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## **Federal Republic of Germany**

# **National Renewable Energy Action Plan based on the Directive 2009/28/EG on the Promotion of the Use of Energy from Renewable Sources**

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## National RES Targets 2020

- Share of RES in final energy consumption in 2005 5,8%
- Until 2020 Germany obliged to increase the share of RES to at least 18,0%
- Share in transport needs to rise to 10%
- Energy consumption of 8.255 PJ expected for 2020, thus a minimum of 1.486 PJ from RES



## National RES Targets 2050

- Germany defined further aims in energy strategy
- Energy Concept: comprehensive energy strategy until 2050
  - 80-95% reduction of GHG emissions
  - Renewables should account for the biggest share in future energy mix
- New targets for renewable energies until 2050
  - 2020: 18% RES                      35% RES-E
  - 2030: 30% RES                      50% RES-E
  - 2040: 45% RES                      65% RES-E
  - 2050: 60% RES                      80% RES-E



## National RES Targets 2020

- Directive 2009/28/EG specifies two scenarios for the development of the gross final energy consumption of the National Renewable Energy Action Plan
- “Reference scenario”:
  - Taking into account energy saving and efficiency measures that have been put into place by the end of 2008
- “Additional energy efficiency scenario”:
  - Taking into account all measures to be adopted from 2009
- The “additional energy efficiency scenario” will be used as a basis for the predicted development path of renewable energies



# National Renewable Energy Action Plan - Sector Paths

**Table 1: Expected target path for energy from renewable sources in the sector heating and cooling, power production and transport in Germany, as well as minimum value for the target path by Directive 2009/28/EG (in per cent)**

	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating & Cooling	6.6	9.0	9.4	10.0	10.5	11.1	11.7	12.4	13.1	13.9	14.7	15.5
Electricity	10.2	17.4	19.3	20.9	22.7	24.7	26.8	28.8	31.0	33.3	35.9	38.6
Transport	3.9	7.3	7.5	7.6	7.0	7.0	7.0	7.1	9.3	9.4	9.7	13.2
Total Share of Renewable Energies	6.5	10.1	10.8	11.4	12.0	12.8	13.5	14.4	15.7	16.7	17.7	19.6
			<b>2011 - 2012</b>		<b>2013 - 2014</b>		<b>2015 - 2016</b>		<b>2017 -2018</b>			<b>2020</b>
Minimum Value for the Target Path according to the Directive			8.24		9.46		11.29		13.73			18.00

- Without additional energy efficiency and energy saving measures in the “reference scenario” the share of renewable energy at the gross final energy consumption will be an estimated 18,2% in the year 2020 (compared to 19,6% in the “additional energy efficiency scenario”).



## National Renewable Energy Action Plan Sector Target: Electricity

**Table 2: Estimated gross power generation (in GWh) from renewable sources**

Power Generation (GWh)	2005	2010	2020
Hydropower	19687	18000	20000
Geothermal Energy	0	27	1654
Solar Energy	1282	9499	41389
Wind Energy	26658	44780	104435
Biomass	14025	31296	49457
<b>Total</b>	<b>61653</b>	<b>103602</b>	<b>216935</b>

- Almost fourfold increase of share of electricity from renewable sources from 2005 to 2020
- Wind is and stays most important RES for electricity generation
- Almost threefold increase of share of electricity from biomass sources from 2005 to 2020
- In 2005, biomass has the third largest share of renewable electricity production (first: wind, second: hydro), in 2020 it has the second largest share (largest: wind)



## National Renewable Energy Action Plan Sector Target: Electricity- Biomass Shares

**Table 2a: Estimated share of gross power generation from biomass of all renewable electricity production**

<b>Power Generation</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>
Solid	16.3%	16.7%	11.3%
Biogas	5.9%	13.2%	10.8%
Liquid	0.5%	1.4%	0.7%
<b>Biomass total</b>	<b>22.7%</b>	<b>31.2%</b>	<b>22.8%</b>

- Solid biomass stays most important resource for electricity production
- Importance of biogas grows



## National Renewable Energy Action Plan Sector Target: Heating and Cooling

**Table 3: Estimated generation of heating and cooling from renewable sources**

<b>Heat Generation (ktoe)</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>
Geothermal Energy	12	34	686
Solar Energy	238	440	1245
Biomass	7260	9092	11355
Heat Pumps	196	465	1144
<b>Total</b>	<b>7706</b>	<b>10031</b>	<b>14431</b>

- Almost doubling the share of heating and cooling from renewable energies from 2005 to 2020
- Biomass will remain most important renewable energy source for heating and cooling, but the share will decrease.





# National Renewable Energy Action Plan Sector Target: Heating and Cooling – Biomass Shares

**Table 3a: Estimated generation of heating and cooling from biomass sources**

Heat Generation	2005	2010	2020
solid	88.2%	74.9%	62.0%
Biogas	2.0%	9.1%	11.7%
Liquid	4.1%	6.6%	4.9%
<b>Biomass total</b>	<b>94.2%</b>	<b>90.6%</b>	<b>78.7%</b>

- Largest share solid biomass
- Biogas from 2% in 2005 to 15% in 2020



## National Renewable Energy Action Plan Sector Target: Transport

**Table 4: Estimated amounts of renewable energies in transport**

Transport (ktoe)	2005	2010	2020
Bioethanol	144	639	857
Biodiesel	1598	2790	4443
Electricity from Renewable Energies	169	217	666
Others (Biogas, BtL, Vegetable Oils)	177	102	173
<b>Total</b>	<b>2087</b>	<b>3747</b>	<b>6138</b>
Total biomass without electricity	1918	3530	5472

- Increase of bioenergy in transport by almost a factor of three from 2005-2020
- Biodiesel plays key role and maintains its share of over 70% of renewable energies in transport



## National Renewable Energy Action Plan Sector Target: Transport Shares

**Table 4a: Estimated shares of renewable energies in transport**

<b>Transport</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>
Bioethanol	0.3%	1.2%	1.8%
Biodiesel	3%	5.3%	9.2%
Electricity from Renewable Energies	0.3%	0.4%	1.4%
Others (Biogas, BtL, Vegetable Oils)	0.3%	0.2%	0.4%
<b>Total</b>	<b>3.9%</b>	<b>7.3%</b>	<b>13.2%</b>

- The separate target of the EU-Directive for transport of 10% will be achieved and even exceeded with 13,2%



## Flexibility Mechanism

- Germany welcomes the flexibility mechanism of Art.6 and 12 of the Renewable Energy Directive
- cooperation to reduce costs and create synergies help to reach aims and ensure that growth of RES will be effective and efficient
- Germany is not expected to be dependent on using flexibility mechanisms
- Germany is expected to be able transfer between 2011 and 2019 a total amount of 128 PJ to other Member States



# National Renewable Energy Action Plan Biomass Resources

**Table 5: Estimated resources of biomass for primary energy generation**

<b>Primary energy generation (ktoe)</b>	<b>2006</b>	<b>2015*</b>	<b>2020*</b>
From forestry	9792	12086 - 12943	11966
From agriculture and fishery	7357	7715 - 7978	8789 - 9482
Biomass from waste	955	2126	2317
<b>Total</b>	<b>18104</b>	<b>21927 - 23047</b>	<b>23072 - 23765</b>

\* spread depends on successful launch of second generation biofuels (higher value) and accordingly decelerated development (lower value) and wide exhaustion of national potential, additional import demand



## National Renewable Energy Action Plan Biomass Availability and Imports

- Expected difference of 9.500 ktoe (about 400 PJ) between biomass demand and domestic supply by 2020
- Possibilities to close this gap:
  - Demand for imports taking into account sustainability criteria
  - Further yield increases of energy crops (e.g. improvements in cultivation),
  - Increased use of forest biomass and landscape conservation material
  - Cultivation of fast growing tree species on agricultural land as well as energy plants on ecological compensation areas
  - Cultivation of short rotation coppice on agricultural areas
  - Future cultivation of energy crops on compensation areas for nature conservation



# RES Support Instruments in Germany

- Renewable Energy Sources Act (EEG)  
*> Priority access and feed-in tariff system*
- Renewable Heat Act  
*> Obligation and incentives*
- Market Incentive Programme  
*> Grants and loans*
- Biofuels  
*> Blending obligation*
- Research and Development





- **Renewable Energy Sources Act (EEG)**
  - Priority access for RE to the power grid
  - Priority transmission and distribution
  - Obligation of grid operators to purchase the electricity produced from RE
  - Fixed price (“tariff”) for every kilowatt hour produced from RE for 20 years
    - Fixed basic payment rates differing according to the type of RES, the conversion technology, and the capacity of the plant. The feed in tariffs are guaranteed for a period of 20 years and subject to annual degression for new installations.
    - Various *cumulative bonus payments* for compliance with further quality and sustainability criteria (e.g. for the utilisation of renewable raw materials (“Nawaro” bonus), for the utilisation of surplus heat in CHP plants (CHP bonus), and for the use of innovative technologies, such as Stirling engines, fuel cells, or upgrading biogas to natural gas quality (biomethane).
    - In 2009, an additional bonus for the use of manure and landscape conservation material has been introduced.





## Heating/Cooling

- **Renewable Heat Act**

- Obligation to use renewable energy sources in new buildings
- Alternative measures: energy saving, CHP, waste heat
- Progress report in 2011

- **Market Incentive Programme (MAP)**

- grants and low interest loans for biomass, solar- and geothermal energy
- 2009: MAP triggered investments of 3 bn. €



- **Biofuel obligation**

- Obligation to sell a legally specified minimum share (quota) of biofuel as petrol
- Energy quotas
  - 2009: 5,25%
  - 2010-2014: 6,25%
- From 2015 on energy quotas will be transformed into minimum net GHG reduction targets
  - 2015-2016: 3%
  - 2017: 4,5%
  - 2020: 7%

- **Electric vehicles**

- Target: 1 mio. vehicles in 2020



## Sustainability criteria for biofuels and bioliquids

- Binding sustainability criteria for biofuels and bioliquids implemented in Biofuels-Sustainability Ordinance and Biomass-Electricity Sustainability Ordinance
- Both ordinances transpose the binding sustainability criteria for biofuels and bioliquids of the Renewable Energy Directive
- Biomass-Electricity Sustainability Ordinance: compliance required from 01.01.2011 to qualify for financial support for electricity from RES
- Biofuels-Sustainability Ordinance: compliance necessary for biofuels to be considered in quota and for granting of tax reductions



## Sustainability criteria for biofuels and bioliquids

- Biofuels-Sustainability Ordinance: compliance with sustainability criteria necessary to be considered in quota or for tax reductions
  - Protection of areas with high biodiversity value
  - Protection of areas with high carbon stock
  - Protection of peatlands
  - Environmental Cross Compliance rules (sustainable agriculture)
  - Minimum GHG savings of 35%, after 2017 of 50%, after 2018 of 60%



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## Sustainability criteria verification

- Verification of the sustainability criteria is guaranteed by private certification structures (examples ISCC, REDcert)
- German Federal Agency for Agriculture and Food (BLE) is responsible for registration and control of certification system and certifying institutions
- So far 2 certification systems and more than 10 institutions have been registered





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## Sustainability criteria

- Germany supports extension of sustainability criteria to all biomass sources and on more countries
- In Energy Concept Germany committed itself to extend sustainability criteria to cover all bioenergy carriers
- Initiative of Commission expected
- Germany supports the activities of the Global Bioenergy Partnership (GBEP), a G8 initiative launched in 2005 to establish international criteria



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THANK YOU FOR YOUR ATTENTION!

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