



Green Gas International (Green Gas) is a prominent international project developer engaged in coal mine methane (CMM) mitigation. Founded soon after the Kyoto Protocol and the associated carbon credit trading scheme came into effect in 2005, the company has since developed rapidly. Its work covers the entire gas mitigation value chain, from enhancing coal mine safety and productivity, to the acquisition of carbon credits.

Demand for the company's services is strong, in part due to a renewed interest in coal as an important energy source. One of the main constraints to increasing coal mine productivity and development remains CMM. Reflecting this, the key to increased coal output and productivity often lies in the gas drainage system that a mine employs.

Following a series of mergers and acquisitions, Green Gas has now accumulated over 50 years of CMM experience. This was further strengthened in 2007, when the company merged with OKD, DPB a.s., an established Czech pioneer of CMM management and use, to create Green Gas DPB a.s. (DPB). With the Czech Republic already internationally renowned for the safe operation of its coal mines, it was a natural decision for Green Gas to choose DPB as the site for its new global CMM centre of excellence.

A tradition in Czech coal

DPB a.s. was founded in 1960 to enable a safe working environment, free from major gas and water problems, in the underground coal mines of the Ostrava – Karviná (OKR) Coal District, of what is now the Czech Republic. In 2005, the company's first combined heat and power plant was installed at an abandoned coal mine, to generate electric power from CMM.

The company currently provides the following services:

- Generation of electrical and thermal energy from mine gas in cogeneration units.
- Mine gas exploration and exploitation and surface gas drainage of Carboniferous gas.
- Mine gas distribution through its own gas pipeline system.
- In-mine and surface drilling works.

Last year, Green Gas International merged with Czech pioneers in coal mine methane (CMM) management, OKD, DPB a.s. Ing. Antonín Kunz, Managing Director, Green Gas International, Czech Republic, reports on the fruits of this link up, including the establishment of a global CMM centre of excellence.

- Engineering for gassy coal mines.
- Laboratory work specialised in geomechanics and the measurement of the gas content of coal.

DPB's activities are mostly concentrated in the active hard coal mines of the OKR district (Figure 1). This mining district is situated in the Czech part of the Upper Silesian Basin, an area of some 1500 km². The coal in the area is currently exploited by four active mines covering an area of about 135 km².

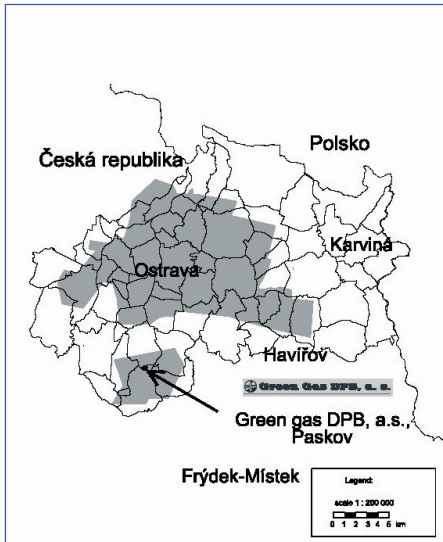


Figure 1. Green Gas DPB location.

Gas processing

DPB's core business is the management and exploitation of mine gas. This gas is released during the coal extraction processes and from the rock disturbed by mining operations. A mine needs to be degassed in order to ensure safe working conditions during the coal extraction. Methane is a combustible gas that forms an explosive mixture in concentrations of between 4 – 16% in air. DPB captures mine gas in the OKR region in two ways:

- Active mines: gas recovery using a gas drainage system.
- Closed mines: where the company owns special mining licences to recover remaining mine gas.

Each gas source is connected to the company's evolving gas pipeline, currently some 150 km long. The mine gas is then supplied via the gas pipeline system to industrial companies in the OKR region. Overall, some 65 million m³/year of methane is distributed to customers.

Combined heat and power production

DPB added a new dimension to its services in 2005, with the combined production of electrical and thermal energy through the combustion of mine gas. Cogeneration units produce electric currents with a voltage of

380 V, which is then transformed into 6 kV or 20 kV according to the needs of the local power grid. The heat from the combustion engine is recovered to supply heating systems and provide hot running water.

The first cogeneration unit installed by DPB in 2005, had an electric output of 580 kW. After this, a long-term programme was developed to install more such units. As of March 2008, 11 cogeneration units have been installed, with an electrical output ranging from 580 – 1555 kW.

The electricity produced is supplied to the local distribution network, with some locations also using the thermal energy for heating adjacent buildings. Additional cogeneration units with a total electrical output of 40 MW are planned for installation by 2012 and a total capacity of 11 MW.

Drilling works

Due to intensive mining activity in the OKR district, there is high demand for underground drilling work, a service that DPB currently provides. Gas drainage and geological exploration boreholes are in particular demand. For this, cross-measured boreholes with a length up to 100 m are used to reduce the gas emitted from the coalface. Special in-mine gas drainage boreholes of up to 300 m are also drilled to drain additional in-mine gas sources.

Intensive coal mine development requires current degassing systems to have improved efficiency. Drilling specialists from DPB recently visited a mine site in Australia to see a demonstration of directional drilling, using down hole motors at the Dendrobium and Tahmoor collieries. These directional boreholes are used not only for degassing a rock massive, but also for determining coal seam thickness and direction. The drilling specialists received new practical knowledge about this cutting edge technology, which is being evaluated thoroughly for its suitability, before any implementation in the geological conditions of the OKR district.

Engineering services

DPB provides a wide scope of engineering services to the local mining industry. Presently, it is preparing and coordinating safety risk assessments for the future mining of 21 coalfaces in the OKR mines. The company provides services in mine ventilation, degassing, air conditioning of future coalfaces, geological and geo-technical work and hydrogeology safety measures. With a successful track record in these areas, the company's specialists work on these projects with domestic institutes such as



Figure 2. Portable co-generating unit.

Ústav geoniky ČAV, HBZS, the Technical University of Ostrava and Bastro, as well as with international partners, such as Freiberg University in Germany.

DPB successfully operates a network of 45 surface and underground seismic stations, which continually monitor outburst prone underground mining activities. The company's engineering specialists also perform highly sophisticated calculations of coal gas reserves using specialised software.

A team of company specialists deals with the issue of mine gas surface emissions in urban areas. Their work ensures the safety of citizens and safe gas drainage of areas that are at risk from uncontrolled gas emissions. The team applies the accredited methods of measuring methane concentration in soil and air (methane screening), combined with the various methods of gas emissions measurement.

DPB also offers a hydrogeological assessment of the impact of mining activities on public water supplies. Other engineering activities include laboratory services that provide petrographical and geo-technical testing of coals. These laboratories use the US Bureau of Mines (USBM) methodologies for determining the gas content of coal seams.

Future prospects

With the company's record of success in the OKR district, Green Gas is now in the process of creating a 'CMM Centre of Excellence' based around DPB's operations in the Czech Republic.

The objective of the centre is to be a world leader in the provision of CMM management services for active mines. This will draw on DPB's technological expertise and experience gained from many years of work in the OKR district, one of the most active mining areas in the world. More specifically, the centre will be an international leader in expert assessments, preventative measures and mining safety. It will offer services for state administration institutes and mine authorities that are required to address occupational safety, as well as research and development of mining in the OKR district. Importantly, this knowledge will also be available to other coal mine projects operated by Green Gas around the world.

The centre will comprise a 'brain trust' of specialists for the exploration of CMM sources (geology, geophysics, and hydrogeology) in underground conditions, as well as in the surface areas of hard coal

mines. Research will be undertaken into the exploitation and treatment of mine gas, mainly for its use in cogeneration units, and the implementation of modern drilling technologies used in hard coal mine environment.

Preventative measures against mine gas emissions will be evaluated in regions affected by mining activities, along with the design and implementation of new degassing methods in underground hard coal mines. This is particularly important given the complex geo-mechanical and geological conditions of the mines.

As well as benefiting the region's mine operators, the CMM Centre of Excellence will cooperate with domestic and foreign scientific research institutes and leading world-renowned specialists in the CMM field.

While other companies may find different ways to address CMM in the coming years, the combination of Green Gas's knowledge, DPB's successful track record of managing CMM and the new Centre of Excellence, means Green Gas has a compelling offer for coal mine operators looking to profit from the problem of CMM while, at the same time, significantly increasing the safety of their operations. 