DELPHI ENERGY FUTURE

POSSIBLE FUTURES:

FINDINGS FROM THE DELPHI ENERGY FUTURE 2040

AFRICA: TECHNOLOGY ENABLES IMPORT-INDEPENDENCE

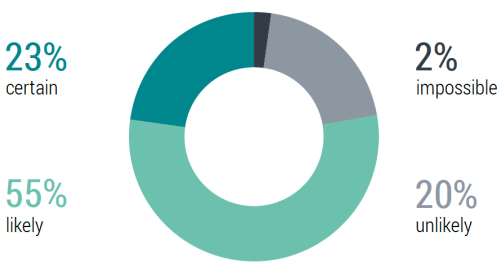
For many developing countries the transition to renewables in the period to 2040 has not represented a move to another system as much as an opportunity allowing them to build a decentralised, cost-effective and secure supply system in the first place. This is the case for many countries in sub-Saharan Africa, for example, where electricity supply systems used to be characterised by low electrification rates, few centralised power stations, fragmented infrastructure and network overload.

Energy systems in 2040, by contrast, are decentralised systems based on renewable energy sources and storage that allow for the creation of "energy islands" operating mostly independent of centralised interconnected systems. Thanks to advances in photovoltaics and storage technology, electricity can now be generated at prices not even the most efficient conventional power stations can compete with. Decentralised forms of renewable energy generation deliver the largest benefits where existing energy infrastructure has been only rudimentary as they do not require complex transmission and distribution networks. Particularly sub-Saharan developing countries, where existing interconnected systems are weak and not extensive, profit from this development.

"Delphi Energy Future 2040" is a strategic foresight project in the energy sector, based upon the expertise of more than 350 experts from over 40 countries and all relevant sectors. This extraordinary study offers exciting insights into a worldwide discussion that evolve around the core question "What future awaits the energy systems in Germany, Europe and the world in the year 2040 and beyond?" To access all results, please download the full report free of charge here:
http://www.delphi-energy-future.com/results/

THESIS 35
By 2040 renewable energy sources operating in conjunction with storage units will be the generation technology with the lowest electricity production costs. High-performance customer generation facilities will be sold in retail stores and can be installed in a matter of minutes.

WILL THIS THESIS ACTUALLY TAKE PLACE?



Installation, maintenance and operation of the new systems no longer require expert skills. All necessary knowledge – even during failures or disturbances – is conveyed in the form of online training.

Easier access to capital, also through microcredit lending, is a central factor. International funds endowed with climate money have aligned their approach to these needs and offer microfinancing opportunities. Crowdfunding platforms close problematic financing gaps by providing both equity and debt.

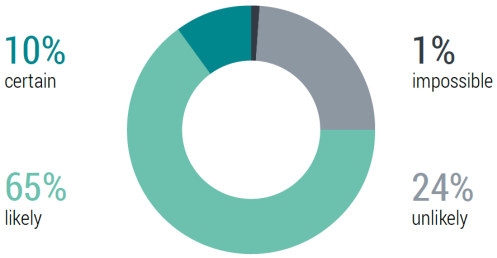
Not all African countries have been able to fully seize the opportunities by 2040. But: many factors point towards the emergence of decentralised energy systems largely operating on renewable energy sources especially in decentrally organised African states. The idea that nuclear energy could be an alternative, however, has turned out to be an illusion: due to its incalculable associated costs nuclear energy is no longer considered an option; the lengthy and complex decommissioning projects in the industrialised world act as a deterrent, preventing developing countries from following their example.

Even though coal, oil and natural gas continue to be available at low prices in 2040, they hardly endanger the renewables' momentum. These simply have the better arguments on their side now that using local renewable resources is the more economically viable approach and also makes countries independent from energy imports, whereas the creation and maintenance of fossil-based, centralised infrastructures is a highly cost-intensive enterprise. Adopting their own energy transitions tailored to their specific needs does not only allow developing countries to shake off their dependence on energy imports or foreign expertise but also to keep their energy prices stable in the long term. For more information, please read theses 35 and 38.

THESIS 38

By 2040 the energy supply system will be structured in a cellular way: interconnected cells and "islands" of the size of a city or medium-sized region will generate their energy from solar power, wind power, storage units and a minor share of conventional reserves.

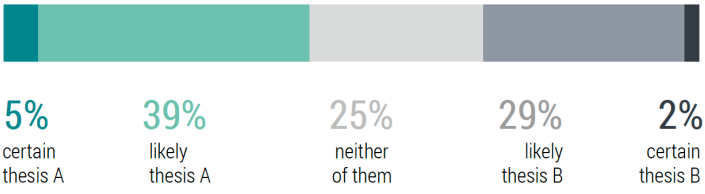
WILL THIS THESIS ACTUALLY TAKE PLACE?



THESIS 45

A: By 2040 the African countries will have achieved independence from international commodity markets thanks to a promotion of decentralised forms of renewable energy generation, and will be developing new energy systems themselves (frugal innovation).
Versus
B: By 2040 the high investment costs of renewable energy projects, a lack of investors and insufficient levels of qualification will have prevented Africa from "leapfrogging". Its energy mix will be dominated by fossil sources of energy.

WHICH OF THE TWO THESES (A, B) WILL TAKE PLACE?



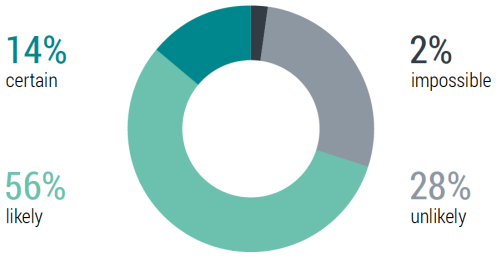
BLOOMING LANDSCAPES OR CONTINUED URBANISATION?

Lack of access to energy for lighting, heating, cooling, cooking and communication purposes – which used to be a development obstacle obstructing progress for more than 2 billion people – has been largely overcome by 2040, thanks to decentralised forms of renewable energy. As a result, small businesses and medium-sized commercial and industrial enterprises are being developed, for example in the areas of food processing. Not only can health stations be operated but access to communication and lighting promotes education and training. In Africa, value creation at the local level has made many rural communities and municipalities independent from central government transfers in 2040. Local investment decisions, for example on the construction of roads or community centres, are increasingly taken by the affected communities themselves, which ensures that investment projects meet local needs and requirements. As municipalities thrive economically, this enhances their political status, improving the chances of increased social participation and stabilisation.

In 2040 countries that have opted for de-centralised energy systems are holding another trump card: their systems are more resilient to natural disasters or acts of terrorism and thus provide a higher level of supply security. Many – not all – developing countries in Africa are now in a position to develop their own technological solutions to accommodate their needs. This also comprises establishing management and technical know-how as well as creating research and development facilities. For more information, please read theses 23, 29 and 45.

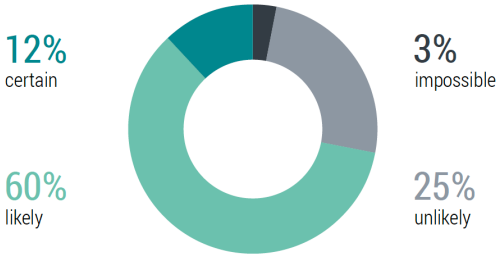
THESIS 23
By 2040 the generation and supply of energy will have been decentralised and made more flexible, which will have led to the emergence of structures that are more resilient to crises and acts of terrorism.

WILL THIS THESIS ACTUALLY TAKE PLACE?



THESIS 29
By 2040 distributed generation with renewable energies using battery storage will have led to the emergence of new democratic self-governance structures at the local level. Municipalities and social bottom-up movements will have gained momentum.

WILL THIS THESIS ACTUALLY TAKE PLACE?



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