



**Federal Republic of Germany**

**Progress report under Article 22 of**  
**Directive 2009/28/EC on Promotion of the Use of Energy from**  
**Renewable Sources**

**(As of: 31.12.2011)**

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## **0. Introduction and summary**

### **Energy transition in Germany**

Germany is on the cusp of a sea change in its energy supply. The Fukushima disaster on 11 March 2011 prompted the Federal Government to adopt key new features for a fast-tracked transition in energy policy on 6 June 2011. Alongside the decision to phase out nuclear power completely by the end of 2022, these key features flesh out and fast-track a raft of measures that had already been adopted in September 2010 under the Federal Government's Energy Concept.

Germany will completely phase out power generation from nuclear energy in a gradual fashion by the end of 2022 at the latest. The eight nuclear power plants that were shut down in Spring 2011 will not be reconnected to the grid. Renewable energies will play a decisive role in Germany's future energy supply. Renewable energies shall account for 60% of total consumption in 2050, and at least 80% in the electricity sector. The German Parliament adopted a comprehensive package of measures on 30 June 2011 on how to implement this transition in energy policy, including the amendment of the Renewable Energies Act (EEG). This has paved the way towards entering the renewable energy age.

The more rapid phasing-out of nuclear power means that the reorganisation of the energy supply that began with the Energy Concept needs to be implemented faster. Nevertheless, climate protection remains a key driver alongside security of supply and cost effectiveness. This transition in energy policy needs to be socially and environmentally responsible and ecologically sound. The decision to implement this energy transition provides major signals for investment in innovation and technological progress.

### **Renewable Energies**

Germany is continuing the successful steps already taken towards developing and using renewables. The 2010 targets under European Directive 2001/77/EC on the promotion of electricity from renewable energy sources in the internal electricity market and the European biofuels directive 2003/30/EC have been met and exceeded.<sup>1</sup>

With a total 25,130 ktoektoe (1052 PJ)<sup>2</sup> energy being produced from renewables in 2010 in the electricity, heating and fuel sectors, the share from renewables increased by more than 15% on 2009 levels, when it stood at 21,696 ktoektoe (908 PJ). This trend for continual growth in the share of renewables in the energy supply also continued apace in 2010.

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<sup>1</sup> National target for 2010 under Directive 2001/77/EC: 12.5% renewables in the electricity sector. Value achieved in 2010: 17%; EU target for 2010 under Directive 2003/30/EC: 5.75% biofuel in the transport sector. Value achieved in 2010: approx. 5.8%.

<sup>2</sup> Under the calculation method from Directive 2009/28/EC, i.e. including normalisation of electricity from wind and hydroelectric power and multiple counting for RE electricity consumption in road transport and biofuels under Art. 21 (2) of the Directive. This figure therefore differs from the national energy and renewables statistics, which do not include normalisation and multiple counting.

Renewables also increased their share of gross final energy consumption (GFEC) in 2010: after 10.2% in 2009, the share of renewables in the GFEC hit 11.3%<sup>3</sup> in 2010, although overall gross final energy consumption for 2010 rose over 4% on 2009 levels due to economic and meteorological conditions (from 213,696 ktoektoe to 222,772 ktoektoe, or from 8947 PJ to 9327 PJ).

This meant the estimated figure for the share of renewables in the GFEC for 2010 of 10.1% contained in the National Renewable Energy Action Plan (NREAP) unveiled by the Federal Government on 4 August 2010 could actually be exceeded by 1.2 percentage points. This once again places Germany on the right track in terms of achieving its ambitious targets for developing renewables: they shall account for at least 18% of gross final energy consumption by 2020. Additionally, the Federal Government has concluded that a 19.6% share of renewables in gross final energy consumption can be achieved in 2020 under the German NREAP.

**Electricity generation** from solar, wind, hydro, biomass and geothermal sources increased more than 11% between 2009 and 2010 and exceeded 112 TWh (9642 ktoektoe). The biggest contributor to the increase was photovoltaics, which saw its share rise 77% on the previous year and, with 11.7 TWh (1005 ktoektoe), attain a share of 1.9% of gross final energy consumption. There was also a clear increase in electricity generation from biogas. Wind power was the biggest contributor to electricity generation from renewable sources in 2010 with 43.1 TWh (3706 ktoektoe). Moreover, 2010 saw the first offshore windfarm in Germany come online. Overall, the share of renewables in gross energy consumption between 2009 and 2010 climbed from 17.4% to 18.4% (taking into account normalisation rules), although gross energy consumption rose 5.6% in 2010 compared to the previous year due to economic conditions.

**Heat** generation from renewables increased over 21% from 2009 to 2010 from 10,222 ktoektoe to 12,441 ktoektoe (428 PJ to 521 PJ), which meant that despite the increase in heat consumption due to economic and meteorological conditions, the renewable share of overall heat generation rose (2009: 106,645 ktoektoe or 4465 PJ, 2010: 113,237 ktoektoe or 4741 PJ) from 9.6% (2009) to 11.0% (2010). By far the greatest proportion in this increase in renewable energy heat generation came from solid (and, to a lesser extent, gaseous) biomass.

In **Transport**, renewables (biofuels and renewable energy power) accounted for a share of 6.2% of the GFEC in 2010, which was up on the previous year (5.8%). The increase in the gross final energy consumption for transport (2009: 51,003 ktoektoe or 2135 PJ, 2010: 51,557 ktoektoe or 2159 PJ) explains the rise in the consumption of renewables used in transport between 2009 and 2010 from 2,981 ktoektoe to 3,209 ktoektoe (125 PJ to 134 PJ).

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<sup>3</sup> Under the national energy and RE statistics, i.e. without taking the EU calculation method into account, the share of renewables in final energy consumption in 2009 was 10.2% and, in 2010, 11.3%.

Renewables achieved a share of 11.3% of gross final energy consumption in 2010, meaning that Germany has already surpassed the intermediate target set by EU Directive 2009/28/EC for 2013/2014 (9.46%). Nevertheless, further efforts are necessary, particularly in the heating sector, in order to achieve the national renewables targets for 2020 and to meet the German NREAP estimates in the long term. Alongside the heating sector, better market and system integration for electricity derived from renewables and developing the network and storage capacity lie at the centre of the Federal Government's strategy to further develop renewables. Important steps have been taken with the amendment of the Renewable Energies Act, which came into force on 1 January 2012, the Grid Expansion Acceleration Act, promotion of research into energy storage and many other measures. These measures are being monitored on an ongoing basis and optimised and extended where necessary. The Federal Government will provide information on these further developments in future progress reports.

The information on the development of renewables for 2009 and in particular for 2010 is provisional only, due to the final energy statistics not being available yet. The Federal Government will report on any updated figures for 2009 and 2010 in the next progress report.

### **Climate protection and the socio-economic effects of renewable energies**

The use of renewables in 2010 prevented emissions of approximately 120 million tons of CO<sub>2</sub> equivalent (CO<sub>2,eq</sub>), which represents a significant contribution towards meeting German climate protection targets. The highest levels of greenhouse gas prevention were attained in the electricity sector with 75 million t CO<sub>2,eq</sub>. This includes approximately 57 mt CO<sub>2,eq</sub> that can be attributed to amounts of electricity that were remunerated under the EEG alone. In the heating sector, 40 mt CO<sub>2,eq</sub> greenhouse gas emissions were prevented, and 5 mt CO<sub>2,eq</sub> in the fuel sector.

In addition, investment and the number of jobs in the renewables sector hit new heights in 2010: EUR 26.6 billion was invested in renewable energy installations, and approximately 370,000 people are currently employed in the renewables sector.

Germany has the highest energy prices in Europe, but also has reliable, modern networks and installations. Acceptance levels among the general public for further development of renewables is high and people support the transition in energy policy. Nevertheless, further development needs to take into account the burden for consumers.

### **Federal Government reporting on the Biomass Power Sustainability Regulation and the Biofuel Sustainability Regulation (Biomass Sustainability Regulations)**

In its Sustainability Regulations for Biomass (Section 64 B Biofuel Sustainability Regulation (Biokraft-NachV) and in Section 72 of the Biomass Power Sustainability Regulation (BioSt-NachV)), Germany pledges to provide information in the scope of the progress report to the European Commission on fulfilment of the requirements pursuant to the Biomass Sustainability Regulation and on the sustainability-related effects from manufacturing liquid biomass or biofuels, including an assessment of the social admissibility of using liquid biomass or biofuels. This shall be done in addition to using the model provided in Point 14 of the report and is therefore excluded from the reporting requirements of the progress report itself.

## **Composition of the progress report**

This progress report provides information on the content required under article 22 of EU Directive 2009/28/EC. The model provided has been used to produce the progress report. Instead of using Tables 3 and 4 as advised, the relevant information has been given in text form. Additional tables, e.g. Table 1b, have been used, albeit in a slightly amended form. Information out of the scope of the model, such as reporting on the two biomass sustainability regulations or additional details, is indicated accordingly.

### **1. Sector-specific share and overall share and actual consumption of energy from renewable sources over the past two years (2009 and 2010)**

*(Article 22 (1) (a) of Directive 2009/28/EC)*

The following illustration of developments in the share of renewables in the heating and cooling, electricity and transport sectors, together with their overall share of gross final energy consumption in Germany over the 2009-2010 reporting period, is for the most part based on the current publications of the Energy Balance Working Group (AGEB) and the Renewable Energy Statistics Working Group (AGEE-Stat) for each given situation. The statistical data supplied for the 2009-2010 reporting period is provisional in part. The assumption is that corrections will be made to the figures for 2009-2010 for gross final energy consumption (GFEC) and renewable energy consumption in forthcoming reports up to 2021 under Directive 2009/28/EC. Consequently, the share of renewables in the energy supply in Germany as indicated here should be regarded as provisional.

All calculations in this 1<sup>st</sup> progress report follow the accrual and calculation rules for the National Renewable Energy Action Plan (NREAP), as set out in Directive 2009/28/EC<sup>4</sup>.

So as to obtain a better overview, the share of renewables in gross final energy consumption is presented from 2005 to 2010, according to the calculation method in Directive 2009/28/EC. The figures for 2009 and 2010, which are the focus of this report, are highlighted.

### **Evolution in gross final energy consumption**

The trend in recent years for gross final energy consumption (GFEC) in Germany has been a downwards one, even when economic and weather-related fluctuations are superimposed (cf. Table A): while the GFEC in 2005 was 227,477 ktoektoe (9524 PJ), preliminary estimates for 2010 put it at 222,772 ktoektoe (9327 PJ), 2.1% lower than in 2005. The biggest contributor to this drop has been the heating sector (-3,487 ktoektoe). However, the fall in consumption has been lower in the electricity (-146 ktoektoe, in terms of gross energy consumption) and transport (-1,695 ktoektoe) sectors.<sup>5</sup>

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<sup>4</sup> For details on the calculation method, see Chapter 7.1.1 of the German NREAP.

<sup>5</sup> Due to the calculation method under Directive 2009/28/EC, total gross final energy consumption does *not* equal the sum of the three sectors.

Gross final energy consumption in Germany in 2010 (222,772 ktoektoe) was 0.4% lower than estimates for the “scenario with additional efficiency measures” (EFF) in Germany’s NREAP (223.584 ktoektoe or 9361 PJ for 2010). In comparison to the statistics, the NREAP’s EFF scenario assumed a 1640 ktoektoe (69 PJ) lower GFEC in the heating and cooling sector and 560 ktoektoe (23 PJ) lower gross energy consumption in 2010. On the other hand, the EFF scenario overestimated the GFEC in transport by 798 ktoektoe (33 PJ).

Table A: Evolution of gross final energy consumption in Germany in the heating and cooling, electricity, transport sectors and overall GFEC (ktoektoe), Sources: EEFA 2011, AGEBA 2011

	2005	2006	2007	2008	2009	2010
<b>Heating and cooling<sup>6</sup></b>	116,724	116,891	105,474	113,165	106,645	113,237
<b>Electricity<sup>7</sup></b>	52,631	53,070	53,147	52,846	49,708	52,485
<b>Transport<sup>8</sup></b>	53,252	53,479	52,804	51,841	51,003	51,557
<b>Total<sup>9, 10</sup></b>	227,477	227,644	217,278	224,085	213,696	222,772

### Renewable energy share of gross final energy consumption

Consumption of energy from renewable sources rose over the period 2005-2010 from a total 15,160 ktoektoe to 25,130 ktoektoe (635 PJ to 1052 PJ) (see Table 1a). This corresponds to an increase of over 65%. In 2009 and 2010 alone, use of renewables increased 4791 ktoektoe (201 PJ). Renewable energy consumption in the electricity, heating and cooling sectors has experienced year-on-year growth since 2005. However, sales of biofuels, particularly of biodiesel and plant oils, saw greater fluctuations, which were induced, inter alia, by changes in fiscal support during the observed period. Nevertheless, renewable energy consumption in the transport sector in 2010, at 3,209 ktoektoe (134PJ), was patently higher than in 2005 (2007 ktoektoe or 84 PJ).

<sup>6</sup> Final energy consumption of all energy products, except electricity, for all purposes other than transport, plus consumption of heating for own needs in electricity and heat power plants together with heat loss in grids (Point “2. Own consumption of systems” and “11. Transmission and distribution losses”, pps. 23 and 24 of the Regulation on Energy Statistics, ABl. L 304 of 14.11.2008).

<sup>7</sup> Gross electricity consumption: gross national electricity production, including own production, plus imports, minus exports.

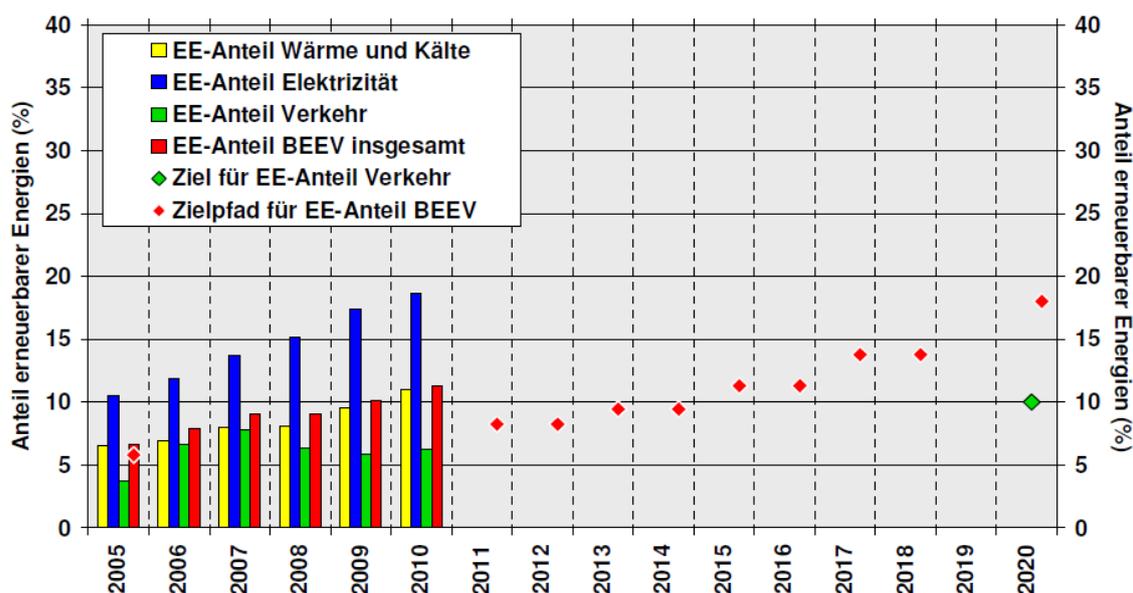
<sup>8</sup> Consumption in the transport sector as per the definition in Article 3 (4) (a) of Directive 2009/28/EC. The figure for electricity from renewable sources in road transport should be multiplied by a factor of 2.5 here, in accordance with Article 3 (4) (c) of Directive 2009/28/EC.

<sup>9</sup> As per the definition in Article 2 (f) of Directive 2009/28/EC. This covers final energy consumption plus grid losses and own consumption of heating and electricity in electricity and heating plants (NB: this does not cover energy consumption for pumped storage or conversion in electric boilers or heat pumps in district heating systems).

<sup>10</sup> The share of aviation in the GFEC was 4.1% (2009) and 3.9% (2010, estimated). The aviation clause under Article 5 (6) of Directive 2009/28/EC has therefore not been triggered in these two years as the aviation share of gross final energy consumption in Germany was below 6.18%.

A comparison of the three sectors showed that the electricity sector posted the highest growth rate in the 2005-2010 period as regards renewable energy use (11.7% per annum on average). Growth in the transport sector hit 9.8% p.a. and in the heating and cooling sector 10.1% p.a. Overall, the average growth rate for renewable energy consumption was 10.6% per annum between 2005 and 2010.

Seen in absolute terms, the heating sector contributed the most to the increase in renewable energy consumption. Here consumption increased between 2005 and 2010 by 949 ktoektoe/a (40 PJ/a) on average, compared to 820 ktoektoe/a (34 PJ/a) in the electricity sector and 240 ktoektoe/a (10 PJ/a) in the transport sector.



Key to graphic

**y axis: Renewable energy share (%)**

**y axis: Renewable energy share (%)**

**Box:**

**Renewable energy share – heating and cooling**

**Renewable energy share – electricity**

**Renewable energy share – transport**

**Total renewable energy share GfEC**

**Target for renewable energy share – transport**

**Trajectory for renewable energy share GfEC**

**Figure 1: Development of the renewables share and comparison with the indicative trajectory<sup>11</sup> and the separate target in the transport sector<sup>12</sup>**

<sup>11</sup> In accordance with Annex IA and IB of Directive 2009/28/EC.

<sup>12</sup> Target: 10% renewables in transport in 2020

Table 1: Sector-specific share (heating and cooling, electricity and transport and total share for energy from renewable sources<sup>13</sup> (percent)

	2005	2006	2007	2008	2009	2010
<b>Heating and cooling<sup>14</sup></b>	6.6	6.9	8.0	8.1	9.6	11.0
<b>Electricity<sup>15</sup></b>	10.5	11.9	13.7	15.2	17.4	18.4
<b>Transport<sup>16</sup></b>	3.8	6.7	7.8	6.3	5.8	6.2
<b>Total<sup>17</sup></b>	6.7	7.8	9.1	9.1	10.2	11.3
<b>Amount via cooperation mechanism<sup>18</sup></b>						
<b>Surplus for cooperation mechanism<sup>19</sup></b>						

Table 1a: Calculation table for the contributions of individual sectors to the renewable energy share of final energy consumption (ktoektoe)<sup>20</sup>

		2005	2006	2007	2008	2009	2010
<b>A</b>	<b>Heating and cooling</b>	7,695	8,074	8,469	9,153	10,222	12,441
<b>B</b>	<b>Electricity</b>	5,540	6,315	7,308	8,033	8,653	9,642
<b>C</b>	<b>Transport<sup>21</sup></b>	2,007	3,567	4,107	3,284	2,964	3,209
<b>D</b>	<b>Total<sup>22</sup></b>	15,160	17,852	19,768	20,339	21,696	25,130
<b>E</b>	<b>Transfers to other Member States</b>	0	0	0	0	0	0
<b>F</b>	<b>Transfers from other Member States and third countries</b>	0	0	0	0	0	0
<b>G</b>	<b>Total after adjustment</b>	15,160	17,852	19,768	20,339	21,696	25,130

<sup>13</sup> Facilitates comparison with Table 3 and Table 4a of the NREAPs.

<sup>14</sup> Share of renewable energy in heating and cooling: gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5 (1) (b) and 5 (4) of Directive 2009/28/EC) divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of NREAPs applies.

<sup>15</sup> Share of renewable energy in electricity: gross final consumption of electricity from renewable sources for electricity (as defined in Articles 5 (1) (a) and 5 (3) of Directive 2009/28/EC) divided by total gross final consumption of electricity. The same methodology as in Table 3 of NREAPs applies.

<sup>16</sup> Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Article 5 (1) (c) and 5 (5) of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of NREAPs applies.

<sup>17</sup> Renewable energy share in gross final energy consumption The same method as in Table 3 of the NREAPs applies (row G of Table 1a divided by row 4 of Table A).

<sup>18</sup> In percentage point of overall RES share.

<sup>19</sup> In percentage point of overall RES share.

<sup>20</sup> Facilitates comparison with Table 4a of the NREAPs.

<sup>21</sup> without multiple counting for electricity in road transport and biofuels under Art. 21 (2).

<sup>22</sup> According to Art.5 (1) of Directive 2009/28/EC, gas, electricity and hydrogen from renewable energy sources shall only be considered once. No double counting is allowed.

The share of renewables in the GFEC can be computed for the individual sectors, as shown in Table 1, from the gross final energy consumption in Table A and the absolute values for renewable energy consumption in Table 1a. The RES share of GFEC rose between 2005 and 2010 from 6.7%<sup>23</sup> to 11.3%. In comparison: a 10.1% RES share had been projected for 2010 in Germany's NREAP. The RES share in 2010, which was higher than expected in the NREAP, is the result – as explained below – of higher consumption of renewables than forecast in the NREAP in the electricity and heating and cooling sectors. Altogether, these more than made up for lower-than-expected RES consumption in transport (particularly biodiesel).

Germany did not make use in 2010 of the cooperation mechanism provided for in Directive 2009/28/EC. Consequently, the 11.3% renewable energy share was derived exclusively from national production.

In 2010, the RES share in the electricity sector (taking into account the normalisation rules for wind and hydroelectric power) reached 18.4% - 1.0% higher than forecast in the NREAP. This is due to the higher levels of actual RES power feed-in than in the NREAP (NREAP: 105.0 TWh, actual: 112.1 TWh). In the heating and cooling sector, the NREAP estimated figure of 9.0% was also surpassed in 2010, with 11.0% achieved. The underestimation of GFEC in the NREAP could therefore be more than offset by the underestimation of absolute production of heating and cooling from renewable sources (NREAP: 10.031 ktoektoe or 420 PJ, actual: 12.441 ktoektoe or 521 PJ). Only in the transport sector did the estimated RES share of GFEC in the NREAP of 7.3% exceed the actual statistical figure for Germany of 6.2%. This can be traced to sales of biodiesel, which were much lower than expected, and to the revision of traction current consumption by rail traffic, as described below, which also entailed lower RES consumption by the railways.

### **Developments in the electricity sector**

In the electricity sector, the actual evolution in consumption of electricity from renewable sources (9,642 ktoektoe or 112.1 TWh) exceeded the NREAP's estimates for 2010 (9,026 ktoektoe or 105 TWh). On the one hand, this is due to stronger growth in photovoltaics in 2010 than in the NREAP (total installed output at end of 2010: 17.32 GW with 11.7 TWh electricity production, NREAP: 15.78 GW with 9.5 TWh electricity production). The other reason is that the estimates regarding installed output and electricity production from hydroelectric power erred on the side of caution in the NREAP so as to take into account the uncertainties that still existed in 2010 in the literature available on hydroelectric power. The database on installed output and electricity production from hydroelectric power has been revised since the NREAP was published. According to the new estimates, both installed hydroelectric output and (normalised) electricity production are clearly higher than estimated in the NREAP (installed output: 4.39 GW instead of 4.05 GW in the NREAP, electricity production: 2017 ktoektoe or 23.5 TWh instead of 1548 ktoektoe or 18.0 TWh in the NREAP).

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<sup>23</sup> Due to more recent statistical data, the renewables share of GFEC in Germany for 2005 (6.7%) deviates from the figure indicated in Annex I Table A of Directive 2009/28/EC for Germany for 2005 (5.8%).

Installed wind turbine output essentially matched the NREAP estimates, likewise - despite 2010 being a bad year for wind – the same holds true for (normalised) wind power feed-in. Nevertheless, it is worth noting that actual wind power storage in 2010, which stood at 37.79 TWh (3,250 ktoektoe), was markedly lower than the normalised figure of 43.10 TWh (3,706 ktoektoe). The same applies for hydroelectric power, where actual feed-in in 2010 was 20.96 TWh (1802 OE), yet the normalised figure was 23.46 TWh (2017 ktoektoe)<sup>24</sup>. Without normalisation of wind and hydroelectric power feed-in, the renewables share would only account for 17.1% in 2010 instead of the 18.4% as reported in Table 1. The renewables share of overall GFEC would fall from 11.3% to 11.0%.

Table 1.b-i: Actual overall contribution (installed capacity, in GW), provided by each technology using renewable energy sources in Germany in view of the binding targets for 2020 and the indicative trajectory for the share of energy from renewable energy sources in the electricity sector.<sup>25</sup>

	2005	2006	2007	2008	2009	2010
<b>Hydro electric<sup>26</sup></b>	<b>4.12</b>	<b>4.08</b>	<b>4.17</b>	<b>4.14</b>	<b>4.15</b>	<b>4.39</b>
<i>without use of pumps</i>						
< 1MW	0.63	0.64	0.66	0.67	0.68	0.70
1 MW-10 MW	0.98	0.99	1.03	1.01	1.01	1.04
> 10 MW	2.50	2.45	2.48	2.46	2.46	2.66
<i>using pumps<sup>27</sup></i>	0.19	0.19	0.18	0.14	0.11	0.15
<i>Use of both processes<sup>28</sup></i>						
<b>Geothermal energy</b>	<b>0</b>	<b>0</b>	<b>0.003</b>	<b>0.003</b>	<b>0.008</b>	<b>0.008</b>
<b>Photovoltaic</b>	<b>2.06</b>	<b>2.90</b>	<b>4.17</b>	<b>6.12</b>	<b>9.91</b>	<b>17.32</b>
<b>Tidal, wave and other energy from the sea</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Wind power</b>	<b>18.39</b>	<b>20.58</b>	<b>22.19</b>	<b>23.84</b>	<b>25.72</b>	<b>27.21</b>
onshore	18.39	20.58	22.19	23.84	25.64	27.03
offshore					0.07	0.18
<b>Biomass<sup>29</sup></b>	<b>3.17</b>	<b>3.87</b>	<b>4.76</b>	<b>5.41</b>	<b>6.07</b>	<b>6.65</b>
solid	2.43	2.74	3.05	3.42	3.59	3.65
Biogas	0.69	0.98	1.47	1.74	2.15	2.73
Liquid biofuel	0.05	0.15	0.24	0.24	0.33	0.28
<b>Total</b>	<b>27.74</b>	<b>31.43</b>	<b>35.30</b>	<b>39.51</b>	<b>45.86</b>	<b>55.58</b>
Of which CHP:						

<sup>24</sup> The figures for 2009 are as follows: Wind power: 38.64 TWh (3,322 ktoe, actual feed-in), 41.26 TWh (3,547 ktoe, normalised); hydroelectric: 19.04 TWh (1,637 ktoe, actual feed-in), 22.43 TWh (1,929 ktoe, normalised). RE electricity share: 16.4% (without normalisation), 17.4% (with normalisation); total RE share: 9.9% (without normalisation), 10.2% (with normalisation).

<sup>25</sup> Facilitates comparison with Table 10a of the NREAPs.

<sup>26</sup> Normalised in accordance with Directive 2009/28/EC and Eurostat methodology.

<sup>27</sup> natural intake only

<sup>28</sup> In accordance with new Eurostat methodology.

<sup>29</sup> Take into account only those complying with applicable sustainability criteria, cf. Article 5 (1) of Directive 2009/28/EC last subparagraph.

Table 1.b-ii: Actual overall contribution (gross electricity production, in TWh/a) provided by each technology using renewable energy sources in Germany in view of the binding targets for 2020 and the indicative trajectory for the share of energy from renewable energy sources in the electricity sector<sup>25</sup>

	2005	2006	2007	2008	2009	2010
<b>Hydro electric<sup>26</sup></b>	<b>22.5</b>	<b>22.4</b>	<b>22.9</b>	<b>22.6</b>	<b>22.4</b>	<b>23.5</b>
<i>without use of pumps</i>						
< 1MW	2.5	2.5	2.5	2.5	2.5	2.4
1 MW-10 MW	5.3	5.4	5.6	5.4	5.4	5.5
> 10MW	14.6	14.4	14.7	14.6	14.4	15.5
<i>using pumps<sup>27</sup></i>	0.7	0.7	0.6	0.5	0.4	0.5
<i>Use of both processes<sup>28</sup></i>						
<b>Geothermal energy</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.02</b>	<b>0.02</b>	<b>0.03</b>
<b>Photovoltaics</b>	<b>1.3</b>	<b>2.2</b>	<b>3.1</b>	<b>4.4</b>	<b>6.6</b>	<b>11.7</b>
<b>Tidal, wave and other energy from the sea</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Wind power</b>	<b>26.6</b>	<b>30.1</b>	<b>34.8</b>	<b>38.8</b>	<b>41.3</b>	<b>43.1</b>
Land-based	26.6	30.1	34.8	38.8	41.2	42.9
offshore	0	0	0	0	0.04	0.21
<b>Biomass<sup>29</sup></b>	<b>14.0</b>	<b>18.7</b>	<b>24.3</b>	<b>27.5</b>	<b>30.3</b>	<b>33.9</b>
solid	10.0	12.4	14.4	16.0	15.7	16.0
Biogas	3.7	5.4	8.4	10.1	12.6	16.2
Liquid biofuel	0.3	0.9	1.5	1.5	2.0	1.7
<b>Total</b>	<b>64.4</b>	<b>73.4</b>	<b>85.0</b>	<b>93.4</b>	<b>100.6</b>	<b>112.1</b>
Of which CHP:	3.9	4.7	4.8	5.0	5.7	6.2

### Evolution in the heating and cooling sector

RES consumption in 2010 in the heating and cooling sector stood at 12,441 ktoektoe (521 PJ, Table 1a) - a marked increase on the NREAP estimate (10,031 ktoektoe or 420 PJ) – which was for the most part due to higher-than-expected use of solid biomass for heat generation (NREAP: 7516 ktoektoe or 315 PJ, actual: 9,537 ktoektoe or 399 PJ). In addition, heat generation from biogas (incl. sewage and landfill gas) was significantly higher in 2010 than predicted in the NREAP (NREAP: 912 ktoektoe or 38 PJ, actual: 1,293 ktoektoe or 54 PJ). Solar thermal heat production and use of environmental heat in heat pumps in 2010 essentially corresponded to the NREAP estimates. Deep geothermal energy continues to play an ancillary role only in heat generation in Germany (Table 1c).

Table 1c: Actual overall contribution (final electricity production<sup>30</sup>) provided by each technology using renewable energy sources in Germany in view of the binding targets for 2020 and the indicative trajectory for the share of energy from renewable energy sources in the heating and cooling sector (ktoektoe)<sup>31</sup>

	2005	2006	2007	2008	2009	2010
<b>Geothermal energy<sup>32</sup></b>	<b>12</b>	<b>14</b>	<b>14</b>	<b>18</b>	<b>25</b>	<b>25</b>
<b>Solar power</b>	<b>239</b>	<b>277</b>	<b>313</b>	<b>355</b>	<b>407</b>	<b>447</b>
<b>Biomass<sup>33</sup></b>	<b>7,260</b>	<b>7,560</b>	<b>7,863</b>	<b>8,439</b>	<b>9,392</b>	<b>11,513</b>
solid	6,793	6,914	7,002	6,944	8,158	9,537
Biogas	154	244	374	838	863	1,293
Liquid biofuel	313	402	488	657	371	683
<b>Heat pumps<sup>34</sup></b>	<b>185</b>	<b>224</b>	<b>279</b>	<b>341</b>	<b>399</b>	<b>456</b>
- aérothermal	34	47	71	101	133	163
- geothermal	118	139	167	192	214	237
- hydrothermal	34	37	42	47	52	56
<b>Total</b>	<b>7,695</b>	<b>8,074</b>	<b>8,469</b>	<b>9,153</b>	<b>10,222</b>	<b>12,441</b>
Of which district heating <sup>35</sup>						
Of which biomass in households <sup>36</sup>	4,406	4,599	4,659	4,880	5,332	6,251

### Evolution in the transport sector

Use of renewables in the transport sector (Table 1d) in 2010 was lower at 3,209 ktoektoe<sup>37</sup> than predicted in the NREAP (3,749 ktoektoe or 157 PJ). This was mainly due to biodiesel consumption, which at 2,244 ktoektoe (94 PJ), was lower than expected in the NREAP (2,790 ktoektoe or 117 PJ). In contrast, more bioethanol was used as a fuel in 2010 at 749 ktoektoe (31 PJ) than foreseen in the NREAP (639 ktoektoe or 27 PJ). Consumption of electricity from renewable sources played as minor a role in road transport as renewably-produced hydrogen.

<sup>30</sup> Direct use and district heat as defined in Article 5 (4) of Directive 2009/28/EC.

<sup>31</sup> Facilitates comparison with Table 11 of the NREAPs. Table 1b as shown in the template has been broken down into Table 1b-I and 1b-II for a better overview and GW and TWh have been used instead of MW and GWh.

<sup>32</sup> except low temperature geothermal in heat pump applications

<sup>33</sup> Take into account only those complying with applicable sustainability criteria, cf. Article 5 (1) of Directive 2009/28/EC last subparagraph.

<sup>34</sup> only environmental heat.

<sup>35</sup> District heating and / or cooling from total renewable heating and cooling consumption. No reliable data available.

<sup>36</sup> From the total renewable heating and cooling consumption.

<sup>37</sup> without multiple counting

The amount of electricity from renewable sources that was used in rail traffic in 2010 (162 ktoektoe or 6.8 PJ) is lower than the corresponding estimate in the NREAP (219 ktoektoe or 9.1 PJ)<sup>38</sup>. The reason for this is that the estimates for 2010 were based on extrapolated statistical data on rail electricity consumption, which, according to the most recent findings, overestimated actual rail electricity consumption before 2010 (IFEU 2010, including updates<sup>39</sup>). Accordingly, it is to be suspected that the future evolution of RES electricity consumption by the railways, as is set out in the NREAP up to 2010, slightly overestimates the actual development we can expect to see. However, neither meeting the 18% target for renewables in Germany's gross final end consumption by 2020 nor the standalone target of 10% RES in the transport sector are affected. It would therefore not be appropriate to revise the RES share forecast for 2020 in the NREAP at this juncture for these reasons.

Table 1d: Actual overall contribution provided by each technology using renewable energy sources in Germany in view of the binding targets for 2020 and the indicative trajectory for the share of energy from renewable energy sources in the transport sector (ktoektoe/a)<sup>40 41 42</sup>

	2005	2006	2007	2008	2009	2010
<b>Bioethanol/ ETBE</b>	<b>152</b>	<b>326</b>	<b>296</b>	<b>402</b>	<b>574</b>	<b>749</b>
In accordance with Art. 21.2 <sup>43</sup>	0	0	0	0	0	0
Imported <sup>44</sup>						
<b>Biodiesel<sup>45</sup></b>	<b>1,597</b>	<b>2,499</b>	<b>2,944</b>	<b>2,391</b>	<b>2,157</b>	<b>2,244</b>
In accordance with Art. 21.2 <sup>43</sup>	0	0	0	0	17	0
Imported <sup>46</sup>						
<b>RES-H<sub>2</sub><sup>47</sup></b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>RES electricity<sup>48</sup></b>	<b>83</b>	<b>104</b>	<b>115</b>	<b>130</b>	<b>143</b>	<b>162</b>
in road transport	0	0	0	0	0	0
in non-road transport	83	104	115	130	143	162
<b>Miscellaneous<sup>49</sup></b>	<b>176</b>	<b>638</b>	<b>752</b>	<b>360</b>	<b>90</b>	<b>55</b>
In accordance with Art. 21.2 <sup>43</sup>	0	0	0	0	0	0
<b>Total</b>	<b>2,007</b>	<b>3,567</b>	<b>4,107</b>	<b>3,284</b>	<b>2,964</b>	<b>3,209</b>

<sup>38</sup> The respective NREAP methodology was used as a basis for calculating consumption of renewables in rail transport for 2009 and 2010: The national share of renewable electricity in gross electricity consumption for 2007 and 2008 was used as a basis, which in turn was calculated from the normalised wind and hydroelectric power feed-ins for these years.

<sup>39</sup> Electricity consumption for DB-AG rail transport by IFEU (2010) is based on statistical data. Electricity consumption of local railways is based on information from transport operators. Electricity consumption of other railways has been estimated.

<sup>40</sup> Facilitates comparison with Table 12 of the NREAPs.

<sup>41</sup> For biofuels take into account only those compliant with the sustainability criteria, cf. Article 5(1) last subparagraph. Sustainability criteria for biofuels have been in force in Germany since the beginning of 2011. For this reason, no checks can be made for the 2009 and 2010 reporting years regarding the extent to which the criteria were met.

<sup>42</sup> No robust figures are available on biofuel imports.

<sup>43</sup> Biofuels that are included in Article 21 (2) of Directive 2009/28/EC. Article 21 (2) has been transposed into German Law with effect from 1.1.2011. The figures for the 2009 and 2010 reporting years are estimates by the Federal Environment Agency based on industry data.

<sup>44</sup> From the whole amount of bioethanol / bio-ETBE.

<sup>45</sup> including HVO (hydrated vegetable oil)

<sup>46</sup> From the whole amount of biodiesel.

<sup>47</sup> Hydrogen from renewable sources.

<sup>48</sup> electricity from renewable sources.

<sup>49</sup> Biogas, BtL, vegetable oil.

**2. Measures taken in the preceding 2 years and/or planned at national level to promote the growth of energy from renewable sources taking into account the indicative trajectory for achieving the national RES targets as outlined in your National Renewable Energy Action Plan.**

(Article 22 (1) (a) of Directive 2009/28/EC)

(Reporting in accordance with Article 22 (1) (a) of the RES Directive, considering points b-f of the RES Directive in detail)

Table 2: Overview of all important strategies and measures

<i>Measure name and reference</i>	<i>Type of measure*</i>	<i>Expected outcome**</i>	<i>Target group and/or activity***</i>	<i>Existing/planned</i>	<i>Measure start and end date</i>	<i>Amendments to NREAP</i> <i>Short description</i>
<b>Renewable Energies European Law Adaptation Act (EAG EE)</b>	Regulatory	Transposition of Directive 2009/28/EC into national law	Public sector in particular, but also investors, private households	Existing	24.02.2011 German Parliament resolution, Approved by Bundesrat (German upper house) on 18.03.2011	EAG EE has caused amendments to the EEG, Renewable Energy Heat Act, Energy Statistics Act, Building Code, Building Construction Statistics Act and in the Biomass Sustainability Regulation. The focus areas of the EAG EE are the introduction of an electronic national register of guarantees of origin and for public buildings to act as good examples of using renewables.
<b>Renewable Energies Act (EEG)</b>	Regulatory	Increased share of renewable energies in the electricity supply	Investors, private households	Existing	Start: April 2000 (as the follow-up regulation to the Stromeinspeisungsgesetz (law on the sale of electricity to the grid) in force since 1991); comprehensive revisions in 2004, 2009 and 2011; most recent amendment comes into force on 1 January 2012. The Act is open-ended.	Focus of amendments through EAG EE (see above): introduction of an electronic national register of guarantees of origin and grid connection timeplan Focus of changes brought by EEG Amendment 2011: Comprehensive reworking of remuneration; Improving market integration through incentives for direct marketing (in particular introduction of market premium)

<i>Measure name and reference</i>	<i>Type of measure*</i>	<i>Expected outcome**</i>	<i>Target group and/or activity***</i>	<i>Existing/planned</i>	<i>Measure start and end date</i>	<i>Amendments to NREAP Short description</i>
<b>Grid Expansion Acceleration Act (NABEG)</b>	Regulatory	Speed up the approval procedure for grid expansion (electricity) beyond the Electricity Grid Expansion Act	Owners of high voltage power lines (expansion) and high voltage power lines (new build)	New	New, in force since 28.07.2011	New, in force since 5 August 2011 - Introduction of a Federal planning system for interstate or cross-border high voltage power lines of particular public interest and new rules for the planning approval process for these power lines
<b>EUR 5 billion KfW special programme "Offshore wind energy"</b>	Financial	The programme is intended to make an effective contribution to removing the financial difficulties faced in the start-up phase of offshore windfarms	Investors	New	The KfW Offshore wind energy programme started on 6 June 2011	It promotes the construction of up to 10 offshore windfarms in the German North and Baltic Sea areas with a total lending volume of EUR 5 Billion at market interest rates. All project companies that invest in the EEZ and the 12 sm zone of the German North and Baltic Sea areas and that require project finance are entitled to the scheme.
<b>Energy Management Act (EnWG)</b>	Regulatory	Implementation of EU regulations under the third internal energy market package, inter alia unbundling	Power companies	Existing	Energy Management Act of 7 July 2005, amended 5.8.2011	Promotion of smart grids - Information on origin of electricity and composition for final consumers - Duty to report for grid operators - Regulation of grid operation - Inter alia
<b>Cogeneration of heat and power Act (KWKG)</b>	Regulatory	New builds, modernisation and operation of CHP plants and district heating grids	Power plant operators, energy suppliers, investors	Existing	Start: April 2002, amended January and August 2009 and amended July 2011 through the Act on reorganisation of provisions on the energy industry. Currently (December 2011) work ongoing on amendment (target: Entry into force 1 <sup>st</sup> Half 2012)	- Amended July 2011: extension of operating period for plants (originally 31.12.2016, now 31.12.2020) and - Removal of the "double cap" For plants > 50 kWel - Planned amendments: extension of support, particularly for plant modernisation and grid expansion, extension to cover heat storage and cooling networks and storage

<i>Measure name and reference</i>	<i>Type of measure*</i>	<i>Expected outcome**</i>	<i>Target group and/or activity***</i>	<i>Existing/planned</i>	<i>Measure start and end date</i>	<i>Amendments to NREAP Short description</i>
<b>Renewable Energies Heat Act (EEWärmeG)</b>	Regulatory	Increase renewable energy share in heating supply for buildings (emphasis on new builds)	Property owners (private and public)	Existing	Start: Jan 2009; Comprehensively extended by EAG EE (see above); first review by means of progress report end 2011	Amendments through EAG EE of 18.3.2011, particularly introduction of role model function for public buildings, specification of rules on RES cooling  Publication of progress report planned for end 2011
<b>Market incentive programme (MAP)</b>	Financial	Investment in renewables in the heating sector	Private households, investors	Existing	Support in place since 1999, new conditions since 15 March 2011; open-ended validity	Last Directive of 15.3.2011; funding conditions amended to mirror market developments
<b>KfW promotional programmes for Energy-Efficient Construction and Renovation</b>	Financial	Energy efficiency measures and investment in buildings, inter alia in renewables	Private households, investors, building owners, local authorities, social institution funding bodies	Existing	No end date set for measures	Parts of programme have been developed further: inter alia adapted to EnEV 2009 on 1.7.2010, support discontinued for KfW 130 (renovation) and KfW 85 (new builds), introduction of demanding new subsidy assessment standards with Efficient house 40 and 55 for new builds and 55 for renovation, standards tightened up for individual renovation measures
<b>Energy Saving Regulation (EnEV)</b>	Regulatory	Respect for minimum standards for heating and energy efficiency of buildings, as well as cooling facilities in renovation and new builds of residential and non-residential properties	Property owners (private and public)	Existing, Amendment planned	In force since 1.2.2002, most recently amended with effect from 1.10.2009	EnEV 2009 tightened and adapted to the new directive on energy performance of buildings (Directive 2010/31/EU)
<b>Biofuel Quota Act (BioKraftQuG)</b>	Regulatory	Reduction of greenhouse gas equivalent like CO <sub>2</sub> .	Fuel trade	Existing, Amended 18 June 2009	Existing, amendment from beginning 2015	No changes to NREAP

<i>Measure name and reference</i>	<i>Type of measure*</i>	<i>Expected outcome**</i>	<i>Target group and/or activity***</i>	<i>Existing/planned</i>	<i>Measure start and end date</i>	<i>Amendments to NREAP Short description</i>
<b>Act on the promotion of climate protection in town and municipal development</b>	Regulatory	Increase climate protection	Local authorities, municipalities, towns	Existing	Came into force on 30 July 2011	<ul style="list-style-type: none"> <li>- changes the Federal Building Code (Art.1)</li> <li>- new: Section 248: special provision on economical and efficient energy use (deviation from development plans)</li> <li>- new: Section 249: special provisions on wind power in urban land-use planning</li> <li>- climate protection clause</li> <li>- use of PV and solar thermal on buildings made easier</li> <li>- regulatory possibilities for RES heating, electricity and CHP use in development plans</li> <li>- flexible operation of outdoor biogas plants made easier</li> </ul>
<b>Biomass Sustainability Regulation (BioSt-NachV)</b>	Regulatory	<p>Protection of areas of nature conservation value and biodiversity in regions with a high degree of biodiversity.</p> <p>Reduce greenhouse gases</p>	Operators of plants producing electricity from liquid biomass under the EEG or – by cross reference with the EEWärmeG – Obligated under EEWärmeG when fulfilling commitment through liquid biomass	Existing	<p>Has existed since 29.07.2009</p> <p>Amended by Act of 31 July 2010, 12 April 2011 and 28 July 2011</p>	<p>Transitional provisions (Section 78) on prevention of short-term market shortages of liquid biomass</p> <p>Amended by EAG EE</p> <p>Amended by revised EEG</p> <p>BioSt-NachV and Biokraft-NachV allow for certain transitional rules up to 31.12.2010.</p> <p>Both national regulations have been fully applicable since 01.01.2011.</p>
<b>Biofuel Sustainability Regulation (BiokraftNachV)</b>	Regulatory	<p>Protection of areas of nature conservation value and biodiversity in regions with a high degree of biodiversity.</p> <p>- Reduce greenhouse gases</p>	Fuel producers	Existing	Has existed since 30.09.2009	BioSt-NachV and Biokraft-NachV allow for certain transitional rules up to 31.12.2010. Both national regulations effective from 01.01.2011.
<b>Energy Tax Act (EnergieStG)</b>	Regulatory	Tax revenue, maintain competitiveness of biofuel	Fuel trade	Existing	Effective as of 1.1.2010	The original idea to further reduce tax concessions on pure biofuel from 2010 to 2012 has been dropped; credit rates from 2009 have been continued from 2010 to 2012.

<i>Measure name and reference</i>	<i>Type of measure*</i>	<i>Expected outcome**</i>	<i>Target group and/or activity***</i>	<i>Existing/planned</i>	<i>Measure start and end date</i>	<i>Amendments to NREAP Short description</i>
<b>Gas Network Access Regulation (GasNZW)</b>	Regulatory	Support for feeding biogas into the gas network  Goal: Six billion m <sup>3</sup> per annum until 2020 and 10 billion m <sup>3</sup> per annum until 2030	Investors, biogas plant operators, biogas transport clients	Existing, amended on 3.9.2010.	Came into force on 9.9.2010	- Grid connection cost allocation now 25% for connectee, 75% for grid operator  - Ensure the long-term availability of grid connections of at least 96%  - Implementation road map in accordance with the GasNZV, Section 33, (7) which establishes the timeframes for grid connection.
<b>Government electromobility programme</b>	Financial	Increase the electromobility share in vehicular traffic; strategy to support research, development and roll-out of electromobility	Investors, academics, industry	Existing programme/concrete measures planned	Implementation of announced measures started 2011	Planned measures (Example): R&D programme Initial and further training Raw materials, materials and recycling
<b>Strategic energy storage funding initiative</b>	Regulatory	Increase storage capacity for electricity and heat	Academics, industrial cooperation	Existing	Came into force on 17 May 2011	New funding programme set up in 2011 for electrical and thermal storage and priority topics
<b>Act (amending) on the establishment of a special fund – the “Energy and Climate Fund” - (EKFG-ÄndG)</b>	Regulatory	Funding of measures on: Energy efficiency, renewable energies, energy storage and grid technologies, energy-efficient building refurbishment, national climate protection, international climate and environment protection, electromobility development	Project executing agencies and the eligible parties	Existing	Came into force on 1 January 2011  Amended on 29 July 2011	Additional measures: Additional funding available to develop electromobility (capped at EUR 300 million from 2014).  Grants for companies with high energy consumption from 2013 to offset higher energy costs due to emissions trading.  Inter alia funding of the CO <sub>2</sub> building refurbishment programme and strengthening of the MAP.

\* Indicate if the measure is (predominantly) regulatory, financial or soft (i.e. information campaign).

\*\* Is the expected result behavioural change, installed capacity (MW; t/year), energy generated (ktoe)?

\*\*\* Who are the targeted persons: investors, end users, public administration, planners, architects, installers, etc?  
or what is the targeted activity / sector: biofuel production, energetic use of animal manure, etc?

\*\*\*\* Does this measure replace or complement measures contained in Table 5 of the NREAP?

## **Rules and regulations of the federal states and municipalities**

This progress report presents the Federal Government's arrangements for support for renewable energies and updated information in comparison to the NREAP. Updates on the federal states and municipalities' measures listed in the NREAP, which, for the most part, are given by way of example, cannot be provided in the progress report due to their number. Nevertheless, these regional measures and targets are playing an important role towards achieving national renewables targets.

For instance, the first progress report from the State of Baden-Württemberg on the Renewable Energies Heat Act has been available since August 2011 (Baden-Württemberg Ministry of the Environment 2011).

Moreover, the federal states have reported back to the Federal Government on implementation and their own measures in the heating and cooling sector (BMU 2011b).

### **2.a. Please describe the progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of renewable energy**

*(Article 22 (1) (e) of Directive 2009/28/EC)*

No major regulatory and non-regulatory barriers to the development of renewable energy were observed during the scientific investigations conducted while drafting the Renewable Energies European Law Adaptation Act (EAG EE).

Nevertheless, the existing legislation is constantly checked and improved. In this way, for instance, a number of provisions were adopted to improve building regulations as part of the amendment of the Federal Building Code (BauGB). Further information can be found in point 3.0.7. below.

### **2.b. Please describe the measures in ensuring the transmission and distribution of electricity produced from renewable energy sources and in improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements**

*(Article 22 (1) (f) of Directive 2009/28/EC)*

#### **2.b.1. Renewable Energies European Law Adaptation Act (EAG EE)**

Under the Renewable Energies European Law Adaptation Act (EAG EE), grid operators are obliged to give plant operators schedules and cost estimates for the provision of grid connections. Plant operators continue to bear the costs for the grid connection line, whereas grid operators shall continue to be responsible for the costs for developing the grid as required.

#### **2.b.2. EEG 2012 and amendment of the Energy Management Act (Energiewirtschaftsgesetz)**

Amendments and clarifications have been made regarding feed-in management and congestion management under the EEG 2012 and the revised Energy Management Act, which was adopted at the same time. All told, the end result was to clarify that systems producing electricity from renewables and combined heat and power shall be given priority in terms of grid use and may only be regulated after all other energy generation plants. Exceptions shall be allowed at all times when there is a risk to the security of the energy supply.

To increase the above grid security, solar systems with an installed output of 30 kW and over shall in future be fitted with a device enabling them to be controlled remotely. Previously, it was the case that only systems of over 100 kW output could be controlled.

### **2.b.3. Amendment of the Energy Management Act (EnWG)**

The amendment of the EnWG introduced a plan for grid development at maximum voltage level (380kV) for the first time. This obliges the transmission grid operators to develop every year a ten-year grid development plan (NEP) on the basis of a concerted scenario, defining national grid needs at maximum voltage level for the next decade. The NEP shall involve the general public and grid users through consultation and shall be confirmed by the Federal Network Agency under the supervision of the authorities and through public participation. The Federal Network Agency shall submit the NEP as a draft for a federal requirement plan. The federal requirement plan shall be adopted by the federal government and shall establish the binding energy-related needs and urgently-required network expansion projects for the planning authority.

### **2.b.4. Grid Expansion Acceleration Act (NABEG)**

The Grid Expansion Acceleration Act came into force on 5 August 2011. The Act creates the basis for more rapid development of the transmission grid. This primarily regards the planning and approval procedures and their preparation and also aims to increase acceptance among the general public for expanding the grid. Fixed deadlines are prescribed for each step as per the following order.

After receiving the project developer's application, the Federal Network Agency shall determine infrastructure corridors for interstate or cross-border maximum voltage lines (Federal Technical Planning) as a basis for the planning approval process. As part of this, the Federal Network Agency shall check to see whether public or private interests conflict with a project in an infrastructure corridor and shall carry out a territorial impact assessment and a strategic environmental impact assessment. The scope of the Federal Technical Planning shall be established in an application conference. The Federal Network Agency shall involve other authorities and bodies dealing with matters of public interest in the environmental impact assessment. After disclosure, publication and consideration of the federal states' objections, Federal Technical Planning shall be mandatory for the planning approval process. The infrastructure corridors defined in the Federal Technical Planning shall be included in the yearly publication of the Federal Grid Plan. The Federal Network Agency may, after completion of the Federal Technical Planning, issue a development freezing order which prohibits projects or structural changes which would pose an obstacle to the respective power lines.

The planning approval process shall begin with the project developer's application, upon which the planning authority shall immediately convene an application conference, bringing together project developers and affected public agencies and associations. The general public shall be informed of the application conference (by means of publication in the official journal, on the planning authority's website and in local daily newspapers). The planning authority shall present a framework of assessment for planning approval based on the application conference. After hearings, the planning approval process shall result in a planning approval decision. In the process, the environmental impact assessment may be limited in nature due to the strategic environmental assessment already carried out (see above).

The erection or amendment of maximum voltage lines that are shown in the Federal Grid Plan's infrastructure corridors or routes are not subject to regional planning procedures are not required for.

### **2.b.5. System Service Ordinance (SDLWindV)**

The Ordinance on system services by wind power plants, which came into force in 2009 (System Service Ordinance; SDLWindV), was recently amended on 30 March 2011. The System Service Ordinance regulates requirements for better technical grid integration of wind energy crops. This recent amendment means the System Service Ordinance has now been adapted to the most recent grid connection rules for the medium voltage grid.

### **2.b.6. Low voltage directives**

The grid technology/grid operation forum of the German Association for Electrical, Electronic & Information Technologies e.V. (VDE) has published "General conditions for a transitional arrangement on frequency-dependent active power control of PV systems in the mains grid". This should be considered an ex-ante arrangement for addressing the 50.2 Hz problem, until the German Electricity Association (VDEW) has completed its revision of its Directive on "Decentralised power generating facilities in the low voltage grid – Directive for connection and parallel operation of decentralised power generating systems on the low voltage grid" (VDEW 2005) in late 2011.

### **2.b.7. ACER: Guidelines on Electricity Grid Connections**

The European Agency for the Cooperation of Energy Regulators (ACER) conducted consultations on the development of non-legally binding framework guidelines for connection to the electricity grid. The results of the consultation were published on 19 July 2011 under the title "ACER Public Consultation on Draft Framework Guidelines on Electricity Grid Connections – Evaluation of responses". This is a step towards harmonised European rules on grid connections for significant grid users of all types. What constitutes a significant grid user is defined in the framework guidelines.

### **3. Please describe the support schemes and other measures currently in place that are applied to promote energy from renewable sources and report on any developments in the measures used with respect to those set out in your NREAP**

*(Article 22 (1) (b) of Directive 2009/28/EC)*

As part of the transition in energy policy that the German Federal Government adopted on 6 June 2011, the fast tracked development of renewable energy is the most important target – in addition to the complete phasing out of nuclear power by the end of 2022. The share of renewables in electricity consumption is to rise from 17% in 2010 to at least 35% by 2020 at the latest. The Federal Government is aiming for a share of at least 50% by 2030 at the latest, and at least 60% by 2040. By 2050, it should account for a minimum 80%. The targets under the energy concept of 28 September 2010 have been established and progress fast tracked by the decision for a transition in energy policy.

The following points address the measures that have been adopted in the Energy Transition Package for the renewables sector, together with further development of central measures set out in the NREAP. Instead of using Table 3 as suggested in the progress report template, updated information on support measures is presented in text form. As such, when examining the main instruments to promote renewable energy, this allows for detailed information to be presented on feed-in tariffs, investment incentives etc.

#### **3.0. Support measures**

##### **3.0.1. Renewable Energies European Law Adaptation Act (EAG EE)**

The Act transposing Directive 2009/28/EC on the promotion of energy from renewable sources (Renewable Energies European Law Adaptation Act - EAG EE) of 12 April 2011 has introduced the following amendments:

##### **Amendments to the Renewable Energies Act (EEG):**

- Guarantees of origin can now be issued, sent and cancelled electronically for electricity from renewables. To this end, the EAG EE lays the foundations for the creation of an electronic register of guarantees of origin. In the future, the Federal Environment Agency (UBA) will issue the guarantees of origin, instead of environmental verifiers as is the case at present. It shall also be responsible for recognising, sending and cancelling the guarantees. The power to issue statutory ordinances has been written into the EEG 2009 to enable further embellishment.
- Grid operators are obliged to send those wishing to feed into the grid timetables for processing connection requests and providing grid connections, together with information on establishing the grid connection point and an estimate of the connection-related costs for the system operator (see 2.b).

- The power to issue statutory ordinances for the Biomass Sustainability Regulation (BioSt-NachV) has been reworded and extended so as to enable the introduction of sustainability criteria for all aggregate states of biomass – solid, liquid and gaseous –, social sustainability criteria, protection of legitimacy provisions and measures to prevent indirect land-use change.
- Degression for photovoltaic systems has been changed by the mid-year introduction of an extension-dependent degression.
- The so-called “green electricity privilege” has been restricted to 2 cent/kWh.

### **Amendments to the Renewable Energies Heat Act (EEWärmeG):**

- The EEWärmeG has been altered to include the target of making public buildings an example of how to use renewables for heating and cooling (Art. 13 (5) of Directive 2009/28/EC) and the implementation of a framework for supporting renewables in the building sector.
- To implement this target, the existing obligatory coverage of new builds under the EEWärmeG has been extended to existing public buildings. Moreover, this obligation shall apply only to public buildings that are publicly owned or rented.
- Additionally, the definition of usable heat has been extended. In the new wording, the term “heating” has been extended to “cooling” so that the usage types are labelled more clearly. When comprehensively refurbishing public buildings, at least 15% of the heating and cooling energy needs shall be covered by renewables (except where gaseous biomass is used: at least 25%).

### **3.0.2. Renewable Energies Act (EEG)**

The lower house of the German Parliament adopted the Amendment to the EEG on 30 June 2011. The upper house’s decision on 8 July 2011 concluded the legislative procedure.

Targets: the **development targets** for the electricity sector laid down in the Energy Concept of 28 September 2010 (see 3) have been enshrined in the EEG.

Market, grid and systems integration: with an **optional market premium**, EEG systems operators have received an incentive to operate their systems in a more market-orientated fashion. All EEG systems are included in this rule. For biogas systems that come on line from 2014 with an output of 750 kW or more, the market premium is binding. The market premium is determined by the difference between the system-specific EEG-tariff and the monthly average stock market price determined ex post. This shall be corrected for wind and photovoltaic (PV) power using a technology-specific value factor that reflects the respective market value on the stock market. Additionally, a management premium shall cover, inter alia, costs arising from forecasting errors.

- In addition to the market premium, a “flexibility premium” shall be paid to support targeted investment in demand-orientated capacity of power generation by biogas systems. This premium will enable additional investment to be made in larger gas storage tanks and generators that would not be covered by the market premium alone. This additional investment will enable system operators to delay power generation by approximately 12 hours depending on demand.
- An incentive has been introduced to take account of the grid situation when selecting the location of new systems. It limits **compensation** in the event of curtailment to 95%. At the same time, investment security is provided by limiting the provision to a maximum 1% of annual revenue.
- Integration of PV systems into the grid is being pushed forward:
  - PV systems are included in feed-in management, so in the future – like all other EEG systems – they can be curtailed in the event of grid overload to prevent damage.
  - The following options are available for small PV systems (under 30 kW): either operators install a technical curtailment device and play a part in feed-in management or - if such a device is too expensive - they can restrict the system’s feed-in output to the grid connection point to 70%. By doing this, any possible, albeit rare, output peaks can be “capped”. This lowers the fed-in quantities of electricity by approximately 2% only as a general rule and reduces the need to develop the grid.

Provisions (including tariffs) for the different renewable energy types:

### **Onshore wind:**

- General continuation of the tariff structure in accordance with EEG 2009.
- Increase in **degression** from 1 to **1.5%** (pressure on cost reductions).
- **System services bonus** for new systems (previously limited to 31.12.2013) extended one year.
- **Repowering bonus** restricted to old systems that were problematic for the grid, which were brought on-line before 2001 (otherwise the free-rider effect).

### **Off shore wind:**

- Inclusion of the “**Sprinter premium**” (2 ct/kWh) in the initial tariff, increasing it from 13 to 15 ct/kWh.
- Degression start postponed from 2015 to 2018, due to delays in developing offshore farms. In return, degression increased from 5 to 7%
- Introduction of an optional **acceleration scenario**: initial tariff increases to 19 ct/kWh, but only paid for 8 instead of 12 years. Subsequently the normal initial tariff (15 ct/kWh) shall apply for the extension period which is dependent on water depth and distance from the coast, and then the basic tariff shall apply (as before) – 3.5 ct/kWh. It is thereby assumed that the basic tariff will not be claimed and instead the electricity will be marketed directly.

Measures on wind power that accompany the EEG arrangements:

- **EUR 5 billion Kreditanstalt für Wiederaufbau (KfW) programme**, providing finance for roughly 10 windfarms, collecting experience and thereby facilitating the financing of subsequent projects.
- Removal of the deadline for the transmission grid operator's **obligatory provision of a grid connection** in the EnWG or NABEG.
- Preparation of an **Offshore Grid Connection Masterplan**, preferably by the German Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie).
- No support for electricity from windfarms in nature reserves in the Exclusive Economic Zone (EEZ).

### **Biomass:**

- Drastically **simplified tariff system** with a performance-related basic tariff (between 6 and 14.3 ct/kWh) and two additional input tariff classes (input tariff class I - performance related with 4 to 6 ct/kWh - and input tariff class II - performance and input-dependant with 6 to 8 ct/kWh).
- Special tariff for **organic waste fermentation plants** with connected composting of digestate for use of organic waste to generate electricity (14 – 16 ct/kWh).
- Staggered additional tariff (1 to 3 ct/kWh) for **biomethane feed-in**.
- Introduction of a special category for **small-scale liquid manure plants** (up to 75 kW plant system rating) using at least 80% liquid manure input (relative to mass) and 25 ct/kWh tariff; in addition to producing electricity, the idea here is to alleviate climate change in particular (liquid manure methane emissions avoided) and to protect the environment (groundwater).
- **Level of tariffs reduced** by 10 – 15% on average, particularly for small systems, where there has clearly been excessive subsidising. In this way, the tariff for a typical 150 kW facility shall drop from approximately 26 ct/kWh at present to 20 – 22 ct/kWh in the future.
- **Degression** increase from 1 to 2% on the tariff where no commodities are required, i.e. the commodities tariff will no longer be subject to degression, as natural commodity prices are decided by the world market and thus have no cost-cutting potential.
- For the production of electricity from biogas, the use of **maize and corn** is limited to 60% (relative to mass) to prevent excessive maize cultivation.
- Deletion of the tariff for **waste wood combustion** for new systems so as to prevent competition with other uses.
- Introduction of a **pro-rata tariff** (i.e. all inputs can be mixed). This simplifies the use of ecologically beneficial inputs and in particular the development of waste potential, which was partly not utilised due to the previous principle of exclusive use.

- Introduction of **minimum requirements** for biogas systems: Each system (apart from organic waste fermentation plants with connected digestate composting), must prove that either 60% is used for heat or 60% for liquid manure or is directly marketed (e.g. market premium). Therefore it is no longer sufficient to just produce electricity; instead an added benefit is necessary.
- Support for electricity from **liquid biomass** has been removed for new systems.
- A **flexibility premium** has been introduced in order to promote market-orientated production of electricity from biogas systems (see above).
- Adaptation of the power to issue statutory ordinances for further sustainability requirements in the light of European developments.

### **Photovoltaics:**

- Existing **degression rule** (flexible cap) and half-yearly extension-dependent adaptation retained as in 2011.
- The **own-consumption rule** has been extended until the end of 2013 for systems up to 100 kW.
- Targeted measures are being taken for **grid integration** of photovoltaics (see above).
- There shall be no tariff for ground-mounted PV systems on redevelopment sites located in national parks or nature reserves.

### **Geothermal energy:**

- Inclusion of combined heat and power (CHP) and early starter bonus in the **basic tariff**, increasing the amount from 16 to 23 ct/kWh; additional increase by a further 2 ct/kWh to 25 ct/kWh, as there have barely been any projects yet.
- **Technology bonus** for petro-thermal projects has increased from 4 to 5 ct/kWh.
- **Degression** only kicks in from 2018, but is then increased from 1% to 5%.

### **Hydroelectric:**

- **Tariff structure simplified** (previously 3 categories).
- **Tariff period** simplified to 20 years.
- **Degression** simplified to 1%.
- Inclusion of existing **storage** or storage power plants with natural inflow only.
- Environmental requirements for use of hydroelectric power have been fleshed out and require fulfilment of sections 33 to 35 and 6 (1) (i) and (ii) of the Water Resources Act.

### **Landfill, sewage and mine gas**

- Deletion of the technology bonus for innovative plant technology.

### **Special compensation scheme and industrial own consumption:**

- The circle of beneficiaries has been extended. To this end, the lower threshold has been reduced from 10 to 1 GWh and a “sliding-scale for access” introduced to prevent distortions of competition. Simultaneously, the second criteria for the benefit – the electricity cost/gross value added ratio - has been decreased slightly to 14%.
- At the same time, due to increasing circumvention attempts (e.g. through contracting), a lock-in has been introduced.
- Electricity that is moved over the public grid shall no longer be classified as for own consumption, unless the autoproducer operates the power plant himself and consumes the electricity on the premises of the plant producing the electricity. A transitional rule ensures stocks are safeguarded for existing own consumption concept plans.

### Miscellaneous:

- Continuation of the clearing houses and clarification of the legal effect of their decisions; long-term financing for them secured.

Table 3a: Tariff payment for hydroelectric electricity production under the EEG 2012

<b>Plants up to 5 MW – New plants (Section 253)</b>	
Plant system rating	EEG 2012 tariff in ct/kWh over 20 years
up to 500 kW	12.70
up to 2 MW	8.30
up to 5 MW	6.30
up to 10 MW	5.50
up to 20 MW	5.30
up to 50 MW	4.20
over 50 MW	3.40
<b>Degression</b>	
For hydroelectric systems under EEG 2012: All hydroelectric systems are subject to degression of 1%.	

Table 3b: Electricity production tariff from landfill, sewage and mine gas under EEG 2012

<b>Landfill gas plants (Section 24)</b>	
Output share EEG 2012	Tariff in ct/kWh
Up to 500 kW <sub>el</sub>	8.60
up to 5 MW <sub>el</sub>	5.89
<b>Sewage gas plants (Section 25)</b>	
Output share EEG 2012	Tariff in ct/kWh
Up to 500 kW <sub>el</sub>	6.79
Up to 5 MW <sub>el</sub>	5.89
<b>Mine gas plants (Section 26)</b>	
Output share EEG 2012	Tariff in ct/kWh
Up to 1 MW <sub>el</sub>	6.84
Up to 5 MW <sub>el</sub>	4.93
Over 5 MW <sub>el</sub>	3.98
<b>BONUS for landfill, sewage and mine gas</b>	
	EEG 2012 tariff in ct/kWh

For gas treatment in landfill and sewage gas plants (Annex 1) of up to 5 MW Rated power:	
a) max. rated power of 700 Nm <sup>3</sup> /h:	3.00
b) max. rated power of 1000 Nm <sup>3</sup> /h:	2.00
b) max. rated power of 1400 Nm <sup>3</sup> /h:	1.00
<b>Degression</b>	
For electricity from landfill, sewage and mine gas under EEG 2012: 1.5% on basic tariff and bonus.	

Table 3c: Tariff for biomass electricity production under EEG 2012

Biomass may only be used when it is utilised in the context of the version of the Regulation on the production of electricity from biomass (Biomass Regulation-Biomasse V) in force since 1 January 2012.

<b>Biomass (Sections 27, 27a, 27b)</b>	
<b>Basic tariff <sup>1)</sup></b>	
Output share	EEG 2012 tariff in ct/kWh
up to 150 kW <sub>el</sub>	14.30
up to 500 kW <sub>el</sub>	12.30
Up to 750 kW <sub>el</sub>	11.00
up to 5 MW <sub>el</sub>	11.00
up to 20 MW <sub>el</sub>	6.00
<b>Input tariff class I <sup>1)</sup></b>	
Output share	EEG 2012 tariff in ct/kWh
up to 150 kW <sub>el</sub>	6
up to 500 kW <sub>el</sub>	6
up to 750 kW <sub>el</sub>	5
up to 5 MW <sub>el</sub>	4
up to 20 MW <sub>el</sub>	-
<sup>1)</sup> Only 2.5 ct/kWh over 500 kW to 5,000 kW for electricity from bark and residual wood from forestry	
<b>Input tariff class II <sup>1)</sup></b>	
Output share	EEG 2012 tariff in ct/kWh
up to 150 kW <sub>el</sub>	8
up to 500 kW <sub>el</sub>	8
up to 750 kW <sub>el</sub>	8/6 <sup>2)</sup>
up to 5 MW <sub>el</sub>	8/6 <sup>2)</sup>
up to 20 MW <sub>el</sub>	-
<sup>1)</sup> For selected, ecologically desirable inputs only.	
<sup>2)</sup> Only 6 ct/kWh for electricity from liquid manure (only Nos. 3, 9, 11 to 15 of Annex 3 to the Biomass Regulation)	
<b>Organic waste fermentation plants <sup>1)</sup> (Section 27a)</b>	
Output share	EEG 2012 tariff in ct/kWh
up to 150 kW <sub>el</sub>	16
up to 500 kW <sub>el</sub>	16
up to 750 kW <sub>el</sub>	14
up to 5 MW <sub>el</sub>	14
up to 20 MW <sub>el</sub>	14
<sup>1)</sup> Only applies to biogas plants that ferment certain organic waste (in accordance with Section 27a (1)) and are directly linked to a facility for post-rotting of the solid fermentation residues. The rotted-down fermentation residues must be recovered. The tariff may only be combined with the gas treatment bonus.	
<b>Small-scale liquid manure plants (Section 27b)</b>	
Output share	EEG 2012 tariff in ct/kWh
up to 75 kW <sub>el</sub>	25 <sup>1)</sup>
up to 150 kW <sub>el</sub>	-
up to 500 kW <sub>el</sub>	-

up to 750 kW <sub>el</sub>	-
up to 5 MW <sub>el</sub>	-
up to 20 MW <sub>el</sub>	-
1) Special category for liquid manure-biogas plants of up to 75 kW installed output on the site of the biogas production plant, not combinable (i.e. no additional basic or input tariff or gas treatment bonus).	
<b>Gas upgrading bonus (Section 27c (2))</b>	
up to 5MW <sub>el</sub> output in accordance with Annex 1	EEG 2012 tariff in ct/kWh
For gas upgrading	
a) max. capacity up to 700 Nm <sup>3</sup> /h	3.00
b) max. capacity up to 1000 Nm <sup>3</sup> /h	2.00
b) max. capacity up to 1400 Nm <sup>3</sup> /h	1.00
<b>Degression</b>	
The basic tariff (Section 27 (1)), the tariff for organic waste fermentation plants (Section 27a), small-scale liquid manure plants (Section 27b) and the gas treatment bonus (Section 27c (2)) are subject to a degression of 2.0% (Section 20 (2) (5)).	
The input-dependent additional tariff according to input category 1 or II is not subject to degression.	

Table 3d: Tariff for geothermal electricity production under EEG 2012

<b>Geothermal energy (Section 28)</b>	
<b>Basic tariff</b>	
Output share	EEG 2012 tariff in ct/kWh
all systems	25.00
<b>Bonus</b>	
<b>Technology bonus</b>	
For plants up to 10 MW <sub>el</sub> using petrothermal technology	EEG 2012 tariff in ct/kWh
	5.00
<b>Degression</b>	
For geothermal energy under EEG 2012: 5.0% on tariff and bonus from 2018.	

Table 3e: Tariff for electricity production from offshore wind power under EEG 2012

<b>Offshore wind power</b>	EEG tariff 2012 ct/kWh
Increased initial tariff <sup>1</sup>	15.00
Basic tariff	3.50
Initial tariff in acceleration scenario	19.00
1) The increased initial tariff is guaranteed for offshore wind power for the first 12 years from when the plant comes on stream. It is extended 0.5 months for each full nautical mile in excess of 12 nautical miles and 1.7 months for each full metre's depth over 20 metres. In the case of the acceleration scenario, the same tariff is guaranteed for the extension period arising from the distance from the coast and water depth as in the "normal" tariff types (Section 31 (3) (ii)).	
<b>Degression</b>	
Offshore wind power under EEG 2012: Until 2017 0%. From 2018: 7%	

Table 3f: Tariff for electricity production from onshore wind power under EEG 2012

<b>Basic tariff</b>	
	EEG 2012 tariff in ct/kWh
Increased initial tariff	8.93
Basic tariff	4.87 <sup>1)</sup>

Small wind turbine up to 50 kW in ct/kWh	8.93 <sup>2)</sup>
<sup>1)</sup> The increased initial tariff is guaranteed for five years. Pursuant to Section 29 (2), this is extended by two months for each 0.75% of the reference yield by which the yield of the installation falls short of the reference yield by 150%.	
<sup>2)</sup> Calculation of the reference yield does not apply to small wind systems up to 50 kW inclusive pursuant to Section 29 (3). A reference yield of 60% will be assumed for these plants. This means that the initial tariff can be claimed for the entire support period.	
<b>Bonus for onshore wind power</b>	
<b>System services bonus</b>	
	EEG 2012 tariff in ct/kWh
The <b>system services bonus</b> (SDL-Bonus) is paid under Section 29 (2) for new systems for the increased initial tariff period, provided they are in operation before 31.01.2015. Evidence must be provided that the requirements under Section 6 (5) of the EEG have been fulfilled.	0.48
<b>Repowering</b>	
	EEG 2012 tariff in ct/kWh
The repowering bonus pursuant to Section 30 for the replacement of existing wind power installations on the same or on an adjacent site is paid for the increased initial tariff period, provided the replaced plants were operating prior to 1.1.2002.	0.50
<b>Degression</b>	
For onshore wind power under EEG 2012: 1.5% on tariff and bonus.	

Table 3g: Tariff for photovoltaic electricity production under EEG 2012<sup>50</sup>

<b>Rooftop systems (Section 33)</b>		
Output share	EEG 2012 tariff in ct/kWh	
up to 30 kW	24.43	
from 30 kW	23.23	
from 100 kW	21.98	
from 1 MW	18.33	
<b>Ground-mounted and building systems that are not buildings in themselves (Section 32)</b>		
	EEG 2012 tariff in ct/kWh	
	17.94	
<b>Systems on sealed surfaces and redevelopment sites (Section 32)</b>		
	EEG 2012 tariff in ct/kWh	
	18.76	
<b>Tariff for consumption of own electricity (own consumption tariff)<sup>1)</sup></b>		
	EEG 2012 tariff in ct/kWh	
	Up to 30% own use	Over 30% own use
up to 30 kW	8.05	12.43
from 30 kW	6.85	11.23
from 100 kW to 500 kW	5.60	9.98
<sup>1)</sup> In order to claim under the scheme for own consumption, the system must be installed between 1 January 2012 and 31 December 2013 and be located on or on top of a building. Installed output must not exceed 500 kW. It must be connected to the grid.		

<sup>50</sup> Between 1 October 2010 and 30 September 2011 the Federal Network Agency was notified under Section 16 (2) (ii) of the EEG of systems with a total output of approximately 5 200 megawatts. With this, the threshold value in the framework of the double cap of 4 500 megawatts was exceeded and the 5 500 megawatt threshold value undershot. The Federal Network Agency has declared that a 15% degression rate shall apply from 1.1.2012. In this context, the tariff rates shown in Table 3g shall apply as a result from 1.1.2012. Depending on the growth in photovoltaics, the tariff rates shall be updated on 1.7.2012 pursuant to the double cap, where applicable.

<b>Degression for radiant solar energy under the EEG 2012 "flexible cap"</b>
<b>Rooftop systems, ground-mounted systems and own consumption tariff</b>
<p>The degression for electricity from solar system changes depending on the new output installed each year in Germany (market volume). The basic degression rate is 9%. However, depending on installed output the previous year, degression may be higher or lower.</p> <p>If installed capacity on 30.09 of the respective preceding year is within between 2500 and 3500 Megawatts that of the previous twelve months, degression will not change from 9% at the end of the year. If the reported installed capacity in this period exceeds 3,500 MW, 4,500 MW, 5,500 MW, 6,500 MW or 7,500 degression rises accordingly by 3, 6, 9, 12 or 15 percentage points respectively.</p> <p>It drops by 2.5, 5 or 7.5 percentage points respectively, in the event of falling 2,500 MW, 2,000 MW or 1,500 MW short. Degression is calculated from the tariff rate applicable on 1 January of the year.</p> <p>From 2012, tariffs may also fall on 1 July of a given year: tariff rates drop 3, 6, 9, 12 or 15 percentage points if installed capacity of systems registered after 30 September of the preceding year and before 1 May of the respective year (multiply by 12 and divide by 7) exceed 3,500 MW, 4,500 MW, 5,500 MW, 6,500 MW or 7,500 MW. This reduction is also calculated from the tariff rate applicable on 1 January of the year.</p> <p>Information on the respective applicable tariff rates is provided by the Federal Network Agency (BNetzA).</p>

### **Tariff payments, differential costs and EEG apportionment:**

At the same time as the amount of electricity covered by the EEG is growing, so too are the related tariff payments. In 2009, they accounted for EUR 10.8 billion in total according to the EEG year-end settlement and EUR 13.2 billion in 2010 (saved network charges disregarded). The resulting EEG average tariff was 13.9 Cent/kWh in 2009 and, in particular due to the development of photovoltaics and biomass systems attracting higher tariffs, 15.9 Cent/kWh in 2010.

The costs arising from renewable energy support are transferred as an EEG apportionment to electricity customers as part of the price of electricity. In so doing, the aforementioned tariff payments are intended to minimise the price of electricity produced from renewable sources. Based on forecasts of the transmission system operators (TSOs), who are in charge of marketing the EEG electricity, 2010 saw an EEG apportionment increase of 2.05 cents/kWh. In retrospect, this value has proved to be somewhat too low. After analysis of the EEG year-end statement, the calculated EEG apportionment for 2010 was roughly 2.3 cent/kWh. Taking into account that they needed to make good their underestimate, the TSOs determined the EEG apportionment for 2011 at 3.53 cent/kWh. The EEG Amendment 2011 will for the first time allow TSOs the option of having a liquidity reserve of up to 10% of the apportionment amount. To determine the 2012 EEG apportionment, this liquidity reserve was set at 3% of the apportionment amount. In doing so, the EEG apportionment for 2012 has increased slightly on 2011 levels (3.59 cent/kWh).

Nearly 600 particularly electricity-intensive companies in the manufacturing sector and the railways have benefitted in 2011 from the Special Compensation Scheme in the EEG, largely exempting them from apportionment of costs.

The merit order effect can be seen through the increasing production from renewable energy sources. It describes the influence that the priority feeding in of electricity from renewable sources, in particular from wind power, has on wholesale prices. Demand for conventional electricity falls and the stock market price drops, which

electricity consumers can also benefit from. According to studies for the BMU, the price-dampening effect caused by electricity production supported by the EEG in 2010 was roughly 0.5 cent/kWh or - in relation to the total amount of electricity traded on the spot market – just short of EUR 3 billion.

### **3.0.3. Renewable Energies Heat Act (EEWärmeG)**

Based on the EAG EE, the Act for the promotion of renewable energy sources in the heating sector (Renewable Energies Heat Act (EEWärmeG)) was amended through the amendments to the EAG EE in accordance with the German Parliament's decision of 24 February 2011 (see 3.0.1 and Annex 1).

The EEWärmeG, which first came into force in 2009, has also been the subject of an evaluation concluding by the end of 2011 ("Progress report"), in accordance with Section 18 of the Act. The progress report analyses the state of play of market introduction of plants producing heating and cooling from renewables. It also looks at the most important compensating measures with regard to achieving the purpose and objective under Section 1 of the EEWärmeG, the technical developments, cost developments and the cost effectiveness of these systems, the amounts of oil and natural gas saved, the reduced emissions of greenhouse gases and how this Act has been executed. It also outlines proposals for further development of the Act.

### **3.0.4. Market incentive programme for renewable energy use in the heat market (MAP)**

For over a decade, the market incentive programme (MAP) has been the Federal Government's cornerstone instrument in promoting the use of renewables in the heating sector. In 2010, EUR 235 million was disbursed for renewable energy investment for heat production in the form of 145,891 grants primarily to private individuals, along with EUR 72 million in redemption loans and interest subsidies to commercial and municipal investors. The volume of investment this triggered reached EUR 2.15 billion.

As part of the ongoing efforts to adapt to market developments, the Directive was amended on 15.3.2011 as follows.

#### **I. Solar collectors:**

1. (Limited) increase in the basic subsidy for solar collectors for combined hot water and space heating to EUR 120/sqm (m<sup>2</sup>) until 30 December 2011, when the subsidy reverts to EUR 90/m<sup>2</sup>.
2. The previously limited-term boiler scrappage bonus (bonus for additionally exchanging an old non-condensing boiler for a new condensing boiler) has been extended with no end date, although it has been made degressive. The bonus is worth EUR 600 (previously EUR 400) up to 30 December 2011, from then on EUR 500.
3. The combination bonus for solar thermal plus heat pump or solar thermal plus biomass is also worth EUR 600 (previously EUR 500) until 30 December 2011, from then on EUR 500.

#### **II. Biomass boilers:**

1. Re-introduction of support for low-emission pellet wood gasification boilers. To qualify for support, these boilers must feature a particularly low particle emission value of 15 milligrams per cubic metre (mg/m<sup>3</sup>) maximum (previously 50 mg/m<sup>3</sup>). This value follows the emissions threshold value applicable from 2017 under Phase 2 of the 1stBImSchV (Federal Emission Control Act). Support is worth a flat-rate EUR 1000.
2. All previous support for pellet ovens with water chamber, pellet boilers (also combination boilers) and wood chip furnaces remain unchanged.

### **III. Heat pumps:**

1. The technical requirements for support have been revised. The required seasonal performance co-efficient has been reduced.
2. Support for heat pumps has now been adapted to another measurement unit (instead of living area as before, now on heat output). The level of support remains essentially the same as before.

### **IV. KfW subsidies:**

1. Large heat pumps have now been included in the KfW subsidy scheme.
2. Support for biogas pipelines now discontinued.
3. Continuation of the support that expired at the end of 2010 for small biogas processing plants.

### **3.0.5. KfW promotional programmes for Energy-Efficient Construction and Renovation**

Investment incentives have increased through constant improvements to programme content and streamlining of programme components. On 1.7.2010, adapted to the EnEV 2009, inter alia.

The important changes are as follows:

- funding discontinued for KfW “Efficient House” 130 (renovation) and KfW “Efficient House” 85 (new builds),
- introduction of new demanding support standards for “Efficient House” 40 and 55 for new builds and 55 for renovation,
- stricter standards for individual renovation measures.

### **3.0.6. Energy Saving Regulation (EnEV)**

The Amendment of the Energy Saving Regulation (EnEV) 2012 introduces the “climate-neutral building” standard for all new buildings by 2020, based on primary energy ratings. The according renovation road map for existing buildings will start in 2020, leading in stages to the target of an 80% reduction in primary energy demand by 2050. The applicable efficiency principle shall be respected in this process.

The following grouped themes require implementation:

- introduction of the lowest-energy buildings by 31.12.2020 for all new builds (2 years earlier for buildings occupied by public authorities);
- extension of mandatory displaying of energy certificates (in particular extension to certain private and smaller buildings used by public authorities and visited in number by the general public;
- the guideline that in future real estate advertisements in the commercial media for buildings or dwellings for sale or to rent must provide an energy rating, where an energy certificate is available, along with
- the introduction of an independent control system for energy certificates.

### **3.0.7. Federal Building Code (BauGB)**

The Federal Government wishes to strengthen climate protection and brownfield development further in planning law. The Federal Government's Energy Concept of 28 September 2010 stipulates that for the development of onshore wind power, planning and building regulations need to be created where necessary and appropriate to safeguard repowering, i.e. the replacement of old wind turbines with new ones.

The Act on the Promotion of Climate Protection in Town and Municipal Development of 22 July 2011 came into force on 30 July 2011. In article 1, it lays down the amendment to the Federal Building Code, in particular:

- inclusion of a climate protection clause,
- construction of renewable energy systems encouraged outdoors (Section 35 BauGB):
  - adjustment of the threshold value for privileged biogas plants,
  - privileged admissibility for plants using radiant solar energy on permissibly used buildings.
- protection under planning law for sustainable measures on existing buildings for energy-saving purposes (cf. Section 248 new),
- special arrangements to cover wind energy, particularly for repowering (cf. Section 249 new).

The second part of the planning law amendment focussing on increasing brownfield development and adapting Building Regulations will be implemented subsequently.

### **3.0.8. Grid Expansion Acceleration Act (NABEG)**

The objective of the Grid Expansion Acceleration Act (NABEG) (see also point 2.b.3.) is to speed up the approval procedure – over and above the existing Power Grid Expansion Act.

#### **Federal technical planning and federal grid plan:**

Due to the significance of developing the grid for the entire country, the piecemeal nature of the approval procedure needs to be eliminated. A standardised approval procedure is required nationally. This would simplify procedures and cut unnecessary red tape. **Federal technical planning** will be introduced in the future.

This is conducted by the Federal Network Agency in consultation with the states concerned. The federal technical planning process will result in the **federal grid plan**. It establishes the infrastructure corridors required nationally and reserves them for the construction of maximum voltage power lines. The general public shall be involved at an early stage.

**More participation and transparency:**

A financial balancing mechanism has been created to offset adverse effects that municipalities have to agree to for line expansion in the public interest. The compensation comes in addition to enhanced participation rights for citizens in relation to grid operators' grid development plans. In addition, a Federal Government information campaign involving grid operators and environmental associations shall promote communication and transparency in grid expansion.

**Grid expansion for offshore wind power:**

Rapid and cost-efficient connection of offshore wind farms helps drive the expansion of offshore wind energy. Joint grid access for offshore windfarms is enshrined in law. Additionally, an offshore masterplan shall ensure optimal coordination of offshore expansion.

**Electricity connections:**

Progress on European grid expansion needs to be pushed forward so that electricity trading can function. Clear legal framework conditions shall be laid down for the construction of cross-border powerlines. This is especially true with regard to costs and conditions for connecting to the transmission network. This provides incentives for internal electricity market integration – to the benefit of consumers.

**Cutting red tape by easing the burden on the planning authorities:**

The burden on authorities will be eased in bureaucratic and formalised procedures. Following the example of the Federal Building Code, authorities will be able to engage private project managers for formalised procedures. This will free up the authorities to work on core tasks.

**Simplified approval procedure:**

Different approval formats will be simplified. Standardised approval procedures will be created for 110kV overhead lines and underground cable. This will speed up completion of the approval procedure.

**3.0.9. Energy Management Act (EnWG)**

The Act reforming energy management provisions of 28 July 2011, which was announced on 4 August 2011 in the German Federal Law Gazette, amended the EnWG on 5 August 2011.

This amendment of the Energy Management Act (EnWG) above all implements the guidelines created in European Union law through the third internal energy market

package (consisting of Directives 2009/72/EC and 2009/73/EC and Regulations (EC) Nos 714/2009, 715/2009 and 713/2009). The changes cover above all the ongoing decoupling of transmission, supply and distribution supply operators (in particular the decoupling of transmission system operators and storage system operators as well as separate branding for distribution supply operators), reform of the so-called object grids (now called closed distribution grids), regulation of gas storage plants and introduce further consumer protection rights and independence of the regulatory bodies.

Financial incentives for interruptible loads in distribution grids will be created as an aspect of “smart grids”. In this way suppliers and end consumers will be charged a reduced grid fee for fully interruptible consumer equipment including electric vehicles. The reduced grid fee will be specified in a legal regulation.

Electricity distribution system operators with more than 10,000 clients shall present a report on the state of the grid and grid expansion plans at the request of the regulator. Operators of high-voltage grids (110 kV) shall issue a report each year on the state of the grid and the effects of development of renewables and, where necessary, grid development plans.

Electricity distribution system operators are obliged to provide support for measures by transmission network operators (or larger electricity distribution system operators), when required to maintain grid security at the least expense possible.

Energy supply companies are obliged to publish their generation mix on bills for the end consumer, in marketing material targeted at the latter and on their sales websites. They shall draw a comparison with the average German electricity mix and supplement this with information on the environmental impacts (CO<sub>2</sub> emissions, radioactive waste) (electricity disclosure). Data on the amounts of electricity that the electricity disclosure is based on shall be reported to the Federal Network Agency on a yearly basis.

Storage plants built between 31 December 2008 and 4 August 2026 are exempt from grid fees for 20 years from the date they start operating. This applies to storage plants that store electricity taken from the general supply grid and then feed it back into the grid at a later date, and for plants producing hydrogen through water electrolysis. If pump or turbine output increases after 4 August 2011 by at least 15% and the storable amount of energy by at least 5%, existing pumped-storage power plants shall be exempted from grid fees for 10 years.

With regard to the **50.2 Hz problem** (danger of a large-scale blackout through PV systems automatically powering down if the grid frequency rises to 50.2 Hz), the power to issue statutory ordinances has been incorporated in EnWG Section 12 (3) (a). Existing production facilities shall be upgraded.

### **3.0.10. Biofuel Quota Act (Biokraft-NachV) and taxes on biofuels**

Biofuels used in transport from 1 January 2011 have to meet the sustainability requirements under the biofuel sustainability regulation (Biokraft-NachV), as already stated in the NREAP.

Since January 2007, the biofuel quota act has defined a minimum percentage of biofuels for use in Germany in transport. An overall share of 6.25% of energy has applied since 2010. From 2015, this quota will be changed to a minimum contribution

to be provided by biofuels towards greenhouse gas reduction for fuels, which will rise to 7% by 2020. Pure biofuels and biomethane can also be counted towards the biofuel quota.

Furthermore, the energy tax act provides for a limited tax incentive for pure biodiesel and pure vegetable oil outside the biofuel quota.

### **3.0.11. Miscellaneous measures for the promotion of renewable energies initial and further training:**

Section 16a of the EEWärmeG stipulates that Craft Chambers have the option of issuing regulations for further training examinations under Annex IV of the Act and Section 42a of the Crafts Ordinance (Handwerksordnung).

### **Approval, certification and authorization procedures:**

In Germany, approval for renewable energy-based systems (RES systems) is governed partly by the Emissions Control Act and in part solely in accordance with planning and building laws. The following changes have been made to the Federal Emissions Control Act (BImSchG) in relation to the NREAP:

- Amendment of 21 July 2011:
  - The duties of operators of plants requiring approval have been adapted to fit the new version of the Greenhouse Gas Emissions Trading Act (TEHG).
- Amendment of 1 March 2011:
  - The Federal Emissions Control Act (BImSchG) has been re-worded by means of the amendment to the Energy Tax and Electricity Tax Act to fit the newly-drafted 10th Federal Emissions Control Regulation (BImSchV). Furthermore, inter alia, new criteria were defined to class bioethanol as a biofuel.
- Amendment of 26 November 2010:
  - The ninth Act amending the Federal Emissions Control Act established the legal basis for the revised 10th BImSchV (Regulation on Fuel Consistency and Quality).

### **National electromobility and energy research platform:**

In addition to the information provided on renewables in the NREAP, the Federal Ministry of Economics and Technology (BMWt), together with the Federal Ministry of Transport, Building and Urban Development (BMVBS) have operated a joint Electromobility office (GGEMO), which acts as the Federal Government's one-stop shop for industry and science and pools all activities in this area. The National Electromobility Platform (NPE) was set up at high-level talks between the Federal

Government and industry, the scientific sector and other players on 3 May 2010 and a Joint Statement was adopted. Representatives from industry, science and politics work closely together in the NPE. Tangible steps are being worked on towards achieving two goals. Initially, the idea is to develop a leading electromobility market in Germany with at least one million vehicles by 2020. At the same time Germany shall evolve to become the leading electromobility provider. The goal is for Germany to maintain its position at the top of the global rankings for exports in electromobility as well.

The NPE is made up of a steering committee and seven work groups with roughly 20 members each. The NPE delivered its first progress report in November 2010. This progress report contains an inventory of electromobility developments in Germany thus far.

The NPE published its second report in mid-May 2011. It illustrates the opportunities for "Germany PLC" in the electromobility field and highlights the efforts that need to be undertaken in its view for Germany to become both leading market and provider. Furthermore, provided that all the players push electromobility forward together in Germany, NPE data shows that there is the potential to create some 30,000 extra jobs through electromobility by 2020.

The Federal Government presented its Government Electromobility Programme on 18 May. It included the goals to be achieved by the end of the legislative period. The Government Programme can also be read as a response to the NPE report.

### **Storage offensive:**

Development of storage capacity is being driven forward through a storage offensive (exempting storage from grid fees, inter-agency storage research programme incl. demonstration systems). In this context, research is also ongoing on future storage needs, appropriate framework conditions and implementation problems for conventional and new storage technologies (e.g. pumped-storage power plants).

No relevant changes have been made yet since the NREAP was produced to the additional measures that are listed in the NREAP under 4.2. for which no information is provided in the progress report or related sub-points.

### **3.1. Please provide the information on how supported electricity is allocated to final customers (for the purposes of Article 3 (6) of Directive 2003/54/EC)**

*(Article 22 (1) (b) of Directive 2009/28/EC)*

Electricity from renewables subsidised by the secure feed-in tariffs of the EEG is marketed on the electricity stock exchange by the transmission system operators and the difference between the proceeds from the sale and the tariff and premia payments is refunded. The total expenses are apportioned among the end consumers, whereas electricity that is auto-produced and consumed on the spot is fully exempted. Moreover, companies in the manufacturing sector and the railway sector that use a great deal of energy are largely exempted from this apportionment.

Electricity suppliers indicate the proportion of electricity from renewable energy in terms of overall energy consumption on end consumers' bills. Section 54 of the EEG has been amended to this end.

Under the Energy Management Act (EnWG) of 7 July 2005 (BGBl. I S. 1970, 3621), which was recently amended by Article 2 of the Act of 28 July 2011 (BGBl. I S. 1690), electricity supply companies must provide information on bills, advertising material and on the company website under Section 42 regarding the electricity mix and further information on the environmental impacts (implementing Article (3) (6) of Directive 2003/54/EC).

**4. Please provide information on how, where applicable, the support schemes have been structured to take into account renewable energy source applications that give additional benefits, but may also have higher costs (e.g. biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material)**

*(Article 22 (1) (b) of Directive 2009/28/EC)*

**4.1. EEG provisions**

The EEG contains additional provisions in the tariff rates that promote the use of renewable energy technologies in particular. In addition to tiered tariff rates, the introduction of a proportional remuneration input payment (i.e. the ability to mix input payment classes) also helps when it comes to the payment of electricity from biomass in order to promote the use of environmentally beneficial substrates, such as liquid manure and landscape conservation materials. For example, a bonus will be granted post-2011 for upgrading biogas to natural gas quality.

In addition, small wind systems up to and including 50 kW are exempted from the reference yield calculation obligation foreseen for calculating the initial tariff period. A 60% reference yield shall be generally assumed for small wind systems so that these systems can claim the higher initial tariff for the entire tariff payment period.

Moreover, the use of heat from biomass plants in Section 27 will now be mandatory (so far largely only promoted by a bonus scheme). At least 25% of the electricity generated in the plant in the first calendar year and thereafter at least 60% in each calendar year must be generated in the form of combined heat and power in accordance with Appendix 2 of the Act in order to receive remuneration under the EEG. Here, in the case of electricity generation from biogas, 25 percent of the heat from the electricity generated through combined heat and power to heat the digester will be credited. As an alternative to the heat recovery scheme, biogas plants may provide evidence that they use 60% liquid manure; the heat recovery requirement does not apply when electricity from biomass is marketed directly (e.g. using market premium).

Under Appendix 2 of the EEG in force from 2012, combined heat and power use means electricity generated in the form of combined heat and power which replaces the use of proven fossil fuels for heat, using a comparable amount of equivalent energy to that which would be used to generate heat from fossil fuels (to be verified by reports). Alternatively, evidence of heat recovery in one of the recognised forms

on the positive list in Annex 2 of the EEG shall be sufficient. Non-eligible uses are clarified in a negative list.

## **4.2. Combined heat and power generation**

In addition to the EEG arrangements on heat recovery (cf. previous point) and those in the MAP programme (see point below), the Combined Heat and Power Generation Act (KWKG) (Combined Heat and Power Generation Act of 19 March 2002, as last amended in 2011) promotes combined heat and power generation (CHP) systems by means of pay-as-you-go fixed-term bonuses on the market electricity price. The political goal is to increase the share of electricity generated from combined heat and power to 25% of electricity generated in Germany by 2020.

The KWKG was amended by the Act on reorganisation of provisions on the energy industry of 28.07.2011. One significant change is that operators of CHP plants wishing to receive a bonus under the KWKG are now accorded a longer period of time to commission their plants. This period has been extended from 31.12.2016 to 31.12.2020. Furthermore, the previous double cap for systems of more than 50 kW electrical output has been removed. Hitherto, this cap stipulated that the CHP bonus was limited to 6 years or 4 years in the manufacturing sector. The second cap refers to full utilisation hours. The figure was set at 30,000 hours. The amendment to the Act means that only the full utilisation hours limit applies now. The new arrangement gives plant operators the ability to organise the mode of operation of CHP plants more flexibly and thus be able to contribute better towards system integration of fluctuating renewable energies without having to lose out on any bonus payments under the KWKG.

The statutory interim report for 2011 ascertained that the proportion of electricity from combined heat and power generation is currently approximately 15% and that this amount would rise to 20% by 2020 if the promotion scheme remained unchanged. In order to make a contribution towards achieving the 25% objective, the Federal Government passed a further amendment to the KWKG on 14 December 2011 that will be adopted under parliamentary process in the first semester of 2012. In particular, the amendment shall mean a moderate increase in the bonus payable for systems liable for emissions trading that commence operating from 2013. In addition, a new inclusion is support for retro-fitting condensing power plants and respective industrial facilities. Support for modernisation of CHP plants will be made easier. Investment support for district heating grids has been expanded and the possibility of support for heat storage and cooling networks fed by CHP plants and storage extended. The option of lump-sum bonus payments has been created for very small CHP systems and fuel cells of up to 2 Kilowatts.

CHP plants are supported under the Market Incentive Programme (KfW Renewable Energies Programme) provided:

- they are biomass plants for combined heat and power generation (CHP) of up to 2 000 kW rated output, provided they are strictly heat-operated. Support is granted to compensate for optimising operation for heat recovery.
- with deep geothermal systems for heating, to generate power or for combined heat and power generation (CHP). Additional expenditure incurred for deep

drilling with special technical drilling risks is eligible. Furthermore, the exploration risk can be covered in part.

#### **4.3. Amendment of the Biomass Regulation**

The Regulation on the Production of Electricity from Biomass (Biomass regulation – BiomasseV) has been in force since 21.06.2001. It will be amended through the German Parliament's decision of 30 June 2011 on 1 January 2012. New arrangements will be set out for support for biomass as recognised under the EEG. The Biomass regulation also legislates on which materials shall be classed as eligible biomass under the EEG in the future in terms of support, for which materials an extra input-related payment can be claimed, which energy reference values are to be used to calculate tariff payments and how the input-related payment is to be computed. The Biomass regulation also governs which technical procedures come under the scope of the Act and which environmental requirements need to be respected.

The objective behind the new amendments to the Regulation was to legislate on the latest developments in application of the EEG for bio-energy crops.

#### **4.4. Amendment of the 36th Ordinance on Execution of the Federal Emission Control Act**

In addition, the 36<sup>th</sup> Ordinance on Execution of the Federal Emission Control Act Ordinance on Execution of the Federal Emission Control Act BImSchV, of 29 January 2007, as amended by Article 1 of the Ordinance of 17 June 2011) stipulates that biofuels manufactured from the following materials shall have double the weighting in the biofuels quota:

- Waste to which the provisions of the German Waste Management and Product Recycling Act apply
- Residues (crude glycerine, tall oil pitch, liquid manure, dung and straw)
- cellulosic non-food material or
- lingo-cellulosic material

#### **4.5. Particularly-eligible biofuels under the Energy Tax Act**

Synthetic hydrocarbons or synthetic hydrocarbon compounds obtained through thermo-chemical conversion of biomass – so-called BtL fuels - and alcohol obtained from biotechnological processes for the disassociation of cellulose are fuel types that receive special support. In addition to counting against the biofuels quota, they are also fully exempt from the energy tax until 2015. The exemption also applies when incorporated with fossil fuels in proportion to the biofuel amount.

#### **4.6. Flanking measures**

Support is also provided for the aforementioned materials through what are known as “flanking measures”, such as investment support for individual systems, know-how support (studies, knowledge transfer). By way of example of investment support schemes, there are individual system support schemes (“flagship projects”), regional

support (e.g. bioenergy villages) right up to large amounts of support for research topics (BTL, wood gasification).

**5. Please provide information on the functioning of the system of guarantees of origin for electricity and heating and cooling from renewable energy sources, and the measures taken to ensure reliability and protection against fraud of the system**

*(Article 22 (1) (d) of Directive 2009/28/EC)*

The Renewable Energies European Law Adaptation Act and the related guarantees of origin arising from this act implement the provisions of Directive 2009/28/EC and regulate trading of guarantees of origin. As a result, Section 55 of the Renewable Energies Act has been amended. This stipulates that the Federal Environment Agency is the central government agency that issues, cancels, transfers and recognises foreign guarantees of origin upon request. To this end, an electronic database needs to be set up at the Federal Environment Agency, where recognition, transfer and cancellation of guarantees of origin have to be registered. The certificate of origin register is currently under construction along these lines at the Federal Environment Agency. Guarantees of origin shall only be traded after first having been registered on this database, i.e. issuing, recognition and cancellation of guarantees of origin are registered in the database. The Federal Environment Agency shall be responsible for control of the data. An electronic control system shall ensure system reliability. In addition, the Energy Management Act stipulates that the Federal Environment Agency shall receive access to electricity suppliers' data on electricity disclosure so that the Federal Environment Agency can compare the electricity disclosure with already-issued and cancelled guarantees of origin and thereby be able to check the trade in guarantees of origin for fraud and abuse.

As regards the heating/cooling sector, Germany has not made use of the option provided for in Article 15 (2) (ii) of Directive 2009/28/EC which also allows for the issuing of guarantees of origin for heating and cooling from renewable energy sources.

**6. Please describe the developments in the preceding 2 years in the availability and use of biomass resources for energy purposes**

*(Article 22 (1) (g) of Directive 2009/28/EC)*

There has been no substantial change to the availability of biomass in Germany in 2009 and 2010 in comparison to the detailed information provided in the NREAP for 2006 and 2007. Given this, the recommended use of Table 4 as given in the progress report template has been dispensed with. In its place, the most significant recent changes in the availability of biomass are examined.

The available agricultural crops used directly for electricity generation have increased due to the marked increase in land area. This is primarily the result of the increase in the area under cultivation for biogas substrates, in particular maize. There was no growth worth noting in the area under cultivation with oilseed. The total production quantities of arable crops to generate energy (cereals, oilseed, sugar

beet, silage maize and others) reached roughly 32 million tonnes (FM) for 2010. Palm oil imports also increased significantly in comparison to 2006 to 2.5 million tonnes per year. However, due to the rising price, increasingly less palm oil is used for power and heat generation.

The areas under cultivation with short-rotation trees and other energy crops have increased slightly since 2006, providing approximately 52,000 t in 2010. Cultivation of short-rotation tree and grass species continues to serve research purposes primarily. The availability of agricultural by-products (straw and animal excrement) has also risen slightly and accounted for 162 million tonnes in 2010. The production of animal fats and other by-products can be seen as constant.

Wood biomass from forests and other areas for direct use for generating energy increased marginally in comparison to the reference year 2006 and totalled 29.75 million cubic metres in 2010. The amount of residual matter from timber logging has increased in accordance to the percentual increase in felling. The production of waste matter from landscape management has remained constant.

Table 4a: Agricultural land used for domestic energy plant cultivation (ha) (sources: FNR 2010; Bund-Länder-AG NawaRo)

Land use	Land area (ha)	
	2009	2010
1. Land used for common arable crops (wheat, sugar beet etc.) and oilseeds (rapeseed, sunflower etc.) (Please specify main types)	<b>1,698,000</b>	<b>1,830,000</b>
2. Land used for short-rotation trees (willow, poplar) (please indicate main species)	<b>2,300</b>	<b>3,600</b>
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum. (Please specify main types)	<b>1,800</b>	<b>2,100</b>

**7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding 2 years associated with increased use of biomass and other forms of energy from renewable sources. Please provide where available references to relevant documentation on these impacts in your country**

*(Article 22 (1) (h) of Directive 2009/28/EC)*

**7.1. Land use for renewable energies**

Land use for renewable energies primarily concerns bioenergy and, to a markedly lesser extent, wind power and photovoltaic energy. Due to the low number of geothermal and hydroelectric plants and slow growth thereof, these energy forms can be ignored in this point.

Therefore, bioenergy is examined in detail as follows and photovoltaics are used as an example of developments with regard to the use of ground-mounted systems.

## **Bioenergy:**

According to the German Agency for Renewable Resources (FNR 2011), the total land area used for energy generation from biomass reached 1.83 million hectares (ha) in 2010 and 1.97 million ha in 2011, which corresponds to approximately 12% of land used for agricultural purposes in Germany in 2010 (there are 16.9 million ha of agricultural land in total in Germany and, according to the FNR, 12 million ha of arable land). Inter alia, cultivation of plants for biogas production - including maize in particular - grew from 500,000 ha to 650,000 ha between 2008 and 2010. Well over a quarter of the area planted with maize is used for energy in Germany at the present time.

**Land use** for the production of biofuels and bioliquids dropped slightly between 2009 and 2011 (from 1.168 million ha to 1.160 million ha) (FNR 2010a, 2011):

- for bioethanol:
  - 2009: 226,000 ha
  - 2010: 240,000 ha
  - 2011: 250,000 ha (current estimate)
- for biodiesel/vegetable oil:
  - 2009: 942,000 ha
  - 2010: 940,000 ha
  - 2011: 910,000 ha (current estimate)

## **Changes in land use**

Essentially, the same environmental requirements apply to production of biomass for energy and material re-use as for food and feed production. The increase in land use for bioenergy production is primarily tied to the growth in biogas systems (biofuels production has largely remained constant; cultivation of fast-growing timber has thus far only required a very small area of land). With the growth in biogas use, many regions in Germany are witnessing large-scale maize cultivation, often in monoculture (problem of monoculture of maize). Due to the increasing need for biomass for energy use, the quality of permanent pastures in Germany may, on the one hand, be adversely affected through intensive use, and, on the other, due to the loss of partly valuable land through conversion of pasture land. According to assessment using integrated administration and control system (IACS) data, roughly half the converted land is used for maize cultivation.

The greater concurrent competition for land between food, feed and energy crop production due to biogas generation is not always just a local phenomenon, even if the catchment radius of biogas power plants for the production of silage and other substrates that are used in such facilities is rarely more than 10 km. Accordingly, statements about Germany as a whole are rather unspecific, as is presented in the EEG monitoring on biomass:

An increasing loss of permanent pasture has been noted in relation to the evolution of agricultural prices and scarcity of land, and also due to the relocation and concentration of livestock rearing. Increasing cultivation of energy crops and in particular the increasing cultivation of maize is also impacting on land scarcity in stock rearing regions (particularly in MV, NI and SH), where a trend towards conversion of pasture is particularly noticeable in these regions.

Permanent pasture currently accounts for 29% of agricultural land in Germany, i.e. 4,783,853 ha in total, which, on average, is a drop of 4% on 2009 levels. Some federal states (Baden-Württemberg, Mecklenburg-Western Pomerania, Lower Saxony, North Rhine -Westphalia and Schleswig-Holstein) have therefore adopted bans on conversion of permanent pasture in their own statutory instruments (BMU 2011c et al.).

By the same token, there are many individual voices from different regions linking the growth of biogas plants to increased rental prices and conversion of permanent pasture. Chapter 9 refers to the environmental impacts.

A brief description of the situation in Schleswig-Holstein offers a snapshot of the changes to land use. In 2010, roughly 100 new biogas plants were built there (making a total of 400). At the same time, the area planted with maize increased by 30,000 ha to 180,000 ha and the amount of pasture fell. The proportion of land planted with maize as part of total arable land increased to 27% in Schleswig-Holstein, and over 50% on a regional basis (LAWA 2011).

In order to safeguard against excessive maize cultivation, measures were introduced in the new EEG 2012 to limit the use of biogas, such as restricting the use of maize and corn to 60% (mass-related).

### **Photovoltaics:**

In 2008, 1,700 ha were used for ground-mounted photovoltaic systems and 5,800 ha of building surfaces for photovoltaics and solar thermal energy. At the end of 2010, the land requirements for ground-mounted systems reached 7,483 ha, of which 5,101 were on arable land and 2,382 on land for redevelopment, sealed land and other surfaces (BMU 2011d).

## **7.2. Price developments**

The following subchapters are limited to price developments in commodity prices for bioenergy.

### **7.2.1 Biomass**

#### **Solid biomass:**

Due to strong demand, prices for timber have risen in recent years. The main reason for the price increases for raw timber is the markedly improved economic situation. This also applies to the economic sectors that are important consumers of semi finished goods and prematerials produced from raw timber, for instance furniture manufacturers, paper, cardboard and paperboard manufacturing and the building industry. An additional reason is the increasing demand for wood for energy (BMU 2011c).

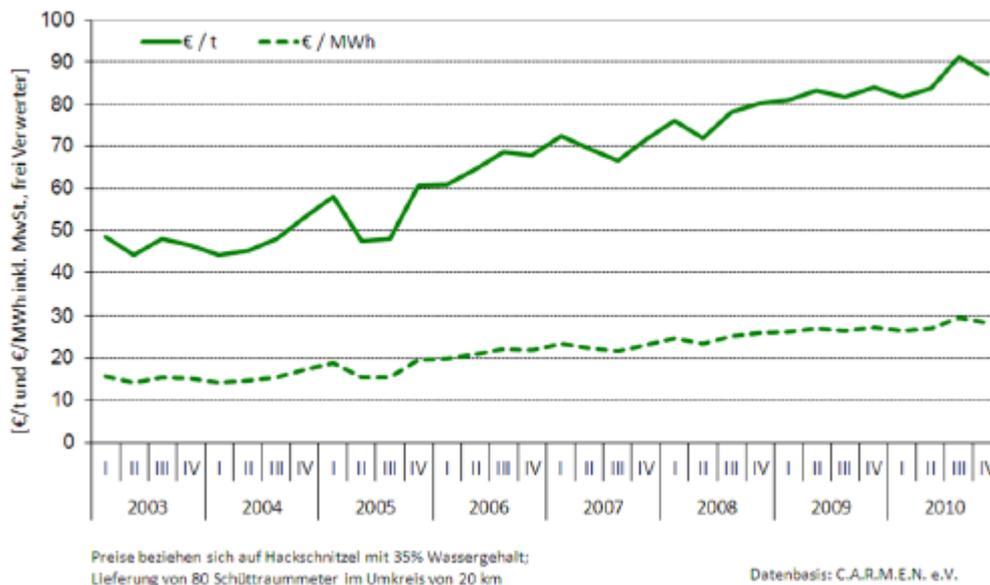
Timber is traded both regionally and internationally. Timber prices differ from region to region in Germany. Put in an international context, demand for solid fuels has risen sharply. Stronger competition is also expected in the future for solid fuels.



**Key to graphic**

(y axis: €/t and €/MWh incl. VAT, below x axis: EUWID database)

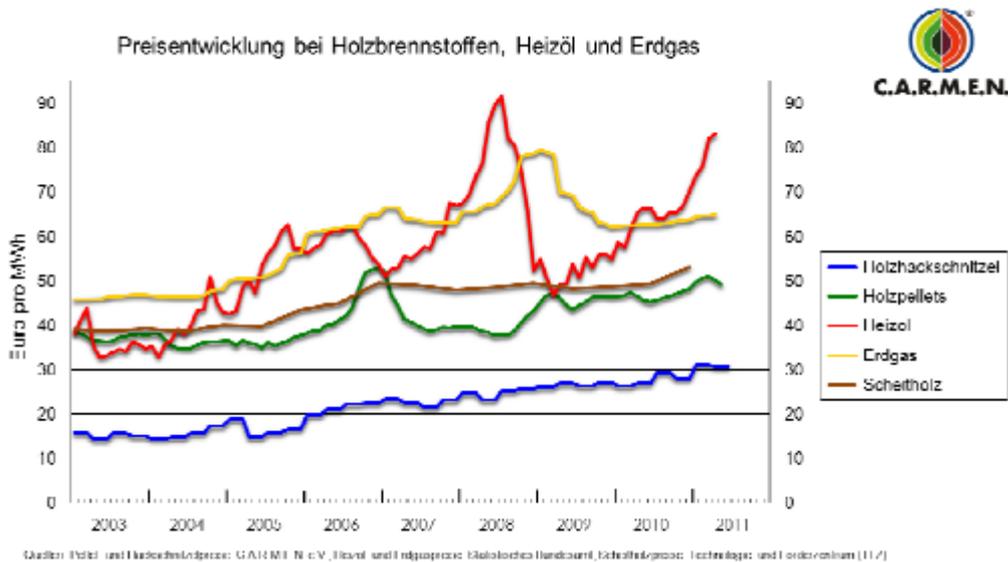
**Figure 2: Price development of average prices of waste wood lines (Source: BMU 2011c)**



**Key to graphic**

(y axis: €/t and €/MWh incl. VAT, free user, x axis: prices refer to wood chips with 35% water content; delivery of 80 loose cubic metres within a radius of 20 km  
Database: C.A.R.M.E.N, e.V.)

**Figure 3: Price development of average prices of wood chips from forest wood (Source: BMU 2011c)**



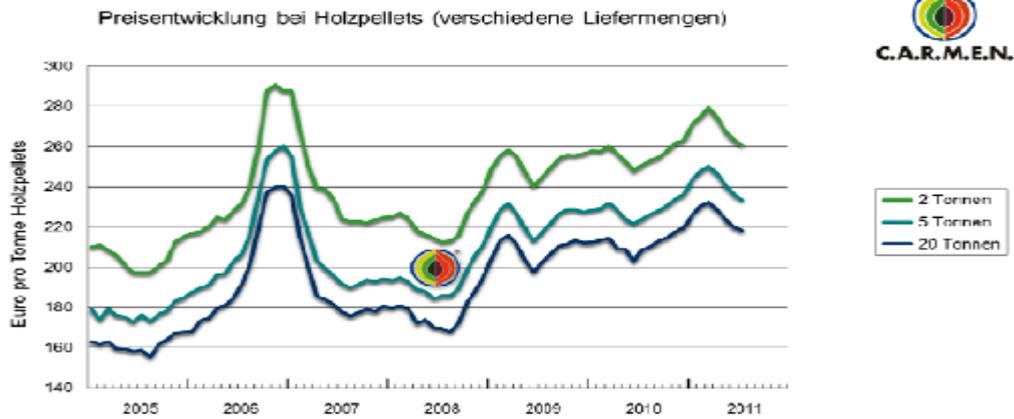
**Key to graphic**

(Title: price development for wood fuels, heating oil and natural gas  
 x axis: Source: Pellet and wood chip prices: C.A.R.M.E.N, e.V., heating oil and natural gas prices: Federal Office of Statistics, firewood prices: Technologie und Förderzentrum (TFZ)  
 y axis: EUR per MWh  
 blue= wood chips  
 green= wood pellets  
 green= wood pellets  
 red= heating oil  
 yellow= natural gas  
 brown= firewood

**Figure 4: Price development of average prices of wood fuels in relation to heating oil and natural gas prices (Source: C.A.R.M.E.N. 2011a)**

In addition to the regional price differences, system size plays a particularly important role in terms of procuring fuel (residual wood from forestry and landscape conservation timber). Operators of small systems (heating plants < 1 MWth) pay comparatively more for their fuel than operators of large plants (heating plants/heating power plants >1 MWth). For example, the following figure illustrates this phenomenon (price development in the average price of wood pellets).

Many stakeholders also expect prices to increase in the future for solid fuels.



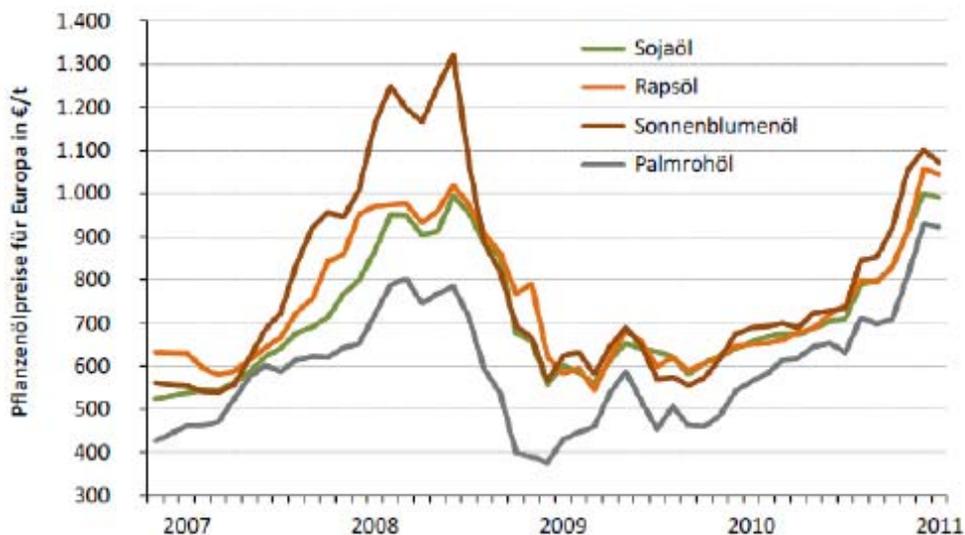
**Key to graphic**

(Title: Price development for wood pellets (varying delivery quantities))  
 (x axis: EUR per ton wood pellets.  
 Green= 2 tons  
 Light blue= 5 tons  
 Dark blue= 20 tons

**Figure 5: Price development in the average price of wood pellets (Source: C.A.R.M.E.N 2011b)**

**Liquid biomass:**

Prices for liquid biomass are subject to international market conditions. After prices peaked in 2008, the price then dropped significantly due to the global economic situation in 2009 and 2010. With the global economic situation improving, vegetable oil needs are on the up, as are prices for vegetable oil.



**Key to graphic**

(y axis: vegetable oil prices for Europe in €/t  
 Green= soy oil  
 Orange= rapeseed oil  
 Brown= sunflower oil  
 Grey= crude palm oil)

**Figure 6: Developments in vegetable oil prices 2007 – 2011 in Germany and Europe (EEG biomass monitoring, BMU 2011c)**

## **Gaseous biomass:**

Due to their high water content and therefore their bulk, prices for gaseous biomass substrates are subject to both changes in commodity prices on the global market and regional influences (transport distances on average approx. 6 km, rarely up to 25 km). They have a minor influence only on the German agricultural sector due to their high transport costs.

The use or price of cereals is defined by international trade prices alone. Both are dependent on crop yields and trade flows. The influence of bioenergy use in Germany on international trade prices for cereals is estimated as being extremely low. The growth of biogas plants has led to increased rental prices for arable land in certain regions of Germany (BMU 2011c inter alia).

### **7.2.2 Producer prices for agricultural and forestry sector products**

The index of **producer prices for agricultural products (Federal Statistical Office 2011a)** (without sales tax) was 24.9% higher in Spring 2011 than at the same time the previous year. There were marked price increases for bread wheat, bread-making quality rye, feed wheat and grain maize. However, annual producer prices are severely dominated by respective crop yields and only indirectly by competition for land. An increase in commodity prices can be detected as a long-term trend.

Prices for **forestry sector products (Federal Statistical Office 2011b)** also rose sharply over the last year. As wood is used for energy, the influence of the global economic climate (growth in the furniture and paper industries and in the building sector) is considerably greater than competition.

Comparing the producer price index for agricultural products and the increase in land with renewable raw materials (Nawaro) in Germany (very sharp increase 2004 - 2007, but relatively constant 2009 and 2010) has not established any clear correlation.

## **8. Please describe the development and share of biofuels made from wastes, residues, non-food cellulosic material, and ligno cellulosic material.**

*(Article 22 (1) (i) of Directive 2009/28/EC)*

In 2009, 43 ktoe (1.8 PJ) of biodiesel were manufactured from plant waste in Germany. Consumption in 2009 reached 17 ktoe (0.7 PJ). In 2010, production of biodiesel under Art. 21 (2) of Directive 2009/28/EC rose to 86 kt RÖE (3.6 PJ). However, consumption of this biodiesel fell to 0 ktoe. No other biofuels made from wastes, residues, non-food cellulosic material, and ligno cellulosic material were produced or consumed in noteworthy quantities in 2009 and 2010 in Germany. This placed the share of biofuels under Article 21 (2) of Directive 2009/28/EC in renewable energy sources (including RE electricity) in transport at 0.6% (2009) and 0.0% (2010).

Table 5: Biofuel production and consumption in accordance with Art. 21 (2)

<b>(ktoe) Biofuel in accordance with Art. 21 (2)<sup>51</sup></b>	<b>2009</b>	<b>2010</b>
Production - biodiesel	43	86
Consumption - biodiesel	17	0
Biofuel production in accordance with Art. 21 (2) as a whole	43	86
Biofuel consumption in accordance with Art. 21 (2) as a whole	17	0
Share of fuels under Art. 21 (2) in the renewable energy sources In transport in% <sup>52</sup>	0.6%	0.0%

**9. Please provide information on the estimated impacts of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within your country in the preceding 2 years. Please provide information on how these impacts were assessed, with references to relevant documentation.**

*(Article 22 (1) (j) of Directive 2009/28/EC)*

The main energy crops used to produce biofuels and bioliquids in Germany are rapeseed, wheat, rye and sugar beet.

The growth of renewables does involve impacts on the environment. These impacts largely depend on how the cultivation of energy biomass is organised, together with the location and how the system is managed to use, store and transfer renewable energy. The impacts should cause no other inappropriate negative impacts on the natural world and environment. For this reason, the Federal Government decided in its National Strategy on Biological Diversity (NBS, 2007) that biodiversity should not bear the cost for production and use of renewable energy. Sustainably-managed expansion of renewable energies, as promoted by the Federal Government, must therefore ensure biodiversity is maintained, safeguard the ecological balance and the landscape alongside high air quality and water and soil protection. Where possible, synergies are harnessed with environmental and nature conservation measures. Following these approaches also contributes to increasing acceptance for new technologies.

**Impacts of biofuels and bioliquids on land use**

**Land use** for the production of biofuels and bioliquids dropped slightly between 2009 and 2011 (from 1.168 million ha to 1.160 million ha) (FNR 2010a, 2011):

- for bioethanol:
  - 2009: 226,000 ha
  - 2010: 240,000 ha
  - 2011: 250,000 ha (current estimate)
- for biodiesel/vegetable oil:
  - 2009: 942,000 ha
  - 2010: 240,000 ha
  - 2011: 910,000 ha (current estimate)

<sup>51</sup> Biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material.

<sup>52</sup> Denominator includes consumption of electricity from renewable sources in transport.

What is relevant to the environment here is not only the direct amount of land, but also the low number of species of energy crops (reinforced by self-compatible energy crops with reduced crop rotation). This process, particularly with the conversion of permanent pasture (3.1% lost over the last 4 years (BfN 2010)) and more intensive cultivation, can lead to a loss in biodiversity and adversely affect the water status. The spatial distribution and size of the areas under crops and the use of fertilizers and pesticides also impacts on biodiversity and water quality. In this way, for example, crops that are cultivated later and that develop more slowly, such as maize and beet, do not provide enough food and shelter for many species of farmland bird (German Parliament 2010, 75f). Similarly, erosion-prone crops increase the risk of nutrient runoff into surface water. Residual amounts of nitrogen fertilizers in autumn increase the risk of nitrate displacement into groundwater.

The effects energy crops have on biodiversity, water resources and water and soil quality are defined by the specific ecological balance of the site and its sensitivities and the spatial characteristics of cultivation. The environmental impacts when cultivating energy crops (including possible adverse effects on water through continuing excess nitrogen inputs) are in essence the same as those of conventional agriculture.

The growth in energy crops (for use in all sectors) has forced more intensive use of arable land. From 2008 to 2010 the amount of fallow and uncultivated land – in part very valuable for biodiversity – dropped further from 310,000 ha to 250,000 ha (**Federal Statistical Office** 2011c). However, the growth in agricultural land use cannot be traced solely to increasing use of biofuels and bioliquids.

Directive 2009/28/EC established sustainability requirements for biomass for energy use. The Biomasse Power Sustainability Regulation and the Biofuel Sustainability Regulation transposed this EU directive with its framework for sustainability criteria for biofuels and bioliquids into national law.

In the interests of environmental, climate and nature protection and conservation, the cultivation of plants should not destroy any areas of special value to biodiversity or areas with a high-carbon constituent (e.g. wetlands, peat bogs). Furthermore, certain minimum requirements on keeping land in good agricultural and ecological condition have to be respected when cultivating biomass in the EU.

In terms of protecting **water resources** and water quality – apart from the minimum requirements pursuant to Article 6 (1) of Regulation (EC) No 73/2009 – the Regulations contain no further requirements. Despite the existing cross-compliance provisions under Article 6 (1) of Regulation (EC) No 73 (2009), it has not been possible to achieve the goals of the EC groundwater directive at present. The reason for this is that the share of total agricultural use for the production of biofuels and bioliquids is rising.

Cultivation of rapeseed, maize, beet, rye, etc. for energy does not in itself signify any more intensive cultivation with adverse effects on the environment in comparison with conventional arable farming. However, there has been an increase in the number of reports from the regions that pastureland with good-quality soil (and high carbon storage capacity) is being re-designated as poor-quality soil. The effect is that maize is being cultivated on what was previously permanent pasture and consequently releasing more carbon dioxide with the related negative impacts on water quality.

Maintaining **soil quality** is promoted by the Biofuel Sustainability Regulation and the Biomass Power Sustainability Regulation through incorporating soil carbon content in the greenhouse gas balance and the greenhouse gas (GHG) bonus for improvement of heavily degraded or heavily polluted land. Of note is the fact that the calculation of the GHG balance can be replaced by using standard GHG values.

Using the guidance values for crop-specific changes to the humus reserves in soil by different main crop types, it can be seen that sugar beet, causing losses of 760 kg carbon humus (humus-C) per ha\* per year, and cereals including oleaginous crops, with 280 kg humus-C losses per ha per year\*, are humus consumers (VDLUFA 2004). It is therefore very important that the rules on cross-compliance (“cross compliance” provisions) to maintain organic matter in soil on the basis of Regulation (EC) No 73/2009 are also respected in practice.

For example, a publication of the German Parliament in 2010 (S.73) provides a table on changes to the humus reserve for different crop types.

Table B: Change to humus reserves for different types of crops (Source: German Parliament 2010)

<b>Crop type</b>	<b>Change to humus reserves (In kg humus carbon per ha and year)</b>
Sugar beet	-760
Potato	-760
Corn, silage maize	-560
Cereals, sunflower	-280
Secondary crops	+80 to +200
Grain legumes	+160
Agricultural grass, legume-grass mixes in seeding year	+100 to +400
Agricultural grass, legume-grass mixes each main production year	+600

Among others, the following research projects have been conducted or started to gauge the impacts of biofuel and bioliquid production on **biodiversity**, water resources and water and soil quality over the last two years:

- Basic information for sustainable use of agricultural waste for bioenergy production (Project 03KB021 of the biomass energy use support programme). This project looked at the potential of straw on a national basis, taking into account ecological and technical economic aspects;
- Biomass crops of the future from a nature conservation point of view (2010 environmental research project of the Federal Agency for Nature Conservation);
- Report of the German Parliament’s Committee for Education, Research and Technology Assessment (18<sup>th</sup> Committee) under Section 56 of the rules of procedure. Technology assessment. Chances and challenges of new energy crops (German Parliament 2010): Growth in energy crop use and competition (for land) (also MAE-D-Scenarios), environmentally-responsible energy crop production;

- Research and Development (R&D) project: Standards for environmentally-benign production and use of renewable energies (FKZ 0325016): existing conflicts on bioenergy at large, standards, etc. (Peters 2011);
- R&D project: Effective land use for bioenergy from a nature conservation standpoint (FKZ 3508 83 0300) (BfN 2009a)

## 10. Please estimate the net greenhouse gas emission savings due to the use of energy from renewable sources

(Article 22 (1) (k) of Directive 2009/28/EC)

Table 6: Estimated greenhouse gas emission savings from the use of renewable energy (million t CO<sub>2</sub>eq) (Sources: Update to BMU 2010a by Federal Environment Agency (UBA), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) 2011b)

Environmental aspects	2009	2010
<b>Estimated total greenhouse gas emission savings from the use of renewable energy (net)<sup>53</sup></b>	<b>106</b>	<b>120</b>
- Estimated net greenhouse gas emission savings from electricity from renewable energy sources	69	75
- Estimated net greenhouse gas emission savings from heating and cooling from renewable energy sources	33	40
- Estimated net greenhouse gas emission savings from use of renewable energy sources in transport	5	5

In 2009, the use of renewable energy sources led to net greenhouse gas emission savings of 106 million tonnes CO<sub>2</sub>eq. By far the greatest amount of saved emissions came in electricity production with 69 million t CO<sub>2</sub>eq. Use of renewable energy sources to generate heating and cooling led to 33 million t CO<sub>2</sub>eq lower greenhouse gas emissions than if a fossil fuel mix had been used for heating and cooling generation. Use of biofuels reduced greenhouse gas emissions by 5 million t CO<sub>2</sub>eq in 2009.

As use of renewables in 2010 was more comprehensive than in 2009, the reduction in greenhouse gas emissions was higher. A total 75 million t CO<sub>2</sub>eq was avoided in the electricity sector, 40 million t CO<sub>2</sub>eq in the heating and cooling sector and 5 million t CO<sub>2</sub>eq in transport, giving a total of 120 million t CO<sub>2</sub>eq.<sup>54</sup>

The greenhouse gas avoidance factors for each technology that were used for calculations can be found in Table A1 in the Annex.

<sup>53</sup> The contribution of gas, electricity and hydrogen from renewable energy sources should be reported depending on the final use (electricity, heating and cooling or transport) and only be counted once towards the total estimated net GHG savings.

<sup>54</sup> To prevent distortion of the estimated GHG savings, in the case of electricity production from wind and hydroelectric power, the actual feed-in amounts were used as a basis, i.e. *without* applying the normalisation rule. Taking the normalisation rule into account, for 2009 and 2010 the figures in the electricity sector are 5 (2009) and 6 (2010) million t CO<sub>2</sub>eq higher greenhouse gas savings than indicated in Table 6.

**11. Please report on (for the preceding 2 years) and estimate (for the following years up to 2020) the excess/deficit production of energy from renewable sources compared to the indicative trajectory which could be transferred to/imported from other Member States and/or third countries. Please also comment on the estimated potential for joint projects until 2020**

*(Article 22 (1) (l) and (m) of Directive 2009/28/EC)*

Directive 2009/28/EC does not provide any figures yet for the indicative trajectory for the current 2009/2010 reporting period. Therefore no deficit or surplus can be ascertained for this period. However, at 11.3%, the RES share in Germany is already significantly above the trajectory figures until 2014 inclusive. Hence, it can be assumed that for the next 2 reporting periods (2011/2012 und 2013/2014) at the very least, Germany will achieve surpluses as regards the indicative trajectory which can be made available, where necessary, for statistical transfers and joint projects.

Table 7: Actual and estimated excess and/or deficit (-) production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States and/or third countries in [Member State] (ktoe)<sup>55,56</sup>

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual and estimated excess and/or deficit (-) production of renewable energy <sup>57</sup>			5,703	7,065	5,507	7,105	4,761	6,453	4,130	5,976		3,065

The numerical values indicated in Table 7 are identical to the figures in Table 9 of the NREAP as Germany's estimates regarding gross final energy consumption and RES energy supply have not changed from what is contained in the NREAP.

Insofar as the possibility of potential surpluses actually being used for statistical transfers or joint projects by Germany is something that would have to be clarified on a case-by-case basis.

**11.1. Please provide details of statistical transfers, joint projects and joint support scheme decision rules.**

As indicated in the National Action Plan for Renewable Energies, Germany will hit its national target of 18% energy from renewable sources in gross final energy consumption in 2020 by means of national measures. According to current estimates, the share of renewable energy in gross final energy consumption is anticipated to reach 19.6%, yielding a 1.6% surplus. Consequently, Germany is not reliant on use of the flexible cooperation mechanisms and has thus far not made use of articles 6 to 12 of the Directive. Nevertheless, Germany is very interested in successful implementation of the cooperation mechanisms and sees the growth of renewable energy in Europe as offering promising possibilities for effective cooperation between Member States.

<sup>55</sup> Please use actual figures to report on the excess production in the two years preceding submission of the report, and estimates for the following years up to 2020. In each report Member States may correct the data of the previous reports.

<sup>56</sup> When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. -x ktoe).

<sup>57</sup> Please differentiate between types of renewable energy and origin/place of destination of imports/exports

Given this context, Germany actively supports exchanges between the Member States on ways how to put into practice the flexible cooperation mechanisms under the Intelligent Energy Europe (IEE) project “Concerted Action” implementing Directive 2009/28/EC, for which Germany has taken on the co-chair’s role in the working party on flexible cooperation mechanisms.

In principle, Germany is interested in transferring surplus quantities of renewable energy over the indicative national trajectory – whilst taking into account achievement of its own targets – by way of statistical transfers to other Member States under Article 6 of the Directive to achieve their objectives. The anticipated annual surplus up to 2020 ranges from approx 3000 to 7000 kilotons crude oil equivalent (kt COE). Due to its comparatively clear surplus amounts, Germany offers corresponding securities when executing a statistical transfer. Germany supports cooperation of this kind and is engaged in negotiations with other Member States in this regard. Specific commitments via statistical transfer will be decided on and checked on a case-by-case basis.

Germany views the execution of joint projects on energy production from renewable sources with other Member States as offering great potential and major opportunities. Germany is particularly interested in carrying out projects with third countries in accordance with Article 9 of the Directive. In energy scenarios commissioned by the Federal Government in Germany it becomes apparent that in the long term, Germany will have to cover part of its renewable electricity renewable needs through imports. Put in perspective, importing solar power from North African countries can make an important contribution towards future energy supply in Europe. Due to better storage capability, solar thermal power stations (Concentrated Solar Power) can also be a means to ensure needs-based energy production through renewables in Germany itself. In order to make headway on implementation of Article 9 of the Directive, Germany supports the execution of the first reference projects importing power from renewables from North Africa under the Union for the Mediterranean’s solar plan.

**12. Please provide information on how the share for biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates**

*(Article 22 (1) (n) of Directive 2009/28/EC)*

To determine the contribution of biodegradable waste to power and heat generation, it has been designated that 50% of waste processed in waste incineration plants is biodegradable. This figure comes from a study (UBA 2011), which investigated the amounts of electricity from waste in selected waste processing procedures in detail. Research looked at municipal waste (residual waste, bulky waste, organic waste, card, paper, cardboard packaging, light packaging, waste wood and sewage sludge), as well as commercial waste similar to domestic refuse. The amount of biodegradable material could be calculated for the individual waste groups. Calculating the share of the different waste groups as part of the total waste used to produce energy enables the average amount of biodegradable waste to be determined from all the waste for energy production as a whole. There are no immediate plans to improve this estimate of the share of biodegradable waste in waste used for energy production.

### **13. Reporting under RE Dir. Art. 22 (3) a-c**

Reporting on whether Germany is planning:

- a. to set up a single administrative body that is responsible for processing approval, certification and authorisation requests for systems using renewable energy and supporting applicants;
- b. to provide for automatic approval for planning and approval requests for systems using renewable energy if the approval authority has not issued a response within the stipulated deadline; or
- c. to designate the geographical locations in spatial planning that are suitable for use of renewable energy sources and the construction of district heating and cooling systems.

On a) Germany is currently not planning to set up a single administrative body.

On b) The Federal Government is not planning to provide for respective automatic approval. Approval for planning applications for plants using renewable energy falls within the competence of the federal states. In actual fact, it would appear that a procedure of this kind would be inadmissible under European law for projects requiring an environmental impact assessment (EIA).

On c) On the basis of the Spatial Planning Act, it is the competence of the federal states to draw up spatial planning plans which also establish (geographical) areas for spatial development plans and measures, provided these are required for sustainable, balanced spatial development. This can also include – subject to examination of the spatial development significance of the concrete plan or measure – areas for the use of renewable energies. Examples of statutory regulations on the use of renewables in the federal states in the context of land use planning are listed in the NREAP.

## **Reporting outside the scope of the template progress report**

### **14. Report under the Biomass Power Sustainability Regulation and the Biofuel Sustainability Regulation (Biomass Sustainability Regulations)**

In its Sustainability Regulations for Biomass (Section 64 B Biofuel Sustainability Regulation (Biokraft-NachV) and in Section 72 of the Biomass Power Sustainability Regulation (BioSt-NachV), Germany has stipulated that it will include in its progress report to the European Commission information on fulfilment of the sustainability regulations. This falls under Point 14 of the report and is therefore excluded from the reporting requirements of the progress report itself.

The report is based on the evaluation and progress report of the German Federal Office for Agriculture and Food (BLE) for 2010 and refers to the 2009 to 2010 period (BLE 2011). The BLE is the authority in Germany that is responsible for implementing the sustainability requirements of Directive 2009/28/EC.

#### **14.1. Information on fulfilment of the requirements under the Biomass Sustainability Regulations**

The Biomass Sustainability Regulations came into force at the end of 2009 and the beginning of 2010. Both regulations have been fully applicable since 1 January 2011. Certain transitional provisions applied in the interim period.

The sustainability requirements under the BioSt-NachV have had to be met since 1 January 2011 as a precondition to receiving EEG tariff payments for power from liquid biomass. Operators of combined heat and power plants only receive a bonus for the use of renewable raw materials (Nawaro bonus) in addition to the basic tariff under the EEG when the cultivated biomass used to produce the liquid biomass fulfils the stipulated site-specific sustainability requirements and the 35% greenhouse gas reduction condition.

In accordance with Biokraft-NachV, fulfilment of the Biokraft-NachV sustainability requirements from 1 January 2011 shall be a condition for the biofuel counting against the biofuels quota and for the granting of tax concessions under the Energy Tax Act (EnergieStG). In addition, biomethane that is upgraded to natural gas quality for use as fuel has to meet the sustainability criteria to count against the biofuels quota or to benefit from a tax concession.

Sustainability certificates<sup>58</sup> are issued in Germany with the help of non-governmental certification bodies. In 2010, the BLE, as the body responsible for recognising and checking certification systems and certification bodies, recognised

- two certification systems (ISCC and REDCert) and
- 25 certification bodies.

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<sup>58</sup> Sustainability certificates are documents that prove fulfilment of the requirements of the sustainability regulations for a given amount of biomass through the entire production and supply chain (from cultivating firm to last interface). Sustainability certificates may only be issued by the last interface. The last interface must be certified to issue sustainability certificates under a recognised certification system by a certifying body recognised by the BLE.

On settlement day (31 December 2010), participants in the certification systems recognised by the BLE primarily originated from Germany, the Czech Republic and France. On settlement day, (31 December 2010) participants from third countries in the certification systems recognised by the Federal Office for Agriculture and Food (BLE) were primarily from Indonesia and Malaysia. Nevertheless, it should be borne in mind that there was only a low number of participants from third countries by settlement day.

The certification bodies recognised by the BLE certified 840 undertakings, 85% of which were in Germany. 547 sustainability certificates had already been drafted by settlement day. 212,968 m<sup>3</sup> (6 million MJ) of sustainable biomass was covered by sustainability certificates, of which 155,696 m<sup>3</sup> from old systems.<sup>59</sup>

Evidence of fulfilment of the requirements under BioSt-NachV or Biokraft-NachV could also be provided on an interim basis until 31 December 2011 in the form of environmental expert certificates. In 2010, environmental expert certificates were not of any practical relevance as only one environmental expert certificate was issued.

In addition to recognition and checking of certification systems and bodies, the BLE has the following tasks, amongst others:

- in the biofuel sector: provision of data required for biofuels to count against the biofuels quota or for tax relief to the biofuels quotas bodies and chief customs offices;
- in the bio-electricity sector: provision of data to grid operators that are needed for tariff payment and the so-called Nawaro bonus for plant operators;
- using the web application Sustainable Biomass System – Nabisy checking sustainability certificates of economic operators in terms of their verisimilitude and the issuance of sustainability part certificates at the request of economic operators;
- Evaluation of implementation of the sustainability criteria of the Renewable Energy Directive in Germany and annual drafting of a progress report from the Federal Government.

As part of its remit, the BLE instituted the following measures towards implementation of the regulations up to 31 December 2010:

- Production of information material for market participants in the sustainable biomass production sector in German and English;
  - Construction and maintenance of a website with information and documents according to Section 76 BioSt-NachV or Section 68 of the Biokraft-NachV which market participants can download;
- Development of a universal classification scheme for recognising certification systems and bodies and for monitoring measures/sustainability certificates under Section 55 BioSt-NachV or Biokraft-NachV;
- Provision of a database under Section 17 (2) (ii) (b) BioSt-NachV or Biokraft-NachV on documenting the origin of biofuels and the sustainability certificates (web application Sustainable Biomass System -Nabisy-) and
- Development of a register of plants in accordance with Section 61 BioSt-NachV.

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<sup>59</sup> Old systems are systems that began operating before 23 January 2008. From 1 April 2013, old systems will have to respect the necessary greenhouse gas reduction potential. However, evidence can be proved voluntarily before the necessary greenhouse gas reduction potential is achieved.

#### **14.2. Information on the impacts arising from the manufacture of liquid biomass used in the Federal Republic of Germany to generate power and biofuels used for transport on sustainability**

Empirical values for 2010 are only available in limited form, as economic operators were first obliged to provide proof of sustainability from 1 January 2011.

The efficacy of the measures will be first checked for the 2011 calendar year in the context of a future evaluation.

#### **14.3. Evaluation of whether the use of liquid biomass to generate power and the use of biofuels is socially acceptable**

The Federal Government advocates respect for social criteria in the context of the sustainability of bioenergy and Directive 2009/28/EC, as well as in the international arena. This regards the primacy of human rights to food and water, respect for ILO core labour standards and respect for existing land and water rights, as well as the involvement of local and indigenous populations.

## **15. Annex**

### **15.1. List of abbreviations**

ACER: Agency for the Cooperation of Energy Regulators (European association of grid regulators)

AGEB: Energy Balance Working Group

AGEE-Stat: Renewable Energy Statistics Work Group

BauGB: Federal Building Code

BImSchG: Federal Emissions Control Act

BImSchV: Federal Emissions Control Regulation

Biokraft-NachV: Biofuel Sustainability Regulation

BioSt-NachV: Biomass Power Sustainability Regulation

BLE: German Federal Office for Agriculture and Food

BMU: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

BMVBS: Federal Ministry of Transport, Building and Urban Development

BMWi: Federal Ministry of Economics and Technology

CHP: Combined heat and power generation

CO<sub>2</sub>eq: CO<sub>2</sub> equivalent

ct: Euro cent (EUR 0.01)

EAG EE: Renewable Energies European Law Adaptation Act

EEG: Renewable Energies Act

EEWärmeG: Renewable Energies Heat Act

EEZ: Exclusive Economic Zone

EFF: NREAP scenario “with further energy efficiency measures”

EIA: environmental impact assessment

EnergieStG: Energy Tax Act

EnEV: Energy Saving Regulation

EnWG: Energy Management Act

FNR: German Agency for Renewable Resources

GFEC: gross final energy consumption

GGEMO: Joint Electromobility Office

GHG: greenhouse gas

GW: Gigawatt (10<sup>9</sup> watt)

GWh: Gigawatt hours (10<sup>9</sup> watt hours)

ha: hectare

Humus-C: Carbon humus

IEE: Intelligent Energy Europe  
ISCC: International Sustainability and Carbon Certification  
KfW: Kreditanstalt für Wiederaufbau (KfW development bank)  
ktoe 1000 tonnes crude oil equivalent  
kWh: Kilowatt hours ( $10^6$  watt hours)  
KWKG: Combined Heat and Power Generation Act  
m<sup>2</sup>: square metre  
m<sup>3</sup>: cubic meter  
MAP: Market Incentive Programme  
MW: Megawatt ( $10^6$  watt)  
NABEG. Grid Expansion Acceleration Act  
Nawaro: renewable raw materials  
NPE: National Electromobility Platform  
NREAP: National Renewable Energy Action  
OE: oil equivalent  
PJ: Petajoules ( $10^{15}$  joules); 1 PJ = 23.8846 ktoe  
Plan  
PV: Photovoltaics  
R&D Research and Development  
RE Dir: EU Directive 2009/28/EC  
RE: Renewable Energy  
REDCert: Company for the certification of sustainably-produced biomass GmbH  
SDLWindV: System Service Ordinance  
t: ton  
TSO: transmission system operator  
TWh: Terawatt hours ( $10^{12}$  watt hours)  
UBA: Federal Environment Agency  
VDE: German Association for Electrical, Electronic & Information Technologies e.V.  
VDEW: German Electricity Association

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### 15.3. References

**AEE 2010:** Erneuerbare Energien 2020 – Potenzialatlas Deutschland (*Inventory of Potential in Germany*), German Renewable Energy Agency, Berlin, February 2010.

**AGEB 2011:** Gross electricity production in Germany from 1990 to 2010 by energy type, Energy Balance Working Group, November 2011.

**BfN 2009a:** “Effective land use for bioenergy from a nature conservation standpoint” (FKZ 3508 83 0300), Federal Agency for Nature Conservation, can be consulted at: [http://www.bfn.de/0319flaecheneffektive\\_bioenergie.html](http://www.bfn.de/0319flaecheneffektive_bioenergie.html) (28 November 2011).

**BfN 2010:** Background information for the Press – Bioenergy and biodiversity on 1 October 2010, Federal Agency for Nature Conservation, Bonn, October 2011, can be consulted at: <http://www.bfn.de/fileadmin/MDB/documents/presse/15-Bioenergie-und-Biodiversit%E4t.pdf> (28 November 2011).

**BLE 2011:** Biomass Power Sustainability Regulation, Biofuel Sustainability Regulation. Evaluation and Progress Report for 2010, Federal Office for Agriculture and Food, Bonn, March 2011.

**BMU 2010a:** Renewable energy in figures – national and international development, ZSW Stuttgart, UBA Dessau, June 2010.

**BMU 2011a:** Renewable energy in figures – national and international development, ZSW Stuttgart, UBA Dessau, July 2011.

**BMU 2011b:** Renewable energy in figures – Internet update of selected data, ZSW Stuttgart, UBA Dessau, December 2011.

**BMU 2011b:** “Federal States’ Reports on the Renewable Energies Heat Act”, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Berlin, August 2011, can be consulted at: <http://www.erneuerbare-energien.de/inhalt/47539/4596/> (28 November 2011).

**BMU 2011c:** Monitoring the impact of the Renewable Energies Act on the development of power generation from biomass. Interim report March 2011, DBFZ Leipzig, Berlin, March 2011.

**BMU 2011d:** Preparation and accompaniment of the drafting of the 2011 progress report in accordance with Section 65 EEG – Solar radiation energy, Leipzig Institute for Energy GmbH, Berlin, June 2011.

**Bund-Länder-AG NawaRo:** German Federal Government/States Renewable Raw Materials Working Group, 2010.

**C.A.R.M.E.N. 2011a:** “Energy. Wood for energy index charts”, information graphic, Central Agricultural Commodity Marketing and Development Network, can be consulted at: [http://www.carmenev.de/dt/energie/hackschnitzel/hackschnitzelpreis\\_grafiken.html](http://www.carmenev.de/dt/energie/hackschnitzel/hackschnitzelpreis_grafiken.html) (28 November 2011).

**C.A.R.M.E.N. 2011b:** “Energy. Pellet price index charts”, information graphic, Central Agricultural Commodity Marketing and Development Network, can be consulted at: [http://www.carmen-ev.de/dt/energie/pellets/pelletpreis\\_grafiken.html](http://www.carmen-ev.de/dt/energie/pellets/pelletpreis_grafiken.html) (28 November 2011).

**German Parliament 2010:** Report: Chances and challenges of new energy crops, German Parliament, Berlin, November 2010, can be consulted at: <http://dipbt.bundestag.de/dip21/btd/17/038/1703891.pdf> (28 November 2011).

**EEFA 2011:** Definition of “gross final energy consumption” pursuant to the provisions of EU Directive 2009/28/EC based on the data of the Energy Balance Working Group (AGEB) – Short study commissioned by the Federal Ministry of Economics and Technology (BMWi), Energy Environment Forecast Analysis GmbH (EEFA), Münster, Berlin, November 2011.

**FNR 2010:** 2009 2010 annual report, German Agency for Renewable Resources, Gülzow, 2010.

**FNR 2010a:** “Cultivation of renewable raw materials in Germany 2011”. Information graphic, German Agency for Renewable Resources, 2011, can be consulted at:

[http://www.nachwachsenrohstoffe.de/fileadmin/fnr/images/aktuelles/medien/Anbau2010\\_Tabelle\\_DE\\_300\\_rgb.jpg](http://www.nachwachsenrohstoffe.de/fileadmin/fnr/images/aktuelles/medien/Anbau2010_Tabelle_DE_300_rgb.jpg) (28 November 2011).

**FNR 2011:** “Renewable raw materials: data and facts”, German Agency for Renewable Resources, 2011, can be consulted at: <http://www.nachwachsenrohstoffe.de/service/daten-undfakten/anbau/?spalte=3> (28 November 2011).

**IFEU 2010:** Adjustment and upgrading of “Data and calculation model”: Energy consumption and pollutant emissions from motorised transport in Germany 1960-2030 (TREMODO, Version 5), final report commissioned by the Federal Environment Agency, Heidelberg, March 2010.

**LAWA 2011:** Meeting documents from 141st LAWA plenary assembly, German Federal Government/States-Water/ Saxony State Ministry for the Environment and Agriculture, Bautzen, 31 March/1. April 2011.

**Peters 2011:** “Renewable energies nature conservation standards information database. Bioenergy information database. Biomass production: existing conflicts”, Wolfgang Peters, can be consulted at: [http://www.naturschutzstandards-erneuerbarerenergien.de/index.php?option=com\\_infodatabase&Itemid=72&sparte=1&aspekt=1&view=konflikt](http://www.naturschutzstandards-erneuerbarerenergien.de/index.php?option=com_infodatabase&Itemid=72&sparte=1&aspekt=1&view=konflikt) (28 November 2011).

**Federal Statistical Office 2011a:** “Producer prices for agricultural products September 2011: + 8.5% on September 2010”, Federal Statistical Office, can be consulted at: <http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/Preise/PreiseLandForstwirtschaft/ErzeugerpreiseLandwirtschaftlicherProdukte,templateld=renderPrint.psm1> (28 November 2011).

**Federal Statistical Office 2011b:** “Producer prices for forestry sector products August 2011: + 15.0% on August 2010”, Federal Statistical Office, can be consulted at: <http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/Preise/PreiseLandForstwirtschaft/ErzeugerpreiseForstwirtschaftlicherProdukte,templateld=renderPrint.psm1> (28 November 2011).

**Federal Statistical Office 2011c:** “Special soil use and harvests – arable land by main crop groups and crop types”, Federal Statistical Office, can be consulted at: <http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/LandForstwirtschaft/Bodennutzung/Tabellen/Content75/AckerlandHauptfruchtgruppenFruchtarten.psm1> (13 December 2011).

**UBA 2011:** Using the potential of the biogenic share of waste to generate energy, IAA TU Dresden, INTECUS Dresden, May 2011.

**Baden-Württemberg Ministry of the Environment 2011:** Progress report on the Renewable Energies Heat Act, Baden-Württemberg Ministry for the Environment, Climate and Energy, Stuttgart, July 2011.

**VDEW 2005:** Decentralised power generating facilities on the low voltage grid 4<sup>th</sup> Edition 2001. Directive for connection and parallel operation of decentralised power generating facilities on the low voltage grid with VDN amendments, German Food Industry Association e.V., Frankfurt am Main, September 2005.

**VDLUFA 2004:** Humus accounting. Methods for judging and measuring the humus supply on arable land, The Association of German Agricultural Investigation Institutions, Bonn, April 2004.

## 15.4. Miscellaneous

The avoidance factors documented in Table C were used to calculate the avoided GHG emissions that are indicated in Section 10. Further details on the method used to calculate the GHG avoidance factors for both reporting years are available in BMU 2010a and BMU 2011.

Table C: Greenhouse gas avoidance factors for 2009 and 2010 (in million t CO<sub>2</sub>eq/PJ) to calculate the greenhouse gas emissions avoided in Section 10 (Source: BMU 2010a, BMU 2011a, UBA calculations and updates)

		2009	2010
<b>Electricity</b>	Hydroelectric	0.221	0.221
	Wind power	0.204	0.204
	Photovoltaics	0.189	0.189
	Biogenic solid fuels	0.216	0.216
	Biogenic liquid fuels	0.167	0.167
	Biogases	0.164	0.162
	Deep geothermal	0.136	0.136
	<b>Heating</b>	Biogenic solid fuels	0.084
Biogenic liquid fuels		0.076	0.073
Biogases		0.048	0.046
Solar thermal		0.062	0.062
Deep geothermal		0.018	0.018
Other environmental heat (heat pumps)		0.023	0.023
<b>Transport</b>	Biodiesel	0.038	0.038
	Vegetable oil	0.049	0.049
	Bioethanol	0.040	0.040

## ANNEX 1

The Renewable Energies European Law Adaptation Act (see Point 3.0.1) has updated the EEWärmeG with the following amendments.

In Section 1 of the EEWärmeG “Object and objective of the Act”, the term “cooling” has been included so that the wording now reads “to support production of heating **and cooling** from renewable energies”, together with “to increase the share of renewable energies in final energy consumption for heating **and cooling** to 14% by 2020”.

A new Section 1a “Making public buildings an example” has been introduced. In Section 2 (1), further points have been added under “Definition of terms”. In this way, with the definition of renewable energies in the context of the Act, the term “heat derived from air or water” has been made more tangible with the addition “and rendered technically usable”. Additionally, the term “Cooling from renewable energies” has been introduced under Point 5. The following terms have been defined in more detail in the context of the Act: “district heating or district cooling”, “comprehensive renovation”, “public buildings”, “public”, “expert”, “obligated party”, “heating and cooling energy needs”.

The Section 3 “Obligatory coverage” now extends to newly-constructed public buildings abroad and extends obligatory coverage for public buildings to buildings in Germany and abroad that are comprehensively renovated. Moreover, the federal states have been given the option of issuing their own regulations for existing public buildings.

In Section 4, the scope of the obligatory coverage has been restricted for German Federal Armed Forces buildings, where the obligatory coverage contravenes the type and main purpose of the Federal Armed Forces’ activities.

In Section 5 - Renewable energies and new buildings – the term “cooling” energy needs has been added so that now heating and cooling energy needs (as a total sum) have to be covered at least 15% by renewables.

Section 5a describes the share of renewables in comprehensively-renovated public buildings. Here the share of gaseous biomass has been adjusted to at least 25% (30% for new builds). For all other renewables, a percentage of at least 15% applies for meet obligations in a similar fashion to new builds.

Section 6 - Supply - several buildings added as well as public buildings and offers the possibility for a portfolio of buildings to meet the sum of their heating and cooling energy needs from renewable energy sources as a whole and not as individual buildings.

In Section 7 – Compensating measures – the term cooling energy needs has also been added and compensating measures extended to district heating and cooling. Solar thermal systems have been added for public buildings. These may also be operated by third parties. As a compensating measure, solar thermal systems must have a slightly higher aperture area (0.06 m<sup>2</sup>) than for fulfilment of the commitment (0.03/0.04 m<sup>2</sup>) (each per m<sup>2</sup> useable area). In Annex 1 on solar thermal systems, the “Solar Keymark” has been introduced as a quality criterion.

Section 9 – Exemptions – adds that obligatory coverage and compensating measures do not apply to the public sector under certain conditions.

Section 10 – Evidence – adds requirements for delivered biomass, which are defined in the newly-worded Annex II to the Act. The obligation to provide evidence for biomass does not apply to public buildings.

Section 10a - Information on public buildings acting as an example has been newly added.

Section 13 Support has been extended to the generation of renewable cooling. Additionally the construction or expansion of district heating grids has been added as eligible for support.

Section 14 - Supported measures - adapts the minimum requirements for systems for heating and cooling generation. For solar thermal systems there is the Solar Keymark, for biomass systems a conversion efficiency of 89% to meet the obligatory coverage requirement, 85% when not used to fulfil the obligation and 70% for systems not used for heating or water heating. For heat pumps, one of the following symbols must be respected: Ecolabel, Blue Angel or European Quality Label for Heat Pumps.

Section 16a - Installers for renewable energies - amended. This section describes the possibility for Craft Chambers to issue regulations for further training examinations under Annex IV of the Act and Section 42a of the Crafts Ordinance (Handwerksordnung).

Section 18a - Reports of the federal states - amended. It contains deadlines for the federal states to submit their reports to fulfil their reporting duty under Article 22 of Directive 2009/28/EC and for the progress reports on the Act under Section 18. This encompasses experience with public buildings as examples, reports on own planned or enacted regulations or laws along with execution of the Act.

Number I of the Annex to the EEWärmeG: solar radiation energy has been amended by setting a higher aperture surface per m<sup>2</sup> of useable area where the installation of a solar thermal system needs to be recognised as a compensating measure (only for public buildings) (0.06m<sup>2</sup> versus 0.03 or 0.04m<sup>2</sup>).

Number II of the Annex to the EEWärmeG: biomass has also been comprehensively amended.

Point 1 contains arrangements for gaseous biomass. In new builds, these can only be used in CHP systems to fulfil obligations. For existing public sector buildings that are comprehensively renovated, biomass may also be combusted as an alternative in heating boilers that correspond to the most cutting-edge technology.

As regards the upgrading of gaseous biomass to natural gas quality, there are further provisions regarding the environmental impacts of gas upgrading and feed-in, as well as the application of mass balance systems when obtaining biogas from the natural gas network.

Point 2 deals with liquid biomass and adds sustainability criteria under the Biomass Power Sustainability Regulation and also applies, with exceptions, to the EEWärmeG.

Point 3 on solid biomass has been completely replaced.

Points 4 and 5 on evidence of the requirements for delivered biomass and evidence of other requirements has been completely amended. These points now describe the contents of the evidence for fuel suppliers for delivered biomass. For gaseous biomass, reference is made to the rudiments under Number II 1 (c) of the Annex. For liquid biomass, Section 14 of the Biomass Power Sustainability Regulation applies, including evidence of greenhouse gas reduction under use for heating production, should this not be contained as a reference value in Section 14. Alternatively, the German Federal Office for Agriculture and Food (BLE) may publish a calculation method online for GHG reduction potential for different uses.

Amendments have been made to the quality criteria for geothermal energy and environmental heating in Number III of the Annex. Essentially, systems now have to feature European environmental or conformity marks to be valid under the EEWärmeG. (Blue angel, Ecolabel or European Quality Label for Heat Pumps (or like-for-like proof for fossil-fuel powered heat pumps).

Amendments have been made to the seasonal performance co-efficient for heat pumps in existing public buildings under Section 3 (2). It should now be 0.2 points below the usual seasonal performance co-efficient.

Number IV of the Annex – Cooling from renewable energies – has been amended. Definitions are provided for the term “technically-usable cooling” and on the use of cooling in the context of the Act.

Number V of the Annex – Heat loss – has been expanded to take in cooling from heat loss.

Number VI of the Annex - Combined Heat and Power Generation – expands on this by focussing on the use of technically-usable cooling from systems that are operated with heat from CHP systems.

Number VII of the Annex – Energy-saving measures - contains an additional point regarding the transmission heat transfer coefficient in newly-built or existing public buildings. The figure must be lower than for private new-builds. Explanations are given of the term and how to calculate transmission heat transfer coefficients.

Measures under Annex VII have to meet the requirements of numbers I-VI to be recognised as compensating measures.

Number VIII of the Annex – District heating or cooling – has been defined in more detail as the total heating or cooling distributed in the district heating or cooling grid.