

3.2 SPECIFIC POINTS

Security of supply

Positive effect on political security of supply; technological security of supply questionable

- The experts surveyed in the three emerging countries had very different opinions about the political and the technological security of the energy supply in Germany. The effects of the Energiewende on **political security of supply** were unanimously regarded as positive, and were cited by Chinese and South African experts in particular. This was frequently attributed to the expansion of domestic generation from renewables, and with it Germany's decreasing dependence on energy imports.

Political security of supply



China

- "Being a country, whose energy sources are mainly gained through import, Germany could be in great danger. If countries such as the USA, those in Middle East, and Russia ceased to provide oil to it, everything would be over. So Germany should try to be self-efficient." (2.1b Science)
- "In a short run, the energy transition makes Germany less dependent to foreign energy resources, and thus it contributes to improvement of the security of the energy supply." (2.3a Science)
- "It is definitely positive for the security of the energy supply in Germany. Because Germany possesses very few traditional energy resources, and the needs regarding this can only be fulfilled through imports. So the energy transition is for sure positive for the security of its energy supply." (2.3a Science)



South Africa

- "I think it is an excellent idea. Well then they become self reliant then, they don't have to import gasses and stuff." (2.3a Industry)
- "Look I think it will probably lead to energy security if they can get these renewables energy to achieve a grid parity, for example if they can get the wind farms to achieve grid parity then they don't have to import so much gas or they don't to import the other primary energy sources." (2.3a Industry)
- "Well I think it is probably a positive move for Germany in terms of energy security, because it reduces dependence on fossil fuel and gas." (2.3a NGOs)

Positive effect on political security of supply; technological security of supply questionable

- The assessments diverged significantly as regards the **technological security of supply**. Some of the respondents expressed great confidence in the Energiewende not affecting the reliability of the electricity supply. This view was largely sustained by a positive image of Germany as a “rational” and “well-organised” state, and thereby the belief that the decision to Energiewende must have been preceded by a thorough risk analysis and appraisal of the options. Similarly, there was faith that Germany – as one of the leading industrialised nations – has the financial clout and research resources to resolve the current technological challenges. Some of the experts pointed to the stabilising effect of a decentralised energy-generation concept, while others emphasised increased energy efficiency and how this lowers consumption.
- On the other hand, there was significant scepticism about the technological aspects behind a reliable energy supply. One of the primary issues cited was the grid fluctuation associated with electricity from renewables, a problem for which only some current technological solutions could be seen. Due to this lack of convincing technological solutions, coupled with the fast pace of implementation, there was frequent mention of short- and medium-term **supply interruptions**.
- Independently of the technological issues, many of the experts argued that Germany could use **electricity imports** from neighbouring EU countries as a back-up option to bridge any supply problems. Some experts even suggested that integration with the European electricity grid was crucial to ensure the new German energy mix would provide a stable and secure supply of electricity.

“I think it will not fall. Germany is a country where they plan everything.”

*Parliament representative,
Brazil*

Technological security of supply exists

- “No, since it’s a sustainable measure with a long-term planning policy I don’t see any problem. Everything in life depends on planning to be structured.” (2.3a Industry)
- “I’m not an expert on the German energy system but there’s a lot of redundancy. I think nowadays they import quite a lot from France. ... There are more than 10 nuclear power plants so it’s easy to buy from their neighbor. I don’t see it as a critical situation because consumption is stabilized.” (2.3a Industry)
- “I think it will not fall. Germany is a country where they plan everything.” (2.3a Parliament)
- “(Germany is) trying to diversify its energy matrix, it starts to mitigate these risks. So I believe it is on track.” (2.3a Parliament)



Brazil



China

- "In the medium to long term I see no problem. I see more problems in the short term." (2.3a NGOs)

- "I don't think there would be problems in this respect. Despite the increased costs, due to the relatively mature industrial system, security of energy transmission and supply can be guaranteed." (2.3a Industry)
- "From the perspective of energy security, firstly, energy sources are more diversified, changing the current situation where the supply structure and usage is restrained by others." (2.3a Public administration)
- "Western developed countries are rich and can import electricity from other countries if there is shortage. For example, a part of the energy consumed in Germany is transmitted from Poland and Russia." (2.3a Science)
- "I think the security of the energy supply in Germany will be better, because power plants of new energy are scattered, so the large-scale blackout can be avoided." (2.3a NGOs)



South Africa

- "Absolutely I think it is going to support the security of supply and besides that, if maybe it doesn't become a success, they have got countries like France and other allied countries next to Germany that they can source their energy from." (2.3a Industry)
- "I think Germany as a country, my experience with them, they wouldn't have done anything or decide on a certain direction if they haven't researched thoroughly,..." (2.3a Public administration)
- "Well I think that I have great confidence in the German people especially their technocrats in thinking this thing through." (2.3a Science)
- "Well in the long run it will ensure a more sustainable energy network or an energy supply network." (2.3a Science)
- "Well, I think if anybody can do it the Germans can." (2.3a Science)
- "I am sure there have been concerns over time about consistency of clean energy sources, but I can't imagine that the German government would make commitments like this without having certainty about the supply." (2.3a NGOs)

Doubts about the technological security of supply

- “This is one problem that must be known in terms of technology. Solar energy provides, but how do you accumulate this energy? Wind energy is more constant, but is more unpredictable. Solar power is more predictable. You know you will have sunlight for some time during the day, so wind is more unpredictable. One problem to be overcome is how you will store this energy.” (2.3a Industry)
- “Now is a big risk. If there’s no wind, there’s no generation of energy and you do not have a way to store it.” (2.3a Public administration)
- “Yeah, that’s a problem, because when using nuclear energy you have a high capacity factor, ie, the plant is guaranteed.” (2.3a Science)
- “Yes, it could happen, if it becomes too dependent on renewable sources, as I have mentioned a little earlier, they depend on the weather, if there is wind, or whether it is night or day. Therefore you cannot be very dependent on these sources, you can have other sources such as nuclear energy as a reserve for when there is a supply need.” (2.3a Science)



Brazil

- “To my knowledge, the technology of transmission and storage in Germany still needs to be improved. If there is more exhaustion or leak in the transmission and storage, the cost would be increased, the output of electricity would be less, and the price would go up. In this respect, I think there is still room for improvement.” (2.3a Industry)
- “If they wish to replace nuclear energy with all renewable energy for electricity generation during the process of energy transition, equipment transformation and technological development must be completed soon, otherwise it might lead to insufficient supply of the energy needed. In general, I still have some concerns over the security of energy supply.” (2.3a Industry)
- “Temporarily, the energy supply in Germany will become more intense. Because nuclear energy takes up about 20% in Germany now, this is a big proportion. Abandoning nuclear energy might cause energy shortage.” (2.3a Science)



China



South Africa

- "I think security will only be assured by having neighboring countries who can fulfill shortages of renewable they are not in a position to supply." (2.3a Industry)
- "They can't provide security unless they buy electricity." (2.3a Industry)
- "Well a lot of renewables, there's a problem with security of generation because a lot of them are weather dependant, whereas coal or nuclear you can generate regardless of the weather or conditions so I think there is an issue around security of generation,..." (2.3a NGOs)
- "I don't think it's going to be as secure as having nuclear." (2.3a NGOs)

Environmental and climate protection

The Energiewende as a step towards better environmental and climate protection; negative side effects not to be ruled out

"The environment protection is actually the outcome of the energy transition."

*Business representative,
China*

- The large majority of respondents viewed the Energiewende as an **environmentally and climate-friendly policy change away from fossil and high-risk fuels towards low-emission, low-risk energy sources**. In this sense, Germany's energy policy changes were fundamentally regarded as a step towards better environmental and climate protection. Hardly any of the experts surveyed in the three emerging countries questioned the Energiewende in terms of it being conducive to the climate and environment. Almost all of the respondents expected that Germany would experience positive climate and environmental net effects from switching to renewables.
- Nevertheless, the experts from the surveyed countries also displayed awareness of the **negative side effects of the Energiewende** for Germany's climate and environment. Cited issues included disfigurement of the landscape, changes in land use (wind, solar, grid expansion) and noise pollution (wind). Also identified were the increased GHG emissions caused by panel manufacturing (photovoltaics), by the expansion of fossil-fuel production as a bridging technology, and by the provision of fossil back-up capacities (coal, gas) for base-load production.
- As well as emphasising the fact that the Energiewende has negative side effects within Germany, some experts also pointed out the possibility of **transfer effects**, that is, **environmental and climate issues** being **exported** to other countries. One aspect addressed in this context was the financial incentive for high-consumption, high-emission industrial sectors to relocate abroad. This harbours the risk that the positive climate and environmental effects of the Energiewende will be restricted

to Germany, while the negative effects increase elsewhere, with the overall net effect remaining largely the same.

- A few experts voiced concern that the Energiewende would have a **very low overall global impact** if the restructuring of the energy system was limited to just Germany. At the same time, there was hope that Germany's efforts would encourage other countries to follow suit, which would give Germany's Energiewende a positive global effect in the medium term.

The Energiewende as a step towards better climate and environment protection

- "I think it's is very good because you're taking the electric matrix out of power plants, thermal power plants, coal, natural gas, etc., which intensify the greenhouse effect and then you're putting energy sources that are much less evasive into the environment instead." (2.3b Industry)
- "Look, this is the most positive aspect of this change: the concern with environmental issues is a concern that needs to happen worldwide." (2.3b Parliament)
- "If you change the energy matrix by a matrix that is much cleaner and with less emission of consumed particles per unit of energy consumed, it will happen." (2.3b Public administration)
- "I think it's a form of environmental protection. This policy maximizes the environmental protection mechanisms used today." (2.3b Science)
- "I think the effect is favorable because it goes toward reducing the demand of natural products, at least in energy and greenhouse gases." (2.3b NGOs)



Brazil

- "The environment protection is actually the outcome of the energy transition." (2.3b Industry)
- "I think the energy transition in Germany, if it is successful, would contribute to the environmental protection. For example, to use natural gas to replace the current non-renewable energy sources for power generation is a very good way of protecting the environment." (2.3b Public administration)
- "This can definitely reduce the climate-damaging greenhouse gas emissions, reduce energy consumption, and is beneficial to the environment." (2.3b Science)



China



South Africa

- "I am of course positive to it. First, as EU is actively urging its members to raise their goals of emission reduction, Germany can play a role in energy transition by protecting climate and environment with its action and act as a leader in the world as well. Second, theoretically, the more oil and coal are replaced with renewable energy, the less greenhouse gases such as CO₂ would be emitted." (2.3b NGOs)

- "Well, it is a big move towards that because their goals are reduction of greenhouse gases. Reduction of using fossil fuels, going for more sustainable forms of energy." (2.3b Industry)
- "I think it will go far to reduce greenhouse gas emissions and it will also help to influence the agenda for the international program to reduce greenhouse gases." (2.3b Science)
- "I think it's a very good step forward that will actually present more pollution and perhaps it will restore the environment to as much as possible natural levels that existed before." (2.3b Science)

Negative side effects for the climate and environment



Brazil

- "If it gives up nuclear power right now, it'll have to consume more coal until the new renewable energies are available. Then, this, at first, this decision to forgo nuclear energy could lead to an increase in emissions." (2.1b Public administration)
- "What we have worked in the Ministry is the idea that it doesn't work thinking that renewable energy alone is friendly, environmentally speaking." (2.3b Public administration)
- "The only issue that deserves more attention is when it comes to wind on the territorial issue. I believe it will be in the sea, which brings up fewer problems in this regard, but the portion of the land has to be done carefully, even considering the population density in Germany, which is higher than Brazil." (2.3b NGOs)
- "I just think the issue of coal is a little dangerous, because most of that nuclear power will have to be replaced by power coal and gas plants." (2.3b NGOs)

- “The negative aspect is the environmental pollution. For example, the generation of solar energy is still harmful to the environment. When producing solar energy equipments, there are wastes and litters which might do harm to the environment as well.” (2.1b Public administration)
- “The German energy transition does harm to the environment at a certain level. For example, manufacturing of solar energy equipment pollutes the environment at a certain extent.” (2.3b Science)
- “Towards the critical thing of this energy transition at my point of view, because no nuclear power, it may increase the amount of the use of coal; while the amount of coal increases, so as the carbon dioxide, followed by increasing greenhouse gases, and this would be a very serious problem.” (2.1b Science)
- “... For example, a part of the energy consumed in Germany is transmitted from Poland and Russia. In such a case, pollution is shifted to Poland and Russia, and thus is still harmful to the global environment.” (2.3a Science)



China

- “Well I think in the short term it’s actually bad because turning off nuclear reactors and supplementing it with coal is worse.” (2.3b Industry)
- “..., the renewables they have an environmental footprint, because if you’re going to install wind farms, you need a lot of land, ..., so there is an environmental footprint, however, in terms of carbon emissions, renewables they’ve got very little carbon emissions, so it will be a plus for carbon emissions and for the rest of the environmental footprint.” (2.3b Industry)
- “... you know there are negative impacts about having lots of wind generation infrastructure, there are certainly negative impacts there, but you know there is no free lunch,...” (2.3b Science)
- “Again, I think that you know, what would be an impact, would be the visual, the landscape I mean they’ve been very good about landscape design in Germany.” (2.3b Science)



South Africa



Transfer effects and limited global impact



Brazil

- “It doesn’t work if Germany is a clean country when countries like China, India, Brazil, have an dirty expansion of the generation park. So from the standpoint of mitigation of the effect of greenhouse gases, we cannot just look at Germany isolately. The impact on the industry pushes companies to reallocate plants; industries go to China and continue their emissions over there. Then the benefit is zero – or even negative; this on my point of view of greenhouse gas.” (2.3b Industry)
- “I do not know how much Germany power means to the world, but by my calculations, today it represents 13% of global energy. So it is not very significant. If this program in Germany took place in China or the U.S., then the two together would consume 25% of world energy, then the impact on the environment would be much more significant.” (2.3b Public administration)



China

- “However, regarding overall situation, it will only have a light impact. As long as other countries continuously generating carbon dioxide, greenhouse effect still exists, even the carbon emission in Germany is reduced to zero. It is utterly inadequate to the global environment protection. I think the key is that the countries, such as America, China and India, which use the most energy, reduce the emission of carbon and sulfur.” (2.3b Industry)

Economic feasibility

The Energiewende has high start-up costs, but is a good investment in the future

- Assessment of the economic feasibility of the Energiewende varied depending on whether the respondents opted for a short-term or a long-term perspective. Virtually all of the experts from the three countries saw the Energiewende as being associated with **high start-up costs**. Due to the high generating costs from renewables compared to other energy sources, the high investments required for the construction of new plants, grids, storage systems and back-up capacities, and research and development costs, the Energiewende was viewed in all three surveyed countries as a very expensive project in the short and medium term. However, there also was a widespread view that Germany – being a wealthy industrialised nation – could shoulder these transitional costs. Several experts also pointed out that the environmental costs of conventional energy generation have only partially been reflected in energy prices to date.

- Looking at the economic feasibility of Germany's Energiewende from a **long-term perspective**, the assessments were generally more optimistic. The costs for generating and supplying electricity from renewables were predicted to drop over time. In this context, some of the experts also pointed out the long-term cost benefits of a supply grid based on renewables as opposed to fossil fuels in the light of the natural resource shortages to be expected from a global increase in energy consumption.
- When assessing the overall economic feasibility of the Energiewende, remarkably few experts from the three surveyed countries drew on a **macroeconomic cost perspective** that also took the effects on other economic sectors into account. However, if the experts' responses to the economic advantages and disadvantages of the Energiewende are included, different assessments in relation to the short-term and long-term effects emerge. For the short term, there was a prevailing view that the Energiewende would have a rather negative macroeconomic effect, specifically a loss of competitiveness and jobs in individual industrial sectors, as a result of rapidly rising energy costs. For the long term, on the other hand, the Energiewende was expected to lead to higher exports and employment.

High start-up costs, decreasing long-term cost

- "Renewable energy is currently more expensive than conventional. ... , some of the reasons are: you have a low production rate of renewable technologies that, as a matter of scale, raise the price of these technologies..." (2.3c Science)
- "There is no doubt the cost is higher, because these new generators, particularly in relation to energy that is being converted from solar to electricity... Nevertheless, the cost is coming down, that is, an increase in production means more manufacturing and the tendency is that the cost will come down." (2.3c Science)
- "I think in the beginning they will have to invest a little more. There is a willingness of the government to see that, and then the cost drops significantly." (2.3c NGOs)



Brazil



China

- "Currently, the energy transition is non-profitable, or can only gain a very tiny profit, or even, its prospect is not optimistic. But in the long run, it's already laid a good foundation for the future development, and is making steady progress in the areas of technology, production, and people's awareness." (2.3c Industry)
- "The energy transition can save costs. German lacks of natural energy resources except coal. Oil and natural gas are all imported. So the transition to renewable energy resources can help Germany get rid of dependence on importing traditional energy resources from other countries, and can allow it to control the costs of energy resources as well." (2.3c Industry)
- "New energy belongs to a rising industry, so heavy investment at the beginning stage is needed, as well as the support from the Government. As the technology develops, Germany might get increased benefits at the later stage." (2.3c Public administration)
- "As regards to the long-term benefit, to develop renewable energy resources will definitely be better than using traditional ones. The German energy transition will promote the development of technology related to solar and wind energy. Then, the costs of using solar energy, wind power, and geothermal energy will be lower than using nuclear power." (2.3c Public administration)
- "The costs caused by the environmental pollution are not covered by the current electricity price. If includes the cost of pollution, it might be higher than the cost of generating electricity by renewable energy sources." (2.1b NGOs)



South Africa

- "In our experience in our country, if you go to renewables you pay at this stage more, but I think in the long run, when you take all the direct and indirect costs and consequences and the impact on the environment, it will work out then in an efficient way, but maybe short term it will have a cost premium, but maybe on the long term of you look at direct and indirect costs, it will have a positive economic spin." (2.3c Public administration)
- "Well it's said that renewable energy will cost more but I'm sure as the technology increases that the tipping point will come where it becomes just as viable as coal based or other fossil fuel based energy sources." (2.3c Public administration)
- "I think over the long term it is going to be considerably more cost effective as the prices of conventional energy gets more and more expensive." (2.3c NGOs)

Macroeconomic cost perspective

Negative

- "Energy is getting very expensive and we try to protect it. But it is expensive for the home consumer, and this compromises the income that will be lacking for other investments and other expenses." (2.1b Industry)



Brazil

Positive

- "Transforming from the thermal or nuclear power generation into new energy power generation can stimulate the economic development, upgrade energy technologies and equipments, and enlarge exports." (2.1a Industry)
- "The German energy transition is highly beneficial to the sustainability of economy and industry of Germany. The benefits will mainly impact the economy, energy policy, and the burden to people's life." (2.1a Public administration)
- "Ideally, energy transition will bring a positive impact to the German economy ultimately." (2.3c Science)



China

Negative

- "I think if the implementation is too fast, it would cause industrial crisis." (2.1b Industry)
- "Moreover, the sudden energy transition has a certain impact on its industrial development and people's life. After all, the very quick increase of electricity price makes the expenses of each household be higher. All these impacts are negative." (2.1b Public administration)
- "In the long run, the energy transition can improve Germany's international influence and economic competitiveness. However, at the initial stage of transition, it might cause economic burden on Germany." (4.1 Science)



South Africa

Positive

- "I think it's gonna be on a large scale, it's also got to be like creating more job opportunities also and seeming that they a first class country that they can produce energy actually cheaper then." (2.3c Public administration)



- "I think it is expensive but there are motives to undergo this expense and in the medium term there may be benefits in terms of technology development and therefore export opportunities." (2.3c Science)
- "I think it will stimulate a lot more entrepreneurship and jobs in a new greener energy sector, so Germany is obviously aiming to be at the cutting edge of that technology, which it will be able to sell worldwide." (2.1b Science)

Negative

- "So I am sure with careful planning and a staggered implementation of this thing, I don't know of the 2022 goal for the nuclear thing is achievable but it is obviously going to hurt their economy but I think they will be able to manage it." (2.3c Industry)
- "It's going to negatively impact on that. Germany will be in the short run be left competitive economically wise against countries who still use nuclear and coal." (2.3c Science)