

Delphi Energy Future

Energy Futures 2040:
A positive vision or calculated optimism?

Jens Burgtorf, GIZ

'It is not a matter of correctly predicting the future, but of being prepared for it.'

Pericles (ca. 500 - 429 BCE), Athenian politician and military commander

'Prediction is very difficult, especially about the future.'

Niels Bohr (1885 - 1962), Danish physicist

What future awaits the energy systems in Germany, Europe and the world in the year 2040 and beyond?

The Goal of Delphi Energy Future 2040

- Assessment of **possible futures of energy systems** from global and cross-sectoral standpoint
- **Awareness for fundamental changes** (and “weak signals”) in the energy sector – and its potential consequences
- Impulse for **strategic debate** among stakeholders
- **New perspectives** on global energy transition building on 350 experts with diverse national and professional backgrounds

Strategic Foresight's Added-Value

- Assessing **possible futures** instead of clear prognosis
- Providing **orientation** for strategic planning (“thinking in alternatives”)
- Opening up new (also **non-mainstream**) perspectives
- Identifying potential “**game changers**” and its indicators

Why Choose the Delphi Method?

- Access “**intuitive expert knowledge**” about future developments
- Include experts with **diverse backgrounds and perspectives**
- Take **non-mainstream** opinions/ expectations into account
- Anticipate trend-breaks (**early warning system**)
- Create global group **communication process**
(feedback and reflection of other participants’ opinions)

Delphi in Brief

- Structured expert surveys
- Assessment of experts' opinions and expectations
- Combination of qualitative and quantitative methods
- Focus on medium- and long-term scenarios
- Developed in the 1950s in a military context and soon adopted by governments and corporations

Delphi Step by Step

Interviews



Theses



Round 1



Feedback



Round 2

=

Results

&

Interpretation

80 expert interviews worldwide to identify topics and develop 56 theses on the energy future.

350 international experts assess the likelihood of the theses in various rounds.

Assessments are summarized and fed back to experts. Experts can confirm or revise their estimates.

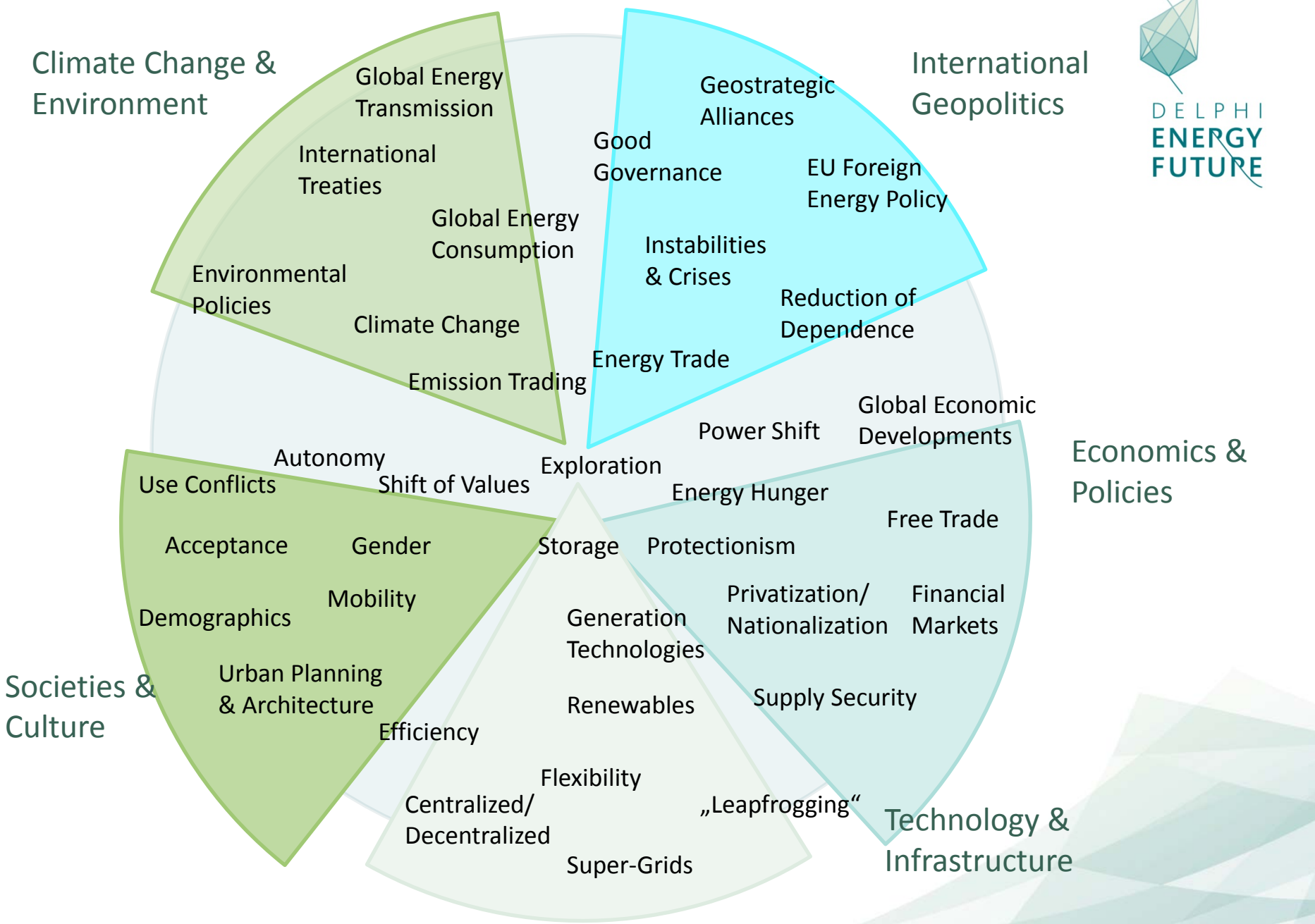
→ Watch the Delphi Energy Future 2040
project movie **here!**

<https://www.youtube.com/watch?v=0fihhsK4-ZM>

(5.15 min)

Delphi Energy Future 2040 in Numbers

- from 2014 – 2016
- 80 in-depth interviews
- 56 theses
- more than 350 energy experts
- from 40 countries
- thinking 25 years ahead
- 13 storylines about the future



Who are the Experts?

SEX (IN %)

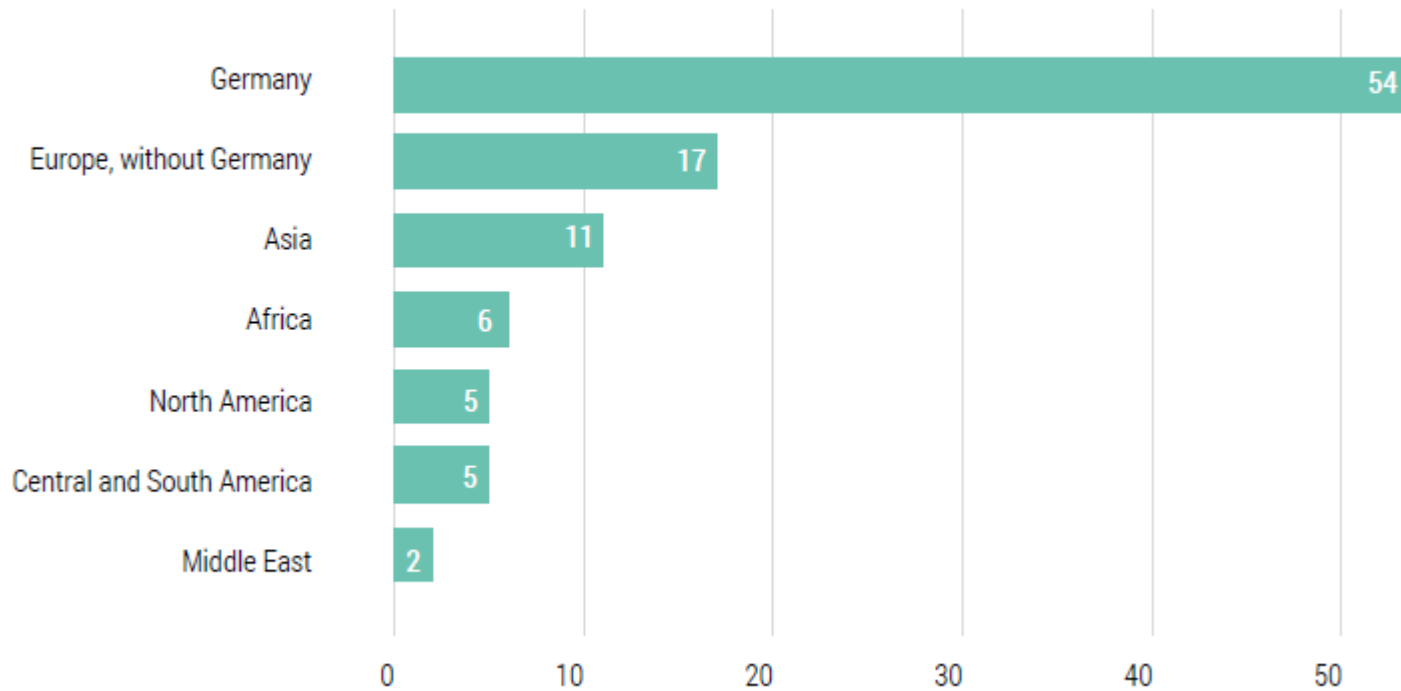


SECTORS (IN %)

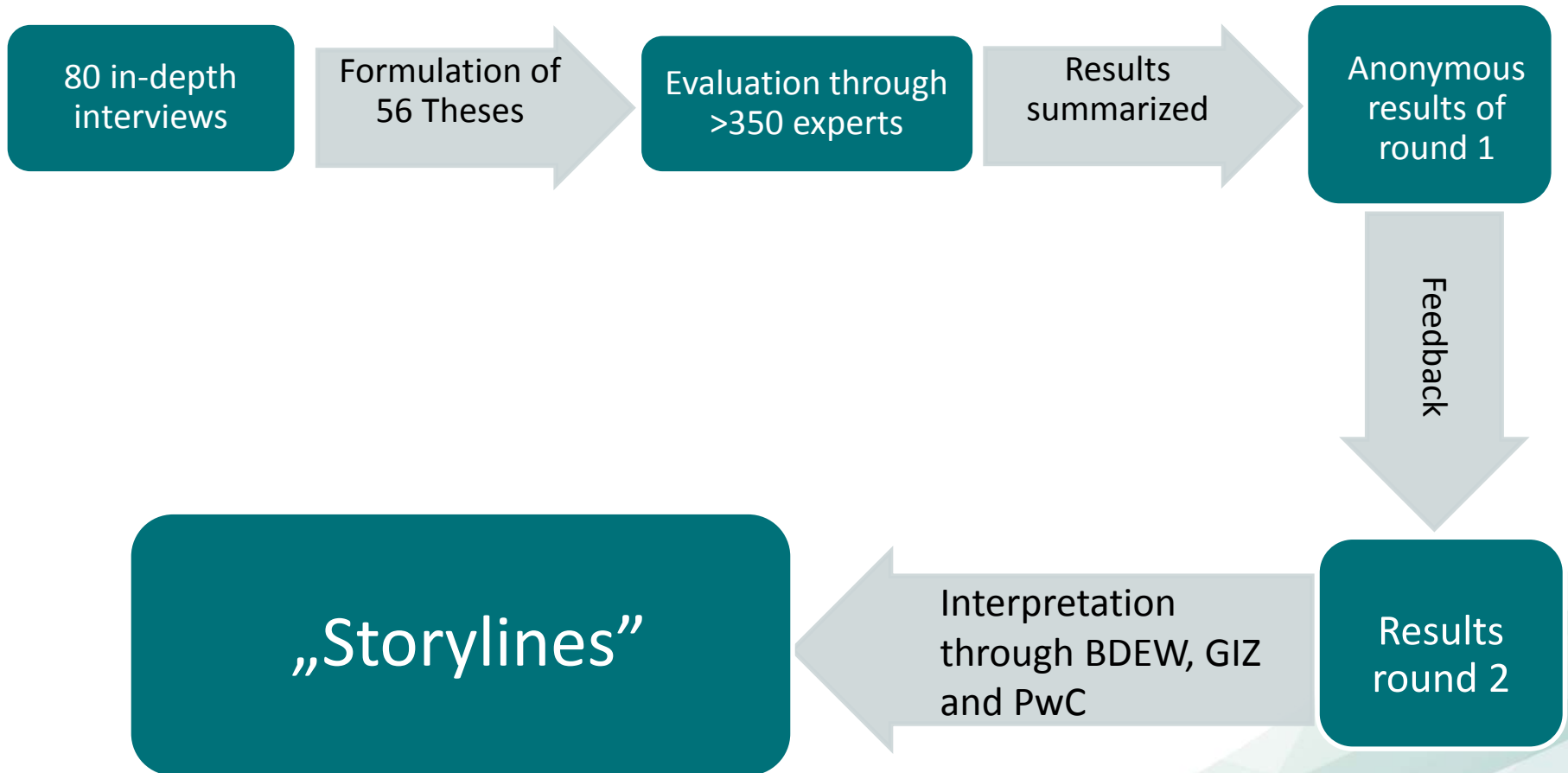


Who are the Experts?

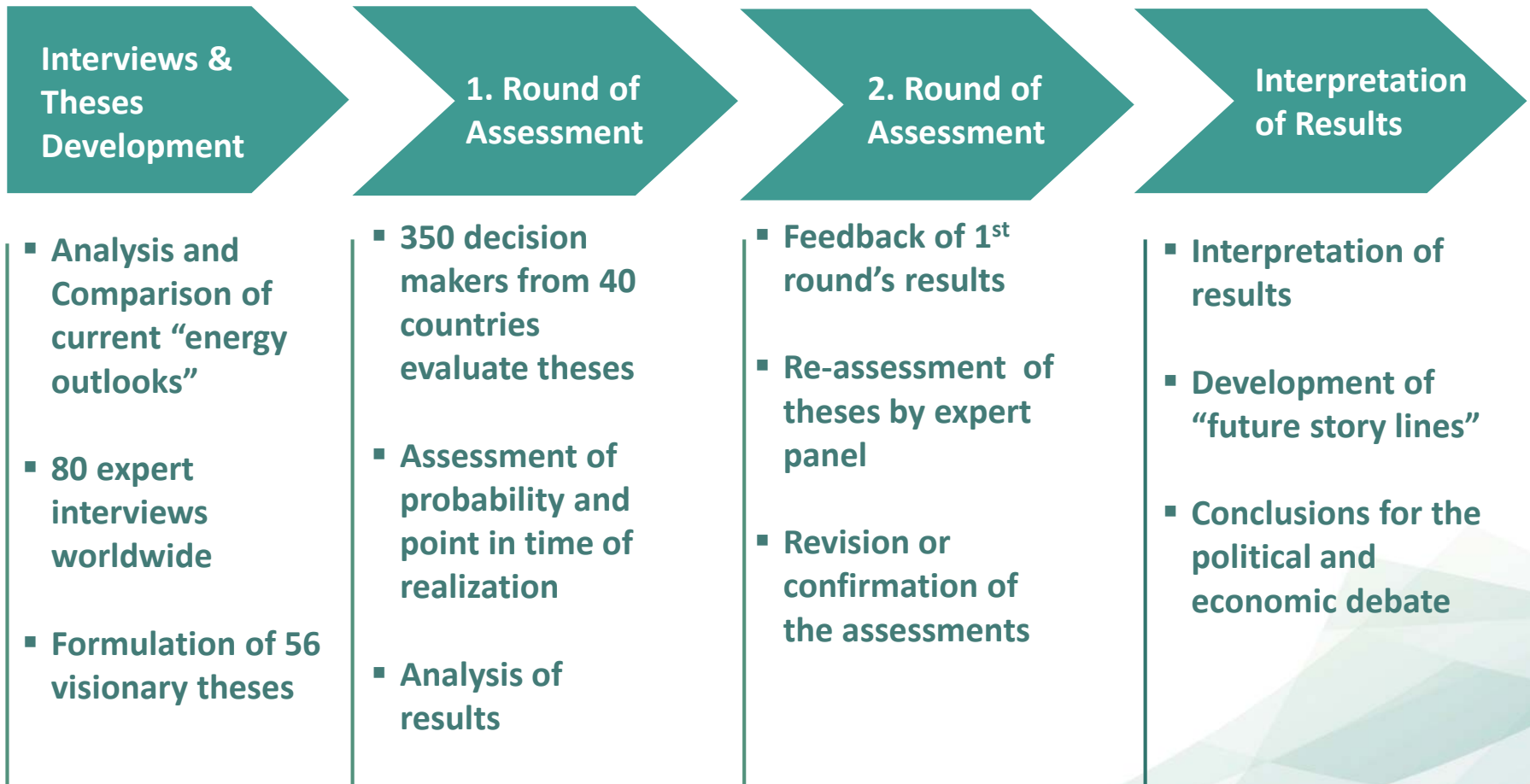
REGIONS (IN %)



The Delphi Energy Future Process

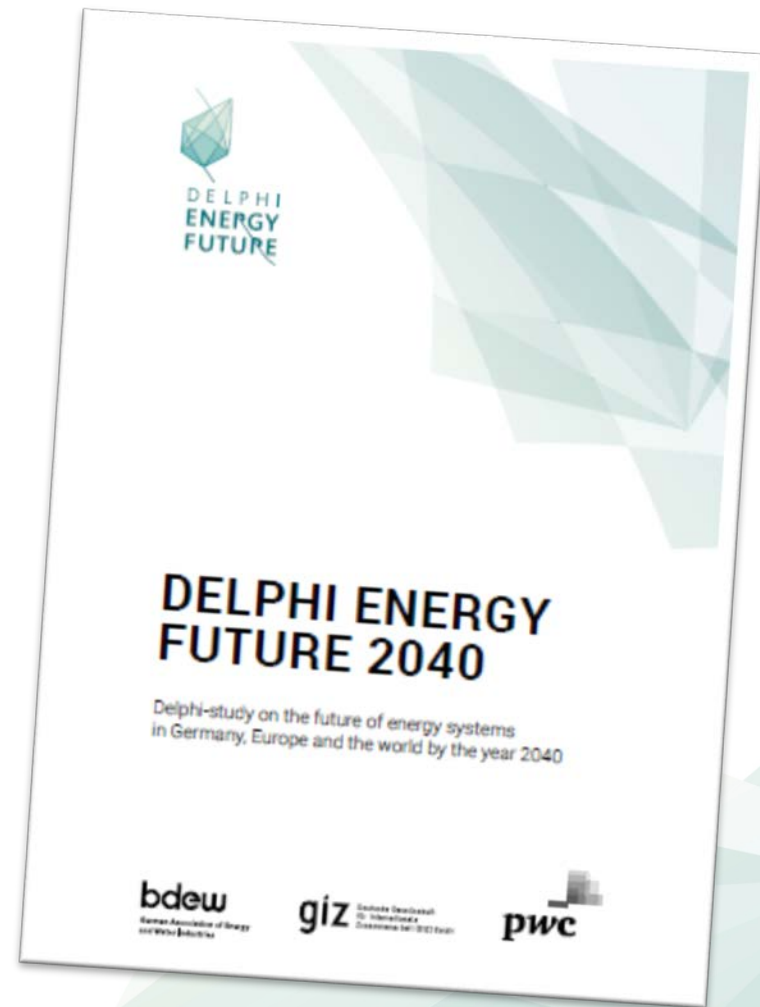


Implementation in 4 Steps



Results

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

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

Global Climate Treaty is Delivering Effective Results

- Binding global climate regime enforced
- Regional carbon emissions pricing is effective

A Functioning Climate Regime is Driving Investment

- Climate regime and carbon pricing boost renewables
- Economic motives most crucial for adopting renewables

Technological Innovation

- Renewable energies have the lowest electricity production cost
- Innovative PV applications enable widespread RE-use
- PV + storage is the “game-changer” (enabling decentralised “presuming”)
- ICT/digitalisation changes business models and brings new players to the table

Fossil Fuel Demands Declines

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

Causes of the Decline in Demand

- Renewable energy is economically more competitive
- Binding climate regime
- Divestment from fossil energy sources
- Electric mobility – fuelled by cheap RE - is competitive

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

Africa: Technology Enables Import-Independence

- Renewables are the cheapest option
- Decentralized renewables allows for rural electrification
- All necessary skills can be conveyed through online-training
- Climate money and micro-financing address financing-gaps
- Great opportunities for development and ‘leapfrogging’
- But not all countries will have profited by 2040

Blooming Landscapes or Continued Urbanisation?

- Urbanisation is likely to continue but...
- Decentralized, low-cost renewable technologies enable rural electrification
- Electrification brings development opportunities
- Decentralized systems are more resilient
- Decentralization fosters local self-governance

Storage is the Game Changer

- Renewables + storage are dominant energy source
- The ‘all-electric-society’ is a reality
- A market for second-hand car batteries emerges
- Decentralised RE and fosters local self-governance
- Energy systems are increasingly digitalized

New Regulatory Regimes Have Emerged

- Energy-governance in Europe takes place locally and regionally
- Common EU domestic and foreign energy policies exist
- The European ‘copper plate’ is a reality
- Decentralized energy islands emerge
- ‘Sustainable cities’ strengthen local self-governance

The Economic Emancipation of the Energy Transition



- Renewables + storage are the most competitive technology
- Economic factors are the energy transition's main driver
- Ecological and social disasters still motivate the energy transition
- Middle class pressure and development opportunities motivate the transition in developing and emerging economies
- States adopting renewables early are among the most competitive
- The global energy transition produces new winners and losers

The Project Partners

bdew

German Association of Energy
and Water Industries

- Umbrella association of German energy industry
- Representing more than 1.800 companies and 90% of German electricity production

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

- German federal enterprise operating in more than 130 countries worldwide
- Advising energy policy and strategy processes represents key area of GIZ's work



pwc

- Providing advisory services in 157 countries
- Supporting strategy processes for many local public utilities

Thank you for your attention

DELPHI ENERGY FUTURE
is a joint project of:

bdew

German Association of Energy
and Water Industries

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH


pwc

Contact:

Delphi Energy Future Programme Office

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Köthener Straße 2

10963 Berlin

Germany