



## Germany

Germany is a highly developed OECD country with a radically forward looking set of energy policies, commonly referred to as the *Energiewende* (Energy Transition, see <http://energytransition.de/>). Germany's environmental air quality and energy related policies are created and managed by the *Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety* (see <http://www.bmub.bund.de/en/>). Advice and guidance on technical rules and standards are provided by the *Kommission Reinhaltung der Luft* (Commission on Air Pollution Prevention, see <http://www.vdi.eu/engineering/technical-divisions/commission-on-air-pollution-prevention-of-vdi-and-din/krdl-active-for-clean-air/>), a joint body of the VDI (Verein Deutscher Ingenieure, see <http://www.vdi.eu/index.php?id=2675>) and DIN (Deutsches Institut für Normung e.V, see <http://www.din.de/en/>). General expert advice on the environment and its implications is performed by the *German Advisory Council on the Environment* (Sachverständigenrat für Umweltfragen, SRU, see [http://www.umweltrat.de/EN/TheGermanAdvisoryCouncilOnTheEnvironment/Council/mission\\_node.html](http://www.umweltrat.de/EN/TheGermanAdvisoryCouncilOnTheEnvironment/Council/mission_node.html)).

The *Energy Concept* (see [http://www.germany.info/contentblob/3043402/Daten/1097719/BMUBMWi\\_Energy\\_Concept\\_DD.pdf](http://www.germany.info/contentblob/3043402/Daten/1097719/BMUBMWi_Energy_Concept_DD.pdf)) is a regulatory policy introduced in September 2010, directing the energy transition until 2050. It sets countrywide emission reduction aims, such as a 40% greenhouse gas emissions reduction by 2020 compared to 1990 levels. Multiple other targets are set for future years. However, these targets are not the subject of any legally binding legislation. Instead they are considered '*politically binding*', meaning the government will aim to meet the targets but there are no ramifications if they are not met. In addition, the Energy Concept aims to increase supply of energy from renewable sources, increase energy efficiency and security, create investment in the infrastructure for an efficient electricity grid, increase the number of electric vehicles, and develop new efficient buildings.

The Energy Concept is not regarded as a roadmap or strategic route for decarbonisation and thus there are no objective reduction pathways, nor are there any specifications for the responsibility of industry in the reduction targets. It should also be noted that the Energy Concept is not in favour of any particular technology, and instead operates on a market driven framework, to naturally select the best available technology. A potential future market driver will be the European Union Emissions Trading Scheme (EU ETS, see [http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)), as this will subversively select technologies that emit the least carbon dioxide or other greenhouse gas.

In June 2011, a revised energy package was introduced following the Fukushima accident in Japan. This package of legislation is supplementary to the Energy Concept of 2010, but speeds up its implementation. Most notably, the phase-out rate of nuclear power was increased, with about 40% of the existing nuclear grid capacity coming offline in a single week.

Germany is a member state of the European Union (EU) and is therefore bound by the emission standards legislation that has been summarised within the European Union section of the emission standards database (see <http://www.iea-coal.org.uk/documents/83365/9442/European%20Union>). The current legislative directives that regulate and influence the Emission Limit Values (ELV) for coal power facilities are:

- Industrial Emission Directive (IED – 2010/75/EU, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075>) – for all new facilities and existing installations that 'opt in';

- Large Combustion Plant Directive (LCPD – 2001/80/EC, <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1402653842533&uri=CELEX:32001L0080>) – no longer regulates new facilities;
- National Emission Ceilings for Certain Atmospheric Pollutants Directive (NECD – 2001/81/EC, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0081>) – sets national pollutant limits for individual member state countries that must not be exceeded;
- European Union Emissions Trading Scheme (EU ETS 2009/29/EC, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0029>, which amends 2003/87/EC, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02003L0087-20090625>).

German environmental legislation has been strongly guided and derived from the directives and regulations stipulated by membership of the EU. To meet the requirements of European law the following EU legislation has been transposed and enacted into German law:

- National Emissions Ceilings Directive (2001/81/EC, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0081>) via Neununddreißigste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes Verordnung über Luftqualitätsstandards und Emissionshöchstmengen (39 BImSchV, Regulation on ambient air quality standards and emission ceilings, [http://www.gesetze-im-internet.de/bundesrecht/bimschv\\_39/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/bimschv_39/gesamt.pdf)).
- Regulations for the implementation of the EU directive of the European Parliament and the Council on Industrial Emissions (Integrated Pollution Prevention and Control) (Recast) (2010/75/EU, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075>) has been transposed and separated into three parts, a legislative Act and two regulations, one of which is not relevant to coal:
  - Act for the Implementation of the Directive on Industrial Emissions from 8 April 2013 (Gesetz zur Umsetzung der Richtlinie über Industrieemissionen vom 8 April 2013), published in Bundesgesetzblatt Teil I 2013 Nr. 17 vom 12.04.2013 pp 734-752, available at [http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger\\_BGBl&jumpTo=bgbl113s0734.pdf#\\_bgbl\\_%2F%2F\\*%5B%40attr\\_id%3D%27bgbl113s0734.pdf%27%5D\\_1444324124468](http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl113s0734.pdf#_bgbl_%2F%2F*%5B%40attr_id%3D%27bgbl113s0734.pdf%27%5D_1444324124468);
  - Regulation to Implement the Directive on Industrial Emissions, Amending the Regulations on Pollution Control and Fault Advisor Ordinance and adopting the Decree from 2 May 2013 (Verordnung zur Umsetzung der Richtlinie über Industrieemissionen, zur Änderung der Verordnung über immissionsschutz und störfallbeauftragte und zum Erlass einer Bekanntgabeverordnung vom 2 Mai 2013), published in Bundesgesetzblatt Teil I 2013 No. 21 vom 02.05.2013 pp 973-1020, available at [http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger\\_BGBl&jumpTo=bgbl113s0973.pdf#\\_bgbl\\_%2F%2F\\*%5B%40attr\\_id%3D%27bgbl113s0973.pdf%27%5D\\_1444324204252](http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl113s0973.pdf#_bgbl_%2F%2F*%5B%40attr_id%3D%27bgbl113s0973.pdf%27%5D_1444324204252);
- The Large Combustion Plant Directive via the Ordinance on Large Combustion Plants, Gas Turbines and Internal Combustion Engine Systems (Verordnung über



Großfeuerungs-, Gasturbinen- und Verbrennungsmotoranlagen (13 BImSchV), available from [http://www.bmub.bund.de/themen/luft-laerm-verkehr/luftreinhaltung/luft-reinhalte/download/artikel/13-bimschv-verordnung-ueber-grossfeuerungs-gasturbinen-und-verbrennungsmotoranlagen/?tx\\_ttnews%5BbackPid%5D=695&cHash=3b7033c23834011e9a2f321c3404113e](http://www.bmub.bund.de/themen/luft-laerm-verkehr/luftreinhaltung/luft-reinhalte/download/artikel/13-bimschv-verordnung-ueber-grossfeuerungs-gasturbinen-und-verbrennungsmotoranlagen/?tx_ttnews%5BbackPid%5D=695&cHash=3b7033c23834011e9a2f321c3404113e)).

Currently, emission limit values for air pollutants from coal combustion installations are often stipulated within European directives and then transposed into German law. However, even before EU regulation, Germany was consistently ahead of other EU countries on the implementation of strict emission limit values. This meant there was little effect on the German coal industry when the EU began enforcing its air pollution directives.

Aside from the compliance with the EU legislation a national programme for air quality has been longstanding. National legislation on air pollution revolves around the Federal Immission Control Act (Bundes-Immissionsschutzgesetz, GImSchG, [http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/bimschg\\_en\\_bf.pdf](http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/bimschg_en_bf.pdf)). Following the initial enforcement in 1974, there have been many multiple amendments and ordinances to the Act, affecting a wider range of industries.

Coal combustion facilities with a rated thermal input of less than 50 MW are controlled and regulated by the First General Administrative Regulation Pertaining the Federal Immission Control Act, which is more commonly known as the TA-Luft 2002 (Technische Anleitung zur Reinhaltung der Luft, available at <http://www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/taluft.pdf> or in English, Technical Instructions on Air Quality Control, from [http://www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/taluft\\_engl.pdf](http://www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/taluft_engl.pdf)). This key legislation lays down the air emission limit values for dust (particulates), carbon monoxide (CO), sulphur oxides and nitrogen oxides, given in the table below. Producers of pollution must obtain emissions verification of their operation by TÜV Süd ([http://www.tuev-sued.de/home\\_en](http://www.tuev-sued.de/home_en)) to obtain a TA Luft approval certificate.

If the coal combustion installation has a thermal input greater than 50 MW, then it will be regulated by the 13th Ordinance on the implementation of the Federal Immission Control Act (Verordnung über Großfeuerungs-, Gasturbinen- und Verbrennungsmotoranlagen – 13 BImSchV (Ordinance on Large Combustion Plants, Gas Turbines and Internal Combustion Engine Systems), available at [http://www.gesetze-im-internet.de/bundesrecht/bimschv\\_13\\_2013/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/bimschv_13_2013/gesamt.pdf)). The latest 13 BImSchV incorporate the EU's Industrial Emissions Directive (2010/75/EU). It sets emission limit values for dust (particulates), sulphur oxides, nitrogen oxides, carbon monoxide and mercury, given in the tables below.

### Emission limit values for coal combustion plants in German legislation: TA-Luft 2002

Applicable to plants with a thermal input of less than 50 MW

Pollutant	Plant size, MWth	Daily emission limit value, mg/m <sup>3</sup>
dust	≥5	20
	<5	50
NO <sub>2</sub> (NO + NO <sub>2</sub> )	≥10	400
	<10	500
	all	300 (fluidised bed combustion)
N <sub>2</sub> O	all	150 (fluidised bed combustion)
SO <sub>2</sub> (SO <sub>2</sub> + SO <sub>3</sub> )	all	1300 (for hard coal)
	all	1000 (other fuels)
	all	350 <sup>1</sup> (fluidised bed combustion)
CO	all	150

<sup>1</sup> if the emission limit cannot be met by reasonable effort, then a desulphurisation rate from 25% applies

Reference conditions are 7% O<sub>2</sub> in exhaust gas (dry basis) at 273.15 K and 101.3 kPa.

## Ordinance on Large Combustion Plants, Gas Turbines and Internal Combustion Engine Systems: 13 BImSchV

Applicable to *new plants* (in operation after 7 January 2014) with a thermal input of 50 MW or more.

Pollutant	Plant size, MWth	Emission limit value (ELV), mg/m <sup>3</sup>		
		Daily mean value	Half-hourly mean value	Annual mean value
dust	all >300	10	20	10
NO <sub>x</sub> (NO + NO <sub>2</sub> )	50–100	300	600	250
		400 (pulverised lignite)	800 (pulverised lignite)	250
	>100–300	200	400	100
	>300	150	300	100
		200 (pulverised lignite)	400 (pulverised lignite)	100
SO <sub>x</sub> (SO <sub>2</sub> + SO <sub>3</sub> )	50–100 <sup>3</sup>	400	800	
		350 <sup>1</sup> (fluidised bed)	700 <sup>1</sup> (fluidised bed)	
	>100–300 <sup>4</sup>	200 <sup>2</sup>	400 <sup>2</sup>	
	>300 <sup>5</sup>	150 <sup>2</sup>	300 <sup>2</sup>	
		200 <sup>2</sup> (circulating or pressurised fluidised bed)	400 <sup>2</sup> (circulating or pressurised fluidised bed)	
CO	50–100	150	300	
	>100	200	400	
Hg (mercury and its compounds)	all	0.03	0.05	0.01

<sup>1</sup> a desulphurisation rate of at least 75% must also be achieved

<sup>2</sup> a desulphurisation rate of at least 85% must also be achieved

<sup>3</sup> an alternative desulphurisation rate of 93% must be achieved if the stated daily and half-hourly mean ELV cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

<sup>4</sup> an emission limit value value of 300 mg/m<sup>3</sup> for the daily mean value and 600 mg/m<sup>3</sup> for the half-hourly mean value shall apply and additionally a desulphurisation rate of at least 93% of the daily mean value must be achieved, if the stated daily and half-hourly mean emission limit values cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

<sup>5</sup> an emission limit value of 400 mg/m<sup>3</sup> for the daily mean value and 800 mg/m<sup>3</sup> for the half-hourly mean value shall apply and additionally a desulphurisation rate of at least 97% of the daily mean value must be achieved, if the stated daily and half-hourly mean emission limit values cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

Reference conditions are 6% O<sub>2</sub> in exhaust gas (dry basis) at 273.15 K and 101.3 kPa.

### Ordinance on Large Combustion Plants, Gas Turbines and Internal Combustion Engine Systems: 13 BImSchV

Applicable to *existing plants* (in operation before 7 January 2014) with a thermal input of 50 MW or more.

Pollutant	Plant size, MWth	Emission limit value, mg/m <sup>3</sup>		
		Daily mean value	Half-hourly mean value	Annual mean values
dust	all >300	20	40	10
NO <sub>x</sub> (NO + NO <sub>2</sub> )	50–100	300 <sup>1</sup>	600 <sup>1</sup>	
	>100–300	400 <sup>2</sup> (pulverised lignite)	800 <sup>2</sup> (pulverised lignite)	
	>300	200 <sup>3</sup>	400 <sup>3</sup>	
SO <sub>x</sub> (SO <sub>2</sub> + SO <sub>3</sub> )	50–100 <sup>11</sup>	200	400	
	>100–300 <sup>12</sup>	350 <sup>5</sup> (fluidised bed)	700 <sup>5</sup> (fluidised bed)	
	>300 <sup>13</sup>	200 <sup>6,7,8</sup>	400 <sup>6,7,8</sup>	
CO	50-100	150	300	
	>100	200 <sup>10</sup>	400 <sup>10</sup>	
Hg (mercury and its compounds)	all	0.03	0.05	0.01

<sup>1</sup> for plants in operation before 27 November 2003 which do not operate for more than 1500 operating hours per year as a rolling average over a period of 5 years, an emission limit value of 450 mg/m<sup>3</sup> for the daily mean value and 900 mg/m<sup>3</sup> for the half-hourly average must be achieved

<sup>2</sup> for plants in operation before 27 November 2003, an emission limit value of 450 mg/m<sup>3</sup> for the daily mean value and 900 mg/m<sup>3</sup> for the half-hourly average must be achieved

<sup>3</sup> for plants in operation before 27 November 2003 which do not operate for more than 1500 operating hours per year as a rolling average over a period of 5 years, an emission limit value of 400 mg/m<sup>3</sup> for the daily mean value and 800 mg/m<sup>3</sup> for the half-hourly average must be achieved

<sup>4</sup> for plants in operation before 27 November 2003 which do not operate for more than 1500 operating hours per year as a rolling average over a period of 5 years (except for fluidised bed combustion), an emission limit value of 800 mg/m<sup>3</sup> for the daily mean value and 1600 mg/m<sup>3</sup> for the half-hourly average must be achieved

<sup>5</sup> a desulphurisation rate of at least 75% must be achieved

<sup>6</sup> a desulphurisation rate of at least 85% must be achieved

<sup>7</sup> for plants in operation before 27 November 2003, an emission limit value of 250 mg/m<sup>3</sup> for the daily mean value and 500 mg/m<sup>3</sup> for the half-hourly average must be achieved, and a desulphurisation rate of at least 75% in fluidised bed combustion and at least 60% in other furnaces must be met

<sup>8</sup> for plants in operation before 27 November 2003 which do not operate for more than 1500 operating hours per year as a rolling average over a period of 5 years (except for fluidised bed combustion), an emission limit value of 800 mg/m<sup>3</sup> for the daily mean value and 1600 mg/m<sup>3</sup> for the half-hourly average must be achieved, and a desulphurisation rate of at least 75% in fluidised bed combustion and at least 60% in other furnaces must be met

<sup>9</sup> for plants in operation before 27 November 2003 which do not operate for more than 1500 operating hours per year as a rolling average over a period of 5 years, an emission limit value of 300 mg/m<sup>3</sup> for the daily mean value and 600 mg/m<sup>3</sup> for the half-hourly average must be achieved. A desulphurisation rate of 85% must also be met

<sup>10</sup> for plants in operation before 27 November 2003, an emission limit value of 250 mg/m<sup>3</sup> for the daily mean value and 500 mg/m<sup>3</sup> for the half-hourly average must be achieved

<sup>11</sup> an alternative desulphurisation rate of at least 92% of the daily mean value must be achieved if the stated emission limit value cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

<sup>12</sup> an emission limit value of 300 mg/m<sup>3</sup> for the daily mean value and 600 mg/m<sup>3</sup> for the half-hourly mean value shall apply and additionally a desulphurisation rate of at least 92% of the daily mean value must be achieved, if the stated daily and half-hourly mean emission limit values cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

<sup>13</sup> an emission limit value of 400 mg/m<sup>3</sup> for the daily mean value and 800 mg/m<sup>3</sup> for the half-hourly mean value shall apply and additionally a desulphurisation rate of at least 96% of the daily mean value must be achieved, if the stated daily and half-hourly mean emission limit values cannot be met by reasonable effort due to the sulphur content of the indigenous fuels

Reference conditions are 6% O<sub>2</sub> in exhaust gas (dry basis) at 273.15 K and 101.3 kPa.

This paper reflects the IEA CCC understanding of the relevant legislation and is not a substitute for the official version. The IEA CCC does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use.

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