Profiles

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Prospects for coal and clean coal in Ukraine

Ukraine's energy economy is largely served by natural gas imported from Russia, even though coal is the country's richest resource of fossil fuels. Within the power generating sector, nuclear power's role is expected to increase in the future. The country's >60 Mt/y coal industry, mostly bituminous and anthracite, has recently undergone a programme of changes, including mine privatisation, closure of unproductive mines and, in some cases, modernisation of equipment and improvement in safety measures. Ukraine is to expedite privatisation of the coal industry; currently about 45% of coal in Ukraine is produced in privately-owned mines.

Imported energy accounts for a large proportion of Ukraine's energy supplies, most notably natural gas and oil. Security of supply of gas has become extremely important in recent years with pipeline disputes of imported and transit gas causing considerable concern.

Coal is located mainly in Donbass, in the eastern Donetsk region of Ukraine. There are a few, smaller fields, in other parts of the country. Ukraine's *Energy Strategy to 2030* is based on government's intention to decrease the country's dependance on imported fuels, including plans to increase coal production. The power generation sector has over-capacity and is exporting electricity to neighbouring counties. However, power shortages still occur due to plant inefficiency and large transmission losses. While nuclear power is being pursued, coal is a growing factor in the future prosperity of the Ukrainian economy.

Ukraine's aim to become less dependent on imported natural gas can only be positive for the security of gas supplies, both into and through the country. Coal policy in Ukraine could therefore have major implications on Russian gas supplies and prices to the EU.

Ukraine has about 16 Gt of proven reserves of anthracite and bituminous hard coal; reserves of lignite and subbituminous coal could more than double this. Based on information provided by the companies which report to the Coal Mining Ministry of Ukraine, Ukraine was the twelfth largest producer of hard coal in the world in 2009, at about 72.5 Mt, yet the output is half that produced in 1990. In 1990, Ukraine exported 17 Mt to Russia. A year later, Ukraine gained independence, and the output from Ukrainian coal mines plummeted and export trade collapsed. The coal industry still employs roughly 400,000 people, and has 160 mines in operation.

Ukraine has more than 50 GW of generating capacity, and 40–42% of total generation, or 95% of thermal power generation, is coal fired. Since nuclear power plants provide only base-load power, this is the minimum required to allow the thermal plants to regulate the power supply on the grid. Most of the country's 20–22 GW of coal-fired capacity employ supercritical steam conditions. However these plants are of an older design dating back to before the 1980s, and so efficiencies will be far from those of modern supercritical designs. Therefore, there must be scope to improve the existing plants (beyond current investment and upgrade plans). Ukraine's plans to use more coal will depend on the efficiency performance of the existing fleet, the growth in output from the fleet, and the development of new plants (along with funding). All these factors will, therefore, influence Ukraine's demand for coal and have an impact on Ukraine's plans for domestic production and even open possibilities of exporting coal.

Past energy strategies envisaged coal production rising to 90 Mt by 2010, and 120 Mt by 2015. With production in 2008 at roughly 77.3 Mt, these aspirational targets remain unfulfilled by a large margin. Nevertheless, the spirit of the policy is to reopen mines and construct new mines. Coal prospects in Ukraine are, therefore, more positive than the country has seen in the past.

Ukraine has one of the most energy-intensive economies in the industrialised world, and so energy efficiency represents Ukraine's single best opportunity to improve energy security. Improved efficiency is essential for Ukraine's growth and development, and for protecting its environment. Ukraine can improve its energy efficiency considerably, both through targeted policies and through market-oriented energy pricing.

The European Commission's approval of Ukraine's Accession to the European Energy Community in 2010, underlines the importance of Ukraine to the European energy markets.

While there is much interest in Ukraine in new, state-of-the-art supercritical pulverised coal plants, the economic/financial means to build such plants are not

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available – a situation that is expected to last for a number of years.

Another issue is that the supercritical boilers are normally used for base load and are in excess of 600 MW. In Ukraine, where much of the base load is provided by nuclear power, most thermal power plants are used for load levelling, for which 200–300 MW is considered optimal, as they operate at a low utilisation factor. New large power plants are not currently considered a necessity in Ukraine.

All future plants to be built in Ukraine are planned to be of the supercritical type, using fluidised bed combustion, but no new plants are planned for the near future. The only projects under way at this time are for the refurbishment of existing plants and the privatisation of the industry, which is expected to last to 2012. While policies and documents to improve the state of the coal and power industries are being prepared, it is not likely that any action will be taken until the country balances its budget and no predictions can be made on this.

Carbon capture and storage, and underground coal gasification, are not part of any present or near future plans in Ukraine. Most of the boilers have been in operation for more than 25–30 years. Also, the electricity producing Ukrainian thermal power plants have not been provided with equipment for sulphur and nitrogen oxide removal from the flue gas. However, Ukraine has several projects under way to capture coalbed and coal mine methane and use it as a fuel.

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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