

P2.1-1 Scenarios - How to Make Scenarios Work? Examples from the Work of UBA

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In order to achieve an 80 – 90% reduction in GHG emissions by 2050 we will first have to transform our electricity supply system. The energy sector holds a key function regarding GHG emissions by currently causing more than 80 % of the emissions in Germany. Within this sector the electricity supply is responsible for about 40% of energy-related CO₂ emissions. The potential for reducing emissions in the electricity sector is very high. Provided a highly efficient use of electricity and energy conversion, as well as an energy supply system that is completely based on renewable energies, it will be possible to reach a level of nearly zero GHG emissions.

For Germany, the technological change towards an electricity supply system completely based on renewable energies by 2050 is possible. By doing so, Germany's status as a highly industrialised country can be maintained, as can its subsequent ways of living, patterns of consumption and behaviour. This is shown in our simulation of the scenario 'region's network scenario' as well as in several studies of other institutions like the German Advisory Council on the Environment (SRU), the German Enquête-Commission on sustainable energy supply or Greenpeace.

Our results should be regarded as one part of a level playing field needed to create a 100 % renewable electricity supply system by 2050. Aside from the regional scenario, we also sketch two other scenarios: International large scale application of technology and Local Energy Autarky. For these two scenarios we intend to go more into depth within further studies as we expect them to provide further momentum towards achieving the level playing field.

A switch to an electricity supply system based on renewable energies will also be economically beneficial. The costs of such a change in the energy supply are significantly lower than those of adapting to an unmitigated climate change we

* UBA 2010c

** SRU 2010, Enquete-Kommission 2002

and future generations would have to otherwise face, Germany could link a respective strategy to a successful economic development whilst creating important momentum for current international climate negotiations.

An electricity supply system completely based on renewable energies can provide the security of supply for today's high level of demand and at any hour of the year. The results of our simulations show that renewable energies can supply the demand for electricity and provide the necessary control reserve. Load fluctuations of the renewables can be safely compensated for at any time as the different forms of energy conversion, energy storage and intelligent load management complement each other sufficiently.

As an important condition for achieving this 100% renewable electricity supply, we have to tap the existing energy saving potential at the same time. This applies not only to the energy use of private households. Despite the expected economic growth, industry, trade and commerce also have to reduce their energy consumption by achieving the existing energy saving potential. If this is the case, renewable energies can provide the substantial additional electricity demand from new applications like electric cars or heat pumps for heating and hot water. To limit future electricity consumption for heating, a very good insulation of buildings is a basic requirement.

70% of the current primary energy consumption in Germany is based on the import of coal, natural gas or uranium. A complete supply of electricity from renewable energies could therefore dramatically reduce Germany's dependency on such imports and decrease vulnerability to fluctuating or rising oil- and gas prices.

The conversion of the electricity supply system towards the use of 100% renewable energies by 2050

*** Stern 2007

**** UBA 2010b

is possible. Nevertheless, this is a very ambitious goal and requires decisive political support. The share of renewable energies in the German gross electricity consumption has increased in the past 15 years from less than 5% to 16% in 2009. However, there is still much work ahead if Germany wants to cover its demand for electricity in 2050 completely through renewable energies: It is not only necessary to accelerate the expansion of renewable energies but

also to substantially convert the existing energy system to make it fit for an exclusive use of renewables in the future.

It is important to define intermediate goals, particularly for the period after 2020. Generally, it can be said: The earlier we start decisive actions the more time we will have to tackle the upcoming challenges of necessary technological and societal adaptation!