



NATURAL GAS: A BRIDGE TO CLIMATE BREAKDOWN

AN INVESTOR BRIEF ON OVERCOMING THE POWER SECTOR'S
NATURAL GAS DEPENDENCE

A COLLABORATIVE PROJECT OF:



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EXECUTIVE SUMMARY

This report serves to inform investors about the evolving risks associated with the use of natural gas within the power sector. At a time when investors are paying increasing attention to power utilities' exposure and contribution to climate change impacts, natural gas infrastructure build-out is expanding rapidly in the United States. As coal's inevitable decline within the energy system continues, natural gas, which is largely replacing it, is a growing source of climate concern. In isolation, risks to future cash flow for individual projects may seem minimal, but examination in aggregate reveals a different picture – that investment in new natural gas infrastructure is incompatible with long-term shareholder and societal well-being.

Initially, natural gas was considered a 'bridge' fossil fuel to a clean energy future, given findings that it has approximately half the climate impact of coal. Supporters pointed to natural gas-based technologies as a means to ensure reliable electricity service as the world adopted more variable clean energy technologies such as wind and solar. However, natural gas is still a fossil fuel whose use generates large climate warming emissions. To achieve a safe level of climate stabilization and protect investor portfolio exposure to global climate change, the bridge for natural gas and its associated emissions must have a clear end.

And yet, billions of dollars are poised for investment to build natural gas infrastructure throughout the United States. This investment drive, which includes power plants and pipelines with multi-decadal lifespans, is incompatible with maintaining a safe climate and avoiding disastrous and costly economy-wide impacts.

Under current regulatory systems, monopoly utilities able to justify investment in new natural gas infrastructure are rewarded with growth and healthy returns. The company-level risk of overbuilding assets is mitigated, as captive customers are typically required to cover the costs. However, while regulation ensures utilities an opportunity to recover reasonable costs of providing customers with electric service, it does not guarantee utilities cost recovery as a right. The current period of rapid technological and policy disruption creates new risks for monopoly utilities, and public and economic pressure in the future may result in the disallowance of cost recovery. Even with current regulatory protection, utilities face a multitude of risks associated with natural gas.

This report surveys how the proliferation of natural gas infrastructure contributes to distinct risks that threaten shareholder value, including investor portfolio risk, company-level physical risk, regulatory and technological transition risk, and reputational risk. While progress is happening, as seen by the increasing number of utilities setting mid- and long-term decarbonization targets aligned with the Paris Agreement's goals, concerns remain as to what extent natural gas' expansion may jeopardize those goals.

The shifting landscape of policy and increasing public attention regarding climate change is a rapidly evolving source of disruption for natural gas infrastructure. Increased levels of awareness, activism, and grassroots mobilization are bringing climate change to the fore of public attention and increasing pressure on policymakers and companies to urgently and decisively act to address greenhouse gas emissions. Enabled by this pressure is a growing tide of newly introduced local and state legislative commitments to ambitious clean energy goals over the coming decades, as well as legislation specifically focused on curbing the use of natural gas.

Further undermining the natural gas 'bridge' is the cost-competitiveness of clean energy alternatives. Clean technology companies are innovating to provide portfolios of reliable energy generation for the grid and forego the need for any fuel, helping lower costs for customers. The increasing cost-competitive trend of clean energy technologies indicate that economic arguments supporting natural gas are unfounded, and a clean energy transition is more financially prudent. These improved economics invite ample opportunities for investment in clean generation resources to replace emissions-heavy and economically inefficient fossil power plants. Additional opportunities are emerging to increase electricity demand through electrification of buildings and transport and to meet that demand with clean electricity.

That is not to say that the ongoing energy transition is without challenges. Regulation and markets must evolve to support utilities through the transition and to promote innovation. Further concerns that require careful consideration include the need for a just transition for workers, the development of new utility business models, the misalignment of parent-company goals with subsidiaries, and the inertia holding back a traditionally risk-averse industry.

Investors have a unique role to play in the clean energy transition. They are well positioned to encourage power utilities to reduce the investment risks associated with an overreliance on natural gas. This report articulates ways investors can effectively promote sustainable progress by:

- Engaging directly with companies and requiring analysis of emerging risks described in this report.
- Joining influential investor coalitions such as Climate Action 100+ and Climate Majority Project.
- Weighing in to shift the policies and regulations that govern utility operations to better facilitate a clean energy transition. For example, advocating for innovative policies such as securitization, performance-based regulation, and net-zero goals with utilities, regulators, policymakers, and in public forums in the energy industry.

Investors and the utilities they own are now facing an urgent challenge – to address the risks of continued natural gas reliance and stem its impact on the climate crisis.

1. INTRODUCTION - THE POWER SECTOR'S GROWING GAS PROBLEM

As the window of opportunity to prevent catastrophic climate change narrows, natural gas has been lauded by many in the fossil fuel industry as a 'bridge' from high-carbon coal to a low-carbon future. Indeed, gas has been an important step on the path of reducing climate change emissions in the energy sector — the relative emissions savings of burning gas instead of coal is part of the reason CO₂ emissions in the U.S. fell from 2007 to 2017.¹ However, power sector emissions in the U.S. *increased* by 2% in 2018² before falling again in 2019.³ The increasing use of natural gas, including as a replacement for most of 2018's coal-fired power plant retirements as well as to supply power for new growth in electricity demand, now stands as an obstacle on the path to clean energy solutions.⁴

Natural gas is a fossil fuel comprised primarily of methane, a potent greenhouse gas with roughly 84 times the global warming potential of CO₂ over a 20-year period.⁵ When natural gas is combusted to provide energy or through flaring, CO₂ is released. Additionally, methane is released intentionally through venting at gas wellheads and unintentionally through fugitive methane releases in the production and transportation of gas, creating

1. "Preliminary US Emissions Estimates for 2018," *Rhodium Group*, 8 Jan. 2019, rhg.com/research/preliminary-us-emissions-estimates-for-2018.

2. *Ibid.*

3. Houser, Trevor and Pitt, Hannah, "Preliminary US Emissions Estimates for 2019," *Rhodium Group*, 6 Jan. 2020, rhg.com/research/preliminary-us-emissions-2019.

4. "Preliminary US Emissions Estimates for 2018," *Rhodium Group*, 8 Jan. 2019, rhg.com/research/preliminary-us-emissions-estimates-for-2018.

5. Pachauri, Rajendra and Meyer, L.A. (eds), "Climate Change 2014: Synthesis Report," *IPCC*, 2015, p. 87, www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf.

6. Alvarez, Ramón A., et al., "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain," *Science*, American Association for the Advancement of Science, 13 July 2018, (hereafter cited as Alvarez, Ramón A., et al.) science.sciencemag.org/content/361/6398/186.

significant climate impacts throughout the gas supply chain. 2018 research in *Science* suggests U.S. methane supply chain emissions are likely close to 60% higher than estimated by the Environmental Protection Agency (EPA) – a leakage rate of approximately 2.3%.⁶ This leakage rate implies gas-fired plants emit closer to 75% of coal-fired plant emissions per-unit of energy.

To avoid the catastrophic climate breakdown predicted to occur as temperature rise moves beyond 1.5°C, the 2018 Intergovernmental Panel on Climate Change (IPCC) *Special Report on Global Warming of 1.5°C* concludes that “net-zero” carbon emissions must be achieved across all sectors of the global economy by 2050.⁷ Given the power sector’s outsized impact on climate and the potential for a zero carbon grid to eliminate transportation and building emissions through electrification, the power industry is poised to play a key role in societal decarbonization.^{8,9} Significantly, even if methane emissions in the natural gas supply chain could be reduced to close to zero, and all coal power plants transitioned to burning gas, this would only halve CO₂ emissions,¹⁰ leaving a substantial level of emissions above the net-zero target required for safe climate stabilization. In other words, while coal must go first, new gas is a bridge to climate breakdown – we must begin phasing down both gas and coal today to achieve the level of decarbonization that science demands.



INVESTORS ARE TAKING NOTE: GAS POSES MATERIAL RISKS

Portfolio Harms of Climate Change: Global warming creates alarming costs for the global economy. The increased costs result from supply chain dislocations, reduced resource availability, lost production, commodity price volatility, infrastructure damage, crop loss, energy disruptions, political instability, and reduced worker efficiency, among many other devastating impacts. Studies project savings of \$20 trillion to the global economy by 2100 if warming is kept to 1.5°C versus 2°C,¹¹ and the loss of hundreds of billions of dollars by 2100 in the U.S. if emissions continue unabated.¹²

As of June 2019, 215 of the largest global companies had reported almost \$1 trillion at risk from climate impacts, much of that within five years.¹³ Achieving the Paris Agreement’s

goal of keeping warming to 1.5°C is an imperative for investors to protect the value of their portfolios in the medium to long term,¹⁴ and utilities have a critical role to play to achieve this target. Power companies that lag

7. “Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments,” IPCC, www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments. Accessed 31 Jan. 2020.
8. IPCC, 2018, “Global Warming of 1.5°C,” IPCC, 2019, section 2.3.2.1 www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf.
9. Mahone, Amber, et al., “Deep Decarbonization in a High Renewables Future,” *Energy and Environmental Economics*, Inc., June 2018, (hereafter cited as Mahone, Amber, et al.) www.ethree.com/wp-content/uploads/2018/06/Deep_Decarbonization_in_a_High_Renewables_Future_CEC-500-2018-012-1.pdf.
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11. Burke, Marshall, et al., “Large Potential Reduction in Economic Damages Under UN Mitigation Targets,” *Nature*, Vol 557, 24 May 2018, Macmillan Publishers Limited, p. 1, www.nature.com/articles/s41586-018-0071-9.epdf.
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13. “World’s Biggest Companies Face \$1 Trillion in Climate Change Risks,” CDP, www.cdp.net/en/articles/media/worlds-biggest-companies-face-1-trillion-in-climate-change-risks. Accessed 31 Jan. 2020.
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behind in reducing their greenhouse gas emissions are increasing the risk of catastrophic climate impacts that threaten shareholder value.

To address climate portfolio risk, utilities must begin planning now to align their operations with the Paris Agreement's 1.5°C goal. Given the long lifetime of gas-based infrastructure, increasing investment in this fuel source is shortsighted and harms shareholders by contributing to exacerbating the impacts of climate change across the global economy.

Physical Risks of Climate Change: Utilities themselves face significant physical risks from a changing climate, impacting investor expectations for the sector.¹⁵ Physical risks expose utilities to operational disruptions including from storm damage due to flooding or hurricanes, fires, increased water scarcity (imperative for generation cooling systems), and legal liability. For example, in California in 2018, Pacific Gas and Electric (PG&E) entered into bankruptcy after it was held liable for destructive fires caused when its equipment ignited drought-depleted vegetation, an event the *Wall Street Journal* called “the first climate-change bankruptcy.”¹⁶ Unless sufficient action is taken to reduce climate stress, these types of challenges will only increase for companies.



Regulatory and Technological Transition Risks of Fossil Power: In 2007, the European power sector experienced unanticipated disruption when a combination of policy and technology competition led to a rapid reduction in demand for incumbent utilities' coal generation assets. This resulted in over \$150 billion in write-downs of utility assets between 2010-2016, and significant restructuring in the sector. Some of the largest utility companies lost up to 4/5 of their value. Between 2007 and 2018, E.ON's market capitalization shrank from €92 billion to €20 billion, and RWE's had fallen from €53 billion to €12 billion.¹⁷ U.S. utilities have the opportunity to avoid such a chaotic transition by planning and avoiding similar mistakes with natural gas.

Despite the risks, most power utilities in the U.S. are continuing to invest in new natural gas power plants and pipelines, with operating lifetimes stretching far beyond what is permitted in climate stabilization models, raising the question of stranded assets and self-inflicted harm. The Energy Information Administration (EIA) projects 50 gigawatts of new natural gas combined cycle plants will be built between 2019-2024.¹⁸ The Rocky Mountain Institute (RMI), a global leader in energy research, found



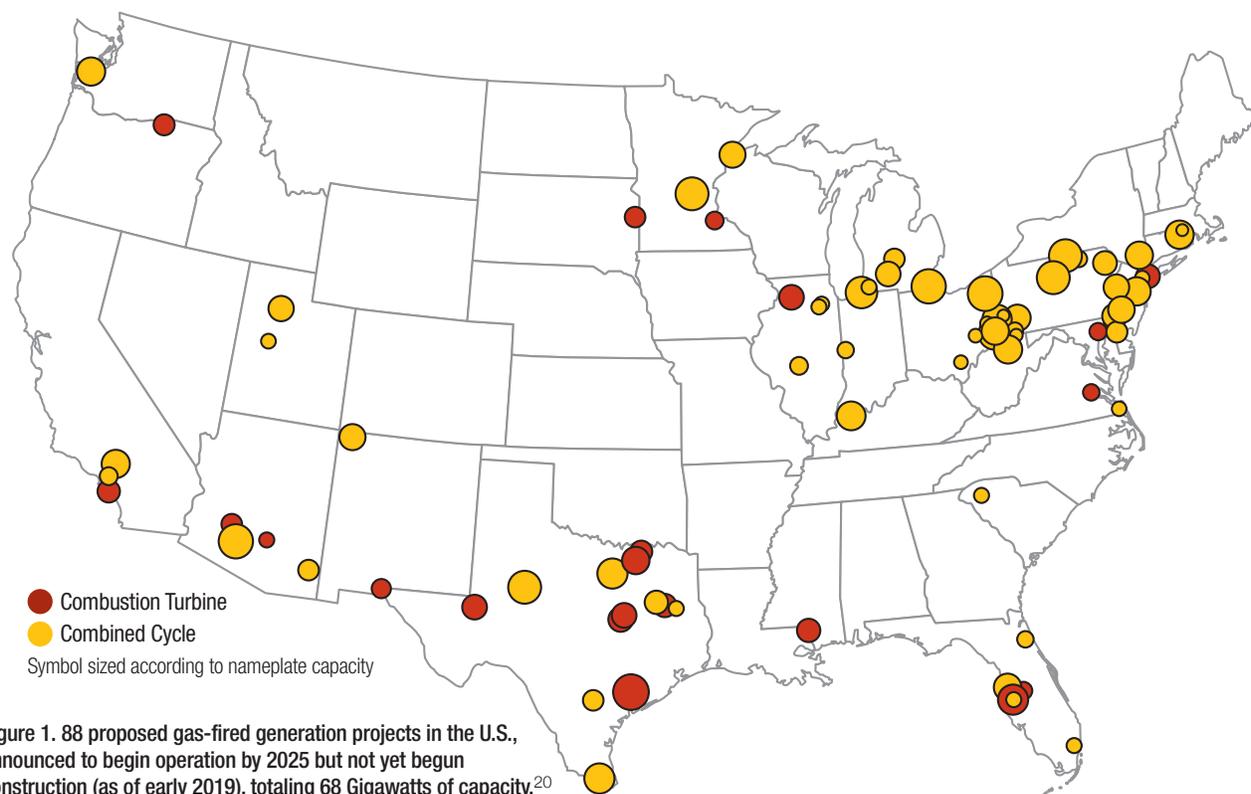
15. “Getting Physical: Assessing Climate Risks.” *BlackRock*, 4 Apr. 2019, www.blackrock.com/us/individual/insights/blackrock-investment-institute/physical-climate-risks#electric-utilities.

16. Gold, Russell, “PG&E: The First Climate-Change Bankruptcy, Probably Not the Last.” *The Wall Street Journal*, 18 Jan. 2019, www.wsj.com/articles/pg-e-wildfires-and-the-first-climate-change-bankruptcy-11547820006.

17. “Lessons from European Electricity for Global Oil & Gas,” *Carbon Tracker Initiative*, 20 Dec. 2018, www.carbontracker.org/reports/lessons-from-european-electricity-for-global-oil-gas.

18. “Annual Energy Outlook 2020 – with projections to 2050,” *U.S. Energy Information Administration*, Jan. 29, 2020, p. 4. www.eia.gov/outlooks/aeo/pdf/AEO2020%20Full%20Report.pdf.

that the U.S. is on track to spend roughly \$1 trillion on new gas-fired power plants and fuel by 2030.¹⁹ Given the plethora of clean energy commitments from states and municipalities, coupled with significant cost declines projected for clean alternatives, these gas infrastructure assets will either become stranded or need to be retrofitted with expensive and relatively unproven carbon capture and storage (CCS) technology to remain viable.



Reputational Damage and the Need for a Just Transition: Investors are increasingly paying attention to labor issues associated with shifting business models related to fossil fuels. In order for companies to retain their social license to operate, the impacts on employees must be considered to promote a thoughtful, equitable transition. The Just Transition concept is embedded in the Paris Agreement, and initiatives within the United Nations Principles of Responsible Investment (PRI) and the Interfaith Center on Corporate Responsibility (ICCR) evidence growing investor concern.^{21,22}

Investors Require Enhanced Disclosure: Investors must demand more transparency on how their utilities are addressing climate and investor risks created by current utility business models. While the sector is experiencing an inexorable shift away from coal, its growing reliance on natural gas is of concern for investors that recognize the risk it presents to climate stability and future cashflows.²³

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22. “Transitioning to a Clean Energy Economy,” *ICCR (Interfaith Center on Corporate Responsibility)*, www.iccr.org/our-issues/climate-change/transitioning-clean-energy-economy. Accessed 31 Jan. 2020.

23. “Net Zero By 2050,” *Climate Majority Project*, Feb. 2019, www.climatemajority.us/net-zero-report.

UTILITIES ARE SHOWING SIGNS OF MOVEMENT, BUT NOT FAST ENOUGH

As greater awareness of the climate crisis has grown, and clean technology has proliferated, there has been a notable shift throughout the power utility sector. Heavy greenhouse gas (GHG) emitters are now setting ambitious, long-term decarbonization targets. Xcel Energy, PSEG, Duke Energy, Dominion Energy, DTE, Arizona Public Service, and NRG have all set noteworthy net-zero by 2050 emissions goals (See Table 1 below). Yet, many of these same utilities' continued investment in new natural gas infrastructure is at odds with their emission reduction commitments. For example, Duke, Dominion, Southern, and AEP's business plans actually indicate a slowdown of their decarbonization plans between 2017 and 2030—a slowdown tied to significant gas investment plans.²⁴



UTILITY	MID-TERM TARGET	FINAL TARGET	BASELINE	COVERAGE
AEP ²⁵	70% by 2030	80%-Net-zero by 2050	2000	Electricity
Alliant Energy ²⁶	40% by 2030	80% by 2050	2005	Electricity
Ameren ²⁷	35% by 2030	80% by 2050	2005	Electricity
APS ²⁸	65% by 2030	100% by 2050	n/a	Electricity
Austin Energy ²⁹ (Electric only)	n/a	Net-zero by 2050	n/a	Electricity
Avangrid ³⁰	Carbon neutral by 2035	n/a	2015	Electricity
Avista ³¹	Carbon neutral by 2027	100% by 2045	n/a	Electricity
CMS Energy Corp ³²	n/a	90% by 2040	2005	Electricity
Dominion ³³	65% methane by 2030	Net-zero by 2050	2010	Gas & Electric
DTE Energy ³⁴	50% by 2030	Net-zero by 2050	2005	Electricity
Duke Energy ³⁵	50% by 2030	Net-zero by 2050	2005	Electricity
Evergy ³⁶	40% by 2020	80% by 2050	2005	Electricity
FirstEnergy ³⁷ (Electric only)	n/a	90% by 2045	2005	Electricity
Green Mountain Power ³⁸ (Electric only)	100% by 2025	n/a	n/a	Electricity
Hawaiian Electric ^{39,40} (Electric only)	30% renewables by 2020	100% renewables by 2045	n/a	Electricity
Idaho Power ⁴¹ (Electric only)	n/a	100% by 2045	n/a	Electricity
Madison Gas & Electric ⁴²	n/a	Net-zero by 2050	n/a	Electricity
National Grid ⁴³	45% by 2020	80% by 2050	1990	Gas & Electric
New York Power Authority ⁴⁴ (Electric only)	70% renewable by 2030	Carbon free by 2040	n/a	Electricity
NIPSCO ⁴⁵	92% by 2028	n/a	2005	Electricity
NRG ⁴⁶ (Electric only)	50% by 2025	Net-zero by 2050	2014	Electricity
Platte River Power ⁴⁷ (Electricity only)	100% by 2030	n/a	n/a	Electricity
PNM ⁴⁸ (Electric only)	n/a	100% by 2040	n/a	Electricity
Portland General Electric ⁴⁹ (Electric only)	n/a	80% by 2050	2010	Electricity
PSEG ⁵⁰	80% by 2046	Net-zero by 2050	2005	Electricity
PVREA ⁵¹ (Electric only)	80% by 2030	n/a	n/a	Electricity
SMUD ⁵² (Electric only)	60% renewable by 2030	Net-zero by 2040	n/a	Electricity
Salt River Project ⁵³ (Electric only)	62% by 2035 (Intensity)	90% by 2050 (Intensity)	2005	Electricity
Southern California Edison ⁵⁴ (Electric only)	40% by 2030	80% by 2050	1990	Electricity
Southern Company ⁵⁵	50% by 2030	Low to no-carbon by 2050	2007	Gas & Electric
Xcel Energy ⁵⁶	80% by 2030	Net-zero by 2050	2005	Electricity

Table 1: Energy Utility Emission Reduction Targets⁵⁷ – Only targets 80% and above are included.

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26. "Energy and Climate: Alliant Energy," *Alliant Energy Corporation*, sustainability.alliantenergy.com/energy-climate. Accessed 31 Jan. 2020.
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Planned gas development not only runs counter to companies’ own disclosed targets, but such targets often include only the electricity generation business segment of the company, leaving natural gas distribution segments to grow emissions without limit. Further uncertainty remains around the full scope of emissions counted and associated with the natural gas supply chain of utilities, including upstream methane emissions and natural gas distribution.

2. TRANSITION RISKS OF UTILITY NATURAL GAS INVESTMENT: POLICY & PUBLIC PRESSURE

If companies continue building fossil fuels into their systems, they risk being disrupted by climate-driven policy and pressure. The U.N. warns of an ‘Inevitable Policy Response’, when “governments will be forced to act more decisively than they have so far” on climate change.⁵⁸ This intensified policy response is already manifesting at state and local levels due in part to swelling grassroots pressure regarding the climate crisis.

PLEDGES AND POLICY

As the rate of climate change impacts have increased, a growing number of U.S. states and cities are making ambitious commitments to decarbonize their power grids, supercharging the clean energy transition.⁵⁹ Several states have adopted various clean or renewable energy commitments (see Table 2 below), and more governors elected in the 2018 mid-terms are pushing to set ambitious targets.⁶⁰ In addition to such state-level goals, more than 130 cities have committed to 100% clean energy in their power grids, and six are already powered by 100% renewable generation.⁶¹

Gas for uses other than electricity generation, such as for heating and cooking in buildings, is also facing greater scrutiny. New efforts have introduced policies to break with gas distribution at the city-level by banning or disincentivizing gas infrastructure in new buildings. As of 2019, 21 cities in California, and one in Massachusetts, have passed legislation and more are considering it.^{63,64,65} The California Public Utilities Commission (CPUC) in early 2020 launched a new rulemaking (an official process to propose new policy) to strategize and regulate a managed transition away from

STATE	LEGISLATIVE MANDATE	DATE
Hawaii	100% renewable energy	2045
Washington DC	100% renewable energy	2032
Maine	100% renewable energy	2050
Puerto Rico	100% renewable energy	2050
New York	100% clean energy	2040
California	100% clean energy	2045
Washington	100% clean energy	2045
New Mexico	100% clean energy	2045
Nevada	100% clean energy	2050

Table 2: State 100% Clean Energy Power Grid Commitments⁶²

58. “What is the Inevitable Policy Response?” *PRI*, www.unpri.org/inevitable-policy-response/what-is-the-inevitable-policy-response/4787.article. Accessed 31 Jan. 2020.

59. “100% Commitments in Cities, Counties, & States,” *Sierra Club*, www.sierraclub.org/ready-for-100/commitments. Accessed 31 Jan 2020.

60. Merchant, Emma Foehringer, “2018: The Year of 100% Clean Energy,” *GTM*, 24 Dec. 2018, www.greentechmedia.com/articles/read/the-promise-of-100-in-2018.

61. “100% Commitments in Cities, Counties, & States,” *Sierra Club*, www.sierraclub.org/ready-for-100/commitments. Accessed 31 Jan 2020.

62. “100 Percent Renewable Targets,” *EnergySage*, news.energysage.com/states-with-100-renewable-targets/. Accessed 31 Jan. 2020.

63. Gough, Matt, “Forward-Looking Cities Lead the Way to a Gas-Free Future,” *Sierra Club*, 11 Feb. 2020, www.sierraclub.org/articles/2020/02/forward-looking-cities-lead-way-gas-free-future.

64. DeCosta-Klipa, Nik, “Brookline’s Ban on Oil and Gas in New Buildings Could Just be the Start,” *Boston.com*, 21 Nov. 2019, www.boston.com/news/local-news/2019/11/21/brookline-gas-oil-ban.

65. Baker, Mike, “To Fight Climate Change, One City May Ban Heating Homes with Natural Gas,” *The New York Times*, 6 Jan 2020, www.nytimes.com/2020/01/05/us/bellingham-natural-gas-ban.html.

natural gas to achieve the state’s midcentury decarbonization goals.⁶⁶ These policies will only accelerate the transition to all-electric buildings and weaken the economic case for gas infrastructure needed to provide both gas and electric service.

As cities and states aim to meet climate targets, these regulatory and policy shifts are already proving adverse to utility gas assets. In 2018, NRG announced that it would close three gas-fired power plants due to regulations and, soon after, Calpine cancelled plans for a gas plant in California.⁶⁷ Greater scrutiny of fossil fuel infrastructure at the regulatory commission level is also apparent. Financial and climate concerns have recently led several local commissions to reject utility plans for new gas power plants including in Indiana,⁶⁸ Arizona,⁶⁹ and California.⁷⁰ These actions point toward a future where demand for gas is limited and are important signals for utilities to heed.



PUBLIC AWARENESS AND GRASSROOTS PRESSURE

In September 2019, millions of people globally, including hundreds of thousands in the U.S., took to the streets to advocate for greater climate action.⁷¹ This was just one example of broad and growing public sentiment against fossil fuel polluters. Even on a local level, resistance to gas plants is a growing concern for utilities.⁷² When Southern California Edison proposed a 262 MW new natural gas plant, local advocates in Oxnard, California pushed back with evidence that renewables and storage would be faster and cleaner and the plan was shelved.⁷³ Some grassroots groups are producing credible ‘alternative’ integrated resource plans⁷⁴ to propose cleaner and more cost-effective investment strategies for utilities. This happened in North Carolina in response to Duke Energy’s gas-heavy integrated resource plan.⁷⁵ Civil society campaigns are also attracting attention. Following Sierra Club’s impactful ‘Beyond Coal’ campaign, Michael Bloomberg, the former mayor of New York City and billionaire owner of Bloomberg, committed \$500 million to a ‘Beyond Carbon’ campaign aimed at shutting down remaining coal and halting natural gas projects.⁷⁶

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66. “Order instituting rulemaking to establish policies, processes, and rules to ensure safe and reliable gas systems in California and perform long-term gas system planning,” *California Public Utilities Commission*, 27 Jan. 2020, docs.cpuc.ca.gov/PublishedDocs/Published/G000/M325/K641/325641802.PDF.
 67. Penn, Ivan, “It’s the No. 1 Power Source, but Natural Gas Faces Headwinds,” *The New York Times*, 28 Mar 2018, www.nytimes.com/2018/03/28/business/energy-environment/natural-gas-power.html.
 68. “Cause No. 45052,” *Indiana Utility Regulatory Commission*, 24 Apr. 2019, www.in.gov/iurc/files/45052_ord_20190424102046480.pdf.
 69. “Commissioner Burns Proposed Amendment No. 1,” *Arizona Corporation Commission*, 9 Mar. 2018, images.edocket.azcc.gov/docketpdf/0000186395.pdf.
 70. Roselund, Christian, “California Regulators Choose Clean Energy and Storage Over Existing Gas Plants,” *PV Magazine*, 15 Jan. 2018, pv-magazine-usa.com/2018/01/15/california-regulators-choose-clean-energy-and-storage-over-existing-gas-plants.
 71. Taylor, Matthew, et. al., “Climate Crisis: 6 Million People Join Latest Wave of Global Protests,” *The Guardian*, 27 Sep. 2019, www.theguardian.com/environment/2019/sep/27/climate-crisis-6-million-people-join-latest-wave-of-worldwide-protests.
 72. Roberts, David, “Clean Energy is Catching up to Natural Gas,” *Vox*, 26 Oct 2018, www.vox.com/energy-and-environment/2018/7/13/17551878/natural-gas-markets-renewable-energy.
 73. Spector, Julian, “Southern California Edison Picks 195MW Battery Portfolio in Place of Puente Gas Plant,” *GTM*, 25 April 2019, www.greentechmedia.com/articles/read/sce-picks-major-battery-portfolio-in-place-of-puente-gas-plant.
 74. Integrated Resource Plans (IRP) are forward-looking projections used by utilities to evaluate and plan for power system needs that are reviewed by local regulators.
 75. Wilson, Rachel, et al., “North Carolina’s Clean Energy Future,” *Synapse Energy Economics*, GridLab, 7 Mar. 2019, gridlab.org/wp-content/uploads/2019/04/NC-Clean-Energy-Report_Final_20190307-DB.pdf.
 76. “Beyond Carbon,” *Bloomberg Philanthropies*, www.beyondcarbon.org. Accessed 31 Jan. 2020.
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Collectively, public advocacy campaigns and their successes reflect a growing awareness that natural gas, particularly investment in new gas infrastructure, is incompatible with attaining climate goals. Given the popularity of renewable energy and the growing public focus on reducing emissions, the trend of new natural gas plants being challenged on economic and policy grounds is likely to accelerate. Utilities seeking expeditious approval of new gas investment plans must begin rethinking their approach – while the power sector has produced plans favoring the construction of new natural gas, cleaner approaches will better resonate with investors, regulators, and the public, reducing policy risk today and into the future.

3. FINANCIAL RISKS OF NATURAL GAS INVESTMENT: CHANGING ECONOMICS

CUSTOMER DEFECTION

According to Edison Electric Institute (EEI) research, 70% of utility customers support the statement that “in the near future, we should produce 100 percent of our electricity from renewable energy sources such as solar and wind.”⁷⁷ Due in part to utility unresponsiveness to large customer demands for clean energy, once-captive customers are seeking ways to directly purchase clean energy, circumventing utilities and eroding their ratepayer base. As a result, customers large and small are challenging the traditional monopoly model to access clean energy.

Community choice aggregations (CCAs) have emerged as a solution for communities seeking a way to access clean energy.⁷⁸ These programs enable local governments to buy power for residents and businesses from alternative sources, essentially bypassing local utilities.⁷⁹ Currently, CCAs are authorized in nine states, Virginia being the most recent to pass legislation in 2018, and five more states are actively investigating the introduction of legislation.⁸⁰ In 2017 close to 750 CCAs procured roughly 42 million MWhs of power for approximately five million customers, the majority of which serve California customers.⁸¹

Large corporate clients are also seeking ways to reduce their climate impact. Many view the use of clean energy to power their operations as one of the most cost-effective approaches available for reducing greenhouse gas emissions. For example, over 200 companies, including large corporations like Ikea, Apple, Facebook, and Google, have joined the RE100 initiative and committed to procuring 100% renewable energy.⁸² Uptake is rapidly growing, and in 2018, 121 corporations in 21 different countries signed 13.4 GW worth of clean energy contracts. This nearly doubled the previous record set in 2017.⁸³ In jurisdictions where clean energy sourcing is not made sufficiently available by utilities, the private sector is banding together to demand it. For example, some of the largest tech companies in the world, including Microsoft, Apple, and Salesforce, sent a letter to Dominion



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77. Roberts, David, “Utilities Have a Problem: The Public Wants 100% Renewable Energy, and Quick,” *Vox*, 11 Oct. 2018, www.vox.com/energy-and-environment/2018/9/14/17853884/utilities-renewable-energy-100-percent-public-opinion.
78. Trubish, Herman K., “As CCAs Take Over Utility Customers, Local Renewable Generation Emerges as the Next Big Growth Driver,” *Utility Dive*, 8 Oct. 2019, www.utilitydive.com/news/as-ccas-take-over-utility-customers-local-generation-emerges-as-the-next-b/564422.
79. “Community Choice Aggregation,” *EPA*, Environmental Protection Agency, www.epa.gov/greenpower/community-choice-aggregation. Accessed 31 Jan. 2020.
80. “CCA By State,” *Lean Energy, U.S.*, www.leanenergyus.org/cca-by-state. Accessed 31 Jan. 2020.
81. “Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets,” *National Renewable Energy Laboratory*, Feb. 2019, p. iv, <https://www.nrel.gov/docs/fy19osti/72195.pdf>.
82. “222 RE100 Companies Have Made a Commitment to Go ‘100% Renewable.’ Read About the Actions They are Taking and Why,” *RE100*, www.there100.org/companies. Accessed 31 Jan. 2020.
83. “Corporate Clean Energy Buying Surged to New Record in 2018,” *Bloomberg NEF*, 28 Jan. 2019, about.bnef.com/blog/corporate-clean-energy-buying-surged-new-record-2018.

Energy, the main utility in Virginia, rebuking it for including so much natural gas in its latest integrated resource plan, and demanding more solar and wind.⁸⁴

While it is fast becoming the norm for large corporate entities to achieve 100% renewable energy targets, an even more ambitious clean energy goal is emerging. Technology giant Google has set a new benchmark with its goal to power its operations on a 24/7 basis with zero-carbon energy.⁸⁵ This ambitious goal leaves no room for utilities to balance clean-energy with fossil fuels like natural gas. They must innovate to facilitate the clean energy demanded from corporate giants. As Google achieves this goal, other corporations are sure to follow, exerting further pressure on utilities to deliver clean energy around the clock.

Distributed solar and storage costs have been steadily decreasing over the last decade with no signs of slowing.⁸⁶ As these costs drop, small customers have the opportunity to choose to move ‘off-grid’ and defect from local utilities. Where economic incentives such as net energy metering support it, customers have rapidly adopted grid-connected rooftop solar. Utilities that fail to embrace local clean energy solutions face the risk of rapid and uncontrolled load defection if and when the cost of solar plus storage becomes competitive with grid power.

RENEWABLES THREATEN THE ECONOMICS OF NEW GAS

Historically, renewable generation technologies have been derided as costly and inadequate to compete with more conventional fossil fuel powered technologies. However, that line of argument has rapidly waned as solar and wind costs have continued to tumble, and show little sign of slowing their downward price trajectory.⁸⁷ Today, new unsubsidized wind costs \$28-54/MWh, and solar costs \$32-44/MWh, while new combined cycle natural gas costs \$44-68/MWh (see Figure 2 below).⁸⁸ In short, in almost all jurisdictions, utility scale wind and solar now offer the cheapest source of new electricity, without subsidies.

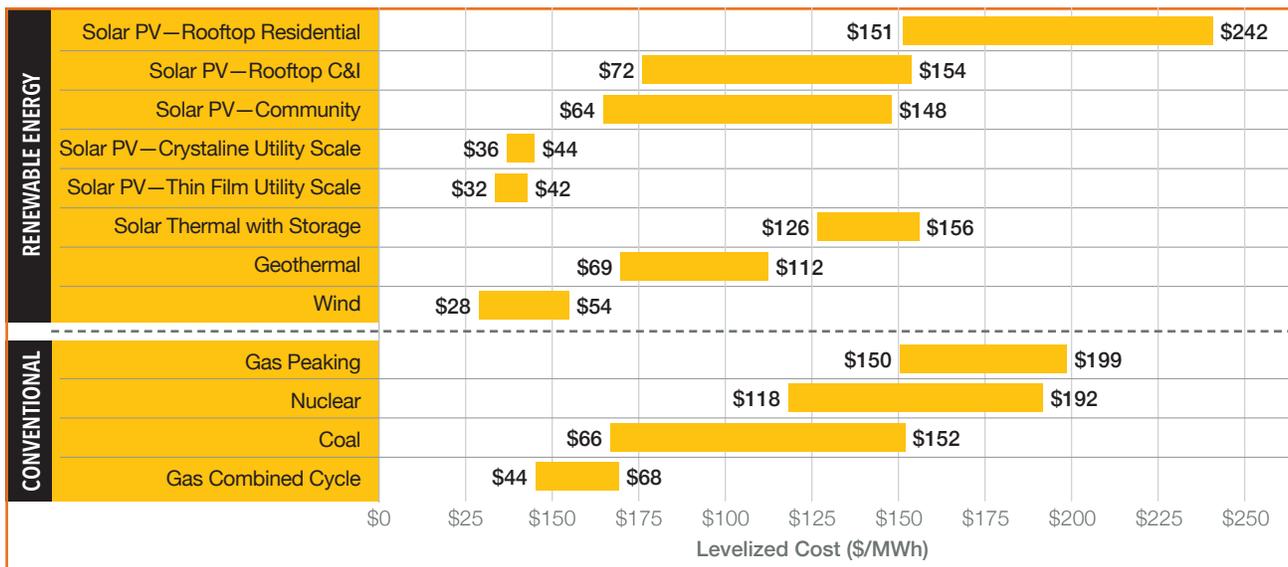


Figure 2. Levelized Cost of Energy Analysis Comparison – Unsubsidized Analysis⁸⁹

84. Gheorghiu, Iulia, “Tech Giants Pressure Dominion for More Storage, Renewables, Less Gas in Virginia,” *Utility Dive*, 14 May 2019, www.utilitydive.com/news/tech-giants-pressure-dominion-for-more-storage-renewables-less-gas-in-vir/554692.

85. “Achieving Our 100% Renewable Energy Purchasing Goal and Going Beyond,” *Google*, Dec. 2016, p. 11. static.googleusercontent.com/media/www.google.com/en//green/pdf/achieving-100-renewable-energy-purchasing-goal.pdf.

86. “Tracking the Sun,” *Berkeley Lab-Electricity Markets & Policy Group*, Oct. 2019, <https://emp.lbl.gov/tracking-the-sun>.

87. “New Energy Outlook 2019,” *Bloomberg NEF*, about.bnef.com/new-energy-outlook. Accessed 31 Jan. 2020.

88. “Lazard’s Levelized Cost of Energy Analysis – Version 13.0,” Nov. 2019, p. 2, www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-13-0-vf.pdf.

89. *Ibid.*



While comparing the levelized cost of energy (LCOE) only tells part of the story, the economics for clean energy resources remain compelling when utilities compare portfolios of clean energy resources to new natural gas plants. NV Energy’s recent procurement of 1,200 megawatts (MW) solar and 580 MW of four-hour battery storage already beats new natural gas on price. NV Energy paid \$20/MWh for solar and \$13/MWh for enough battery storage to shift 25% of daily energy, resulting in a total cost of \$33/MWh per MWh delivered (including federal tax credits).⁹⁰

A premium of \$13/MWh is already not much to pay to make solar and wind dispatchable. With solar costs projected to continue falling, this “adder” for shifting solar and wind to make it competitive with natural gas plants will only fall. And storage is not the only competitor to shift energy from times of excess to times when it is needed - flexible demand, transmission connectivity, or improved market operations also provide these services at a discount if policy changes can unlock these resources.⁹¹

RMI analysis finds that portfolios of solar, wind, storage, efficiency, and demand response could replace new gas-fired generation in the U.S. at ‘significant net cost savings’ today, while providing the same grid reliability as the gas plants.⁹² This analysis reflects a growing need to examine demand-side resources in concert with supply-side in order to decarbonize effectively. If cost trends continue even conservatively, clean energy portfolios could beat the operating costs of efficient gas plants within 20 years, threatening the viability of existing and new plants.⁹³

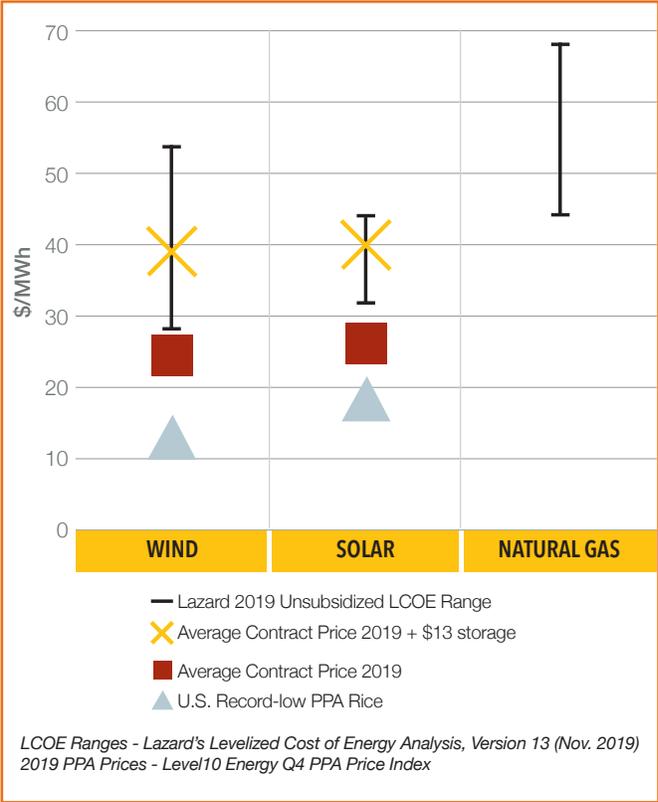


Figure 3: Clean Energy Contracts vs. Natural Gas

90. Merchant, Emma Foehringer, “NV Energy Announces ‘Hulkingly Big’ Solar-Plus-Storage Procurement,” *GTM*, 25 June 2019, www.greentechmedia.com/articles/read/nv-energy-signs-a-whopping-1-2-gigawatts-of-solar-and-590-megawatts-of-storage.
 91. “Grid Flexibility: Methods for Modernizing the Power Grid,” *Energy Innovation*, Mar. 2016, energyinnovation.org/wp-content/uploads/2016/05/Grid-Flexibility-report.pdf.
 92. Dyson, et al., rmi.org/insight/the-economics-of-clean-energy-portfolios. Accessed 31 Jan. 2020.
 93. Ibid.

This economic tipping point is starting to play out in utility investment decisions, particularly as utilities seek to replace uneconomic coal generation with new resources. In the upper Midwest, Xcel announced plans to retire its remaining coal-fired capacity a decade ahead of schedule and replace it mainly with at least 3,000 MWs of solar by 2030 and 1,850 MWs of wind by 2022.⁹⁴ Xcel CEO, Ben Fowke, noted that low wind prices make more business sense than gas for the company.⁹⁵ Northern Indiana Public Service Company (NIPSCO) recently determined through its planning process that it could replace all its coal plants almost entirely with wind and solar resources at lower cost when compared to other options such as natural gas.⁹⁶ Analysis and cost modeling by major financial institutions are reaching similar conclusions, demonstrating renewable technologies are superior investments over natural gas. Morgan Stanley found that a move from coal-fired generation straight to renewable energy generation would save customers \$8 billion annually. The research found that over 70 GWs of coal generation will become uneconomic to run over the next decade, presenting regulated utilities with an investment opportunity of between \$93-184 billion to replace these coal assets with low-cost renewables, achieving a 'triple-bottom-line' benefit to customers, the environment, and shareholders.⁹⁷

Many utilities, including those with net-zero carbon goals, have embraced natural gas instead. With renewable-centric clean energy portfolios already beating many new natural gas plants on cost, coupled with the estimated lifetime of these assets at 25-30 years,⁹⁸ there is diminishing economic rationale for these plants. According to projections by the National Renewable Energy Laboratory (NREL), this cost inversion will only grow,⁹⁹ increasing the opportunity cost of reliance on gas, while also unnecessarily subjecting customers to natural gas price volatility.¹⁰⁰

Natural gas power plants built by rate regulated utilities after 2020 will have remaining capital account balances for which customers will likely be paying until 2045 or 2050 assuming regulators grant utility requests for cost recovery. In an investor's worst-case scenario, as new plants lose market share to cheaper renewables before the end of their productive life, regulators may face enough pressure to consider prohibiting or reducing utility cost recovery from customers for relatively new but underutilized natural gas plants. The costs from this accelerated retirement will likely fall on consumers, akin to discussions today about who pays and how much for uneconomic regulated coal-fired power plants. In the future; however, it is possible that regulators may question leaving rate payers with full responsibility, especially where concerns were raised in planning processes and approval hearings.

RELYING ON CARBON CAPTURE TECHNOLOGY EXACERBATES RISK

In a Paris-aligned scenario for the U.S. economy, natural gas can only be part of the power mix if carbon capture and sequestration (CCS) technology sufficiently sequesters carbon emissions at economic prices. Currently there is doubt as to whether gas plus CCS has a role to play in future energy provision. CCS is prohibitively expensive and yet to be proven at scale, adding cost to fossil fuel infrastructure already struggling to compete

94. Moylan, Martin, et al., "Xcel's new plan: Coal-free by 2030, Nuclear Until 2040," *MPR News*, 20 May 2019, www.mprnews.org/story/2019/05/20/xcel-energy-coal-nuclear-power-wind-solar-minnesota.

95. Bade, Gavin, "Lazard: Renewables Can Challenge Existing Coal Plants on Price," *Utility Dive*, 12 Nov. 2018, www.utilitydive.com/news/lazard-renewables-can-challenge-existing-coal-plants-on-price/541965.

96. "NIPSCO Announces Addition of Three Indiana-Grown Wind Projects." *NIPSCO*, 1 Feb. 2019, www.nipSCO.com/our-company/news-room/news-article/nipSCO-announces-addition-of-three-indiana-grown-wind-projects.

97. Smyth, Joe, "Financial Analysts Expect Decarbonization Will Benefit Utility Ratepayers and Shareholders," *Energy and Policy Institute*, 9 Jan 2020, www.energyandpolicy.org/financial-analysts-expect-decarbonization-will-benefit-utility-ratepayers-and-shareholders.

98. "Combined-Cycle Plant Life Assessments," *Sargent and Lundy*, www.sargentlundy.com/wp-content/uploads/2017/05/Combined-Cycle-PowerPlant-LifeAssessment.pdf. Accessed 31 Jan. 2020.

99. "Annual Technology Baseline: Electricity," *NREL*, <https://atb.nrel.gov/>. Accessed 5 Feb. 2020.

100. Binz, Ron, et al., "Practicing Risk-Aware Electricity Regulation: 2014 Update," *Ceres*, p. 16, www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation-2014-update.

economically with clean technologies with continued dropping costs.^{101,102} Further, it requires specific geographical conditions, such as depleted oil fields or deep saline aquifers, where the CO₂ can be stored, limiting its potential.¹⁰³ Even if well-functioning CCS technology were to be developed and deployed at scale, it is unlikely to capture more than 90% of emissions,¹⁰⁴ and it still does not solve for the impacts of methane leaks across the natural gas supply chain.¹⁰⁵

With a handful of vertically integrated utilities planning to vastly expand natural gas power plants while planning to reach net-zero emissions by 2050, three possibilities emerge: utilities will miss their targets; CCS will reduce emissions from these plants; or some portion of these assets will retire early and leave customers with the bill.

ALTERNATIVE MEANS OF DECARBONIZING NATURAL GAS USE

Some utilities have proposed investment in the substitution of renewable natural gas (RNG) or hydrogen into existing fossil gas infrastructure as a means to lower the carbon intensity of those systems. While research shows that some RNG processes involving sources such as farm waste and landfills can be beneficial to the climate (especially in harder to decarbonize sectors such as industry and transportation),¹⁰⁸ use of RNG for distribution applications for rate-paying customers or for electricity generation may not prove cost-effective or achieve long-term climate targets.¹⁰⁹ Furthermore, a lack of supply may prove to be a significant constraint to plans relying on this fuel.¹¹⁰ Proposals to inject hydrogen into gas systems raise new concerns including cost and the need to retrofit existing infrastructure currently not equipped to handle hydrogen.

Recent attempts at CCS highlight the risk of relying on this technology at scale. Southern Company worked for years to add CCS to the Kemper ‘clean coal’ power-plant project. The plant’s costs spiraled from \$2.9 billion to \$7.5 billion (\$87/MWh in wasted funds) with the CCS aspect of the project ultimately being shelved and the project shifted to gas-fired technology.¹⁰⁶ NRG, the first U.S. utility to fit CCS to a coal power station is similarly finding the technology a tricky fit for its bottom line. NRG’s CEO Mauricio Gutierrez stated in March 2019 that the “economics are challenging” although the technology is operational and performing as designed.¹⁰⁷ The economics of CCS will become an even bigger hurdle over time unless costs can drop dramatically, as wind and solar coupled with storage look to outcompete the operational costs of gas, even without CCS, in the near-term.

101. Stockman, Lorne, et al., “Burning the Gas ‘Bridge Fuel’ Myth: Why Gas is Not Clean, Cheap, or Necessary,” *Oil Change International*, May 2019, p. 8, www.priceofoil.org/content/uploads/2019/05/gasBridgeMyth_web-FINAL.pdf.

102. Added costs stem from the construction of the CCS equipment; additional operation and maintenance costs including energy to extract, pump, and compress the CO₂; and transportation and storage costs. If a market develops for the CO₂ byproduct, some of these costs could be offset. Rissman, Jeffrey and Orvis, Robbie, “Carbon Capture and Storage: An Expensive Option for Reducing U.S. CO₂ Emissions,” *Forbes*, 3 May 2017. www.forbes.com/sites/energyinnovation/2017/05/03/carbon-capture-and-storage-an-expensive-option-for-reducing-u-s-co2-emissions/#7040c1da6482.

103. “What is CCS?” *Carbon Capture & Storage Association*, www.ccsassociation.org/what-is-ccs/. Accessed 31 Jan. 2020.

104. *Ibid.*

105. Alvarez, Ramón A., et al., science.sciencemag.org/content/361/6398/186.

106. Walton, Robert, “DOJ Opens Investigation into Kemper Plant as Southern Warns of Possible ‘Material Impact,’” *Utility Dive*, 2 May 2019, www.utilitydive.com/news/doj-opens-investigation-into-kemper-plant-as-southern-warns-of-possible-ma/553936.

107. Lee, Mike and Mandel, Jenny, “Big Oil Looks to CCS, But Will it Really Help the Climate?” *E&E News*, 19 June 2019, www.eenews.net/stories/1060626447.

108. Paulos, Bentham, “Analysis: Why utilities aren’t doing more with renewable natural gas,” *Energy News Network*, 14 Feb. 2019, energynews.us/2019/02/14/west/analysis-why-utilities-arent-doing-more-with-renewable-natural-gas/.

109. Mahone, Amber, et al., www.ethree.com/wp-content/uploads/2018/06/Deep_Decarbonization_in_a_High_Renewables_Future_CEC-500-2018-012-1.pdf.

110. *Ibid.*

4. UTILITY ACTION: OPPORTUNITIES AND BARRIERS

Given the changing landscape around climate, evolving energy technologies, and ongoing shareholder efforts, among other factors, some U.S. utilities are showing signs of meaningful progress toward decarbonization and enhanced disclosure on climate risks. Many utilities now publish reports describing their low-carbon scenario analysis and emissions reduction initiatives, in some cases, annually. Furthermore, many utilities now acknowledge that setting greenhouse gas reduction targets is expected by stakeholders. In 2018, Xcel Energy became the first U.S. utility to set a net-zero by 2050 greenhouse gas target.¹¹¹ Demonstrating the importance of a first-mover, within a year of Xcel's announcement, several utilities joined in setting net-zero targets.¹¹²

While some utilities are setting targets and undertaking action to achieve their goals, many more utilities maintain their fossil fuel dependent trajectory and remain on the sidelines of the ongoing transition. Even some utilities that have set ambitious targets have not demonstrated sufficient plans on how to achieve them. Utilities that do not address these problems risk lagging behind as their competitors move forward.

INTO THE UNKNOWN - OVERCOMING MANAGEABLE RISKS OF A RAPID, LOW-CARBON ENERGY TRANSITION

Utilities cite a host of reasons to delay movement away from fossil fuels, particularly natural gas. Many maintain that natural gas generation is needed either instead of, or in addition to, renewables, for reliability. Evidence increasingly demonstrates that such assertions are unfounded.¹¹³ Some utilities, and even entire countries, are already reaching high levels of energy generation from variable solar and wind generation sources. In 2018, nine countries generated above 20% of their electricity from just wind and solar. Denmark generated over 50%, Uruguay above 30%, and Ireland just under 30%.¹¹⁴ Instantaneous wind and solar generation in California¹¹⁵ and the Southwest Power Pool (the regional grid that covers most of the midwestern United States)¹¹⁶ at times have exceeded 60%. U.S. states with the fewest power outages are among the top producers of solar and wind generated power. For example, Texas' grid reliability metrics significantly improved as its wind production increased 645% over a ten-year period.¹¹⁷

111. "Xcel Energy Aims for Zero-Carbon Electricity by 2050," *Xcel Energy*, 4 Dec. 2018,

www.xcelenergy.com/company/media_room/news_releases/xcel_energy_aims_for_zero-carbon_electricity_by_2050.

112. Gearino, Dan, "Utilities are Promising Net Zero Carbon Emissions, But Don't Expect Big Changes Soon," *Inside Climate News*, 15 Oct. 2019, insideclimatenews.org/news/15102019/utilities-zero-emissions-plans-urgency-coal-gas-duke-dte-xcel.

113. "Abstracts of 47 Peer-Reviewed Published Journal Articles From 13 Independent Research Groups with 91 Different Authors Supporting the Result That Energy For Electricity, Transportation, Building Heating/Cooling, and/or Industry can be Supplied Reliably with 100% or Near-100% Renewable Energy at Difference Locations Worldwide," 29 Dec. 2019, web.stanford.edu/group/efmh/jacobson/Articles/I/CombiningRenew/100PercentPaperAbstracts.pdf.

114. "Renewables 2019: Global Status Report," *Ren21*, 2019, p. 43, www.ren21.net/wp-content/uploads/2019/05/gsr_2019_full_report_en.pdf.

115. Roselund, Christian, "California Sets a New Solar Output Record – and It Isn't Even Spring Yet," *PV Magazine*, 18 Mar. 2019, pv-magazine-usa.com/2019/03/18/california-sets-a-new-solar-output-record-and-it-isnt-even-spring-yet.

116. Walter, Curtis, "Wind Breaks a New Record in Southwest Power Pool," *Into the Wind, the AWEA blog*, 26 Apr. 2019, www.aweablog.org/wind-breaks-new-record-southwest-power-pool.

117. Motyka, Marlene, Slaughter, Andrew and Amon, Carolyn, "Global Renewable Energy Trends," *Deloitte Insights*, 13 Sept. 2018, (hereafter cited as Motyka, Marlene, et al.) www2.deloitte.com/insights/us/en/industry/power-and-utilities/global-renewable-energy-trends.html.

Energy experts acknowledge that a high level of renewables can be reliable and affordable.^{118,119} The landmark 2012 NREL Renewable Electricity Futures Study found an 80% renewable U.S. grid was reliable and affordable, using what are now outdated cost assumptions for solar, wind, and batteries and since-improved modeling technology.¹²⁰ Studies by NOAA,¹²¹ Evolved Energy,¹²² and Vibrant Clean Energy¹²³ have found the same.

Historically, fossil fuel resources like gas and coal have served important adequacy and stability functions for the grid. However, scalable zero-carbon resources that exist today also provide reliability services and obviate the need to invest in new natural gas generation incompatible with a low-carbon pathway. For example, renewables and storage with smart inverters are increasingly able to offer similar reliability with greater accuracy.¹²⁴ Cutting edge modeling from NREL suggests the grid can remain stable and maintain resource adequacy with currently available technology at 70% wind and solar penetration.¹²⁵

Hybrid renewable resources paired with battery storage now provide dispatchable clean energy, competing with natural gas for resource adequacy services. Recent contracts for solar-plus-storage reflect increasing cost competitiveness between hybrid resources and large combined-cycle gas turbine (CCGT) plants for both capacity and energy.¹²⁶ Where firm generation is needed to ensure resource adequacy, the limited use of gas for this interim purpose should be made clear and confined to existing resources, and only after subjecting such resources to competition from clean alternatives.

Renewables create new opportunities for system resilience as well. A recent report by Department of Energy cites potential resilience concerns associated with increased reliance on natural gas generation and associated fuel delivery.¹²⁷ At roughly 9% of electricity supply in 2019, renewable resources will add to diversity of energy sources supplying the grid, offsetting risks of disruptions to natural gas delivery.¹²⁸ Deloitte notes that in instances where extreme weather conditions have tested the grid's ability to ride through and recover from these



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118. "Renewables Global Futures Report," *Ren21*, 2017, p. 28, www.ren21.net/wp-content/uploads/2019/06/GFR-Full-Report-2017_webversion_3.pdf.
119. Jacobson, Mark, et al., "Matching Demand with Supply at Low Cost in 139 Countries Among 20 World Regions with 100% Intermittent Wind, Water, And Sunlight (WWS) for All Purposes," *Elsevier*, 3 Feb. 2018, web.stanford.edu/group/efmh/jacobson/Articles/I/CombiningRenew/WorldGridIntegration.pdf.
120. "Renewable Electricity Futures Study," *National Renewable Energy Laboratory*, www.nrel.gov/analysis/re-futures.html. Accessed 31 Jan. 2020.
121. "Wind, Sun Could Eclipse Fossil Fuels for Electric Power by 2030," *NOAA*, 25 Jan. 2016, www.noaa.gov/media-release/wind-sun-could-eclipse-fossil-fuels-for-electric-power-by-2030.
122. Haley, Ben, "350 ppm Pathways for the United States," *Evolved Energy Research*, 8 May 2019. www.evolved.energy/post/2019/05/08/350-ppm-pathways-for-the-united-states.
123. "Colorado Electrification and Decarbonization Study," *Vibrant Clean Energy*, 5 Nov. 2019, www.vibrantcleanenergy.com/wp-content/uploads/2019/11/CEDS-CEI-VCE-FullReport.pdf.
124. Loutan, Clyde, et al., "Demonstration of Essential Reliability Services by a 300-MW Solar Photovoltaic Power Plant," *NREL*, Mar. 2017, www.nrel.gov/docs/fy17osti/67799.pdf.
125. Novachek, Joshua, Brinkman, Greg and Porro, Gian, "Operational Analysis of the Eastern Interconnection at Very High Renewable Penetrations," *NREL*, Sept. 2018, www.nrel.gov/docs/fy18osti/71465.pdf.
126. O'Boyle, Mike, "Cheap Clean Energy Makes New Natural Gas a Risky Bet Utility Regulators Should Avoid," *Forbes*, 10 July 2019, www.forbes.com/sites/energyinnovation/2019/07/10/utility-regulators-should-avoid-risky-bets-on-new-natural-gas/#5c5e1b9674fa.
127. "Staff Report to the Secretary on Electricity Markets and Reliability," *US Department of Energy*, Aug. 2017, p. 12, www.energy.gov/downloads/download-staff-report-secretary-electricity-markets-and-reliability.
128. O'Boyle, Michael, "Secretary Perry, We Have Some Questions for You Too," *GTM*, 19 May 2017, www.greentechmedia.com/articles/read/secretary-perry-we-have-some-questions-for-you-too.

events,¹²⁹ renewables have effectively compensated for fuel-based resource shortfalls. For example, wind broke generation records when the United Kingdom faced a natural gas shortage during a winter storm in 2018 and beat generation expectations in the U.S. when coal piles froze during the 2014 polar vortex or were flooded during Hurricane Harvey in 2017.¹³⁰ The Northeastern grid operator found that during 2018's bomb cyclone weather event, 1.6 gigawatts of planned offshore wind additions in Massachusetts would have provided consistent power, saved up to \$80 million, and reduced gas use 20%.¹³¹

Because they are modular in size, renewables, particularly solar and storage, have significant potential to increase resilience to remote communities threatened by wildfires. Many military bases concerned about fuel security are switching from gas- and oil-fired generators to renewables-plus-storage alternatives to improve resilience under emergency conditions.¹³² Borrego Springs, California, connected by a single transmission line to the San Diego Gas & Electric grid, is using renewables-plus-storage to increase resilience to wildfires and storms created by vulnerable transmission links.¹³³ This could be a model for California utilities, which recently executed public safety power shutoffs to millions of Californians to prevent power lines from sparking wildfires.¹³⁴



THE OPPORTUNITY FOR NEW INVESTMENT

Steel for Fuel

Xcel Energy, a major U.S. electric and natural gas company with annual revenues of \$11.4 billion, has pioneered a “growth and environmental” benefits strategy called “steel for fuel” that adds wind farms and solar projects to its utility-owned generation portfolios, while retiring aging coal plants. These solar and wind plants are owned by Xcel’s operating utilities and/or by third parties under power purchase agreements (PPAs). Xcel achieves cost savings (and potentially increased earnings) from substituting non-fuel for fossil fuel generation, as well as risk reduction benefits to shareholders.^{135,136} In a recent earnings call with investment analysts, Xcel CEO Ben Fowke noted that the utility intends to “. . . invest in renewable generation in which the capital cost could be more than offset by fuel savings.”¹³⁷

129. O’Boyle, Mike, “What ‘Resilience’ Means in a Clean Energy Future,” *GTM*, 29 Nov. 2017, www.greentechmedia.com/articles/read/resilience-in-a-clean-energy-future.

130. Motyka, Marlene, et al., www2.deloitte.com/insights/us/en/industry/power-and-utilities/global-renewable-energy-trends.html.

131. “High Level Assessment of Potential Impacts of Offshore Wind Additions to the New England Power System During the 2017-2018 Cold Spell (Memo),” *ISO New England*, 17 Dec. 2018, www.iso-ne.com/static-assets/documents/2018/12/2018_iso-ne_offshore_wind_assessment_mass_cec_production_estimates_12_17_2018_public.pdf.

132. Merchant, Emma Foehringer, “US Military Microgrids are Using More Renewables and Batteries,” *GTM*, 9 Nov. 2018, www.greentechmedia.com/articles/read/for-the-u-s-military-energy-resilience-has-long-been-a-priority#gs.CRmy7HQW.

133. Gies, Erica, “Microgrids Keep These Cities Running When the Power Goes Out,” *Inside Climate News*, 4 Dec. 2017, insideclimatenews.org/news/04122017/microgrid-emergency-power-backup-renewable-energy-cities-electric-grid.

134. Pickoff-White, Lisa, “PG&E Power Safety Shutoffs Could Continue for 10 Years, says CEO,” *KQED News*, 18 Oct. 2019, www.kqed.org/news/11781060/pge-power-safety-shutoffs-could-continue-for-10-years-says-ceo.

135. Dear Fellow Shareholders,” *Xcel Energy*, 2017, investors.xcelenergy.com/Interactive/NewLookAndFeel/4025308/Xcel_Energy_Inc-Hosting_Page_2018_ClientDL/ar/HTML1/xcel_energy-ar2017_0003.htm.

136. “A Message from the CEO,” *Xcel Energy*, www.xcelenergy.com/company/corporate_responsibility_report/a_message_from_the_ceo. Accessed 31 Jan 2020.

137. On the same conference call, Xcel Chief Financial Officer Robert Frenzel characterized wind farm investments as “. . . as a deeply in the money hedge against fuel prices. . .” “Xcel Energy (XEL) Q1 2018 Results – Earnings Call Transcript,” *Seeking Alpha*, 26 Apr. 2018, seekingalpha.com/article/4166527-xcel-energy-xel-q1-2018-results-earnings-call-transcript.

Credit Suisse Equity Research is among financial analytic firms that are taking notice of Xcel's switch from fuel to steel:

*With fuel costs as a pass-through expense (no return earned) for regulated utilities, utilities have a built-in incentive to build more renewables. Replacing fossil fuel generation with wind resources reduces the fuel portion of a customer's bill and substitutes it with recovery of and on capital investment in wind turbines (and solar panels). This strategy, which was pioneered by [Xcel Energy] under its "steel for fuel" program, is under consideration by [CMS Energy Corporation] and others. . . . [a] **win-win situation for regulators, consumers, and environmental groups, striking a balance between supporting state RPS goals and stabilizing customer rates.**¹³⁸ (emphasis added)*

Other analysts note that "steel for fuel" provides opportunity for investment that is equal to, or better than, maintaining investment in old equipment. The strategy substitutes capital investment where utilities can earn equity returns for fuel expenses that are passed through to consumers' rates without earnings potential. Recent Morgan Stanley analysis found early utility adopters of renewables are trading at a valuation premium and raised price targets for utility stocks poised to take advantage of a "steel for fuel" investment strategy.¹³⁹

"Electrify Everything"

A clean electricity grid lays the foundation for electrification of buildings and transportation as a pathway for deep decarbonization.^{140,141} Electric utilities should see tremendous upside pursuing clean energy goals in the context of economy-wide decarbonization. Full electrification of vehicles and building components would increase electricity demand by roughly 70%.¹⁴² If done well, it could also improve the utilization of grid infrastructure and renewable resources, reducing rates for all customers.¹⁴³ For electric utilities, this means new grid infrastructure, new power plants, and new customers.

Undeniably, utilities cannot drive electrification on their own – market transformation, clear policy signals, and regulatory cooperation are all required. This transition toward electrification is already in motion. Bloomberg New Energy Finance (BNEF) projects that Electric Vehicles (EV) will dominate global sales of passenger cars (57% of global sales) and buses (81% of global sales) by 2040.¹⁴⁴ Electrification in the building sector is also increasingly economic. A 2018 study on decarbonizing the Californian energy system found that building electrification was one of the lowest cost GHG mitigation strategies available.¹⁴⁵



138. Weinstein, Michael, et al., "Power & Utilities Primer," *Credit Suisse Equity Research*, 9 Apr. 2018, p. 12, plus.credit-suisse.com/rpc4/ravDocView?docid=_XsZr2AN-XtNI.

139. "The Second Wave of Clean Energy – Part II: Who Can Ride the Wave?" Morgan Stanley, 29 Jan. 2020. See also "Morgan Stanley: \$64B capex upside for utilities replacing coal with renewables," *S&P Global*, 18 Feb. 2020, www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/morgan-stanley-64b-capex-upside-for-utilities-replacing-coal-with-renewables-56987725.

140. Mahajan, Megan, "How To Reach U.S. Net Zero Emissions By 2050: Decarbonizing Electricity," *Forbes*, 12 Nov. 2019, www.forbes.com/sites/energyinnovation/2019/11/12/how-to-reach-us-net-zero-emissions-by-2050-decarbonizing-electricity/#7b32751d49e7.

141. "The Role of Electricity in Decarbonizing CA's Energy System," *Energy + Environmental Economics*, 24 Sept. 2019, www.ethree.com/wp-content/uploads/2019/10/The-Role-of-Electricity-in-Decarbonizing-California%E2%80%99s-Energy-System-CEC-Workshop-24-Sept-2019.pdf.

142. "Transportation and Heating Electrification Could Aid in Increasing Utility Sales and Reducing Carbon Emissions, According to Brattle Economists," *The Brattle Group*, 24 Jan. 2017, www.brattle.com/news-and-knowledge/news/transportation-and-heating-electrification-could-aid-in-increasing-utility-sales-and-reducing-carbon-emissions-according-to-brattle-economists.

143. "Colorado Electrification & Decarbonization Study," *Vibrant Clean Energy*, 5 Nov. 2019, www.vibrantcleanenergy.com/wp-content/uploads/2019/11/CEDS-CEI-VCE-FullReport.pdf.

144. "Electric Transport Revolution Set to Spread Rapidly Into Light and Medium Commercial Vehicle Market," *Bloomberg NEF*, 15 May 2019, about.bnef.com/blog/electric-transport-revolution-set-spread-rapidly-light-medium-commercial-vehicle-market.

145. Aas, Dan, et al., "Draft Results: Future of Natural Gas Distribution in California," *Energy + Environmental Economics*, 6 Jun 2019, p. 3, www2.energy.ca.gov/research/notices/2019-06-06_workshop/2019-06-06_Future_of_Gas_Distribution.pdf.

Utilities can play an important role in boosting needed policy signals given their significant influence, access to information, and trusted brand. Southern California Edison is proactively modeling and advocating for a low-carbon pathway and is at the center of massive vehicle and building electrification efforts.¹⁴⁶ Rather than continuing to rationalize investment in gas, utilities can become decarbonization advocates at their legislatures and utility commissions, providing leadership to other stakeholders on how to decarbonize all sectors at speed and scale. The very credibility of electrification as a decarbonization strategy is undermined when utilities double down on fossil fuel infrastructure.

As electrification trends continue, demand for electricity will grow and demand for natural gas distribution to buildings will shrink. Since many utilities are hybrid electricity and natural gas providers, this fuel switching implies a needed shift in resources and planning toward growth in the electricity business. A managed transition on the gas distribution side is critical to avoid stranded asset risk. Gas utilities must carefully manage the risk of a ‘death spiral’, wherein the fixed costs of maintaining and reinvesting in natural gas distribution pipes overwhelm a shrinking customer base, driving more and more customers over to electric heat.¹⁴⁷ Hybrid companies may be tempted to double down on gas-fired generation to help justify and pay for new and existing gas infrastructure, but negative public and financial pressure will continue to focus on both businesses’ reliance on natural gas.

On the other hand, new electrified end-uses present additional opportunities to lower costs and improve reliability, while reducing emissions. For instance, EVs and smart electrified homes could be used to improve system efficiency by being used as batteries to store excess power and as demand-side management resources. Shifting EV charging and water heating to hours when grid capacity and zero marginal cost renewables are readily available can obviate the need for new infrastructure and help green the grid, providing flexibility and soaking up excess generation from wind and solar.



REMAINING BARRIERS

The risk of failing to achieve a just transition away from fossil fuels: For companies to achieve net zero emissions by 2050, the transition must address local economic dependence on fossil fuels by creating new economic development in those communities. Failure to do so exacerbates economic inequality and risks public support for the energy transition, potentially stalling its advancement.

To some extent, renewable resources provide this opportunity. In a 2019 report, Energy Innovation and Vibrant Clean Energy found that 3/4 of existing coal plants could be replaced by wind or solar within 35 miles

of those coal plants at immediate savings to consumers.¹⁴⁸ It is true that renewables will not replace coal plant and mining jobs 1:1, however they may replace local tax revenue and provide a temporary boon to local economies during construction. Prioritizing coal communities for renewable development, as was done in Pueblo County in Xcel Colorado’s Clean Energy Plan,¹⁴⁹ is a best practice to promote a just energy transition.

146. “The Clean Power and Electrification Pathway,” *Southern California Edison*, Nov. 2017, www.edison.com/content/dam/eix/documents/our-perspective/g17-pathway-to-2030-white-paper.pdf.

147. “California’s Gas System in Transition,” *Gridworks*, gridworks.org/initiatives/cagas-system-transition. Accessed 31 Jan. 2020.

148. “The Coal Cost Crossover: Economic Viability of Existing Coal Compared to New Local Wind and Solar Resources,” *Energy Innovation*, 24 Mar. 2019, energyinnovation.org/publication/the-coal-cost-crossover.

149. Pyper, Julia, “Xcel to Replace 2 Colorado Coal Units with Renewables and Storage,” *GTM*, 29 Aug. 2018, www.greentechmedia.com/articles/read/xcel-retire-coal-renewable-energy-storage.

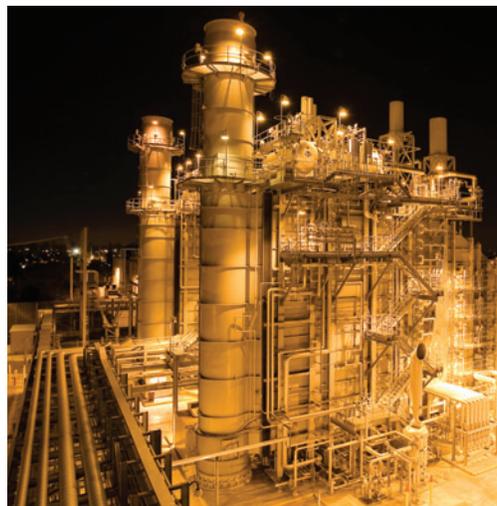
The economic displacement caused by full transition away from fossil fuels in the electricity sector will reach far beyond the impacts emerging for coal communities. Some models to scale and institutionalize just transition principles exist in legislation, such as Colorado's creation of a just transition office to assist communities in developing plans and implementing economic transition, and temporary transition assistance.¹⁵⁰ As economic displacement becomes more acute, investment in building efficiency, broadband access, local renewables, and job retraining aimed at these communities must expand to meet the need, enabling the same communities to benefit from the clean energy transition.

Companies whose employees will be impacted by the energy transition have a role to play in supporting just transition principles. Utilities must be sure to engage and communicate clearly, and in advance, with affected stakeholders to mitigate negative impacts and reduce risks including reputational damage, increased local opposition, and loss of social license to operate.

Misaligned business model incentives for demand management and early retirement: New business models are necessary to integrate higher levels of distributed energy resources, take advantage of new technologies, meet environmental goals, and address changing customer needs and expectations. In many jurisdictions under current legislation, utilities are not incentivized to operate and manage the electricity system in ways that support the achievement of climate or environmental goals, encourage efficiency, promote distributed energy, or protect customers.

One key element of the issue is cost of service regulation. Under cost of service, many investor-owned utilities are treated as state-protected monopolies. Investors in the utility are allowed to make a return on net invested capital (gross capital minus accumulated depreciation) but not sales of the product it provides, or on operational costs including fuel, labor, maintenance, and service expenses.¹⁵¹

In its current form, cost of service regulation promotes investment in utility-owned assets but does not incent retirement of uneconomic assets such as coal and gas, which might be replaced at cost savings by cleaner resources. Such policy also shifts the risk of fuel cost volatility onto customers since operational and fuel costs are direct pass-throughs to utilities, creating no incentive to cut costs through solar, wind, or other fuel-free sources. Similarly, because utilities do not face the risk of high fuel prices, they are less willing to embrace renewable technology that may avoid or reduce fuel price risk for customers.



Finally, this business model is at odds with distributed energy resources (DERs)¹⁵² and service-based solutions.¹⁵³ Distributed energy includes customer-sited energy solutions such as rooftop solar and behind-the-meter storage. Many utilities have demonstrated reluctance to service initiatives that would help grow the use of clean distributed energy.¹⁵⁴ Another option that reduces the need to build additional gas power plants is enacting

150. "HB19-1314: Just Transition From Coal-Based Electrical Energy Economy," *Colorado General Assembly*, leg.colorado.gov/bills/hb19-1314. Accessed 31 Jan. 2020.

151. "Optimizing Capital and Service Expenditures," *Advanced Energy Economy*, 5 June 2018, p. 2, info.aee.net/hubfs/PDF/Opex-Capex.pdf.

152. Trabish, Herman K., "Should the Regulatory Two-Step Give Way to a New, Performance-Based Dance?" *Utility Dive*, 18 June 2018, www.utilitydive.com/news/should-the-regulatory-two-step-give-way-to-a-new-performance-based-dance/524428.

153. "Optimizing Capital and Service Expenditures," *Advanced Energy Economy*, 5 June 2018, p. 2, info.aee.net/hubfs/PDF/Opex-Capex.pdf.

154. Garskof, Josh, "How Utilities are Fighting Back on Solar Power," *Consumer Reports*, 30 June 2016, www.consumerreports.org/energy-saving/how-utilities-are-fighting-back-on-solar-power.

demand management strategies like energy efficiency programs or demand response. Demand response is an evolving approach where devices that demand power can be controlled and shifted around in real-time to mitigate peak stresses and accommodate the current generation situation, thereby improving efficiency and system cost savings.^{155,156} Electric Vehicles, because they are such large, flexible loads, provide massive opportunities for cost-effective demand response in the near future.

Such demand management approaches can make the power system more efficient and cost-effective in a variety of ways, but also reduce the need for utility capital investments such as gas plants.¹⁵⁷ This reduction in demand for capital investment projects can harm investors' returns, thus providing a bias for utilities to not pursue new strategies that might be high in value for ratepayers, societal goals, and system resilience.¹⁵⁸

Some states are experimenting with introducing new incentive regulation that would be based on the achievement of performance indicators such as cost, resilience, and emissions. This is known as performance-based regulation (PBR). For example, Illinois introduced PBR legislation in 2011 to modernize its grid. The legislation included penalty incentives for not improving reliability. According to Commonwealth Edison (ComEd), this approach contributed to avoiding 11 million customer outages in the last six years, equating to \$2.1 billion in societal savings. Illinois added energy efficiency legislation in 2016, and while data from this legislation has not been fully reviewed, initial findings indicate it has been successful at shifting utilities' culture and approach.¹⁵⁹ Legislation in New York has allowed utilities to earn a rate of return for non-infrastructure investments in non-wire solutions like energy storage, distributed generation, grid software, and energy efficiency.¹⁶⁰ Performance-based regulation is still in its infancy but is gaining interest, with efforts to introduce it in Colorado, Minnesota, Oregon, California and Hawaii.¹⁶¹ It could prove highly effective in reorienting utilities to better incorporate important climate goals and be rewarded for innovative efforts to achieve them.

Parent company climate goals at odds with subsidiaries: Given the localized nature of utility planning and regulatory approvals, ensuring corporate climate targets are integrated adequately throughout all levels of a company and its subsidiaries can prove yet another challenge.¹⁶² In particular, utility companies with decarbonization goals limited to electricity generation should extend those goals to apply to all businesses, including gas distribution subsidiaries or departments. PG&E has shown leadership in this area by supporting California municipalities in its service territory, including Berkeley and San Francisco, in banning gas hookups for new customers.¹⁶³ As mentioned above, electrification trends will likely require hybrid utilities to shift resources from one utility to the other. In cases where subsidiaries are gas-only, those business segments face a much less certain future.

155. "Demand Response," *Energy.Gov*, www.energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid/demand-response. Accessed 31 Jan. 2020.

156. Roberts, David, "Using Electricity at Different Times of Day Could Save Us Billions of Dollars," *Vox*, 24 Oct. 2019. www.vox.com/energy-and-environment/2019/8/7/20754430/renewable-energy-clean-electricity-grid-load-flexibility.

157. For utilities that make revenue from energy sales, DERs are not favored because they directly reduce utility revenue, particularly efficiency and rooftop solar, which many utilities have openly opposed.

158. Cross-Call, Dan, "Navigating Utility Business Model Reform," *Rocky Mountain Institute*, 2018, rmi.org/insight/navigating-utility-business-model-reform. Accessed 31 Jan. 2020.

159. Trabish, Herman K., "Performance-based Regulation: Seeking the New Utility Business Model," *Utility Dive*, 23 July 2019, www.utilitydive.com/news/performance-based-regulation-seeking-the-new-utility-business-model/557934.

160. *Ibid.*

161. Walton, Robert, "Colorado Sets Initial Timelines for Performance-Based Regulation Review as it Looks to Other States," *Utility Dive*, 18 Dec. 2019, www.utilitydive.com/news/colorado-sets-initial-timelines-for-performance-based-regulation-review-as/569260/.

162. Tait, Daniel, "Georgia Power's 2019 IRP: Limit Renewables, Lock in Fossil Fuels," *Energy and Policy Institute*, 10 Apr. 2018, www.energyandpolicy.org/georgia-powers-2019-irp-limit-renewables-lock-in-fossil-fuels.

163. Moench, Mallory, "SF Bans Natural Gas in New City Buildings, Plans all Construction Ban," *San Francisco Chronicle*, 23, Jan 2020. www.sfchronicle.com/business/article/SF-bans-natural-gas-in-new-city-buildings-may-14984899.php.

Flocking toward natural gas business has proven fruitful in the short term. A Duke spokesperson stated in late 2016 that Piedmont Natural Gas, which Duke purchased, was growing at a rate of 8-9% whereas Duke itself was only growing at a pace of 4-6%.¹⁶⁴ As demand for the fuel has continued to grow, utility parent companies have continued their pursuit of related acquisitions and investments.^{165,166}

Expanding into natural gas transmission operations offers revenue streams from delivering fuel to other utilities, as well as benefits from vertical integration and firmer supply control for fuel for their own generation and distribution businesses.¹⁶⁷

For example, the Atlantic Coast Pipeline project, a 600 mile natural gas pipeline from West Virginia to North Carolina, is owned by Dominion and Duke.¹⁶⁸ Some of these companies' regulated utilities will be customers of the pipeline and, as noted, Duke owns Piedmont Natural Gas, another partner on the pipeline.¹⁶⁹ Such conditions have created incentives for utilities to support gas as a significant component of their energy mix, instead of clean energy technologies and in spite of corporate climate goals.



In the face of more immediate disruption to the natural gas distribution business from city-level electrification ordinances and state-level decarbonization targets, some utilities are taking aggressive action to protect their natural gas interests. SoCalGas is a subsidiary of Sempra with over 21 million gas customers in California.¹⁷⁰ Its core business is at risk of disruption from California legislation seeking to decarbonize the economy, in part through electrification of vehicles, appliances, and buildings, in line with the Paris Agreement.¹⁷¹ In response, SoCalGas has engaged in a coordinated effort to win the support of local officials for natural gas over electrification for heating and cooking, a preemptive defense against climate-focused efforts to curtail the use of natural gas. Thus far, SoCalGas has managed to get more than 100 cities and counties to endorse its push for resolutions that seek 'balanced energy solutions' including gas.¹⁷² This leaves questions as to how Sempra's gas-dependent strategy reconciles with California's mid-century decarbonization targets.

Inertia is powerful: Another significant impediment to progress is the typically conservative and risk-averse nature of the utility industry and its investors. There is a comfort in tried and tested traditional technologies and

164. Bade, Gavin, "'Eyes Wide Open': Despite Climate Risks, Utilities Bet Big on Natural Gas," *Utility Dive*, 27 Sept. 2016, (hereafter cited as Bade, Gavin), www.utilitydive.com/news/eyes-wide-open-despite-climate-risks-utilities-bet-big-on-natural-gas/426869.

165. *Ibid.*

166. "U.S. Natural Gas Demand is at a Record – and Prices Keep Dropping," *Reuters*, 8 Aug. 2019, www.reuters.com/article/us-usa-natgas-prices-analysis/us-natural-gas-demand-is-at-a-record-and-prices-keep-dropping-idUSKCN1UY27V.

167. Bade, Gavin, www.utilitydive.com/news/eyes-wide-open-despite-climate-risks-utilities-bet-big-on-natural-gas/426869.

168. "Dominion agrees to buy Southern stake in Atlantic Coast Pipeline as project costs soar" *S&P Global*, 11 Feb. 2020, www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/021120-dominion-agrees-to-buy-southern-stake-in-atlantic-coast-pipeline-as-project-costs-soar.

169. Walton, Robert, "Are Utility Investments in Natural Gas a Good Bet?" *Utility Dive*, 27 Oct. 2015, www.utilitydive.com/news/are-utility-investments-in-natural-gas-a-good-bet/407847.

170. "About SoCalGas," *SoCalGas*, www.socalgas.com/about-us/company-profile. Accessed 31 Jan. 2020.

171. "Governor Brown Signs 100 Percent Clean Electricity Bill, Issues Order Setting New Carbon Neutrality Goal" *Office of Governor Edmund G. Brown Jr.*, 10 Sep. 2018, wayback.archive-it.org/5763/20180921190053/https://www.gov.ca.gov/2018/09/10/governor-brown-signs-100-percent-clean-electricity-bill-issues-order-setting-new-carbon-neutrality-goal/.

172. Roth, Sammy, "California ditched coal. The gas company is worried it's next," *Los Angeles Times*, 22 Oct. 2019, <https://www.latimes.com/environment/story/2019-10-22/southern-california-gas-climate-change>.

business models for a heavily regulated industry that requires high levels of reliability in its service provision. The more immediate demands and pressure for utilities to transition to a clean energy business plan are unfamiliar and atypical of how these utilities have operated for decades, leading to resistance.¹⁷³ This was exemplified in the case of NRG where former CEO David Crane attempted to steer the utility rapidly toward a new business model focused on renewables, foreseeing an inevitable clean energy future. This strategy was rejected, David Crane was removed from the company, and renewable assets were sold.¹⁷⁴

To adopt and integrate new technologies and strategies requires experimentation and adaptation of the current power utility model. This is a tough proposition for large complex companies facing significant regulatory restrictions on innovation. Utilities were not created to be flexible or move quickly and are accustomed to long time horizons.¹⁷⁵ As such, it is all the more important that investors demonstrate support both in the short and long term for their companies to proactively accelerate Paris-aligned transition plans.

5. NEXT STEPS TO ADDRESS GROWING INVESTOR CONCERN



SHAREHOLDER ENGAGEMENT ON THE RISE

Investors are increasingly paying attention to how climate change will threaten their portfolios and are taking action to protect value. Environmental, social, and governance (ESG) investment strategies help investors identify industry leaders and avoid high-risk companies. Additionally, investors see value in engaging the emissions heavy companies they own, moving them to decarbonize as a means of mitigating climate risk. As a result, investor engagements with utilities are increasing in number and scope. These engagements seek to mitigate risk and capture opportunity at the individual company level, while helping minimize climate impacts at a portfolio level in the medium to long term. Climate

Action 100+ (CA100+) is a global investor coalition with over \$41 trillion in assets under management that engages 161 companies across all sectors (including utilities – 11 of which are in the U.S., see Table 3) to reduce

AEP Company, Inc.	The AES Corporation	Dominion Energy, Inc.
Duke Energy Corporation	Exelon Corporation	Firstenergy Corp.
Nextera Energy, Inc.	NRG Energy, Inc.	PPL Corporation
The Southern Company	Vistra Energy Corp.	WEC Energy Group, Inc.
Xcel Energy, Inc.		

Table 3: Climate Action 100+ U.S. Power Utilities¹⁷⁶

173. “Old-School ‘Mindset and Culture’ is Sidelining Traditional Utility Companies in Global Transition to Renewables,” *IEEFA*, 19 Sept. 2017, ieefa.org/outdated-mindset-culture-sidelining-traditional-utility-companies-global-transition-renewables.

174. Barba, Alisa, “Inside Energy Reads: What Happened to NRG Energy?” *Inside Energy*, 7 Mar. 2016, insideenergy.org/2016/03/07/inside-energy-reads-what-happened-to-nrg-energy.

175. Keaveney, Bob, “The Energy Industry is Changing Fast, and Most Utilities Aren’t Ready,” *BizTech*, 14 Mar. 2019, biztechmagazine.com/article/2019/03/energy-industry-changing-fast-and-most-utilities-arent-ready.

176. “Focus List of Companies,” *Climate Action 100+*, climateaction100.wordpress.com/companies. Accessed 31 Jan. 2020.

emissions in line with the Paris Agreement’s goal of limiting global temperature rise to well below 2°C.^{177,178} Significantly, BlackRock recently joined the coalition—a move that came less than a year after the firm published a whitepaper describing that climate risks have been underpriced, especially for utilities.¹⁷⁹ The Climate Majority Project, which launched in February 2019 with investors representing \$1.8 trillion in assets under management, is asking the top 20 investor owned utilities (IOUs) in the U.S. to set a goal of reaching net-zero emissions by 2050.¹⁸⁰

INVESTOR ACTION: ENGAGING COMPANIES TO ADDRESS NATURAL GAS RISKS

Investors should consider a variety of avenues to address the natural gas infrastructure risks within the power utility sector. A critical step is to engage in dialogue with utility companies with significant gas assets. Investors can also join coalitions like Climate Action 100+ and the Climate Majority Project to participate in ongoing related dialogues and initiatives.

When evaluating portfolio companies, investors require clear information to adequately assess whether a utility has articulated a Paris-aligned transition pathway, and whether its gas-related plans are consistent with that pathway. Investors should seek information that is critical to understanding progress in this arena. Such information includes:

- **Targets:** Has the company set greenhouse gas emission reduction targets in line with the Paris Agreement (net-zero by 2050)? Has it provided short- and medium-term targets? Do targets apply to all segments of its business (include gas-reliant subsidiaries) and are those emissions reported separately? Is the company taking responsibility for its Scope 1-3 emissions (including downstream product and upstream supplier emissions) in its targets and reporting in accordance with the GHG Protocol?¹⁸¹
- **Planning:** Does the company disclose transition plans for achieving its decarbonization targets? Is the company incorporating emission reduction targets into future planning projections?
- **Proactive Innovation:** Is the company investing in innovative solutions to facilitate decarbonization (renewables, storage, energy efficiency, demand response, electrification, CCS, next generation nuclear, hydrogen)?
- **Energy Source Assumptions:** Does the company have a transparent integrated resource planning process and is it using reasonable planning models? Does the company disclose reasonable assumptions for clean energy resources and the services they provide to ensure an unbiased field for resource decisions? Is it considering demand-side/efficiency resources as potential supply?
- **Gas Assumptions:** If the company views natural gas use as compatible with a Paris-aligned energy transition, what assumptions regarding pricing, depreciation timelines, supply chain methane leakage, and CCS factor into that view? Is the company disclosing a unit-by-unit cost/benefit economic analyses on early retirement scenarios for fossil fuel assets? If the company is proposing a future mix of Renewable Natural Gas (RNG) or hydrogen, what assumptions does it provide regarding the source, associated costs, climate impacts, and timeline?

177. “Global Investors Driving Business Transition,” *Climate Action 100+*, climateaction100.wordpress.com/. Accessed 31 Jan 2020.

178. Koning Beals, Rachel, “World’s largest asset manager BlackRock joins \$41 trillion climate-change investing pact” *MarketWatch*, 14 Jan. 2020, www.marketwatch.com/story/worlds-largest-asset-manager-blackrock-joins-41-trillion-climate-change-investing-pact-2020-01-09.

179. Schulten, Ashley, et al., “Getting Physical,” *Blackrock Investment Institute*, April 2019, www.blackrock.com/us/individual/literature/whitepaper/bii-physical-climate-risks-april-2019.pdf.

180. “Global Investors Launch Initiative to Wipe Out Carbon Pollution at Country’s Largest Power Utilities,” *NYC Comptroller*, 28 Feb. 2019, static1.squarespace.com/static/5c33155fec4eb7e2b8479aeb/t/5c77fdbb419202f2b7655a32/1551367612407/net-zero-release.pdf.

181. “Corporate Value Chain (Scope 3) Accounting and Reporting Standard,” *World Resources Institute*, September 2011, ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf. Accessed 31 Jan 2020.

182. “Investor-Owned Utility Securitization (IOU): ROC / RRB Ratepayer-Backed Bonds For Grid Modernization, Coal Plant Retirement, Transition

- **Stakeholder Engagement:** Does the company have a process for facilitating active communication with and consideration of community members and labor groups affected by the energy transition?
- **Lobbying:** Is the company aligning its lobbying and political support with climate stabilization goals? Is the company demonstrating support for policy that would help it cost-effectively achieve decarbonization goals such as securitization, electrification, and performance-based regulation? Is the Company lobbying against local, state, or federal decarbonization efforts?
- **Governance:** Is the company instituting new governance measures to align with decarbonization targets such as tying executive compensation to targets and specifying board director responsibility for climate mitigation?

INVESTOR ACTION: USING THE INVESTOR VOICE TO INFORM SOUND POLICY



Beyond individual company engagements, investors should be aware of and support emerging policies that will expedite a managed transition from natural gas dependence to clean-energy generation technologies. These policies can help protect investor portfolios in the medium to long term by ensuring industry laggards are properly incentivized to transition away from counterproductive technologies and investments. Such policies include:

- **Financial transition policy** such as securitization can aid in retiring uneconomic fossil fuel assets early through providing ratepayer backed bonds to recoup the remaining depreciation on fossil fuel assets. Investments in new clean-energy generation can then be made to replace retired fossil generation providing lower rates for customers, healthy returns for utility investors, and managing climate risks.^{182,183}
- **Utility business model transformation policy** such as performance-based regulation can aid in reorienting profits and incentives toward broader societal goals like reliability, efficiency, customer engagement, and emissions reductions.¹⁸⁴ This can also enable the development of utility business models that promote demand-side flexibility.

Assistance and More,” *Saber Partners*, saberpartners.com/rocbonds/. Accessed 31 Jan. 2020.

183. “Managing The Utility Financial Transition From Coal To Clean,” *Energy Innovation*, 7 Dec, 2018, energyinnovation.org/publication/managing-the-utility-financial-transition-from-coal-to-clean-2/.

184. “Going Deep on Performance-Based Regulation,” *Energy Innovation*, energyinnovation.org/resources/project-series/going-deep-performance-based-regulation. Accessed 31 Jan. 2020.

185. “Investors Support Green New Deal’s Call for Climate Action,” *As You Sow*, 11 Apr. 2019,

Investors can support these policies and other related regulatory actions by participating in local and national policy arenas. Steps investors can take include:

- **Engage with state regulators and utility commissioners** on the importance of achieving net-zero emissions by 2050. Discuss risk to the economy and to investors, in addition to the local benefits of the clean energy transition including economic development and ratepayer savings. Also discuss support for legislation that would help facilitate the energy transition.
- **Support innovation** by advocating for federal and state research and development on next generation demand response, electrification, and future low-carbon technologies that help provide firm power.
- **Participate in utility-focused forums** such as the National Association of Regulatory Utility Commissioners (NARUC) events.
- **Write or sign onto letters of support for climate-mitigating energy policy** at local, state, and national levels. For example, a group of investors representing over \$60 billion in assets signed onto a letter of support for the principles of a Green New Deal in 2019.¹⁸⁵

6. CONCLUSION

Given its significant and growing portion of greenhouse gas emissions, reducing natural gas dependence in line with what is needed to achieve net-zero emissions by 2050 is one of the most critical actions the energy sector can take. This will contribute to stabilizing global climate change and avoiding its worst impacts. Emissions from natural gas demand an immediate, proactive response from the utilities responsible for their climate-related risks. Integrating climate-forward planning will help utilities avoid costly investments and associated asset-stranding risks, while ensuring their business models evolve to take advantage of the unfolding clean energy transition.

This report is designed to raise awareness of the complex risks and opportunities that utilities face regarding natural gas, as well as the implications for investors. A lack of information as to how natural gas assets and investments align with emission reduction goals has made it challenging for investors to obtain a clear sense of whether utilities are sufficiently addressing such concerns. More comprehensive disclosures and action in the areas described in this report will enhance understanding and accountability in this evolving field. Moving forward, investors should continue to engage companies to ensure natural gas risks are adequately managed. Utility companies that make meaningful progress in this area and publicly communicate their actions will be well-positioned to lead and thrive through the low-carbon energy transition underway.

www.asyousow.org/press-releases/investors-support-green-new-deal-climate-action.

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