



## **CO<sub>2</sub> Storage and ECBM Case Study in Velenje Coalmine (Slovenia)**

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In Velenje coalmine, lignite has been extracted for 120 years. Since 1999 approximately 4 million tons of lignite have been dug out per year and almost all of it has been used to produce electricity in the near thermal power plant in Lóžtanj (LTPP). Apart from SO<sub>2</sub> and NO<sub>x</sub> also CO<sub>2</sub> emissions are high and cause a serious additional environmental problem. The emitted value of carbon dioxide in the Lalek Valley is around 4 million tons per year. The regional and wider national strategic goals are concerning the use of natural resources and electricity production in the future regarding the Kyoto protocol, signed in year 1998. Velenje coalmine was already implemented a project of Clean Coal Technology (CCT). The injection of CO<sub>2</sub> in coal seams and possibility of using coal bed methane (CBM) is one of these CCT projects. The research has been carried out starting in the year 2001. In 2001, the content of methane was measured in existent vertical wells from the surface in Velenje coalmine. In 2002, an estimation of quality and quantity of emitted gas from horizontal and cross-measure wells in the coalmine was performed. Gas samples were taken from three different locations: (1) coalseam at the G plate, (2) during mining in area -20a and (3) in collapsed area -90c. In the year 2003 the measurements of gas quality from horizontal wells at the G plate and in the collapsed area continued. The gas was of medium quality and methane content was between 33 and 70 %. In 2004 an experiment was performed on sequestration of carbon dioxide (CO<sub>2</sub>) in the coal seam. The aim of the experiment was to estimate the suitability of the coal bed for storage of CO<sub>2</sub> released during combustion of coal and the usage of subsequently released CH<sub>4</sub>. The wells were 3000 m far from the mine entrance. The first three wells were 6 m apart from each other, the other three 3

m. In the wells the amounts of CH<sub>4</sub>, CO<sub>2</sub>, dimethylsulfide, oxygen, carbon monoxide and hydrogen, as well as flow, humidity and temperature of desorbed gases were measured. CO<sub>2</sub> was sequestered in the second and fifth well for four hours. In the other wells desorbed gases were sampled in 2 l tedlar bags. During sequestration of CO<sub>2</sub> gases were sampled from the wells every half hour. Eight weeks after the experiment was performed, the composition of gases was remeasured. The amount of methane was between 60 and 78%, which is essentially higher than in previous research. Gas desorbed from these four wells was still medium quality and can be used for electricity production or for space and water heating on-site. When Thermal power plant ŁoŹtanj will install a gas turbine, the degasification system in Velenje Coal mine will be an interesting option considering coal bed methane use in Thermal power plant ŁoŹtanj.