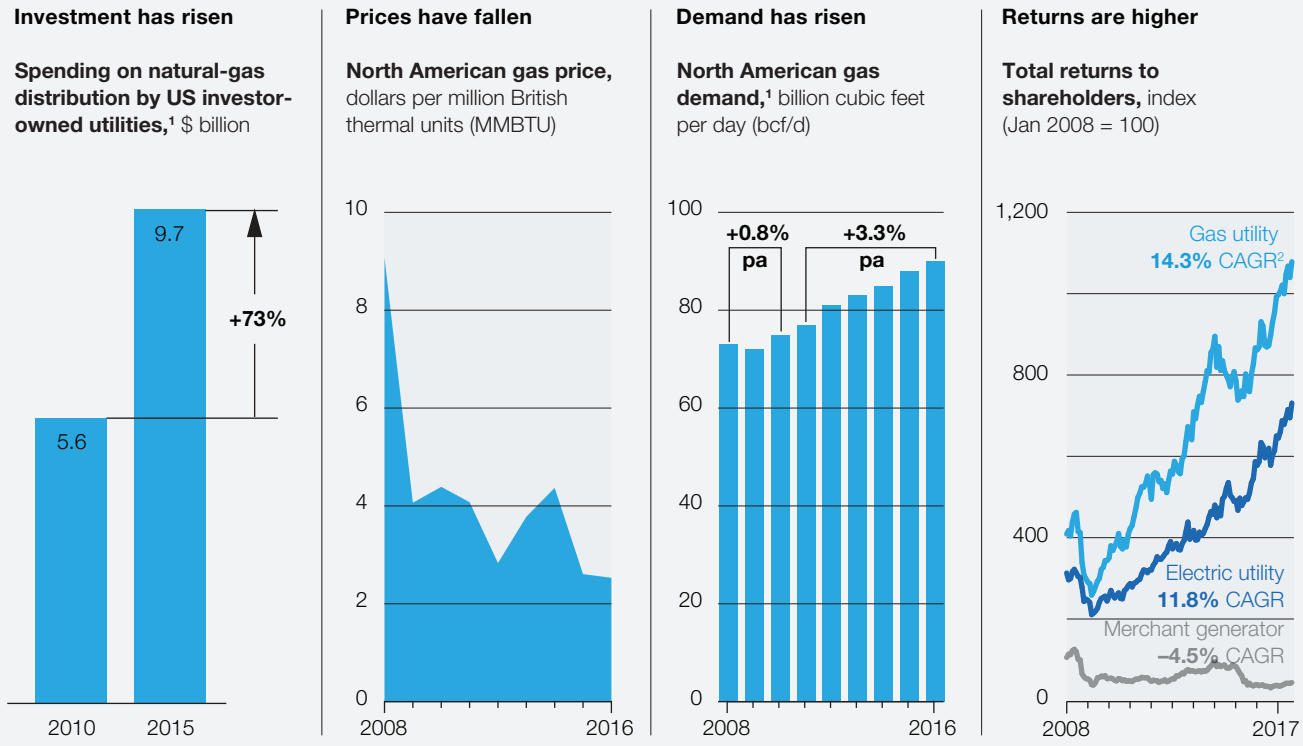
Now, however, there are countervailing pressures. A number of states are rolling out decarbonization policies to reduce GHG emissions sharply by 2050. Current and proposed policies cut emissions from three major sources: power generation (by switching from gas and coal to wind and solar), end uses in buildings (such as using low-carbon electricity rather than natural gas or fuel oil for heating), and transportation (shifting from conventional gasoline-powered vehicles to models that run on electricity or other alternative fuels). Policies to reduce emissions from power generation and the end uses of energy, in particular, could affect LDCs by lowering demand for natural gas. Transportation-related policies may exert less influence because natural-gas vehicles represent a small portion of the transportation fleet.

Moreover, competition is growing because renewable energy is getting less expensive. The cost to build utility-scale solar-photovoltaic systems has fallen by 10 to 15 percent a year annually since 2010. In sunny locations, solar is now the lowest-cost energy option even without subsidies. As for wind, the price per kilowatt-hour has dropped by two-thirds and by even more in wind-rich states; the best projects are near parity with natural gas.

With decarbonization, the most ambitious states account for a large share of the US economy and population. Their example could be influential far beyond their borders, as it was in the rooftop solar market: early efforts to develop profitable business models helped shape policies all over the country. If a similar trend played out in relation to decarbonization, a significant percentage of the current gas load could be at risk by 2030. That would leave gas utilities and energy companies at risk

Exhibit 1

The combination of high demand, low prices, and huge investments has generated returns for gas utilities that outpace those of their electric counterparts.



[1] Includes investor-owned utilities but not municipally owned utilities or cooperatives.
[2] Compound annual growth rate.

Source: ABB Energy Velocity from Federal Energy Regulatory Commission Form 2 and state public-utility-commission filings; Energy Information Administration; New York Mercantile Exchange; McKinsey Energy Insights

of holding stranded assets, such as pipelines and storage facilities.

Policy choices can powerfully influence the economics of end uses of energy in buildings. Already, measures (such as tighter building codes) in some states to improve energy efficiency have probably slowed demand growth for both electricity and gas. Incentives for electric appliances such as heat pumps could increase both the scale of these developments and the level of innovation—and thus lower costs. That makes the technology more appealing and can also create momentum for stricter rules. In the future, it is certainly possible that states will mandate an increase in the level of electrification in buildings.

As the competition gets tougher and the policy environment changes, gas LDCs could go down the

same road recently traveled by electric utilities: sales could decline even as fixed-infrastructure costs stayed the same or increased. For example, if renewables displace gas, transmission pipelines could not only be used less but also require more compression and higher capacity-related payments. That could translate into a higher cost per unit of energy—and higher bills for consumers, who might then begin to look for alternatives.

Buildings versus power: Paths to decarbonization

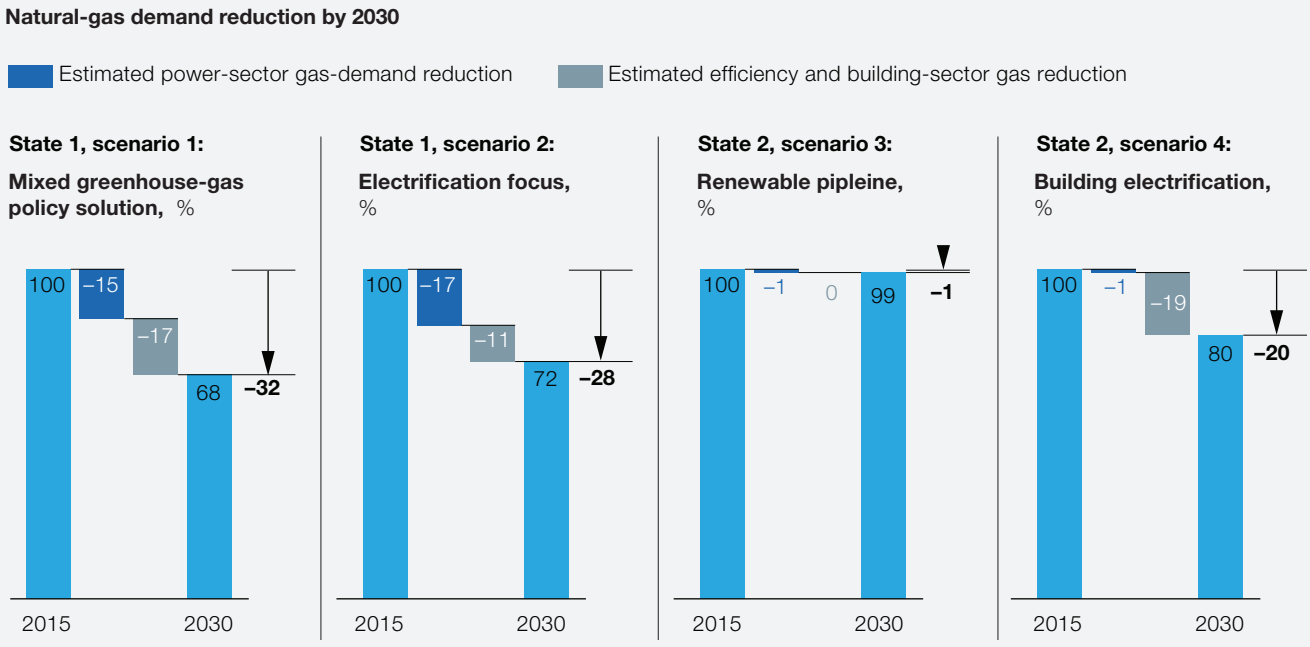
To illustrate how changes in the building and power sectors could cut the amount of gas going through the pipeline, we looked at four possible scenarios, looking at two states with different power-generation mixes and climates (Exhibit 2).

The first scenario envisions cutting greenhouse-gas (GHG) emissions 40 percent from 1990 levels by 2030, by using direct state-level policy measures, such as stricter building codes and higher renewable-portfolio standards. We project that if a state implements all these policies, gas demand could fall by almost one-third.

The second scenario hits the same target but results in a slightly smaller reduction in demand for gas (25 to 30 percent). It relies much more on decarbonizing transport through the electrification of the vehicle fleet and increasing the goals for the decarbonization of the power sector. In this scenario, the changes in the power and transportation sectors are substantial enough to reduce the need for change in the building sector through 2030.

Exhibit 2

These four scenarios envision a wide range of outcomes, but in three of them, natural-gas demand falls substantially.



In the third scenario, a state seeks to reduce GHG emissions 50 percent by 2050. This pathway offers the most optimistic decarbonization scenario for LDCs, with little or no decline. There are two reasons for the low level of impact. First, this state has significant no-emissions power, which can be readily ramped up or down to balance the expansion of less reliable renewable generation. Second, this scenario assumes that renewable natural gas is developed cost effectively.

Switching to a lower-emissions blend of natural gas reduces the need to electrify end uses of energy in buildings for the sake of reducing GHGs, so the delivery infrastructure would still be used. Renewable natural gas can come in a variety of forms, including biogas (produced from feedstocks such as agricultural waste, food waste, or even algae) or gas produced using advanced technologies such as power-to-gas (the conversion of zero-carbon electric power to low- or zero-carbon gas). Power-to-gas technologies use electrolysis to create—from water—hydrogen that can be used directly in transportation or industry, or combined with stored carbon to make a synthetic (renewable) natural gas. The additional benefit of power-to-gas production is that it can provide seasonal storage for the electric system—renewables generated in spring could be stored and used for heat in winter. The caveat is that affordable, renewable natural gas does not yet exist. While there is a great deal of research, the technology and infrastructure require substantial investment to be developed at scale.

The final scenario looks at how the future could play out if a state does not pursue renewable natural gas and instead chooses to emphasize electrification. In this case, there would be relatively little change in demand from power generation. But switching to electricity in building end uses could hit gas demand significantly, contributing to an estimated 15 to 20 percent decline by 2030.

These four scenarios, then, envision a wide range of outcomes. What's notable is that in three of them, natural-gas demand declines substantially. The only scenario with stable demand is the one in which renewable natural gas is developed—and this is by no means a sure thing. Clearly, gas LDCs need to prepare.

How LDCs can create a resilient growth strategy

The developments in renewable-energy and electrification policies could pose risks to future gas demand. If these trends continue, adapting to the transition will require technical, system-wide problem solving. For example, gas infrastructure serves as a storage system that can back up the grid during extreme weather—think of the "polar vortex" in the US Midwest in 2014—or when the generation of renewables is low. The US energy landscape is changing, particularly in states moving aggressively to reduce emissions. Adapting will be difficult, but gas LDCs can reduce the risks and ensure a future that may not be golden but is at least stable and prosperous.

For a start, LDCs need to develop a deeper knowledge of the customer's economics and perceptions, and of the implications of the trends toward electrification and decarbonization. They must also understand how current and possible future polices could affect capital expenditures and the risk of stranded assets.

Here are some questions for LDCs to ask—and answer:

Where are we going?

- How much volume is at risk over the next ten to 15 years?
- What is the outlook for volume growth over the next five, ten, and 15 years?
- How could policy and economic trends change those projections?

- What are the reasonable downside scenarios for each state? How much demand is at risk and what assets could be stranded?

- How expensive will it be to decarbonize the energy sector by accelerating the level of electrification? How does that compare with investing in renewable natural gas?

On the basis of this analysis, how should we respond?

- What are the implications for our asset strategy and cost structure? For example, where should we double down on the traditional distribution infrastructure and where should we move upstream into storage and transmission?

- What new or existing products and regulatory policies demonstrate the value of the natural-gas infrastructure—for instance, investing in emerging decarbonized-gas technologies, strengthening the role of performance-based ratemaking to reflect the value of each customer, and adjusting depreciation policies? How can these be incorporated into operational- and financial-planning processes?

- How can we highlight the comfort and performance benefits of gas (for example, in cooking) so that customers will demand continued choice and access?

Once gas utilities have addressed these questions, they can take effective action in three ways.

Improve operations and affordability for customers

LDCs can pursue a number of no-regrets actions regardless of how the economic and policy environment evolves. These include improving operations (among other things, for reliability and safety) while also using digitization, advanced analytics, and automation to cut costs by as much as 30 to 40 percent. Making gas more affordable could help LDCs show policy makers and consumers that gas remains a viable source of energy and worthy of further investment—for example, in natural-gas infrastructure.

Leading gas utilities are already combining current techniques, such as lean management, with new technologies, including aerial patrols, advanced control centers, and sophisticated leak-survey systems. They are supporting these investments by deploying process technology, digitizing work orders and other forms of paperwork, applying advanced analytics to asset-management and planning decisions, and integrating communications technologies into work management. One utility, for example, has created an app that allows frontline managers to connect with crews in the field. Supervisors know where the crews are at all times and can communicate, solve problems, and react to emergencies in real time.

Develop customer value and promote demand

Some moves require relatively low investment but could pay off significantly, depending on which scenario prevails. One possibility is to work with customers so that they understand the value of gas-driven technology and see the LDC as the provider of choice; for example, many people prefer using gas for cooking and heating. By working to ensure that these options remain available, utilities can promote a more balanced discussion of decarbonization policies. Utilities that invest in next-generation technology and advanced analytics can improve the customer experience and create demand for the existing system.

One Southeastern utility, for instance, is deploying a combination of advanced analytics, digital solutions, and design thinking to learn what residential, commercial, and industrial consumers value.

This utility is also learning from other industries, including hospitality and retail, how to align its operations with the ways in which customers prefer to interact. For example, it is working with a technology company that uses personality profiles to match customers with compatible call-center employees. And it is collaborating with another company to track customers' interactions digitally. In the future, when people may be able to choose where and how they procure their energy, the utility believes that these investments will help it retain customers.

Make one or two big strategic bets

To thrive in an era of decarbonization, gas utilities won't be able to do more of the same old thing—innovation is essential. Investing in renewable gas is one option. Increasing the use of biogas and developing power-to-gas options would enhance the value of the existing gas infrastructure even as GHG emissions were restricted. Power-to-gas technologies are being tested, but they are still far from commercial development and are not likely to become economically viable at scale until the 2030s at the earliest.

Another possible bet is attempting to scale up the use of natural gas for transportation—for instance, using liquefied and compressed natural gas in trucks and shipping. This approach would require massive investment in new infrastructure, such as fueling stations, and creating incentives that would help medium-duty vehicle fleets (of smaller delivery trucks, for example) convert to natural gas.

Most forecasts expect natural-gas prices to remain low for at least the next decade. That will help limit the economic impact of decarbonization policies on consumers even if demand for gas begins to slow or even to decline.

Gas LDCs will need to participate in policy conversations to explain the value of the system and of customer choice and fuel diversity. In addition, LDCs can improve their operations and increase the affordability, reliability, and safety of the gas system. Given regulatory and economic trends, the long-term future of the US gas infrastructure is not guaranteed. Change is coming—like it or not.

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