



Federal Ministry of
Food, Agriculture
and Consumer Protection

The Renewable Energy Sources and the Renewable Energies Heat Act

Data and facts for biomass



Foreword

Dear readers,

A climate-saving and protecting, economically efficient, resources-saving and socially acceptable energy supply is the key challenge of the 21st century. The Federal Government has laid the foundation for a trendsetting energy policy in 2007 with the Integrated Energy and Climate Programme (IEKP). The climate protection objectives defined in this programme form the basis for our work. In particular the renewable energies are of central importance. The amendment of the Renewable Energy Sources Act (EEG) and the Renewable Energies Heat Act (EEWärmeG) accommodate this fact.

Germany has assumed a cutting-edge position in the market for power generation from renewable energies with its successful market introduction policy. Around 70 percent of the renewable energies are produced from regenerative biomass. The improvement of the biomass energy efficiency also offers a high sustainability potential. Bioenergy can support the regional added value and thus create employment opportunities. This provides new chances for rural areas. 280,000 new jobs have been created in the overall renewable energy industry to date.

The amended EEG strives to increase the share of renewable energies in the overall power generation by at least 30 percent by 2020. The traditional biomass potential is limited. The pro-



motion therefore is mainly focussed on the energetic use of agricultural by-products, slurry, wood from short rotation forestry and landscaping material. The additional extension of cogeneration helps saving coal and oil and enables higher resources efficiency. Other key objectives include the technical development of biogas treatment and supply into the natural gas network.

The heat sector, in particular, offers great improvement potential with regards to the use of renewable energies. To date, the share of renewable energies in the overall heat consumption in Germany amounts to 7.7 percent. The objective is to increase this share to 14 percent by 2020. The Renewable Energies Heat Act serves to further increase the use of heat from renewable energy sources and other climate-saving measures for new buildings.

The new legal regulations are important development steps towards sustainability in the context of the energy and climate policy. Plant operators, energy companies, our society and our environment will benefit from energy generated from clean and future-proof resources.

This brochure provides an informative and comprehensive guidance on the Renewable Energy Sources and the Renewable Energies Heat Act, the application of which will take us further into the future.

A handwritten signature in green ink that reads "Ilse Aigner". The signature is fluid and cursive.

Ilse Aigner
Federal Minister of Food, Agriculture and
Consumer Protection

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Act on Reforming the Renewable Energies Law on Power Generation and Related Regulations (EEG)

The Renewable Energy Sources Act (EEG) serves to promote power generation from renewable resources. With the adoption of the Act on the Supply of Power from Renewable Energies to the Public Network in 1991, the supply conditions and the compensation regulations were defined for the first time, thus creating incentives for the production of regenerative power. This act was replaced by the Act on Granting Priority to Renewable Energies on April 1st 2000. The amendments implemented since then were required in order to consider the altered framework conditions and new objectives, in particular for biomass.

EEG – an instrument for realising energy-political targets

In addition to climate protection, the sustainable energy supply, energy safety and the reduction of macroeconomic costs are of special importance for the Federal Government. Renewable energies contribute to the achievement of these objectives and to the preservation of fossil energy sources. The EEG has proven to be a suitable instrument for promoting renewable energies in the electricity sector and for the development of technologies for generating power from such sources.

The share of renewable energies in the gross power consumption has nearly tripled to 14.8 % in the recent decade. In addition to wind (44 %) and water power (23 %), around 29 % of the power from renewable energies was produced from biomass in 2008.

Development of the power generation from renewable energies (RE) and biomass in Germany

1998	2000	2002	2004	2006	2008
Power generation from RE					
GWh					
26,913	36,679	45,760	57,529	72,240	91,352
RE share of gross power consumption					
%					
4.8	6.3	7.8	9.5	11.7	14.8
Biomass share					
GWh					
1,642	2,279	4,017	8,347	15,593	21,084
Biomass power share in power generation from RE					
%					
6.1	6.2	8.8	14.5	21.6	23.1

Source: BMU based on AGEE-Stat as of April 2009

With the commencement of the 2nd EEG amendment, the power generation from renewable energies will be further extended.

§ 1, clause 2, EEG

“... Purpose ..., ... of this act ..., to extend the share of renewable energies in the power supply to at least 30 percent by 2020 and to continuously increase this share subsequently.”

A key aspect of this amendment is to increasingly promote the power generation from agricultural residuals (slurry, litter), landscaping material and residual forest wood as well as fast growing wood from short rotation forestry.

New framework conditions for power from renewable energies

Power supply management replaces the previous power generation management.

§ 11, clause 1, EEG

“Network operators are ... in exceptional cases, entitled to control facilities connected to their network with an output exceeding 100 kilowatt for generating power from renewable energies, cogeneration or mine gas”

This regulation is aimed for the utmost power supply from renewable energies, mine gas or cogeneration to the network.

In exceptional cases, the network operator may cut off plants from the network:

- in case of a risk of a network capacity overload in this network area,
- to ensure the collection of an utmost power quantity from renewable energies and cogeneration, and
- subsequently to a performed data acquisition of the actual supply to the respective network region.



The network connection requires the plants to be equipped with a technical or functional facility for a remote reduction of the supply level and acquisition of the respective actual supply data (by the plant operator) that may be accessed by the network operator.

Operators of plants that have been commissioned prior to the 1st of January 2009 must meet these operational and technical requirements as from the 1st of January 2011.

Plant operators that are particularly affected by the supply management are entitled to a compensation regulation.

§ 12, clause 1, EEG

“The net operator, whose network has caused the regulation requirement ... is obligated to indemnify the plant operators ...”

- The indemnity amount can be agreed individually between the network operator and the plant operator.
- In absence of such an agreement, the net operator agrees to pay the lost compensation and heat proceeds less saved expenses. “Lost compensations” means the compensation rates according to the EEG or the justified price that the plant operator would have received in a case of own marketing. The lost heat proceeds are to be determined based on the heat supply agreements, including contract damages, if applicable.

The plant operator may market the power to third parties.

§ 17, clause 1, EEG

“Plant operators are entitled to sell the power generated in the plant to third parties in each calendar month ...”

- The overall produced power can be marketed to third parties.
- The produced power can also be marketed partially to third parties, while claiming the EEG compensation for the remaining power.

The plant operator must notify changes with regards to his power marketing prior to the beginning of the respective previous calendar month to the network operator.

In case of a partial direct power marketing, the plant operator must determine a fixed percentage of the current power generation which is intended for direct marketing and must be able to prove his adherence to this percentage at any time.

Compensation regulations for power from renewable energies

Compensation for power from multiple plants

The compensation regulations for power from multiple plants have been stipulated in order to avoid a plant splitting (breaking up plants into smaller units in order to receive higher compensation rates for smaller performance areas).

§ 19, clause 1, EEG

“Multiple plants are only regarded as a single plant independently from the ownership conditions and solely for the purpose of determining the compensation for the most recent commissioned generator, if:

- *they are located on the same property or otherwise in direct vicinity,*
- *they generate power from similar renewable energies,*
- *the power generated by these plants is compensated according to the regulations of this act, depending on the performance of such plant, and*
- *the plants have been commissioned within twelve consecutive calendar months ...”*

The regulation also applies retroactively for existing plants (for reviewing the compliance with the constitution, several complaints are pending at the Federal Constitutional Court).



Compensation commencement and term

The commencement and term of the compensation correspond to the currently applicable standard (EEG 2004).

§ 21 EEG

“(1) The compensation has to be paid as from the date, on which the generator produces the first power exclusively from renewable energies or mine gas and has supplied such power to the network according to § 8 clause 1 or clause 2 for the first time or ...

(2) The compensation is to be paid respectively for a term of 20 calendar years, additionally the year of commissioning. ... The term shall commence in the commissioning date of the generator – independently of whether the latter has been commissioned with renewable energies, mine gas or other energy sources.

(3) The replacement of the generator or other technical or structural parts does not result in a restart or extension of the term according to clause 2, sentence 1, unless specified otherwise in the following provisions.”



Compensation for power generated from biomass

1. Basic compensation

The compensation for power generated from biomass consists of a basic compensation graded according to performance areas.

Basic compensation thresholds according to § 27, clause 1, EEG

Performance area	2009
up to and including 150 kW _{el}	11.67 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	9.18 Cents/kWh
> 500 kW _{el} up to and including 5 MW _{el}	8.25 Cents/kWh
> 5 MW _{el} up to and including 20 MW _{el} ¹⁾	7.79 Cents/kWh

1) For power generated from plants exceeding 5 MW_{el}, the EEG compensation can only be claimed, if the power is generated from cogeneration.

The basic compensation can be increased as the case may be, by:

- the bonus for observing the corresponding formaldehyde limit values,
- the bonus for power generation with innovative technologies (Technology bonus),
- the bonus for the use of renewable raw materials or slurry (NawaRo bonus), and
- the bonus for the power production in cogeneration (KWK-bonus).

As a novelty, the EEG compensation claim also applies for power generated from plants with an output exceeding 20 MW_{el} up to and including the performance area of 20 MW_{el} (complete overview on page 46 et seq.).

Degression

§ 20, clause 2, EEG

“...the compensations and bonuses for power generated from biomass are decreased by 1 percent per year...”

The compensation level and the bonuses for power generated from newly commissioned biomass plants are reduced annually as from the 1st of January 2010.

Compensation for power generated from biomass for the coming years

Performance share	Basic compensation in Cent/kWh					
	2009	2010	2011	2012	2013	2014
up to and including 150 kW _{el}	11.67	11.55	11.44	11.32	11.21	11.10
> 150 kW _{el} to 500 kW _{el}	9.18	9.09	9.00	8.91	8.82	8.73
> 500 kW _{el} to 5 MW _{el}	8.25	8.17	8.09	8.00	7.92	7.85
> 5 MW _{el} to 20 MW _{el}	7.79	7.71	7.63	7.56	7.48	7.41

Note: For calculating the compensation rates, the values are rounded to the second digit of the fractional part. The degression calculation for the next year however is based on the unrounded value for the previous year.

Basic compensation calculation

The basic compensation calculation for the supplied power is performed according to the compensation levels. The performance that is relevant for the compensation does not depend on the electrical active power of the plant in this context, but rather on the equivalent performance, i.e. the ratio between the supplied annual power quantity (kWh) and the clock hours of a calendar year (h).

Calculation example of the basic compensation of a bioenergy plant

Year of commissioning	2009
Installed electrical performance	380 kW
Combined heat and power plant (CHP) operating hours	7,500 hours per year
Power production per year	2,850,000 kWh

$$\text{Equivalent performance} = \frac{2,850,000 \text{ kWh}}{8,760 \text{ h}} = 325 \text{ kW}_{eq}$$

Compensation levels	Output [kW _{el}]	Clock hours/year	Basic compensation [Cent/kWh]	Proceeds [Euro]
up to 150 kW _{el}	150 x	8,760 x	11.67	= 153,343.80
> 150 kW _{el} to 500 kW _{el}	175 x	8,760 x	9.18	= 140,729.40
> 500 kW _{el} to 5 MW _{el}	0 x	8,760 x	8.25	= 0
> 5 MW _{el} to 20 MW _{el}	0 x	8,760 x	7.79	= 0
	325			294,073.20

The EEG exclusivity principle is eased

§ 27, clause 3, EEG

“The compensation can be claimed for power ..., from plants that also use other biomass in addition to the biomass according to the ... Biomass Ordinance ...”

- Other biomass includes materials that are not subject to the regulation concerning the power generation from biomass (Biomass Ordinance) but rather biomass according to the guideline 2001/77/EG (e.g. sewage sludge).

Guideline 2001/77/EG, clause 2b:

“Biomass: the biodegradable portion of agricultural products, waste and residuals (including vegetable and animal materials), products, waste and residuals from forestry and related industries as well as the biodegradable portion of industrial and household waste.”

The EEG compensation can be claimed to the power share generated from biomass according to the Biomass Ordinance only. The charge material book must include information and evidence with regards to type, quantity, unit, origin and calorific value per unit of the used materials. This information must enable the evidence of the used biomass as well as the calculation of the EEG power share.

This ease of the exclusivity principle does not extend on the charge materials for biogas production. Biogas itself is an EEG-accepted biomass according to the Biomass Ordinance.

2. Bonus for the observance of the corresponding formaldehyde limit values

§ 27, clause 5, EEG

“The compensation for power generated from plants that are subject to a permission according to the Federal Immission Control Act and use gas (biogas) generated through anaerobic digestion is increased by 1 Cent per kWh, if the formaldehyde limit values imposed by the emission minimisation instructions according to the Technical Instructions on Air Quality are adhered to and this adherence is evidenced through certification issued by the competent authority.”

The Emission-Minimisation bonus is granted for power generated from biogas plants with a performance of up to and including 500 kW_{el}. The bonus can also be claimed for power from old plants (commissioning prior to the 1st of January 2009), however not for power from plants using biogas tapped from the gas network. A formaldehyde limit value in the exhaust gas of 40 mg/m³ must be observed.



3. Bonus for the power production with innovative technologies – “Technology bonus”

Annex 1 (to § 27, clause 4, no. 1) EEG

“The technology bonus ... can be claimed for power generated in plants with an output of up to and including 5 megawatt, using an ... innovative procedure.”

In addition to innovative plant technology, innovative procedures according to the EEG also include biogas upgrading.

Innovative plant technology according to the EEG:

- **Thermochemical gasification:** A process, in which e.g. biomass is transitioned into the gaseous state in a reactor by feeding heat, pressure and gasification agent – e.g. oxygen. The gas treatment (purification) enables a power generation via gas motors and gas turbines.
- **Fuel cell:** The fuel cell directly converts the chemical energy of the treated biogas into power. The functional principle is comparable to the reversal of the water electrolysis. In a fuel cell however, hydrogen (H₂) and oxygen (O₂) combine to form water (H₂O), producing electrical energy and heat.
- **Gas turbine:** Highly densified air is burned under fuel gas in-feed in a combustion chamber. The heated gas is conveyed to the turbine, driving a downstream generator.

- **Organic Rankine Cycle (ORC):** This process uses organic oil (thermal oil) that evaporates at lower temperatures and pressures as compared to water. The steam enters a slowly running turbine that generates power via a generator.
- **Stirling engine:** In this case, a piston is moved through the expansion of an enclosed gas by an external energy and/or heat source rather than by the expansion of combustion gases as in combustion engines.

Other innovative technologies:

- Steam motors,
- Multicomponent mixture plants, in particular Kalina-Cycle plants,
- New: Technologies for the exclusive thermochemical conversion of straw and other crop stalks biomass, or
- New: Plants for the exclusive fermentation of biowaste directly related to the creation of a postmaturation of solid fermentation residuals including a use of the postmatured fermentation residuals.

Gas treatment

In addition to the common use for power and heat production, biogas can also serve as a substitute for natural gas. This requires a complex treatment of the biogas in order to supply the latter as “biomethane” (biogas with natural gas quality) into the natural gas network. This way, the upgraded biogas can be transported over any distance through the existing gas network infrastructure and e.g. used for power generation in combined heat and power plants with a demand for the produced heat.

The technology bonus applies to power generated from upgraded biogas, if the biogas treatment for the supply to the natural gas network meets the following requirements:

- maximum methane emission into the atmosphere during treatment of 0.5 percent,
- maximum power consumption for the treatment of 0.5 kWh per standard cubic metre of crude gas,
- maximum capacity of the gas treatment plant of 700 standard cubic metres (Nm³) of treated crude gas per hour, and
- delivery of the process heat for the biogas treatment and production without the use of additional fossil fuels.

Amount of the potential “technology bonuses”

	2009
Innovative technologies	2 Cents/kWh
Biogas upgrading and supply	
up to a maximum capacity of the gas upgrading plant of 350 Nm ³ treated crude gas per hour	2 Cents/kWh
up to a maximum capacity of the gas upgrading plant of 700 Nm ³ treated crude gas per hour	1 Cent/kWh

4. Bonus for power generated from renewable raw materials – “NawaRo bonus”

Around 60 percent of the biogas plants currently use renewable raw materials (EEG experience report 2007).

Annex 2, item I, no. 1a (to § 27, clause 4, no. 2) EEG

“The bonus can be claimed ... if ... the power is generated exclusively from renewable raw materials or – in case of an anaerobic digestion of the renewable raw materials or slurry (biogas) - in combination with merely vegetable by-products.”

Renewable raw materials: Plants and plant elements generated in agricultural, forestry or gardening operations or during landscaping that have not been subjected to any other treatment or modification than for harvesting, preservation or use.



Slurry: All materials that are defined as slurry according to the regulation (EG) no. 1774/2002 of the European Parliament (EP) and the European Council as of October 3rd 2002 with hygienic regulations for animal by-products not intended for human consumption, as amended by the regulation (EG) 2007/2006 of the European Commission as of December 22nd 2006 (ABl. EG Nr. L 379 S. 98).

The positive list recently included in the EEG (annex 2, item III) substantiates the term “renewable raw materials” – referring in particular to:

- Periphyton of grass and pasture lands as whole plants in the form of greenery, dry material and silage,
- Field forage plants including crop harvested as whole plants, oilseeds and legumes as greenery, dry material and silage,
- Untreated vegetables, medical and spice plants, cut flowers,
- Grains, seeds, corn-cob mix, corms, beets (including sugar beets and mass beets), fruit, vegetables, haulm, turnip-top, straw as greenery, dry material and silage,
- Rapeseed and sunflower oil, respectively refined and unrefined,
- Palm and soy bean oil, refined and unrefined (new: only, if certain sustainability criteria are met ^{1) 2)}),

1) see also page 33

2) In the period between the 1st of January 2009 and the effective date of the sustainability regulations, but in no case later than until the 31st of December 2009, this does not apply for plants that have been commissioned prior to the 5th of December 2007.

- Wood residuals resulting from thinning and trunk wood harvesting in forestry operations as well as bark, and wood from short rotation plantations,
- Plant or plant elements incurred during landscaping activities,
- Dung and urine, including the litter of farm animals and horses as well as forage residuals occurring in an agricultural operation.

As a novelty, the substrates mentioned above may be fermented together with a selection of merely vegetable by-products without a denial of the NawaRo bonus.

Accordingly, the “NawaRo bonus” is only granted proportionally to the power generated from renewable raw materials. The percentage of the power entitled to the NawaRo bonus must be evidenced by an environment expert.



Positive list for merely vegetable by-products

Merely vegetable by-products	Standard biogas yield (kWh _{el} per ton of fresh mass)
Spent grains (fresh or squeezed)	231
Vegetable grooming products	100
Cereals (strip waste)	960
Brewer grains (wheat) from alcohol production	68
Rejects:	
vegetable,	150
potatoes,	350
medical and spice plants,	220
cut flowers	210
Cereal dust	652
Glycerine from vegetable oil processing	1,346
Potatoes (mashed, medium starch contents)	251
Potato vegetable water from starch production	43
Potato process water from starch production	11
Potato pulp from starch production	229
Potato peels	251
Potato distiller's wash from alcohol production	63
Molasses from beet sugar production	629
Pomace (fresh, untreated)	187
Rapeseed extraction shred	1,038

Merely vegetable by-products	Standard biogas yield (kWh _{el} per ton of fresh mass)
Colza cake (residual oil contents of around 15 percent)	1,160
Sugar beet dried cake from sugar production	242
Sugar beet chips	242

NawaRo bonus for power production from solid biomass

“NawaRo bonus” amount – solid biomass

Performance share	EEG 2009
up to and including 150 kW _{el}	6 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	6 Cents/kWh
> 500 kW _{el} up to and including 5 MW _{el}	4 Cents/kWh ¹⁾ 2.5 Cents/kWh

1) for power from the combustion of wood from short rotation forestry and landscaping material

NawaRo bonus for power production from liquid biomass

As a novelty, the NawaRo bonus for power generated by new plants in which vegetable oils are converted into power is only granted up to and including an performance share of 150 kW_{el}.

“NawaRo bonus” amount – liquid biomass

Performance share	Existing plants 2009 (commissioning until December 31 st 2008) ^{1) 2)}	New plants 2009 (commissioning after December 31 st 2008) ¹⁾
up to and including 150 kW _{el}	6 Cents/kWh	6 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	6 Cents/kWh	0 Cent/kWh
> 500 kW _{el} up to and including 5 MW _{el}	4 Cents/kWh	0 Cent/kWh

- 1) For existing and new plants using palm or soy bean oil for power production, the NawaRo bonus is only granted in addition for power, if evidence is provided that such plants generate power from sustainably grown biomass in the sense of the regulation according to EEG § 64, clause 2, no.1.
- 2) During the period from the 1st of January 2009 to the effective date of the sustainability regulations but in any case to the 31st of December 2009 by the latest, this regulation does not apply for plants that have been commissioned or ordered prior to the 5th of December 2007.

NawaRo bonus for the power production from gaseous biomass

“NawaRo bonus” amount – gaseous biomass (excluding biogas)

Performance share	EEG 2009
up to and including 150 kW _{el}	6 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	6 Cents/kWh
> 500 kW _{el} up to and including 5 MW _{el}	4 Cents/kWh

NawaRo bonus for power production from biogas

The NawaRo bonus for power generated with biogas plants subject to a permission according to the Federal Immission Control Act that commissioned after the 31st of December 2008 is only granted if the fermentation residuals storage is equipped with a gas-tight cover and additional gas consumer installations (e.g. gas flare) are used for hazardous incidents or in case of an over-production.

“NawaRo bonus” amount – biogas

Performance share	EEG 2009
up to and including 150 kW _{el}	7 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	7 Cents/kWh
> 500 kW _{el} up to and including 5 MW _{el}	4 Cents/kWh



Increase of the NawaRo bonus, if a minimum slurry share (according to the regulation (EG) no. 1774/2002 of the European Parliament as of October 3rd 2002 incl. the hygiene regulations for animal by-products not intended for human consumption (ABI. EG Nr. L 273 S. 1), as amended by the regulation (EG) no. 2007/2006 of the European Commission as of December 22nd 2006 (ABI. EU Nr. L 379 S.98) is used for power generation.

Annex 2, item VI (to § 27, clause 4, no. 2b) EEG

“The bonus ... is increased for power from biogas plants ..., if the slurry share ... amounts to a least 30 mass percent at any time.”

The minimum slurry share must be evidenced by an environmental expert opinion.

Slurry bonus amount ¹⁾

Performance share	as from 2009
up to and including 150 kW _{el}	4 Cents/kWh
> 150 kW _{el} up to and including 500 kW _{el}	1 Cent/kWh

¹⁾ The slurry bonus cannot be claimed for power from plants, in which gas (biomethane) taken from the gas network is used for power generation.

Increase of the NawaRo-Bonus, if a minimum share of landscaping material is used for power generation.

Annex 2 item VI (to § 27, clause 4, no. 2c) EEG

“The bonus ... is increased for power from biogas plants ..., if the power is mainly generated with plants or plant elements from landscaping activities.”

The landscaping material share must be evidenced by an environmental expert opinion.

Landscaping bonus amount

Performance share	as from 2009
up to and including 500 kW _{el}	2 Cents/kWh

5. Bonus for cogeneration power production – “KWK-bonus”

Annex 3, item I (to § 27, clause 4, no. 3) EEG

“The KWK bonus can be claimed ... up to and including a plant output of 20 megawatt, provided that ... the claim refers to electrical power ... as defined by the Cogeneration Act ...”

“KWK” power is the calculatory result of the useful heat and CHP coefficient of the cogeneration plant (CHP). In case of plants that are not equipped with heat removal systems, the complete net power generation consists of cogeneration power (Cogeneration Act, § 3, clause 4).

The reasonable use of the heat generated from the power production must be evidenced.

Reasonable heat utilisation according to the use option specified in the KWK positive list

KWK positive list according to EEG, annex 3, item III

- Heating, hot water supply or cooling of buildings according to § 1, clause 1, no. 1 of the German Energy Saving Regulation up to a heat input of 200 kWh per square meter of useful space per year,
- Heat supply into a network with a minimum length of 400 m and a heat distribution and transfer loss not exceeding 25 % of the heat consumer's useful heat demand,
- Usage as process heat for industrial processes according to the 4th Regulation on the Implementation of the Federal Immission Control Act as of March 14th 1997 (BGBl. I p. 504), most recently amended by article 3 of the Act as of October 23rd 2007 (BGBl. I p. 2470), and the production of wood pellets for combustion purposes,
- Heating of operating buildings for poultry farming, if the replacement of fossil energy resources is evidence and the heat supply leads to additional costs of at least 100 Euro per kW of heat output,
- Heating of animal stables with the following upper limits:
 - Poultry fattening: 0.65 kWh per animal,
 - Sow husbandry: 150.0 kWh per sow and year, as well as 7.5 kWh per piglet,
 - Piglet breeding: 4.2 kWh per piglet,
 - Pig fattening: 4.3 kWh per porker,

- Heating of under-glass installations for the cultivation and reproduction of plants, if the replacement of fossil energy resources is evidence and the heat supply leads to additional costs of at least 100 Euro per kW of heat output,
- Usage as process heat for treating fermentation residuals for fertiliser production.

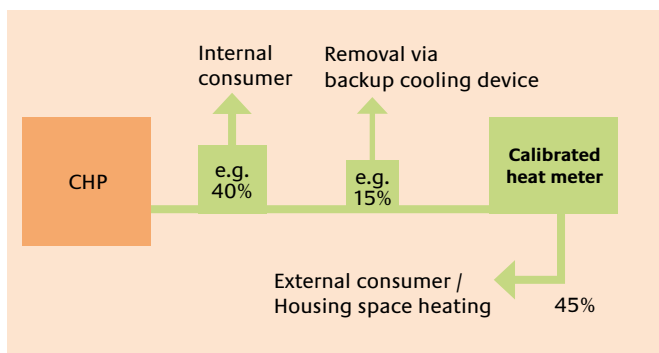
The heat usage is equally reasonable, if the replacement of fossil energy resources is evidenced and the heat supply leads to evidenced additional costs of at least 100 Euro per kW of heat output.

“KWK bonus” amount

Performance share	as from 2009
Power from plants up to and including 20 MW_{el} that have produced power in cogeneration plants for the first time after December 31st 2008 (evidence of reasonable heat usage)	3 Cents/kWh
Power from other existing plants with an output of up to and including 500 kW_{el} , produced in cogeneration plants according to the EEG 2009 requirements	3 Cents/kWh
Existing plants up to and including 20 MW_{el} with a heat usage according to EEG 2004 requirements	2 Cents/kWh

KWK bonus calculation

A cogeneration bonus (KWK bonus) is exclusively paid for the cogeneration power, i.e. the share of the electrical power corresponding to the heat share being used outside of bioenergy plants (see illustration below). The power required to couple out the measured heat quantity can be calculated from the aggregate's CHP coefficient and the measured heat quantity.



Source: KTBL Faustzahlen (2007), changed BMELV

KWK bonus calculation example for a bioenergy plant

Produced thermal energy	700,000 kWh
Produced electrical energy	400,000 kWh
CHP coefficient of the cogeneration unit	0.571
Externally used thermal energy	350,000 kWh

$$\text{Cogeneration power} = \frac{400,000 \text{ kWh} \times 350,000 \text{ kWh}}{700,000 \text{ kWh}} = 200,000 \text{ kWh}$$

According to this calculation, 400,000 kWh of electrical power are required for a heat output coupling of 350,000 kWh. The power share, for which the plant operator is entitled to the corresponding KWK bonus in addition to the power compensation, is calculated by multiplying the externally used heat with the cogeneration unit's CHP coefficient.

Compliance with sustainability criteria

The sustainable production and use of vegetable raw materials and energy sources is a basic prerequisite for their use.

§ 64, clause 2 EEG

“The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is authorised with the agreement of the Federal Ministry of Food, Agriculture and Consumer Protection, ... to regulate ... that the compensation claim for power generated from biomass only exists if evidence is provided that ... certain requirements with regards to a sustainable cultivation of agricultural and forestry lands and the protection of natural habitats have been met during the cultivation of the used biomass ...”

A large variety of approaches for sustainable production methods exists for the European agriculture and forestry. Testing and developing these approaches in research projects is among the key promotion objectives of the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV).

The pursued strategies include a.o.:

- Increase of the species variety in energy plant cultivation,
- Breeding new varieties,
- New cultivation methods with reduced pesticide and fertiliser usage and year-round vegetated fields,
- Use of highly efficient conversion processes,
- Cascaded use models with a material and subsequently energetic use of renewable resources, and
- Residuals recycling as fertiliser.

The agricultural markets have been globalised for a long time. Therefore, the need for bioenergy and renewable raw materials is increasingly satisfied on global markets, without considering sustainability issues. The tropes incur other problems than Europe, due to rainforest spaces being cleared for the cultivation of food, forage and energy plants, like oil palms and soy beans, workers are exploited and native habitants are banished.

A pilot project for implementing a certification concept funded by the BMELV is intended to find a remedy. The objective is, in a first step, to only approve biomass with a sustainability certification for the production of biomass fuels. Subsequently, the certificates must also be applied to all usage paths for agricultural raw materials in order to void shifting effects. The certification project, which is at the onset of a two-years test phase, therefore is equally suited as an instrument for testing the sustainability requirements of various draft laws on national and EU level.

For more information on the certification of sustainability criteria, visit the website www.iscc-project.org.

EEG Clearing Body (EEG-Clearingstelle)

The EEG-Clearingstelle has started its work in October 2007. Its statutory task is to clear disputes and application issues with regards to the EEG.

The EEG clearing house interferes in case of disputes related to the EEG in order to find an acceptable solution for two or more parties (settlement procedure) and examines concrete cases without any legal commitment as a neutral mediator upon the parties' request (opinion procedure) or provides recommendations on the interpretation and application of the EEG (recommendation procedure).

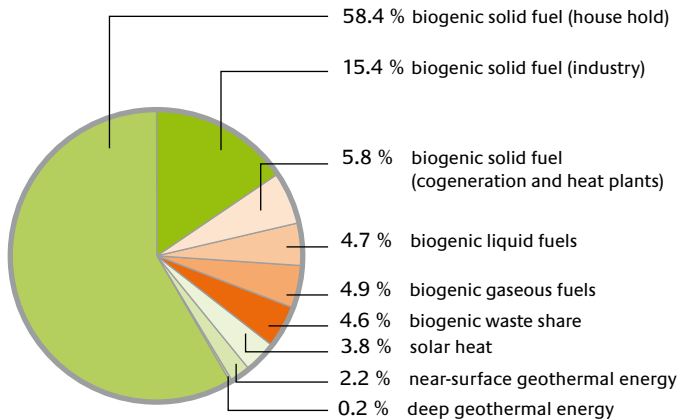
For more information on the Clearingstelle EEG and its work, please contact:

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Act on Granting Priority to Renewable Energies in the Heat Sector (EEWärmeG)

EEWärmeG – an instrument for realising energy-political targets in the heat sector

The EEWärmeG serves as an instrument for promoting renewable energies in the heat sector. The objective of this act is to enable a sustainable energy supply development and to develop heat generation technologies. The share of renewable energies in the heat supply in Germany amounted to 7.7 percent (108,7 TWh) in 2008 – more than 93 percent of this heat were generated from biomass.



Source: BMU based on AGEE-Stat as of April 2009

The heat usage from renewable energies is planned to be increased with the commencement of the EEWärmeG on the 1st of January 2009.

§ 1, clause 2 EEWärmeG

“... Purpose ... of this act is to ..., increase the share of renewable energies in the final energy consumption for heat (ambient, cooling and process heat, as well as hot water) to 14 percent by 2020.”

Introduction of a use obligation for renewable energies

This use obligation applies to all new buildings with a floor space exceeding 50 m². It does not apply for projects, for which a building application or building notices has been filed prior to the 1st of January 2009.

§ 3, clause 1, EEWärmeG

“Owners of new buildings must cover the heating energy demand with a proportionate use of renewable energies.”

The use obligation does not apply to:

- Operational buildings that are mainly used for animal breeding and husbandry,
- Operational buildings that must be held open permanently and to a large extent due to their purpose,
- Underground structures,
- Under-glass installations and growing rooms for the breeding, reproduction and sale of plants,
- Air-inflated structures and tents,

- Buildings that are intended to be erected and dismantled repeatedly and temporary buildings with a planned service life of up to two years,
- Buildings that are intended for church service and other religious purposes,
- Residential buildings with an annual usage period of less than four months,
- Other operational buildings that need to be cooled to an indoor temperature not exceeding 12°C or heated less than four months and cooled less than two months per year, and
- Buildings that are part or secondary facilities of a plant covered by the application scope of the Greenhouse Gas Emission Trading Act ... as amended from time to time.

Contribution of the various renewable energy sources to the compliance with the usage obligation

Use of solar radiation energy:

The heating energy demand must be covered by at least 15 % from solar radiation energy. The thermophotovoltaic devices must be certified with the “Solar Keymark” quality mark.

- Residential buildings with a maximum of 2 apartments require thermophotovoltaic devices with an aperture of at least 0.04 m² per m² floor space.
- Residential buildings with more than 2 apartments require thermophotovoltaic devices with an aperture of at least 0.03 m² per m² floor space.

Use of gaseous biomass:

The heating energy demand must be covered by at least 30 % from gaseous biomass (from cogeneration).

Use of solid biomass (fulfilment of the efficiency requirements): The heating energy demand must be covered by at least 50 % from solid biomass.

Use of liquid biomass (fulfilment of the sustainability criteria): The heating energy demand must be covered by at least 50 % from liquid biomass. The implemented boilers must correspond to the best available technology.

Use of geothermal energy/geothermal heat (fulfilment of efficiency requirements): The heating energy demand must be covered by 50 % through plants using geothermal energy and geothermal heat.

Alternative measures for fulfilling the use obligation

Building owners can also fulfil the legal use obligation by not using renewable energies but rather taking alternative measures.

- Coverage of at least 50 % of the heating energy demand through plants using waste heat (especially from heat pumps or ambient air equipment with heat recovery),
- Coverage of at least 50 % of the heating energy demand from highly efficient cogeneration plants according to the EU guideline 2004/8/EG,
- Energy-saving measures based on the standards of the Energy Saving Regulation,
- Coverage of the heating energy demand through a local or block heating supply network (heat mainly coming from renewable energies or by at least 50 % from plants using waste heat or by at least 50 % from cogeneration units or by at least 50 % from a combination of renewable energies, waste heat and cogeneration heat).

Renewable energies and alternative measures can also be combined for compliance with the use obligation.

Exceptions from the use obligation

The obligation to use renewable energies to cover the heating energy demand can also be omitted.

§ 9 EEWärmeG

“The obligation ... is omitted, if ... the fulfilment of the latter and the performance of alternative measures ... contradict to public legal obligations or ..., as the case may be, are technically unfeasible or ... if the competent authority exempts the obligor upon request ...”

The authorities' competence is administered by the Federal States.

Promotion of renewable energies for heat generation

The budget of the market incentive programme is increased for this purpose.

§ 13 EEWärmeG

“The Federal Government ... supports the use of renewable energies for heat generation with up to Euro 500 million per year from 2009 to 2012.”

- Investment subventions via the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA) (Federal Office for Business and Export Control), Frankfurter Strasse 29-35, 65760 Eschborn, www.bafa.de
- Repayment subventions via the Kreditanstalt für Wiederaufbau (KfW) (Reconstruction Loan Corporation), applications can be filed with the respective main bank, www.kfw-foerderbank.de

Eligible measures

Construction and extension of:

- Solar thermal plants,
- Plants for the use of biomass (efficient and low-emission pellet ovens and pellet central heatings, wood-chip heatings and split-log gasification boilers),
- Plants for using geothermal energy and heat, as well as
- Local heat networks, heat reservoirs and eventually transfer stations for heat consumers.

Various bonus payments are equally granted in addition to the basic support:

- Regenerative combination bonus,
- Circulating pump bonus and
- Depending on the plant type: 2 different efficiency bonus levels.

Furthermore, an innovation subvention is granted for the equipment and/or retrofitting with fine particle filter and waste-gas heat exchangers (condensing boiler technology).



Economic comparison of wood and fuel oil heating

Calculation example for a period property single-family home having an annual fuel demand of 28 MWh for heating and hot water subsequently to energetic retrofitting works.

	Heating oil	Pellets	Split-log
Energy content (kWh/l and/or kWh/kg)	10	5	4.15
Fuel quantity/year	2,800 l	5.6 t	15 st.
Fuel price	73 Cents/l	190 €/t	60 €/st.
Specific fuel costs (Cent/kWh)	7.30	3.80	3.15
Annual fuel costs	2,044 €	1,064 €	900 €
Operation-specific costs/year (a.o. maintenance/repair, chimney sweep, auxiliary power)	415 €	656 €	445 €
Equipment investments, incl. boiler, control, process water reservoir (also buffer storage in case of split-log), fuel storage and discharge and installation	8,200 €	16,900 €	12,200 €
Subvention*	0 €	2,700 €	1,325 €
Annual costs with subvention**	666 €	1,010 €	747 €
Total annual costs, incl. maintenance, repair, etc. – with subvention	3,125 €	2,730 €	2,092 €
Specific costs (Cent/kWh, at 90% boiler efficiency)	0.13	0.11	0.09

Source: FNR
st. = stere

* Subvention: BAFA, basic split-log subvention €1125, Pellet boiler €2000, buffer storage €500, circulating pump €200

** Interest: effective interest rate from KfW programmes as of 02/2008 (pellet and split-log gasification boiler 3.24 %, oil heating 5.15 %)

Other programmes for promoting renewable energies

The BMELV publication “Förderung der Energieeinsparung und Umstellung von Energieträgern“ (promotion of energy resources savings and transitions) (Spring 2009) includes more information

- **Guideline for the promotion of demonstration projects in the energetic use of renewable raw materials** for promoting plants and procedures that represent the state of the art in science and technology or an innovative procedure combination in the selected application area (www.fnr.de),
- **Promotion programme for renewable raw materials** for promoting projects that address the energetic and material use of renewable raw materials (vegetable and animal raw materials) from agriculture and forestry (www.fnr.de),
- **Guideline for the promotion of research and development projects** for promoting the introduction of new energy-saving and sustainable energy production technologies in practical agricultural applications,
- **Community task “Improvement of agricultural structures and costal protection (GAK)”**: In the context of the promotion principles for the integrated rural development, promotion of the rural character of aligned infrastructural activities, in particular to tap agricultural and touristic development potentials in the framework of an income diversification of agricultural and forestry operations and for the decentralised supply of renewable energies (local heat or biogas pipelines) (www.bmelv.de),

■ **GAK:** In the context of the principles for the promotion of individual agricultural operations (part A: AFP promotion of thermal and cold insulation activities; part B: Promotion of investments for diversification, cogeneration units, biomass and biogas plants; part D: Promotion of the energy consultancy for individual operations intended to train agriculturists in the use of energy resources) (www.bmelv.de),

■ **Landwirtschaftliche Rentenbank:** Promotion programmes of the Landwirtschaftliche Rentenbank focussed in agriculture, agricultural and nutrition economics, new energies and rural development (promotion of measures a.o. for a sustainable deployment and storage of fertilisers and pesticides and for improving the energy efficiency in stables and gardening, as well as for the installation of biogas plants and other investments for the recycling of renewable agricultural materials) (www.rentenbank.de).



Compensation table – complete overview

EEG 2009
Basic compensation
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
> 500 kW _{el} up to and including 5 MW _{el}
> 5 MW _{el} up to and including 20 MW _{el}
Emission minimisation bonus
up to and including 500 kW _{el} ^{3) 4)}
Bonus for the power generation with innovative technologies (technology bonus)
Innovative technologies ⁵⁾
Biogas upgrading and supply (new plants: up to a maximum gas treatment plant capacity of 700 Nm ³)
Up to a maximum upgrading plant capacity of 350 Nm ³ treated crude gas per hour
Up to a maximum upgrading plant capacity of 700 Nm ³ treated crude gas per hour
Bonus for the power production from renewable raw materials (NawaRo bonus)
NawaRo bonus for solid biomass
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
> 500 kW _{el} up to and including 5 MW _{el}
NawaRo bonus for liquid biomass
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
> 500 kW _{el} up to and including 5 MW _{el}
NawaRo bonus for gaseous biomass (excluding biogas)
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
> 500 kW _{el} up to and including 5 MW _{el}

New plants	Existing plants
11.67 Cents/kWh ^{1) 2)}	11.67 Cents/kWh
9.18 Cents/kWh ^{1) 2)}	According to year of commissioning
8.25 Cents/kWh ^{1) 2)}	According to year of commissioning
7.79 Cents/kWh ^{1) 2)}	According to year of commissioning
1.00 Cent/kWh	1.00 Cent/kWh
2.00 Cents/kWh	2.00 Cents/kWh
2.00 Cents/kWh	2.00 Cents/kWh
2.00 Cents/kWh	
1.00 Cent/kWh	
6.00 Cents/kWh	6.00 Cents/kWh
6.00 Cents/kWh	6.00 Cents/kWh
4.00 Cents/kWh ⁶⁾	4.00 Cents/kWh ⁶⁾
2.50 Cents/kWh	2.50 Cents/kWh
6.00 Cents/kWh ⁷⁾	6.00 Cents/kWh ^{7) 8)}
0.00 Cent/kWh	6.00 Cents/kWh ^{7) 8)}
0.00 Cent/kWh	4.00 Cents/kWh ^{7) 8)}
6.00 Cents/kWh	6.00 Cents/kWh
6.00 Cents/kWh	6.00 Cents/kWh
4.00 Cents/kWh	4.00 Cents/kWh

EEG 2009
NawaRo bonus for biogas
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
> 500 kW _{el} up to and including 5 MW _{el}
Increase of the NawaRo bonus by a slurry bonus ^{10) 4)}
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
Increase of the NawaRo bonus by a landscaping bonus ¹¹⁾
up to and including 150 kW _{el}
> 150 kW _{el} up to and including 500 kW _{el}
Bonus for the power production from cogeneration (KWK bonus)
Power from plants up to and including 20 MW _{el} , starting power production from cogeneration after the 31 st of December 2008 ¹²⁾
Power from other existing plants up to and including 500 kW _{el} , produced from cogeneration ¹²⁾
Power from other existing plants up to and including 20 MW _{el} , produced from cogeneration (heat use according to EEG 2004)

- 1) The basic compensation can only be claimed for power from plants using biogas tapped from the gas network, if the power has been produced in a cogeneration according to annex 3 of the EEG 2009.
- 2) The basic compensation can only be claimed for plants > 5 MW_{el}, if the power is produced in cogeneration according to annex 3 of the EEG 2009.
- 3) The basic compensation for power from biogas plants is increased, if the formaldehyde limit value corresponding to the emission minimisation instruction "Technical Instructions on Air Quality" (TA Luft)(40 mg/m³ exhaust gas) is observed and certified by the competent authority.
- 4) No compensation can be claimed for power from plants using biogas tapped from the gas network.
- 5) The technology bonus can be claimed for power generated in plants with an output of up to and including 5 MW_{el}.
- 6) Granted for power from the combustion of wood from short rotation forestry and landscaping material.

New plants	Existing plants
7.00 Cents/kWh ⁹⁾	7.00 Cents/kWh
7.00 Cents/kWh ⁹⁾	7.00 Cents/kWh
4.00 Cents/kWh ⁹⁾	4.00 Cents/kWh
4.00 Cents/kWh	4.00 Cents/kWh
1.00 Cent/kWh	1.00 Cent/kWh
2.00 Cents/kWh	2.00 Cents/kWh
2.00 Cents/kWh	2.00 Cents/kWh
3.00 Cents/kWh	3.00 Cents/kWh
-	3.00 Cents/kWh
-	2.00 Cents/kWh

- 7) The bonus for power from palm and soy bean oils is only granted upon evidence of the sustainability criteria according to EEG § 64, clause 2, no. 1.
- 8) From the 1st of January 2009 to the commencement of the sustainability regulations but in any case to the 31st of December 2009 by the latest, this does not apply to plants that have been commissioned or ordered prior to the 5th of December 2007.
- 9) The compensation can only be claimed for power from plants with a fermentation residuals storage equipped with a gas-tight cover and additional gas consumer installations used for hazardous incidents or in case of an overproduction.
- 10) Provided that 30 mass percent of the fermentation substrate volume according to Regulation (EG) no. 1774/2002 consist of slurry at any time.
- 11) The power must be produced mainly from plants or plant elements incurred during landscaping activities.
- 12) The heat use must be reasonable in the sense of the EEG 2009.



Notes

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