

Profiles

Prospects for coal and clean coal technologies in the Czech Republic

'Coal supplies half of the country's primary energy and around two thirds of its electricity'

The Czech energy economy is characterised by limited reserves of oil and natural gas. However, it has sizable reserves of brown coal, lignite and hard coal that provide a significant proportion of the country's energy supply. Recent estimates suggest that reserves amount to 1.3 billion tonnes of brown coal, 50 million tonnes of lignite and 350 million tonnes of hard coal. There are also other known reserves of brown and hard coal that are not currently being exploited, or have not been fully explored. These may have the potential for development at some point in the future.

Annually, the Republic produces 13–14 Mt of hard coal and around 49 Mt of brown coal/lignite. It is anticipated that the level of coal used in the country is likely to remain roughly around the current level for some years, so coal production and consumption levels are likely to remain fairly stable, especially within the power generation and CHP sector. Apart from power generation, its biggest national market, coal will also retain a degree of importance for a number of other uses that include a range of industrial, commercial and residential applications.

At present, coal supplies around half of the country's primary energy and is used to generate around two-thirds its electricity. The balance of electricity is provided mainly by nuclear power. Others sources (hydro, other renewables, and natural gas) make only a small contribution towards meeting the country's electricity needs.

The country currently has a total installed generating capacity of 17,344 MWe, of which, 10,650 MW is

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coal fired. Around two-thirds (6524 MW) is operated by CEZ, the state generator, and the remainder by independent power producers. The balance of generating capacity comprises 3760 MW of nuclear capacity (operated by CEZ), 2150 MW of hydro capacity, and 775 MW of gas fired capacity.

Coal-fired stations therefore form the backbone of the Czech generating fleet. During the last five years, there has been a steady increase in both the production and consumption of electricity in the country and, at peak times, more than 96% of base load generation is provided by coal and nuclear units. Annual electricity production amounts to ~83 TWh, and of this, around two-thirds is generated by coal-fired stations. Conventional pulverised coal (PC) fired power plants using domestic brown coal produce the bulk of this. Brown coal fired plants dominate as they provide the cheaper option. The balance is provided mainly by nuclear units. The Czech power industry currently has an overcapacity of nearly 50% and as a result, in recent years, the country has become a major electricity exporter. It is now the second largest exporter in Europe, exporting electricity mainly to Germany, Austria and the Slovak Republic.

During the past 10–15 years, several major modernisation programmes have been undertaken by the power generation sector and most conventional PC power plants have been comprehensively equipped with modern control systems to minimise emissions of SO₂, NO_x and particulates. Further programmes of

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updating and refurbishment are under way or planned. A number of outdated PC power plants have been repowered using circulating fluidised bed combustion (CFBC) technology. CFBC units are now operating successfully at a number of power stations, CHP facilities, and heat-only stations, as well as at various industrial facilities.

Apart from CFBC based systems, several other types of clean coal technologies (CCTs) are presently in operation or under development within the country. PC technology using supercritical (SC) steam conditions is being increasingly considered for new build generating capacity. A new 660 MWe SC project is under way at CEZ's Ledvice power plant, and there appears to be a strong possibility that this will be followed by a second. The success of these may encourage the development of other similar projects in the country, especially as older conventional PC plants reach their retirement age.

Apart from these clean coal projects, the country also has a coal-fuelled IGCC plant in operation at Vresova. Here, two 200 MW gas turbines are fired on syngas produced by fixed bed, dry ash gasifiers that consume 2000 t/d of local coal. Efforts continue to improve the plant's economic and environmental performance and a new entrained flow gasifier has been added to gasify unwanted plant by-products. Syngas produced will be fed to the combined cycle units. More generally, at present, there are no plans for further IGCC plants to be built in the Czech Republic. However, this situation could change in the future.



The new entrained flow gasifier installed at the Vresova IGCC facility. It gasifies plant by-products to generate syngas. This is fed to the two combined cycle units. (Photograph courtesy of Sokolovská uhelná)

Overall, in the longer term, the outlook for clean coal technologies is considered to be good. However, only limited further deployment is expected in the near term as a consequence of the country's current excess generating capacity and the recently increased contribution from its nuclear sector. It is anticipated that after ~2010, as older generating plant is increasingly retired, there will be greater incentive and opportunity for the further uptake of CCTs.

Each issue of *Profiles* is based on a detailed study undertaken by IEA Clean Coal Centre, the full report of which is available separately. This particular issue of *Profiles* is based on the report:

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