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## Transforming the global energy system – where do we stand?

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# The Current Column

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## Transforming the global energy system – where do we stand?

*Bonn, 20 August 2012.* If the esoteric interpretation of the Mayan calendar is to be believed, we have only a few months left before the world ends. If climate science is to be believed, we have only a few years left to rescue the world. In its Fourth Assessment Report in 2007 the Intergovernmental Panel on Climate Change (IPCC) came to the conclusion that global greenhouse gas emissions will have to reach their maximum level by not later than 2015 if average global warming is to be kept below 2°C. In fact, greenhouse gas emissions have risen by an annual average of 2 percent in the past twenty years.

Reversing this trend would require a radical change in the way the world's countries generate and consume energy. This is true not only of the industrialised countries, but of the developing countries, too – especially the rapidly growing emerging economies, whose hunger for energy is currently being satisfied predominantly with coal. Along with energy efficiency, the expansion of renewable energies is an ecological imperative.

Five years after the IPCC's most recent Assessment Report not much has yet happened as regards energy transformation – or perhaps it has. A glance at the annual report of the REN21 organisation on the state of renewable energies might give rise to some optimism. Renewables are a definite growth sector; not even the financial crisis has been able to change that. In 2011 USD 257 billion was invested in renewables, 17 percent more than the previous year. This shows that policy can actually succeed in changing whole sectors: 109 countries have now introduced measures to support renewables, including 65 with feed-in tariffs. Without these measures, such growth of relatively expensive technologies would not have been possible.

Another welcome fact is that the developing countries and emerging economies have meanwhile become a driving force in the expansion of renewables. Half of all countries with supportive policies are developing countries, and this is having an impact. China particularly stands out: in 2011 it added over 30 GW of new capacity, taking the total capacity of renewables to an estimated

282 GW. This does, however, include some 212 GW generated by large hydropower stations that may do serious damage to the environment, among them the Three Gorges Dam. By comparison, all Germany's power stations, whether fuelled by renewables, fossil fuels or nuclear energy, have a total capacity of some 160 GW.

Other countries, too, have made progress. India has the world's fifth largest wind power capacity, and it is setting its sights high with its recently launched Solar Mission: by 2022 it is to have a solar energy capacity of 20 GW. Brazil produces most of the world's supply of ethanol and has the fourth largest renewables capacity. Even smaller countries like South Africa are taking their first steps towards energy transformation. Although the fixed feed-in tariff for renewables introduced in 2009 initially flopped because the government was afraid the costs would be too high, the renewables market appears to be taking off now that the system has been changed to tariff auctions. The first two rounds of auctions met with considerable interest, and prices fell very sharply thanks to the keen competition among the bidders.

These developments have created some optimism – but unfortunately, they are only one side of the coin. The other side is investment in fossil fuel infrastructure, because we have seen a renaissance of coal since the beginning of the new millennium. Once coal-fired power stations have been built, they have a useful life of several decades. For coal-rich countries like South Africa, they have the advantage of supplying reliable and cheap electricity, which the countries can generate with familiar technology and without outside help. To prevent further uncontrolled blackouts like the one it suffered in 2008 and to meet the growing demand for electricity, South Africa is therefore not only planning to use more renewables: its coal-fired power station capacity is also being increased on a grand scale. With the coal-fired Medupi and Kusile power stations, which are co-funded by the KfW IPEX Bank, some 8.6 GW of coal-based electricity is currently being added. This is equivalent to a 20 percent rise in the present total capacity. The

Medupi coal-fired power station alone will increase South Africa's CO2 emissions by 7 percent.

Globally, too, coal is still widely used, fuelling almost half of the growth in the world's energy consumption over the past ten years, mostly in the emerging economies' electricity sectors. The International Energy Agency warns that, with investment structures as they are, enough CO2 emissions will already be "locked in" by existing power stations, factories, buildings, etc. by 2017 to raise the concentration of greenhouse gases in the atmosphere to 450 ppm. That is considered to be the maximum possible if climate change is to be kept within acceptable limits.

So where do we stand as regards energy transformation? Well, the first steps have been taken in the right direction. Investment in renewables reaches a new record level each year, rising from USD 130 billion in 2008 to USD 257 billion in 2011. However, their market share is still relatively small. If the traditional (and often unhealthy) use of biomass in developing countries is excluded, only about 8 percent of global final energy consumption is currently derived from renewables, and almost half of that figure (3.3 percent) comes from that controversial source, large-scale hydropower. Fossil fuels continue to account for 81 percent.

There is, then, still not a great deal of energy

transformation to be seen. But it can be hoped that the rising investment in renewables is an indication of a change in the trend. The development of generation capacity leads to learning effects, which will, in turn, make political support easier until it is no longer needed. Indeed, some renewables (hydropower and wind power, for instance) have already reached grid parity, meaning that they are price-competitive with fossil fuels. Others, such as solar energy at sunny locations, are about to reach this stage. It is to be hoped, then, that it will not be long before a tipping point is reached, the point at which renewables simply become the cheaper option. Even they, of course, are not a panacea: rules and standards will be needed to prevent them from creating new problems elsewhere. Biofuels, for example, may compete with foodstuffs for land and so increase food prices, the mining of raw materials for solar panels may harm the environment, and large-scale hydropower may necessitate resettlement schemes that are not always socially acceptable. Nonetheless, fossil fuels must give way to renewables in the medium term, because there is one thing that climate science makes clear to us: if we do not begin very soon to change the way we treat our planet, Earth will be a very uncomfortable place for future generations to live. We probably have more time to change than the Mayan calendar gives us, but not a great deal more.



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