



THE PERCEPTION OF GERMANY'S 'ENERGIEWENDE' IN EMERGING COUNTRIES

RESULTS OF QUALITATIVE INTERVIEWS
ON GERMANY'S TRANSFORMATION
OF THE ENERGY SYSTEM IN BRAZIL,
CHINA AND SOUTH AFRICA



Konrad
Adenauer
Stiftung

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About the study

This study was conducted by infratest dimap on behalf of the Konrad-Adenauer-Stiftung (KAS). Within the KAS, the study was a joint project involving the departments of European and International Cooperation and Politics and Consulting, with the Political Dialogue and Analysis and Empirical Social Research teams taking the lead at the working level. The contents and structure of the expert interviews were determined in collaboration with specialists at infratest dimap, based on input from earlier workshops.

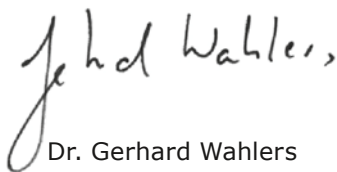
From 5 November 2012 to 18 January 2013, a total of 121 telephone interviews were conducted in Brazil, China and South Africa using a prepared script. Local research institutes carried out the interviews, with infratest dimap serving as the lead German institute. The qualitative structured interviews, whose results are not representative, were recorded, transcribed and translated into English. The target groups included experts from business, politics, public administration, science and civil society who were informed about Germany's Energiewende. Members of parliament were interviewed in Brazil and South Africa; however, this was not possible in China. This study is based on the report prepared by infratest dimap (see Chapter 6, Appendix on the study).

Foreword

It was not that long ago that Germany embarked on an ambitious plan to have the Energiewende. The objective is to make the country's energy supply more sustainable through a three-pronged approach of expanding the use of renewable energies, identifying new ways to increase energy savings, and reducing harmful greenhouse gases. This is a sensible strategy for a country that has relatively few fossil-fuel resources. At the same time, as an industrial nation that produces few greenhouse gas emissions in comparison to other countries, Germany could have a substantial impact on global energy policy by setting a positive example. However, it is already clear that we must first overcome a number of technological and societal challenges that will require a real commitment from us all. Yet if we succeed in switching to renewables while also achieving security of supply, cost-effectiveness and climate protection, Germany will be in a strong position for the future.

In addition to the German domestic political debate over implementing the Energiewende, the issue has also taken on an increasingly European and international dimension. This study allows us to broaden the scope of the debate to include the perspective of emerging countries. These nations are already the world's leading energy consumers and will play a pivotal role in any attempt to create sustainable global economic growth. The interviews show that most of the reservations partly held in Europe about Germany's Energiewende are not shared by energy experts in Brazil, China and South Africa. In fact, these individuals believe that some elements of Germany's Energiewende can be transferred to other countries. However, first and foremost, there exists a desire to share in the experiences and knowledge that we in Germany are gaining. For KAS's future work, this translates into new ideas and opportunities for shaping dialogue on energy policy and defining strategies. You will find further results and insightful analysis in this study.

I very much hope you find it interesting and thought-provoking.



Dr. Gerhard Wahlers
Deputy Secretary-General
Konrad-Adenauer-Stiftung e.V.

Putting the results in context

Germany's energy-supply system is undergoing a major transformation – one that is driven by the Federal Government's commitment to implementing far-reaching measures that will expand the use of renewable energies, reduce energy consumption and lower the level of harmful greenhouse gases. Germany's Energiewende is not only important in terms of domestic policy, but is also increasingly taking on a foreign policy dimension. International trends such as the United States' efforts to achieve energy independence, the rising global demand for energy (led by emerging countries), and the increased number of climate-change regulations at the national level are radically redrawing the world energy-policy map. Germany's Energiewende is part and parcel of these global changes. However, as a leading industrialised nation that aims to switch its energy supply almost entirely to renewables, Germany has a special role to play.

Looking at international developments, it is already clear that today's emerging countries will have a particularly decisive impact on global energy policy. This will require Germany to engage in a more intensive dialogue on energy-policy issues with these countries, making a strong case for an Energiewende that is economically feasible and environmentally friendly while guaranteeing security of supply.

The present study should help to foster this type of dialogue on energy policy. To this end, qualitative interviews were conducted in Brazil, China and South Africa with a select group of experts from business, public administration, civil society, science and politics in order to find out how Germany's Energiewende is perceived.

Experts in the surveyed countries cited Germany's interest in environmental and climate protection, increased competitiveness over the long term and security of the energy supply as the main reasons for its Energiewende. They interpreted the Energiewende as a comprehensive environmental and climate initiative motivated by strategic economic considerations.

Environmental and climate protection policies that reduce harmful greenhouse gases received a particularly positive assessment. Germany's plan to phase out high-risk nuclear power in the medium term was also viewed in a favourable light. In the area of economic development, the respondents expected that the conditions for the development and marketing of new technologies that provide competitive advantages internationally will improve even further. Respondents were of the opinion that this could also spur growth in other economic sectors. Overall, they assume that Germany's Energiewende will have a global knock-on effect. Mature Germany technology capable of being mass-produced at low cost could lead to an even greater transfer of German technology to emerging countries, they said.

On the other hand, the respondents also perceived negative aspects regarding Germany's Energiewende. Many of the experts were of the view that the high start-up costs resulting from high energy prices and investments in grid expansion could pose risks for industry, employment and competitiveness in the short term. In addition to this, they regarded the timetable for implementing the switch as overly ambitious and pointed out that it could be seen as being inconsistent with climate targets. Furthermore, some experts pointed to unresolved technological issues such as fluctuations in and storage of renewable energies.

From an overall perspective, the experts surveyed regarded Germany as playing a vanguard role in energy policies that promote the use of renewable energies. They perceived this Energiewende to be an extraordinary project due to its scope, costs, timetable and unprecedented nature. However, the favourable conditions in Germany, mainly because of its industrial strength, and an urgency caused by growing dependence on electricity imports were also seen as factors. The decision to pursue the switch was also viewed as being part of a global trend toward renewable energies, one that is driven largely by ambitious climate policies in Europe. Thus, according to some of the experts surveyed, Germany was predestined for the pioneering role.

The three main components of energy policy – climate protection, security of supply and economic feasibility – show that the Energiewende is fundamentally perceived as an environmentally and climate-friendly project on a grand scale, but also as one that can have side effects. Looking at the security of the energy supply, respondents emphasised the importance of long-term independence from energy imports, while at the same time pointing to the technological problems that still need to be solved. When assessing economic feasibility, Germany's Energiewende was regarded as an investment with high start-up costs, but with long-term benefits.

With regard to the question as to what extent Germany's Energiewende could serve as a model for the surveyed countries, the study first inquired into the current energy-policy targets in the respective countries. Brazil aims to secure a clean energy mix by tapping into additional renewable energy sources, while China places a strong focus on increasing energy efficiency, reducing harmful greenhouse gases and promoting clean energy sources. South Africa, on the other hand, plans to gradually diversify its energy mix by switching from coal to renewables and nuclear power.

Based on these findings, the study was able to define how Germany's Energiewende might impact on energy policies in the surveyed countries. One positive effect here was seen as lying in a general learning effect, which includes a keen interest not only in technological solutions but also in the planning, management and organisation of the process of switching to renewables in Germany.

Experts also expressed the hope that technology transfer would occur; for example, this could involve the development of joint production plants. Furthermore, they hoped that a positive outcome of Germany's Energiewende would have a motivational effect, one that would encourage the elites in the surveyed countries to take further steps toward sustainability. On the other hand, they did not expect Germany's Energiewende to have any direct negative effects. However, experts did point out that a direct transfer is almost impossible to imagine due to differences between the countries. They particularly feared that the lack of local expertise and qualified technical staff could create problems. The study showed that from the perspective of the surveyed countries, the transfer of certain elements of Germany's Energiewende makes absolute sense; wholesale copying, however, would be counterproductive.

When making a general assessment of Germany within the context of global trends, particularly with regard to the long-term economic and energy-policy considerations, the countries surveyed regarded the country as well positioned for the future, in spite of short-term risks related to price and cost increases. There was a consensus among the experts that Germany's energy-policy plans will be worthwhile in the long term.

1 SUMMARY: RESULTS

The experts surveyed in the emerging countries saw Germany's Energiewende in a different way to people in Germany. While debates in German politics and the German media focus on the problems, costs and risks involved, these three countries clearly saw the potential in the switch. Of course, from a short-term perspective, the experts did discuss problems such as energy security and energy costs. Yet, surprisingly, the countries barely registered public protests against the measures involved in the Energiewende, as they tended to ascribe a high level of ecological awareness to German society.

From a long-term perspective, however, the experts almost completely overlooked the problems. One of the most significant findings was the positive overall image Germany enjoys in the three countries. The experts thought that, although Energiewende was an ambitious project, Germany, of all countries, would succeed in making it a reality. Germany was regarded as a country of planners that is quick to get a handle on its problems. The experts said that Germany's future independence from raw material imports would be one of the positive long-term effects. Given that Germany lacks raw materials, the experts considered the decision to make the switch to be entirely logical. They believed that it would bolster Germany's economic power in the long term, and some even talked of Germany being a model for a new industrial revolution. The Energiewende will therefore have a positive global impact and will provide an initial impetus for other countries. If Germany's switch proves a success, it can serve as a blueprint for other nations. The experts also saw distinct competitive advantages on the global market. German products will no longer just be "made in Germany", they will be "made with green energy in Germany".

Attitudes to Germany's Energiewende: differences between the three countries



South Africa

- Sees itself as a developing country
- Prioritises economic goals
- Has resource issues (money, expertise)



Brazil

- Refers to traditionally clean energy mix
- Has resource issues (money, expertise)



China

- Very interested in technology, very self-confident
- Sees the Energiewende as a project for industrial policy

Attitudes to Germany's Energiewende: differences between the groups of experts

Industry/
Administration

- In favour of gradual changes
- Emphasise economic prudence
- Interested in technologies (industry)
- Interested in implementation (public administration)

Science

- Feasibility depends on technological breakthroughs
- More likely to question the security of energy supply

NGOs

- More critical of energy policies in own country
- Favour a faster transition
- Favour larger-scale restructuring/stronger alignment

2 STATE OF KNOWLEDGE ON THE ENERGIEWENDE



2.1 GOALS

Perceived goals of the Energiewende:
environmental and climate protection +
global competitiveness + political security
of supply

- All three emerging countries saw Germany's Energiewende as being linked with **diversifying the energy mix** in favour of renewable energies. The dominant view was that Germany's switch entails the reorganisation of the energy system as a whole. Aspects above and beyond changing the energy supply in Germany, such as energy-efficient building refurbishments and the transport sector, were given less consideration by the experts in all three countries. However, promoting energy efficiency was often mentioned as a further component of the Energiewende.
- As expected, all three countries mentioned **environmental and climate policy** as a central motivating factor for the Energiewende in Germany. On the one hand, respondents referred (in relation to nuclear power) to deliberately avoiding crises that pose environmental risks, and to the as yet unresolved issue of waste disposal. On the other hand they focused on the fact that expanding renewables to replace fossil fuels will reduce climate-damaging greenhouse gas emissions.

"It is all about climate change and reducing the carbon footprint."

Representative of the administration, South Africa

- In all three countries, respondents said that they assumed Germany had **strategic economic goals** such as technology development and making German industry more competitive in the global market for renewable energies and energy efficiency. It was striking that this view of the Energiewende as a project of industrial policy designed to promote national industries is particularly strong in China.
- Some experts considered that the decision to make the Energiewende was also driven by **political** considerations of improving **security of supply** in Germany. They thought that the main goal of the Energiewende was to reduce the dependency on certain energy sources (nuclear power, coal), on imports (oil, gas, uranium) and thus on price levels in the international raw materials and energy markets.
- Only in isolated cases was the primary motivation behind Germany's Energiewende seen as lying purely in **domestic policy**, i.e. as being about responding to anti-nuclear demands from large sections of the population and from environmental interest groups.

Environmental and climate-policy motives



Brazil

- "The first has a connection to greenhouse effect gas, combined with gas energy. Then we have the goal of building or developing a national industry of green technologies, solar, wind, and all equipment you need to develop this matrix. Then we had the goal to get rid of nuclear energy and to maintain a certain popular pressure precisely on this issue of disposing the nuclear fleet." (1.2 Industry)*
- "The main goal is to mitigate environmental impacts and climate changes in search of sustainability." (1.2 Parliament)
- "I think that's sustainability, a cleaner energy that causes less damage to the environment and lower risk due to the Japanese nuclear problem." (1.2 Parliament)
- "I understand that the most important point is the search for replacement of non-renewable fossil energy, and especially nuclear, by clean sources, clean energy." (1.2 NGOs)

* The abbreviations at the end of the quotations relate to the questions and to each group surveyed. You can find an overview of these on pages 86 and 87. Respondents' statements are given in their original form and have not been edited.

- “The main objective is to promote clean energy and reduce environmental pollution. This is good. The main issues are phasing out nuclear energy, develop wind power, solar energy, and hydro power, etc.” (1.2 Industry)
- “Global warming and deterioration of the environment of the entire world make the energy transition a trend of development. The strategic goal in energy sector is to use renewable energy resources, such as wind, solar, and hydro power, to replace non-renewable energy resources such as coal and oil.” (1.2 Industry)
- “The main objectives are to reduce energy consumption, emission, and air pollution.” (1.2 Industry)
- “The main objectives are reducing climate-damaging greenhouse gas emission, reducing energy consumption as well as electricity use, and improving energy efficiency.” (1.2 Science)



China

- “Look it is about environmental foot print and going green to as to support intergenerational life going forward for the next generation.” (1.2 Industry)
- “Given the climate change, the main aim of this project, around energy, is to ensure that later we have got the support and sustainable energy or green energy initiatives.” (1.2 Parliament)
- “It is all about climate change and reducing the carbon footprint.” (1.2 Public administration)
- “Well it seems they want to go green on energy and also amongst others they want to decrease their dependence on nuclear energy, ...” (1.2 Science)
- “First of all to reduce the CO₂. To go to energy sources that... they are not based on fossil fuel.” (1.2 Science)



South Africa

Strategic economic motives



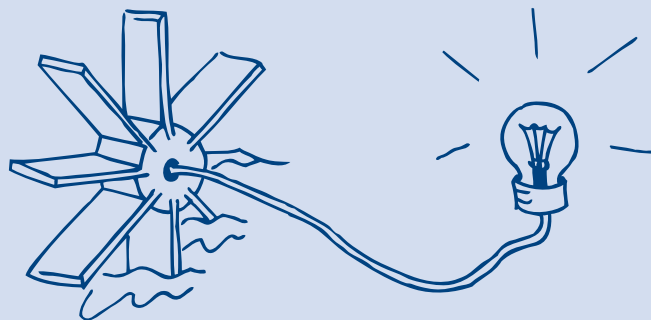
Brazil

- "...Then we have the goal of building or developing a national industry of green technologies, solar, wind, and all equipment you need to develop this matrix." (1.2 Industry)
- "The industrial development, which generates new jobs. In Germany, job creation related matters were the main reason why the government kept it going." (2.1a Science)
- "...Also I can think of a new economy. I mean... new sources of wealth and jobs. What we're talking is green economy." (1.2 Science)
- "I think Germany is interested in strategically positioning itself as a global supplier of cutting edge technology in this area." (1.2 NGOs)



China

- "The first issue which is the most important is to increase economic benefits." (1.2 Industry)



- "First, energy transition can help German build the leading role at the aspect of energy technology." (1.2 Industry)
- "Regarding the further meaning, besides environment protection, Germany is seizing the future market of energy. German has very advanced technologies on producing new energy equipments, such as solar panels, wind-powered electricity generators. Through energy transition, aside from realizing the goal of environment protection, Germany can also seize the enormous energy market in the background of energy exhaustion in future." (1.2 Industry)
- "Therefore, in the short run, Germany's objective is to protect environment. In the long run, it is to seize the energy market in future." (1.2 Industry)
- "I think German is ready to start the next industrial revolution. Germany regards its renewable energy technology at a leading position all over the world." (1.2 NGOs)

- "...And I also think they hope to lead in the technology development of renewable energy." (1.2 NGOs)



South Africa

Political motive: security of supply

- "What we see here is more about gas, so what I see in relation to gas is that it's a country that produces little, gas from oil and the internal market is basically imported from Russian." (1.2 Public administration)
- "So it is a question of sustainability which is admirable but there is also a question of self-sufficiency that is how Germany will energetically support itself without depending too much on importation." (2.1 Public administration)
- "Well there are two basic ones (goals) which are reducing imported energy and reducing the dependence on fossil and nuclear energy." (1.2 Science)



Brazil

- "Also being short of energy resources – for example, 80% of oil is imported – Germany can guarantee its energy supply by adopting this policy." (1.2 Industry)
- "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)



China

- "I think they're probably looking at some energy independence, because remember, Germany, especially for heating, they rely on gas from Russia and the situation sometimes does become volatile so I think they're looking for energy security coupled with a bit of energy independence." (1.2 Industry)



South Africa

Domestic policy motives



Brazil

- "...Then we had the goal to get rid of nuclear energy and to maintain a certain popular pressure precisely on this issue of disposing the nuclear fleet. I think it was the government's decision, except to popular pressure that the chance of the moment after Fukushima occurred." (1.2 Industry)
- "I imagine it would have been due to the pressure of the population in relation to environmental issues following the problems caused by the tsunami in Japan." (1.2 Science)



China

- "The main objective of government leaders is to fulfill the wishes of people." (1.2 Public administration)
- "The main reason is the ever stronger protest against nuclear power among the German public after the Japan nuclear crisis." (1.2 Public administration)



South Africa

- "Political. They playing to the anti nuclear lobby." (1.2 Industry)

- Improved security of supply, the development of competitive advantages for German industry, and optimised environmental and climate protection were mentioned by all target groups as the three main factors motivating Germany's Energiewende. However, the respondents' sectors determined which of the goals they linked most closely to the Energiewende. Respondents from industry and from ministerial administration in all three countries were more likely to assume motives that aim to increase the security of the energy supply and to create technological advantages. Scientists and representatives of NGOs from all three countries, on the other hand, were more likely to believe that the Energiewende is primarily driven by environmental and climate issues.

2.2 INFORMATION BASIS

Where the experts get their information: the internet beats traditional media in Brazil and China

- In **Brazil** and **China**, **online news portals and websites** are among the most important sources of media information on the energy policy discussion in Germany. Given the global shift from traditional media towards the internet, both countries are less likely to use print media and television as sources of information on Germany's Energiewende. NGOs in China are obviously especially likely to use the internet to obtain independent information; compared to other sectors, their knowledge on the switch is more often based exclusively on online research. Unlike in Brazil and China, respondents in **South Africa** make greater use of **traditional media**, such as television, radio, daily newspapers and magazines, to find out more about the Energiewende in Germany.

Sector-specific information resources

- Aside from the mass-media channels, ways of finding out about Germany's Energiewende vary in all three countries depending on the sector where respondents work and thus on their ability to access special resources. For example, informal and peer-to-peer contacts (including direct contacts to Germany) are used in companies, public authorities and NGOs, while scientists and business people also use specialist publications. In addition to using personal contacts, companies and scientists also rely on congresses, conferences, meetings, forums and seminars. In Brazil, where energy policy discussions have long been part of politicians' daily lives, committee work is an additional information forum where members of parliament can learn about energy policy activities in Germany.

Differences in attention between the countries

- The attention given to Germany's Energiewende and to energy issues in general varies greatly between the three countries. There is a big gap between Brazil and China on the one hand and South Africa on the other – a situation that largely reflects how the countries are at different stages in their energy discussions. Experts in **Brazil** and **China**, for example, were of the opinion that their countries, like Germany, have long since entered a phase of reorienting their energy policies.

"In fact, Germany, just like the entire Europe, is going through a new model of power sector. Brazil's gone through that as well."

Representative of industry, Brazil



Brazil

- "In fact, Germany, just like the entire Europe, is going through a new model of power sector. Brazil's gone through that as well." (1.1 Industry)
- "This (process of energy transition) is taking place not only in Germany, but even here in Brazil." (2.1c Science)



China

- "As mentioned above, China is also engaged in the energy transition." (3.2c Industry)
- "The German energy transition is just a direction, towards which Germany can make efforts to. They are promoting usage of new energy resources. China is doing the same." (2.1c Science)



South Africa

- "So in simple terms, the focus should be first on driving economic growth, giving access to that and thirdly on the climate change, for me. The climate change should not be the key priority because we are not the biggest emitter of greenhouse gases in the world, it's the Chinese and the US." (3.1 Industry)
- "... But as I said earlier, our immediate problem is more in creating jobs and having an economy that shows some form of growth." (3.1 Industry)

- In South Africa, however, the experts dismissed energy and climate issues as having lower priority than economic issues. Pointing to the country's status as a developing country, experts frequently said that generating growth to support efforts to raise living standards was more important than considerations of making South Africa's energy policy more sustainable. Another indicator of the low priority given to energy policy issues in South Africa can be seen in experiences of finding motivated participants for this study. Whereas in Brazil and China there was no difficulty at all in recruiting participants, interest in the survey in South Africa fell well below expectations in some cases. Despite great efforts, it was particularly difficult to persuade South African politicians to take part (see 6.1: Participants).

3 ASSESSMENTS OF THE ENERGIEWENDE



3.1 GENERAL POINTS

Positive aspects of the Energiewende

Environmental and climate benefits, technological impact, global knock-on effect

- As expected, **environmental and climate benefits** were the most positive aspects identified in all three of the surveyed countries. The main talking point was the potential for reducing emissions that are harmful to the climate through the planned expansion of renewables. Many of the experts also included Germany's nuclear phase-out in their positive assessment, regarding this as a move away from a type of energy generation that is perceived as risky and unsafe. Other positive aspects cited included efforts to reduce energy consumption and improvements in energy efficiency.
- In all three countries, Germany's Energiewende was expected to have a positive **technological impact**. The German economy was predicted to benefit from the Energiewende by gaining better conditions for the development, use and marketing of new technologies, and, as a result, competitive advantages on international markets. In some cases, the experts expected that a change in energy generation would also have repercussions for Germany's other economic and societal sectors. An overall embracing of a "greener" economy was predicted, as was a shift towards more economical and sustainable energy consumption.

"It is beneficial for environmental protection. Germany is doing pretty good in protecting environment among all the countries."

*NGO representative,
China*

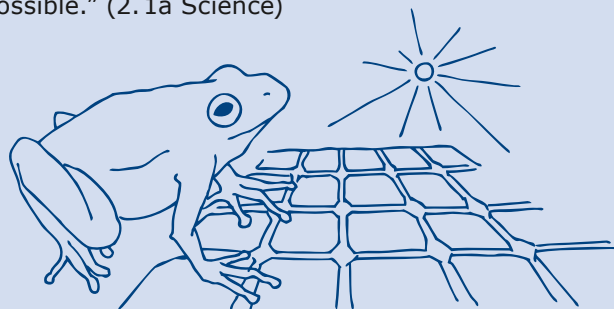
- Lastly, there are hopes that Germany's Energiewende will have a **global knock-on effect**. Other countries are expected to follow Germany's example in terms of practical implementation, and to make use of the technologies developed and readied for commercial production as part of the Energiewende. It is expected that supplying the global market, as well as the higher turnover associated with this, will result in positive cost effects that could also lead to more affordable imports of new green technologies by emerging countries. There is also hope that technology will be transferred to developing countries. In economies that have competitive suppliers of such technologies, domestic industries stand to benefit from export trade as a result of Germany's Energiewende, as is already the case for China's photovoltaics sector.

Environmental and climate benefits



Brazil

- "I see many positive aspects. I think mainly the energy from coal, oil, which are not renewable, is a significant contribution to the greenhouse effect. Then the distribution of this energy has a positive effect when it comes to reducing greenhouse gases and the decrease on the use of renewable sources, which are sources of carbon fixation." (2.1a Industry)
- "It's a template that will do Earth great good. We are living in the Earth's climate changes due to global warming, so the search for models that reduce heating energy is critical." (2.1a Parliament)
- "The most positive aspect is lowering environmental impact, I think that is the main point." (2.1a Public administration)
- "I think what trumps everything is the environmental issue and the reduction of emission of greenhouse gases, and mainly showing that this is possible." (2.1a Science)



- "For those who are environmentalist like me, I think the proposal has basically positive aspects. The first one is to actually minimize the risk of major accidents, to decrease and eliminate nuclear power. And the second is to reduce energy consumption. This I think is fundamental: eliminate waste and reduce the need for energy. The third is to seek energy sources that emit less greenhouse gas, thus contributing to the mitigation of global warming." (2.1a NGOs)

- "It has many positive aspects, but environment protection is the greatest topic. The energy transition in Germany advocates using electrical energy, including wind energy, luminous energy and geothermal energy, etc. The energy it uses comes from nature itself, it can reduce the emission of carbon." (2. 1a Industry)
- "I think to phase out nuclear energy completely until 2022 is good. Also to generate electricity by renewable and recyclable energy sources (e.g. with offshore wind) also finds favor with me." (2. 1a Public administration)
- "It is beneficial for environmental protection. Germany is doing pretty good in protecting environment among all the countries." (2. 1a NGOs)
- "The positive aspects are that Germany can save energy, reduce consumption, and develop renewable energy sources." (2. 1a NGOs)



China

- "The positive aspects for me are obviously more renewable energy, and also very particularly the reduction in energy intensity in industrial processes, because that it a big thing for us." (2. 1a Industry)
- "Well obviously the reduction in carbon dioxide emissions. It will be very good for the climate and also reduction in consumption and making everything more energy efficient, is going to then reduce strain on the whole infrastructure of energy provision. So just getting smarter about not wasting energy, I think is what it is all about." (2. 1a Science)



South Africa

Technological impact

- "First, because Europe has more resources, especially in relation to the countries of the southern hemisphere, it has the opportunity to experience these new technologies and invest in alternative energy generation." (2. 1a Public administration)
- "I think that the main positive aspect is that Germany will be a pioneer in a scientific effort to innovate and make these renewable sources become more economically and financially viable." (2. 1a Public administration)



Brazil



China

- "I believe the entire question on sustainability, sustainable cities and all that concerns it, of high relevancy. Cutting back on the greenhouse effect gases will only depend on their emission, basically. Cutting back on electricity or a more rational use of it would be perfect, as long as there was a change of habit by the consumers. For the increase of productivity, new technological advances must be achieved. New construction techniques in order to reduce consumption of electricity is something important that is already on the agenda..." (2. 1a Science)
- "...Secondly, there will be a much greater development in the areas of engineering and technology in order to generate energy. So people may be looking towards a new era in terms of energy development." (2. 1a Science)
- "Well, I have already said that it is a question of technology in itself, I mean, the investment and creation of dissemination; gain in scale, after a stronger investment in this technology." (2. 1a NGOs)



South Africa

- "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 on-going German energy transition allows Germany to have a leading position around the world in the energy aspect." (2. 1a Industry)
- "First, German government will increase investment for energy transition, including investment for technology, human resources, and raw materials. With strong support by government, Germany will get improvement in technology." (2. 1a Public administration)
- "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)
- "The positive aspect is to improve the technology development in Germany." (2. 1a Science)

- "I think Germany will be recognized as leading the world in this particular way." (2. 1a Industry)
- "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)

Global knock-on effect

- "...Obviously Germany as a country which exports technology to the rest of the world can be a source of technology that services the world." (2. 1a Parliament)
- "This technology brings good things to many countries including Brazil." (2. 1a Industry)
- "..., I think it is interesting when a country like Germany that has the possibility to invest in those new forms of technology, makes it cheaper to other countries in order for them to do about the same, to learn and follow that model, according to their possibilities. Something that would be very interesting, if they are not thinking about it, would be the possibility of transferring that knowledge to other countries, mainly the countries in development, and most especially to the BRIC countries." (2. 1b Public administration)
- "I believe that investment in research in pursuit of innovation in the use of technology, will make it possible for the results they got to make significant gains and be a model for other countries as well." (2. 1a Public administration)
- "I see as a absolutely beneficial position in the context of international agendas for the balance in energy use and emissions. ... And we hope it will be a model to be adopted by other countries." (2. 1a Public administration)
- "I know that there is a German company, Siemens, which has been a world leader in solar panels for converting solar energy into electricity. I think that if it were possible to make the price cheaper globally, it would be something that would be very welcome." (2. 1a Science)



Brazil

- "... the German energy transition will have a certain impact on the economic structure of the whole world." (2. 1a Public administration)
- "German performs very well in the use of new energy sources and there are a lot that are worth being learnt by other countries." (2. 1a Science)
- "If the German energy transition takes progress quickly or works very well, it can serve as a model for the whole EU and for the rest of the world as well." (2. 1a NGOs)
- "Germany reduces the usage of traditional energy and increase that of new energy, which might boost China's photovoltaic market." (2. 1a NGOs)



China



South Africa

- "It is great for other people in the world, because we can use them as an idea and a benchmark of what they did and see how ... it will help them to help us." (2.1c Industry)
- "I think it is progressive and it is something that should be watched and learned from." (1.2 NGOs)
- "It could be a possible change in the world that would assist humanity,..." (2.1a NGOs)

Negative aspects of the Energiewende

Costs, extent, unresolved technological issues

- In all three countries, the majority of the experts surveyed had a positive overall view of Germany's Energiewende and of the course it is taking. Negative aspects were not so much voiced as fundamental objections to the project per se, but rather as conjecture regarding **implementation risks and obstacles**. However, some of the experts surveyed had difficulties naming any negative aspects.
- In all three countries, the **cost issue** was viewed as the most critical aspect. The start-up costs involved in the Energiewende were generally perceived to be very high due to the high generating costs for renewables, as well as the necessary investments in plant and grid capacities. With regard to the cost factor, the experts also anticipated negative economic repercussions, at least in the short term, for the industrial sector, employment figures and international competitiveness. Cost was also viewed as a core issue in domestic energy consumers' acceptance of the Energiewende; in many cases, it was also seen as being of socio-political significance. In the event of the Energiewende being delegitimised due to costs, some concerns were expressed that political backing for the switch may not continue in its present form. In addition, the implementation of Germany's Energiewende was seen as being vulnerable to external factors such as the country facing increased financial strain as a result of the euro crisis and the global financial and economic crisis.
- However, some of the reservations expressed addressed the **extent** of the changes associated with the Energiewende, as well as its proposed **timetable** until 2020. There were also concerns about having **no nuclear power** at all in Germany's future energy mix, accompanied by a huge expansion of renewables. Several experts could not (yet) imagine the full-scale replacement of nuclear energy by renewables in light of the current situation; some even see this replacement as being inconsistent with environmental policy goals such as the reduction of emissions that damage the climate. This last response was frequently backed up with the expectation that any nuclear phase-out would entail a short- or

"The cost of solar energy is more expensive than nuclear energy, for example. So they had to give up a Fund of several million or billion euros to finance this initiative."

*Business representative,
Brazil*

medium-term increase in fossil-fuel use. More fundamentally, a number of experts – particularly from China and South Africa – regarded nuclear power as a clean energy source. Lastly, several experts suggested that the **time frame** for the implementation of the Energiewende was overly ambitious given the magnitude of the proposed changes.

Cost issues

- “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)
- “The cost of solar energy is more expensive than nuclear energy, for example. So they had to give up a Fund of several million or billion euros to finance this initiative.” (2.1b Science)
- “I think there is a great challenge that is the final cost of energy. So that is a challenge. I wouldn’t say that is a negative aspect. It is a challenge. ” (2.1b NGOs)



Brazil

- “The cost of new energy and clean energy is much higher than that of the regular ones, so German government pays a kind of allowance when implementing energy transition. Although this kind of allowance helps the corporations to a great extent, it increases the burden on end consumers.” (2.1b Industry)
- “I think if the implementation is too fast, it would cause industrial crisis. The electricity price will increase.” (2.1b Industry)
- “The negative aspects are, first, the price of energy might increase and the energy expenses for ordinary people might go up; second, too quick transition might stir up social unrest.” (2.1b Public administration)
- “The negative aspects include, first, current energy enterprises might encounter problem on profit, and have conflict with government. Second, the economic costs for the energy transition is relatively high, so Germany needs to consider issues of economic benefits.” (2.1b Science)
- “In the short term, the negative aspect is mainly the higher costs of renewable energy resources vs. traditional energy resources such as fossil ones. But I think Germany is ready for the energy transition, because they ought to be well prepared before making the move.” (2.1b NGOs)



China



South Africa

- “The negative aspects is that the electricity prices are going to solar, they are going to increase phenomenally. So in other words the cost of doing business in Germany will increase and the cost of consuming electricity will increase, which means then the input costs in general will increase. Well I think that is the big one and it may limit Germany’s competitiveness globally.” (2. 1b Industry)
- “Um, well obviously there does mean that there are a lot of costs that have to go into the whole transition.” (2. 1b Public administration)
- “Well I think it will be very expensive.” (2. 1b Science)

The radical nature of the Energiewende (extent, total nuclear phase-out, pace of implementation)



Brazil

- “Focusing again on solar energy: when there is Sun, there is energy; when there’s no Sun, there has to be a backup. So sometimes the backup pollutes more than the system we had before.” (2. 1b Industry)
- “I think we have to evaluate the issue of nuclear power, apart from the impact there was with the accident in Japan. But if nuclear energy is conducted within the strict standards of safety, I believe it is something that should not be thrown out. I found the position of the German Government very inflexible in that field. Flexibility to seek stricter safety standards.” (2. 1b Parliament)
- “I think that nuclear energy is not a bad energy and Germany cannot forgo nuclear energy now. 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)
- “Nuclear or hydropower energy is stable, plants operate day and night, so there can never be a country where you can have 100% of its energy from photoelectric cells or through wind, they have to be complemented, there is no doubt. So you cannot totally abandon nuclear energy with this program.” (2. 1b Science)

- "I think the energy transition in Germany is somewhat radical. Despite the relatively good base, to completely change the energy resources, which provide energy to its economic pillar, heavy and light industry – is a bit risky. I think it would be more secured for Germany to extend the time frame needed for the transition." (2.1b Industry)
- "I think the German energy transition is definitely not able to be achieved within a short period, with the development and economic strength of Germany both being restrictions for the investment to this reform." (2.1b Public administration)
- "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)
- "The negative aspect is that Germany may focus on the energy transition too much, so its development speed is too fast. Of which I assume dangerous is that if Germany can not find the new energy to replace nuclear energy in time,..." (2.1b NGOs)



China

- "They have to fill the hole they left by turning off their nuclear power plants in the short term." (2.1b Industry)
- "If I'm correct, they're going to supplement the alternative sources with coal fired power stations, we have the greenhouse gas emissions on that side." (2.1 Public administration)
- "There is a challenge to do it quickly..." (2.1b Science)
- "Well I think it is good to move to renewable energy, but I think it is a mistake to move away from nuclear energy." (2.1b NGOs)



South Africa

Technological and geophysical challenges



Brazil

- "Focusing again on solar energy: when there is Sun, there is energy; When there's no Sun, there has to be a backup. So sometimes the backup pollutes more than the system we had before. So in the case of Germany, we speak of nuclear and solar energy. And so we go and put on batteries. There we have the first problem: battery is also a residue that will cause problems in the future. "Ah, but we're not going to use the battery. We will use the backup". I do not know what this backup energy is. If it is a thermal energy or gas, the project is not 100 % sustainable." (2. 1b Industry)
- "I don't know if it would be negative, which is different than being critical. But today the renewable sources of energy that they are betting a lot on, which is the solar and wind power, are intermittent sources. So there is a security risk in the system and I think that is a critical point." (2. 1b Parliament)
- "I was a little amazed regarding solar energy, because they have very little sun." (2. 1b Parliament)
- "Let's say you have a big city and that energy is being generated there for a place that focuses more on solar energy, so if there is not enough solar energy, you will have to transport energy from other places. The system is very interlinked. The fewer plants you have, the fewer the problems of instability. This new technique of having a number of small plants is not very well managed yet, one of the reason relates to the differences between them, so that the quality of energy, that is, so that consumers continue to receive energy without fluctuations or interruptions. So we have to say that there are some problems." (2. 1b Science)



China

- "For the negative aspects, I think their technology on applying new energies may not catch up. The currently using energies, including solar energy, wind energy and petroleum energy, need new and more advanced technology to improve its utilization efficiency, including transform solar energy and wind energy to electricity." (2. 1b Industry)
- "...Furthermore, technology in the new energy sector is not mature and stable enough." (2. 1b Public administration)
- "The objectives of energy transition are not achievable with the current technology." (2. 1b Science)
- "The technology of renewable energy in Germany is not mature enough. If it quits using traditional energy in a short time, there might be shortage of energy supply." (2. 1b NGOs)

- Another category of reservations about the Energiewende primarily concerned **technological** and **geophysical issues**. These were predominantly voiced by experts from Brazil and China. Perceived technological issues included the yield variability associated with renewables, energy-storage difficulties, and the resulting load and stability issues for the grid. This last aspect included doubts about the extent to which renewable energies could be sufficiently supplied in a densely populated industrial nation in the northern hemisphere.
- **Germany's unilateral approach** was one last negative aspect identified by a small number of experts. On the one hand, this reflected a basic disappointment with the fact that other countries have not taken on similar measures to Germany's or are not yet following Germany's example. On the other hand, there is a critical view of the fact that Germany's Energiewende is not addressing Europe's cross-border electricity market. It was pointed out that even if Germany shuts down all of its nuclear power plants, it may still continue to consume nuclear-generated electricity purchased from neighbouring countries.

"In my opinion Germany should have more support."

*Business representative,
Brazil*

Germany's unilateral approach

- "In my opinion Germany should have more support." (2.1b Industry)
- "They're (Germans) already importing from France, mainly nuclear, and the Czech Republic. Austria has been building some nuclear plants and they are trying to sell to Germany. This in some way deters the politics related to renewable energy in Germany, for it imports it from other countries." (2.1b NGOs)



Brazil

Overall view of the Energiewende

Pioneering decision to some, to others an expectable global trend

- In none of the three countries was there a consistent opinion on whether or not Germany's Energiewende is an unusual decision. Some of the experts regarded Germany as having a **pioneering, vanguard role** in energy policies. This unprecedented role-model character was also perceived within the framework of Western industrialised countries. The experts were aware that there are no benchmarks or blueprints for the process of switching to renewables. In this context, Germany's decision to pursue the switch was regarded as remarkable. Some of the experts also perceived this decision to be extraordinary due to the **extent and pace of change**, and the **extent of costs** that it entails.

The Energiewende as an extraordinary decision



Brazil

- "I would say that is something extraordinary and different from what I have seen in other countries. It is extraordinary because they are fairly damning targets in Germany, and we don't see that in other countries." (2.1c Public administration)
- "I see it as something extraordinary, whereas we have no reference from other countries that have had this courage. So is an exceptional effort." (2.1c NGOs)
- "I see it as an extraordinary and very innovative and courageous measure. And I think Germany has the structure, it has ways to keep taking such innovative, courageous measures." (2.1c NGOs)



China

- "I think it is relatively a kind of extraordinary development. Because Germany is the first country who claims to totally abandon nuclear energy. I really appreciate the attitude to innovation." (2.1c Industry)
- "I consider the concept of the German energy transition is extraordinary, and it needs a rather long time for implementation." (2.1c Public administration)
- "In this field, Germany does better than other countries. In the future, Germany will be the leading role in all aspects of energy development, which will be an advantage for its development." (2.1c NGOs)



South Africa

- "I think it is extra ordinary. It is obviously a first world movement." (2.1c Industry)
- "No it's progressive. It's not the ordinary because the other countries are still struggling with the technology around renewable energy,..." (2.1c Public administration)
- "If they actually do what they say it is extraordinary and quite a leading trend for the rest of the world." (2.1c Public administration)
- "Well I think it is something extra ordinary. I wish it was normal, but I don't see the same happening in any other countries." (2.1c Science)
- "I think it shows great leadership and I think it is a very good initiative." (2.1c NGOs)

- While not necessarily questioning Germany’s pioneering role in energy policies, a number of experts nevertheless did not regard the Energiewende as an extraordinary decision because they saw Germany as predestined for it. The reasons given for this were not only a resource-driven urgency to adopt new energy policies, but also Germany’s favourable economic and socio-political conditions.
- From the perspective of the three emerging countries surveyed here, Germany’s **first-world-country developmental standard** is advantageous for the Energiewende. As a rich, highly developed industrial nation, Germany is perceived to have the necessary research and technology resources, as well as the capacity to invest in such resources as required. In tandem with this, Germany’s economic and industrial structure, as well as its demographic projections mean that its energy needs are stagnating. This also makes it easier to undertake changes in energy policy.
- Some experts were of the view that Germany’s decision to Energiewende simply resulted from its **own particular energy-resource situation**. As the country lacked domestic fossil fuels and relies on electricity imports, a medium-term reshuffling of the energy mix to include more renewables did not seem to be a surprising development, they said.
- Many experts were of the view that the German public’s **high awareness of environmental issues** made it easier for political decision-makers to establish a new energy mix, simplified downstream opinion-shaping processes and discouraged NIMBY* phenomena. In the same context, experts also pointed to Germany’s past environmental policy decisions. Part of Germany’s Energiewende was thus regarded as a result of a continuous development that is following a **historical path**.
- However, a sizeable number of experts declined to recognise Germany’s pioneering role per se on grounds of Germany’s Energiewende being a symptom of **European** and indeed **worldwide endeavours to introduce more climate-friendly policies**. This view is most prevalent in Brazil and China, quite possibly because the topic has already been on these countries’ own energy policy agendas for a long time.

“Not extraordinary. Well it’s a first world country. ... And technologically is very advanced.”

*Science representative,
South Africa*

* *Not In My Back Yard*

An Energiewende to be expected from a highly industrialised nation



Brazil

- "From my perspective the German model is consolidated on the basis of a highly developed society, a society of high, but stabilized, energy consumption." (2. 1c Industry)
- "I think it is a normal outcome from the development of the country, I think society leads to that." (1. 2c Industry)
- "The first thing I see is that Germany wants to and can do this. As far as I can see it has a settled consumption curve, and I believe that I even consider myself a descendent nowadays. The population has been stable for a long time even with a slight tendency to decline. A first world country with cutting-edge consumption is a rich country so it can afford to try a different matrix..." (1. 2c Industry)
- "I think this is a natural process in developed countries, particularly a very developed country, where the governing class and those in government have a lot of awareness and respect for future generations and towards a future that is environmentally sustainable, so I think it is a policy that is worthy of praise, but I do not see it as a natural stage of development." (2. 1c Public administration)



China

- "In terms of Germany's development, the energy transition is compatible with its economic power and technological development. So I think it's natural and normal." (2. 1c Public administration)
- "The energy transition can be regarded as a kind of normal development for Germany, because this issue will be taken into consideration by every country if they have reached a certain stage of development." (2. 1c Science)
- "This is basically a kind of normal development. Due to the developed economy and limited fossil energy resources, Germany needs to make the transition to renewable energy resources for maintaining the sustainable economic development." (2. 1c NGOs)



South Africa

- "No (not extraordinary) I think for them, because they are European economies, so it is almost a normal transition." (2. 1c Industry)
- "I see it as a normal development, because as I said earlier on, it's largely driven by the EU directive, because remember all the EU countries,..." (2. 1c Industry)
- "Not extraordinary. Well it's a first world country... And technologically is very advanced." (2. 1c Science)

The Energiewende to be expected due to Germany's lack of local resources

- "No. I think it's a normal process. Because Germany does not have many sources of energy. It is a relatively small country with a very large population. So it is natural that Germany had to put the brain to work and look for new ways to get energy."
(2.1c Public administration)



Brazil

- "At least, it's normal development for Germany. Germany needs oil for its industrial development, but there is no such deposit there. And they cannot rely on the resources that don't exist in the country."
(2.1c Industry)
- "The German energy transition is a kind of normal development. Germany is not self-sufficient with its energy sources, imports a lot, and is greatly dependent upon the import."
(2.1c Science)
- "German doesn't implement the energy transition voluntarily, but is forced by current situation, without other alternatives. Coal and oil will both be exhausted in the new future. So in order to produce sufficient electricity to meet daily needs, Germany has to find other ways."
(2.1c Science)



China

Germany's Energiewende to be expected due to Germans' high environmental awareness

- "I don't think Germany needs to put forth an extraordinary effort because they've been dealing with this for a long time and they've been improving and have learned a lot, especially from the solar issue... The big change was made in the past."
(2.1c Industry)
- "Society is so well developed that they have the luxury of stabilized consumption. This is a widespread concept in Germany, the social masses already think this way."
(2.3b Industry)
- "I think they've been following a path and there isn't anything so special about that..."
(2.1c Parliament)



Brazil

- "I think this is a normal development and is in line with the national conditions of Germany."
(2.1c Public administration)



China

- "In Germany I think it will be a relatively easy, the transition. In order to get political buy in, it would be relatively easily done in Germany, I don't think it would be so easy in South Africa."
(2.2 NGOs)



South Africa

The Energiewende is also part of a global trend



Brazil

- "Today there is a global awareness of this sustainability issue, new sources of clean energy generation, so I think it's a matter of always having a sense of involvement in this effort, following the worldwide trend." (2. 1c Industry)
- "I think Germany is going towards this direction because the whole world, society is seeking sustainability and working with fossil material, with nuclear power which isn't the most appropriate." (1. 2c Industry)
- "This is taking place not only in Germany, but even here in Brazil." (2. 1c Science)
- "Look, in fact, the goal that the whole world has is trying to become self-reliant on the issue of energy and currently seeking renewable energy sources as well." (1. 2c NGOs)
- "Look, I think that is the result of development within the context that the world presents." (2. 1c NGOs)



China

- "I think it is a kind of normal development. Because the whole world realizes that we can not totally rely on the existing energies any more, like nuclear energy and coal, and we should adopt sustainable and environmentally-friendly energies like water power and wind power, which are mechanical energies and are renewable." (2. 1c Industry)
- "The direction is normal. Many countries, including China, will follow this direction in the future." (2. 1c Industry)
- "The German energy transition is just a direction, towards which Germany can make efforts to. They are promoting usage of new energy resources. China is doing the same." (2. 1c Science)
- "The energy transition is a major global trend due to the shortage of oil resources as well as environmental pollution." (2. 1c Science)
- "As a person engaging in environment research, I think the German energy transition a normal development from the global perspective, and is only one step forward than other countries." (2. 1c NGOs)

Limited knowledge about the political implementation of the Energiewende

- Among the surveyed experts from all three countries, there was virtually no in-depth or practical **knowledge** about the **political implementation of the Energiewende** in Germany. When asked to assess the German government's actions in this field, the majority of respondents displayed a very **superficial understanding** and struggled with their answers. The main reason given for this difficulty in responding was a lack of insight into domestic German politics. Many respondents also chose not to evaluate the political implementation of the Energiewende, but again assessed the decision itself in terms of its degree of innovation, feasibility, scope of change, investment costs, etc.
- The few answers that did address the **implementation process** of the Energiewende were very diverse. Respondents assessed the rate of progress¹, the programme-planning efficiency², and a number of factors that could aid³ or obstruct⁴ further implementation of Germany's Energiewende. Again, responses were largely of a general nature and did not directly address the actions of the coalition currently in government.

1 China: "Despite the difficulties and problems in the beginning stage, German energy transition process is in a stable stage now." (2.2 Public administration)

2 Brazil: "In Germany, where planning is inherent to their culture, I think it is very well planned." (2.2 NGOs)

3 South Africa: "I think there will be wide support for it, because I think it is on the wish list of a very large percentage of the citizens." (2.2 Industry)

4 Brazil: "I think Germany will find a resistance of economic lobbies, possibly from oil and coal industry, which is the source for Germany." (2.2 Industry)

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)

4 AN ENERGIEWENDE IN THE SURVEYED COUNTRIES?



4.1 DISCUSSIONS ON ENERGY POLICY IN THE SURVEYED COUNTRIES

The situation in Brazil



Maintaining the clean energy mix by tapping additional sources of renewable energy

- The experts surveyed differed widely in their assessment of the extent to which Brazil is on the right track. While politicians and business representatives took a positive view of the country's efforts to date, the verdicts of NGOs, scientists and some respondents from the private sector were frequently more **critical**. A lack of long-term planning, conflicting decisions and insufficient incentives for private investors in the renewables sector were some of the features of Brazilian energy policy that they considered unsatisfactory.

- "Keeping the renewable matrix the way it is and making more efforts to bring in a greater amount of other renewable energy such as wind – which is already used but we need more – biomass, solar and SHPs." (3.1 Industry)
- "Brazil needs to continue its expansion policy, where he has the opportunity to combine a series of renewable energy." (3.1 Industry)
- "Ah, Brazil is already showing a trend towards use of renewable energy, right. Crescent basically biomass." (3.1 Industry)

- “We must launch a diversification of the energy matrix here, we’re stuck the hydroelectric plants and I think Brazil offers conditions to diversify and seek models that have less impact.” (3.1 Parliament)
 - “Brazil has its policy for seeking its energies such as hydroelectric power which is reaching its limit, our production is large. ... But Brazil is still in line with some hydroelectric lines, thermoelectric from sugarcane bagasse, and is beginning to discuss the possibility of trash. The question of photovoltaics, or solar energy, is strongly emerging in Brazil. So we have a big basket full of energy matrixes here in Brazil and it’s essential so as not to neglect or focus on just one. Of course here in Brazil the focus is very much on hydropower.” (3.1 Parliament)
 - “Brazil has an enviable energy matrix, more than 75% is renewable, so it’s a completely different situation from Germany. And right now we are, for example, in the ten year plan of electricity expansion and the goal is to have a wind energy auction for up to 10% of the energy matrix.” (3.1 Parliament)
 - “It is important to see that we have one of the cleanest energy matrixes in the world. ... Now we need to evolve, and the steps for that, as I said, are given toward wind energy, reducing impact hydro-power, seeking alternative biomass. Anyway I have a reading that we’re on the right track.” (3.1 Public administration)
 - “We, unlike Germany which depends on something around 30% of nuclear energy, we have an even greater dependence on hydropower, more than twice, are 70%. In other sources are almost symbolic the allocations. Yes, Brazil needs a very fast way to encourage and stimulate the production with other sources, especially those sources that are renewable, you know, like wind, solar and also the biomass part. So think Brazil should now follow this path similar to that Germany already has intensified.” (3.1 Parliament)
 - “Brazil is something a bit complicated because we’re way behind on clean energy, like wind and solar, but it is very advanced in hydro. I think Brazil has advanced even in the environmental suitability of the dams that are now much less striking than before, I think the major route from Brazil is proceeding with the hydroelectric plants and gradually increase the solar, wind and biomass, because we have fantastic conditions for this.” (3.1 NGOs)
- The energy experts differed very little in their assessment of **hydro-power**, which they widely support as the “clean backbone” of the Brazilian energy system and do not question. However, large hydropower plants such as the Belo Monte project drew criticism from representatives of NGOs on account of their adverse impact on the environment. Other problems mentioned were issues of security of supply during dry periods and the high grid investment costs needed to link power plants to conurbations.

The role of hydropower

- “There are some leaders in the country who are going against the Belo Monte, in my opinion this is a lack of technical information, there is a movement of Globo artists speaking, I think they are people who were induced to speak without technical knowledge and are talking a lot of nonsense, that’s my opinion.” (3.1 Industry)
- “I think this is an urgent issue; we are not against hydroelectric power stations, if they don’t have large social and environmental impact and they are dispersed into small and medium-sized hydropower stations. In fact, this madness of millions of kilometers of cables, they are totally crazy.” (3.1 Parliament)
- “So I think the biggest problem in Brazil today is get rid of that stigma of hydropower, electricity as something harmful to the environment, as indeed it is not.” (3.1 Public administration)
- “The use of the Amazon land for projects that raise much controversy is very questionable, either for the difficulty for distribution or for its impacts on the environment, or even for the reduction of the potential in generating energy during part of the year.” (3.1 Science)
- “The Belo Monte plant, despite all the controversy, did not require as much destruction as plants such as Itaipu and others. So I believe that there is a need to carry on capturing hydro energy, since once it is captured it is not polluting and it is very safe.” (3.1 Science)
- “In Brazil it’s very different, because we have a hydroelectric capacity that is not explored and building dams in the Amazon, like the Belo Monte, is not good.” (3.1 NGOs)
- “So you have to work to generate energy from renewable sources and thus end up with this story that hydropower is clean energy because it is not. So thus also harness the potential of hydropower in a more sensible, right.” (3.1 NGOs)

- The Brazilian experts focused remarkably little on what role **nuclear power** and **pre-salt oil reserves** should play in diversifying Brazil’s future energy matrix. When they did, however, opinions varied widely. There is no clear consensus either on nuclear power or on exploitation of the oil fields off the Brazilian coast.

The role of nuclear power

- "...We should reduce the thermal ones as much as possible, gas, coal, including the nuclear station which is still scheduled."
(3.1 Industry)
- "About nuclear energy, I think Brazil shouldn't go down that way. We should concentrate on the resources which have a strong potential, as much as wind power, solar power and hydroelectric power station."
(3.1 Industry)
- "The expansion of biomass are coming with greater force, now when we think in a decade, certainly has room for gas, nuclear, and the amount of wind and biomass." (3.1 Public administration)
- "We are going to carry on having our hydroelectric stations, this is a competitive advantage that Brazil has, but unfortunately, we will also invest in nuclear power, contrary to the direction Germany is taking."
(3.1 Public administration)
- "Even nuclear energy. I do not think something as dramatic as well, which is an energy that generates no emissions..."
(3.1 Public administration)
- "I think that we also need to have nuclear plants in order to diversify our energy mix, because it is energy that is always available if we need it." (3.1 Science)
- "Yes, Brazilians have to walk to try to decrease nuclear power entirely, we still have some." (3.1 NGOs)

The role of pre-salt oil reserves

- "We will not have the pre-salt question soon, then the gas on the one hand is welcome, it is a fossil fuel, reasonably clean, and as much as others can give you security energy." (3.1 Industry)
- "I think that oil is a finite product, I mean there are tanks, we've discovered things such as pre-salt but it is finite and also polluting."
(2.1c Parliament)
- "What we are doing is madness and the prospect of the pre-salt, so that we can get more fossil fuel. This is a very difficult moment for Brazil. The focus is wrong." (3.1 Parliament)
- "I think the negative impact on Brazil could be mid-term as Brazil prioritizes the replication of the current model, that is, if Brazil continues to go down the hydroelectric path and bet more on pre-salt, as it is, to generate a volume of energy focused more on conventional thermal technologies, it will lose innovation and competitiveness."
(3.2b NGOs)

The situation in China



Improved efficiency and emissions reductions, promotion of clean energy sources – including nuclear power

- The Chinese experts were virtually unanimous in their view that conventional energy sources, especially coal, would continue to play a major role in their country's energy supply for the foreseeable future in order to ensure security of supply in the face of China's growing demand for energy. They therefore regarded a **gradual change** as a realistic scenario for the future development of Chinese energy policy. Key aspects of this policy should include **improved energy efficiency** on both the production and the consumption side and **continuous expansion of renewable energy sources** (wind, solar, hydropower). In the view of the experts surveyed, China's future energy policy should also focus on **technology-driven emissions reductions** in the use of conventional fuels and on the **introduction and monitoring of environmental and safety standards**.

- "Our current technology might block the process of energy reformation. New energy can not completely replace the existing energies in China, coal is still one of the major energies." (3.1 Industry)
- "What China should do is, first: increasing the reserves of conventional energy sources; second, putting "energy conservation and emission reduction" into practice, instead of treating it just as a slogan; and third, which is also the most essential, is attaching nationwide importance to the environmental protection." (3.1 Industry)
- "China has made perfect industry standards and policies about pollutant control. However, the implementation was bad. Thus I think China should make higher and stricter standards in energy industry." (3.1 Public administration)
- "I think in China, the proportion for renewable energy resources should be increased to around 30% in the next several decades from now." (3.1 Public administration)
- "It's not quite possible for China to apply new energy sources such as wind and solar power on a large scale. China should right now focus on increasing the use efficiency of traditional energy sources such as coal, and control the using amount of them." (3.1 Science)
- "Currently we should put focus on energy conservation and emission reduction, instead of the development new energy resources." (3.1 Science)
- "First, to improve the efficiency of energy use. 70% energy in China is generated by consuming coal, so the improvement of use efficiency of fossil energy resources is beneficial to economic development, reduction of pollutant emission, and decreasing the impact on climate." (3.1 NGOs)

- “China should increase the percentage of new energy sources in the future. The environmental pollution is quite severe in China. And the neglect of environmental protection will ultimately harm our own interests in the future.” (3.1 NGOs)

Improved efficiency and emissions reductions, promotion of clean energy sources – including nuclear power

- There was widespread agreement among the experts on the future role of nuclear power in the Chinese energy supply, irrespective of the sector they represent. The majority were in favour of **keeping nuclear power** in the Chinese energy mix, while some experts even supported its expansion. Only a few voices called for nuclear power to be scaled back or phased out entirely, as in the German model.

- “With our current technologies, we could replace some nuclear power by other energy resources. However, if we want to replace nuclear power fully, we need more time to improve our technologies. China needs decades or even longer to develop the technology for energy transition.” (3.1 Industry)
- “In long term, I think China still needs to develop nuclear power. China has greater demand on electricity than Germany, due to population and production base, therefore, China encounters more resistance than Germany when implementing energy transition... In the same time, we should develop nuclear power as soon as possible. When we have advanced technology utilizing nuclear power, we can control the pollution to very low level. However, we should be cautious and make stable development on nuclear power, since it still has pollution to environment.” (3.1 Industry)
- “China should continue with the use of nuclear power, while should use solar, wind, and hydro power as auxiliary energy resources.” (3.1 Industry)
- “First, China should reduce the proportion of energy generated by coal consumption and hydro power plants, accelerate nuclear energy use, develop renewable energy resources appropriately, such as geothermal and flammable gas.” (3.1 Public administration)
- “We should continue with the use of nuclear power. To abandon nuclear power in China is unrealistic. Using renewable energy sources exclusively cannot meet the demands of economic development in China.” (3.1 Public administration)

- “China cannot abandon nuclear power at this stage, because it’s the only very mature energy industry besides thermal power industry, while renewable energy sources are not. So the energy transition of Germany would be a very meaningful reference, but there is still a gap for China to implement this policy.” (3.1 Science)
- “It’s impossible for China to follow Germany’s path of energy transition. There are two things China should do: First, greatly improve the utilization of renewable energies. Second, moderately develop the usage of nuclear power, under the precondition of guaranteed safety.” (3.1 Public administration)
- “I think China should also stop using nuclear energy. Because China has a large population, and where we build our nuclear power stations owns high density of population, so it is very dangerous. Nuclear energy does not take up large proportion of our energy, even we give it up, the influence on our economy and energy supply is not great.” (3.1 NGOs)
- “At the same time of developing renewable energy, our country should make sure of the security of nuclear power, and popularize the fundamental knowledge of nuclear energy.” (3.1 NGOs)

The situation in South Africa



Experts want gradual diversification: less coal, more renewables and nuclear power

- The South African experts assumed that their country’s energy structure would continue to be **primarily based on domestic coal** for some time yet. In view of the current importance of coal for the energy supply, South Africa’s state of development, and the growing demand for energy from industry and domestic consumers, many of the economic experts in particular argued against a rapid shift towards sustainability. They emphasised the need to strike a balance between energy-intensive catch-up development and the requirements of a greener and more climate-friendly energy policy.

- “I think I South Africa in particular we still have a collaborative approach, wherein we go green gradually but at the same time we are being mindful of our sources of energy that we have, which are largely really fossilized – that is now coal that has been turned into electricity. So we need to balance it, not rush into your space of renewable, that could be very costly and damage the economic situation of the country”. (3.1 Industry)
- “...But as I said earlier, our immediate problem is more in creating jobs and having an economy that shows some form of growth. So I think a slow conservative approach by phasing in more sustainable energy.” (3.1 Industry)
- “Oh ok, remember South Africa it’s a developing country so you’ve got pockets of the country which is very developed and we also have large pockets that are underdeveloped.... So in simple terms, the focus should be first on driving economic growth, giving access to that and thirdly on the climate change, for me. The climate change should not be the key priority because we are not the biggest emitter of greenhouse gases in the world, it’s the Chinese and the US.” (3.1 Industry)

- Nevertheless, the majority of the experts surveyed in South Africa wanted to see **the country reduce its use of coal** in the long term. They pointed to the problems of South Africa’s almost complete dependence on a single energy source and the emissions that result from using coal to generate electricity. However, the respondents were of the view that the necessary diversification of South Africa’s energy mix should proceed in several different directions and should not focus solely on increased use of a single energy source. The experts mentioned both inadequate financial and technological resources, as well as the absence of the necessary political will and capacity to act, as possible obstacles to the diversification process.
- The **expansion of renewables** is regarded as a diversification option in South Africa. In view of the favourable geophysical potential for renewables, the experts particularly supported increased investment in **solar and wind energy**. They regarded greater **use of nuclear power** as a second diversification option. The experts focused on gradual change in South Africa’s future energy mix and mentioned efficiency aspects significantly less often.

- "Well I think they got to wean off coal and put more nuclear in and wait for the renewable to catch up." (3.1 Industry)
- "I think the percentage of renewables should be increased. I think there must be support for initiatives that contain the amount of CO₂ emissions from the coal fired plants. I think the reliance on coal must be reduced. And I believe that nuclear is a viable alternative for South Africa, because of the limitations on access to hydro power in South Africa." (3.1 Industry)
- "We should go the same route, invest more in alternative sources but also educate the masses in terms of saving electricity so that the current power that is generated from our coal fired power stations, the demand is also reduced from the grid." (3.1 Public administration)
- "It's renewable energy policy should be updated and increased because of our abundance of solar energy in this country." (3.1 Public administration)
- "Well I think that we need to take a leaf out of the German book and start taking alternative energy very seriously. So you know my feeling is to start phasing out coal, we cant do that immediately, but certainly over the next 30–40 years to phase out coal. Stay well clear of nuclear and yet invest heavily into alternative energy sources." (3.1 Science)
- "I think in South Africa we should also move a little bit away from coal and focus more on for instance solar energy which we have abundance of in South Africa. We should become very much more energy aware especially our big companies. The small households and the people using small amounts of electricity can also contribute to that but our big energy consumer is the big industry should look at ways in which they could decrease their dependence on energy." (3.1 Science)
- "So I would suggest that perhaps South Africa should invest in solar energy by about sixty per cent. And I would also suggest a nuclear power for some years to come. I think it should be a combination of the two. Nuclear power stations and solar energy. And about ten percent wind energy." (3.1 Science)
- "No I think there should be a gradual change to renewables, I think they should not discount nuclear, I think they should decrease their reliance on coal fired power stations, because that's where we get a lot of acid rain and pollution problems..." (3.1 NGOs)
- "Well renewable energy, sun solar and wind, as well as nuclear. I think you have to go nuclear and reduce the use of coal power stations, I think they causing tremendous impact." (3.1 NGOs)

4.2 EFFECTS OF GERMANY'S ENERGIEWENDE ON THE SURVEYED COUNTRIES

Positive effects: learning effect, technology transfer, motivational effect

- Experts in Brazil, China and South Africa saw the positive effects of Germany's Energiewende on their countries' own energy policy as lying mainly in **learning effects** for the gradual expansion of renewable energies in their countries and local improvements in energy efficiency. As expected, the energy experts in all three countries expressed keen interest in technological solutions. They were also interested in the planning, organisation and management of the process of switching to renewables in Germany.
- In relation to the relevance of new technologies to the field of renewable energies and energy efficiency, the experts were **hoping for closer economic and technological cooperation with Germany**. In **Brazil** and **South Africa**, in particular, the experts expected Germany to do more to share its technological lead through the transfer of experience, knowledge and skills. They hoped that technology transfer would involve not only the export of new energy and efficiency technologies but also the construction of plants and elements in their own countries. Since large-scale production of new energy and efficiency technologies will by then be fully mature, the experts expected significant cost advantages. Until then, however, the countries concerned – especially South Africa – will continue to rely partly on financial assistance from Germany, for instance in pilot projects.
- The experts in **China** also quoted the opportunity to acquire mature Western technologies as a positive effect of Germany's Energiewende. However, they also referred to China's innovative ability and saw the Energiewende in Germany as opening up export and sales opportunities for Chinese industry, especially in the photovoltaic sector. In some cases respondents commented very openly on growing cost disadvantages for German suppliers as a consequence of the Energiewende and the resulting competitive advantages for the Chinese manufacturing sector.
- Setting aside economic and technological issues, a few of the respondents believed that a positive outcome of Germany's Energiewende would have a **motivational effect** on their own countries and beyond. Some of the experts hoped that if Germany could demonstrate that the Energiewende is feasible, this would encourage the political and business elites to take further steps towards sustainability and increase society's acceptance of green technologies in general in their own countries.

"Hopefully we can learn from some of the experiences that Germany is going through now in this transition and apply that learning to the strategy in South Africa."

*NGO representative,
South Africa*

Learning effects

- “So I think we should learn from them to avoid the same mistakes, it’s like ‘ctrl+c, ctrl+v’ and get it right here. It’s important to adjust some things to our reality because some things that are good for them aren’t necessarily good for us...” (3.2a Industry)
- “Through experience and learning from mistakes and successes and I think that it’ll be very easy for Brazil to implement these renewables because it has much possibility in view of the geographical conditions and opportunities that nature presents.” (3.2a Parliament)
- “I think Germany will always be a reference in technology. The German institutes that study renewable energy are worldwide known for their top-notch technology and they won’t let that go easily.” (3.2a NGOs)



Brazil

- “China can go over the German energy transition policies, learn technologies and implementation, e.g. how to give consideration to interests of parties.” (3.2a Industry)
- “I think the scientific and technological achievements developed by Germany can be learnt by China, such as bioenergy generation and energy storage.” (3.2a Public administration)
- “China should not only learn the technology, but also the attitude of working and useful experience in all aspects from the Germans.” (3.2a Science)
- “Germany attaches great importance to the development of energy technology and construction of grid during the development of renewable energy resources that is to build supporting facility that keeps up with the development. This can be taken as reference. In addition, to increase energy efficiency by constructing energy-saving large buildings, and to promote energy conservation in related industries are also worth being learnt from.” (3.2a NGOs)



China

- “Well I think probably it is going to be technology wise and then watch this space, how do they transition, how does it damage and affect the economy, how is the response from the industry and individuals and government? In other words we can learn valuable lessons going forward.” (3.2a Industry)
- “Well it is obviously that we could learn lessons from what Germany has done and that it could inform our policy processes as well.” (3.2a Public administration)
- “Hopefully we can learn from some of the experiences that Germany is going through now in this transition and apply that learning to the strategy in South Africa.” (3.2a NGOs)



South Africa

Technology transfer



Brazil

- “No doubt we could benefit from that, by the transference of technology, by the production of energy, besides the great potential our country has, we could do it much better and in a much larger scale, everyone knows that, but the situation remains the same. And of course we could advance a lot with a technical cooperation between Brazil and Germany and bring here all that technology and manufacture all the equipment here, because it is very expensive to import all that large materials, photovoltaic cells, the blades of the wind turbines, etc. So the transference of technology would be very important.” (3.2a Public administration)
- “I think Brazil could benefit in several ways. I mean, not the buyer of this technology, but use this technology even for a partnership and have production strategies. Here in Brazil, we have the biggest wind power bases, but if you think about training, through exchanges, we can contribute in part to technological research.” (3.2a Public administration)
- “There could be partnerships with universities and institutions, they could develop something here and apply it back in Germany. Once our researchers receive incentives from a country like Germany, the universities where these researchers work would grow in general. Brazil could benefit by developing partnerships.” (3.2a Science)



China

- “In many industries in China, we have learned advanced technologies from other countries, which helped us cut down the investment on R&D at the initial stage. However, in many industries, we only learned the superficial knowledge, but not their core technologies. It would be better if we could develop together with partners in foreign countries, and learn the core technologies.” (3.2a Public administration)
- “As for the fields that Germany doesn’t have superiority to China, China can enter. For example, China’s production ability would be needed, it could produce equipment for renewable energy generation and have them exported to Germany. This is beneficial for us.” (3.2a Science)
- “I don’t think to learn from the German energy transition is necessary. In fact, China is superior to Germany in some aspects. For example, solar water heaters are with a relatively high penetration rate in China; also polysilicon and photovoltaic cells are well developed.” (3.2a Science)

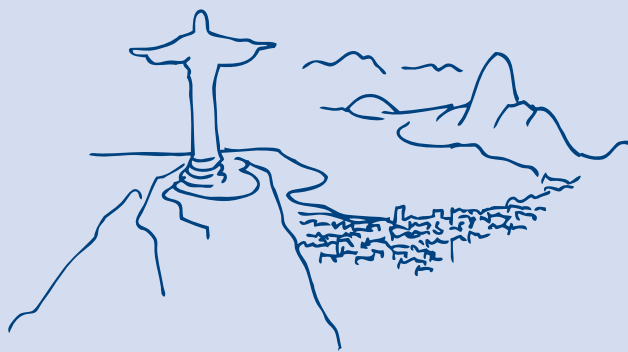
- “So I think the significance is that we don’t have to go and reinvent the wheel. We will be able to enjoy some of their economies of scale in terms of manufacturing etcetera. So I am sure there will be a lot of benefit for us in implementing that future technology because there is no R&D costs.” (3.2a Industry)
- “If Germany was willing to partner with South Africa in terms of technology transfer where South Africa has an opportunity to see the benefits of moving to renewables, but also if there are any opportunities of funding, where Germany can fund pilot projects in South Africa.” (3.2a Public administration)
- “I think they should keep their eyes open and copy the technology that is going to be invented over the next thirty years. And make a technology transfer to South Africa in terms of renewable energy sources.” (3.2a Science)



South Africa

Motivational effect

- “If happens there, it’ll be an example and it can happen here, too.” (3.2b Industry)



Brazil

- “I think that not only Brazil but the whole world could benefit from this German model as long as it becomes successful and becomes a reference. Again, not only Brazil but any country in the world is likely to follow this model when they find out the possibility of improving the energy issue and lessening the environmental impact.” (3.2a Science)
- “That thing of inspiration and provocation, I think that since there is something going well, you will already have more concrete cases here in Brazil to promote as a reference, and with that we could go further.” (3.2a NGOs)



China



South Africa

- “It can remind the Chinese government in making policy to give full consideration to environmental factors.” (3.2a Science)

- “Well, I think if they can demonstrate that it is achievable and come up with technology efficiencies that can be replicated here, then I think it can demonstrate what is achievable.” (3.2a NGOs)
- “Yes, once it is demonstrated, it is possible.” (3.2a NGOs)

Negative effects of simple adoption of the model

- On the issue of negative effects, opinion varied widely in all three countries. Some of the experts did not envisage Germany’s Energiewende as having **any direct negative effects** on their own country, or believed that the effect would only be negative if the Energiewende failed. This was consistent with the widely held positive view of the Energiewende (Chapter 3, Chapter 5). At the same time, however, the belief in slight negative effects was also based on a **perception** of at most **low energy-policy dependence** between their own country and Germany, as well as on **confidence in national decision-making and regulatory sovereignty** in the field of energy policy.
- For example, many of the experts viewed negative effects as likely to arise specifically in cases where external pressure forced countries to make significant modifications to the course of their energy policy. One negative effect that was mentioned, particularly in China, was the **growing international pressure** to speed up and expand the process of making energy-supply systems more sustainable and environmentally friendly. This reflected concerns about deteriorating foreign relations and possible image problems for the country concerned, as well as a fear of measures that are not compatible with the country’s energy-related and economic circumstances.
- Both industry and government experts were concerned about how **unresolved organisational and technological issues would be dealt with** if Germany’s goals for the Energiewende were simply adopted wholesale, as well as about **technical security of supply** and the expected **high investment costs**. As economic consequences of a significant shift in energy policy, the experts mentioned **problems for conventional energy producers and in energy-intensive and high-emission sectors**. In connection with a comprehensive shift in energy policy, the experts in Brazil and South Africa in particular also raised the problem of the **lack of technical expertise and qualified staff**. This was accompanied by a fear that where countries lack their own expertise and investment strength, foreign companies may divide up

“I don’t think there is much of a negative impact if at all.”

*Local government representative,
South Africa*

the national energy supply market between themselves. This problem was also mentioned in China, although in this case in a scenario in which the country failed to catch up with the West in terms of technology.

No negative effects expected

- "I do not think so because our land availability is much larger and has a greater capillarity in power generation." (3.2b Parliament)
- "No, not in Brazil, it is very improbable. We don't export energy, we export oil." (3.2 Public administration)
- "At first, no. At first, no. ... They do not import Brazilian energy, right. So it will not impact in any calendar marketing." (3.2 Public administration)
- "I don't think so, I don't think German is dependent on Brazil in terms of energy. Germany doesn't buy coal, gas, oil from Brazil. I mean, Germany doesn't import any energy input or technology from Brazil so I don't see any impact in this regard." (3.2b Science)



Brazil

- "The German energy transition isn't much relevant to China. So China is not under especially negative impacts. Germany has its own practice in energy development and so does China too." (3.2b Science)
- "There isn't specific negative impact on China. China has relatively good energy complementarity, with different key energy forms in various places. Germany has different environment and water resource situation vs. China. So their policy might not necessarily be suitable for us." (3.2b Science)
- "I don't think it will have a great negative impact on China, because different countries have different conditions." (3.2b NGOs)



China

- "I don't know of anything that would have a negative impact." (3.2 Industry)
- "I don't think there can be any." (3.2 Public administration)
- "I don't think there is much of a negative impact if at all." (3.2 Public administration)
- "I can't really see it actually, no they may be something but I can't at the moment get the link between Germany's energy and ours." (3.2 NGOs)



South Africa

Negative effects expected



Brazil

- "This issue of renewable energy is extremely expensive and inefficient. They'll want to bring this idea over here and then subsidize it to enable this more expensive energy. It'll affect our production and energy cost in a bad way. The cheap energy would have to subsidize the expensive one." (3.2 Parliament)
- "Look, the only thing we can't allow to happen is that any kind of radicalism takes over. ... Ideally, the dream is that we only use renewables in the future but you can't get too radical to the point of compromising the development and growth of the country." (3.2b Parliament)
- "Investment capacity, then I do not know how much it will cost, if it is more expensive than here in Brazil, may still impact, it depends on the investment." (3.2 Public administration)
- "I think the only issue is that they have more money to invest and here, in Brazil, we don't have so much money to invest in this way, in other forms of generation. So I think this is the problem. Their engineering is more advanced than ours and they have more money to invest." (3.2b Science)



China

- "However in the future decades, if China were forced to implement the energy transition, but were not well prepared for it, thus the market were occupied by foreign enterprises, then there would be negative impacts. Without foreign technology and products, China would face very great difficulties in energy consumption then." (3.2b Industry)
- "Social and world-wide pressures will exert negative pressures on Chinese government who will be urged to implement Energy transition policy as well. Nevertheless, it is infeasible and time-pressing for China to carry out Energy transition policy." (3.2b Public administration)
- "The negative impact I assume is the international pressure. When energy transition becomes the global trend, as a country that gives out a lot of emission, China would be under supervision by the whole world, especially by the US. If something happened, China would be forced by the US to develop green energy (clean energy). So China would be under greater pressure when making policy." (3.2b Science)



South Africa

- "The ability to make use of that technology. The ability to afford that technology obviously is a negative." (3.2b Industry)
- "So you're going to end up with an energy industry in South Africa that is literally owned by foreigners. Renewable industry is a very lucrative industry so you're going to get all those profits expatriated to Germany and that will not support the government objectives such as Black empowerment and economic growth." (3.2b Industry)

- “Costs. Well on the industry, to be tremendous effect. Our exports, our manufacturing, everything, it is terrible.” (3.2b Industry)
- “It could be if people have to lose their jobs that are currently working at power stations, people that are in the mines that are digging the coal. If that can be transformed for them to get jobs in this new whole idea of greening, that will be of good benefit to everybody in this country.” (3.2b Public administration)
- “If they come in and take more of our natural resources and our land – our arable land. Start taking more of what we have got – our water. And then we land up with nothing.” (3.2b NGOs)

4.3 TRANSFERABILITY OF GERMANY’S ENERGIEWENDE

Transfer rather than copy

- In all three countries, the experts surveyed tended to regard **simple wholesale copying** of the German model for switching to renewables or the accelerated adoption of it, as **not very realistic**. They explained this on the grounds that the future direction of national energy policy must take account of local social and political conditions, the particular country’s state of economic and technological development, and of course the existing energy situation, for example the main fuels currently in use. In all three countries, they therefore regarded the **chances of adoption of the Energiewende succeeding** as depending on both the **extent** of the changes and the **speed** at which they are made.
- Nevertheless, the **fundamental attitude to the transferability** of Germany’s Energiewende was mainly **positive** in all three countries. The fundamental options for adopting the model were most often perceived in **China**, while more cautious opinions were heard in the other two countries. The reservations expressed in **Brazil** related mainly to the major role that renewable energies have traditionally played in the national energy mix. Experts in **South Africa** not only mentioned the collision with economic goals but also emphasised the country’s status as a developing country with limited resources (money, expertise, skilled workers) as an obstacle.
- However, the vast majority of the experts surveyed emphasised that **elements of Germany’s Energiewende are in principle transferable**: in all three countries, the experts saw some aspects of it – such as investment in renewables, improved energy efficiency, and transparency and public participation – as steps that could be incorporated into their own energy policy or that should be compulsorily adopted.

“There are certainly elements, that can be transferred. I don’t think everything can.”

*Science representative,
South Africa*



Brazil

- "I don't know if it is fully transferred, perhaps just some concepts because the Brazilian energy matrix is very different from the German one, our energy matrix is 80% renewable." (3.2c Industry)
- "I think so, with this non-radicalism restriction, you can discuss the idea." (3.2c Parliament)
- "Look, then, Brazil is ahead of Germany, on the issue of renewable sources. So Brazil categorically do not need to invest so many millions or increase the energy bill to encourage renewable sources, that Germany encouraged renewable sources." (3.2c Science)
- "Our main source of electricity is hydropower, so our model is different from theirs, but we could make use of the good ideas which they have there and apply them in Brazil, of course." (3.2c Science)



China

- "Things should be dealt with in the light of specific conditions. No policy from a country is completely applicable for another one. We should select the projects suitable for China. The volume of wind and water is different between our two countries, so we should take Germany's practice as reference instead of transferring it without changes." (3.2c Industry)
- "I think the German energy transition could be transferred to China, but it should be taken gradually. We cannot merely copy the Germany model, but seek for the best pattern suitable to China's actual conditions and take actions step by step." (3.2c Industry)
- "Mentioned before, China should trace the Energy transition in Germany. However, taking account of the economic foundation and necessary technologies, it is not suitable for China to implement Energy transition policy now." (3.2c Public administration)
- "With the educational level of Chinese people is not at the same level as that of Germans, China cannot copy these measures completely." (3.3 Public administration)
- "There are differences between developed and developing countries. The implementation of policy should be based on the national conditions and development direction." (3.3 Public administration)

- "I think the good part from that transition could be adopted by South Africa. But whether they will be adopted in whole or whether they will be modified. I've got no idea." (3.2c Industry)
- "I don't think you will be able to do it totally as they have done it in Germany, because we have got a lot of coal resources and we have got cheap electricity at this stage. So I don't think in a sense you can totally just take that model and institute it in South Africa." (3.2c Public administration)
- "There are certainly elements, that can be transferred. I don't think everything can." (3.2c Science)
- "In order to do this kind of leap between conventional ways of energies to other forms of renewable energy (Inaudible) you would need to spend an enormous amount on research and development and you would have to have a certain pool of people with knowledge and South Africa does not have this at the moment, it's not a first world country so in the best case they will copy what's happening elsewhere." (3.2c Science)



South Africa

Adopting the expansion of renewables, improved energy efficiency, and assuring transparency and public participation

- "I'd say all, I can not concentrate on one, because they all have a positive impact and they all impact on each other." (3.3 Industry)
- "I think, in fact, the three are complementary. I think the country he wins the three points you highlighted. There is no gain, a breakthrough isolated." (3.3 Parliament)
- "All three are essential. The issue of energy efficiency is very important, you lose a lot of energy today, this is a real problem. The very distance between where energy is generated and the consumer centers is another factor, besides the participation of society." (3.3 Public administration)
- "The three subjects are definitely very relevant. At this point the strategic question is the question on energetic efficiency, but the other questions are very important too." (3.3 Science)
- "Look, I think all of them." (3.3 NGOs)



Brazil



China

- "All these three measures can be transferred to China." (3.3 Industry)
- "These measures should all be transferred to China." (3.3 Public administration)
- "I think these measures can all be transferred to China. China does not do well enough in utilization of renewable energy sources, in improving energy efficiency, and especially in increasing transparency." (3.3 Science)
- "All these measures can be learnt from." (3.3 NGOs)



South Africa

- "I think all of them can be transferred in fact we already have the new South Africa." (3.3 Industry)
- "All of them because those are important strategic interventions that are needed to establish the industry." (3.3 Public administration)
- "I think all of them. I think you cannot leave out any of those." (3.3 Science)
- "Well I would think that they could all be developed and I think they are being developed in South Africa." (3.3 NGOs)

- In line with existing preferences for future national energy policy, the **expansion of renewables** was regarded in China and South Africa as a policy that should be pursued. The same applied to Brazil, since the country is trying to diversify its energy mix with more solar, wind and biomass. On the other hand, a matrix change such as Germany's **complete withdrawal from nuclear power use** was regarded as **non-transferable** for the foreseeable future, especially in China and South Africa.

- In all three countries, measures to **improve energy efficiency** attracted at least as much interest as the expansion of renewable energies. Particularly in Brazil, where the energy mix is traditionally a clean one, many people expressed greater interest in German energy-efficiency measures than in the expansion of renewables. Some of the Chinese experts also rated efficiency targets higher than the expansion of renewables, explaining this by referring to the investment in wind and solar energy that is already under way in China, but also on grounds of cost.

- In both areas – developing sources of renewable energy and improving efficiency – it was noticeable that expectations are high in both technological and political/administrative respects. All three countries very much hoped that they would be able to adapt mature technical systems and implementation solutions from Germany.

- The majority of the respondents also supported **transparency and public participation** in the form of open communication on energy policy between policy-makers, the private sector and the general public. NGO experts and representatives of the scientific community would often like to see greater openness and more **direct public influence “from the bottom up”** in political and business decisions; they frequently report significant shortcomings in this area in their particular countries. In the eyes of experts with a background in business, parliament or local government, on the other hand, the desire for greater transparency is typically technocratic and primarily envisages **awareness raising and transfer of knowledge “from the top down”**. These experts hope that making “the person in the street” aware of energy-related considerations will reduce possible obstacles and mitigate conflict.

Expansion of renewables particularly highlighted



Brazil

- "I think the question of the use of renewable energy, I think Brazil is an example, the use of solar energy is emerging here." (3.3 Industry)
- "I think the first is the increased production of renewable energy, but with distributed generation. You have to decentralize generation and allow all households manage their energy from the most abundant source we have in Brazil, the sun." (3.3 Industry)
- "I think that all three points are crucial, but I think first of all, we have to use renewable sources of energy..." (3.3 Science)
- "I think the one that is more likely to grow in Brazil is the first option (increasing energy production from renewable energy sources), where you have clean alternative sources..." (3.3 NGOs)



China

- "The German energy transition attaches essential importance to the use of renewable energy resources, which are inexhaustible." (3.3 Industry)
- "About the measure of increasing energy production from renewable energy sources, I think it can be adopted selectively. Because the energy now can not fully satisfy the needs of corporations, so we can choose some places as the pilot units, and popularize it after increasing the efficiency gradually." (3.3 Industry)
- "As is planned in China, the proportion of renewable energy resources should increase by the year of 2015 to 2020. Thus the first measure (increasing energy production from renewable energy sources) can be applied here." (3.3 NGOs)



South Africa

- "We have huge resources in wind, we are a sunny country and I don't think anyone has touched anything in terms of energy out of the sea. And we have a very long coast line. We have all the natural resources to be able to harness energy." (3.3 Industry)
- "Well I think all forms of renewable energy are suitable for South Africa and it is universal systems that we can all implement." (3.3 Public administration)
- "...it's suitable, because we have the weather conditions, especially for solar obviously and the opportunity is there because we currently have very little energy generation from renewables." (3.3 NGOs)
- "They all are pretty important. But I think the renewable energy drive that's happening at the moment with wind power and solar power will probably be the biggest influence." (3.3 NGOs)

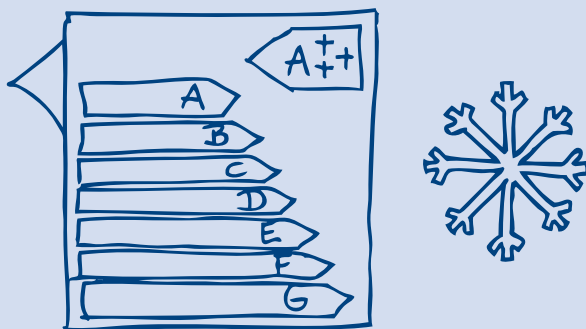
Energy efficiency particularly highlighted

- "Look, I don't think it's a matter of cleaner sources in Brazil, because here we have a clean matrix, a hydroelectric plant. I think energy efficiency, it's a very important vector and it's getting harder to exploit water resources in Brazil." (3.3 Industry)
- "It is all related to energy efficiency, which is something Brazil needs to improve on..." (3.3 Parliament)
- "Look, I think it would be efficient, right. Because referring to renewable energy, Brazil already produces quality." (3.3 Public administration)
- "I think maybe more of that Brazil needs to be inspired by the model of Germany is to increase the efficiency of processes, covering losses in industries, increase efficiency in energy use." (3.3 NGOs)



Brazil

- "The biggest issue with this (use of renewable energy), is how to improve the use efficiency." (3.3 Industry)



- "From my point of view, improving energy efficiency can be adopted by China. However, things should be dealt with in the light of specific conditions. As state-owned enterprises, we can not make decision. We have to wait for government to make policies. It might be difficult for government to work out policies with reference of German experience, considering the complicated interest relationship between enterprises in different regions." (3.3 Industry)
- "But in my opinion, improving energy efficiency is the most urgent problem and is of greater importance than the other two. Technologies of clean energy sources are not very mature and require high costs, which is unaffordable for China. But as for improving energy efficiency, the industrial energy consumption in China is very high, and thus reduction of it is more important than adoption of green energy. Germany is much better developed than China in this field, and thus can be learnt from." (3.3 Science)
- "Improving efficiency is quite positive." (3.3 NGOs)



China



South Africa

- "Improving energy efficiency, that is the big one for us. That is the simple one. In other words make do with the little that you have but let your outcome and your output be more. So that would be energy efficiency and currently in this country we have underpriced electricity and as a consequence we have got a huge abuse of energy. So first price it correctly and then number 2 then achieve the efficiency." (3.3 Industry)
- "I think our country has a lot of wastage in terms of our energy." (3.3 Public administration)
- "I think energy efficiency. There has been quite a bit of focus on it in South Africa, but there is obviously more that we can do." (3.3 NGOs)
- "We need more efficient coal fired power stations." (3.3 NGOs)

Transparency and public participation particularly highlighted

- "I think especially popular involvement. That generates a collective agenda with regard to responsibility." (3.3 Public administration)
- "There is a lot of misinformation on the part of the population with respect to the effects and impacts of wind power, so that involvement of the population, mainly dealing with the fundamental expansion is crucial to reduce conflicts related to power generation." (3.3 Public administration)
- "I think, without a doubt, participation, transparency and participation of society and even in decisions throughout the transition process. Here it absolutely does not. And what would happen, here's a simulacrum of it, which is such a thing as a public hearing, but is very precarious, very little participation, very little. I think it needed to be much more advanced so we go acquiring maturity." (3.3 NGOs)



Brazil

- "As regards to increasing transparency, I think it is necessary in China. During the process of increasing transparency, there will be lots of resistances. I don't think there will be breakthrough within a short-term period. But due to the development of internet, information can not be kept secret from the public. So to make information public by the government actively is not totally impossible, but only will need some time after all conditions are ready." (3.3 Industry)
- "First, acceptance of energy transition from the general public is very important. China, with such a large population, this issue would be a big challenge. If we can get the majority understand and participate in new energy reform, then the transition would be at ease." (3.3 Public administration)
- "Regarding the transparency and civic participation, it helps the public know the information about energy transition and encourage people to support and cooperate." (3.3 Public administration)
- "... , we should popularize the knowledge of new energy, including renewable energy and nuclear energy, let the public decide which kind of energy they prefer, and encourage the development of new energy in the meanwhile." (3.3 NGOs)



China

- "I think the last (increasing transparency and civic participation) one you mentioned is the one thing, if it were done, would have the greatest beneficial effect. Because we come from a background of having abundant and cheap energy and we still have a mindset that that hasn't changed all that much. And we are therefore very wasteful of it." (3.3 Industry)



South Africa

- “We all know that that transparency, creating awareness, getting buy in, saving the planet, all those things are important and it needs to be communicated. We can see why some things are not accepted very well in South Africa.” (3.3 Public administration)
- “Governance, I think, is a big challenge and I think we definitely need more transparency and we need excellent communication.” (3.3 Science)
- “I think the civic involvement level of transparency, it would be really important, because we have a monopoly energy system at the moment and unfortunately that isn’t always in the best interest of all South Africans. There is preferential rates given to the really big industrial users, and the pricing then ends up being a lot more expensive for your individual users.” (3.3 NGOs)

- In many cases, the **time factor** played an important role in respondents’ assessment of the transferability of Germany’s Energiewende. Most of those surveyed regarded the direct introduction of a similarly constituted Energiewende as unrealistic. The reasons given for this belief included the timetable of the Energiewende that is currently under way in Germany, the present energy-policy conditions in the country concerned, and Germany’s lead in technological matters. The same arguments were used to justify longer transition times for possible implementation of an Energiewende based on the German model in the surveyed countries, especially if Germany’s complete Energiewende and its phase-out of nuclear power are taken into account. However, in some cases the experts’ responses also reflected a strategically motivated caution prompted by a desire to await both the **outcome of the Energiewende in Germany** and **technological breakthroughs**.

5 OUTLOOK: FUTURE ENERGY POLICY IN GERMANY



5.1 COMPETITIVENESS

Long-term positive effects on competitiveness, short-term risks of a jump in prices

- Most experts in the three countries were convinced that the Energiewende would have more positive than negative effects on German competitiveness in the long term, despite all the uncertainties inherent in the predictions. Direct advantages were seen in the field of energy and environmental technologies. Respondents anticipated that in this area Germany would succeed in gaining and, in the long term, maintaining a leading position internationally in a permanent global growth market due to its technological lead, fully developed industrial production, and tried and tested technical solutions. In some cases, however, Germany's future competitive chances were seen as depending on how far competitors such as China would manage to close the technological gaps.
- If the Energiewende is a success, long-term competitive advantages in other economic sectors were anticipated in addition to the advantages in the fields of energy and environmental technologies. This was attributed to the expectation that costs for the generation and supply of renewable energies would fall, while prices for fossil fuels would rise. Finally, respondents considered it possible that the Energiewende would be of benefit to Germany's image as a "nation of green technology" which would be subsequent advantages in the global competition for investors and consumers.

- The experts surveyed identified risks for German industry stemming directly from the Energiewende with the initial phase of the switch and with particular industrial sectors. They anticipated a short-term jump in costs due to sharply rising energy prices, resulting in a noticeably adverse effect on international competitiveness.

Long-term competitive advantages



Brazil

- "So surely this will make Germany a country of prominence, it will be the pioneer, it will be the one who did it right. In my opinion this will keep Germany in a status of first world country, respected, finally, a country to which everyone looks. They will move forward. That's my opinion. It will maintain its leadership position in the global energy issue." (4.1 Industry)
- "I think this issue of being a benchmark country, a model in developing technologies, they will obviously sell it to the world." (4.1 Parliament)
- "However, in the long run, as this energy is renewable, when these plants have paid off their investments, we will end up with clean, renewable and cheap energy, at a low cost. You have a plant running on one of these sources, renewable, clean and low-cost. So in the long run this will certainly make Germany into a very competitive country." (4.1 Public administration)
- "In the long-term they will have an advantage, precisely because they would have been the first to go through this transition which later others will have to go through, and they would have taken the first step, they will be the ones who will be in the lead, because they will have technology developed in this area and they will be able to sell these technologies and ideas to the rest of the world." (4.1 Science)

- "I think, Germany will be a leader in the energy sector worldwide. It will be self-sufficient with the energy supply, independent, and protect the domestic environment." (4.1 Industry)



- "The energy transition can decrease the utilization of the current energy resources, promote the development of German economy, and improve the international status of Germany." (4.1 Public administration)
- "Germany lacks of energy resources, so the energy transition will definitely bring many benefits and reduce its dependence upon other nations' energy sources. This will also have an impact on Germany's competitiveness. The energy transition is a development trend. If German can be the first in implementing energy transition successfully, it will take a leading position in energy technology and its national competitiveness will be greatly enhanced as well." (4.1 Science)
- "The energy transition is an unavoidable trend. Germany can provide better experience and technology to the whole world with its energy transition; the development of related industries will be promoted; and the global economic development will be accelerated." (4.1 NGOs)



China

- "Well I think they will certainly become self sufficient, their efficiency will improve, and in the long run they will be the world leaders in the game." (4.1 Industry)
- "I think in the long run, as I said the renewable energy will then be cheaper and I think also other countries doing business with Germany, they will actually prefer to do business with a country that's using renewable energy. So that will actually put them on the forefront." (4.1 Public administration)
- "I think it will have an impact in as much as they will be increasing by current expectation pressure worldwide in terms of producing goods and services in a sustainably environmentally friendly manner." (4.1 Science)
- "I think they can become technology leaders, that is my perception is that in this opportunity they take the lead and they can be technology leaders. And they would probably be able to sell that knowledge to other countries." (4.1 NGOs)



South Africa

Risks



Brazil

- “Moreover, the negative, we have a very high cost of energy and industry in Germany goes to China where there is no environmental benefit. Then we have a problem, because it impacts on income generation in Germany, increasing income generation in China. The environmental impact remains the same or even increases.” (4.1 Industry)
- “If the country invests in an expensive energy source it’s becomes a matter of competitiveness because your source is primary and expensive to be internally used and those countries which are using a cheaper energy source end up being more expensive. We can see it happening in China.” (4.1 Public administration)
- “I think that they’ll suffer a little, because energy will cost more initially, so I think they’ll have some problems with the market, with their products, because they’ll be expensive. I think the main consequence is that they will lose out a little in the global market, because production will become more expensive.” (4.1 Science)



China

- “In the short run, the energy transition will bring a negative impact on Germany, because a relatively long time will be needed when adopting new energies.” (4.1 Industry)
- “As for the risk that Germany is going to take, I think it lies in the investment at the initial stage of energy transition, such as the infrastructure construction. In the short run, it adds up the cost, but it is beneficial in the long term.” (4.1 Public administration)
- “It might have a negative impact on Germany’s competitiveness. When they abandon nuclear energy, they have to utilize renewable energies. However, cost for renewable energies is higher. In short term, the electricity price might be increased. This has negative impact on Germany’s energy industry and other industries.” (4.1 Science)
- “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 NGOs)



South Africa

- “As I said initially the prices in the short term are going to be very excessive. So you are more than likely to experience a lower competitiveness in Germany in the short term.” (4.1 Industry)
- “Initially it might make them a bit less competitive because there is a high capital injection but in the long run it might increase their competitiveness in the sense that their energy supply might be more guaranteed in a way and it is everything about the green economy.” (4.1 Public administration)

- “It’s going to increase their cost in the beginning and it might impact in the short run of their products being more expensive than products from China or wherever India or Korea.” (4.1 Science)
- “In the long run it should be energy independent and it should be also fully compliant with environmental standards, but I think that this will come at a very great cost.” (4.1 NGOs)

5.2 LONG-TERM CONSIDERATIONS

Planning energy policy will be worthwhile in the long term

- The majority of the respondents in all three countries approved of industrialised countries considering the framework of their future energy policy over the long term. Most of the experts in the three countries regarded Germany’s programme to Energiewende, which is designed to take place over the course of forty years, as a visionary and responsible programme strategy. They also assumed that the Energiewende would ultimately be worthwhile for Germany as a location for industry. Reflecting the positive assessment of the long-term effects on German competitiveness, the majority view was that the Energiewende would put Germany in a globally leading position in the field of energy and environmental technologies; furthermore, it would provide German industry with a secure and, in the final analysis, cost-effective energy supply, thus giving Germany corresponding competitive advantages. Many experts in all three countries therefore concluded that the drafting of long-term energy policy targets should be taken as an example for their own countries as well.

- “I think Germany has this capability in terms of reconstructing the industry, some energy model. I think Germany is going to remain as an industrial center in a long-term.” (4.2 Industry)
- “Well, I believe that there may be a cost reduction in the long term due to the cost of energy with this new source of renewable energy. I believe it might be a cheaper production cost, although an it’s investment to be paid, but in the medium and long term there should be a reduction in energy cost that ends up having an influence on German industry.” (4.2 Parliament)
- “I see positive impressions. Because Germany gradually is still a country with a very strong industry, it exports a lot. And I think this will greatly benefit the industry because it is a sector that consumes a lot of energy. And it will benefit the technology sector, which is a



Brazil



China

sector that is growing and will be increasingly important in the world. And I think that Germany will stand very well in this sector.”
(4.2 Public administration)

- “I think as an industrial center and the more energy efficient it gets, it will be more competitive and able to produce. It will be able to market products that are also effective. And I think everyone in the future will look for that.” (4.2 NGOs)



South Africa

- “I think such a long-term thinking is very positive to the energy development of Germany and the whole world. Germany will play a leading role in the energy sector in the future, and its competitiveness will be benefited as a result.” (4.2 Industry)
- “Such a long-term thinking is good. The energy transition is a trend, which other countries such as China should consider following. The energy transition is unavoidable in the far future, so it’s very good for Germany to raise it right now.” (4.2 Public administration)
- “I think Germany is a well-developed industry country. It is excellent for Germany to consider the relationship of environmental protection, politics and industry in the long term.” (4.2 NGOs)

- “I think it is insightful and marvellous. If we look at our example in this country, since 1994, no infrastructure investment was put into the development of power and yet the demand grew and with the demand we ended up in trouble. So you have to plan for the future and they are doing the right thing.” (4.2 Industry)
- “My belief is it’s a good thought. Remember we always want to plan for a short term and once such things fail it means then we don’t have any way to deal with our issues. Rather plan for a longer term and looking at whatever happens so we can be able to take care of such. But if you plan for a shorter term obviously you will always have challenges one way or another.” (4.2 Public administration)
- “Well you know it is just going to make Germany much more competitive. It is going to be getting cheaper energy. You know energy is going to cost more and more, there is now a new glut of oil on the market from fracking and alternative sources – deep sea drilling and so on, which are putting a lot more oil back into circulation, but you know that is going to run out sooner or later and the environmental costs are going to become more and more. So Germany is making itself incredibly competitive, because it is looking at the long term and these are long term issues, they are not 5 year plans, they are 50 year plans and I have huge admiration for the German people and German government for biting the bullet and taking the long term view.”
(4.2 Science)

6 APPENDIX



6.1 PARTICIPANTS



	Brazil	China	South Africa
Target groups	Experts with knowledge of Germany's Energiewende from the following sectors: <ul style="list-style-type: none"> ▪ Industry (energy sector + energy-intensive industries) ▪ Parliament (excluding China) ▪ Public administration ▪ Science ▪ NGOs 		
Methods	Structured telephone interviews		
Interview dates	5 to 30 Nov. 2012	19 Nov. 2012 to 4 Jan. 2013	29 Oct. 2012 to 18 Jan. 2013
No. of interviews	50 interviews	40 interviews	31 interviews
Local recruitment / interviews	Market Analysis www.marketanalysis.com/br	Marcom China www.marcom-china.com	TNS South Africa www.tnsglobal.com
Management / coordination / evaluation / reporting	infratest dimap www.infratest-dimap.de	Richard Hilmer Roberto Heinrich Jürgen Hofrichter Anja Simon	

Brazil

	Industry	Parliament	Public administration	Science	NGOs	Total
Number of expert interviews	10	10	10	10	10	50
Sex						
Male	8	10	7	9	8	42
Female	2		3	1	2	8
Age of respondents						
(average)	45	52	43	53	51	49
Education of respondents						
College (incompl.)	9 (2)	1				10
High School	10	1	9	10	10	40
Political Party						
PT	3					
PMDB	2					
DEM	1					
PR	1					
PSD	1					
PV	1					
PDT	1					

	Industry	Parliament	Public administration	Science	NGOs
Position of respondents	Business executive	Deputy	Secretaries	Professors	President
	Energy efficiency advisor				Director
	Engineer manager				Coordinators
	Technology engineer				Biologist
	Vice president				
	Environmental coordinator				
	Presidency advisor				
	Operations manager				
	Engineer Energy manager				

	Industry	Parliament	Public administration	Science	NGOs
Main activity / main business of company / organization	Energy solutions company	Mine and Energy Committee	Environment Ministry	USP – São Paulo University	Alternative energies development in Latin America
	Generation, transmission and distribution of electricity	Environment and Sustainable Development Committee	Mine and Energy Ministry	Foundation	Citizenship and sustainability
	Electricity, natural gas, energy and environmental services	Environment, Consumer Defense and Inspection and Control Committee	Goiás State Government	Federal University	Sustainable development and renewable energies
	Cellulose industry			ULBRA – Brazilian Lutheran University/	Energetic efficiency
	Shopping center			UFRGS – Rio Grande do Sul Federal University	Conservation of natural resources and rational economic development
	Automation Food industry			UNISINOS – Vale do Rio dos Sinos University/	Nature conservation
				UERGS – Rio Grande do Sul State University	Environment conservation
				UNESP – Júlio de Mesquita Filho State University	Socio-environmental development
				UnB – Brasília University	
				Ceará Federal Institute of Education, Science and Technology	
				UFU – Uberlândia Federal University	

China

	Industry	Bureaucracy	Public administration	NGOs	Total
Number of expert interviews	10	10	10	10	50
Sex					
Male	8	8	10	7	33
Female	2	2		3	7
Age of respondents					
<30	1	2		4	7
30–39	6	3		4	13
40–49	3	5	3	1	12
50+			7	1	8
Education of respondents					
College	2	1		2	4
University	3	4	1	4	12
Master and above	5	5	9	5	24
Position of respondents					
	Senior Executives	Mid and top level officials	Professors	Project Manager	
				Principal	

	Industry	Public administration	Science	NGOs
Main activity / main business of company / organization	Manufactory	Energy planning	Nanjing University of Technology	Citizenship and sustainability
	Car industry	Statistic bureau		Eco Think Tank
	Steel industry	Environment protection	Huazhong University of Science and Technology	Citizenship and protection of environment
	Coal mining	Development and Planning	Xi 'an JiaoTong University	Environmental and economic problem-solving
	Power Generation		Yangzhou University	
	Oil industry		China University of Geo Sciences	Citizenship and development
			Dalian University of Technology	Environmental Protection
			East China University of Science and Technology	Energy efficiency and Energy-saving
			University of Shanghai for Science and Technology	Protection of river ecosystems and sustainable water management
			Shanghai Jiao Tong University	Environmental Education
			Jiangsu University	

South Africa

	Industry	Parliament	Public administration	Science	NGOs	Total
Number of expert interviews	8	1	8	6	8	31
Sex						
Male	8	1	6	5	7	27
Female			2	1	1	4
Age of respondents						
(average)	49	40	50	55	54	54
Education of respondents						
Bachelor	2		1	1	3	7
Master	2		2		2	6
Diploma	1	1	2			4
Postgraduate	3		3			6
PhD.				5	3	8
Political Party	ANC					

	Industry	Parliament	Public administration	Science	NGOs
Position of respondents	Director	Deputy	Manager	Professor	Executive Director
	Senior Manager: Renewables, gas and primary energy projects		General Manager	Head of Department	CEO of African Operations
	Economist		Deputy Director		Sustainability Manager
	Chief Engineer		Senior Manager		Director
	General Manager		Environmental education		Founding Member/Manager
	Financial Director		Director		Director
	Chairman Executive		Manager of environmental		Executive Director
			Coordinator		Director
Main activity / main business of company / organization	Coal mining industry	Free State	Trade and Investment	University of Stellenbosch	Education
	Oil industry	Legislature	Delivery community programmes	University of Johannesburg	Environmental consulting
	Electricity		Enterprise and development	University of Witwatersrand	Environmental conservation
	Car industry		Environmental Affairs	Nelson Mandela Metropolitan	Local development
	Service		Development Planning	University of North West	Citizenship
			Local Government		
				University	
				University	

6.2 SCRIPT FOR STRUCTURED INTERVIEWS

1. Knowledge of the Energiewende

1.1 Where did you first hear about Germany's Energiewende?

An additional question if the conversation falters or if respondents do not mention the following themselves: Did you actively find out about Germany's Energiewende? If so, which sources did you use?

1.2 What do you think Germany hopes to achieve with its switch to renewable energies? What are its aims?

2. Perception/ evaluation of the Energiewende

Information module 1

In late 2010, the German Federal Government drew up an energy concept that will see electricity production move largely to renewable sources by 2050. Apart from switching to renewables, the aims include significantly reducing harmful greenhouse gases, lowering energy and electricity consumption, boosting energy efficiency, and reducing energy consumption in buildings. Germany also decided to phase out nuclear power by 2022 following the disaster caused by the damaged nuclear power plant in Fukushima.

- 2.1
- In your opinion, what are the positive aspects of Germany's Energiewende?
 - In your opinion, what are the negative aspects of Germany's Energiewende? What criticisms do you have?
 - Do you see Germany's Energiewende as a normal development or rather as something extraordinary?
- 2.2 How would you evaluate the implementation of the Energiewende at a political level?
- 2.3 How would you evaluate Germany's Energiewende with regard to...
- securing the energy supply in Germany?
 - environmental concerns?
 - its economic feasibility, i. e. its costs and affordability?

3. Benefits of Germany's Energiewende for the surveyed country

3.1 Let's talk about your country now. What is the situation there? Which energy-policy aims do you think should be pursued in [COUNTRY] during the coming decades?

- 3.2
- How might [COUNTRY] benefit from the Energiewende in Germany?
 - How might the switch be disadvantageous for [COUNTRY]?
 - Would it be possible to carry out a similar Energiewende in [COUNTRY]? If so, what form could this take?

Information module 2

A variety of measures are being planned in order to implement the Energiewende in Germany. These include expanding renewable energy production, improving energy efficiency, and increasing transparency and public participation to achieve a high level of acceptance among the population.

3.3 Which of these measures could be implemented in your country? And why would they be suitable for [COUNTRY]?

4. Outlook

- 4.1 How would you evaluate the long-term benefits of the Energiewende for Germany? How do you think the Energiewende will affect Germany's competitiveness?

Additional question if the conversation falters or if respondents do not mention the following points themselves: Where do you see long-term opportunities for Germany? Where do you see risks?

- 4.2 In pursuing the Energiewende, Germany is thinking 40 years ahead. How would you evaluate this kind of long-term thinking in energy policy with regard to Germany's future as an industrial country?

5. Statistical information

To conclude, I would like to ask you a few questions for our statistics:

- 5.1 Sex of the respondent:
Male
Female
- 5.2 May I ask how old you are?*
- 5.3 What is your highest level of education?
- 5.4 *[ECONOMY target group]*: Please could you tell me how many people work in your company in [COUNTRY]?
- 5.5 *[POLITICS target group]*: Note to interviewer: Please enter the name of the party to which the respondent belongs. (Do not ask!)
- 5.6 *[POLITICS target group]*: What is your position?

Thank you for taking the time to talk to us!

* In China it is considered impolite to ask people their age directly. The Chinese respondents were therefore asked to state which of the following age groups they belong to: under 30 years old, 30 to 39 years old, 40 to 49 years old, or 50 years old or more. In both other countries, it was possible to ask respondents their exact age.

For technical reasons, the questions were numbered differently in the South African survey script. However, in the report the quotations from South African respondents have been allocated the numbers in this master script.

6.3 OVERVIEW OF GERMANY AND THE SURVEYED COUNTRIES



Germany

Surface area: **357,050 km²**
 Population: **81.831 million**
 Gross domestic product: **2,570.8 billion euros** (2011)
 Share of renewable energies in primary energy consumption in 2010: **9.9%**

Energy and climate-policy aims

- To reduce harmful greenhouse gases by 40% below 1990 (base-year) levels by 2020, 55% by 2030, 70% by 2040, and 80 to 95% by 2050.
- Primary energy consumption should fall by 20% by 2020, and by 50% by 2050.
- Energy efficiency should increase by 2.1% each year in relation to final energy consumption.
- Energy consumption should fall by 10% compared with 2008 levels by 2020, and by 25% by 2050.
- With regard to buildings, heating demand should be reduced by 20% compared to 2008 levels by 2020, while primary energy consumption should decrease by 80% by 2050.
- Renewable energies should provide an 18% share of gross final energy consumption by 2020. This should increase to 30% by 2030, 45% by 2040, and 60% by 2050.
- Renewable energies should provide a 35% share of gross energy consumption by 2020. This should increase to 50% by 2030, 65% by 2040, and 80% by 2050.



Brazil

Surface area: **8.5 million km²** (47% of South America's surface area)
 Population: **194 million**
 Gross domestic product: **1,602 billion US dollars** (2009)
 Share of renewable energies in primary energy consumption in 2010: **43.9%**



China

Chinese territory: **9,597,995 km²** (including Taiwan, Hong Kong and Macau)
 Gross domestic product: approx. **8,250 billion US dollars** (2012)
 Population: official statistics: **approx. 1.347 billion**
 Share of renewable energies in primary energy consumption in 2010: **11.5%**



South Africa

Surface area: **1,219,090 km²**
 Population: **51.77 million** (2011)
 Gross domestic product: **297.16 billion euros** (2012)
 Share of renewable energies in primary energy consumption in 2010: **10.7%**

(Sources: Federal Foreign Office (<http://www.auswaertiges-amt.de>), Federal Ministry of Economics and Technology (<http://www.bmwi.de>), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (www.bmu.de))

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Dr. Christian Hübner
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