

SECTION SIX

MEETING FUTURE ENERGY DEMAND

>> The global energy system faces many challenges in this century. It will have to continue to supply secure and affordable energy in the face of growing demand. At the same time society expects cleaner energy and less pollution, with an increasing emphasis on environmental sustainability. >>

Over the next 30 years, it is estimated that global energy demand will increase by almost 60%. Two thirds of the increase will come from developing countries – by 2030 they will account for almost half of total energy demand.

However, many of the world's poorest people will still be deprived of modern energy in 30 years time. Electrification rates in developing countries will rise from 66% in 2002 to 78% in 2030 but the total number of people without electricity will fall only slightly, from 1.6 billion to just under 1.4 billion in 2030 due to population growth (see map on page 40).

Energy is vital to human development. It is impossible to operate a factory, to run a shop, deliver goods to consumers, or grow crops, for example, without some form of energy. Access to modern energy services not only contributes to economic growth and household incomes but also to the improved quality of life that comes with better education and health services. Unless access to energy is improved, many of the world's poorest countries will remain trapped in a circle of poverty, social instability and under-development.

If we are to significantly improve access to energy worldwide – and maintain a secure energy system – all forms of energy will be needed. This includes coal, gas, oil, nuclear, hydro and renewables.

The Role of Coal

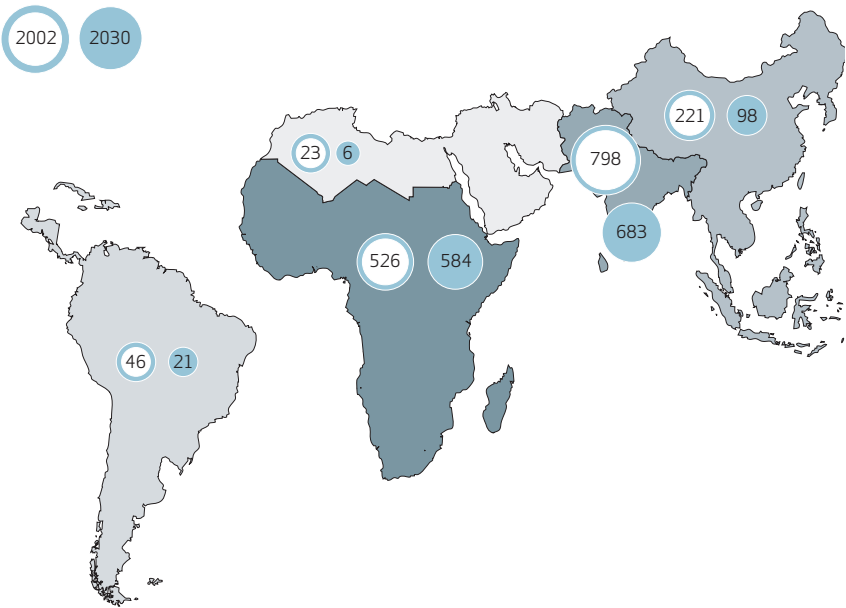
As the most important fuel for electricity generation and a vital input into steel production, coal will have a major role to play in meeting future energy needs.

During the past two years, the use of coal has grown at a faster rate than for any other fuel, rising by almost 7% in 2003. Demand in China grew by 15%, in Russia by 7%, in Japan by 5% and in the USA by 2.6%.

Demand for coal and its vital role in the world's energy system is set to continue. Asian countries will see the most increase in the use of coal, with China and India alone accounting for 68% of the increase.

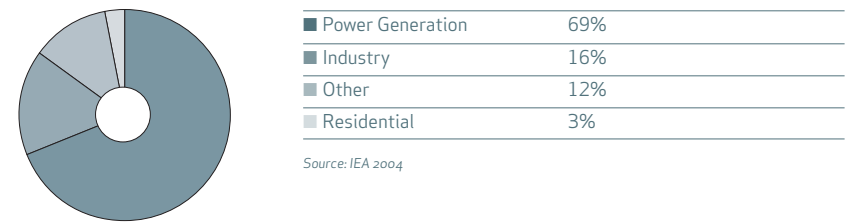
Coal will continue to play a vital role in electricity generation worldwide – while it currently supplies 39% of the world's electricity, this figure will only drop one percentage point over the next three decades.

Number of People Without Electricity in the Developing World (millions)



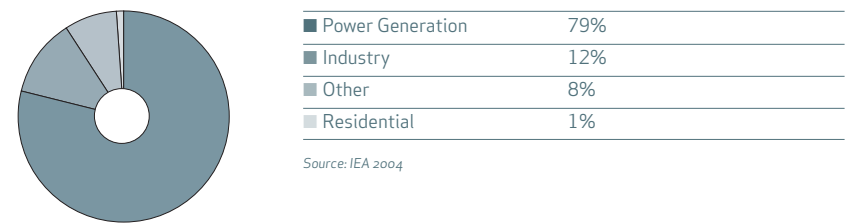
Source: IEA 2004

World Coal Demand by Sector - 2002



Source: IEA 2004

World Coal Demand by Sector - 2030



Source: IEA 2004

With the availability of abundant, affordable and geographically disperse reserves, coal has a vital role to play in a world where reliable supplies of affordable energy will be essential to global development.

Making Further Environmental Gains

Technological innovation will allow demand for coal to be met without an unacceptable environmental impact.

The wider deployment of clean coal technologies will have a significant impact on the environmental performance of coal in both developed and developing countries. It has been suggested, for example, that if the efficiency of the world's coal-fired power stations was improved to the level of Germany's coal-fired power stations, the reduction in CO₂ emissions would be greater than will be achieved under the Kyoto Protocol.

In the longer term, carbon capture and storage offers the potential for significant reductions in CO₂ emissions from coal consumption, nearing almost zero-emissions.

Research and development is focusing on increasingly innovative ways of generating energy. One important option for the longer term is the move towards hydrogen-based energy systems, in which hydrogen is used to produce electricity from gas turbines and, ultimately, fuel cells. Fuel cells use electrochemical reactions between hydrogen and oxygen instead of a combustion process to produce electricity.

Hydrogen does not occur naturally in usable quantities; it would have to be manufactured. Fossil fuels are one probable source. Coal, with the biggest and most widespread reserves of

World Coal Demand (Mt)				
	2002		2030	
	Million Tonnes	Coal's Share of Electricity Generation (%)	Million Tonnes	Coal's Share of Electricity Generation (%)
OECD North America	1051	46	1222	40
OECD Europe	822	29	816	24
OECD Pacific	364	36	423	29
OECD	2237	38	2461	33
Russia	220	19	244	15
Other Transition Economies	249	27	340	18
Transition Economies	469	22	584	16
China	1308	77	2402	72
East Asia	160	28	456	49
South Asia	396	60	773	54
Latin America	30	4	66	5
Middle East	15	6	23	5
Africa	174	47	264	29
Developing Countries	2085	45	3984	47
World	4791	39	7029	38

Source: IEA 2004

any fossil fuel, is a prime candidate to provide hydrogen – via coal gasification – in the quantities needed.

Until recently, the energy intensive nature of the processes involved, the high costs, and the CO₂ by-products made the development of this technology unlikely. However, major technological advances together with carbon storage have opened up renewed prospects for environmentally acceptable, large-volume production of hydrogen. Coal is well-positioned to provide the quantities of hydrogen needed to move towards a new and different energy economy. Europe, Japan, the USA and New Zealand all have active hydrogen programmes and are considering coal as an option to produce hydrogen.

Coal & Our Energy Future

Alleviating poverty, maintaining secure supplies of energy, and protecting the natural environment are some of the biggest challenges facing our world today. The production and use of coal is linked to each of these challenges.

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