



## Findings of **Final Conference of the European Sustainable Chemicals Support Service Phase II - Exploring how capturing and re-using currently emitted industrial gases could be stimulated through industrial symbiosis**



Thursday 27<sup>th</sup> of September 2018

Renatka Krcova, Director, European Chemical Regions Network (ECRN), welcomed the participants stressing the potential of re-using Gaseous Industrial Effluents (GIEs'), which are gases that originate from various processes as effluent gas from energy intensive industries. She underlined that the conference will be interactive and that many participants will use the self-assessment tool to be launched during this conference.

Kirsi Ekroth, Head of Unit of Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) , Chemicals Unit, emphasized that the future of the chemical industry lies in using sustainable feedstocks. The use of biomass and waste was addressed in the earlier Phase I of the European Sustainable Chemical's Support Service. This conference summarized and discussed the findings of its Phase II project aiming at stimulating the re-use of industrial gaseous effluents as a possible sustainable chemical feedstock. In order to achieve this, it became clear that there are many business opportunities, which, however, require cooperation between different stakeholders and industrial sectors.

With Tom Berg, consultant at Ecofys – Navigant, Kirsi introduces the set-up of the project:

- The project has explored re-use of CO<sub>2</sub>, CO, H<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub>; the most promising re-use applications have been mapped economically and environmentally for these gases;
- The project has mapped the current emissions of these (based on databases – apart for H<sub>2</sub>, which was based on "typicals") and hotspots were identified;
- A self-assessment tool (SAT) was made, following the structure of the SAT from the earlier phase;

- Ten hotspots were investigated in more detail, which lead to the selection of four Model Demonstrator Regions, in which a workshop was organized that formed the basis for more specific recommendations addressing possible investment readiness of different EU Regions.

Peter Styring (Sheffield University) summarized the project's key findings saying that for CO<sub>2</sub>, CO and H<sub>2</sub> local conditions typically determine the economics, with separation being costly and emission sources with high purity streams offering the most immediate potential. For many of the re-use technologies, H<sub>2</sub> is required, and its renewable production, required to make the process environmentally beneficial, is expensive, so there is a clear need to develop the availability and affordability of renewable H<sub>2</sub>. Co-utilization of mixed GIE streams (of CO, CO<sub>2</sub> and H<sub>2</sub>, in particular) typically produces positive outcomes environmentally, whilst remaining economically competitive in some cases. Regulatory compliance may drive the need for NO<sub>x</sub> and SO<sub>x</sub> removal, but utilization of these materials as feedstocks rather than wastes allows for the opportunity recovering some of the associated cost (well-established for SO<sub>x</sub>, development of technologies such as LoTOx (Low temperature oxidation for NO<sub>x</sub>).

Tom Berg presented the findings from the workshop in Varna, with mineralization of the pure CO<sub>2</sub> stream emitted by the ammonia plant and delivery of side-product H<sub>2</sub> from a planned new chlorine plant to this ammonia plant as the most promising options. This latter option was spotted on the basis of a press release,<sup>1</sup> but in case the Regional Inspectorate of Environment and Water (RIEW) of Varna, who are aware of industrial investments in the region, would be familiar with the possibilities of exchanging GIEs such options could be spotted more regularly and shared with potentially interested companies to bring supply and demand together. This would involve more capacity building on the topic of GIEs with the Regional Inspectorate.

Adam Szymanski (Lodz University of Technology) summarized the findings of the workshop in the Lodz Region, with lack of data (and a difficulty sharing data linked to confidentiality reasons) and identified transport distances as key barriers. He and Justyna Wojtasik presented the university's research on intensified CO<sub>2</sub> recovery from flue gases and its applications.

Lia Voermans (Brightlands (Limburg)) explained that the Chemelot cluster in Limburg has the challenging mission to be climate neutral in 2050. The regional workshop took a Trilateral approach (including Flanders (Belgium) and North Rhine Westphalia (Germany)), a part of the Trilateral Strategy's Innovation table, where cooperation on innovations on key topics, in this case Carbon Capture and Utilization (CCU), was discussed. Three topics for potential further cooperation emerged: carbon capture technologies; catalysts for transforming non-pure CO<sub>2</sub> and new products that could be directly produced from CO<sub>2</sub>.

Didier van Osselaer (Port of Antwerp) elaborated on the Power to Methanol project currently undertaken in the Port area. The project aims to integrate renewable energy in fuels and feedstocks through flexible operation (the H<sub>2</sub> required is *not* produced with baseload electrolysis), seeking multiple business cases (amongst others partial import to amortize the flexible electrolysis; no hydrogen buffering; use of fatal hydrogen; renewable hydrogen import in the future) to reach economic viability. While the Emission Trading System Directive is providing little push for CCU, there are still lots of uncertainties about whether / how

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<sup>1</sup> <https://balkanengineer.com/events/bulgarian-company-produce-chlorine-products-devnya-bulgaria>

Renewable Energy Directive II will stimulate advanced fuels including "refunobio's" or synthetic and carbon recycling fuels.

Matthijs Ruitenbeek (Dow Chemicals) introduced the many exchanges Dow Chemicals is exploring in the Terneuzen Chemical Industry Site area, often together with Smart Delta Resources (an independent party to alleviate "confidentiality of data" constraints). Dow explored many business cases for exchange of materials, and is working concretely on the potential business cases, including re-use of GIEs. Improving the challenging business cases, the limited policy incentives for circular concepts, and the challenges for cross-border projects would help to accelerate such and future projects of this kind.

Ronald de Vries (Twence) described the CCU process already operated at Twence, NL, and why those took 10 years to be developed. Twence, NL has the intention to further upscale CCU processes in symbiosis with renewable energy and the circular economy but experiences uncertainties in up-scaling the first commercial technical plant, its economics and in the support schemes intended to overcome these.

In the Questions & Answer Session the frequency of change of policies is mentioned as hampering the investment climate allowing for a better industrial planning security, while it was also said that ETS is not driving CCU as yet, although CCU is included in its Innovation Fund.

Wouter Terlouw (Ecofys-Navigant) launched the Self-Assessment Tool produced by the consortium. It aims supporting regional authorities in exploring their investment readiness potential related to the re-use of GIEs, by providing a scoring on 8 parameters and recommendations on what a region could do to improve. It also provides an overview of key emission sources close-by, and potential applications for the emitted gases. Harma Albering (Province of Limburg - Netherlands) tested the SAT and recommends filling this in together with industry and thus using it also facilitating the discussion between the regional authorities and industry.

Nikos Pantalos (DG GROW) presented the Smart Specialization Platform for Industrial Modernization, which aims at bottom-up mobilization and revitalization of regions and industry sites or clusters. It consists of thematic areas, with a new thematic area for chemicals very soon to be launched. He expressed the hope that many of the participants present at this event will join.

Carmine Marzano (DG Research, Development and Innovation, RTD) provided an overview of different CCU type RTD-projects funded so far and emphasized that the deep integration among industries is a challenging factor. The successor of Horizon 2020, Horizon Europe (running 2021-2027) 100 billion euro will be available, it will "evolve" from Horizon 2020 (no revolution). Tomasz Calikowski (DG RTD) added that also biological conversion (not just chemical conversion) is supported by the Community Research and Innovation Programs as well, such as in the BIOCON-Project, with an increasing budget in the future EC, Horizon Europe Program.

Salvatore Scagliarini (European Investment Bank, EIB) described that the EIB has several instruments reducing risks for investment and enabling long-term financing, which proved to be relevant in the context of the conference's discussion. The EIB will help project sponsors by together assessing which support instruments could be opted for their projects, and – when awarded – by providing the support, where instruments can be very flexible and allow for different repayment approaches.

Maria Velkova (DG Climate Action, CLIMA) presented the main points from the related conference September 17<sup>th</sup>, and then presents the Innovation Fund. Specific requirements for CCU:

- Environmentally safe CCU that contributes substantially to mitigating climate change;
- projects involving CCU shall deliver a net reduction in emissions and ensure avoidance or permanent storage of CO<sub>2</sub>;
- CO<sub>2</sub> stored or avoided on a sufficient scale - Where avoidance of CO<sub>2</sub> is to be proven on a case by case basis by an LCA (requirements for this LCA still to be determined).

Timoteo de la Fuente (DG GROW) expressed his gratitude to the participants for joining, stressing the importance of local conditions for industrial symbiosis, which makes the SAT such an important tool for helping EU Regions to develop their investment readiness level.