

DELPHI ENERGY FUTURE 2040

STRATEGIC FORESIGHT

THE PROJECT: “DELPHI ENERGY FUTURE 2040”

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the German Association of Energy and Water Industries (BDEW) and PwC jointly implemented the global foresight study “Delphi Energy Future 2040”. The Delphi method is an instrument of “strategic foresight”. Together with over 350 hand-picked energy experts from all over the world – from industrial, emerging and developing countries – they explored the lead question: “What future awaits the energy systems in Germany, Europe and the world in the year 2040 and beyond?” Goal of the study was to identify and assess potential future developments that – if taking place – might become “game changers” to the whole energy system. Also adjacent policy areas such as climate change, urbanization or resource geopolitics have been included. Thus, the study includes a large variety of perspectives and provides a cross-sectoral outlook on potential crucial developments for decision-maker.

WHY APPLY “STRATEGIC FORESIGHT”?

- Active preparation for potential future developments of great importance (“thinking in alternatives”)
- Early warning system to identify potential “game changers” and sudden trend-breaks
- Input for strategy processes in politics, business and civil society
- Making use of implicit expert knowledge to complement other modeling approaches

THE DELPHI-PROCESS

INTERVIEWS

80 expert interviews worldwide with specialists from politics, business, science and civil society have been conducted focusing on the key factors that will influence future energy systems.



THESES DEVELOPMENT

Based on the interview results 56 visionary theses on the future of energy systems have been formulated.



SURVEY 1

350 international experts evaluate the theses and rate them in terms of their likelihood, timescale and regional impact.



FEEDBACK

The results of the first survey round are being fed back to the expert panel.



SURVEY 2

The experts are asked to re-assess all theses in light of the first round’s results. Thus, a group communication process takes place, typical for a Delphi. Where their opinion varied from the median response they were asked to provide reasons.



INTERPRETATION

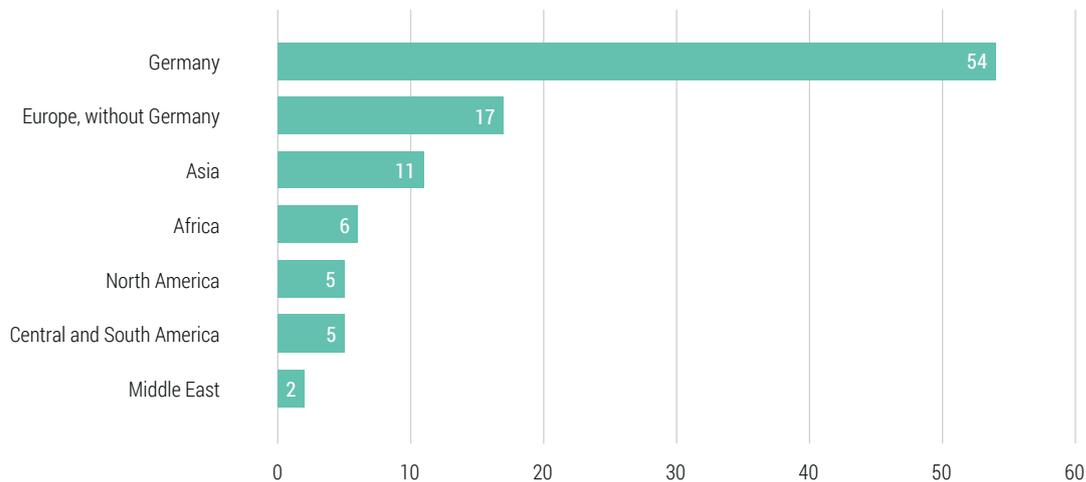
Based on the results of the second survey round GIZ, BDEW and PwC developed brief future story lines describing possible developments until 2040.

WHO ARE THE DELPHI-EXPERTS?

The majority of experts are from Germany and Europe but other regions are also represented: Asia, Africa, North, Central and South America, and the Middle East. The majority of experts have a business/association or public sector background. But many respondents also come from the fields of science and civil society. The range of industries represented in the expert panel was also very broad: other than energy policy specialists and experts from all stages of the energy supply chain, which were the fields of expertise most frequently stated, the expert panel also included decision-makers from the IT sector, the chemical industry, the financial services industry, urban planning and the media.

Nearly half of all responses were provided by women. Given that one criterion for participation in the survey was that participants be experts in their field or decision-makers, almost all respondents are aged 35 or older, with 53% being more than 50 years of age.

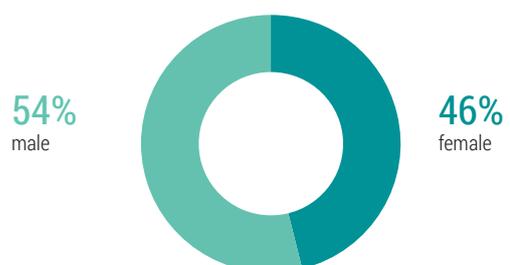
REGIONS (IN %)



SECTORS (IN %)



SEX (IN %)



THE ENERGY WORLD IN 2040: KEY RESULTS OF “DELPHI ENERGY FUTURE” THE RESULTS MIRROR THE EXPECTATIONS AND OPINIONS OF THE ENERGY EXPERTS.

CLIMATE ACTION GAINS MOMENTUM

- Ecological disasters force many governments to act
- Citizens demand sustainable policies
- Consumers demand sustainable products

FOSSIL FUEL DEMANDS DECLINE

- Renewable energy is economically more competitive
- Decentralization of energy systems is driven by cheap renewables
- Sector-coupling based on renewable electricity becomes prevalent
- Electric mobility is long since competitive
- Total energy demand and fossil sources are decoupled

FOSSIL FUEL PRODUCING COUNTRIES ARE DESTABILIZED

- Energy transition progresses faster than expected
- Many producer countries face dire revenue losses
- Subsequent economic crisis causes social unrest

CHINA AND INDIA ARE CHANGING COURSE

- Middle class exerts pressure due to adverse living conditions
- City air pollution strains health care systems
- China and India adopt ecologically friendly policies
- China takes the lead in renewable energies
- Countries adopting – and providing – renewables early on profit economically and dominate the list of the most competitive economies

TECHNOLOGICAL INNOVATION

- Renewable energies have the lowest electricity production cost
- Innovative PV + storage is the “game-changer” (enabling decentralized “presuming”)
- ICT/digitalization changes business models and brings new players to the table
- Major internet companies are among the most important actors in the energy sector, traditional energy companies have lost their market share

PERSPECTIVES FOR DEVELOPMENT

- Cheap decentralized renewables allows for rural electrification
- Local self-governance is strengthened
- All necessary skills can be conveyed through online-training
- Micro-financing address financing-gaps
- Great opportunities for development and ‘leapfrogging’
- Import-independence is gained
- Many – but not all – countries will have profited by 2040

NEW REGULATORY REGIMES HAVE EMERGED

- In Europe energy governance will be organized supra-regionally
- Common EU domestic and foreign energy policies exist
- The European ‘copper plate’ is a reality
- Decentralized energy islands emerge

ECONOMIC EMANCIPATION OF THE ENERGY TRANSITION

- Economic factors such as investors’ return expectations have become the energy transition’s main driver