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STOVE WARS—IS NATURAL GAS PART OF THE PROBLEM OR PART OF THE SOLUTION?

Natural gas, once a nuisance by-product of oil and coal production, has emerged over the past decade as arguably the world's most critically important source of energy. Natural gas has become the largest single source of U.S. energy production, and the second largest source of energy for all end uses. Gas supplied nearly 40% of U.S. electricity production in 2022 and is essential to major industries, including petrochemicals and agriculture. The Russia-Ukraine war has also highlighted the growing importance of gas globally, driving the U.S. to lead the world in exporting liquefied natural gas or LNG. Yet the natural gas industry today seems to be battling for its long-term survival. Why?

We believe natural gas suffers a big perception problem, and perhaps a bit of an identity crisis. About a decade ago, natural gas was called a "bridge fuel" by President Barack Obama, part of an all-of-the-above path to a lower carbon future. The industry embraced this notion, and substitution of natural gas for coal in power generation drove the lion's share of an 18% decline in U.S. CO2 emissions since their 2005–2007 peak. Shale abundance also turned the U.S. into the world's largest gas producer, setting the stage for the LNG exports that averted a major European energy crisis a decade later. Yet, the other side of the "bridge" is looking less familiar.

> "Natural gas—if extracted safely, it's the **bridge fuel** that can power our economy with less of the carbon pollution that causes climate change."
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> *—President Barack Obama, State of the Union address, 2014*

Having largely (but by no means fully) vanquished coal, fossil fuel opponents have set their sights on gas, which is now seen by some not as a bridge but as an environmental scourge. Activists have waged an aggressive (and largely successful) campaign to block the development of new gas infrastructure. Some militant opponents even encourage physical attacks on pipelines in the name of climate activism. Environmental advocates who do acknowledge the positive attributes of natural gas hasten to point out that those benefits are negated by fugitive release of methane (CH4). Natural gas is mostly methane, a colorless, odorless gas that is emitted by decomposing organic matter (think fossils), giving rise to the word "natural" in the name.

Instead of Being Seen as the Problem…

When burned, natural gas emits about half the CO2 of a thermally equivalent use of coal. However, methane that's released *unburned* into the atmosphere is a far more (by some estimates over 80 times) potent heat-trapping greenhouse gas than CO2. This is not lost on gas opponents, who use terms such as "fracked gas," "fossil gas," or methane instead of "natural" to intensify their narrative. While many gas utilities and pipelines are actively driving down their rates of gas leakage, the gas industry from wellhead to burner still "vents" a lot of unburned gas, or simply flares unwanted gas without putting it to any useful purpose. Those actions attract headlines and undermine the perceived value and positive attributes of gas, fuel the opposition arguments, and arguably enable a public narrative that natural gas is a big environmental and climate problem.

…Wouldn't It Be Better to Be Part of the Solution?

It doesn't have to be this way. If methane emissions are a key objection to natural gas use, the industry should accept and embrace that challenge. Gas distribution utilities and pipelines increasingly point out that replacing aging pipe is not just about safety, but about methane mitigation as well. As large buyers of gas, utilities (gas and electric) are arguably also well-positioned to pressure upstream gas producers to address their own methane emissions, limiting venting and flaring and potentially leveraging blockchain technology to verify responsibly sourced gas supply, something that gas-importing nations and some investors are starting to demand. Many gas utilities have also begun capturing waste methane from other non-energy sources such as agriculture and landfills, curtailing those methane releases and beneficially repurposing waste streams as renewable natural gas (RNG).

Contemplating a Different Future

For decades, gas utilities have grown by investing capital in rate base, driving earnings and dividend growth to investors, and spreading the cost of capital investments over an ever-increasing number of customers, keeping bill inflation in check. That virtuous cycle required not only steady growth in natural gas usage, but also a steady stream of new gas customer connections, which drive less volume-sensitive streams of revenue. The industry's instinctive reaction to calls for limiting or eliminating new gas hookups has been to defend the gas stove, which has oddly become a culture war icon.

California, New York, and Washington have been the most aggressive states seeking to limit or eliminate natural gas in newly constructed buildings and requiring the substitution of electricity for cooking and heating. The first of those local efforts, in Berkeley, California, was just struck down by the Ninth U.S. Circuit Court for encroaching on federal turf. Some 20 states have also legislatively pre-empted so-called

"gas bans" by local authorities. Yet the proposed gas bans would only apply to new construction—there wouldn't be black helicopters popping into backyards to nab the stove. And the Ninth Circuit's ruling suggests that the bans could take years to play out.

The stove saga makes us wonder whether new hookups are really the gas industry's only path to the future. Gas use for residential and commercial cooking and heating has been flat to declining since the 1990s due to efficiency gains, while electric power generation has rather ironically emerged as the largest use of U.S. natural gas over the past decade. Despite significant political efforts to phase out its usage, New York and California both remain highly dependent on natural gas for the production of the electricity that's supposed to replace it—meaning that for the time being, electrification is often "gas by wire," with up to half or more of the original energy lost in conversion to electricity and higher emissions than if the gas had simply been used to provide the heat directly.

Over time, renewable electricity production and battery storage are all but certain to meet a growing share of electricity supply, and demand growth will accelerate, especially with electric vehicle and heat pump adoption. Electricity grids are already showing vulnerability to weather, as well as the variability of renewable generation, with sales of relatively inefficient and often high-emitting backup generators rising substantially over the past five years. Electricity bills are also rising, and the massive investment needed for full electrification will add substantial upward pressure, even if growing demand spreads the per-unit cost over a larger base.

Electric Reliability: The Gas Industry's Unrecognized Value

The natural gas system has proven both reliable and resilient through recent extreme weather challenges. In February 2021, homes and businesses equipped with on-site backup power generation (more than likely fueled with natural gas) were able to continue functioning as very few natural gas service interruptions were experienced. Loss of natural-gas-fired power generation, particularly in Texas, was the result of power plants being unable to run in extreme cold, or due to a lack of electricity at some gas compressor stations improperly designated as "non-critical" loads (!) during rotating blackouts. Being underground, the gas system is protected from weather, and the ability to store natural gas gives the system tremendous ability to respond quickly to changing demand—including the ability to fast-ramp peak electricity production as renewable production fluctuates.

Reliable and resilient energy is essential to a civilized society and functioning economy. The gas system's role in ensuring reliability is only likely to grow with electrification, even if gas volumes decline over time

as wind, solar, and battery storage gain share. Electrification that relies on electricity storage and grid expansion to fully eliminate natural gas would likely prove extremely expensive given the short duration of peak electrical loads and the associated high per-unit cost to build new infrastructure that would go unutilized most of the time. A study by the Clean Air Task Force concluded that fully electrifying California by replacing dispatchable nuclear and gas generation with renewables and batteries could cost in the trillions of dollars and multiply the cost of electricity by nearly 30 times.

The gas pipeline and distribution network plays a critical role in balancing the intermittency of renewable power sources, and has the distinct logistical and cost advantage of already being built. However, gas infrastructure is not currently compensated for the value of the reliability it provides. Devising a regulatory compensation scheme to pay the gas system for its critical role in ensuring reliability (including being there for backup generators) would preserve its ability to keep doing just that, provide a new stream of less volume-driven revenue, and preserve the option to incorporate less carbon-intensive fuels such as hydrogen and RNG. Incorporating gas infrastructure alongside new electric transmission, distributed generation, and electricity storage could further the goal of electrification on more economic terms.

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At a more micro scale, the gas system could be leveraged to deploy distributed power generation such as rooftop solar more widely, as well as to advance energy efficiency goals through combined heat and power (CHP), which uses natural gas to produce both electricity and thermal energy (heating or cooling). CHP would integrate the storage and flexible ramping capabilities of natural gas with the inherent reliability of point-of-use energy production that is less susceptible to weather-driven interruption. Commercial CHP could also potentially be linked with carbon capture, use, and storage.

The U.S. natural gas industry is rightfully concerned over efforts to legislate it out of existence. But it also needs to come to terms with the fact that alternative heating and cooking technologies are here to stay, and consumers will embrace them if they offer a better, more economical solution (e.g., electric vehicles). Electricity use will rise, but we believe its dependence on natural gas is likely to remain.

New gas infrastructure is nearly impossible to build today, giving the existing gas system tremendous incumbency value and high barriers to entry. Electrification may chip away at heating and appliances in the residential and commercial customer segments, but the future of natural gas is less about warm cookies and fluffy towels than it is about preserving the provision and delivery of reliable, clean, safe, and affordable energy—even if that energy is electric. The inherent reliability of natural gas infrastructure, a symbiotic counterpart to the variability of renewable energy, makes it a logical partner in a transition to a greater role of electricity in everything from comfort to transportation. The highly efficient and resilient natural gas system is already built and impossible to replicate. The natural gas industry needs to frame its message in these terms and focus its attention on incremental business opportunities.

Specifically, the industry should consider the following strategies:

1) **Look past the stove bans.** Gas bans always will face practical implementation challenges, and a San Francisco court just threw them a major roadblock. That won't silence the gas stove critics, but it likely slows their advance. Meanwhile, the gas industry's efforts and resources would be better spent on crafting a good offense.

2) **Double down on methane leakage abatement,** and apply economic pressure to suppliers to address their own emissions. Every headline about a methane plume is bad news for the entire industry. Meanwhile, the EPA's efforts to regulate methane emissions continue to advance; utilities would do well to stay ahead of this and align business strategy with public policy.

3) **Embrace the emergent role of natural gas** as an enabler of carbon-free renewable electricity generation. Look for ways to further leverage that role in smaller-scale applications such as commercial building CHP applications and microgrids (which often include solar and battery electricity storage as well) to achieve enhanced reliability, energy conversion efficiency, and reduced emissions of all kinds.

4) **Work with regulators, customers, and the electricity industry** to decouple gas industry compensation from new customer hookups in favor of its critical role in ensuring reliability, maximizing use of infrastructure that already exists, and delivering clean, reliable, and affordable energy. Embrace targeted, incentive- and performance-based ratemaking as an adjunct to (not a replacement for) traditional cost-of-service methodology.

5) **Focus attention on emerging technologies** (and attendant subsidies) that address greenhouse gas emissions, including carbon capture, alternative combustion technologies (e.g., Allam cycle generation), and blending/substitution of carbon-free or carbon-negative fuels.

By executing these strategies, natural gas companies can move away from being perceived as part of the problem and actually become part of the solution.

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