Fossil Fuel–Driven Price Volatility Demonstrates the Need for a Renewable Transition

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Introduction

Over the last two years, fossil fuel and energy prices contributed to a 40-year high in inflation in the United States. At its peak in June 2022, US annual inflation reached 9.1 percent—and a third of that inflation came from energy prices. This sparked a new conversation about the causes of inflation, and the inadequacy of monetary policy tools alone to manage price stability.

In our May 2022 brief, "Energy Price Stability: The Peril of Fossil Fuels and the Promise of Renewables," we argued that the inherent volatility of fossil fuel prices presents a persistent threat to macroeconomic price stability. Transitioning to more stable, electrified, renewable energy sources will not only help to slow climate change but will also facilitate long-term price stability. Furthermore, a well-managed, rapid divestment from fossil fuels is necessary to eliminate the inherent volatility in the energy sector. While gas tax holidays and strategic reserve releases may relieve consumers' pain from inflation in the short term, these are only stopgap measures that fail to address the structural deficiency at the root of inflation: dependence on fossil fuels.

Since the release of our original brief, in August 2022 the US Congress passed the Inflation Reduction Act (IRA), a $369 billion investment in clean energy tax credits and subsidies. The legislation is the largest investment the US has made toward a renewable transition, and it was negotiated as a response to prolonged high inflation, marking a shift in both conventional thinking about inflation management and the urgency of the climate crisis. Government investment in a rapid transition to electrified, renewable energy is crucial infrastructure for future energy price stability, but building renewable energy will not be enough to eliminate price volatility related to energy prices without a simultaneous divestment from the use and production of fossil fuels.

Fossil Fuel Price Volatility Drives Inflation

Energy inflation, driven by fossil fuel price volatility, is a major factor in overall inflation. Energy is the fourth largest category of expenses for the average US household, comprising roughly 11 percent of expenditures. Utility and gasoline expenditures' relatively large weight in household consumption means that changes in fossil fuel prices are widely felt by consumers and contribute substantially to changes in the overall inflation rate. Furthermore, when fossil fuel prices change, they can lead to changes in the prices of other goods and services that rely on energy as an input, further contributing to economy-wide inflation. Economist Isabella Weber has found petroleum and coal products, as well as oil and gas extraction, to have the highest indirect impacts on inflation of any prices in the US economy, as their own price volatility drives up input costs and, therefore, prices in other sectors of the US economy. Weber defines these fossil fuel products as "systemically significant," because of their combined large direct and indirect effects on inflation.

Recent inflation highs and lows show the impact of fossil fuel price volatility on inflation. In our May 2022 brief, we illustrated the weighted contribution of monthly and annualized energy price inflation on the inflation rate.[1] Figure 1, below, provides an update on this analysis through September 2023. Historically, gasoline prices in particular exhibit regular fluctuation even on a monthly basis. These positive and negative price changes have a significant influence on the monthly inflation rate and, therefore, skew our understanding of inflation trends and macroeconomic conditions. In March and June 2022, for example, the US monthly inflation rate reached its highest levels simply because of gasoline price spikes in those months. On the other hand, monthly inflation from July 2022 to May 2023 significantly declined. This decline was not a result of declining inflation across the economy (represented by the "other" category in Figure 1), but because in over half of the months during this period gasoline prices declined, dragging the overall inflation rate down.

Figure 1: Gasoline Price Fluctuation Is a Significant Driver of Monthly Inflation

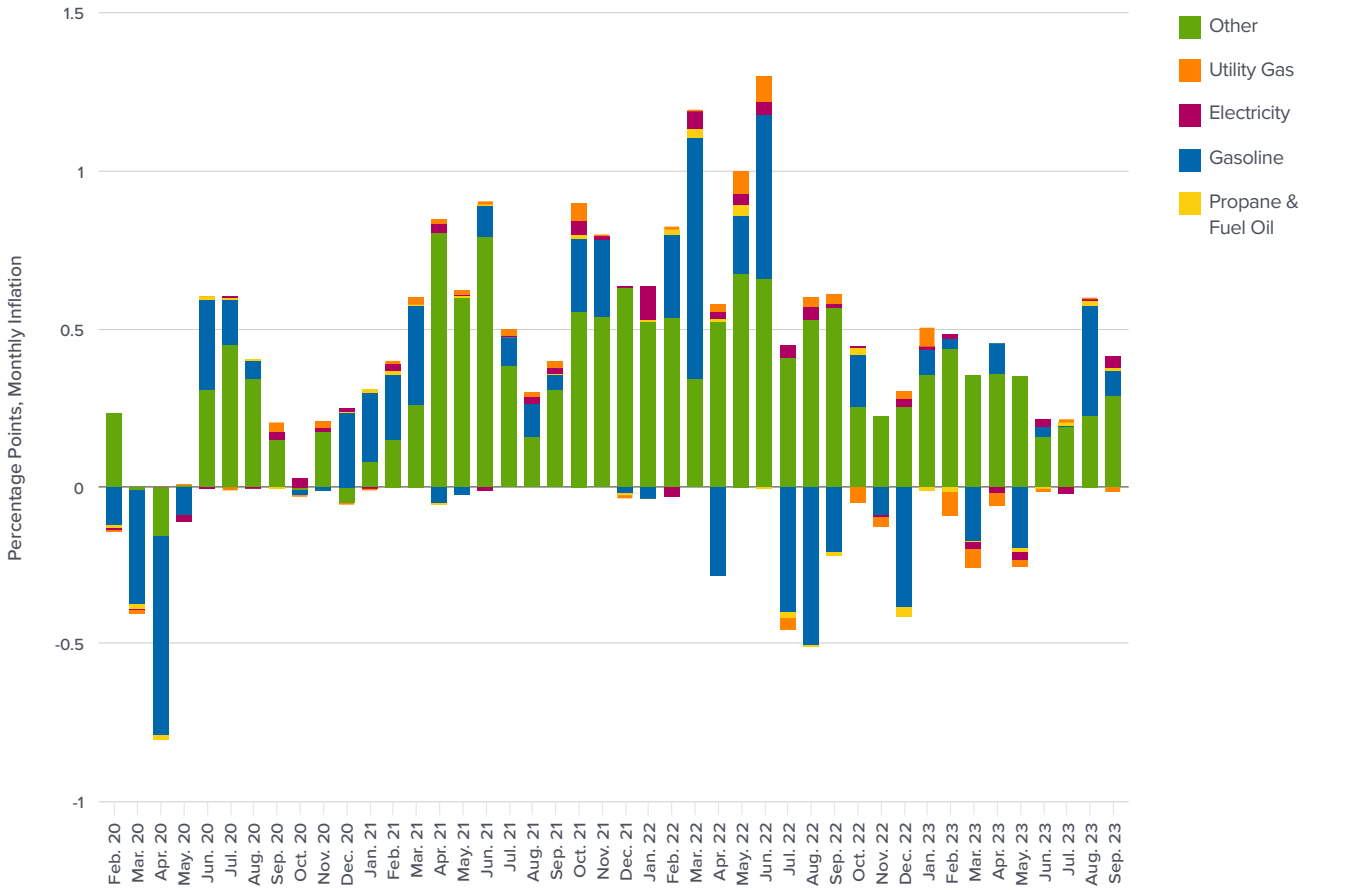

Figure 1 shows the monthly overall inflation rate of each month from 2020 to present. Each bar shows the contribution of four major energy goods and services to the monthly rate, as compared to other, non-energy goods and services. The "other" category comprises all other goods and services in the Consumer Price Index. A price change at the gas pump has a major impact on the rate of inflation. *Source: US Bureau of Labor Statistics, authors' analysis.*

US inflation has been steadily declining since June 2022; though inflation is coming down in general, energy prices have driven the volatile whiplash of overall inflation (see Figure 2, below). From June 2022 to May 2023, the inflation rate declined an average of 6 percent each month, while the weighted

1 See Figures 2 and 3 (pages 5 and 7) in "Energy Price Stability: The Peril of Fossil Fuels and The Promise Of Renewables," for our original analysis.

contribution of energy price inflation declined an average of 23 percent per month. Meanwhile, the weighted contribution of price inflation in all other goods and services (the "other" category) declined by an average of only 2 percent per month. During this period, energy price changes put significant downward pressure on the inflation rate. Had gasoline prices not declined during this period, the year-over-year inflation rate would have been higher in any given month. For example, when US inflation finally dropped to 4 percent in May 2023 (for the first time since April 2021), the inflation rate during that month would have actually been 5 percent had declining energy prices not put downward pressure on the overall inflation rate.

Figure 2: Energy Price Volatility Has Driven the Recent Decline in US Inflation

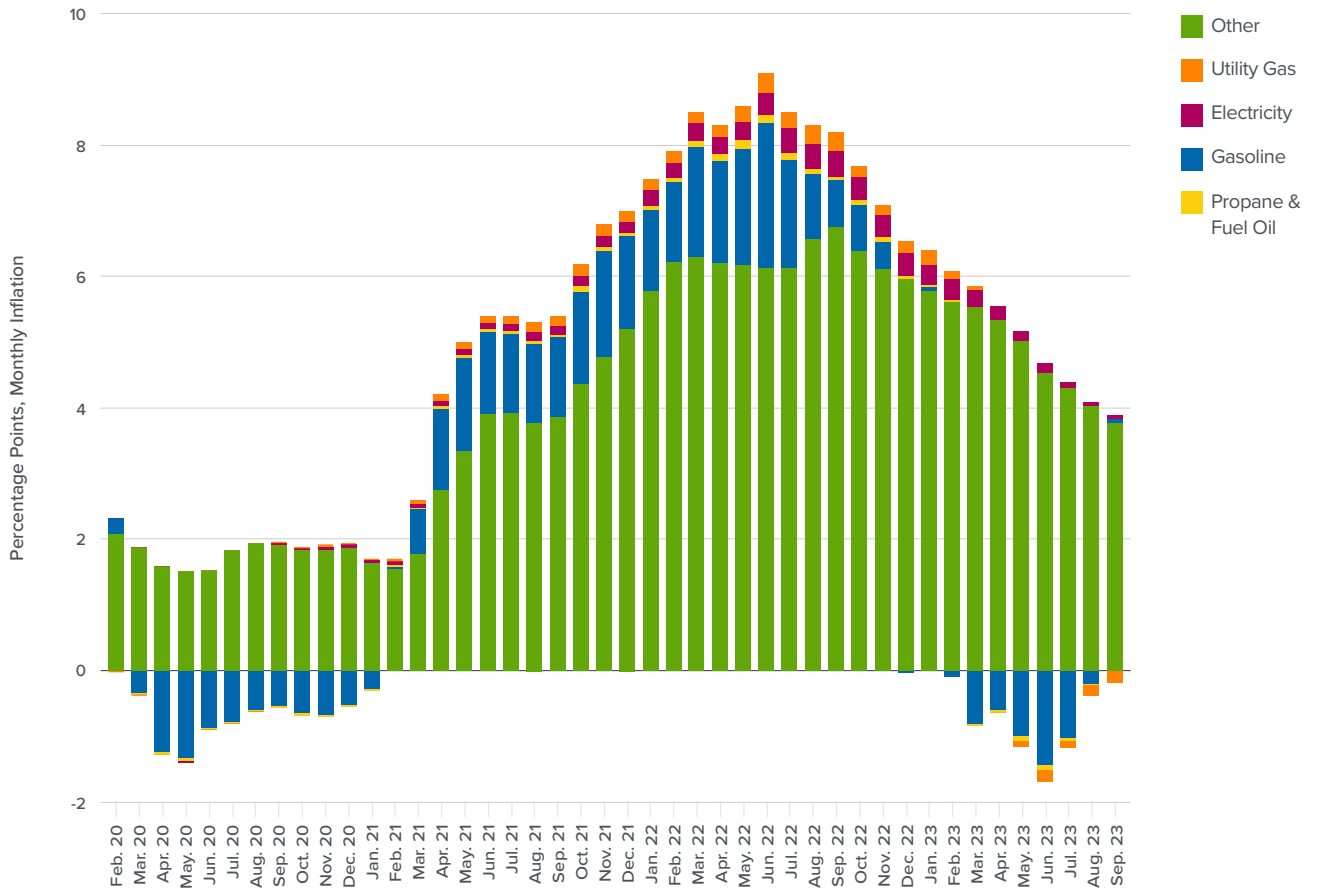

Figure 2 shows the percentage point contribution of four major energy goods and services, as compared to other, non-energy goods and services, to year-over-year monthly inflation from 2019 to present. The "other" category is composed of all other goods and services in the Consumer Price Index. *Source: US Bureau of Labor Statistics, authors' analysis.*

The decline in domestic energy prices since June 2022 can be attributed to a wide variety of factors, from temporary stopgap measures to international market shifts. The International Energy Agency (IEA) reports that advanced economies spent over $500 billion to reduce energy bills for consumers. However, none of these policies address the inherent volatility of fossil fuel prices. As a result, when gasoline prices spike again, we expect the overall inflation rate to rise as well.

Fossil Fuels Are Inherently Volatile

Fossil fuel price volatility stems from several key elements of fossil fuel markets and production.

- **International oil and gas markets are highly exposed to geopolitical conflict.** Because fossil fuels must be discovered and then extracted from where they happen to lie, international trade of these scarce resources is unavoidable. As demonstrated by price changes due to the war between Russia and Ukraine, conflict around the world has a significant impact on domestic prices, even in heavy exporting countries like the United States. Now, sensitive oil markets are already reacting to conflict in the Middle East.
- **Shoring up domestic production of oil, liquid natural gas, or coal cannot guarantee stable domestic prices**. If new proposed fossil fuel projects are approved in the US, we can expect an increase in fossil fuel exports—not domestic energy independence. Fossil fuel companies will continue to chase higher profits abroad and neglect domestic demand even in times of debilitating inflation.
- **The volatility inherent to fossil fuel markets lends itself to speculation by financial institutions**, only exacerbating the price fluctuations that consumers experience. In times of demand crises—such as natural disasters resulting in widespread outages—speculators bet on rapidly increasing prices, and further drive prices to exorbitant heights.
- **Continued fossil fuel production and consumption further intensifies the climate crisis,** which is responsible for increased extreme weather events that disrupt and damage energy infrastructure and international supply chains. In addition to fossil fuel prices themselves being volatile, fossil fuel–driven climate change risks damaging the physical infrastructure of fossil fuel production and distribution.

Effectively managing energy price inflation while retaining a fossil fuel–based economy is nearly impossible, especially as energy commodity markets are getting more, not less, volatile. The Federal Reserve already has limited ability to mitigate inflation that results from supply-side bottlenecks or shortages in domestic production, and even less ability to tame the price volatility resulting from a turbulent international hydrocarbon market.

A Transition *to* Electrified Renewable Energy and *away* from Fossil Fuels Will Facilitate Long-Term Price Stability

While reliance on fossil fuels leads to instability in both household budgets and the macroeconomy, renewables present a stable energy future that includes both a reliable supply of energy and low, stable energy costs for consumers.

- **Electricity prices are consistently more stable than petroleum or natural gas prices**, indicating that a transition to electrified renewable energy sources would offer significant price stability. Figure 3, below, plots the frequency of the annual inflation rates of US consumer prices for electricity, gasoline, and piped utility gas from 1968 to the present. The figure demonstrates that electricity's distribution plot has a much lower average annual rate of inflation and less extreme price volatility compared to gasoline and natural gas service prices.

Figure 3: Electricity Has a Lower Average Inflation Rate and Smaller Variation in Prices than Gasoline and Utility Gas

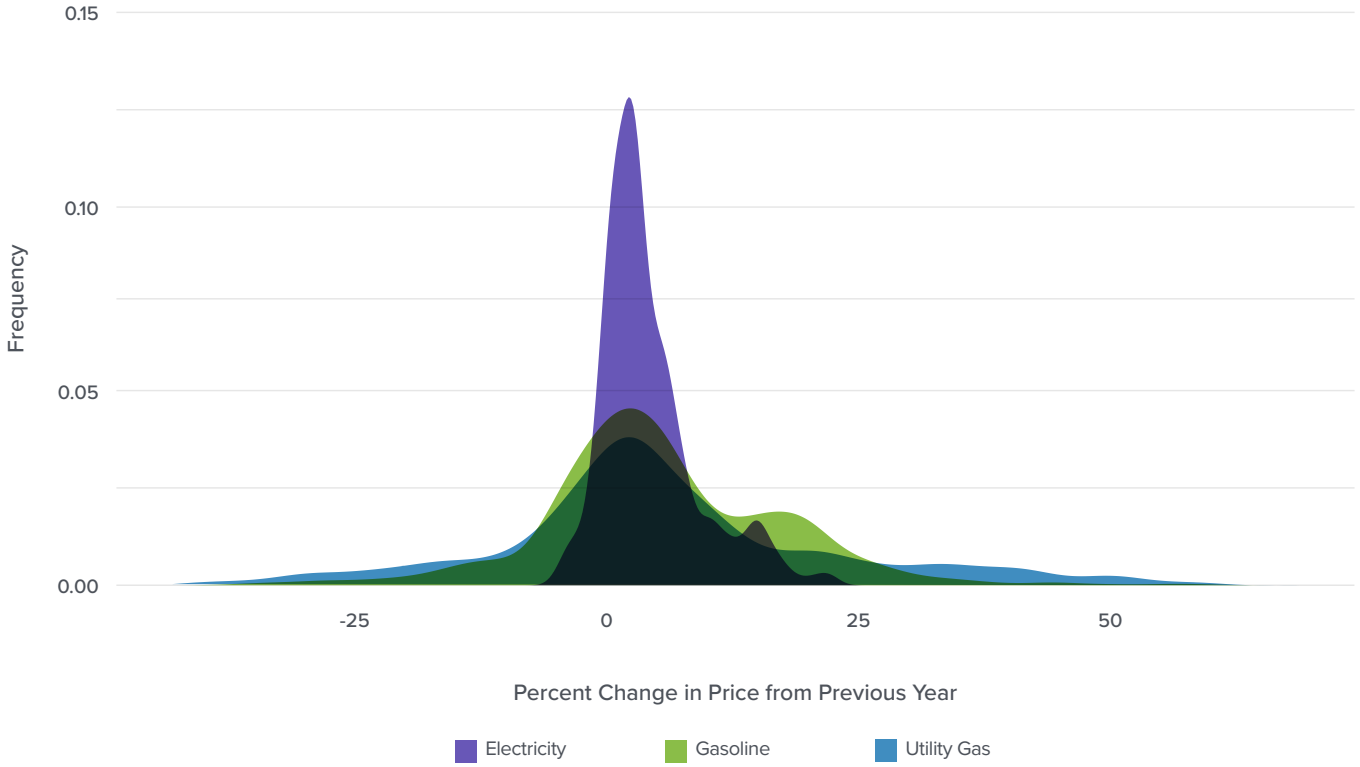

Figure 3 shows the frequency of the distribution of the annual rate of inflation of three major consumer energy items (gasoline, utility gas, and electricity service) from 1968 to the present. The tails of each line represent the lowest and highest extreme rates of inflation for each item. The frequency of each inflation rate is represented by the height of the line at a given rate. Electricity's distribution plot has a lower average annual rate of inflation and less extreme price volatility. The shape of electricity's trend line shows that most electricity inflation is clustered in a very narrow range. Gasoline's trend line is the opposite extreme: Its long tails represent annual inflation rates at -40 percent to 70 percent. The height of its distribution plot is overall shorter than the other two, demonstrating that gasoline inflation spans a broad range and that it is far more volatile. *Source: US Bureau of Labor Statistics, authors' analysis.*

- **Renewable energy sources are consistent and infinite.** While petroleum must constantly be discovered, extracted, and transported, renewable energy is, by definition, naturally replenishing. This prevents the type of major supply disruptions, or manipulations, that plague the fossil fuel industry and provide price uncertainty.
- **The cost of renewable production is declining.** Estimates indicate that by 2030, the costs for solar and wind technologies will fall to 60 and 70 percent, respectively, below the long-run marginal cost for natural gas. Even during the past two years of high inflation, the levelized cost of energy for wind and solar has continued to decrease and beat out all other utility-scale fossil fuel energy sources.

Figure 4: Renewable Energy Continues to Be Cheaper than Conventional Fossil Fuel Sources

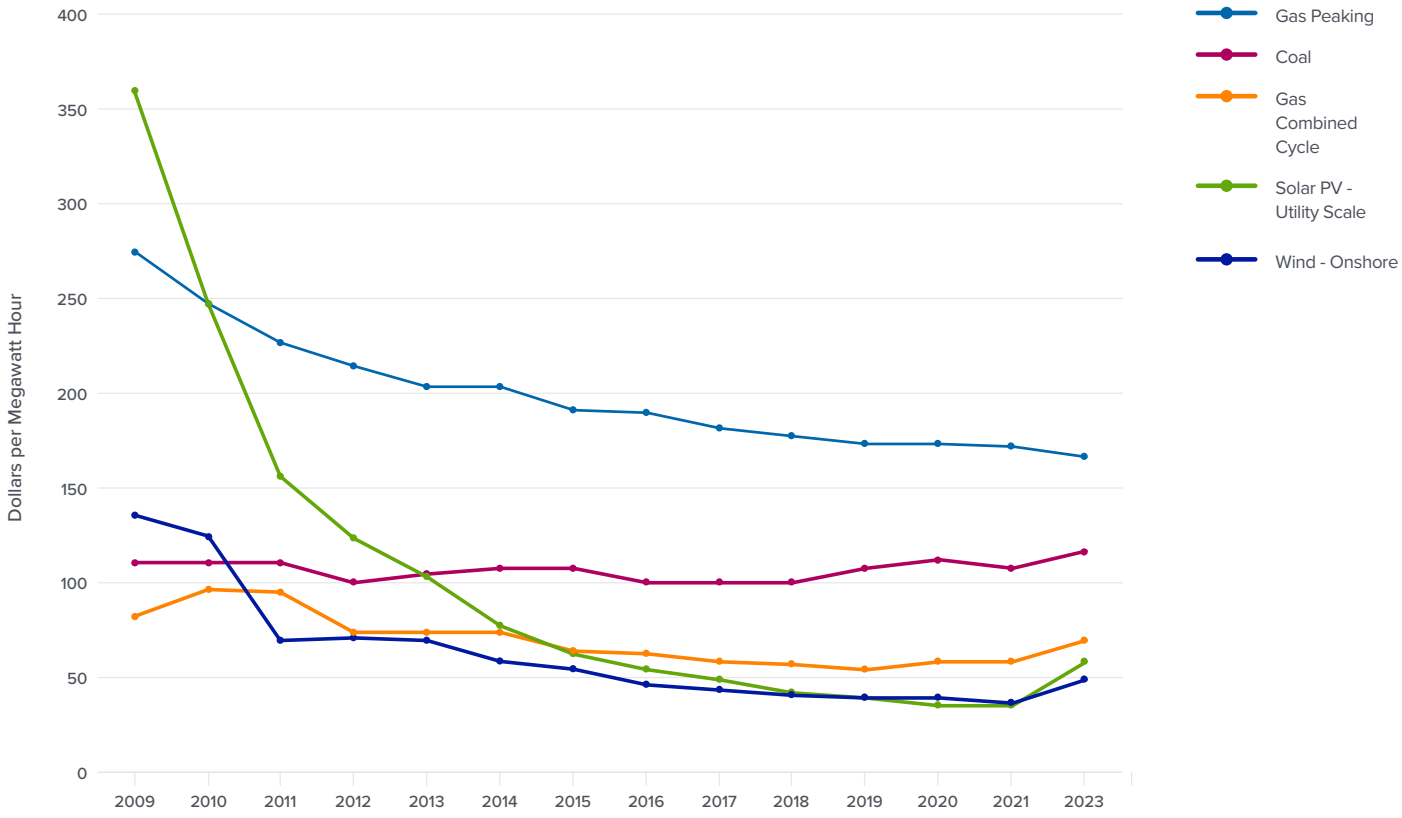

Figure 4 shows average annual levelized cost of energy—the average minimum price at which energy must be sold to offset the total costs of production—in dollars per megawatt hour for various utility-scale sources of electricity. Since 2016, wind and solar costs have remained below those of gas and coal. Combined with the stability of electricity prices, low generation costs for renewables indicate that a transition to electrified renewable energy will facilitate low, stable energy costs for consumers. *Source:* *Lazard 2023*.

- **Renewables have no fuel costs, eliminating the most volatile component of fossil fuel prices.** Once capital is invested in the infrastructure to capture renewable energy and convert it to electricity or heat, there are no fuel costs—that is, no specific volume of gasoline manufactured elsewhere that must be input to generate power. Without fuel costs, renewable energy production can have long-term, fixed-price contracts—something that is not possible in fossil fuel production.
- **Each country has access to some renewable energy sources.** With equitable distribution of the necessary components and the upfront costs of renewable energy technology, production can be relatively free of the geopolitical dynamics that cause much of the volatility of fossil fuels. National economies would no longer be price takers in a global market.
- **A rapid transition away from fossil fuels and toward renewables will mitigate climate change and reduce the frequency of natural disasters**. Fewer natural disasters would likely lead to fewer energy system disruptions that result in price volatility due to a mismatch between supply and demand or speculation.

Conclusion

A complete transition to an electrified renewable energy sector is essential both to mitigate the deepening climate crisis and to stabilize energy prices. Investments in the Inflation Reduction Act, the Infrastructure Investment and Jobs Act, and the CHIPS and Science Act are substantial down payments in building renewable alternatives to fossil fuels. These landmark investments in renewables must also be supported by halting fossil fuel subsidies and disapproving new fossil fuel projects. Otherwise, we will miss out on much of the price stability that the transition to clean energy could provide. A driving force of the recent reduction in inflation from record heights has been due to a decline in fossil fuel prices, but as long as our economy is reliant on fossil fuels, those price declines are not stable or permanent. Our macroeconomy is vulnerable to continued price volatility—both the highs and lows.

The transition to renewables will not go uncontested by powerful fossil fuel corporations. In the last year, President Biden approved the Willow Project and Congress approved the Mountain Valley Pipeline project in exchange for minimal energy permitting reforms. The US Energy Information Administration (EIA) projects that natural gas production will increase by 15 percent and liquid natural gas exports will rise 152 percent between 2022 and 2050. Furthermore, four new proposed oil export terminals, likely to be approved, are expected to emit three times the US's entire emissions output. These projects will undermine existing climate commitments and seed continued energy price volatility for Americans. The economic evidence that a renewable transition will benefit our macroeconomy and planet is clear, but energy markets will not adjust freely so long as fossil fuel interests remain in control. It is essential for long-term price stability that investments in renewable build-out are coupled with a managed wind-down of fossil fuels.