America's Electricity Affordability and Reliability Crisis

A More Expensive and Less Reliable Power Supply

Questions over power grid reliability and electricity affordability are coming to a head. The fuel diversity and fuel security that have long anchored the nation's electricity mix are rapidly disappearing, creating grave consequences for the stability of the nation's power supply. Our overreliance on just-in-time fuel delivery and an oversubscribed natural gas pipeline system, in addition to a pivot from fuel-secure on-demand power to intermittent renewable generation, is stressing the grid in ways that reliability experts and utilities are only beginning to understand. We are pivoting away from coal generation and the balance it provides to the nation's fuel mix more quickly than we are adding affordable, reliable alternatives.

While energy inflation began in 2022 as an oil and gasoline story, it's transformed into soaring electricity and natural gas costs for homeowners and businesses. The shale gas glut that had shaped the U.S. energy equation for a decade is now over. Natural gas prices have soared over the past year, even reaching 14-year highs this summer. American consumers are increasingly stuck paying these far higher prices without, or with severely reduced, dispatchable fuel diversity on many of the nation's regional electricity grids. Coal plant retirements have robbed consumers of a long-standing price buffer to natural gas price volatility.

While U.S. natural gas production is rising, demand continues to outpace supply. The emergence of the U.S. as the world's largest liquified natural gas (LNG) exporter is proving critical to our allies in Europe who are trying to pivot away from Russian energy. At the same time, it has also exposed a once isolated U.S. natural gas market to the pressures of sky-high prices overseas.

Renewable energy supporters point to solar and wind power as an answer to meeting this energy challenge, but the move to variable power raises more questions than it does answers. The costs and challenges of integrating renewable sources of power are growing, not decreasing. With U.S. electricity demand poised to jump, affordability and grid reliability are increasingly resting on shaky ground. The recent disasters in California and Texas, warnings from regional grid operators and regulators, and the ongoing energy crisis in Europe all suggest an immediate need for an energy policy course correction.

Energy Affordability Concerns Are Up

According to polling from Morning Consult, nearly 90% of Americans are worried about rising electricity prices, with 65% very concerned. This trepidation cuts across party lines. In fact, facing the threat of rising prices, warnings of eroding grid reliability, and the potential for blackouts, approximately 76% of voters, as of June of 2022, supported government action to prevent the premature closure of traditional power plants before replacement generating capacity is built and functional.

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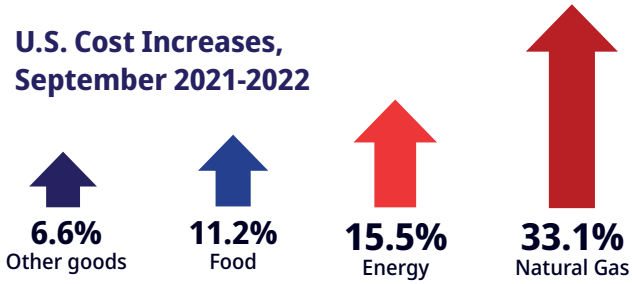
> ***– Morning Consult poll***

Energy-driven inflation, reaching 8.2% in September, is upending the economy and placing a heavy burden on American consumers who can least afford it. According to the Bureau of Labor Statistics' Consumer Price Index, the cost of food is up 11.2% over the 12 months ending in September 2022 with the cost of all other goods, less food and energy, up 6.6%. The cost of electricity is up 15.5%, the largest 12-month increase in 40 years, and the cost of natural gas is up a staggering 33.1%.



Bureau of Labor Statistics' Consumer Price Index

According to U.S. Energy Information Administration (EIA) analysis, nearly a third of American homes struggle to meet energy needs, with 7 million American households reporting occasions when they have been unable to use heating equipment for financial reasons. This pain is particularly acute for elderly and minority populations.

Dispatchable Fuel Diversity Underpins Affordability

A lack of energy diversity leads to fuel shortages during spikes in demand, causing massive price increases and higher potential for disastrous power outages. With demand for energy showing a steep upward curve in the next few decades, the problem will grow more pernicious over the long-term. Failure to address this lack of fuel diversity is not an option. It must be prioritized with an urgency that rises above political or ideological agendas.

Rising natural gas prices are driving up home heating and electricity prices across the country. EIA projects that by 2023, electricity prices will rise to 16% above where they were in 2020. "Higher retail electricity prices largely reflect an increase in wholesale power prices driven by rising natural gas prices," the agency said.

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> ***– U.S. Energy Information Administration***

"These are very high prices and will not be affordable for many households," Mark Wolfe, executive director of the National Energy Assistance Directors Association (NEADA), told Utility Dive. In August of 2022, NEADA released data showing U.S. families have about $16 billion in utility debt, up from $8.1 billion at the end of 2019. The average amount owed rose from about $403 to $792, the group said.

The EIA has warned that a colder than expected winter this year could result in a 50% hike in bills for homes heating with natural gas. In states most dependent on natural gas for electricity generation, electricity rate increases are even higher. According to reporting from E&E News, "wholesale power prices in New England and New York, which have effectively eliminated coal generation and lack large renewable fleets, are expected to increase this year by 96% and 124%, respectively."

Northeastern Electricity Price Increases Expected in 2022

96%↑
expected increase in New England

124%↑
expected increase in New York

Gas to coal switching will be limited this year. Already constrained by forced coal plant retirements that have closed nearly half the fleet in a decade, the remaining fleet is facing logistical challenges that have hampered coal delivery. Utilities remain focused on building up coal stocks for the winter rather than ramping up coal generation. However, it's clear that in regions of the country where coal continues to have a significant presence, dispatchable fuel diversity can be an important hedge against higher natural gas prices; that was certainly true in 2021.

In June of 2021, with natural gas prices steadily rising, coal generation on the PJM grid, the nation's largest, hit a three-year high. Coal demand on the Midcontinent Independent System Operator (MISO) grid rose 37% and 42% in Southwest Power Pool (SPP) territory. When demand spiked on some of the hottest days of the year, (e.g., August 13), the importance of the coal fleet was on full display. On the PJM and SPP grids, coal provided about 33% and 50% of the generation, respectively. On the MISO grid, which covers most of the Midwest, coal provided more than half of the generation, totaling nearly 41 GW of power.

Fuel diversity proves again to be the key to a secure, reliable, and affordable supply of power. According to a study from IHS Markit in 2017, the nation's diverse mix of resources lowered the cost of electricity production by around $114 billion per year and reduced the variability of monthly consumer electricity bills by around 22%. Since the completion of that study, much of that fuel diversity is now gone while natural gas price volatility has made a troubling reappearance.

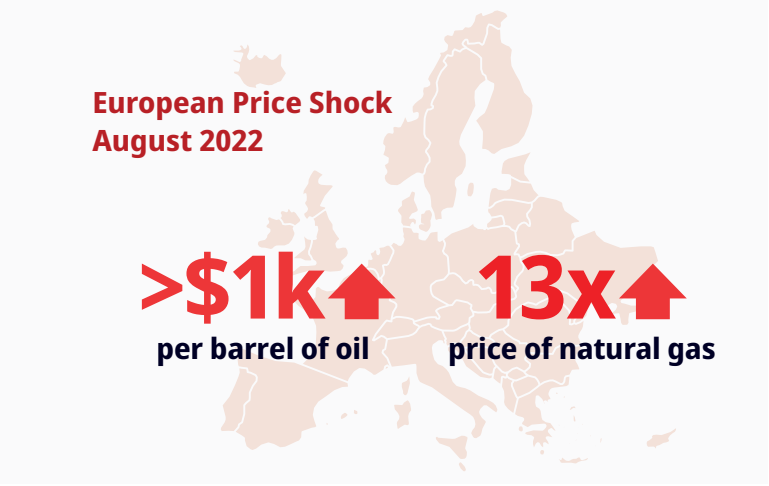
$16 billion
The amount of utility debt U.S. families currently hold, up from $8.1 billion in 2021.

Lack of Fuel Diversity in Europe: The Example NOT to Follow

The European energy crisis is a product of failed policy. It dismantled fuel diversity while speeding to a renewable energy future alongside an increasingly volatile and insecure natural gas market. Driven by soaring natural gas prices and the unfortunate unavailability of renewable power at key moments, European electricity prices have soared, derailing energy-intensive industry and placing extraordinary costs on consumers. In the 4th quarter of 2021, the International Energy Agency reported that average European wholesale prices were more than four times their 2015-2020 average.

In August of 2022, European power prices hit levels equivalent to more than $1,000 per barrel of oil, with the price of natural gas 13 times its normal seasonal price.

Despite robust government assistance to curb price hikes, including bailouts for utilities reaching into the tens of billions of dollars, and even temperature caps on heating this winter, Europeans are facing extraordinary energy price increases that have pushed millions into energy poverty. Before a sweeping plan to cap consumer price increases, Britain, for example, was expecting annual electricity and natural gas bills to exceed £4,000 ($4,820) in January of 2023, and £5,000 ($6,000) later in the spring, up from about £2,000 ($2,400) currently.



Britain's National Health Service warned of a "humanitarian crisis" from the surge in prices. Even with extraordinary government intervention, electricity and gas rationing, and even blackouts, remain a possibility. European governments have scrambled to bring coal capacity back online with France, Italy, Austria, Britain, and the Netherlands all announcing plans to reactivate shuttered coal power plants. Germany is allowing 21 coal plants to restart or work past planned closing dates and is prioritizing coal trains over passenger traffic to ensure plants can get the fuel they need. This 11th-hour scramble, however, may still be too little, too late.

By closing coal and nuclear power capacity, Europe disassembled its own fuel diversity, leaving itself alarmingly dependent on Russian natural gas, a constrained liquified natural gas market, and weather-dependent power from renewables. The result is an economic catastrophe with Fatih Birol, head of the International Energy Agency, warning that the current energy crisis is bigger than the oil crises of the 1970s and 1980s: "Now we have an oil crisis, a gas crisis and an electricity crisis at the same time."

U.S. Grid Reliability is Deteriorating

The North American Electricity Reliability Corporation (NERC) concluded 2021 with a long-term reliability assessment warning that capacity retirements and the rapid remaking of the grid will pose significant challenges to grid reliability over the next decade. NERC's assessment came just weeks after a winter reliability preview that predicted that grids across the country could face the threat of blackouts from a prolonged deep winter freeze. These warnings from NERC come in the wake of grid catastrophe in Texas in February of 2021, rolling blackouts in California, and deeply troubling reliability assessments from grid operators stretching from New England and New York to the Southwest.

NERC expressed particular concern over fuel assurance and the need for operators to have "adequate dispatchable, fuel-assured, and weatherized generation, at their disposal." Furthermore, NERC recommended developing polices that "maintain a sustainable and diverse generation mix."

If NERC's reliability assessment sounds like a direct response to the grid catastrophe in Texas that left millions of households without heat and power, took hundreds of lives, and inflicted tens-of-billions in economic damage, it should come as no surprise. NERC's concern over maintaining a diverse, fuel-assured, and winterized electricity mix is borne out of lessons learned from the disaster in Texas. NERC's Director of Reliability Assessments and System Analysis, John Moura, told reporters that the energy crises in California and Texas "should serve as a wake-up call for the rest of the country." Analysis of that grid failure found that while no fuel source came out of the crisis without challenges, the natural gas system performed particularly poorly.

NERC's concern for the grid has only heightened over the course of 2022. After NERC released its 2022 Summer Reliability Assessment, which contained "unprecedented" warnings for grids across the country, Moura said, "It's a pretty sobering report, and it's clear the risks are spreading." He added, "And while we've initiated action on a number of fronts and sounded the alarm bells for many years, there's clear, objective, conclusive data indicating that the pace of our great transformation is a bit out of sync with the underlying realities and the physics of the system."

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> *- John Moura, NERC's Director of Reliability Assessments and System Analysis*

The Challenge Beyond Texas

ISO New England, the region's grid operator, has been warning for years of fuel security challenges and market failures to address escalating reliability concerns. New England closed almost all its coal generating capacity and finds itself overly reliant on natural gas and an oversubscribed pipeline network for power generation and home heating. ISO New England has warned that a bitterly cold winter could force rolling blackouts for lack of available power supply. Given the correlation between bitter cold spells, hypothermia, and death, this is an unsettling prospect that the nation's most vulnerable will not have electricity or heat when it is most critically needed.

The New York Independent System Operator (NYISO) is telling a similarly alarming story about rapidly eroding reserve margins and fuel insecurity. Zach Smith, NYISO's VP of System & Resource Planning, warned, "our reliability margins are thinning to concerning levels beginning in 2023. We have to move carefully with the grid in transition in order to maintain reliability and avoid the kind of problems we've seen in other parts of the U.S."

Further west, the situation is even worse. The Western Electricity Coordinating Council (WECC) warned when entering summer 2021, the West didn't have the generating reserves to handle a region-wide period of high demand where a heat wave, coupled with drought, could leave states at risk of blackouts for days, or even months. WECC noted that not a single one of its subregions generates enough power to provide sufficient supply during periods of high demand; every region relies on imports to fill the gaps and avoid blackouts. The threat of insufficient capacity region-wide with no reserves to call upon is a new, alarming reality, and California's rolling blackouts in the summer of 2020 appear to be a preview of what could lie ahead for multiple western states.

For weeks this past summer, California survived on a mix of good luck and pleas for consumers to reduce power demand to avoid more blackouts. Once again, continual increases in energy demand threatened to exceed the available supply of power.

Reinforcing Reliability and Maintaining Affordability

The common thread between grid warnings and soaring prices across the U.S. and the ongoing energy crisis in Europe is the loss of dispatchable fuel diversity and the fuel security it underpins. The ongoing loss of coal and nuclear power capacity, without the addition of reliable, secure alternatives, is a mistake U.S. energy policymakers must avoid.

Overreliance on natural gas and just-in-time fuel delivery as an energy transition bridge is proving a grave vulnerability. Fuel security challenges are becoming fuel security crises. Rising U.S. natural gas prices and the return of natural gas price volatility are leaving consumers painfully exposed to rate hikes. Dispatchable fuel diversity and fuel security are the bedrock of electricity reliability and affordability, they will require careful attention in the years ahead.

During the Texas grid crisis...

45 GIGAWATTS
of electricity fell offline, resulting in...

4 MILLION
Texas households without power and heat.

HUNDREDS
of lives lost.

BILLIONS of dollars
in economic damages.

Principles for a Policy Reset

Prioritize Dispatchable Fuel Diversity: Regulators, utilities, and policymakers at the state and federal levels should act with urgency to reshape power markets or provide the necessary incentives to better value a diverse, fuel-assured generating mix that can shield consumers from fuel price volatility. For 30 years, the U.S. has pursued a policy of prioritizing development of renewable electricity generation. Those technologies are no longer developing, and the U.S. needs to reshape tax policy to respond to the electricity reliability demands of today.

Expand Reserve Margins: Capacity reserve margins have been shrinking across the country when the complexities of adding variable power to the generating mix call for expanding this insurance buffer, not reducing it.

Value Fuel Security: In grids across the country, the fuel security provided by coal and nuclear generating capacity is taken for granted and market mechanisms either don't exist or are inadequate to maintain fuel assurance. Efforts should be made to reshape capacity markets to better value fuel-secure generation from existing generating capacity.

Recognize Technology and Infrastructure Limitations: Renewable mandates are accelerating despite deep concerns over the loss of coal capacity, the speed at which new interstate transmission infrastructure can be completed, and long duration energy storage can be brought to market. Renewable energy mandates are out-of-sync with technology and grid reality.

Provide Additions, Not Replacements: With increasing power demands and reliability concerns already approaching a tipping point, competitive renewable energy additions should work alongside the nation's existing generating fleet, not in place of it.

Sources: U.S. Census Bureau; U.S. Bureau of Labor Statistics; Morning Consult; The Wall Street Journal; Bank of America Corp.; Maine Public Utilities Commission; Central Hudson Gas & Electric Corp.; Florida Power & Light Company; North American Electricity Reliability Corporation (NERC); Utility Dive; Argus.

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