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Globalising the German Energy Transition

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With its twin objectives of phasing out nuclear power and decarbonising the energy supply, the German energy transition is of worldwide significance. All the more so if the challenges of climate change and sustainable energy security are taken seriously, for they can only be tackled globally. Although the international dimension of the energy transition has been largely ignored to date, internationalisation – alongside Europeanisation – represents an important aspect of climate protection and security of supply, as well as cost efficiency and competitiveness. If the energy transition succeeds, it will serve as an international model, demonstrating the objectives, options and development paths that are needed to deal with the unparalleled imponderables and growing heterogeneity of the global energy system. The allure of the German energy transition represents an important foreign policy resource, of which full use should be made. That means applying and refining a variable geometry of bi- and multilateral energy relations. If the energy transition is successful, it will raise Germany's international profile, while failure would have significant international repercussions.

The decision to initiate the energy transition is just a year old, so it is still much too soon to assess success or failure in such a long-term business. This is nonetheless the right time to highlight its neglected international dimension (see SWP Comment 33/ 2011). For international cooperation is a central precondition for success.

The existence of a gulf between knowledge and action on climate change and energy security is acknowledged across the world. Agendas are governed by short-termism and scepticism over feasibility and affordability. Even in Germany there is a feeling that it is hard to do the right thing and easy to make mistakes, sometimes leading to hesitation about dedicating major funding to large-scale projects and infrastructure expansion. But preserving the consensus on formulated goals and chosen paths is imperative for the energy transition.

The German energy transition is the first of its kind worldwide, making it the prime international point of reference for such endeavours. Only a handful of countries, among them the United Kingdom and Denmark, have joined Germany in embracing the central date of 2050, as set out in the international climate talks and the EU Energy Roadmap, and formulated long-term political programmes for converting

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their energy systems. Germany stands out not only for its economic weight and industrial structures, but also for pursuing the double goal of phasing out nuclear power and decarbonising its energy system. So the world is watching with interest, often sceptically, but at the same time fascinated and sometimes concerned.

The Energy Transition in the Context of Climate Change and Energy Security

There is still insufficient acknowledgement in Germany and internationally that many of the answers to the challenges of climate change and energy security lie in the energy transition. The International Energy Agency (IEA) has for years been pointing to the urgency of the problems, which are exacerbated by the pressing issue of energy poverty: 1.4 billion people still (or perhaps already, in view of population growth and the finite nature of fossil resources) have no access to electricity and 2.7 billion cook using traditional biomass.

National and international politics faces the Herculean challenge of making the energy system more sustainable while at the same time guaranteeing the supply of fossil fuels for a transitional period without simply maintaining existing arrangements. If we look to the magical date of 2050, the worldwide energy sector needs to be structured to grant the expected global population of nine to ten billion access to a modern, sustainable energy supply, without further harm to the natural environment and resources required by current and future generations.

All this unequivocally underlines the urgency of global system conversion, the energy transition. In the end it matters little whether the transitional use of fossil fuels lasts until 2038 or 2062. The crucial thing is to develop and initiate paths without delay. Action is needed today, because 2050 is now only one – at the most two – power plant life cycles away and lock-in effects created by existing capital stock and infrastructure narrow the cost-efficient decarbonisation options and hamper or delay system change. A glance at the electricity sector shows that power stations have operating lives between 25 and 35 years. Similar effects on different timescales appear in industry, heating and transport, where energy consumption and emissions are determined years ahead by the characteristics of buildings, factories and vehicle fleets.

With its energy transition Germany plays a global pioneering role, both for the shape of the transformation and for the terms of the transitional period. The energy transition certainly involves short-term risks for the systemic stability of the electricity sector, if only because of the difficulty of forecasting the costs involved and not least the behaviour of final consumers. Thus the "unprecedented uncertainties" in the international energy system that the IEA noted in 2010 with respect to the situation and development of supply and demand are ostensibly exacerbated by significant insecurities of political origin. The high level of (already existing) insecurities deprives a sector that depends on long-term planning of its long-term perspectives. While it is often argued that those who set off on a new course have to bear especially high costs and risks, the great uncertainties in the energy world mean that political initiative can at least supply signposts and milestones and reveal which path dependencies must be broken if system change is to succeed. Finally, targets also define development paths. If these are given sensible political and regulatory backing, they can in turn offer orientation and perspectives and mark out an action corridor for the energy sector.

From Niche to Pillar: Renewable Energy

In order to minimise climate change and ensure an inclusive sustainable energy supply, rapid dissemination of renewables is crucial. The international significance of

the German energy transition is thus most obvious for renewables and their market integration.

Especially with respect to the necessary massive and accelerated expansion of renewables, it quickly becomes obvious that national unilateralism will be more expensive than international cooperation. Tried and tested technologies must be made market-ready and competitive, technologies in the testing phase must be advanced to commercial application. The expansion of renewable electricity generation demands great capital investment, while the advantages of low variable costs in operation (zero fuel costs) are not felt until later. As far as this is concerned, the international dimension is important in at least two respects. Firstly, the demand for technical solutions in Germany will contribute too little and too slowly to achieving the necessary scale effects and bringing down the cost curves for the technologies. That requires international cooperation, marketing and networking. Secondly, there are (more) efficient locations for regenerative electricity generation in Europe and neighbouring regions such as North Africa (than in Germany), where yields can be optimised more cheaply. When "harvesting" electricity from wind, sun, geothermal and other sources, meteorological, topographical and/or geological conditions play a decisive role, so renewables will become competitive in certain other regions of Europe and its neighbourhood more quickly than in Germany. Electricity imports and the exploitation of the system capabilities of a broader power grid (operating reserve, spare capacity, storage) are foreseeable in the course of transformation and must be incorporated rapidly if the goals of the energy transition are to be achieved. In the EU and internationally renewables need to be extracted from the "optional extra" niche and developed into a real substitute and powerhouse.

Germany and Europe also have clear industrial and technological interests. But the energy and development concerns of partner nations will also have to be taken into account through transfer of technology and know-how. The advantage of renewables is that components can be manufactured locally. Nor should the contribution to international security and conflict prevention be underestimated. In the medium term cheaper and more efficient renewables could help to reduce energy poverty and defuse national and international access and distribution conflicts over expensive fossil fuels.

The many uncertainties still associated with renewables go a long way to explaining the risk-aversion, especially of financial donors. But those who take that stance are misreading global energy trends. The energy world is becoming more heterogeneous. After the age of coal and oil no single source of energy will dominate. There will not be one definitive answer to the energy question(s). The energy supply is differentiating in terms of production, applications, use paths and locations. A glance at 2030 shows that oil, gas and coal will determine the energy mix in largely equal parts. The costs of renewables will be more strongly influenced by (often unpredictable) technological developments, but easier to calculate because of the free availability of their "fuels". The technological and ecological risks of renewables are hardly going to need to be reassessed. Consequently it is not to be expected that the political and regulative framework will be fundamentally modified. This too distinguishes renewables from fossil and nuclear energy.

Fossil Fuels: (Only) the End Is Certain

Fossil fuels are finite, but the resource base is widening. Firstly, global demand continues to grow despite ever-rising prices. Secondly, high prices have not, as once hoped, caused a clear turn to renewables. Instead the limited financial resources are channelled into exploring and developing unconventional deposits. The question is

less availability than access, and whether investments are made in time and on an adequate scale. Fossil fuels are experiencing their own revolution; natural gas supplies a prime example. In the course of the U.S. shale gas boom, the United States in 2011 overtook Russia as the world's largest natural gas producer. Increasingly, sources such as oil sands, natural bitumen and extra-heavy oil, shale gas, oil shale, tight oil and gas, and coalbed methane are being tapped and ever more offshore deposits are being opened up. In this context global peak oil seems a chimera, driven by technological development and price level with all the associated harmful consequences for environment and climate. From a climate perspective, no more than one-third of proven reserves can be consumed prior to 2050 according to the World Energy Outlook (WEO) 2012.

With a broader spectrum of deposits and production techniques being exploited, it becomes very difficult to calculate what volumes can be produced economically. Moreover, investigations of the "ecological footprint" covering whole production chains are only just beginning. The Deep Water Horizon disaster supplied a drastic illustration of the dangers in the offshore sector. New risks lurk in unconventional production techniques and exploration in sensitive ecosystems like the deep seas and the Arctic. What if a major incident leads to an abrupt production stoppage in particular countries, states or regions and leaves the markets short of significant amounts? Development and production of unconventional reserves are thus also associated with considerable uncertainties of a political and regulatory nature. It is an open question whether these reserves can really satisfy demand to the extent suggested by the data provided by the IEA and major corporations.

The warning signs are known. As IEA chief economist Fatih Birol said in 2009: "Even if demand between now and 2030 were to be completely flat, we would need to find four new Saudi Arabias in the next 22 years." All this means considerable stress in the oil sector. Conflicts and rivalries over access are foreseeable. Even if distribution ends up being managed "only" via higher prices, what does that mean for growth perspectives, especially in developing and emerging economies which already suffer energy poverty? Moreover, the 2012 WEO has to be read carefully: the more relaxed fossil supply situation over the next decade only materializes if all energy efficiency and climate policies announced worldwide are fully implemented.

If the expected demand for gas through until 2035 is to be covered, output growth equivalent to three times Russia's annual production will be required. Put bluntly, gas consumption can only rise to that extent if the enormous resources of unconventional gas can be tapped under economically and ecologically acceptable conditions, as unconventional gas will (have to) cover more than two thirds of the additional demand.

The finite nature of fossil fuels calls for political action, for the markets alone will not accomplish the energy transition and the break with the path dependencies. That is demonstrated clearly enough by developments in unconventional oil and gas and the rising demand for fossil fuels.

These trends are powered by the momentum of conventional energy systems. Additional pressure on multinationals to invest in unconventional reserves originates from the wave of energy sector renationalisations during the past decade, which was encouraged by rising oil prices. State-owned companies now control 85 to 95 percent of reserves. Oil and gas exports form the backbone of rentier economies in the resource-rich countries, with revenues often channelled into shoring up authoritarian regimes, nepotism and personal enrichment. The elites of energy-rich countries have an interest in higher oil prices and state budgets are shaped accordingly; all this drives international oil prices still higher. Only part of the profits are reinvested to maintain production levels. The crux is that ever

greater funds flow out of the oil and gas rich countries, with companies and state investment funds making strategic purchases in Germany and Europe – partly with perpetuating import needs in mind. Thus enormous funds pass to actors that show no interest at all in modernisation. Not only are these funds lost for energy system conversion, but they are actually deployed counterproductively.

Strategic Challenge: Shaping the Transitional Period

The transition from fossil/nuclear to a more sustainable energy system depends on keeping the supply stable and secure without at the same time perpetuating existing use paths. In this respect the international dimension is exceptionally important. Not only the expansion of renewables, but also the contraction and conversion of the fossil/nuclear use path must be shaped proactively. During the transitional period it could make sense to give priority to particular fossil fuels and define narrowing target corridors for individual fossil fuels. Otherwise it is hard to imagine how conversion can proceed hand in hand with increasing use of renewables. Expanding renewables and increasing energy efficiency also serve to hedge geopolitical and price risks. But none of this is an excuse not to intervene strategically in the oil and gas markets.

That is especially necessary with the most climate-friendly fossil fuel. Comparatively clean natural gas is an obvious bridge fuel for the energy transition, as flexible gas-fuelled power stations are an important back-up and enabler for fluctuating renewables. Because of the lack of CO_2 pricing, however, gas is still too expensive for electricity generation, especially in comparison with coal, while short running times erode profitability. Nonetheless the IEA foresees a global golden age for gas with annual demand growth exceeding 2 percent through until 2035. At the same time the oil multis are gradually turning into gas multis. What does all this mean for the future of natural gas in Germany and the EU?

If one wishes to use comparatively climate-friendly gas in the electricity and transport sectors, for which there are good reasons, then politics should set a clearer course towards these use paths. Only if demand is calculable will the necessary investments be made in gas fields and infrastructure, and these orientated on the markets of the future. Even if gas, as a fossil fuel, is to be used only for a transition, the long-term nature of the business demands stable conditions. That presupposes long-term perspectives, to which in times of systemic uncertainty politics must contribute. In a long-term business with high capital requirements like the gas trade, the interaction between expected demand and security of supply is not to be neglected. Increasing insecurity of demand is not only a drag on diversification, but also affects dealings with traditional producers like Russia. Especially in a context of energy transition, security of supply remains a commandment that energy foreign policy must obey. Given the foreseeable shifts in power and trade, the expansion of renewables and international cooperation in this field also represent a gain in policy leeway and negotiating clout.

The geopolitical and strategic challenges in the international energy system are changing. Germany and the EU will have to adapt to a situation where their market power still contracts even if their import demand for individual fossil fuels like natural gas continues to rise, where they will have to compete from a position of falling relative market share with countries that promise growth markets and rising consumption. High growth rates in China and India are already causing relocation of refineries and processing capacity, restricting Europe's arbitrage possibilities and leading to a reorganisation of trade flows. It has been observed that consumers in Europe and even the United States react to rising prices. After the collapse of demand

in the 2009 economic crisis, oil consumption never returned to its previous level. A certain price elasticity of demand can be identified. While many OECD countries seek to further improve their energy efficiency (as the third pillar of the energy transition), global energy efficiency has actually worsened.

Geopolitically, and above all economically, one trend is highly relevant. The major producers in the Middle East, whose importance for the global conventional energy supply will rise still further, are experiencing rapidly increasing domestic consumption. While OPEC's share of global oil production will rise above 50 percent by 2035, demand for natural gas within the Middle East will grow at 3.5 percent per annum, above all in electricity generation. Altogether 90 percent of rising energy consumption will be driven by the non-OECD states, as a rule countries where energy remains subsidised and energy efficiency measures as yet play no role. A dialogue must quickly address this point. Modernising the energy system, improving energy efficiency and initiating alternative energy use paths should be dialogue priorities not only with the major consumer countries but also with traditional energy producers like Russia and countries in North and West Africa and the Persian Gulf region. Only if perspectives for lasting cooperation are opened up and the affected countries "compensated" for the foreseeable devaluation of their fossil reserves will it be possible to agree binding international targets for climate protection and renewables.

Strengthen Energy Transition Diplomacy and International Governance

The energy transition is one of Germany's most important political projects, and both resource and challenge for German foreign and trade policy. Greater attention must be paid to the international dimension in order to contain the political and economic risks of the energy transition and make use of the great opportunities.

International information, communication and intermediation. The energy transition offers answers to the central challenges facing the global energy system. Germany can and must be a pioneer, but will fail if it goes it alone. More energy diplomacy is required.

First of all, information about the energy transition must be provided in other languages. The demand for information abroad can hardly be overestimated. At the very minimum a comprehensive official English-language government website is needed. As well as building on energy cooperation, (pro)active energy transition diplomacy must also explain goals, instruments and measures and communicate long-term perspectives.

International cooperation should thus orientate on exchanging best and worst practices, namely with respect to expanding renewables, phasing out nuclear power and improving energy efficiency. That will serve to enhance Germany's and the project's prestige, but above all "the cause itself".

Variable geometry in energy governance. The growing differentiation of energy paths implies that the international governance structures should play out in a variable geometry. It must be remembered that countries act from completely different positions: economic development, international trading links, climatic conditions, to name but a few. This is one of the main reasons for the global dilemmas of international climate and energy politics, as the British human geographer Michael J. Bradshaw noted in 2010. Moreover, countries' roles change, as producers and consumers, exporters and importers. Energy governance must respond to this. The demand for international cooperation is greater than ever. More coherence is needed above all where the formulation of central goals and targets is concerned.

The international governance landscape offers a range of forums that can be used (and also strengthened) by a (pro)active energy transition foreign policy. First and

foremost is the International Renewable Energy Agency (IRENA) as voice, forum and venue for international cooperation on renewables. Working through it corresponds with a consistent energy foreign policy, given that its founding was a success of German diplomacy. The cooperation of "frontrunners" should be strengthened inside IRENA. The International Partnership for Energy Efficiency Cooperation (IPEEC) should also be backed for exchanging information on best and worst practices in energy efficiency and cooperating internationally in this field.

From the climate policy perspective a top-down signal for a low-carbon energy system is not to be expected for the foreseeable, namely not until bottom-up ways to get there have been opened up. Germany has a key function here. Only through international cooperation in individual fields, know-how and technology exchange, and concrete projects will it be possible to achieve consistency in setting and operationalising goals. The options here include tandem partnerships and a variable geometry of bilateral platforms.

The G-8, the rising powers of the G-5, and the G-20 have already proven to be forums in which ambitious goals and objectives can at least be formulated and declared, even if concrete implementation is largely still to come. The G-20's initiative to phase out inefficient energy subsidies points in the right direction and needs to be pursued much more vigorously. New perspectives of cooperation (and compensation for losses) need to be examined. Energy partnerships and, at the multilateral level, the International Energy Forum (IEF) are important platforms, also for strategic exchange and agreement about the future shape of the fossil energy path. Furthermore, only an intensified dialogue with the producers can stem the uncertainties. This includes bringing more transparency to the markets, as pursued by the Joint Organisations Data Initiative (JODI) of the IEF.

Vision and impact. The energy transition is not just a political project but one affecting the whole of society. It will not run its course "incidentally" but touches on fundamental aspects of prosperity. The question is, whether that must not also mean a fundamental change in consumer behaviour, because demand for energy is composed of the sum of decisions of final consumers. From the global perspective, energy supply and climate change affect the natural environment and resources required by current and future generations and are thus vital questions for all of humanity. Germany's energy transition is a pioneering and groundbreaking initiative. It is an enormous challenge, and also a responsibility. Abandoning the energy transition for lack of courage could have fatal international consequences. For then there would be good reason to doubt that any other country would be able to assemble the arguments and resources for a complete conversion of its energy system.

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