



# Resilient Societies

## The „Energy Change“ in Germany – complex challenges, great opportunities

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## The context of Rio 20+



“Ensuring that some 9 billion people can live a decent life requires, above all, access to affordable, sustainable and reliable energy services, which are currently based almost exclusively on fossil fuel resources and unsustainable use of traditional fuels”

Main Conclusions  
“Global Sustainability: A Nobel Cause”  
Potsdam, Germany, 8-10 Oct 2007

The common denominators of current crises, or what undermines societies' resilience:

- The Dictate of Short-termism
- „There Is No Alternative“ (TINA)

## I) Some basic global parameters

- **3 billion more middle-class consumers by 2030**
- 80% rise in steel demand (2010-2030)
- 147% increase in real commodity prices over the turn of the century
- 44 million people driven into poverty by rising food prices in second half 2010
- **100% increase in the average cost to bring a new oil well on line over the past decade**
- Up to \$1.1 trillion spent annually on resource subsidies

Source: McKinsey, Resource Revolution, 2011

- Fossil Fuels
- Nuclear
- Renewables
- Energy efficiency

## The dream that failed

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*The Economist* 26 years ago:

„to get plenty of nuclear plants built, and then to accumulate, year after year, a record of no deaths, no serious accidents – and no dispute that the result is cheaper energy“.



## The dream that failed (cont'd)

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*The Economist* in 2012:

„In liberalised energy markets, building nuclear power plants is no longer a commercially feasible option: they are simply too expensive“

„But nuclear energy, which has received large subsidies in the past, has not displaced much in the way of fossil fuels either. And nuclear is getting more expensive whereas renewables are getting cheaper.“

“When others bear the costs of mistakes, the incentives favour self-delusion. A system that socialises losses and privatises gains is doomed to mismanage risk”

(Joseph Stiglitz)

## II) The Challenge

- A contribution to „Sustainable Energy for All“ by 2030 (Ban Ki-moon)
- The backbone for a transition towards a „Green Economy“

# Germany's „energy change“.

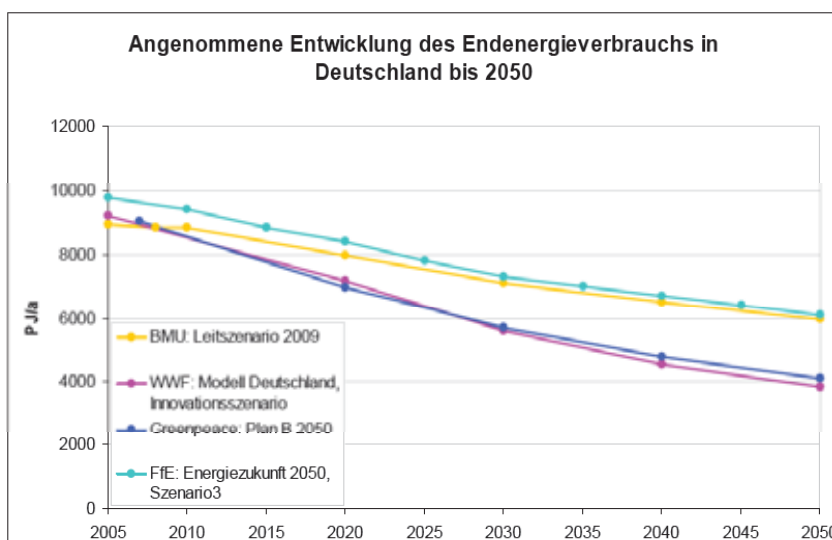
## A project of the whole society



“Every decision of the use of nuclear energy, its shutdown and its replacement with alternative forms of generating energy is **based on society’s value judgments, which precede technical and economic aspects.**”

“... fair distribution of risks and burdens in the long term and those which cannot be limited in terms of time...” (Ethics Commission on a Safe Energy Supply)

## Comparison of 4 low energy consumption scenarios



The huge challenge of **Energy Efficiency**

Source: Germanwatch 2010

Abbildung 5: Angenommener Endenergieverbrauch 2005\*–2050

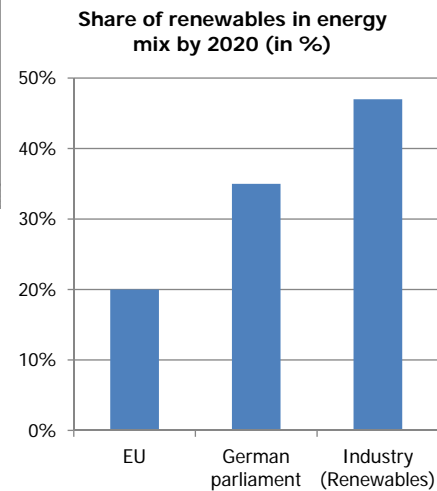
Quelle: BMU (2009), S.9, FfE (2009b), S.328, Greenpeace (2009), eigene Berechnung nach S.88, WWF (2009), S.234.

\*Greenpeace Plan B 2050: 2007–2050

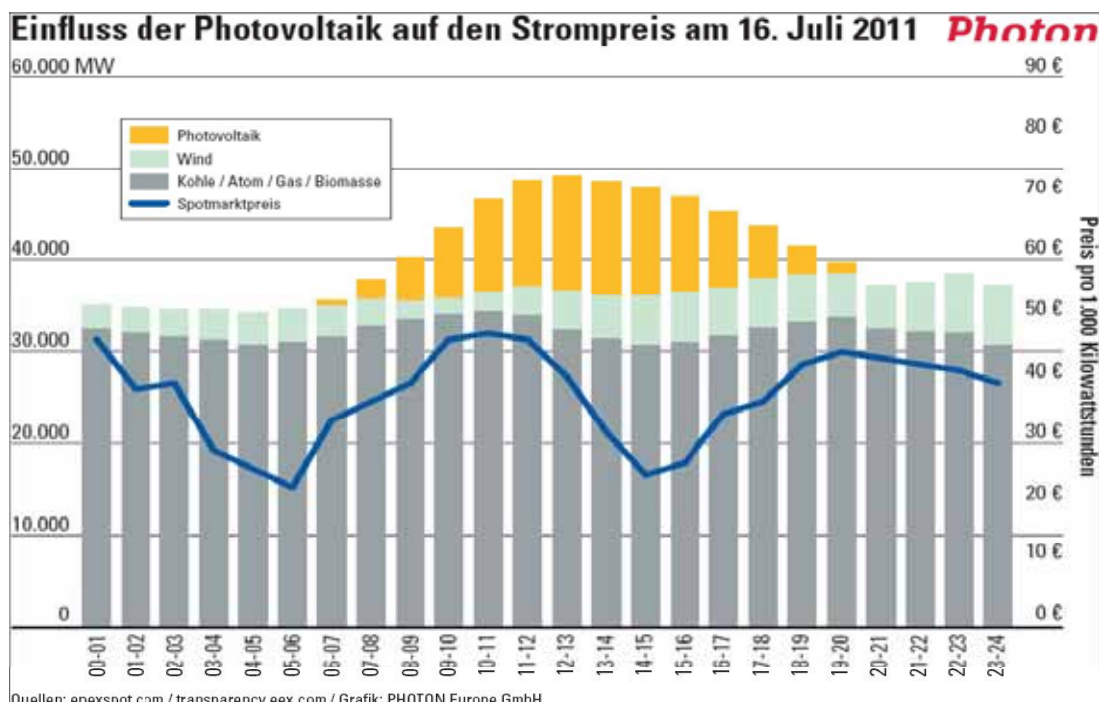
# Renewable energy in Germany



- Renewables in the German energy mix: from 3,1% (1991) to **over 20% (today)**
- Projected share of renewables by 2020:
  - EU 3x20%: 20%
  - German parliament: 35%
  - Renewables Industry: 47%



# Electricity Price in the course of the day

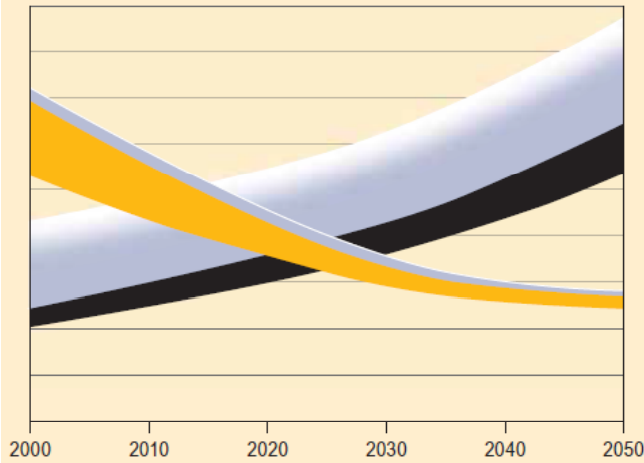


# Learning curve vis-a-vis costs of renewables



## Development of costs for renewable and conventional energy sources

Specific energy costs

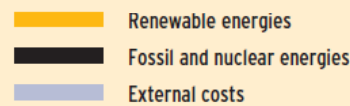


### Renewable energies

- Young technologies: strong technological progress and large economies of scale
- Unlimited, widespread availability
- Globally applicable, can not be misused, practically no hazards
- Low external costs (system manufacture)

### Fossil and nuclear energies

- Limited resources, unequal regional distribution
- Prices rising over longer term
- Expensive and high-risk nuclear technologies (breeders) required to substitute fossil resources
- Nuclear energy is not globally available; high potential for misuse and high-risk
- External costs: prohibitive in the long term for fossil energies (climate change); potentially prohibitive for nuclear energies



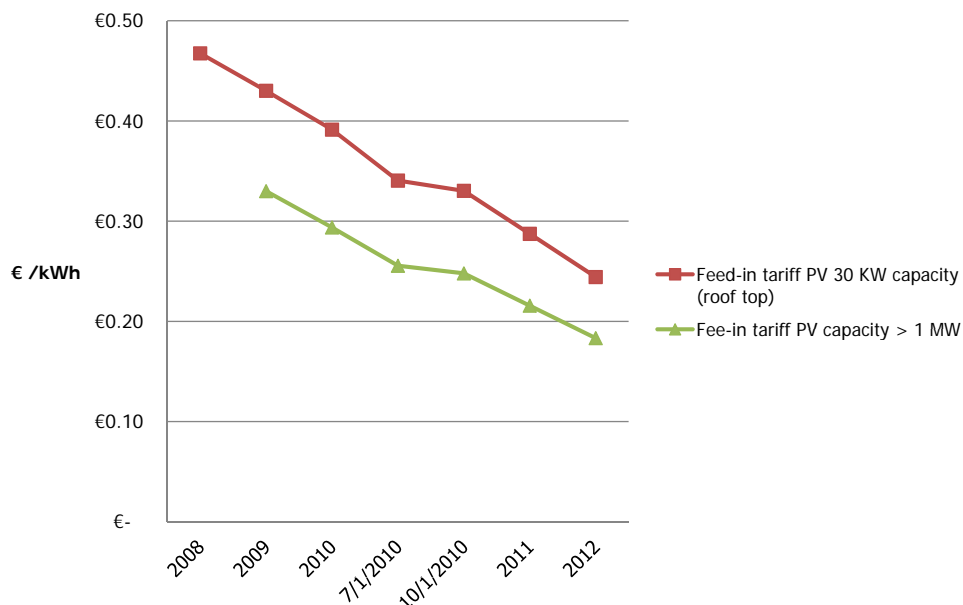
Renewable energy sources provide the cheapest energy in the long run.

Source: DLR

Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2011) Renewable Energies Perspectives for a Sustainable Energy Future

## Feed-in tariffs photovoltaics in Germany

(Source: Renewable Energy Sources Act)





## Terminmarktpreis an der Strombörse

Börsenstrompreis sinkt von 6,2 auf unter 5 Cent pro kWh

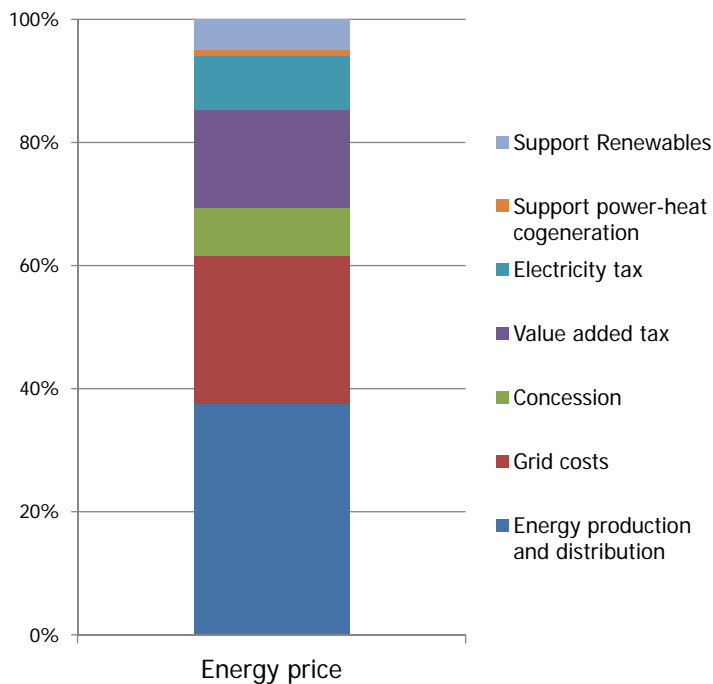


Quelle: Strombörse Leipzig, Terminmarktpreis für das Kalenderjahr 2015 von Juni 2011 – Juni 2012

Je tiefer der Preis an der Strombörse durch die erneuerbaren Energien sinkt, desto höher wird die EEG-Umlage!

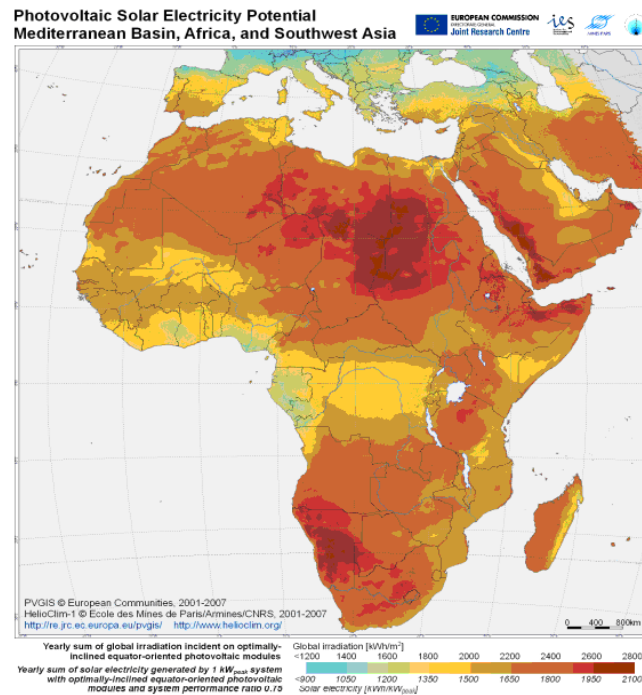
Auf den **niedrigen Großhandelspreis** haben die mit der steigenden EEG-Umlage belasteten **Kleinverbraucher** jedoch keinen Zugriff. **Großverbraucher** hingegen werden auch noch von der Umlage befreit, auf die ihr eigener Preisvorteil zurückzuführen ist. Das macht **1 Cent von 3,5 Cent EEG-Umlage** aus!

## Energy price components (as of 2009)



Source: <http://www.energie-verstehen.de> and BDEW

# Solar electricity potential (in Africa)



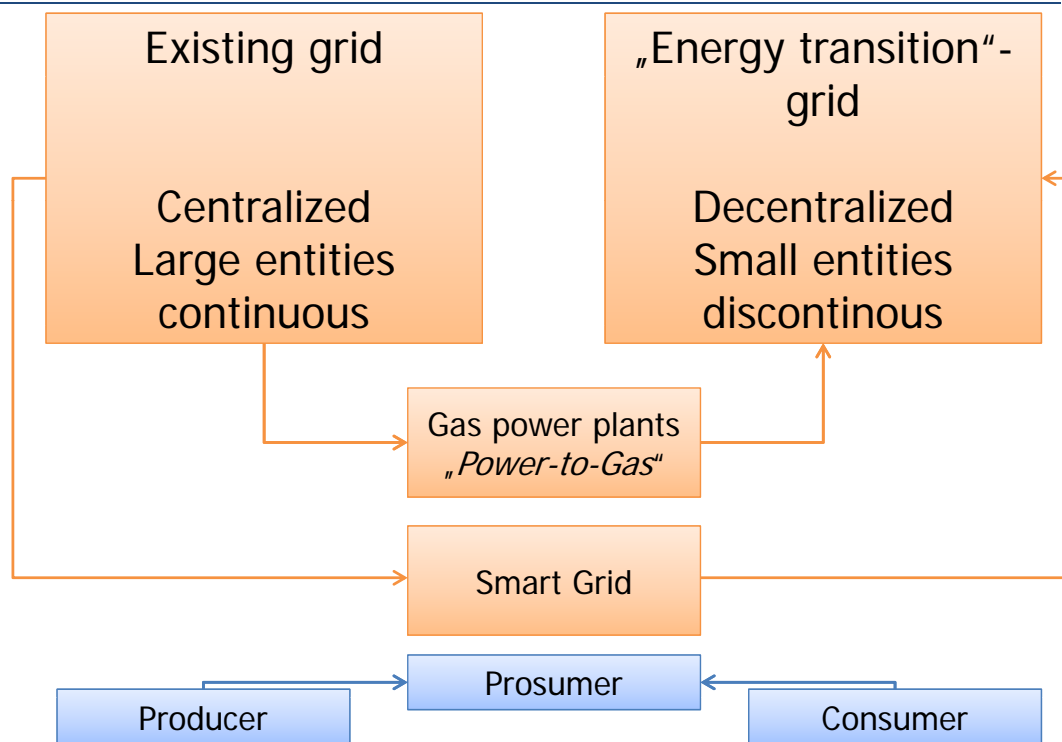
Source: <http://acpobservatory.jrc.ec.europa.eu/content/photovoltaic-potential-africa>

# Harvesting solar energy in the MENA Region: Desertec

A cooperation of major European Companies  
Leader: *MunichRe*



Source: <http://acpobservatory.jrc.ec.europa.eu/content/photovoltaic-potential-africa>



## Enhancing storage capacities

Storage capacities for discontinuous renewable energy sources have to be developed:

- Batteries
- Pumped-storage hydropower plant
- Compressed air energy storage
- Salt
- Gas storage / Power-to-gas
- ...

Conditions for a successful energy transition – or how to increase societies' resilience through the energy change

- climate protection
  - security of supply
  - competitiveness
  - research and innovation
  - economic and financial as well as social viability
  - avoiding one-sided import dependencies for Germany.
- (Ethics Commission on a Safe Energy Supply)

## Participation of the public

“The National Forum for the Energy Change will organise the pluralist participation of the specialist public and civil society, as well as that of the scientific and business communities. It will ensure that the assumptions and scenarios for the energy policies have sound foundations and are accessible to the public. This will be the market square for the Energy Turnaround.”

(Ethics Commission)



Thank you very much for your attention!

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