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Report on the Regional Gasification Guide Workshop for the Nordic Countries

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Introduction

As part of the communication and dissemination activities within the project, a number of workshops have been organised. One of these workshops is the regional workshop for the Nordic countries with the main purpose of informing the audience about the project findings.

According to the project description each of the regional workshops should involve 30-50 policy makers, authorities, investors and manufactures etc. at different regions in Europe, which are not directly involved in the project. In order to reach this amount of participants, the workshop was organised in conjunction with another event, i.e., a two-day Gasification seminar organised at Clarion Hotel Sign, Stockholm by the Swedish Gas Centre on 22-23 October 2009. The seminar started on the 22 October by lunchtime and the workshop was held just before the seminar, i.e., from 9.00-12.00 in the same place as the seminar.

Apart from the presentations of the project results, three external speakers had been invited to the workshop. Their presentations concerned the Danish development in biomass gasification, some aspects of balancing safety issues and investment costs in industrial gasification plants, and finally, a biomass gasification demonstration project at Græsted in Denmark. The full workshop programme is included in Annex 1.

Before the workshop, the project group had sent out targeted invitations to more than 150 people. Furthermore, the organisers of the two-day seminar had been so helpful to forward the workshop invitation to all their participants. This strong effort in inviting people and advertising the workshop resulted in a total of 47 people being present at the workshop including also people from outside Europe (including Canada, China, Chile, India and Africa). The list of registered participants is included in Annex 2



Presentations

In the first presentation, **Harrie Knoef** of project coordinator **BTG Biomass Technology Group BV** (The Netherlands) gave an overview of the work carried out in the Gasification Guide project, and the feedback received from users on the draft Guideline. He first described the history, background and objectives of the Gasification Guide project, the HSE barriers it aims to tackle, the composition of the project consortium, and the content of the 6 work packages. He then proceeded to discuss the content of the draft Guideline, with special focus on the legal framework, pertinent emission limit values, risk assessment approach, safety related issues in practice, emission abatement techniques and the checklist for permitting authorities. Finally, he presented user feedback on the draft Guideline, i.e. specific comments on the draft text and the outcome of a user survey. The survey showed a high response rate (approx. 20%) and the majority of the respondents were (highly) positive about the relevance and quality of the Guideline.

In the second presentation **Martin Hauth** of the Institute of Thermal Engineering at the **Technical University of Graz** introduced the Software Tool “Risk Analyzer”. In this presentation he covered the methodology of the software tool and illustrated its use. The software tool provides helpful and structured approach for risk assessment, by segmenting biomass gasification plants (BGP) into units, functions and parts, for which subsequently stepwise potential hazards and consequences are identified and assessed. Martin illustrated the 6-step risk assessment approach adopted in the software tool, including i. Description of General Plant Data, ii. Structuring into Process Units, iii. Definition of Functions within the Process Units incl. description of the Operating Modes, iv. Definition of the involved Parts within a Function incl. description of the Process Parameter, v. Risk Assessment and setting of Countermeasures, and vi. Reporting.



Questions from the public related to (i) the applied overall control strategy, (ii) whether permitting authorities consider the results of applying the software as sufficient documentation, and (iii) the link/overlap with HAZOP studies.

After the coffee break, **Henrik Houmann Jakobsen** of **BioSynergi Proces ApS (Denmark)** in the absence of **Henrik Flyver Christiansen** of the **Danish Energy Agency (Denmark)** presented some key elements of the lecture on Emission Regulations for Danish Combined Heat and Power (CHP) plants¹. Danish emission regulations make a distinction in the prime mover used (turbine or engine), the scale of operation (unit size) and the fuel used (heavy oil, gas oil, bio oil, biogas, natural gas, LPG or producer gas). For gasifier engines a CO emission limit value (ELV) of 3,000 mg/Nm³ applies. Arguments for this relatively high ELV are that CO is not so harmful to the environment and that CO-emissions from a plant chimney are not directly harmful to people as “*they do not sit on top of the chimney*”.



Questions from the public related to (i) experience gained with –limiting- benzene emissions, (ii) whether there is any preference for applying a diesel or gas engine in BGP, and (iii) how it is possible to achieve the low NO_x emissions at the DTU Viking gasifier.

After introducing her company’s activities, **Louise Andersson** from **FB Engineering (Sweden)** gave a presentation on balancing safety considerations and investment cost in industrial (biomass) gasification plants. She introduced the important factors from a safety point of view, and showed where and when to implement safety in the plant design. She highlighted various important factors for investment, and illustrated what cost savings (up to 20%) and other advantages can be achieved when integrating a BGP in an existing plant,

¹ **Henrik Flyver Christiansen** of the **Danish Energy Authority** prepared and would give this presentation but was unable to attend the workshop.

instead of starting a green field operation. She presented important topics to consider when safety and investment meet, and showed that timely and smart integration of safety issues can cut costs by a further 20%. She recommended contacting the permitting authorities at an early stage. Finally, she presented an example of a feasibility study that was carried out recently at Xynergo, a paper and pulp processing company in Norway. The study showed that through smart integration of a new plant (in this case a pyrolysis plant) at an existing facility (the pulping company), a safe design can be achieved with low investment cost by using existing knowledge and existing safety systems.



In the Q&A session a member of the public remarked that he was happy to see pointed out that environmental rules and conditions have a direct impact on the level of investment and thus the economics of a BGP plant.

Finally, **Henrik Houmann Jakobsen**, managing director of **BioSynergi Proces ApS (Denmark)**, presented his company experience with HSE issues. BioSynergi Proces ApS markets complete BGP, running on fresh forest wood residues (moisture content 30-55 %_{wb}), using patented air staged downdraft gasification technology. It owns and operates the 75 KW_{el} CHP demo biomass gasification plant that is known as the Castor plant and that is installed at the Græsted District Heating Plant in Denmark. Mr. Jakobsen informed the meeting about the history, background and design of the demo project, and about plans for future installations. He explained the workings of the overall technology as well as of the different unit operations and the graphic user interface. He finished with detailing impacts of BGP operation on the environment, on operator safety and on operator health.

Questions from the public related to (i) the applied fuel feeding technology, (ii) the fire safety precautions taken (ii) the occurrence of any gasifier derating and (iii) the control strategy.

Meeting wrap-up

The meeting finalised at time. There had been a lot of good discussions and comments to the various presentations. **Thomas Engberg Pedersen** from **COWI A/S** who had chaired the workshop announced that presentations from the workshop would be sent out by e-mail afterwards, and those of the participants who had not signed up for the workshop in advance expressed their interest in receiving this material and gave their contact information.

Also the final guideline will be made available on the website as soon as possible by BTG. The software tool can already be downloaded for free at www.gasification-guide.eu. The interest in the project results is large as over 110 persons requested for the Guideline. The feedback on the document appears to be very positive, which was also noticed from the workshop participants. There was a consensus that large parts of the Guideline is also useful for other thermal conversion processes like pyrolysis, combustion and fluid bed gasification. Some thoughts about follow-up or spin-of projects were exchanged after the workshop and during the lunch.

It can be concluded that the workshop was successful with almost 50 participants as it was organised in Stockholm, Sweden. The original idea of organising the workshop in May 2009 in Aalborg, Denmark had to be cancelled. COWI, the Danish project partner did an excellent job in organising a second event in a foreign country; it should be noted that there is no partner from Sweden in the project.

Finally, Thomas Engberg Pedersen expressed again his thanks to the Swedish Gas Centre, who assist COWI in organising the workshop by arranging the project meeting room, lunches, drinks, snacks, etc.

Annex 1 - Invitation/Programme

Annex 2 - List of registered participants