



Germany's energy turnaround

Challenging for municipalities and municipal utilities

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Germany's energy turnaround targets objectives that far exceed its legislated, accelerated exit from nuclear power generation. In order for the many energy and climate policy objectives to be met at least EUR 30 bn will have to be invested in Germany annually in areas such as renewable energies, conventional power plant, grids, storage facilities, energy-efficient buildings and alternative propulsion technologies – no small challenge.

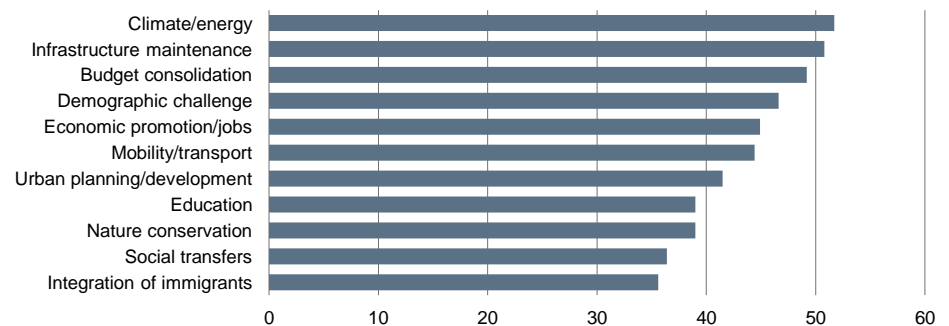
The turnaround will pave the way for municipalities and municipal utilities to enter new spheres of activity in terms of energy provision, the heating market and the transport sector. Municipalities and municipal utilities will probably make their presence felt most heavily in the area of power supply; they have appropriate instruments for the heating segment, too. In the transport sector, by contrast, overarching levels of government are better placed to implement environmental policy measures for boosting energy efficiency.

Considering the immense investment required it becomes obvious that the municipalities' and utilities' budget constraints are the biggest bottleneck for the regionally essential energy turnaround. This applies in particular to investments in projects that are not subsidised by higher levels of government and/or have long amortisation periods.

Therefore, when decisions are made on resource allocation the crucial issue should be which measures do the most to implement the revised energy policy as a whole. In this context it has to be borne in mind that ecological, economic and social objectives are not compatible with one another per se. Permanent prioritisation of the sustainability triad's ecology component and double subsidisation of certain technologies are two positions that cannot be tolerated.

German municipalities consider climate and energy issues very important

Major issues for municipalities in the medium term*



* Survey of 118 major municipalities; multiple responses possible.

Source: Institut für den öffentlichen Sektor



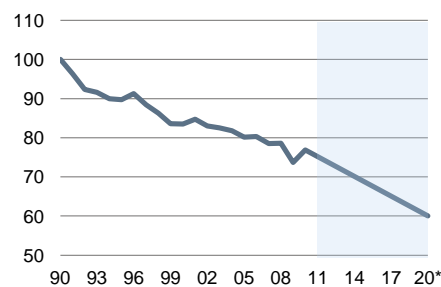
Germany's energy turnaround

Energy turnaround and climate protection: The key objectives

Reduce emissions

1

Greenhouse gas emissions in Germany, 1990=100



* Target for 2020: -40% versus 1990

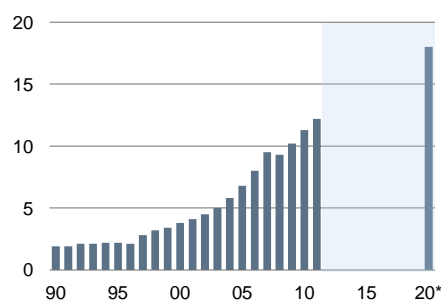
Source: Federal Environment Ministry

In Germany, the concept of the energy turnaround is occasionally limited in the public's perception to last year's decision to stage an accelerated exit from nuclear power generation following the disaster at the Fukushima reactor complex in Japan. Yet the turnaround is very much more comprehensive and goes back to a much earlier date. The topics of energy efficiency and dependence on fossil fuels (especially petroleum) became focal points as early as the 1970s in the course of the first oil crisis. And in 2000 it was agreed in Germany to phase out nuclear power. As things stand today, the "exit from the exit" provided for in the Energy Concept put forward in autumn 2010 by the political parties now in power was only a short time-out from the original plan, if one disregards the fact that the 2000 exit resulted from a voluntary agreement, whereas the 2011 exit was a binding political resolution. The introduction of the Renewable Energy Sources Act (EEG), by means of which Germany massively subsidised the expansion of renewable energies, also dates back to the year 2000. Furthermore, targets for the efficiency of buildings or savings in the transport sector are not new either. Germany's Integrated Energy and Climate Programme, launched in Meseberg in 2007, is a case in point. Moreover, the German government's climate protection targets and Germany's role in EU climate policy have been staked out in principle for several years.

Renewables growing in importance

2

Renewable energies in final energy consumption in Germany (%)



* Target for 2020: 18%

Sources: AG Energiebilanzen, Federal Environment Ministry

Nevertheless: the accelerated exit from nuclear power represents a break with the past for Germany as an industrial location, for all the important political parties are pursuing identical goals for the first time. Therefore, there are now good chances that the required investments in energy supply, grid expansion, storage facilities and other measures will be brought forward in time. Germany's energy turnaround is being followed closely in many countries around the world. Will an industrialised country that consumes a substantial amount of energy and still has pretty high emissions manage to achieve the ambitious goals without jeopardising the security of supply, triggering a massive increase in energy prices and, above all, scaring off power-intensive branches of industry?

Less CO₂, more renewable energy sources, greater efficiency

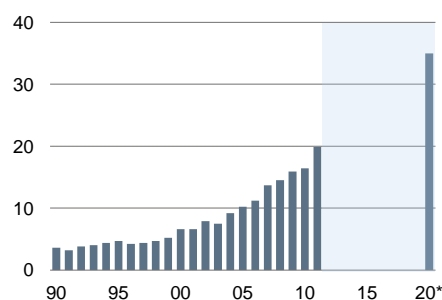
It is worthwhile to outline the challenges that Germany says it wants to face in a grand political consensus with regard to the energy turnaround and climate protection issues. The most important energy and climate policy objectives are as follows:

- Germany would like to lower its CO₂ emissions by 40% versus 1990 by the year 2020 and by at least 80% by 2050.
- Nuclear power is to be phased out by 2022 at the latest.
- The share of renewables in final energy consumption is to be boosted from 12% (2011) to at least 18% in 2020 and 60% in 2050.
- In the case of electricity, the share of renewables in gross power consumption is to be increased from 20% (2011) to at least 35% in 2020 and 80% in 2050.
- Energy efficiency levels in Germany are to be lifted substantially. Primary energy consumption is to be reduced by 50% (vis-à-vis 2008) by 2050, while power consumption is cut back by 25%.

More electricity from renewables

3

Renewable energies in gross power generation in Germany (%)



* Target 2020: at least 35%

Sources: AG Energiebilanzen, Federal Environment Ministry

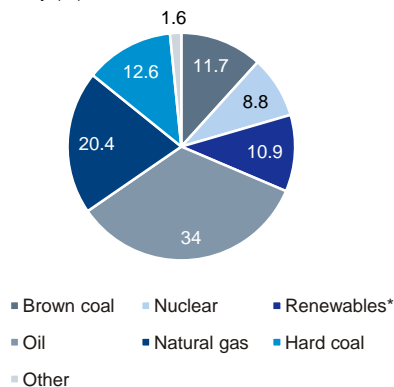


Germany's energy turnaround

Oil is still the most important energy source

4

Shares in primary energy consumption in Germany (%)



* Roughly 69% of renewables based on bio-energies

Source: AG Energiebilanzen

- The refurbishment rate for existing buildings is to be increased from less than 1% now to 2% per year. The primary energy consumption of buildings is to decline by 80% by 2050.
- In transport, final energy consumption is to shrink by 40% (vis-à-vis 2005) by 2050.

Nearly all the targets of what is referred to as the *Energiewende*, or energy turnaround, were already set out in Germany's Energy Concept of autumn 2010 "before Fukushima" and subsequently they remained unchanged. Nonetheless, following the nuclear accident some accents were shifted in Germany's energy policy. Following Fukushima, one of the most important changes vis-à-vis the 2010 Energy Concept – apart from the already-mentioned decision to exit nuclear power generation – is the first-ever emphasis on natural gas as a source of electricity. It is the express wish of the German government that controllable, baseload-capable gas-fired generating stations – together with renewables – close the supply gap that will arise from the faster exit from nuclear power than that foreseen by the Energy Concept. In the original Energy Concept of 2010 natural gas went virtually unmentioned.

Substantial investment required

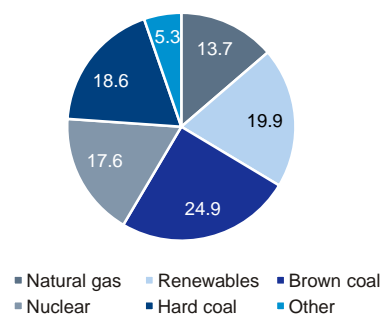
The energy turnaround and climate protection don't come for free – on the contrary: over the next few years considerable sums will have to be invested to achieve the given targets. The size of the project becomes clear when one notes the estimates on investment requirements, which admittedly are fraught with all sorts of uncertainty:

- According to a recent study commissioned by the Federal Ministry of the Environment annual investment in renewable energy sources (electricity and heating) will total roughly EUR 17-19 bn.¹
- This is in addition to investment in fossil-fuelled generating stations (partly to secure the baseload) totalling roughly EUR 4 bn per year up to 2015 as well as about EUR 2 bn annually from 2015 to 2020; subsequently, investment expenditure should decline to about EUR 1 bn per year.
- The study says the costs for the additional expansion of the power grid triggered by the energy turnaround come to over EUR 2 bn per year and over EUR 40 bn up to the year 2030 (transmission and distribution grids).
- To be better able to smooth the fluctuations in renewable energy modern energy storage facilities will need to be built. A recent report published by Deutsche Bank Research finds that in the two upcoming decades roughly EUR 30 bn will have to be invested in Germany to this end.²
- About 40% of energy demand and roughly one-third of CO₂ emissions in Germany are attributable to buildings. Enormous savings potential is harboured in this area. DB Research says that the investment required for energy-efficiency refurbishment of residential buildings alone – depending on the refurbishment rate and assumed efficiency standard – will total about EUR 3-10 bn per year (until 2030).³

Fossil fuels still dominant, renewables already ahead of nuclear

5

Shares in gross power generation in Germany (2011, %)



Source: AG Energiebilanzen

¹ See Deutsches Zentrum für Luft- und Raumfahrt et al. (2012). Langfristszenarien und Strategien für den Ausbau der erneuerbaren Energien in Deutschland bei Berücksichtigung der Entwicklung in Europa und global. Stuttgart, Kassel, Teltow.

² See Auer, Josef and Jan Keil (2012). State-of-the-art electricity storage systems: Indispensable elements of the energy revolution. Deutsche Bank Research. Current Issues. Frankfurt am Main, March 8, 2012.

³ See Auer, Josef et al. (2008). Building a cleaner planet. The construction industry will benefit from climate change. Deutsche Bank Research. Current Issues. Frankfurt am Main, November 14, 2008.



Germany's energy turnaround

- The transport sector will also see investment to reduce energy consumption, although of course this – as at all other levels of energy use – is not solely attributable to the energy turnaround. Roughly half of the German auto industry's expenditure on research and development (some EUR 20 bn per year) is earmarked to improve the energy efficiency of drivetrains.⁴

What role is played by the municipalities?

Government influence growing

Already today it is obvious that many of the measures planned can only be realised if they are subsidised by the government. This has consequences for competition in the energy sector. True, more decentralised energy provision is likely to boost the number of suppliers in the heating and power markets, which suggests heightened competition. However, at the same time, subsidies for individual forms of generation distort competition between the different types of energy. Moreover, the funds are often not deployed according to the highest ecological target achievement rate. Ultimately, the government's influence on the energy market is set to grow over the next few years.

In this report we propose to examine what role the municipalities will play in this context. It is, of course, not disputed that in many segments affected by the policy turnaround there are also private companies offering attractive packages and able to hold their own in competition. It is equally obvious that only with difficulty can the municipalities be compelled to take up the initiative in these areas. For this reason we shall mainly focus on potential courses of action. But what interests us most is what opportunities and challenges will emerge for the municipalities as a result of the volte-face in policy. What instruments do the municipalities hold to achieve the given targets? We also want to investigate in which areas the overarching regulatory framework (e.g. at the federal level) already suffices and thus perhaps obviates the need for additional municipal action. We shall concentrate on the areas of electricity, heating and transport. Note that the links to the above-mentioned targets differ considerably in strength. Raising energy efficiency is an important issue in all segments. The target value for renewables in power generation must naturally also be achieved there. By contrast, the CO₂ target plays a major role in the heating market in particular.

Electricity and natural gas: Many spheres of activity

First privatisation, ...

Municipal utilities have long history in the energy market

For decades it was standard practice that a municipality organised the provision of electricity and gas for its citizens at the local and regional levels. On balance, the municipal utilities achieved important energy industry targets (e.g. in terms of security of supply and grid expansion). It is due not least to regulatory intervention, such as the guarantee of exclusive territorial rights, that the risks for local investors remained small. However, the particularly pronounced investment safety in this monopoly phase – according to many academics and some politicians – came at a relatively high price, as the domestic energy customers have to pay relatively high power and gas bills by international standards.

Liberalisation of the energy markets in late 1990s led to more competition

The liberalisation of the electricity and gas markets in the late 1990s in Germany and other European countries was aimed at achieving a cheaper energy supply. As deregulation enabled proper competition for the first time ever in the grid-based energy markets, it triggered an abrupt end to the existing monopoly phase and started to shake up the traditional supply structures. In this "energy

⁴ See Verband der Automobilindustrie e.V. (2011). Annual Report 2011. Berlin.



Germany's energy turnaround

market phase 1.0" several things changed, ranging from private customers' new option of being able to switch providers right through to the birth of price formation in free markets – in the extreme on energy exchanges. Energy policy took a dual-pronged approach to achieve its objectives; for one thing, the regulatory framework was upgraded for competition by eliminating the territorial monopolies. For another, new innovative instruments such as incentive regulation and product unbundling were created and launched at the same time, which made the transition process controllable and manageable. In this connection there was an institutional revamp, e.g. the establishment of the Federal Network Agency which has since maintained and encouraged competition among grid-based energy forms. As a result, the new competition initially brought pressure to bear on many municipal utilities. Privatisations and sell-offs of municipal utilities were the consequence and by no means seldom.

... then remunicipalisation

Decentralised energy provision
favours municipal suppliers

Over the past few years mutually opposing trends could be observed, though. The days are long gone since major companies could aggressively use the new price competition and thus narrow the smaller municipal utilities' scope for survival. And over time new opportunities for the municipalities and their companies started to beckon: nearly in tandem with the start of the competition phase a trend towards renewable power generation began which has gradually intensified. And as it has mainly had decentralised structures so far, this has favoured local suppliers de facto. Later, new technologies led to a global gas glut that enabled the local gas-fired power stations to cut their fuel costs. By contrast, the energy majors were at a disadvantage with their large-scale power stations on account of international long-term contracts linking the price of gas to that of oil while oil trended skywards; the negotiations to increase the flexibility of the longstanding contracts wore on till mid-2012.⁵ At the end of the day, Germany's nuclear exit that had been legislated by an earlier SPD/Green government and which had applied until the last general election also motivated some municipalities to expand their utilities' own capacities or to reverse past privatisations.

Change of government only temporarily curbed remunicipalisation trend

Interim plans to extend nuclear plant
operating lives changed the underlying
conditions

Following the change of government to a CDU/CSU/FDP coalition at the end of 2009 – and thus to the campaigned-for extension of nuclear plant operating lives – there was, however, a renewed increase in the risks for municipalities that planned to invest in plant upgrades or new capacities. Therefore, an important motive for the still budding trend towards remunicipalisation threatened to disappear. The postponement of the nuclear exit would – according to expectations – have intensified the pressure on electricity prices and thus squeezed the local suppliers' margins. Some already planned combined-cycle gas-fired and steam-turbine power stations, which – thanks to their particular flexibility, high efficiency, low emissions and suitability for combined heat and power generation (CHP) – are commonly regarded as being particularly efficient, sustainable and extremely suitable for municipal energy supply, were suddenly at issue. Greater municipal commitment was also curbed by the cutbacks in subsidies for renewable energy sources (EEG legislation) e.g. for photovoltaics. At the same time, various business opportunities focusing on energy efficiency suddenly seemed less urgent and worthwhile.

⁵ In July 2012, E.ON reached agreement with Gazprom on new, cheaper gas supply contracts, backdating them as far as Q4 2010.



Germany's energy turnaround

Continuation of energy turnaround opens many doors for municipalities

Clearly worded targets

The German government's volte-face on energy policy in 2011 has revived interest in municipal utilities because it reduces the cited risks on the extension of plant operating lives. In the "energy market phase 2.0" now ushered in, competition is no longer at the fore, even though liberalisation – at least de jure – is not being suppressed. The new objectives targeted for the future provision of energy – particularly for the electricity-generating mix – point the way; these are ambitious and clearly worded. Environmental targets such as "more climate protection" had already been given higher priority in "phase 1.0", and these now carry even more weight. While Germany's energy mix to date had mainly been based on fossil fuels, renewable sources are to become even more important in future.

Broad potential field of activity for municipalities

The retooling of power generation brings a raft of challenges with it that offer the energy market players, and the municipal utilities in particular, many ways to get involved. There is a broad spectrum of tasks and it encompasses all core segments, from power generation and grid infrastructure right through to energy storage and efficiency initiatives. Of course, the time factor does play a key role, as not everything that would seem necessary in future has to be addressed immediately. Moreover, special regional factors may lead to differing levels of urgency.

One good example this year is the electricity supply in southern Germany, which is a cause of worry because one of the most important operators could, or would like to, shut down gas-fired power plants there at present for business reasons. One of the driving factors is the priority given to feeding "green electricity" into the grid, which reduces the usage periods for the gas-driven plants and thus their profitability. This gives contours in exemplary fashion to the dilemma that decisions made for microeconomically correct reasons may result in macroeconomically undesired effects. Therefore, securing the power supply in the states of Bavaria and Baden-Wuerttemberg is an extremely important policy issue at present. Since the expansion of the grid required for the massive transmission of electricity from north to south (from wind farms on the coast) will take time, though, there is a need for alternative solutions that can be realised more quickly. The debate ranges from intervening in the decision-making rights of property owners right through to the swift introduction of a capacity market, which of course – with a fully-functioning grid infrastructure in Germany (and Europe) – would not be required at all before 2020.

Examine all the strategic options along the energy value chain

Municipalities would be well advised to examine all the steps along the value chain – i.e. from fuel procurement and power generation right up to trading, energy storage, grids and distribution – and to seek to optimise their structures under the new framework conditions.

Procurement market is important, ...

One challenge facing the nation's still fossil-fuel-dominated power-generating stations is the trend towards higher primary energy prices, e.g. due to Asia's thirst for energy or to CO₂ certificates, even though their price has trended down significantly of late. By contrast, though, the municipalities have many adjustment strategies for more modern procurement at their disposal, and these may be pursued independently of the targets of the energy turnaround. Some worth mentioning are the diversification of energy inputs (portfolio effect) and – to the extent technically possible – the substitution of cheaper alternatives for more expensive fuels. For smaller market participants in particular, the formation of purchasing cooperatives or permanent strategic partnerships holds considerable promise. Especially procurement strategies require constant review and upgrading as necessary.



Germany's energy turnaround

... but challenges at the generating level are bigger

The demands at the generating level are naturally much more varied and complex since they apply not only to procurement but also to related investment in and modern handling of power plants nationwide. Generally speaking, risks such as the climbing price of fossil fuels can be countered by boosting efficiency levels, running generating plants more flexibly, broadening the mix of fossil fuels deployed or – given the favourable subsidy conditions – expanding power generation on the basis of renewables. In principle, as a consequence of the string of unexpected changes to the underlying conditions, any concrete investments in power plant require increased caution and they harbour substantial risks to boot.

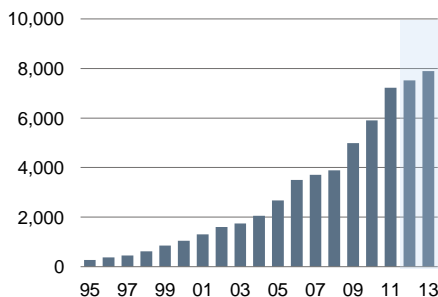
Changes in generating structures offer many opportunities

Provided the government soon improves the framework for fossil-fuelled power stations, particularly gas-driven ones, this could motivate some municipalities to invest here. This option would be particularly interesting up to the early part of the coming decade when the residual lives of the nuclear generating plants remaining are exhausted, above all – as discussed – in southern Germany. Nonetheless, the renaissance of natural gas (and hard coal?) is by no means likely to be permanent. True, at present, the elimination of nuclear capacities does benefit the profitability and thus the survival of those plants in particular that have higher fuel costs than nuclear energy; i.e. ones fuelled by brown coal and hard coal as well as gas-and-steam plants. On a longer-term horizon, however, the expanding role of renewables, which trigger no or virtually no variable costs, alongside gas turbine stations, which already only go online temporarily to smooth out demand peaks, will initially push hard coal and later also gas-and-steam plants over the viability threshold into economic oblivion – assuming the costs of renewable energy continue to decline. Towards the end of nuclear power generation in Germany above all the renewables and – assuming moderate CO₂ prices – brown coal plants will still exhibit variable costs that are below market levels.⁶ Political interference such as the decision in 2011 to exit nuclear power and prioritise feeding EEG-based power into the grid thus induce a massive restructuring – via the outlined merit order effects – of Germany's power station landscape.

More and more biogas plants

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Number of biogas plants in Germany

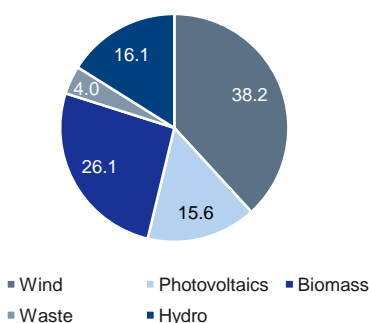


Source: Fachverband Biogas e.V.

Wind power is key pillar of renewables in electricity market

7

Renewable energy sources in gross power generation in Germany (2011, %)



Source: AG Energiebilanzen

Given their many advantages efficient CHP plants – also on the basis of conventional energy sources – will remain an interesting field of endeavour particularly for municipalities; however, the prerequisites for profitable and/or particularly sustainable operation must be met (e.g. the permanent market sale or use of the heat produced). Many municipalities will probably seek alternatives mainly in the renewables field as fossil-fuelled generating stations lose significance. This holds whether the CHP option is available or not.

Examine all renewables for local relevance

In principle, all renewable sources of energy will be of interest to municipalities going forward. In practice, however, natural factors or circumstances such as the availability of biomass, wind or near-surface thermal resources will often determine the economic viability of the investment decisions. Good options for the domain of the municipalities (buzzword: decentralisation) – in rural areas in particular – would be biomass, geothermal, solar thermal, photovoltaic and onshore wind energy. It is no wonder that the number of biogas systems, for instance, has increased seven-fold since 2000, to over 7,000. Naturally, larger-scale solar or onshore wind farms as well as offshore wind farms (which will play the more important role in future), which all tend to focus on the supra-regional

⁶ The low marginal costs of power generation from renewable sources will hence tend to drive down prices on the electricity exchange. Nonetheless, end-consumers will continue for the time being to feel their high investment costs via the EEG levy.



markets, will remain the focus of major utilities and investors in particular for the time being.

The boundaries are in a state of flux, though. Smaller municipal utilities can handle major projects, too, if they join forces. The concept of the virtual power station is still very much on the agenda of innovative municipalities. Besides, municipal alliances are increasingly catching on for the operation of existing plant, for acquisitions and new investments. Add to this the trends towards civic empowerment (also to reduce local resistance) and mixed concepts across sector boundaries. All this also changes the funding environment in the municipal sector. Of course, municipalities may also invest in alternative forms of power generation without a utility of their own; for example, some communities and cities have set up their own solar farms in undeveloped areas or leased out such areas for this purpose. The profits earned thanks to subsidisation can be used, for instance, to cross-subsidise less lucrative investments such as nursing homes, kindergartens or swimming pools.

Double subsidisation should be avoided

There is naturally scope for criticism in principle if municipalities or public corporations avail themselves of the feed-in payments guaranteed by the EEG – i.e. basically a subsidy granted by an overarching level of government. In microeconomic terms (from the perspective of the municipality or its utility), however, many investments in renewables likely are worthwhile. In this respect, municipalities will have a substantial influence on the target of raising the share of renewables in the power supply. It is possible to subsidise renewable energies via municipal policy instruments beyond the level offered via the EEG, but it would be inappropriate to do so, as this would be tantamount to double subsidisation. Furthermore, limiting targets for the expansion of renewable energies (right up to the goal – at least on paper – of energy autarky) to certain municipalities may be quite understandable from a political standpoint. However, such plans should always be adapted to the overarching energy policy objectives. If, for instance, individual municipalities declare for themselves the goal of regional energy autarky or seek to generate 100% of their electricity from regional renewables, this may result in renewable power plant capacities being built on sites that are actually not suitable or are overdimensioned. Note though that the latter mainly represents a problem insofar as the grids for long-distance transmission are not yet available. However, this may also be the case with private investments.

Expansion of renewables requires investment in electricity storage systems

Local factors must be suitable for energy storage facilities

By 2025 the need for new electricity storage systems is set to double.⁷ These are required to balance out the rise in volatility resulting from the massive build-up of solar and wind power systems. Moreover, they can ease bottlenecks in the transmission grid. The newly developing stage in the value chain also offers the municipal utilities an additional, optional field of activity, as long as the local conditions are suitable. The main areas offering good prospects over the next 20 years are pumped storage facilities, storage power plants and compressed air storage. In regions where hard coal used to be mined pumped storage facilities could also be set up underground. The advantage would be that – unlike in mountain regions – there is less likelihood of public protests. For the time being, e-mobility will probably fail to fulfil the initially high expectations of it being an innovative storage medium (see Mobility section). Compared with renewable energies the construction of electricity storage systems has not been promoted much so far. In this respect, involvement in this area would automatically mean a financial tour de force for the municipalities. Perhaps cooperative ventures could be struck with private partners.

⁷ See Auer, Josef and Jan Keil (2012). Ibid.



Germany's energy turnaround

Changes unlock new potential for energy trading

The changes in the energy market are raising the level of volume and price volatility. Moreover, the converging energy markets in Europe are enabling cross-border trading. What is crucial for the municipalities and municipal utilities in this context is that on the one hand they develop strategies to cope with new types of risk, while on the other hand building up contemporary trading strategies. Items on the agenda include tasks for the future such as establishing a high-performance risk management system, creating optimised trading volumes and – if it is still in its infancy – gathering expertise in own-account trading right up to trading in CO₂ certificates.

Grid infrastructure is a bottleneck – speed up work on this permanent construction site!

Distribution grids alone need
EUR 25 bn in investment

The energy turnaround cannot succeed without high-performance smart electricity grids. Since politicians have finally recognised the infrastructure bottleneck there is hope the problem can be eliminated faster in the coming years. One of several problem areas is that it is still not possible to transport large – and in future growing – volumes of wind power from the northern coast down to southern Germany. But the distribution grids, which will likewise need to be adapted to the new trends in the years ahead, are of even greater interest to the municipalities. The VKU (Verband Kommunaler Unternehmen or German Association of Local Utilities) says about 60% of the distribution grids in Germany are operated by municipal authorities. The investment requirements here are estimated to run to EUR 25 bn per year up to 2030; the necessary investments may – given budget constraints – have to compete with, *inter alia*, expenditures earmarked for proprietary generating capacities for their funding. Key drivers for grid expansion include the fluctuating feeds from renewable sources of energy as well as future trends such as the development and expansion of intelligent network structures for future smart grid use.⁸ Going forward, even more importance is likely to be attached to issues such as smart grid planning, optimisation of processes and resources as well as the creation and provision of advanced services. Given the urgency of grid adaptation in the municipal environment considerable attention is already focusing on the Distribution Grid Study being conducted by dena, the German Energy Agency, to be released at the end of 2012.

As far as the expansion of the grid is concerned, the municipalities fundamentally play a major role, of course, if the issue is local resistance to such plans, for the municipalities have so far been one reason for the only sluggish progress. Municipal expertise is required for the drafting of zoning plans, too.

The distribution channel is increasingly important for market success

In the new market environment with greater supra-regional competition the crucial factors, ultimately, are proximity to customers, expertise and competitive prices. Promising distribution concepts include, for example, not only upgrading to become energy service providers, but also flexible concepts that take into account a mixed bag of customer wishes, e.g. load-related tariffs. Municipal energy suppliers can reap a home advantage if they prove their worth as competent energy and environmental advisers. Precisely at the local level is where issues such as energy conservation and efficiency remain good ways to get a foot in the door and establish lasting customer ties.

⁸ For details see Auer, Josef and Stefan Heng (2011). Smart grids: Energy rethink requires intelligent electricity networks. Deutsche Bank Research. E-economics 84. Frankfurt am Main, July 21, 2011.



Germany's energy turnaround

Municipal utilities as energy consultants 8

In Germany's heating market, 60% of the roughly 18 million heating facilities are still gas-fired. The municipal suppliers can score here with advisory services covering all aspects of efficiency and comfort. Moreover, the recently improved procurement possibilities could be used to help gain customer acceptance on the price side. The customers could also be given advice on whether cheaper and more efficient alternatives might be available, as by modernising or exchanging outdated heating plant (e.g. in favour of pellet, biogas or modern gas-fired technology – also combined with solar thermal equipment).

Over the past few years many paths have already been taken to reap as yet untapped energy efficiency potentials. And of course the cited heating facilities would represent only one opportunity among various efficiency initiatives for municipal consulting services and municipal energy utilities. Nonetheless, the local utilities could brush up their image here in particular, as most local customers are likely aware that the municipal companies actually might have a conflict of interest. In this respect, such action would benefit municipal credibility.

It would be favourable, moreover, to pursue such dedicated energy efficiency initiatives also for overarching macroeconomic and/or European interests. For if in future the municipal energy suppliers, producers, distributors and distribution grid operators as well as traders became more involved in a drive to heighten energy efficiency, this would ultimately benefit society as a whole. This would seem advisable and timely. One reason is that thanks to the policy turnaround the energy industry will be geared more heavily towards broader participation in future, thus causing the current conflicts of interest to disappear anyway.

It is practical to distinguish between customer groups such as households and business clients; for the latter – if possible and economically feasible – a breakdown by segment also makes sense. Some households attach relevance not only to the price. They also look at quality aspects such as the share of CO₂ or nuclear content. Moreover, determinants such as household size, sex, education and income may also play a role. As a rule, commercial clients are more willing to switch their provider than households are. Especially since many households are very open to ecological aspects municipal utilities should stress their particular commitment to the energy turnaround and realise that this is an inexpensive way to secure long-term customer ties – and an opportunity that they should seize. There can never be "too much" transparency or civic empowerment for anything having to do with power generation or distribution. In future, the public will have to be integrated more strongly right from the planning stage for all aspects of energy investments.

For municipalities, energy efficiency has potential as a wildcard

Apart from the options open to the municipalities and municipal utilities of becoming more active in the individual segments of the energy supply chain, investments aimed at reducing their own power consumption may naturally also pay off. Major potential may be harboured in, for example, street lighting and wastewater treatment (sewage systems). Power consumption in municipal buildings should be checked at regular intervals. Smaller municipalities in particular need advisory services in these areas in order to reconcile economic and ecological targets. One way of funding such projects is energy performance contracting (EPC), a tool that has already proved to be an asset to several municipalities.

Heating: Energy-efficiency refurbishment offers considerable potential

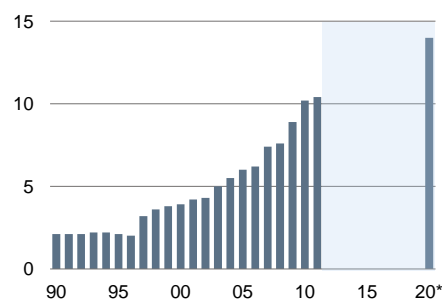
Optimising the energy efficiency of existing buildings is particularly important

At the outset we stated that buildings account for a large share of energy consumption in Germany. Municipalities have an important function when it comes to tapping the energy savings potential in existing buildings. Three main areas may be addressed:

1. According to the German Association of Towns and Municipalities (DStGB) there are 176,000 municipal buildings in Germany. The DStGB estimates that energy efficiency can potentially be boosted by 60% in this area. This will require not only investment in better insulation and modern, needs-based heating systems, but also training for employees and/or users of the buildings. It is a major challenge for the municipalities to find funding for these investments. But at the latest when renovation work has to be conducted on municipal buildings or heating plant has to be upgraded anyway, it would make sense to devote considerable attention to energy efficiency. As energy prices are set to rise in the long term it may be economically worthwhile to invest more in renovation measures in order to enjoy low energy costs during normal operations.
2. Apart from municipal buildings (e.g. administration buildings, schools, swimming facilities) there are over 2 million houses in Germany that belong to municipalities or are operated by municipal housing companies, i.e. more than 5% of the total stock. Many of these buildings will need to have their energy efficiency optimised in the coming years. This will result in strong demand for investment.

More heat from renewables 9

Renewable energies in heat generation in Germany (%)



* Target for 2020: at least 14%

Source: Federal Environment Ministry

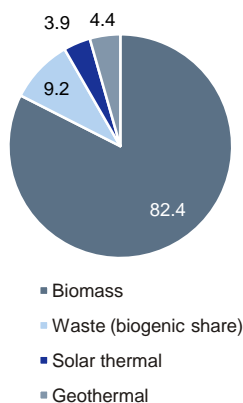


Germany's energy turnaround

Biomass leads in the heating market

10

Shares* in heat generation from renewable energies in Germany (2011, %)



* Difference to 100% due to rounding

Source: AG Energiebilanzen

3. Municipalities can help to ensure that private homeowners also increase their investment in energy-efficiency refurbishment (see box page 10). There are many programmes in rural areas for conserving town centres or sprucing up villages. These include measures fostering the renovation of existing buildings. Some of the funds come directly from municipal budgets, while in some cases they come from programmes launched by overarching levels of government or development banks. In cases where the municipalities are directly responsible, they could do more than today to link the granting of subsidies to energy-related criteria. One further job for the municipalities could be to make information on various government subsidies available to building owners willing to invest in this area; in this connection, however, all the other levels of government should also take interest in raising the degree of transparency. There is also a point of reference for the municipalities in their zoning plans for new building areas. Such zones could, in areas where this is in keeping with the topography, be geared to energy aspects, so the subsequent heating needs of the buildings will be as low as possible. Furthermore, municipalities could set targets for local energy supply and, for example, require that all newly zoned building areas be hooked up with a decentralised CHP unit; of course, this would interfere heavily with the potential owners' freedom of choice. When such measures are considered the economic viability for the municipalities should naturally also be taken into account (e.g. own investment costs and impact on the selling price of building lots).

The municipalities' need for advisory services is likely to increase in all areas over the next few years. Since it is smaller municipalities in particular that do not have the necessary know-how at their disposal to be able to assess the economic viability of the various measures, the municipal decision-making bodies should pay heed to the opinions of energy consultants.

Overarching framework conditions are important

Time for sustainable use of the forest

11

Biomass (especially wood and wood pellets) accounted for over 82% of renewables-based energy consumption in the heating market in Germany in 2011. This makes wood by far the most important renewable form of energy in this segment. In rural areas in particular, many single and two-family homes are heated with wood (at least partly). Close to 20% of the forests in Germany belong to municipalities (referred to as Körperschaftswald). In their sphere of responsibility the municipalities must ensure that the forests are used sustainably – in the truest sense of the word: no more trees may be used (for fuel or as a raw material) than can grow back again.

The extent to which the energy savings potential in the buildings segment can be tapped hinges very heavily on the overarching framework conditions; these include government subsidy programmes and the tax deductibility of refurbishment measures as well as developments in tenancy law. Up to now the government incentives have obviously not been sufficient to substantially boost the refurbishment rate for existing buildings. From our viewpoint it is primarily the federal government's responsibility to flank its own targets in the building sector with corresponding incentives. From an ecological and economic standpoint it is an advantage that the CO₂ mitigation costs in the buildings segment are much lower than for many other measures that have been heavily subsidised up to now. In addition, lower CO₂ emissions in the heating market can be completely credited to Germany's national CO₂ target, while CO₂ reductions in the German electricity market are (largely) meaningless for the national record, since the emissions from the power sector are limited anyway via the EU emissions trading scheme.

Transport: Many instruments, relatively small macroeconomic impact

In Germany, about 18% of CO₂ emissions and as much as 29% or so of final energy consumption are due to the transport sector. This suggests that much can be done here to achieve Germany's energy and climate policy targets. Since 2000 the CO₂ emissions in the transport sector have fallen by more than 15%. That makes Germany one of the few countries anywhere in which significant emissions reductions have already been attained in this sector.

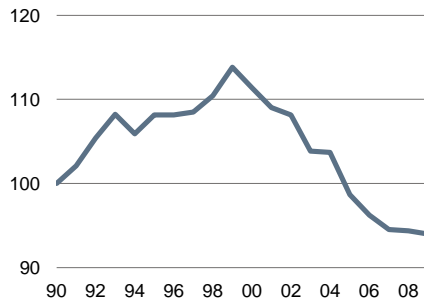


Germany's energy turnaround

Transport sector reports falling emissions

12

CO₂ emissions in the transport sector in Germany, 1990=100



Source: Federal Environment Ministry

Overarching levels of government have greater influence than the municipalities

Before we look at individual municipal instruments for influencing energy efficiency in the transport sector, note that overarching levels of government (federal and EU in particular) have the more efficacious instruments for shaping the "ecological footprint" of the transport sector and the shares of the different modes of transport in the modal split. The federal government, for example, could utilise tax measures (e.g. fuel tax, changes in taxation of company cars or the distance-based commuter allowance), introduce new or increase existing tolls for federal roads, take regulatory steps to intervene in intramodal or intermodal competition (e.g. further liberalisation of rail transport or of aviation tax) or expand the supra-regional infrastructure to influence the development of traffic trends. The EU exerts an influence on the transport sector, for example, by setting CO₂ limits for motor vehicles, extending EU emissions trading to cover air transport, gradually unifying European airspace and setting the competitive framework for individual modes of transport. In comparison with these instruments, which of course are not always used to the optimum, the municipalities have a minor, local impact on the transport sector. Nonetheless, many of the measures outlined in the following are sensible at the municipal level from an ecological and frequently also economic perspective and may help to enhance the quality of life within the municipalities. Given tight budgets the municipalities naturally have to set political priorities here, too.

Local public transport is key factor

Municipalities can lower energy consumption and greenhouse gas emissions in the transport sector via various channels, instruments and measures. The influence of the municipalities on local public transport is probably the most important factor, because local public transport is more energy efficient on average and linked with fewer strains on the environment than many other modes of transport (e.g. motorised individual transportation). Furthermore, local public transport improves traffic flows above all in urban centres; it is a major support for transporting school children; it enables poorer strata of the population to be mobile; and it helps to integrate rural areas.

Municipalities can influence public transport in various ways

Municipalities influence local public transport in various ways. For one, Germany's counties and towns are the competent authorities for regional bus transport; this includes, for example, bus, tram and – in larger cities – underground lines. In regional rail passenger transport (e.g. regional and suburban trains) the federal states are, in principle, the competent authorities. However, they have in many cases transferred responsibility to supra-regional transport associations, in which municipalities are often partners with an ownership stake. So municipalities can influence the respective supply both in regional bus transport as well as – with restrictions – regional rail passenger transport. For another thing, municipal companies (e.g. via municipal utilities or municipally owned operations) offer local public transport services. These companies execute the operational tasks commissioned by the competent authorities.⁹

Generally, an attractive supply of local public transport also generates additional demand and supports a shift in this direction in the modal split. As regards the attainment of energy and climate targets it is of major importance to provide an energy-efficient supply of local public transport. This applies not only to the energy efficiency of the vehicles deployed, but also to their utilisation. A bus used in regular scheduled service that features extremely low fuel consumption is of little benefit if it is scarcely used to capacity. This simple example illustrates

⁹ We will not discuss in detail the various legal and organisational forms of German local public transport or its financing in this report.



Germany's energy turnaround

Load peaks make it difficult to plan capacity utilisation

that the target of attaining as high a degree of energy efficiency as possible may conflict (in an economic sense) with other objectives of local public transport, such as integrating rural areas. After all, local public transport – like other modes of transport – is typically subject to pronounced peak load times, e.g. in the morning and in the evening. For much of the day, however, the load factor is significantly lower. This holds for rural areas in particular. True, this dilemma can be dealt with by selecting the respective "rolling stock" in accordance with demand, both in terms of size and type of vehicle (e.g. bus versus train). However, one should not expect any miracles, because maintaining as flexible a fleet as possible (e.g. a large bus for peak loads, a small one for the rest of the day) raises the fixed costs of local transport.

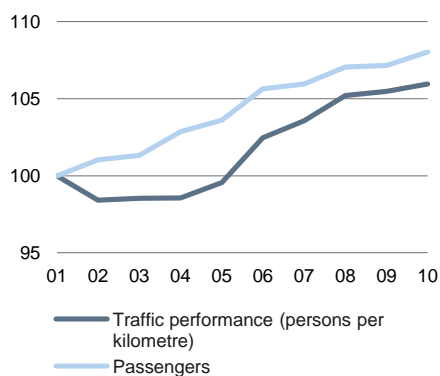
Funding restrictions limit ecological progress in local public transport

In the final analysis, municipalities are already seeking, both as competent authorities responsible for services as well as public transport operators, to reconcile the target of energy efficiency with other local transport objectives. For instance, as competent authorities the municipalities can explicitly specify energy efficiency or CO₂ targets when inviting tenders for local public transport services. Publicly owned transport companies can reduce energy consumption by deploying the most efficient vehicles possible or special driver training courses. However, the scope for action is generally narrowed by economic constraints. After all, the funding of local public transport is closely linked with the development of the public budgets. Regional rail passenger transport is partly financed by the so-called "regionalisation funds" provided by the federal government. Regional bus transport is fundamentally commissioned and funded by municipal budgets. In both cases there is little probability of strongly rising subsidies and likewise little major expansion of supply, even though this would be sensible and desirable from an ecological perspective. In this respect, the trend of recent years is set to continue: the energy efficiency of local public transport is going to improve steadily but only moderately; advances in vehicle efficiency will remain a key factor. One reason for optimism is that traffic performance in local public transport has increased in Germany in the past few years despite budget constraints.

Growth of local public transport

13

Traffic performance and number of passengers using public transport in Germany, 2001=100



Source: VDV

Expand bicycle path network

14

Bicycle transport is particularly friendly to the environment. Use could be fostered by expanding bicycle path networks or designating more such paths in city centres. Examples such as Freiburg and Münster in Germany or other European cities such as Copenhagen and Amsterdam show that very large bicycle traffic shares are possible also in major cities. Restrictions lie in the limited area available. By contrast, the pure investment costs are relatively low at least for identifying bicycle paths on existing streets.

Modern traffic management systems interest major cities

One way for municipalities to optimise traffic flows especially in major cities and thus reduce the related negative ecological effects is to provide modern, electronic traffic management systems. They can efficiently integrate the individual modes of transport (motorised individual, car sharing, local public transport and bicycle), avoid or shorten traffic jams, and reduce the time spent looking for a place to park; electronic parking management systems are already standard in many cities. In future, mobile devices (smartphones) will probably even increase the efficiency and efficacy of such traffic management systems, since they will offer users information on current traffic conditions in real time.

Naturally, the development and maintenance of such traffic management systems require extensive public investment. In practice, however, industrial partners could take interest in such offers because many customers would be willing to pay to a certain extent for such information. For this reason, the participation of private-sector technology firms in the funding of such systems is certainly a possibility.



Germany's energy turnaround

Toll models are economically convincing

Congestion charge: Positive ecological effects possible, but politically sensitive

Toll models are a further option for municipalities seeking ways to influence traffic in urban areas. Several cities outside Germany now have many years of experience in levying a congestion charge (e.g. Singapore and London). The idea behind a toll is economically convincing, for a scarce good – the use of inner-city streets – is assigned a price. Ideally, the toll is geared to traffic volume, which could help to unravel traffic snarls. Naturally, the size of the toll can also be staggered according to ecological criteria, say according to CO₂ or pollutant emissions, or according to the size or weight of the respective vehicles. With a congestion charge, possibly coupled with restrictive parking, motorised individual transportation – depending on its manifestation – would decrease and a more or less greater market share would go to local public transport; this has been the case in other cities. Some people would probably also cut back on a few car trips altogether. In this respect, a congestion charge could prove to have a positive ecological impact, with smaller pollution and noise emission volumes locally likely being a weightier argument for such a toll than reduced CO₂ emissions.

In Germany, a congestion charge would not be easy to implement politically. One indication of this is the decades of – ultimately fruitless – discussions on advantages and disadvantages of motorway tolls for cars. Indeed, if politicians were to plan an urban congestion charge the effects on city retailers and local residents would need to be deliberated along with social aspects and technological issues. At the end of the day, municipalities that consider a congestion charge would need to weigh up the latter's positive ecological potential versus other interests.

Driving bans versus special traffic rights – area development planning is key

Extensive driving bans would encounter substantial resistance

One extreme form of interference in urban traffic would be (regionally limited) driving bans, for example for vehicles with particularly high pollution or CO₂ emissions. For instance, the introduction of an emissions sticker in Germany banned cars with very high pollution values from entering the environmental zones recently established in many cities to reduce the local harm of fine particulates; however, very few vehicles are actually affected by these bans. Extensive driving bans affecting a significant number of cars would no doubt encounter substantial political resistance. The proportionality of such a measure would certainly merit discussion. Instead of imposing driving bans, municipalities could also favour vehicles with particularly low emissions by referring to their ecological benefits. Some conceivable options might include sharing bus lanes, cheaper parking or – in connection with a congestion charge – lower toll tariffs. This option is often debated in connection with the promotion of electric mobility (see below). The effectiveness of such a measure is naturally only ensured as long as the number of vehicles benefiting is not too large, because usage competition increases with the number of vehicles.

Modern traffic management systems and congestion charge models could easily be combined. Ultimately, though, the measures are only of interest to major cities. Virtually no room for manoeuvre emerges for municipalities in rural areas on this count.

Municipalities can also shape local traffic trends via area development planning. This refers not only to the zoning of areas for roads, parking spaces or other traffic routes, but also to the planning of shopping centres, industrial parks and new building areas. For example, shopping centres on greenfield sites lead to larger volumes of motorised individual transportation. This also applies to industrial areas that are not hooked up with public transport. In this respect, area development planning should – as is usually the case already today – also take consequences for traffic development into consideration.



Germany's energy turnaround

Funding of battery charging stations is not a job for the municipalities

E-mobility: It's up to industry in particular

Municipalities will play a major role in driving the market penetration of electric mobility being targeted for the next few years; this applies above all to the provision of battery charging infrastructure. However, from our point of view it is not the responsibility of the municipalities to fund charging stations for electric cars, especially since these are still very expensive. This is primarily the responsibility of industry. Rather, as we see it, the municipalities' job is to find flexible ways to provide the space required for charging stations; there is naturally also going to be competition for the limited parking space. Since the share of the electric vehicles is set to increase only gradually over the next few years, the ecological impact will be very small at first.¹⁰ And most potential first-time customers will probably already have a charging facility at their disposal anyway, which is why there is scarcely any need for the public sector to take action. This again applies particularly to rural municipalities where single-family and two-family dwellings usually have parking spots of their own with a connection to the power grid.

Tap efficiency potentials in municipal fleets

As in the electricity and heating markets municipalities should attach a higher priority to energy efficiency in their own fleets; for example, when vehicles are purchased they should fundamentally feature lower fuel consumption than the models they replace. In this context it has to be noted, of course, that any higher procurement costs for low-consumption vehicles will have to pay off within their useful economic life.

Conclusion and outlook

For Germany's municipalities and municipal utilities, the energy turnaround will mean new spheres of activity and thus also new opportunities. Many of the energy and climate policy targets planned at the federal level require implementation at the local/municipal level. At the same time, the municipalities also face major challenges. The most serious bottleneck holding back required investments is the tight budget situation of the public sector and utilities.¹¹ This applies in particular to investments in projects that are not subsidised by higher levels of government (the federal government) and/or have long amortisation periods. Municipalities and municipal utilities should therefore, from their microeconomic perspective, pay heed to what support for individual measures is available from overarching levels of government, even though such support does not necessarily lead to macroeconomically optimal results. In this context, the municipalities must also consider what follow-up costs will be linked with the granting of any subsidies.

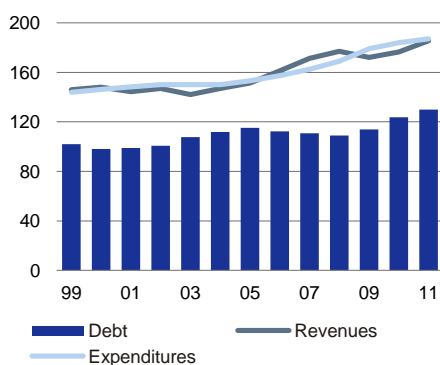
Innovative funding models that involve both the government and the private sector (companies and individuals) may help to alleviate the bottleneck. Risk allocation plays a crucial role: fundamentally, risks ought to be borne by the partner best able to influence them. Ultimately, the attainment of many of the climate and energy policy targets discussed above will probably demand greater financial commitment from the federal government. In some segments (e.g. transport) the federal government also has more effective instruments than the municipalities do.

When resources are being allocated the crucial factor should be which measures have the highest ecological target achievement rate. In this context it

Limited scope for action

15

German municipalities: Revenues, expenditures and debt (EUR bn)



Source: Deutsche Bundesbank

¹⁰ See Heymann, Eric et al. (2011). Electromobility: Falling costs are a must. Deutsche Bank Research. Current Issues. Frankfurt am Main, October 19, 2011.

¹¹ See Zipfel, Frank (2010). Kommunal финанzen – zukunftssicher aufgestellt? Deutsche Bank Research. Aktuelle Themen 482. Frankfurt am Main.



Germany's energy turnaround

has to be borne in mind that ecological, economic and social objectives are not compatible with one another per se. Prioritisation of the sustainability triad's ecology component (say, on the principle of "the more, the better") cannot be tolerated, for other municipal tasks (such as education) would be hurt. Moreover, efficiency criteria for implementing the energy turnaround (e.g. choice of locations suitable for renewables) would be neglected.

Greater cooperation could make sense for smaller municipalities in particular

A further challenge for the municipalities and municipal utilities is the increased demands on administrative authorities and management. Greater cooperation with other municipalities and/or municipal utilities could improve the degree of efficiency in handling the tasks. Mergers to achieve an optimal operating scale may also prove effective. It is smaller municipalities in particular that will often have to turn to external advisory services. Overarching levels of government (e.g. the federal states and federal government) are responsible for ensuring that the many newly developing municipal energy concepts are in line with the overarching targets, even though this may mean interfering in municipal self-government. Ultimately, managing the energy turnaround requires both municipal/regional cooperation as well as supra-regional action.

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