The Renewable Energy Industry Roadmap for Germany: 28% instead of 18% Renewables in 2020

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BEE - German Renewable Energy Federation

INFORSE/EREF-Seminar – Brussels, 27th of May 2010
The German Renewable Energy Federation - BEE

• **Umbrella organisation** of the German RES-associations since 1991

• **Task and mission:** Political consulting → stable and reliable framework conditions for RES

• **22 Member associations:**
  hydro, wind, solar, biomass, and geothermal energy.

• **Representing**
  > 30,000 members, including > 5,000 enterprises.

• **Member of EREF:**
  The European Renewable Energies Federation
EU-27 efforts in Renewables
RES share in 2020

EU-27

BE 13%
BG 16%
CZ 13%
DK 18%
DE 30%
EE 25%
IE 16%
EL 18%
ES 20%
FR 23%
IT 17%
CY 13%
LV 11%
LT 23%
LU 13%
HU 10%
MT 14%
NL 5%
AT 34%
PL 31%
PT 24%
RO 24%
SI 25%
SK 14%
FI 38%
SE 49%
UK 15%

RES share in 2020

But: Is this ambitious enough?
More is necessary and feasible

National Renewable Energy Industry Roadmap

Germany
Starting with some facts

Renewable energy sources as a share of energy supply in Germany

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</thead>
<tbody>
<tr>
<td>Share of RES in total final energy consumption (electricity, heat, fuels)</td>
<td>3.2</td>
<td>4.7</td>
<td>10.1</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>16.1</td>
<td>14</td>
<td>47</td>
<td>18</td>
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<tr>
<td>Share of RES in total gross electricity consumption</td>
<td>3.6</td>
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<td>Share of RES in total energy consumption for heat</td>
<td>4.7</td>
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<tr>
<td>Share of RES in fuel consumption for road traffic</td>
<td>0.2</td>
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<tr>
<td>Share of RES in total primary energy consumption</td>
<td>2.6</td>
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</table>

Share of Renewable Energies in Total Final Energy Consumption

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Consumption</th>
<th>Renewable Energy</th>
<th>Share RE</th>
</tr>
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<tbody>
<tr>
<td>2000</td>
<td>2423 TWh</td>
<td></td>
<td>4.0 %</td>
</tr>
<tr>
<td>2005</td>
<td>2396 TWh</td>
<td></td>
<td>9.9 %</td>
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<tr>
<td>2007</td>
<td>2400 TWh</td>
<td></td>
<td>12.3 %</td>
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<tr>
<td>2009</td>
<td>2295 TWh</td>
<td></td>
<td>18.4 %</td>
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<tr>
<td>2010</td>
<td>2295 TWh</td>
<td></td>
<td></td>
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<tr>
<td>2011</td>
<td>2295 TWh</td>
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<td>2018</td>
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<tr>
<td>2019</td>
<td>2295 TWh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>2295 TWh</td>
<td></td>
<td>28.3 %</td>
</tr>
</tbody>
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Quelle: Branchenprognose (Stand: 10/2009)
Electricity

Figure 2: Electricity generation from RES
Development of electricity generation from renewable energy sources in Germany 1990 - 2009

* Biomass: Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas;

Electricity from geothermal energy is not presented due to the negligible quantities of electricity produced; StrEG: Act on the Sale of Electricity to the Grid; BauGB: Construction Code; EEG: Renewable Energy Sources Act; Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Image: BMU / Christoph Edelhoff; all figures provisional
Share of Renewable Energies in Germany’s Electricity Consumption until 2020

Until 2020, the share of Renewable Energies will reach 47%.

Terawatthours/year

- 2007: 618 TWh
- Forecast: 2020: 595 TWh

- Gross electricity consumption
- Electricity Production from Renewable Sources

- 2007: 14% (88 TWh)
- 2020: 47% (278 TWh)

Source: Industry Forecast 2020; Status: 1/2009
Installed Capacity for Electricity Production from Renewable Energies in Germany until 2020

Source: Industry Forecast 2020; Status: 1/2009
Electricity Production from Renewable Sources in Germany until 2020

Source: Industry Forecast 2020; Status: 1/2009
The Electricity Mix in 2020: Renewable Energies Ensuring 47 % of Supply

- **Nuclear Energy**: 9 TWh (1 %)
- **Natural Gas**: 65 TWh (11 %)
- **Lignite**: 99 TWh (17 %)
- **Hard Coal**: 114 TWh (19 %)
- **Others***: 29 TWh (5 %)
- **Renewable Energies**: 278 TWh (47 %)
- **Geothermal**: 1 %
- **Hydropower (renewable)**: 5 %
- **Photovoltaics**: 7 %
- **Bio-Energy**: 9 %
- **Wind power offshore**: 6 %
- **Wind power onshore**: 19 %

*Waste, Mineral Oil, Storage etc.
Source: Industry Forecast 2020; Status: 1/2009
Development of the Support Volume for Electricity Production from Renewable Energies

Peak will be reached in 2013. Afterwards the support level will decrease.

billion Euro 2008

Source: IfnE based on Industry Forecast; Status: 1/2009
Development of EEG-share until 2020

EEG*-share for non-privileged end-users

Eurocents per kilowatt hour

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<td>Value</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.2</td>
<td>1.1</td>
<td>0.9</td>
<td>0.7</td>
<td>0.6</td>
</tr>
</tbody>
</table>

*EEG = Renewable Energy Law
Source: IfnE based on Industry Forecast; Status: 1/2009
Challenges for the Electricity Sector

- Maintaining stable and reliable framework conditions – only moderate adaptation of remuneration for PV
- Securing priority for Renewable Energies – phasing-out nuclear to be continued
- Enabling post-2020-development now – incentives for combined renewable power plants to be developed
Figure 3: Heat supply from renewable energies
Contribution of renewable energy sources to heat supply in Germany 1997 - 2009

- Biomass *
- Solar thermal energy
- Geothermal energy

Biomass share of RES - heat: 91 %

* Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas;
Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Image: BMU / Brigitte Hiss; all figures provisional
Structure of heat supply from renewable energy sources in Germany 2009

Total: 110.5 TWh

- **Biogenic solid fuels (households)**: 52.5%
- **Near-surface geothermal energy**: 4.2%
- **Deep geothermal energy**: 0.3%
- **Solar thermal energy**: 4.3%
- **Biogenic gaseous fuels**: 9.2%
- **Biogenic liquid fuels**: 7.0%
- **Biogenic share of waste**: 4.6%
- **Biogenic solid fuels (industry)**: 12.6%
- **Biogenic solid fuels (co-generation power installations and heating installations)**: 5.3%

Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); all figures provisional.
Figure 6: Heat generation from renewable energies until 2020
Heat Production from Renewable Energies and Share of Heat Consumption

Prognose

TWh

Quelle: Branchenprognose [Stand: 10/2009]
Challenges for the Heating Sector

- Accelerating modernization of heating systems – quality standards for breakthrough of renewable energies
- Perpetuating market development – Market Incentive Programme to be optimized
- Solving the user-Investor-Dilemma – reconciliation of interests
- Triggering readiness to investment – more market confidence through information and communication
Transport

Figure 4: Biofuel consumption
Contribution of renewable energy sources to fuel supply in Germany 1991 - 2009

- **Bioethanol**
- **Vegetable oil**
- **Biodiesel**

Vegetable oil as a part of biogenic fuels used since 1992, Bioethanol since 2004;

Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Image: BMU / Dieter Böhme; all figures provisional.
Structure of biogenic fuels in Germany 2009

Total: 33.8 TWh

- Biodiesel: 76.9%
- Bioethanol: 20.0%
- Vegetable oil: 3.1%

Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); all figures provisional
Development and Share of Renewable Energies in Transport

Quelle: Branchenprognose (Stand: 10/2009)
Challenges for the Transport Sector

- Restarting policies for biofuels
- Reanimating market for pure biofuels
- Increasing electro-mobility as part of combined renewable energy power plants
Total Greenhouse-Gas (CO$_2$ equiv.) avoidance via the use of renewable energy sources in Germany 2009

- **Electricity**: 74.0 million t, 16.9 million t from Wind energy, 30.2 million t from Hydropower, 23.1 million t from Biomass, 3.9 million t from Biofuels.
- **Heat**: 29.7 million t, 28.2 million t from Biomass, 1.1 million t from Solar thermal energy, 0.4 million t from Geothermal energy.
- **Biofuels**: 4.8 million t.

Total: approx. 109 million t CO$_2$ equiv., from this approx. 55 million t CO$_2$ equiv. by EEG quantity of electricity recompensed.

GG: Greenhouse-Gas; Deviations in the totals are due to rounding.
Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Image: H. G. Oed; all figures provisional.
GHG-avoidance

Durch Erneuerbare Energien vermiedene Treibhausgasemissionen

Mio. t CO₂ eq

Gesamt
Strom
Wärme
Verkehr

2007
108
75
23
10

2020
287
202
57
28

Quelle: Branchenprognose (Stand: 10/2009)
Total turnover from renewable energy sources in Germany 2009 (investments and operation)

- Investments: approx. EUR 17.7 billion
- Operation: approx. EUR 15.7 billion

Turnovers:

- Hydropower; EUR 1,420 million; 4.3 %
- Biomass; EUR 11,400 million; 34.2 %
- Solar thermal energy \(^1\); EUR 13,900 million; 41.6 %
- Wind energy; EUR 5,650 million; 16.9 %
- Geothermal energy \(^2\); EUR 1,003 million; 3.0 %


Total: approx. EUR 33.4 billion

Source: BMU-KI III 1 according to the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW); all figures provisional

\(^1\) Photovoltaics and solar thermal energy; \(^2\) Large plants and heat pumps; Deviations in the totals are due to rounding.
Industry Forecast – avoided fossil fuel imports

Durch Erneuerbare Energien vermiedene Kosten für Brennstoffimporte

Mrd. Euro

Quelle: Branchenprognose (Stand: 10/2009)
## Jobs in the renewable energy sector in Germany 2004, 2008 und 2009

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>2004</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind energy</td>
<td>87,100</td>
<td>85,100</td>
<td>109,000</td>
</tr>
<tr>
<td>Biomass</td>
<td>63,900</td>
<td>56,800</td>
<td>95,800</td>
</tr>
<tr>
<td>Solar energy</td>
<td>25,100</td>
<td>74,400</td>
<td>87,100</td>
</tr>
<tr>
<td>Hydropower</td>
<td>9,000</td>
<td>9,500</td>
<td>9,900</td>
</tr>
<tr>
<td>Geothermal energy</td>
<td>1,800</td>
<td>9,100</td>
<td>9,300</td>
</tr>
<tr>
<td>Public / non-profit - sector jobs</td>
<td>6,500</td>
<td>4,300</td>
<td>3,400</td>
</tr>
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**Increase:** approx. 87%

Figures for 2008 and 2009 are provisional estimate; Source: BMU-KI III Projekt “Gross employment from renewable energy in Germany in the year 2009, a first estimate”; Image: BMU / Christoph Busse / transit.
500,000 jobs in 2020

Jobs in Renewable Energy

Number of Jobs in Tausend

Industry Forecast
2020: 500 000
2007: 250 000

Quellen: BMU/AGEE-Stat, ZSW, DIW, BEE
Stand 3/2008
Thank you for listening!

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