

# Global Energy Crisis

December 2022

The world is in the midst of an energy crisis. Reports of blackouts, demand curtailments, and rising utility bills are now commonplace in many parts of the world that are accustomed to abundant supply. Conversations over energy needs and sources have become increasingly mainstream, and the disruptions resulting from Russia's invasion of Ukraine have revealed how tenuous the supply and demand balance has become. European electricity prices have been ~6x higher in 2022 than the long-term average<sup>1</sup>. European consumers will see utility bills triple in 2022<sup>2</sup>, and there have even been instances of companies halting production rather than operating with high energy prices. Europe is the epicenter of the energy crisis, but this is a global issue.

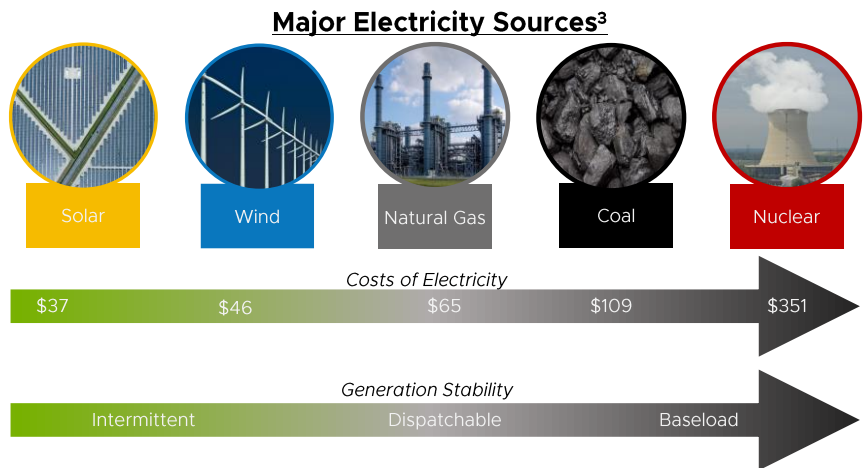
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## Crisis Genesis and Stopgaps

Electricity prices began increasing in 2021, before any sanctions on Russian output, due to the retirement of coal-fired electricity generation. Replacements for the shutdown coal plants have in large part gone to the cheapest sources of new power: solar and wind. Building new capacity takes time and removing the capacity before sufficient new capacity has been installed creates volatility. This shift should prove to be a long-term positive move for energy consumers because it will lead over time to lower energy prices, but it also brings challenges with intermittent renewable production supplanting more continuous fossil fuel generation.

Transitioning away from coal has environmental benefits but the main reason for the switch is operational. Coal power plants reaching the end of their useful lives must be either re-equipped or replaced. The coal power fleet in the developed world is very old, with an average age of 41 years in the US and 34 years in Europe<sup>4</sup> compared to an average useful life of 45 years<sup>5</sup>. From 2016 through 2021, 52GW of coal generation (equivalent to 10% of the coal fleet) was retired in the developed world<sup>6</sup>. The decision to replace retired generation capacity comes down to a question of cost, with renewable sources (along with natural gas) being lower-cost sources of new generation than coal. **Economics are causing the adoption of renewables but retiring fossil fuel plants has created near term volatility in prices.**



The Ukraine invasion has moved the volatile, transitioning energy market into a full-blown European energy crisis. Europe uses natural gas for 20% of its power generation and 37% of the EU's natural gas came from Russia prior to the invasion<sup>7</sup>. The short-term solution has been to buy natural gas elsewhere, which explains the

<sup>1</sup> Average 2022 prices vs 2012-2020 average price. Bloomberg.  
<sup>2</sup> Goldman Sachs, "Energy crisis and higher rates: a new investment framework" 10/13/2022  
<sup>3</sup> BNEF, "2H 2022 LCOE Update" 12/8/2022  
<sup>4</sup> As of 2020. EIA, "World Energy Outlook 2021"  
<sup>5</sup> EIA, "Of the Operating US Coal-Fired Power Plants, 28% Plan to Retire by 2025" 12/15/2021  
<sup>6</sup> BNEF, data as of 11/18/2022.  
<sup>7</sup> BP, "BP Statistical Review of World Energy 2022"

65% increase in liquefied natural gas imports to Europe in 2022<sup>8</sup> and why continental natural gas prices are up 174% year-over-year<sup>9</sup>.

The more uncomfortable impact of Europe’s energy crisis in the short-term has been demand curtailment. In Europe, 70% of fertilizer production (which uses natural gas as an input) has been halted<sup>10</sup> and energy-intensive aluminum production rates are the lowest of this century<sup>11</sup>. These drastic measures add seriously to risks of a European recession, with Goldman Sachs estimating that the energy crisis will be a -15% drag to the EU’s GDP<sup>12</sup>. These short-term measures cannot continue forever.

### Additional Power Capacity Needed

Power generation capacity must be increased in the long-term and the most cost-effective sources of new power globally are solar and wind. Renewables’ main cost advantage is that they do not require fuel. This advantage has widened with rising cost of fossil fuels, as fuel cost account for 63% of a natural gas plants cost of generation<sup>14</sup>. Lack of fuel allows for renewables to provide for true energy security as countries reduced their reliance on neighbors and/or politically unstable regions to keep the lights on. **The ability to lower costs and achieve energy independence are why major nations are providing massive amounts of financial support to renewable development.**

Government Energy Policy Support (billions) <sup>13</sup>	
US	\$369
Germany	€60
Italy	€50
France	€45
UK	£37
Spain	€27
<b>Total (USD)</b>	<b>\$607</b>

Adding battery storage is a measure that will bolster new renewable generation capacity. Batteries help address one of the main shortcomings of wind and solar power – the mismatch between generation and usage patterns – by allowing storage of excess energy for times with less generation capacity. Battery adoption in the US is expected to grow 10x from 2020-24<sup>15</sup>, according to company reported projects.

Nuclear is often discussed as a potential solution to the energy shortage, and it is in many ways an excellent source of baseload power providing energy stability. Unfortunately, the construction of nuclear reactors cannot happen quickly enough to alleviate current energy shortages. For example, the UK awarded a contract for a new Sizewell C nuclear reactor in November 2022 that is not expected to come online until 2033-36<sup>16</sup>. A history of cost and time overruns means that this reactor is most likely to be a solution for the 2040s. There are other nuclear technologies such as small modular reactors (SMRs) that have the potential to speed up construction, but the technology is still in development.

### Summary

The energy crisis is being caused by rising demand, aging fossil fuel plants and supply disruptions. Solar and wind are the cheapest and quickest to market technologies for electricity production. The investment required to repower with low-cost renewables is massive. BNEF estimates that \$4.1 trillion in annual spending will be required through 2050 to meet future demand<sup>17</sup>.

NXG believes that the companies that can produce the lowest cost electricity and are able to dispatch power when it is most critical will be the winners of the energy transition. Companies that cling to the old model of stagnant pricing or and high-cost structures will be left behind. We think that an active management approach is necessary to capitalize on these historic and turbulent energy markets.

<sup>8</sup> IEA, “Gas Market Report, Q4-2022”

<sup>9</sup> NXG, Bloomberg. Weekly prices for day ahead TTF for YTD 2022 (through 12/9/2022) vs 2021 average price.

<sup>10</sup> IEA, “Gas Market Report, Q4-2022”

<sup>11</sup> Reuters, “European Smelter Closures Fracture Aluminum Pricing” 9/1/2022

<sup>12</sup> Goldman Sachs, “The Energy Affordability Crisis: Quantification, Solutions, Implications” 9/4/2022

<sup>13</sup> NXG and UBS, “EU Energy crisis: a boost of a bottleneck for energy transition” 11/10/2022

<sup>14</sup> BNEF, “2H 2022 LCOE Update” 12/8/2022

<sup>15</sup> EIA, “Preliminary Monthly Electric Generator Inventory (based on Form EIA-860M as a supplement to Form EIA-860)” December 2021

<sup>16</sup> BBC, “Sizewell C: What Is It and Where Is It Planned to Be?” 7/20/2022

<sup>17</sup> BNEF, “New Energy Outlook 2022”



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