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Prosperity at Risk: For a New Strategy in Energy Policy*

Germany and Europe are currently in the middle of an energy crisis, triggered primarily by the shortage of gas supplies in the wake of the Russian invasion of Ukraine. Rising prices for gas and electricity, and to a lesser extent for oil and coal, are placing a considerable burden on private households and businesses. In the short term, it is a matter of surviving the coming winter and the winter of 2023/2024, which will probably also be characterized by severe energy shortages, and avoiding a gas shortage. For the medium- to long-term development of prosperity in Germany, beyond the acute crisis, it is crucial to secure the energy supply for private households and companies and to maintain Germany as a location for industry with high added value and well-paid jobs. This must be reconciled with the climate protection goals to which Germany has committed itself.

CO_2 emissions are to be reduced by 65 percent by 2030 compared to 1990 and by 100 percent by 2045. While Germany achieved a 39 percent reduction in emissions in the 31 years since the base year, partly due to the demise of industry in the GDR, a further 61 percent reduction is to be achieved in the remaining 24 years. At the same time, electricity production will have to increase to a multiple of today's value because transport, home heating, and industrial processes are to be electrified. According to estimates, supplying the chemical industry alone could require as much electricity as Germany consumes in total today. This illustrates the scale of the planned transformation.

Even before the current crisis, there was considerable uncertainty about the future of energy supply in Germany, especially about the future of electricity supply. This uncertainty has only grown as a result of the current crisis. The energy-intensive segments of German industry in particular will only stay in Germany if energy costs and supply security in Germany at least do not deteriorate in comparison to competing locations, above all in the United States and China.

THE INTERPLAY OF DIFFERENT ENERGY SOURCES IN THE TRANSITION

It is planned that nuclear power plants and coal-fired power plants will soon be shut down and energy consumption will increasingly be met by renewables and gas-fired power plants. Since the output of gas-fired power plants is easily adjusted, these power plants are particularly well suited to constantly compensating for the volatility of weather-dependent renewables. As long as no efficient storage technologies are available and dams and biogas plants cannot be expanded sufficiently, dispatchable energy is the necessary complement to wind and solar power. Because of occasional Dunkelflaute events – periods of weak wind and overcast weather – the capacity of the corresponding plants must be sufficient to meet German electricity demand in full if necessary, especially since the problem also arises in a fundamentally similar way in the international electricity network because of the high correlation of the weather. If a significant increase in electricity production is needed due to the planned electrification of almost all energy sources, then a corresponding increase in the complementary dispatchable electricity capacity is required.

While the required dispatchable energy sources can be nuclear power, coal, or gas, as has been the case so far, great hopes are also pinned on hydrogen. Hydrogen does not occur in natural reservoirs, but is an energy storage medium: it is produced from elec-

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tricity by means of electrolysis and can be converted back into electricity via fuel cells or gas-fired power plants. However, the technical and economic challenges of a hydrogen economy are considerable. In the loop from electricity via hydrogen back to electricity, about three-quarters of the energy used is lost. Hydrogen embrittles all materials and implies their rapid wear. In addition, hydrogen requires an already smoothed current to keep electrolyzers running continuously, thus presupposing something that it itself is expected to create. Technical solutions exist for this, but they are costly and have consequences for economic efficiency. Hydrogen plays no role in the European electricity network, although the technologies have been known for decades. This may be because only when the very volatile supply peaks of wind and solar power exceed all other consumption is any electricity available for hydrogen production. It would be absurd and unecological to produce hydrogen with green power if this power could also be used directly to replace conventional power sources. In view of these difficulties, it could be a very long time before a functioning hydrogen economy is established.

According to available scenarios, electricity consumption in Germany will increase by around 25 percent in the short term, by 2030, even with increasing energy efficiency.[1] This will require additional conventional dispatchable power plants to complement the volatile electricity from green sources. In 2021, about 40 percent of the electricity supply still came from nuclear power and coal. The last nuclear power plants are to be shut down as early as April 2023, and the coal-fired power plants by 2030. Germany is thus responding to a massive increase in electricity demand by shutting down a substantial share of its power plants, without it being clear whether and how the gap can be filled and the rising electricity demand met. If this is implemented, the demand for dispatchable energy will have to be met primarily by gas-fired power plants in the coming years.

[1] See, for example, EWI (2022a, p. 11), scenario with high degree of electrification. Electricity consumption scenarios produce very different results depending on the premises about price development and the assumed degree of electrification. However, it is clear that electricity consumption in Germany will increase strongly in the medium and long term if the planned electrification of transport, building heating, and industry takes place.

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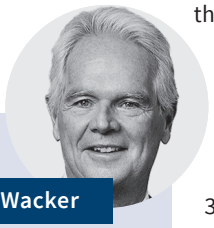

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The coalition agreement of the so-called 'traffic light' parties who form the German government announces the expansion of gas-fired power plants and the creation of a hydrogen electrolysis capacity of 10 GW by 2030 (Coalition Agreement 2021, p. 60). However, there are no reliable public plans to actually build this capacity, nor are there any calculations on their private or national economic viability. For private investors, gas-fired power plants that can be converted to hydrogen are currently not a viable business model.

The situation is aggravated by the fact that, in view of the Ukraine conflict, only a much smaller volume of gas will flow from Russia to Europe and Germany in the foreseeable future. Gas will probably become noticeably more expensive not only for the next two years, but also in the medium term, since the only alternative are LNG imports, which first require a conversion of the infrastructure. According to current estimates, this could make gas in Europe about twice as expensive in the long term as it was before the crisis (Prognos 2022). This calls into question the previous plan for the transition to a climate-neutral energy system.

GERMANY'S COMPETITIVENESS AS AN INDUSTRIAL LOCATION THREATENED

For Germany, the gas shortage poses problems that go far beyond the consequences for electricity production. Heating costs are rising for private households. Germany will lose competitiveness as an industrial location due to the loss of access to gas imports from Russia. This does not affect its competitiveness vis-à-vis other locations in Europe, because the gas market is highly integrated, at least in northwestern Europe. Many countries in Europe, not just Germany, have long benefited from these gas imports. The loss of competitiveness, however, is vis-à-vis the US and Asia.

Before the crisis, on average in 2015–2019, the price of gas in Asia was about 22 percent higher than in Europe, and in the US gas cost about half as much as in Europe. In 2021, when Russia started to cut its gas supplies to Europe, Asia's price disadvantage fell to 16 percent, and in the US the gas price was only one-quarter of the European level (BP 2022). In 2022, the price difference was temporarily much greater. Current scenario calculations, which assume that Russian gas imports will not be resumed by 2030, come to the conclusion that European gas prices could settle at three times the US prices (EWI 2022b, p. 35). In China, the price is likely to fall even further compared to the European level due to increased Russian deliveries. Europe will therefore lose a massive amount of price competitiveness vis-à-vis both competitors.

Developments in the electricity price are similar. In the years 2015–2019, the average

annual exchange electricity price was between EUR 28 and 43 per megawatt hour, in 2021 it was already EUR 93, and in 2022 it was significantly higher.[2] The current extreme price fluctuations against the backdrop of the Ukraine war will not remain. But since the further development of the electricity price is strongly dependent on the price of gas, Germany and Europe will also lose ground here compared to Asia and the US.

One could argue that it is not only energy prices that matter, but also energy efficiency. This is true, but in many industrial applications improvements in energy efficiency have limits. Moreover, more efficient technologies are usually not tied to Germany or Europe as a location. Energy efficiency alone cannot eliminate the risks of industry migrating elsewhere.

There are also occasional calls to compensate for disadvantages in energy prices with subsidies. Subsidizing industrial oil and gas consumption would certainly be counterproductive, because it is economically self-damaging to compensate for permanent locational disadvantages with subsidies. Especially against the background of massive subsidies for industrial investments in the US and in view of dependencies that are problematic in terms of security policy, it may make sense to use public funds temporarily to keep strategically important industries in Germany. However, subsidy programs always carry the risk of maintaining existing, unsustainable structures. This must be avoided.

WHAT NEEDS TO BE DONE? A CHANGED STRATEGY IN ENERGY POLICY

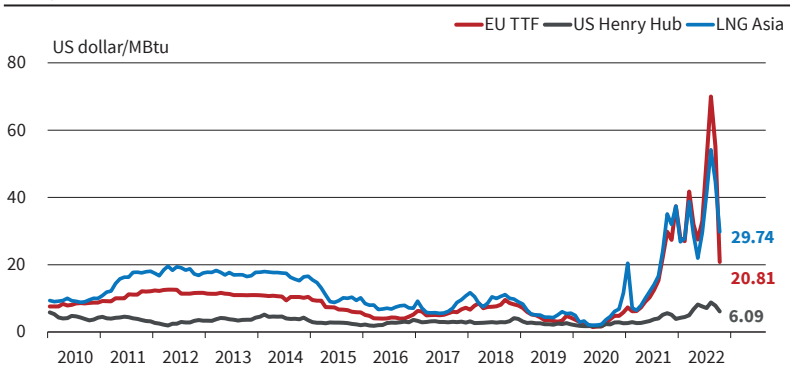
The goal of German energy policy is to move as quickly as possible to an energy supply based solely on renewables, green hydrogen, and synthetic fuels. Accelerating the expansion of renewables and the hydrogen economy is of central importance for this and is rightly at the center of the energy policy strategy. We expressly support the rapid expansion of renewables. But realism is needed here. According to the technological development as it can be expected today, it will take a long time, possibly decades, before such energy systems are fully functional. It is therefore necessary to bridge the time spent building a fully decarbonized energy system.

Climate-neutral energy supply could be achieved more quickly by providing a certain base load with the nuclear power plants that are still operational, which would primarily replace coal-fired power plants and help balance out the seasonal fluctuations in renewables production between summer and winter. For very short-term fluctuations within a day or an hour, battery storage systems, primarily those in electric vehicles, will increasingly play a role in the future. To the extent that it should actually be possible to operate electrolyzers economically with the volatile green electricity in Europe or at other locations, hydrogen can also be used for short-term stabilization. For the coming years, however, the short-term fluctuations in electricity production from renewables will still have to be covered primarily by gas-fired power plants.

Figure 1

Natural Gas Prices

Average monthly spot market prices



Source: International Monetary Fund 2022. © ifo Institute

Gas will not only be important for electricity production for a long time to come. It will also continue to play an important role for many years for heating homes and in many industrial applications and can only be replaced gradually. What has been lacking here so far is the will to invest in alternative technologies such as heat pumps.

To secure prosperity in Germany, it is of central importance to pursue a realistic energy policy strategy that can achieve the goals of a secure, affordable, and environmentally friendly energy supply.

The energy policy of the coming years should include the following points:

1. The Power Supply Should Be Broadly Diversified

In view of the considerable uncertainty about further developments, it is of central importance to diversify the electricity supply broadly and not to recklessly abandon options. The expansion of renewables should be massively accelerated, as should the construction of hydrogen-capable gas-fired power plants. Nuclear power plants should only be shut down when proven and efficient power generation plants are available that can actually do without complementary CO_2-heavy balancing power. Germany should deepen its collaboration with partner countries that are willing to use their nuclear power to help mitigate the problems caused by Dunkelflaute events, bearing in mind that this may create new dependencies.

2. The Electricity Market Should Be Fully Opened Up and Made More Flexible

Currently, rigid regulations and restrictions on competition prevent the necessary broad integration of

[2] Source: https://energy-charts.info/charts/price_average/chart.htm?l=de&c=DE&year=-1&interval=year&chartColumnSorting=default.

decentralized power generation, especially industrial companies and private households, into the energy system. One example of this integration is the use of bidirectional charging for electric vehicles. With an achievable number of 1.4 million suitably equipped electric cars by 2030, their use as storage to compensate for very short-term fluctuations in renewables could make the construction of ten gas-fired power plants superfluous.[3] The goal should be to develop a platform economy in the energy system. This has the potential to sustainably reduce electricity costs for households and companies.

3. Securing the Gas Supply by Expanding Own Production and New Pipelines

To maintain Germany's status as an industrial location, it is of central importance to ensure a secure and competitively priced gas supply. One way to achieve this would be to expand domestic gas production in Germany and Europe through fracking. Here, technical developments have led to environmentally friendly processes that could soon be ready for implementation. The known gas deposits in Germany could replace Russian gas supplies for 14 years. Domestic fracking would have the great advantage that the political imponderables associated with dependence on gas imports from Qatar, for example, would not arise. Therefore, it is important to make gas production by fracking in Germany possible. In addition, gas pipelines should be rapidly expanded both within the EU and from important gas suppliers such as Norway, the United Kingdom, and Southern Mediterranean countries.

4. Planning and Approval Procedures Must Be Accelerated Considerably

Lengthy planning and approval procedures are a major obstacle to the transformation of the energy system. Currently, the planning and approval of a wind turbine project takes four to five years. In the approval procedures alone, an average of about two years elapse between the first submission of the documents and the approval, with major differences between Germany's various federal states (EEG Bund-Länder-Kooperationsausschuss). Long approval procedures also hinder the replacement of existing plants that are due for renewal. With approval taking this long, it is hardly possible to achieve the ambitious expansion targets for renewables by 2030. Planning procedures for the expansion of electricity or gas grids are also far too long. This also has to do with intensive public participation, which is desirable in principle, but the extent of which has to be weighed against other goals, especially the goal of advancing economically significant investment projects. Above all, the expansion of the electricity grid in Germany urgently needs to be accelerated, also with regard to electromobility. Adjusting the details of the existing regulations is not sufficient here. The German government has taken initial measures to accelerate planning for the expansion of renewables, but further steps are required. What is needed is a fundamental revision of the licensing procedures with the aim of significantly speeding up the process. Fracking, too, can only ease the supply situation with any speed if approval and review times are greatly reduced.

5. Strengthen Research and Development on Energy Systems and Energy Efficiency

Creating a decarbonized, affordable, and secure energy supply requires major efforts in research and development. Government funding should focus on renewables, energy efficiency, smart electricity grids, and storage technologies for the hydrogen economy, but not neglect other areas such as fusion research and research on other reactors. Even if Germany sticks to its decision not to return to nuclear power, these technologies can play an important part in mitigating global climate change, and they have good export prospects.

SIMPLY ACCEPTING THE ENERGY SHORTAGE AND THE MIGRATION OF INDUSTRIES IS NOT THE RIGHT WAY TO GO

The warning of deindustrialization due to energy shortages could be countered by claiming that the losses can be compensated for by building up other, less energy-intensive economic activities, and that this also makes it easier to achieve climate protection goals. It is also argued that the number of gas-intensive products manufactured in Germany is manageable, and that their share of industrial sales is limited. These arguments are not convincing. Building up less energy-intensive value creation is certainly possible, but it takes time and is highly risky in view of the already accelerated structural change in key industries such as the automotive sector. The number of gas-intensive products or their share of sales alone says little about the economic importance of gas for domestic prosperity. Increasing the price of gas imports would reduce domestic prosperity even if domestic industrial production were not affected because the intermediate products in question could be imported without any problem. The relocation of energy-intensive production to other locations with lower climate protection standards would lead to rising CO_2 emissions globally. Energy-intensive industries do not conflict in principle with decarbonization goals because they increasingly rely on CO_2-free energy. In addition, energy-intensive industries such as the chemical industry or parts of the metal industry are of fundamental importance for almost all value

[3] Source: Calculations by the company P3.

chains. The migration of these industries could pose supply risks in the face of growing geopolitical tensions or even induce other industries to migrate as well.

Currently, the energy policy debate in Germany is characterized by an irrational confrontation between proponents of conventional energy and renewables, which stands in the way of overcoming the challenges ahead. Preserving Germany's prosperity requires a willingness to change and a pragmatic energy policy that leaves ideological trench warfare behind.

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