The world population is growing by 78 million people every year. Within five decades the total world population has doubled since 1960. Currently one quarter of the world population of some six billion people does not have access to electricity. Thus, compared to any other source of energy, the demand for electricity will increase more rapidly. It is expected that the worldwide electricity consumption will double from currently 16 100 billion kWh to a total of 31 600 billion kWh by the year 2030.

About one fifth of the electricity generated worldwide is consumed in the European Union (EU-25: 3 180 billion kWh). An increase in demand of 35% is expected by 2030.

According to experts, fossil fuels will continue to cover the major share of the increasing demand. In 2030 still 70% of the electricity generated worldwide will be based on fossil fuels. This means for EU-25 that 60% of the electricity generated will be based on fossil fuels.

Renewable sources of energy (renewables) will play an important role in the worldwide consumption of primary sources of energy. Nuclear energy will also keep its position worldwide, and in some countries its share will even be extended.
Worldwide, the reserves and resources of fossil sources of energy as well as of uranium are still sufficient, especially when taking into account unconventional deposits (resources), with hard coal, lignite and uranium having the largest deposits. However, the uneven regional distribution of these deposits results in a growing dependence of the EU-25. Only 5% of the worldwide known fossil reserves are situated within EU-25. These deposits amount to 75 billion tce and comprise mainly lignite and hard coal. The natural gas and crude oil reserves amount to approx. 5 billion tce. The dependence on imported coal will increase in Europe from currently 30% to 66% in 2030. The dependence on natural gas will rise to 81% and for crude oil this figure will increase to even 88%. The total share of imported energies will increase from currently 50% to some 70% by the year 2030.

The reasons for this development are due to decisions of single countries to phase out nuclear power as well as due to the less economical production of individual energies in Europe. In the long term, lignite will be the only fossil fuel that can be mined economically, i.e. at competitive prices in open-cast mines.

**Static range of sources of energy worldwide as well as reserves and resources (in years)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Conventional</th>
<th>Non-conventional</th>
<th>Reserves</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>63</td>
<td>67</td>
<td>62</td>
<td>157</td>
</tr>
<tr>
<td>Natural gas</td>
<td>64</td>
<td>149</td>
<td>64</td>
<td>756</td>
</tr>
<tr>
<td>Uranium</td>
<td>85</td>
<td></td>
<td>85</td>
<td>672</td>
</tr>
<tr>
<td>Hard coal</td>
<td></td>
<td></td>
<td></td>
<td>207</td>
</tr>
<tr>
<td>Lignite</td>
<td></td>
<td></td>
<td>198</td>
<td>1264</td>
</tr>
</tbody>
</table>

Sources: Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), OECD-NEA

Reserve: Documented stock of primary energy that can be produced economically with state-of-the-art technology.

Resource: Additional deposits that is documented but cannot be exploited economically with technology currently available.
Development of dependence on imports of EU-25 between 1990 to 2030

Source: European Commission – European Energy and Transport Scenarios on Key Drivers, Brüssel 2004
The electricity demand in EU-25 will increase from currently 3 200 TWh to some 4 200 TWh by 2020. Due to ageing of the existing power plant portfolio and the phasing out of nuclear power in Germany, the generation gap (replacement and additional demand each with a share of a half) will amount to some 2000 TWh. In 2004 the share of fossil power plant capacity in Europe was about 58 %. Thus, the question has to be answered how to close this gap. Assuming a mean utilisation of 7 500 full-load hours per year for thermal power plants and 3 000 hours for wind power plants (onshore and offshore plants) as technically feasible, this would mean that calculational:

- 167 nuclear power plant units with 1 600 MW each, or
- 242 lignite-fired power plant units with 1100 MW each, or
- 333 hard coal-fired power plant units with 800 MW each, or
- 333 combined cycle power plants with 800 MW each, or
- 133 333 wind power plants with 5 MW each (plus reserve capacity, 80 %, e.g. 267 hard coal-fired units or combined cycle power units) would be required to make up for the described gap.

Alone these figures demonstrate that an energy mix is vital for a secure and reliable electricity supply in the future.

**Electricity Generation in Europe**

The planned operation years of the power plants in the EU vary considerably. Aging curves are only qualitatively. Source: EU - Energy and Transport Outlook
Power plant portfolio in EU-25 (in 2004)

Total net power plant capacity in EU-25: 703 866 MW
A large number of European utilities is planning new power plants, because old power plants have to be replaced and electricity consumption is increasing. Coal, natural gas and nuclear power will remain the most important primary sources of energy in electricity generation also against the background of the newly introduced CO2 trade and the worldwide increasing energy demand.

The majority of the new projects were communicated on the basis of natural gas with some 86 000 MW. New projects based on hard coal, lignite and peat total to a plant capacity of approximately 26 000 MW. One new nuclear power plant is under construction in EU-25 in Finland (Olkiluoto 3) and a new plant is being planned in France (Flamanville 3). Both plants have a capacity of some 3 200 MW. The capacity of existing plants is also to be increased.

Another 13 000 MW of new capacity is being planned on the basis of renewables like wind, hydro power and biomass.

Projects with a total capacity of around 130 000 MW were reported. Whether all these new projects will be realised will strongly depend on the future development of the prices for primary energy sources and the political frame conditions (country-specific bonus-malus systems) within the scope of CO2 reduction policies.

Intended New Power Plant Projects in EU-25

![Intended new power plant capacities and uprates in European countries, share of source of energy](source: Data base, VGB)
Intended new power plant capacities and uprates in European countries

Source: Database, VGB

1) As officially announced, May 2006
Electricity Generation Options
Share of the energy sources in electricity generation in EU-25

- 32% Nuclear power
- 31% Coal
- 18% Gas
- 10% Hydro power
- 1% Wind

Others: 8%. Source: Eurostat
### Pros and Cons of Relevant Electricity Generation Options

<table>
<thead>
<tr>
<th><strong>Nuclear power</strong></th>
<th><strong>Coal</strong></th>
<th><strong>Natural gas</strong></th>
<th><strong>Hydro power</strong></th>
<th><strong>Wind</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros:</strong></td>
<td><strong>Pros:</strong></td>
<td><strong>Pros:</strong></td>
<td><strong>Pros:</strong></td>
<td><strong>Pros:</strong></td>
</tr>
<tr>
<td>– Climate-compatible electricity generation without emissions</td>
<td>– Hard coal can be purchased on the world market from numerous suppliers at low prices</td>
<td>– Most environmentally compatible fossil fuel with relatively low CO₂ emissions</td>
<td>– Climate-compatible electricity generation without CO₂ emissions</td>
<td>– Climate-compatible electricity generation according to wind fluctuations, thus, only utilisable in numerous European countries</td>
</tr>
<tr>
<td>– Economically-priced and reliable supply without any critical dependencies on energy imports</td>
<td>– Lignite is available in Europe as safe, domestic raw material</td>
<td>– Electricity generation in highly efficient power plants</td>
<td>– Domestic source of energy, no dependency on imports</td>
<td>– Further investments for reserve power plants and extension of the electricity grid necessary</td>
</tr>
<tr>
<td>– High safety level of western nuclear power plants</td>
<td>– Power plant technology with high potentials for further efficiency improvements</td>
<td>– Short erection times and favourable investment costs for new plants</td>
<td>– Favourable electricity generating costs in existing plants</td>
<td>– At present economically not competitive</td>
</tr>
<tr>
<td><strong>Cons:</strong></td>
<td><strong>Cons:</strong></td>
<td><strong>Cons:</strong></td>
<td><strong>Cons:</strong></td>
<td><strong>Cons:</strong></td>
</tr>
<tr>
<td>– Not accepted by all European societies</td>
<td>– Increasing demand for hard coal (specially from China and India) and limited transport capacities bear price risks</td>
<td>– Highly fluctuating natural gas prices result in similarly fluctuating electricity generating costs</td>
<td>– Only a limited utilisation potential in numerous European countries</td>
<td>– Fluctuations in electricity generation according to wind fluctuations, thus, only utilisable in conjunction with thermal power plants</td>
</tr>
<tr>
<td>– Extensive nuclear licensing procedures</td>
<td>– CO₂ emissions higher than in the case of natural gas</td>
<td>– Dependence on natural gas imports as possible supply risk</td>
<td>– In “low-water times” electricity generation has to be backed by thermal power plants</td>
<td>– Further investments for reserve power plants and extension of the electricity grid necessary</td>
</tr>
<tr>
<td>– Large safety requirements are to be met</td>
<td>– Flue gas cleaning requires corresponding equipment and systems</td>
<td>– Increasing concentration of deposits in politically unstable regions</td>
<td>– Any further potentials are hardly available in Europe</td>
<td>– At present economically not competitive</td>
</tr>
<tr>
<td>– Disposal and final storage of nuclear fuel not yet politically decided in all societies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Efficient Coal- and Gas-fired Power Plants are Indispensable

• The development of power plants with maximum efficiencies - e.g. the VGB Emax initiative (efficiency, economy and environment) - with the COMTES700 test facility and the
• capture and underground storage of CO₂ (carbon capture and storage = CCS)

are often considered as competing options in the discussion about the sensible and efficient avoidance of CO₂ emissions resulting from coal and gas conversion processes. Right the opposite is true: A simple calculation showed that the replacement of the worldwide existing coal-fired power plants (average efficiency of 30 %) by modern plants with efficiencies of 46 % would lead to a reduction in CO₂ emissions solely produced in hard coal-fired plants by 35 %. Thus, the gradual reduction of CO₂ emissions by advanced technical development is the first option. The higher the plant efficiency, the lower the required expenditures for CCS.

From the viewpoint of CCS, the development of power plants with higher efficiencies is not only a no-regret-measure, but a necessary and sustainable pre-condition.

This procedure results in triple advantage:
• resource savings, since less fuel is required per kWh electricity,
• reduction of the accruing amounts of CO₂,
• more electricity is being generated by the same fuel input.

The capture and storage of CO₂ in a CO₂-free power plant also results in an increase in fuel consumption that also has to be taken into account: The higher the plant efficiency the lower the additional fuel consumption for capture and storage of CO₂. Thus, all increases in efficiency are of advantage for the CO₂-free power plant.
CO₂ reduction in coal-fired power plants by increasing efficiency

- **Average worldwide**
  - Efficiency 1%
  - CO₂ emissions
  - Fuel consumption

- **EU-25**
  - 111.6 g CO₂/kWh
  - 381.2 g CO₂/kWh
  - 379.4 g coal/kWh

- **Today available technology**
  - 743.2 g CO₂/kWh
  - 320.7 g coal/kWh

- **Steam power plant 700°-C-technology**
  - 661.4 g CO₂/kWh
  - 288.6 g coal/kWh

- **CO₂-free power plant**

1) Average data for hard coal-fired power plants

Source: Alstom, VGB
Innovation Lines for CO₂-free Coal-fired and Gas-fired Power Plants

Pre-Combustion
This technology is based on the integrated gasification combined cycle (IGCC), i.e. coal gasification for a gas and steam turbine system. Upon the gasification of coal, the fuel is converted into a synthetic fuel gas through partial oxidation. The synthetic gas (syngas) with a high CO content is converted with water vapour in a CO-shift reaction into CO₂, releasing H₂. This syngas can be used to produce electricity in the combined gas and steam turbine process.

If required, syngas can also be converted into synthetic petrol.
CO₂ is separated prior to combustion in a synthetic gas scrubbing process.

Oxyfuel
In the Oxyfuel process, the nitrogen contained in combustion air is separated in an air separation unit. The remaining flow of oxygen is used in the combustion process. This results in a 75% smaller raw gas mass flow. Since in this process the "cooling effect" of the inerts of the flue gas flow does not occur as in conventional processes, the combustion temperatures are very high. In order to limit the combustion temperature to a level that is acceptable for materials, a large portion of the already cooled down flue gas flow has to be recirculated into the combustion chamber (flue gas recirculation). The flue gas flow leaving the furnace contains up to 70% carbon dioxide. Depending on the coal, the rest is mostly water vapour.
The vapour is condensed through flue gas cooling, thus, a highly concentrated CO₂ flow can be discharged.

Post-Combustion
CO₂ from the flue gas of a conventional power plant process is separated in post-combustion.
The choice of the process is mainly dependent on the composition of the flue gas flow and the CO₂ partial pressure. The currently most widely used variant of CO₂ removal from large gas volumes at low flue gas pressures is the absorption by means of alkaline solutions. Common absorption agents are MEA (mono ethanol amine), DGA (ecoamine) and DEA (di-ethanol-amine). In the amine absorption process the waste gas flow is fed to an absorption column in direct contact with the amine solution. The CO₂ contained in the flue gas flow reacts in a chemical process with amine and is converted into a liquid phase.
The CO₂ solved in the amine solution is subsequently separated in a thermal desorption process so that it can be discharged.
Power plant technologies with CO₂ capture and storage

Pre-combustion  Oxyfuel  Post-combustion

Efficiency losses: 5 to 14 % points

Source: Alstom
Nuclear Power is Extended Worldwide

About 32% of the electricity produced in the European Union comes from nuclear power plants, ranking the EU first on a worldwide scale. Different European countries continue to extend nuclear energy in order to cover the increasing demand for electricity without any CO2 emissions and to ensure sustainable development.

16% of the electricity currently generated all over the world is based on nuclear energy. Together with hydro power and biomass it is the most important CO2-free primary source of energy.

449 nuclear power plants are being operated in 30 countries with a total installed capacity of 387,000 MW.

Programmes aiming at the extension of nuclear energy are being discussed or planned worldwide. Continuous development for the proven light water reactors are preferred as plants of the Generation III+ and are considered concretely for about 40 power plant units. They offer a maximum safety level at optimum resource utilisation and economic efficiency.

Sources: IAEA, Eurostat, OECD-NEA
Nuclear Power in Europe 2006. New projects and planned power plants

FIN: + 1 (Olkiluoto-3, 2010), + 1 planned
GB: 21 – 22 due to aging 2007 to 2010, new units planned
NL: 1 (66 years), 1 new unit?
B: 7, import shares from F
F: 59 + 1 (Flamanville-3, 2012), new series (20) planned
CH: 5, Energy plan 2006: increase of capacity, new units up to 2020
E: 8
SLO: 1
I: Import shares from France, 66% Slovenske Elektrarne (SK), 12.5% Flamanville-3

- Country with NPPs
- Use under examination
- Phase-out decision
- No NPP in operation

S: 10, life-time extension 60 years, increase of capacity, imports from RUS
LT: 1 (~1), 2006 study together with Latvia and Estonia for replacement of Ignalina-2
P: 0, new units until 2025 under examination
RUS: 31 + 7 under construction, life-time extension 3 new units per year beginning with 2012
CZ: 6, life-time extension under approval
UKR: 15, Komshtitski-3 and -4 under construction, life-time extension 11 new units until 2030
HUN: 4, increase of capacity extension planned, life-time extension
TR: 3 new units planned
ROM: 1 + 1 (Cernavoda-2, 2007), Cernavoda-3 planned until 2011
SK: 6 (~2) + 2 (Mochovce-3 and -4), with share of ENEL (Italy)
BUL: 4 (~2) + 2 (Belene, order placed 10/2006, completion: 2011-2013)
Currently 40 nuclear power plants are being constructed worldwide and further plants are being planned or are being considered:
- 29 in the USA,
- 12 in China,
- 6 in India,
- 7 in Japan,
- 12 in Russia and
- another 150 projects for the period 2010 to 2020 in the Netherlands, Switzerland, Romania, Bulgaria, Brazil, Korea, Pakistan, Iran, Mexico, Canada, Lithuania, Kazakhstan, South Africa and Ukraine.

Apart from Germany (operating period some 32 years), other countries have also made plans to abandon nuclear power:
- Belgium (40 years) and
- Sweden (extension of operating time to 60 years planned). Spain postponed its decision to phase out nuclear power. Nearly all other countries are aiming at operating periods of at least 50 to 60 years.

Poland, Australia, Turkey, Chile, Egypt, Georgia, Libya, Nigeria, Thailand, Indonesia and Vietnam are studying the utilisation of nuclear power.

The main reasons for the renaissance of nuclear energy are supply security and the increasing cost advantages in comparison to fossil-fired power plants with their related increasing costs for environmental and climate protection.

The cost of fuel in nuclear power generation is less than 5%. The latest increases in uranium prices are only of minor importance to the generation cost. On the other hand, price increase considerably extends the prospection of uranium. There will be enough uranium for several hundreds of years.

The transition to reactors of the fourth generation as of 2025 can additionally extend the range by a factor 60. For the long-term advanced development, the US Department of Energy (US-DOE) launched in 2002 the programme GENERATION IV in co-operation with Argentina, Brazil, China, Canada, France, Japan, Russia, South Korea, South Africa, Switzerland, Great Britain and EURATOM. The programme is aiming at the development of six reactor types with further improved proliferation safety, reliability and economic efficiency.

China, India, Japan, Korea, Russia and South Africa are also developing their own projects.
Nuclear power worldwide. New units and planned units

Canada: 22
- 4 restarts
- 8 new units until 2024

USA: 104
- 60 years lifecycle extension for all 104 units
- 44 completed, 40 applications, more than 25 new units 2010 to 2015, Generation IV Programme

Mexico: 2
- 2 new units planned

Brazil: 2
- 1 under construction
- 8 new units planned

Canada: 22
- 4 restarts
- 8 new units until 2024

South Africa: 2
- 1 under construction
- 1 new unit planned

Argentina: 2
- 1 under construction
- 1 new unit planned

Iran: 0
- 1 under construction

Pakistan: 2
- 1 under construction

Taiwan: 6
- 2 under construction

Russia: 31
- 19 units:
- 15 years operation time
- 7 under construction (1 Fast-breeder)
- As from 2010: 3 new units per year

China: 11
- 7 new units since 2002
- 4 under construction
- 1 Fast breeder (25 MW) until 2008 + High-temperature reactor until 2010 up to 30 new units until 2020

South Korea: 20
- 8 new units since 2002
- 4 under construction
- 4 new units planned
- Target: 40% nuclear
Renewable-based electricity generation has a high priority within the European Union for reasons of security, diversification of energy supply and environmental protection. However, it is already clear that the objectives of EU-25, i.e. to generate approximately 685 TWh (= 21 %) of renewables-based electricity by the year 2010, will not be achieved. Instead the share of renewables will amount to 19 % at this point in time.

The requirements of the European Union can only be met if the regionally differing sources of renewables are used optimally. An EU-wide harmonisation of the different national support schemes as well as a European-wide trade with "green electricity certificates" would make a considerable contribution towards increased efficiencies upon the utilisation of renewables.

Hydro power is currently the only renewable source of energy that can be operated profitably. However, its technical potential is nearly exploited. Apart from its role as reliable renewable source of energy, hydro power is also playing an important part in connection with reserve capacities and the grid control by pumped-storage plants.
Decentralised Small Plants

Fuel cells, micro gas turbines and Stirling engines can open up future new fields of application for combined heat and power generation (CHP). Fuel cells have the enormous advantage that their electrical efficiency is very high at comparably small units and that the emissions at the location of energy conversion are clearly smaller than in comparison to conventional technologies. However, the technical reliability and operating lifetimes of fuel cells need to be increased.

All these technologies are standing in cut-throat competition and are compared with the cost-structure of conventional energy conversion systems. Market-driven developments have to be realised. These novel energy conversion technologies can only be integrated into the energy system if the system cost can be reduced drastically and corresponding technical solutions can be offered.

Source: Landesinitiative Zukunftsenergien NRW/Germany
Renewables - What is Required?

Wind Energy

Wind power will dominate the further extension of renewables in Germany and Europe. At the end of 2005 a total of approximately 17,356 wind power plants with an output of 18,428 MW were in operation in Germany. At that point in time the installed capacity in Europe amounted to 40,811 MW and worldwide to 59,084 MW. The current as well as the future power plant park will have to meet considerable requirements e.g. in terms of reserve capacity, because wind power is subject to fluctuations caused by weather and therefore it is not reliably available.

Offshore 5 MW plants of three different manufacturers are currently being tested. It is the prime objective to optimise plant engineering, to decrease cost, to increase output and to guarantee reliable operation of wind plants. A condition monitoring system and a uniform power plant identification system for wind power plants are urgently required.
Biomass

In addition to wind power, biomass is making a considerable contribution to electricity generation. This applies in particular to the Scandinavian countries. However, further market penetration will depend on the price development and the availability of fuels. Besides, biomass-based electricity generation is competing with heat generation and biomass fuels.

In Europe, co-combustion of biomass has become an important technology for CO₂-neutral electricity generation. Especially Denmark, Belgium, and the Netherlands use and financially support this highly efficient form of renewables application. The main advantages of co-combustion are the joint use of one common plant, a broad band of substitute fuels and high overall efficiencies for biomass-based electricity generation. The application of biomass pellets in combined heat-and-power plants will turn into a very dynamic market over the next years.

![Biomass: Development of electricity generation](source: Eurostat)
According to the EEA technical report No 6/2006, the greenhouse gas emissions of EU-25 decreased by 4.8% between 1990 and 2004. The reduction for EU-15 was 0.9% compared to the base year.

It was laid down in the Kyoto Protocol that EU-15 committed itself to reduce its greenhouse gas emissions from 1990 to 2008/2012 by 8.0%. However, when considering the emission development since 1990, it seems to be rather doubtful whether the Kyoto target will be achieved although the two largest emitters, namely Germany and Great Britain, have nearly and/or already achieved their national targets. For the second time in series the greenhouse gas emissions increased within EU-15 (and also EU-25), i.e. between the years 2002/2003 and 2003/2004.

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1) Annual European Community Greenhouse Gas Inventory 1990-2004 and Inventory Report 2006 - Submission to the UNFCCC Secretariat.

Source: UNFCCC 2004
Europe will miss the Kyoto–targets

Emissions of greenhouse gases: targets and current emissions

-21.0 %  -1.8 %  Denmark
13.0 %  22.7 %  Ireland
-12.5 %  -14.1 %  United Kingdom
-6.0 %  1.6 %  Netherlands
-7.5 %  0.7 %  Belgium
-28.0 %  0.3 %  Luxembourg
0.0 %  -0.8 %  France
-21.0 %  -17.5 %  Germany
15.0 %  47.9 %  Spain
27.0 %  41.0 %  Portugal
-----  45.9 %  Malta

Sweden  -3.6 %  4.0 %
Finland  14.5 %  0.0 %
Estonia  -50.0 %  -8.0 %
Latvia  -58.5 %  -8.0 %
Lithuania  -60.1 %  -8.0 %
Poland  -31.6 %  -6.0 %
Czech Republic  -25.1 %  -8.0 %
Slovakia  -30.3 %  -8.0 %
Austria  15.7 %  -13.0 %
Hungary  -32.0 %  -6.0 %
Slovenia  -0.8 %  -8.0 %
Italy  12.3 %  -6.5 %
Greece  23.9 %  25.0 %
Cyprus  48.2 %  ----

Source: European Environment Agency EEA
Tasks of VGB Secretariat

VGB PowerTech e.V. is the European technical association of electricity and heat generation. According to its tasks, the VGB Secretariat is divided into the competence centres:

- Nuclear Power Plants,
- Fossil-fired Power Plants,
- Renewables and Distributed Generation,
- Environmental and General Issues,
- Operational Services.

These competence centres are dealing with all issues of power and heat generation and related environmental topics in close co-operation with EURELECTRIC at European level and with VDEW at national level.

For performing its duties according to the articles of association, the VGB Board has opted for honorary committees. The VGB Technical Advisory Board is responsible for appointing the members and fixing the tasks. Currently four general committees are active with their numerous technical and special committees as well as working panels.
VGB PowerTech e.V.

We are a voluntary association of companies that focuses on power plant operation and related technologies, i.e. these fields are an important basis of the entrepreneurial activities of our members. The domicile of the association is Essen with liaison offices in Brussels and Berlin.

**Our objective** is the support and improvement of
- the operating safety and environmental compatibility as well as
- the availability and efficiency of power plants for electricity and heat generation, either in operation or under construction.

Currently we have 439 members in total, comprising operators, manufacturers and institutions connected with energy engineering. Our members come from 32 countries worldwide and represent an installed power plant capacity of 487,000 MW, 405,000 MW of which are in Europe.

**Our tasks are to**
- utilise and bundle international experience,
- offer expertise for current tasks and tomorrow’s challenges,
- represent our members’ interests.

Currently 439 companies from 32 countries are member in our association:

<table>
<thead>
<tr>
<th>Type of Plant</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil-fired power plants</td>
<td>301,000</td>
</tr>
<tr>
<td>Nuclear power plants</td>
<td>122,000</td>
</tr>
<tr>
<td>Hydro power plants and other renewables</td>
<td>64,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>487,000</strong></td>
</tr>
</tbody>
</table>

**EU-25: 401 members in 19 countries**
- Belgium, Denmark, Germany, Finland, France, Greece, United Kingdom, Ireland, Italy, Luxembourg, The Netherlands, Austria, Poland, Portugal, Sweden, Slovenia, Spain, Czech Republic, Hungary

**Europe: 25 members in 6 countries**
- Iceland, Croatia, Romania, Russia, Switzerland, Turkey

**Outside Europe: 13 members in 7 countries**
- Brazil, India, Israel, Japan, Libya, Mongolia, South Africa

**Total:** 439 members in 32 countries