

# 34 Ukraine



## 34.1 Summary of Coal Industry

### 34.1.1 ROLE OF COAL IN UKRAINE

Ukraine produced approximately 1 percent of total world coal production in 2012 (see Table 34-1) producing 64,362 million tonnes (Mmt) of saleable hard coal according to the U.S. Energy Administration, making it the fourteenth largest producer of coal in the world (EIA, 2014a). BP ranked Ukraine as eleventh in production in their 2013 survey report with total raw coal production of 88.2 Mmt in 2012, a 4 percent increase over 2011 and a 20 percent increase over 2009 (BP, 2013). Statistics for 2013 have been released by the Ministry of Energy and Coal Industry of Ukraine, According to the Ministry, raw coal production totaled 83.7 Mmt in 2013 (Yashchenko, 2014).

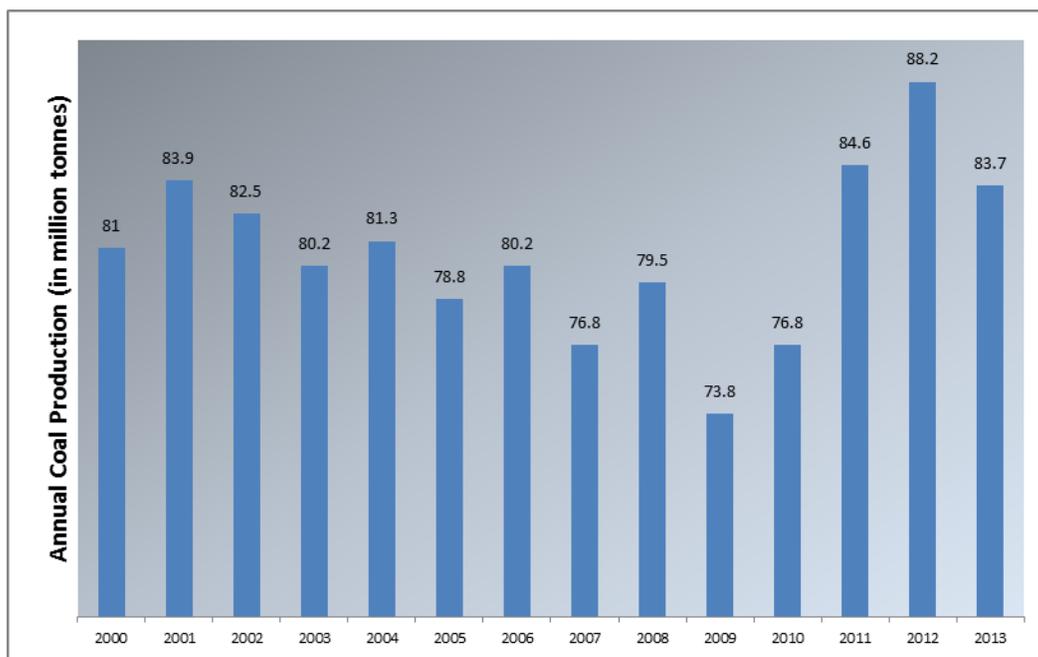
**Table 34-1. Ukraine's Coal Reserves and Production**

Indicator	Anthracite & Bituminous (million tonnes)	Sub-bituminous & Lignite (million tonnes)	Total (million tonnes)	Global Rank (# and %)
Estimated Proved Coal Reserves (2011)	15,351	18,522	33,873	7 (3.8%)
Total Primary Coal Production (2012)	64.4	0	64.4	14 (0.8%)

Source: EIA (2014a)

All of Ukraine's production is hard coal, according to IEA and EIA. 2007 was the last year lower rank brown coals were produced in Ukraine and even then only a small volume of lignite was produced—0.2 Mmt comprising only 0.3 percent of total coal production (IEA, 2013). As reflected in Table 34-1, Ukraine's total coal reserves as of 2012 were 33.9 billion tonnes, of which about 15.4 billion tonnes were hard coals and 18.5 billion tonnes were soft coals (sub-bituminous and lignite) (BP, 2013). Euracoal, the European Association for Coal and Lignite, estimates that Ukraine's total coal resources are 54 billion tonnes with economically recoverable reserves of 34 billion tonnes (Euracoal, 2013). Coal in 330 seams has been explored to a depth of 1,800 meters, with 130 seams exceeding 0.45 meters in thickness. Only 10 seams are suitable for development with the remainder being too deep or too thin to mine (M2M Workshop – Ukraine, 2005).

Coal production in Ukraine declined significantly from 1990 to 1996, falling by over 50 percent from 164.9 Mmt in 1990 to 70.5 Mmt in 1996. Coal production has since stabilized at an approximate average of 80 Mmt per year of raw coal production (BP, 2013). In 2013, Ukraine produced 83.7 Mmt of coal with 59.6 Mmt coming from private mines and the remaining 24.1 Mmt coming from state-owned mines (Yashchenko, 2014). In addition to licensed mines, unregulated coal mining is also reported to be occurring in Ukraine with reports estimating that illegal mining may produce up to 10 percent of Ukraine's coal (Cragg, 2013; Golovnev, 2013).

**Figure 34-1. Ukraine's Historical Raw Coal Production Volumes, 2000-2012**

Sources: BP (2013); Yashchenko (2014)

Ukraine remains critically reliant on coal as one of its primary resources for electric power generation along with nuclear power (EIA, 2014b). In 2012, coal supplied 36 percent of Ukraine's total energy supply (BP, 2013). Ukraine is not among the world's major coal exporters because of a lack of progress on deregulation, along with underinvestment in coal production leading to high coal production costs. Despite its sizeable resources Ukraine is a net importer of coal and in 2012 imported a net 6.963 Mmt (EIA, 2014a). In 2012, 46 percent of the country's rated generating capacity was in thermal sources (coal, oil, and gas-fired), compared to nuclear at 48 percent and hydroelectric at 6.0 percent (EIA, 2014a). Thermal production's role steadily decreased between 2003 and 2005 from 50 percent to 45 percent as nuclear generation capacity increased; however, nuclear and thermal generation have been roughly equal since 2006 (EPA, 2014a).

Coal is produced in two major basins in Ukraine, the Donetsk Basin (60,000 km<sup>2</sup>) in southeastern Ukraine (and western Russia), and the Lviv-Volyn basin (7,500 km<sup>2</sup>) in western Ukraine, which continues into Poland (Sachsenhofer, 2002; M2M – Ukraine, 2005). The Donetsk Basin is commonly referred to as “the Donbass” and holds approximately 95 percent of Ukraine's proved coal reserves (Euracoal, 2013). The Donbass can be further subdivided between the Donetsk (45.6 percent), Lugansk (34.2 percent), and Dnipropetrovsk (15.3 percent) regions (Figure 34-2).

Figure 34-2. Ukraine’s Coal Fields



Source: IEA (2012)

### 34.1.2 STAKEHOLDERS

Potential stakeholders in coal mine methane (CMM) development in Ukraine are listed in Table 34-2.

Table 34-2. Key Stakeholders in Ukraine’s CMM Industry

Stakeholder Category	Stakeholder	Roles
Coal associations	<ul style="list-style-type: none"> <li>▪ Makeyevugol Coal Association (<a href="http://www.makeyevugol.donbass.com/">http://www.makeyevugol.donbass.com/</a>)</li> <li>▪ Donetsksteel</li> <li>▪ DTEK (SCM Holdings)</li> <li>▪ Komsomolets Donbassa Mine</li> <li>▪ DTEK Pavlogradugol (10 mines)</li> <li>▪ Dobropolyeugol (5 mines)</li> <li>▪ Rovenkianthracite (6 mines)</li> <li>▪ Sverdlovanthracite (5 mines) Mine</li> <li>▪ ALC Mine Bilozerska (1 mine)</li> <li>▪ State Enterprise Coal Company Krasnolimanskaya Mine</li> <li>▪ Luganskugol</li> <li>▪ Pervomayskugol</li> <li>▪ Oktyabrugol</li> <li>▪ Private Joint Stock Company “Mine named after AF Zasyadko</li> <li>▪ METINVEST Holdings (<a href="http://www.metinvestholding.com/en">http://www.metinvestholding.com/en</a>)</li> <li>▪ Krasnodonugol (5 mines)</li> </ul>	Project hosts

Table 34-2. Key Stakeholders in Ukraine's CMM Industry

Stakeholder Category	Stakeholder	Roles
Coal associations (con't)	<ul style="list-style-type: none"> <li>▪ Coal Energy SA (<a href="http://www.coalenergy.com.ua/en/">http://www.coalenergy.com.ua/en/</a>)</li> <li>▪ Svyato-Pokrovskaya mine</li> <li>▪ Svyatitelya Vasiliya Velikogo mine</li> <li>▪ Svyato-Serafimovskaya mine</li> <li>▪ Svyato-Andreevskaya</li> <li>▪ Prepodobnogo Sergiya Radonezhskogo mine</li> <li>▪ Chapaeva mine,</li> <li>▪ 1 Maya mine</li> <li>▪ Ternopolskaya mine</li> <li>▪ Svyato-Nikolayevskaya mine</li> <li>▪ Udacha mine</li> <li>▪ Rassypnianskii Krutoi mine sectors</li> <li>▪ Donetsk Coal &amp; Energy <a href="http://www.ivcdn.dn.ua/">http://www.ivcdn.dn.ua/</a></li> <li>▪ Donugol (<a href="http://www.donugol.ru/">http://www.donugol.ru/</a>)</li> <li>▪ Dobropolyengol</li> <li>▪ Dobropolye</li> <li>▪ Krasnoarmeyskugol</li> </ul>	Project hosts
Equipment manufacturers	<ul style="list-style-type: none"> <li>▪ Caterpillar, USA</li> <li>▪ Zeppelin Ukraine (Ukrainian division of Caterpillar)</li> <li>▪ GE Jenbacher (Austria)</li> <li>▪ Biothermica (Canada) – VAM</li> <li>▪ Hofstetter (Switzerland) – flares</li> <li>▪ MEGTEC Systems</li> <li>▪ Durr</li> </ul>	Power generation equipment supplier
Developers	<ul style="list-style-type: none"> <li>▪ ATEC</li> <li>▪ Carbon TF</li> <li>▪ Eco-Alliance</li> <li>▪ EcoMetan</li> <li>▪ EnergoImpex</li> <li>▪ EuroGas (Lviv-Volyn Basin)</li> <li>▪ Green Gas International</li> <li>▪ Green Way 2020</li> <li>▪ HEL East Ltd</li> <li>▪ Pro2 Anlagentechnik GmbH</li> <li>▪ See <a href="http://www.epa.gov/coalbed/networkcontacts.html">http://www.epa.gov/coalbed/networkcontacts.html</a></li> </ul>	Project opportunity identification and planning
Engineering, consultancy, and related services	<ul style="list-style-type: none"> <li>▪ Advanced Resources International Inc. (USA)</li> <li>▪ DMT GmbH</li> <li>▪ Raven Ridge Resources</li> <li>▪ REI Drilling (USA)</li> <li>▪ Ruby Canyon Engineering</li> <li>▪ Schlumberger (global)</li> <li>▪ Weatherford International (global)</li> <li>▪ See <a href="http://www.epa.gov/coalbed/networkcontacts.html">http://www.epa.gov/coalbed/networkcontacts.html</a></li> </ul>	Technical assistance
Government Groups	<ul style="list-style-type: none"> <li>▪ Ministry of Energy and Coal Industry of Ukraine</li> <li>▪ Donetsk Regional State Administration (DRSA)</li> <li>▪ State Service of Mining Supervision and Industrial Safety of Ukraine</li> </ul>	Project approval
Universities, Research Establishments	<ul style="list-style-type: none"> <li>▪ Donetsk Coal Research Institute</li> <li>▪ Ukrainian Natural Gas Research Institute</li> <li>▪ Dnipropetrovsk Mining University of Ukraine</li> <li>▪ National Academy of Sciences</li> </ul>	Technical assistance

### 34.1.3 STATUS OF COAL AND THE COAL MINING INDUSTRY

Ukraine experienced a steep decline in coal production from 165 million raw tonnes per annum (Mta ) in 1990 to 70.5 Mta in 1996. Production stabilized after 1996, fluctuating between 70 and 80 Mta, although 2012 production increased to 88.2 Mt (BP, 2013), and the Ministry of Energy and Coal Industry of Ukraine reports that raw coal production totaled 83.7 million metric tonnes in 2013 (Yashchenko, 2014). Almost two-thirds of the production is steam coal and the remainder is coking coal (IEA, 2013). The increase in coal production is due to the closure of uneconomic mines that came about from the Ukraine mine closure plan in 1997 and the privatization of formerly state-owned mines. Privatization has led to significant investment in the privatized mines and a broader move to market standards where transactions occur with creditworthy customers and payments are more regular. With reserves sufficient to last for over 350 years at current production levels, the coal mining industry should remain stable for the foreseeable future.

Private companies operated 70 percent of Ukraine coal production capacity at the end of 2013 (Yashchenko, 2014). By year end 2013, there were 143 coal mines operating in Ukraine, a decrease of 12 from 2012. Data on ownership is not available for 2013, but in 2012 there were 45 privately owned mines in Ukraine, up from 29 in 2010. The number of state-owned mines declined from 127 in 2010 to 110 in 2012 (Yashchenko, 2013). These changes are in line with the Energy Strategy of Ukraine, which plans for further decrease of state ownership of coal mines (Yashchenko, 2013). The Cabinet of Ministers approved privatization of 66 coal mines between 2012 and 2014, including noted coal associations such as Makeevugol and Luganskugol (MECI, 2012).

Most of the mines in Ukraine are underground mines (Table 34-3) producing bituminous coal. Anthracite accounts for 11 percent of coal production (IEA, 2013). Ninety-five percent of the active mines in 2012 were in the Donetsk basin, while the remaining five percent were found in the Lviv-Volyn basin (MECI, 2012; Yashchenko, 2013).

**Table 34-3. Ukraine – Number of Coal Mines by Type**

Type of mine	Raw Coal Production (million tonnes)	Number of mines
Underground (active) mines – total (2013)	83.7	143
Surface (active) mines – total (2012)	0.02	3

Sources: PEER (2005); Yashchenko (2014); UNFCCC (2014a)

Today, active Ukrainian underground coal mines have an average mining depth of more than 700m and one out of six mines are at a depth of greater than 1,000m (IEA, 2012). The deepest mine is 1,332m, and some preparatory work is being undertaken at a depth of 1,386m (Euracoal, 2013). Average seam thickness is 1.2m. Approximately 90 percent of mines release significant amounts of methane. About 60 percent of mines are reported to have possible coal dust outbursts, while 22 percent of mines are susceptible to possible coal spontaneous combustion (IEA, 2012).

In 2013, 133 out of 143 mines or 93 percent of operating mines were considered gassy, and these mines produced 70 percent of Ukraine's coal in 2013. Thirty of the mines have absolute methane emissions between 0.5 and 12 cubic meters per minute ( $m^3/m$ ) and the other 103 have emissions greater than 12  $m^3/m$  (Yashchenko, 2014). At some mines, the natural gas content can exceed 35 cubic meters per tonne of dry ash-free coal (PEER, 2002).

## 34.2 Overview of CMM Emissions and Development

The Global Methane Initiative (GMI) International CMM Projects Database identifies 31 CMM projects in Ukraine, involving 13 active, underground mines and one surface mine in the Donbass, and three active underground mines, one abandoned mine and one active surface mine in the Lugansk basin. The methane is used for boiler fuel in 11 of these projects, for combined heat and power in eight, flaring in seven, and for industrial use, power generation, pipeline injection, heating/cooling and vehicle fuel and flaring in the remaining five projects (GMI, 2014a). GMI's 2010 Projects Database lists a further eight projects that were publicized through posters at the 2007 and 2010 GMI Expos at <https://www.globalmethane.org/activities/indexact2.aspx?sector=coal#> (GMI, 2014b).

Ukraine has registered more CMM projects under the Joint Implementation (JI) mechanism of the Kyoto Protocol than any other country. Ukraine also has a very good track record with respect to generating Emission Reduction Units (ERUs) under the JI. Thirteen of the 16 projects in the pipeline have been registered with the remaining three still in the determination stage. Of the 13 registered projects, 12 have been issued ERUs, an extremely high success rate compared with other countries. Total ERUs issued through 2012 equal 23 million tonnes carbon dioxide equivalent (MmtCO<sub>2</sub>e) (UNEP RISØ Center, 2014).

One of the latest CMM degasification and utilization projects at the Sukhodolska-Vostochnaya coal mine in Krasnodon was announced by Green Gas International in February, 2010. The mine currently operates at depths up to 1,000 meters and the project plans to enhance the gas drainage system to provide a steady source of methane for heat and power production for use at the mine. (Green Gas, 2010). In January 2014, GGI and Krasnodonugol announced they were entering the next phase of the project to generate heat and power. In addition, DTEK has announced plans to develop a 3 MW power project at the Komsomolets Donbassa mine where it has already used CMM in two flares and also uses CMM in boilers for hot water and steam in winter.

### 34.2.1 CMM EMISSIONS FROM OPERATING MINES

Ukraine is considered to be the world's fourth largest emitter of methane emissions from coal mining activities (USEPA, 2012), even though emissions have been significantly reduced by mine closures and reduced coal production (see Table 34-4). The data in this table may vary from the USEPA data presented in the Executive Summary due to differences in inventory methodology and rounding.

**Table 34-4. Ukraine's CMM Emissions (million cubic meters)**

Emission Category	2000	2005	2010	2015 (projected)
Underground mining - active	1692.55	1315.73	1191.32	
Underground - post-mining	156.32	135.45	133.89	
Surface mining - active	1.42	0.41	.01	
Surface - post-mining	0.20	0.06	0.00	
Abandoned Mines	7.86	4.65	2.80	
Total Emissions	1850.49	1451.65	1325.21	2096.06*
Additional Recovered and Flared	70.36	55.02	127.61	

Sources: UNFCCC (2014a); \*USEPA (2012)

In August 2005, the U.S. Trade and Development Agency (USTDA) awarded a \$585,570 grant to the Donetsk Regional State Administration to conduct a feasibility study on commercial development of coal bed methane (CBM) and CMM in the Donbass region. The project aimed to increase the domestic supply of natural gas, increase mine safety, and improve local environmental quality. The analysis focused on developing the best technical and economic approach for methane drainage at mines, evaluating the technical and economic merits of producing CMM, and assessing the most likely markets and infrastructure required to utilize CMM and CBM (USTDA, 2005). The study focused on two mines, Bazhanov and South Donbass No.3, which were found to have average CMM emissions of 9.9 and 8.8 million m<sup>3</sup> per year respectively. Economic analysis suggests these emissions are sufficient to power on-site electricity generators with capacities of 1.7MW and 3.3 MW. The Bazhanov mine already utilizes 5.5 million m<sup>3</sup> per year of drained methane in onsite boilers for heating purposes (USTDA, 2008). The two mines were publicized in posters at the 2010 GMI Expo. The projects are currently searching for further financial and technical assistance to move their CMM projects to the development stage (GMI, 2014b).

The U.S. EPA supported two recent pre-feasibility studies in Ukraine:

- **Komsomolets Donbassa Mine** – The pre-feasibility study projects gas production from surface pre-mine drainage and gob vent boreholes, analyzes end-use options and assess the feasibility of various combinations of gas drainage and utilization technologies. The study concludes that gob vent boreholes combined with power generation can be economic at the mine.
- **Zhdanovskaya Mine** – There is large potential to reduce methane emissions at Zhdanovskaya Mine. The study identified two main, technically-viable options for the optimal utilization of CMM at the mine: (1) electricity generation by installing a gas-engine generator to produce power for mine use or export to the public grid; and (2) on-site heat generation from existing mine boilers which presently consume coal, but can be switched to use CMM.

### 34.2.2 CMM EMISSIONS FROM ABANDONED COAL MINES

Hundreds of mines have been closed and abandoned in Ukraine since the inception of its coal industry. Between 1990 and 2013, 143 underground mines were abandoned or were in the process of closure in a major effort by the state to increase mine efficiency, improve mine safety, and achieve mine profitability (UNFCCC, 2007; Yashchenko, 2013 & 2014). The mine closure rate has declined in recent years, as the government attempts to bolster national coal production with technical upgrades at coal mines rather than closure, while also investigating opening some previously closed mines (Euracoal, 2008). Due to high groundwater levels, it has been reported by experts in Ukraine that all abandoned mines flood limiting their capacity to be sources of AMM projects. Pumping flood water out of the mine has been considered but it is extremely energy and cost intensive. There may also be environmental concerns with discharge of mine water onto surface soils or surface water bodies. The Government of Ukraine has established a state-owned company responsible for closing mines and managing the abandoned mines. The company is called Ukruglerestrukturizatsia (UDKR). The Donetsk Regional State Administration and UDKR have expressed interest in developing policies and procedures to prepare operating mines for future AMM activity upon closure.

### 34.2.3 CBM FROM VIRGIN COAL SEAMS

Ukraine's CBM resource is approximately 1.7 trillion cubic meters (ARI, 1992; Thomas, 2002). The USTDA grant awarded to the Donetsk Regional State Administration in 2005 aimed to assess the most likely markets and infrastructure required to utilize virgin CBM (USTDA, 2005). The study looked at the feasibility of drilling CBM wells in the areas surrounding the Bazahnov and South Donbass No. 3 mines. Multiple seams of coal are present in a section 500-900 m deep and with gas contents ranging from 15-20 m<sup>3</sup> per tonne. Markets for potential produced gas include direct pipeline sales and compressed natural gas (CNG) projects (USTDA, 2008).

EuroGas Inc. was the first foreign company to drill for CBM in 1998, but has had no commercial success. In 2008, they formed a joint venture with one of Ukraine's largest industrial holding groups, to explore and develop CBM leases in east and west Ukraine, although this project is still in the planning stages (EuroGas, 2010).

Ukraine has very limited R&D resources available for pursuing CMM or CBM research, namely lack of technology for and experience in applying hydro-fracturing to stimulate CBM production. A more favorable investment climate along with clarity on CBM ownership issues are needed before more foreign companies are likely to commit to CBM projects in Ukraine.

## 34.3 Opportunities and Challenges to Greater CMM Recovery and Use

Ukraine has signed and ratified both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (see Table 34-5). As an Annex I country, Ukraine is eligible to host Joint Implementation (JI) projects. Emission Reduction Units (ERUs) are the commodity generated by JI projects and one ERU is equivalent to one tonne of CO<sub>2</sub>. ERU's are recognized offsets in the European Emissions Trading Scheme. The Kyoto Protocol ended on 31 December 2013, and there is no successor agreement; however, the EU ETS continues to operate. To be eligible to be traded in the EU ETS, ERUs must have been generated prior to 1 January 2013, and issued by the UNFCCC's Clean Development Mechanism Executive Board before 31 March 2015.

**Table 34-5. Ukraine's Climate Change Mitigation Commitment**

Agreement	Signature	Ratification
UNFCCC	June 11, 1992	May 13, 1997
Kyoto Protocol	March 15, 1999	April 12, 2004

Source: UNFCCC (2014b)

Per the Kyoto Protocol, Ukraine must stabilize greenhouse gas emissions at the 1990 level of 55.4 MmtCO<sub>2</sub>e. Emission reductions since 1990 due largely to coal mine closures have resulted in current estimated emissions of 17.1 MmtCO<sub>2</sub>e (UNFCCC, 2014a).

As of 2013, degasification is performed at 37 coal mines in Ukraine that account for 41 percent of the country's total coal production. Of the 37 mines degassing, 20 are private mines with annual production of 28.6 Mmt or about one-third of total coal production. The remaining 17 are state-owned mines generating 10 Mta. The number of mines using degasification was steady between

2010 and 2012 at 41 to 42 mines but declined in 2013 to 37 mines. The decrease was due to a large decrease in the number of state-owned mines using methane degasification, while privately owned mines employing degasification has actually been growing since 2010 (Yashchenko, 2014).

Coal mines are prohibited from using CMM if the CH<sub>4</sub> content is below 25 percent, which was the case at 20 of the mines in 2012. The other 15 mines had CH<sub>4</sub> concentrations above 25 percent in their drainage systems, but only five of those have concentrations above 35 percent (Yashchenko, 2013).

In 2013, Ukraine mines recovered 370 Mm<sup>3</sup> in their degasification systems, the same amount as produced by degasification systems in 2012. The Ministry of Energy and Coal Industry reports utilization of 34 percent of the drained gas in 2013, a decrease from 43 percent in 2012. The Government's goal is to increase methane drainage to 450 Mm<sup>3</sup> annually while doubling utilization to 250 Mm<sup>3</sup> per year (Yashchenko, 2014).

### 34.3.1 MARKET AND INFRASTRUCTURE FACTORS

In Ukraine, mineral resources and mines are owned by the state. Existing mines are operated under licenses. While methane in coal is owned by the state, it is assigned to companies, mines, and individuals. CBM/CMM development is subject to the approval of the Ministry of Energy and Coal Industry (M2M Workshop – Ukraine, 2005).

Most CMM that is not flared is currently used for basic applications such as boiler firing and mine air heating, and combined heat and power. There remains significant potential for CMM to fuel additional power generation in gas or dual-fuel power plants, to supplement supplies for other residential, commercial, and industrial uses, or to be converted into transportation fuel. In 2011, Ukraine imported 77 percent of its natural gas requirements (EIA, 2014a) and so the potential markets for CMM in Ukraine are significant, especially as prices for natural gas increase. The principal barrier to expanding the use of CMM is poor market access, including the lack of modern infrastructure to gather and transport methane produced by CMM processes to internal end use markets and to existing international pipelines that serve foreign markets, mainly Western Europe.

### 34.3.2 REGULATORY INFORMATION

The state owns all subsurface resources including coal and gas resources. Private mines lease the minerals from the State. Forty-five operating coal mines have been privatized, which represent roughly 71 percent of Ukraine's annual coal production (Yashchenko, 2013 and 2014). Major private mining companies include DTEK, METINVEST, Donetsk Steel, and Coal Energy SA. The remaining mines are state owned and are referred to as Joint Stock Holding Companies (Triplett, 2006).

The Government of Ukraine prepared the *Updated Energy Strategy of Ukraine to 2030* in 2012, addressing reform of the coal industry. Target growth is to reach 130 Mta of production by 2030, a 53 percent increase over 2012 levels.

State programs to advance CMM production, have previously relied mainly on private investment. Government support has taken the form of various tax incentives to attract investment in coal regions and exempting foreign-manufactured materials and equipment used in CMM development from Ukraine's value added tax.

On 22 February 2006, the Ukrainian Cabinet officially approved a set of JI procedures formally outlining the Federal Government's procedures for consideration, approval, and implementation for domestic companies such as coal mines to carry out JI projects under Article 6 of the Kyoto Protocol; several projects have already been submitted under these guidelines.

More recently, Ukraine has undertaken several important policy steps to promote CMM capture and use.

In 2009, Ukraine's Parliament passed the Law on Gas (Methane) from Coal Beds. The law defines CMM as a fuel resource and clarifies ownership issues, making it easier for third parties to obtain licenses to use vented CMM. The law also does not allow new mines to begin operating unless they brought concentrations of methane down to acceptable levels. In addition, it clarifies that CMM owners can sell their gas into the natural gas transmission system when the gas meets system requirements. Finally, the law attempts to support investments projects by offering state guarantees for protecting investments that aim to improve degasification, providing customs and tax incentives to businesses engaged in CMM recovery and CMM-based production, granting state support and guarantees to the producers and suppliers of energy from CMM.

Certain gas emissions, including methane and carbon dioxide, are controlled as a result of the Law of Ukraine on Protecting the Natural Environment and the Law of Ukraine on Air Protection. Ukraine has regulated emissions and pollutants by charging an ecological tax since 2009 in which each company has to turn in ecological tax forms quarterly and pay for their emissions (Roshchanka and Evans, 2014). The cost of methane emissions is 81.08 Ukraine Hryvnia (UAH)/tonne, or \$9.9/tonne, while the cost of carbon dioxide emissions is 54.05 UAH/tonne, or \$6.6/tonne (Government of Ukraine, 2010).

In June 2009, Ukrainian President Viktor Yushchenko signed important coal mine legislation that includes a tax exemption for Ukrainian CMM projects. Starting in 2010 and continuing through January 2020, profits from the production and use of CMM earned by Ukrainian enterprises will no longer be subject to taxation (the basic charge rate is 16 percent). However, in 2012, the Ukrainian Parliament amended the tax code, requiring mines to pay subsoil use tax for methane utilization. This made CMM projects less feasible. For example, DTEK had to suspend its CMM-fired cogeneration projects.

Due to the coal industry's large role in the economy, not only as an indigenous source of energy but also for employment, the Government of Ukraine offers significant subsidies to state-owned coal enterprises. According to IEA, subsidies in 2009 totaled USD 1.7 billion (IEA, 2012). Private mines do not receive direct subsidies but may receive other preferential treatment such as favorable loan terms, low tariffs, or other attractive options.

## 34.4 Profiles of Individual Mines

Twenty-nine mines have been identified as primary opportunities for CBM/CMM development in Ukraine. These mines have been profiled in great detail by the Partnership for Energy and Environmental Reform in its *Handbook on Opportunities for Production and Investment in the Donetsk Basin* (PEER, 2001).

Table 34-6 gives more up to date details of one of the profiled mines. Other profiles are available at the following sources:

- Updated profiles are available on the GMI website, under “Projects” (GMI, 2014b).  
<https://www.globalmethane.org/activities/indexact2.aspx?sector=coal#>

The pre-feasibility studies of the:

- Komsomolets Donbassa mine  
[http://epa.gov/coalbed/docs/KDMineUkraine\\_preFeasibilityStudy2013.pdf](http://epa.gov/coalbed/docs/KDMineUkraine_preFeasibilityStudy2013.pdf)
- Zhdanovska mine  
[http://epa.gov/coalbed/docs/Ukraine\\_PreFS\\_CMM\\_Zhdanovskaya%20Mine\\_July%202013.pdf](http://epa.gov/coalbed/docs/Ukraine_PreFS_CMM_Zhdanovskaya%20Mine_July%202013.pdf)
- The Project Design Documents available on the UNFCCC website for the projects listed in Table 34-7.
- The USEPA Publication *Addressing Barriers to CMM Project Development in Ukraine: Four Coal Mine Profiles* [http://epa.gov/coalbed/docs/ukraine\\_cmm\\_profiles\\_may2010.pdf](http://epa.gov/coalbed/docs/ukraine_cmm_profiles_may2010.pdf).
- U.S. Trade & Development Agency. Feasibility Study for the South Donbass #3 and Bazhanov Mines. *Coal Mine Methane and Coalbed Methane in the Donetsk Region, Ukraine*.  
[http://www.ustda.gov/library/reports/ukr\\_200581025a.pdf](http://www.ustda.gov/library/reports/ukr_200581025a.pdf)

**Table 34-6. Profile of Yuzhno-Donbasskaya #3**

Yuzhno-Donbasskaya #3 Mine						
<b>Mine Status</b>	Active		<b>Mine Owner</b>	Donetskya Vulgina Energetichna Kompanya		
<b>Mining Method</b>	Longwall		<b>Parent Company</b>	State		
<b>Depth of Seams</b>	585-940 m		<b>Location</b>	Vugledar, Donetsk		
<b>No. of Seams</b>	2 – C <sub>11</sub> & C <sub>10</sub>		<b>2008 VAM Volume</b>	30.32. Million m <sup>3</sup>		
<b>Seam Thickness</b>	1.5-1.7 m		<b>2008 Drained CH<sub>4</sub> Volume</b>	2.9 Mm <sup>3</sup>		
<b>2008 Coal Production</b>	1.2 million tonnes		<b>2008 Utilized CH<sub>4</sub> Volume</b>	0		
	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
<b>Coal Production (thousand tonnes/yr)</b>	1019	1053	1224	1273	1569	1510
Methane (million m <sup>3</sup> /yr)						
<b>Emitted from ventilation systems</b>	15.56	23.70	15.27	12.31	31.23	49.66
<b>Liberated from drainage systems</b>	2.58	1.00	2.89	2.9*	2.9*	2.9*
<b>Total Methane Emissions</b>	18.14	24.70	18.16	15.21	34.13	52.56
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>Coal Production (thousand tonnes/yr)</b>	1289	1190	1266	1200*	1200*	1200*
Methane (million m <sup>3</sup> /yr)						
<b>Emitted from ventilation systems</b>	46.97	53.75	47.97	35.00	32.90	30.32
<b>Liberated from drainage systems</b>	2.9*	2.9*	2.9*	2.9*	2.9*	2.9*
<b>Total Methane Emissions</b>	49.87	56.65	50.87	37.90	35.80	33.12

\* Estimated  
Source: GMI (2014b)

**Table 34-7. List of Ukraine Joint Implementation Projects**

Name of Project
Utilization of CMM at the Coal Mine named after A.F. Zasyadko
CMM utilization on the coal mine Shcheglovskaya-Glubokaya of the State Holding Joint-Stock Company GOAO Shakhtoupravlenye Donbass
CMM utilization on the Coal Mine № 22 “Kommunarskaya” of the State Holding Joint-Stock Company GOAO Shakhtoupravlenye Donbass
CMM utilization on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK (Donbasskaya Toplivnaya Energeticheskaya Kompanya)
CMM utilization on the Joint Stock Company “Coal Company Krasnoarmeyskaya Zapadnaya № 1 Mine”
CMM utilization for heat generation and flaring – Pivdenodonbaska No 3
Utilization of CMM at the Coal Mine Sukhodilska-Skhidna
CMM Capture and Utilization at Samsonivska-Zakhidna Mine
Abandoned CMM Utilization at NPK-Kontakt Ltd.
Utilization of CMM at the Coal Mine Named After M. P. Barakov of JSC Krasnodoncoal
Power Generation from the CMM at the Sukhodolskaya – Vostochnaya Mine
Utilization of CMM at the SE Makiyivvuhillya
CMM utilization on the coal mine Molodogvardeyskaya of the Joint Stock Company Krasnodonugol
Nykanor-Nova Coalmine Methane Utilization Project
CMM capture and utilization at Holodnaya Balka mine in Donetsk Oblast
CMM utilization on the coal mine Molodogvardeyskaya of the Joint Stock Company Krasnodonugol
Nykanor-Nova Coalmine Methane Utilization Project
CMM capture and utilization at Holodnaya Balka mine in Donetsk Oblast

Source: UNEP RISØE Center (2014)

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