

# GERMANY

*By Per Nicolai Martens*

*Aachen University, Institute of Mining Engineering*

**A**s in previous years, in the course of 2000, the overall economic growth in Germany has further increased. The export of goods and services rose by 12.9% in real terms. In the previous year the increase amounted to 5.1%. After slackening during the years before, the impetus for development increased, although the increase in domestic demand dropped from 2.4% in 1999 to 2.1% in 2000. The country's Gross National Product (GNP) amounted to €2.02 billion<sup>1,2</sup>, which is 2.7% more than in 1999. The Gross Domestic Product (GDP) rose by 3.1% to €1.97 billion<sup>2,3</sup> in real terms, compared with 1.6% growth previously.

Growth in economic performance (measured by GDP at 1995 prices per employee) resulted from an increase of 1.5% in productivity (0.5% previously). The number of those in employment, compared with the year before, grew by 584,000 (1.5%) to 38.5 million. The annual average figure for those registered as unemployed fell by 5.3% to 3.25 million.

The slump in the construction industry, which started at the beginning of 1995, continued in 2000. The real gross value added dropped by 3.8% after the small 0.9% growth in the previous year. This is the sixth year of declining economic performance of the building trade.

In 2000, German smelting works produced 30.84 Mt of pig iron and 46.37 Mt of crude steel. Compared with 1999, this corresponds to an increase of 10.4% in pig iron production and an increase of 10.2% in crude steel production. The positive trend, which was apparent during the fourth quarter of 1999,

continued in 2000. The total input of reducing agents in blast furnaces increased; the consumption of coal dust remained unchanged at 82 kg/t. The specific consumption of coke increased by 21 kg/t of pig iron to 375 kg/t and the specific consumption of fuel oil dropped from 40 kg/t to 28 kg/t of pig iron, due to the price trend.

## Energy

The consumption of primary energy in Germany dropped slightly to 484 Mtce<sup>3</sup> in 2000. This is 1.1 Mtce, or 0.2%, less than in 1999. This development was influenced by two reverse trends: first, a decrease can be attributed to the fact that the year under review had warmer weather than the year before; second, the decrease was moderated by increasing overall economic growth. Besides, on January 1, 2000, the second stage of an ecological tax reform came into force and caused an increase in energy prices. Since then an additional levy on fuel (gasoline and diesel) of 3 c/l<sup>4</sup> (6 c/l in total) has been imposed. Furthermore, electricity is taxed at 1.25 c/kWh (+0.25 c/kWh). Ecological taxes for fuel oil (2 c/l) and gas (0.16 c/kWh) remained unchanged.

The subsequent stages of the ecological tax reform, which will come into force at the beginning of 2001, 2002 and 2003, will further increase the ecological taxes on fuel and electricity. Exceptions from taxation apply to manufacturing industries and agriculture. If their ecological tax burden exceeds €511 per year the ecological tax for electricity, fuel oil and natural gas is reduced to 20% of the applicable ecological tax.

<sup>1</sup> The unit 'milliard' used in Germany has been exchanged for its US equivalent, 'billion' (10<sup>9</sup>)

<sup>2</sup> Figures quoted for 2000 are provisional or estimated.

<sup>3</sup> tce = tonne coal equivalent = 8,140 kWh

<sup>4</sup> Figures in cs are rounded due to conversion to euro. Taxes since January 1, 2000: fuels 12 Pf/l, electricity 2.5 Pf/kWh, heating oil 4 Pf/l and gas 0.32 Pf/l

Compared with the previous year, the shares of the energy carriers of total consumption remained almost unchanged. Mineral oil is still the most important supplier of primary energy, with a 38.7% share, followed by natural gas with 21.1%. The remaining two fifths of total primary energy consumption are shared by hard coal (13.5%), nuclear energy (13.0%) and lignite (10.9%), hydroelectricity and wind power (0.8%), miscellaneous energy sources (1.9%) such as firewood, sludge and waste, as well as an import surplus of 0.1% (0.3 Mtce) of electric power.

In absolute figures, Germany's energy balance is as follows: the consumption of mineral oil fell to 186.9 Mtce (-2.4%), natural gas to 102.1 Mtce (-1.2%) and nuclear energy to 63.1 Mtce (-0.2%). Against this, consumption of hard coal rose to 65.5 Mtce (+1.6%), lignite to 52.6 Mtce (+5.0%), hydroelectricity and wind power to 3.7 Mtce (+23.3%) and miscellaneous energy sources to 9.4 Mtce (+3.3%).

The lower demand from private consumers for natural gas, caused by the mild climate, was not completely compensated by an increase in the total number of households using gas heating. Without the temperature influences, the demand for natural gas would have risen by 0.8%. The use of natural gas in industry rose by 3% while it fell by 7% in power plants. Due to the mild weather, sales of heating oil fell by 5.8% after a 14% slump in 1999. Also, sales of gasoline dropped (-4.3%). This was caused by more economical vehicles and an increase of gasoline prices of 18% compared with the year before, which led to a decrease of private vehicle use.

Despite increasing goods traffic, sales of diesel fuel increased moderately (by 0.5%), and consumption of fuel for air traffic increased by 5.4%. The demand for household coal decreased by 7.5% to 0.49 Mt. Power generation from regenerative sources in Germany rose by 18% to 34.1 TWh. Because of this, the share of renewable

energy sources in total power generation increased from 5.9% to 6.0%. Reasons for this were an above average availability of water-power and the continued expansion of new wind-power plants.

Hydroelectricity usage rose by 4.1% to 20.5 TWh and was the most significant regenerative energy source, followed by wind power, which rose by 67.3% to 9.2 TWh. Power generation from biomass and the combustion of waste amounted to 4.5 TWh, an increase of 20% compared with the previous year. Power systems employing photovoltaics raised power production by 40% to 50 GWh.

### Coal Mining

Since the start of 1999, all German hard coal mines are under the ownership of Deutsche Steinkohle AG (DSK). This follows the merger of the former independent mining companies Ruhrkohle Bergbau AG and Saarbergwerke AG into DSK in 1998, and the joining of Preussag Anthrazit GmbH as "DSK Anthrazit Ibbenbüren GmbH" on January 1, 1999.

In 2000, three of the country's remaining 15 hard coal mines were shut down, resulting in 12 operating hard coal mines in Germany. DSK's mines had an overall output of 33.3 Mt. This is 5.9 Mt (15.1%) less than in 1999. The number of workers and staff kept on falling, down 12.5% (8,332) to 58,082.

Compared with the previous year, the average daily output per mine dropped to 9,890 t (-6.5%). However, the average annual production per underground worker increased by 2.0% to 1,057 t, and the performance per manshift increased by 7.3% to 6.685 t.

The German market for coal, which had decreased to 64.5 Mt in 1999, increased by 1.6% to approximately 65.5 Mt due to development of the steel industry. Total imports of coal, coal briquettes and coke rose to approximately 28 Mtce (+25.6%). The share of coke amounts to 6 Mtce (+50%).

Germany-based RAG owns 14 coal mines in the US. Its eight underground and five open-pit operations produce about 54 Mt/y and employ approximately 3,000 workers. One underground mine is currently out of production due to a mine fire. In Australia, RAG holds interests in one open-pit and two underground mines. In Venezuela, RAG owns a 25% interest in an open-pit mine.

Output from German lignite mines increased to 167.7 Mt in 2000, which is 4.0% (6.4 Mt) more than the year before. Lignite consumption rose from 50.1 Mtce (1999) to 52.6 Mtce, and the output from mines in eastern Germany increased by 10%. In the Lausitz field the rise amounted to 7.8% (4.0 Mt up to 55.0 Mt) and in the Middle-German field to 19.1% (2.6 Mt to 16.4 Mt). Output in western Germany remained almost unchanged at 96.3 Mt.

The biggest share of production, with 91.9 Mt, came from the Rhineland field. Most of the remaining production came from the Helmstedt field (4.1 Mt). Continuous decreases in briquette production (-12.2%) were compensated by higher sales to power plants. Modernisation of power plants in eastern Germany is completed, which led to higher demand for lignite. In western Germany, in the Rhineland, modernisation has started.

In 2000, 153 Mt of lignite (91% of the total production) were used for the generation of power and district heating. The new power plants in eastern Germany were built next to the opencast mines and guarantee stable and long-term sales. Some 12.1 Mt of total lignite production have been used for refined products. This is 3.3% less than during the previous year. Sales of coal for fluidised bed combustion (+20.6%), coke (+3.1%) and dust coal (+6.1%) rose. In the case of briquette production, the structural adaptation process continued with a decrease of 12.2%.

In order to keep power generation from lignite competitive, modernisation and structural

adaptation measures are still in progress. Because of these measures the number of people employed in lignite mining continued to fall, in western Germany by 9.2% to 11,210, in eastern Germany by 10.4% to 10,077.

Apart from domestic lignite mining, Rheinbraun AG is also active in Hungarian lignite mining with a share of 21% of Matra, a Hungarian mining and power generation company, and a joint venture with Maritza Istock AG, a Bulgarian lignite producer. Moreover, Rheinbraun AG increased its share in Pittsburgh-based Consol Energy Inc., the fourth biggest hard coal producer of the US, from 68% to 74%.

### Potash and Rocksalt Mining

In 2000, German potash mines had an output (gross production) of 35.9 Mt (-1.9%) and produced 3.41 Mt of K<sub>2</sub>O (-4.1%). Germany's share of the total world potash production dropped slightly to approximately 13%. On the European market, Germany's Kali und Salz GmbH is the leader by far. At the end of the year, 7,185 people (+0.7%) were employed in potash mines.

Agriculture is the most important customer of the potash industry. In 2000, sales of fertiliser amounted to 6.5 Mt (-4.4%). Outside agriculture 1 Mt of products containing potash and magnesium were sold.

In 2000, €123.7 million were spent to safeguard production, modernise plants and improve production processes. The most important investment was a magnesium sulphate (kieserite) production plant project at the Sigmundshall mine.

The German Salt Industry Union reports that sales by its members fell 32.6% to 3.40 Mt in 2000. In 1999, sales amounted to 5.05 Mt. Sales of rocksalt decreased from 4.27 Mt (1999) to 2.68 Mt in 2000 (-37.3%) and sales of brine were reduced from 0.78 Mt to 0.73 Mt (-7.3%).

**Oil and Natural Gas**

Oil production from domestic sources reached 3.12 Mt in 2000. This is 13.9% more than the previous year. After a long-term downward trend, which was interrupted in 1998 but continued in 1999, the German oil producers achieved the highest output since 1992. At the end of 2000, proven and probable reserves of oil amounted to 49.7 Mt, which is 2.1 Mt or 4.1% less than at the end of the previous year.

Production of natural gas<sup>5</sup> amounted to 20.1 billion m<sup>3</sup>. This is a decrease of 5.4% compared with the all-time high reached in 1999 (the share of petroleum gas amounted to 0.16 billion m<sup>3</sup>). Domestic production met 21% of the German demand for natural gas. During processing of natural gas, which contains hydrogen sulphide, 1.1 Mt of sulphur were produced, a decrease of 9.3% compared with the previous year. At the end of 2000, proven and probable reserves of natural gas were estimated to be 342.3 billion m<sup>3</sup> (up 16.7%).

The state of Lower Saxony has by far the major share of the total German production of oil and natural gas. The output of natural gas dropped to 18.97 billion m<sup>3</sup> (94.4%) after 20.41 billion m<sup>3</sup> (96.1%) and oil output fell to 1.59 Mt (51.0%) after 1.65 Mt (60%) in 1999. In oil production, the state of Schleswig-Holstein is increasing in significance because of higher output from the Mittelplate field due to the startup of new production drills (Dieksand). In 2000, the share of production amounted to 43.8% (+0.47 Mt). Other German states are of secondary importance for the production of oil and natural gas.

In 2000, the total drill meterage dropped by 39.4% to 41.4 km, compared with the year before. This includes exploration as well as production drilling. The annual average of employees of 22 companies participating in the Industrial Oil and Gas Association was 5,984 (-0.6%). About half of the employees worked in surveying (6.5%), drilling (6.8%) and production (36.0%). The relatively low decrease in employment results from new members of the association. Without this effect the decrease is 6.2%.

Activities of German companies in foreign countries resulted in natural gas production of 3.8 billion m<sup>3</sup> and mineral oil production of 17.3 Mt. The oil production was concentrated in Africa (49.2%) and the Middle East

Mineral Production				
Item	Units	1998	1999	2000
<b>Energy</b>				
Coal	Mt	41.3	39.2	33.3
Lignite	Mt	166.2	161.3	167.7
Oil	Mt	2.9	2.7	3.1
Natural gas	10 <sup>9</sup> m <sup>3</sup>	19.9	21.2	20.1
Primary energy consumption	Mtce	489	485	484
<b>Others</b>				
Potash	Mt	37.1	36.6	35.9
Rock salt	Mt	6.7	5.1	3.4
Gravel and sand	Mt	370	383	361
Quartz and quartzsand	Mt	35.5	36.7	na
Quartzite	Mt	1.6	1.7	na
Limestone	Mt	19.8	20.7	na
Gypsum	Mt	2.5	2.2	na
Feldspar	'000 t	469.9	500.9	na
Pegmatite	'000 t	312.1	586.8	na
Kaolin	Mt	3.4	3.5	na
Bentonite	'000 t	509	477	na
Graphite	t	270	3,891	na
Fluorspar	'000 t	60.9	66.1	76.9
Barytes	'000 t	210	200	187

Na: Not yet available.

<sup>5</sup> Production of natural gas in m<sup>3</sup> with 9.7692 kWh.

(20.8%). Foreign natural gas production was focused on America (57.3%) and Western Europe.

### **Other Minerals**

Only data for 1999 are available for miscellaneous minerals, with the exception of fluorspar, barytes, gravel and sand. Production of fluorspar from the Clara pit increased by 16.3% compared with the

previous year to 76,886 t, whereas barytes production from the Wolkenhügel, Dreislar and Clara pits decreased by 6.7% to 186,950 t. Output of gravel and sand fell 5.7% to 360.7 Mt, which was mainly due to the poor performance of the building trade. In total, nearly 1,700 companies, with about 3,500 operations, are active in this business and employ approximately 30,000 workers.