

MINUTES

14th ROUND TABLE ON COAL

Coal Conversion Technologies

Participants

ALVAREZ, Antonio, EPPSA, Brussels
BAUER, Franz, VGB, Germany
BOTSCHKE, Peter, European Chemical Industry Council, Brussels
BOWE, David, Yorkshire Coal Task Force, UK
CODA, Beatrice, European Commission
COZZANI, Franco, European Commission DG Research
DIRSCHAUER, Wolfgang, Vattenfall Europe, Germany
DUERR, Matthias, RWE, Brussels
EHLER, Christian, MEP
GRÖGOR, Brigitte, Sachsen-Verbindungsbüro, Brussels
GUTTE, Heiner, IEC, Germany
HILTERMANN, Andreas, InfraLeuna, Germany
HULIK, Gitta, EURACOAL
KALMAR, Istvan, Calamites, Hungary
KLEMM, Franz, EVN AG, Austria
KLOPP, Heinrich, State Ministry of Justice and for European Affairs, Saxony, Germany
KULIK, Lars, RWE Power, Germany
MARCINKIEWICZ, Bogdan, MEP
MARENCO, Claudia, European Commission
MEYER, Bernd, IEC, Germany
MEYERS, Christian, ETP-W, Belgium
MILDNER, Christina, MIBRAG, Germany
MOSTADE, Marc, Clean Coal, London
MURZA, Stefan Klaus, IEC, Germany
PERINEAU, Serge, World Coal-to-Liquids Conference, France
RIEKE, Thomas, Saxony-Anhalt Representation, Brussels
RICKETTS, Brian, EURACOAL
ROGUT, Jan, Central Mining Institute (GIG), Poland
SALLUSITO, Rita, European Commission, DG for Energy
SCHNEIDER, Thomas, GVSt Brussels office
SCHNEIDER, Wolfgang, European Commission, RFSC
STELTER, Kay, DEBRIV, Germany
WENIG, Marcus, Vertretung des Landes Brandenburg, Brussels
WILDE, Marion, European Commission, DG for Energy
ZVOLIKEYCH, Anna, DTEK Brussels Representation

MEPs' Assistants

1. Introduction and welcome (Dr. Christian Ehler, MEP)

On the latest developments in Germany, where the Government has decided to phase out nuclear by 2022, Dr. Ehler remarked that this boosted the prospects for coal since it would be the only abundant indigenous energy resource remaining in Europe. Nevertheless, future coal use would not be possible without a new generation of power plants and processes, so research is urgently needed in many fields, including chemicals production. EURACOAL should therefore assure that research in clean coal technologies will be integrated into the upcoming 8th RTD Framework Programme (FP8).

2. From Mining to Refining – innovative concepts for making the most out of coal (Prof. Dr.-Ing. Bernd Meyer, Director IEC and Stefan Murza – Dept. of Energy Process Engineering and Chemical Engineering, Technische Universität Bergakademie Freiberg)

The energy system of the EU changed very rapidly in the last two decades and engineers must find new solutions in order to satisfy future demand. Many challenges have to be faced and new technologies must be developed – reliable technologies to achieve safe and acceptable energy processes. The increasing share of renewables needs an extremely flexible system where base-load may only account for 20% of supply. New storage solutions must be found and chemical storage could be one answer.

In the post-oil era, with a highly decentralised energy system, society's aim for a decreasing fuel use and a decarbonised economy by 2050 assumes huge efforts in efficiency. Coal would be given a new role if it was not anymore used for its energetic value, but as a chemical feedstock – a source of carbon molecules. Today already, we see several IGCC plants worldwide which use coal or lignite, together with biomass, to produce syngas for chemicals production. By 2030, it should be possible to replace 16 Mt of oil with 71 Mt of lignite for the production of 8.6 Mt of olefins.

Such a process is being developed by IBI (Innovative Braunkohlen Integration) in Middle Germany where research is being carried out in the field of lignite gasification, together with the mining companies. Selective mining allows different quality lignites to serve the different processes. After the preparation of the lignite and a low-temperature conversion, lignite can be gasified and stored as syngas. The only hurdle for IBI is Guidance Document No. 9 from the European Commission on the harmonisation of free allocations under the EU ETS post 2012 which is based on a benchmark for natural gas. IBI urgently needs a lignite-based benchmark in order for its research projects to have some chance of commercial success.

Future research will focus on efficiency increases in the entire process chain, the development of industrial gasification processes with lignite and biomass feedstocks, and the transition to a flexible water-gas shift for hydrogen production. Energy storage facilities must be further developed and CO₂-free chemistry should be promoted and funded under the European research framework.

3. Coal to Liquid Fuels, Natural Gas and Chemicals – a global perspective on coal conversion (Mr. Serge Péreineau, President of the World Coal-to-Liquids Conference and AXEN Consulting)

Many people still think that the conversion of coal to liquid (CTL) fuels is not possible, although installations all over the world prove that it is practical and economic. Sasol produces 30% of South African liquid fuels from coal.

Looking at the forecasts made by the IEA on increasing energy demand (Reference Scenario and 450 ppm Scenario) and the BP Annual Report, oil reserves will last some 42-43 years, gas reserves 64-65 years and coal and lignite more than 200 years. The potential of coal is enormous and as coal is being mined in all parts of the world, and can be shipped and stocked safely, it will be of huge importance to secure our future energy needs. Coal-to-liquids projects are nowadays found all over the world and several conversion routes are possible. The most common one, which is being used by Sasol, is the indirect route, where coal is gasified as a first step (underground or at the surface) into syngas, before being converted into liquid fuels. Chinese industry is developing an indirect route where syngas is converted into methanol and then into petrochemicals. In Inner Mongolia, Shenhua is developing a process, where coal is directly dissolved and liquefied to obtain liquid fuels after hydro-treatment and refining of the products.

These projects show that the conversion from coal to liquids is technically possible and that the constraints do not come from engineering but from green NGOs and an uninformed public. Coal is still the “black devil” in the minds of people and the technical arguments explaining the CO₂ footprint of CTL fuels is not a real argument to convince the public. Additionally, there are several serious concerns about this technology, which needs large volumes of water, making it impossible to apply in regions where water is scarce. Also, more greenhouse gases are produced, as the carbon:hydrogen ratio is much higher in coal than in other fuels. And last but not least, the greater input of energy to obtain liquid fuels makes the technology costly compared to conventional oil production and processing.

Several new projects are nevertheless in progress, especially in South Africa, the USA and China. The project at the German town of Leuna could also play an important role in the future development of coal to liquids.

4. Discussion

Prof. MEYER remarked that the main problem of coal gasification is the large and complex equipment needed, making it a costly process. Economies of scale matter – scaling up from 500 MWth to 1 000 MWth or even 2 000 MWth would make coal gasification competitive with the alternatives by reducing capital costs by 20% to 30% (assuming oil at USD 80-90/bbl). Adding biomass creates supplementary problems such as fouling, chlorine corrosion or fermenting of the biomass in storage. Ultimately, a source of CO₂-free hydrogen would allow truly “green” chemicals production. Until then, any CO₂ price would compromise the economics – a pilot plant would need free ETS allowances.

Mr. Serge PÉRINEAU noted that several technologies are being demonstrated worldwide, but that Sasol is the only company to have mastered CTL on a commercial scale. The company is

only willing to co-operate on large projects (>80 000 barrels per day) as a majority shareholder. Efficiency should be increased and most companies are working on that, but each project developer tends to work alone instead of pooling their efforts.

Dr. Jan ROGUT of the Polish Central Mining Institute (GIG), which led the European underground coal gasification (UCG) project “HUGE”, referred to the difficulties in delivering a pure product for synthesis of chemicals – suggesting that an alternative to the classic Fischer–Tropsch process is needed, one that is less sensitive to impurities. Another obstacle was the very high price for pure oxygen which was needed in large amounts. Cheaper oxygen production (-30%), perhaps using new technologies, would improve the prospects for CTL. GIG had just opened a new R&D centre and hoped to continue its work on UCG and CTL, including liquefaction of coal using methane (an interesting option if shale gas production proves a success in Poland).

Mr. Marc MOSTADE agreed that oxygen supply was a major investment and operating cost. He believed that there were good prospects for UCG – referring to a near-commercial pilot project that was about to commence at a depth of 1 400 metres in Alberta, Canada.

Mr. Christian MEYERS, spoke of the high pressure (50 bar) gasification work now underway at EcoTechnoPôle Wallonie at Liège. This would see capital costs fall since smaller equipment could be used for the same output. His team is looking to use the hydrogen produced to recover iron from the tailings found at many steelworks across the EU.

Mr. David BOWE observed that the feasibility of the different coal conversion technologies is proven and research scientists are convinced that society will pay the price for them, if and when needed. Public acceptance might be a much bigger issue. Would European citizens accept the construction of such huge chemical plants in their neighbourhoods? It would certainly have to be built in an area where people grew up with the chemical industry, such as at Leuna. On the other hand, people in these regions remember the old, dirty chemicals industry which polluted their environment and it will be difficult to convince them that new technologies would have a much lower impact on the environment.

Mr. Andreas HILTERMANN of InfraLeuna gave persuasive arguments for the use of indigenous raw materials for chemicals production: to keep the whole value chain in the EU and avoid foreign oil and gas suppliers taking unearned economic rent. Any negatives associated with mining have to be balanced against the creation of jobs and knowhow – 9 000 jobs protected in Middle Germany plus 2 500 new jobs.

These arguments were supported by Mr. Istvan KALMAR who saw CCS and CTL as imperatives, but still 8-10 years away. Meanwhile, indigenously produced coal (in Hungary in the case of his company) had to compete with imported natural gas, with largely unknown and ignored upstream GHG emissions outside of the EU.

The European Commission may play an important role if unconventional coal use were promoted to ensure supply security and reduce import dependence. Mr. Franco COZZANI said that the Research Fund for Coal and Steel (RFCS) would welcome proposals (by 15 September 2011) and Dr. Marion WILDE noted that DG Energy would hold a FP7 Energy Research Information Day on 7 July, including a focus on hydrogen production. Mr. Thomas SCHNEIDER believed that industry needed to give a clear message to politicians involved in

the FP8 negotiations on which elements of coal conversion needed basic R&D, and which could move forward to demonstration. Future EU support depended on today's lobby.

The 8th Framework Programme for research could play a decisive role if it clearly supports and funds research in this field. EURACOAL should invest in discussions with decision makers who draft the FP8 proposals and convince them of the urgent need to give unconventional coal use an important position in future European research. As chair of the cross-party representative group on FP8, Dr. EHLER called for a clear R&D/demonstration route for coal: industry, academia, Member States and the regions need to think about a collaborative approach to lobbying MEPs and Commissioners Geoghegan-Quinn, Oettinger and Tajani before the end of August to have most impact.

Dr. EHLER closed the meeting after announcing that the next Coal Round would take place on 29 November 2011 to coincide with a special Coal Day.