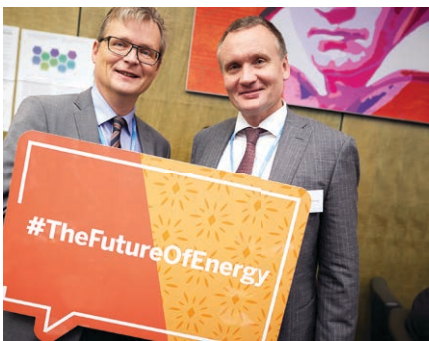


Deep Decarbonisation of Materials Processing Industries



Implications for Policy,
Industry and Research



“ We hope to raise the profile of this important topic among industry, among policymakers, and in society at large.

Prof. Dr. Stefan Lechtenböhmer,
Wuppertal Institute



Deep Decarbonisation of Materials Processing Industries - Implications for Policy, Industry and Research

The conference on “Deep Decarbonisation of Materials Processing Industries – Implications for Policy, Industry and Research” on 10th November 2017, which took place alongside COP23 in Bonn, was presented by the Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia (MWIDE), the Wuppertal Institute for Climate, Environment and Energy and the Energy Agency of the state of North Rhine-Westphalia. Around 95 participants from 15 countries attended this successful event.

The conference provided cutting-edge information on relevant technologies, policies and networks. The speakers were policymakers from pioneering states and regions, representatives from leading companies, heads of industry associations, scientists and NGOs working in the field. All the speakers highlighted the fact that the decarbonisation of processing industries is a crucial topic currently gaining increasing attention.

Deep decarbonisation of materials processing industries is an enormous challenge but it can be tackled successfully by creating new networks and coalitions that cross the borders be-

tween traditional domains and include a wider range of actors, resulting in stronger international collaboration.

A new vision of a decarbonised industry and an integrated industrial policy that respects the necessity of zero emissions is needed.

The examples presented at the conference showed that there are forerunners in industry, science and policy who are willing to tackle the issue by moving beyond traditional borders – between industry, science, society and policy – to create the necessary networks, promote collaboration and find solutions.

Being home to more than 10 % of Europe’s energy-intensive industries, North Rhine-Westphalia (NRW) faces demanding challenges for the implementation of the Paris Agreement, whose ambitious goal is to limit global warming well below 2° Celsius. By focusing on the “Deep Decarbonisation of Materials Processing Industries” and interacting closely with other European and international regions, as well as with industries and societal actors, NRW aims to become a pioneer of solutions for the climate-friendly production of basic materials.



Setting the stage on near-zero for materials processing



Panel Session 1 with:

Michael Theben, Director General ‘Climate Protection’ at the Ministry for Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia;

Prof. Dr. Manfred Fischedick, Vice-President, Wuppertal Institute;

Dr. Dolf Gielen, Director IRENA Innovation and Technology Centre;

Dr. Martin Porter, Executive Director Industry & Innovation and EU Affairs, ECF;

Dr. Christoph Sievering, Head of Positioning and Advocacy for Energy, Covestro;

Nico van Dooren, Director Energy and Industry, Port of Rotterdam.

Chaired by **Prof. Dr. Lars J. Nilsson**, Lund University.

The conference started with stakeholders from policy, industry and society in Panel Session 1 setting the stage on near-zero carbon emission strategies for materials processing industries. They made it clear that the approach taken by processing industries is crucial for deep GHG emissions reductions and that the necessary technologies either already exist or can be developed by industry.

However, it will only be possible to develop the new technological solutions required through a long-term process of innovation for which political and societal support is essential: an integrated global approach and an appropriate policy framework are needed. The panellists agreed on the challenges as well as options for innovating and developing the necessary technologies for net zero emissions industries.

Given the high level of demand for materials – demand that is still increasing – it also seemed obvious that more emphasis needs to be put on the value chains linked to basic materials, which could also offer the prospect of additional business opportunities. There was some discussion, however, about whether and how product and resource-efficiency can be aligned with the economically-driven goal of companies to reduce costs across their value chains and to sell more of their products.

The importance of material processing industries in the context of GHG emissions reductions was highlighted in the first panel session. As well as deep decarbonisation being a huge challenge for industries, it also presents new opportunities for both companies and regions.

Achieving decarbonisation is a challenge given the high costs and economic risks of the technologies required, as well as the international competition in many sectors. Constructive discussions involving all stakeholders are needed to identify appropriate transformation pathways and holistic approaches offering different options or pathways should be considered with open minds. There is a need for innovations and integrated industrial and climate policies to instigate and create momentum for decarbonisation but how this will be achieved requires further experimentation and learning.

carbon emission strategies industries

“With green electricity, carbon dioxide as feedstock, and a renewed government interest in green industrial policy also for heavy industry the stars seem to be aligning towards major structural changes in industry.

Prof. Dr. Lars J. Nilsson, Lund University



“It will be crucial to maintain our industries’ competitiveness while we achieve our climate goals. This requires a holistic strategy to minimise risks and use opportunities.”

Michael Theben, MWIDE NRW



“GHG neutrality in industry requires an innovation offensive including process and product innovations, as well as improved cooperation structures and more integrated policies.”

Prof. Dr. Manfred Fishedick, Wuppertal Institute



“Renewable energy can play a key role in the transformation of the industry sector.”

Prof. Dr. Dolf Gielen, IRENA



“An ambitious circular economy agenda is essential for successful materials processing industrial decarbonisation.”

Dr. Martin Porter, ECF



“For many decades, industries have been actively working on reducing the climate impact through new production technologies as well as materials and solutions needed for climate protection. A constructive discussion amongst all stakeholders is required, exploring the appropriate transformation path towards a GHG emission-neutral society.”

Dr. Christoph Sievering, Covestro



“Renew the existing and embrace the new in order to achieve a CO2 net neutral port in 2050.”

Nico van Dooren, Port of Rotterdam

On the road to near-zero carbon technologies, infrastructure



Panel Session 2 with:

Eva Blixt, Research Manager and Senior Advisor Environmental Issues, Swedish Steel Industry Organisation;

Prof. Dr. Gorge Deerberg, Deputy Director of Fraunhofer UMSICHT;

Tomas Wyns, Doctoral Researcher, Institute for European Studies;

Dr. Henning Wilts, Head of Research Unit Circular Economy, Wuppertal Institute;

Dr. Brigitta Huckestein, Senior Manager Energy and Climate Policy, BASF SE.

Chaired by **Dr. Bettina Wittneben**, University of Oxford & **Dr. Chris Bataille**, IDDRI, Institute for Sustainable Development and International Relations

Panel Session 2 presented an impressive portfolio of possible breakthrough technologies in energy-intensive industries and inspiring pilot projects from different industries, which demonstrated to what extent the technologies and solutions are already being implemented. However, it became clear in the discussion that new forms of cross-industrial cooperation, as well as significant technological and business model innovation, are needed to achieve industrial decarbonisation. The point was made that the whole value chain of a more circular economy could open up potential new areas for value creation. The panellists called for strong industrial and innovation policies to support the development and financing of near-zero carbon processes while not jeopardising the competitiveness of European industry.

Carbon2Chem

The cluster project Carbon2Chem aims to convert process gases from steel pro-

duction into base chemicals. With 19 different project partners from industry and science, the project links various sectors and tackles climate emissions.

Japan Climate Leaders' Partnership (Japan-CLP)

Established in 2009, this network of 43 companies (as of September 2017) aims to create a net zero society based on the idea that low-carbon development is a prerequisite for economic activity.

Hydrogen Breakthrough Ironmaking Technology (HYBRIT)

HYBRIT is a joint venture between three Swedish companies from steel-making, ore mining and electricity generation (SSAB, LKAB and

Vattenfall), which aims to replace coal with hydrogen in the steelmaking process. HYBRIT is a groundbreaking effort to reduce CO₂ emissions and decarbonise the steel industry.

<http://www.hybritdevelopment.com>

Oxyfuel

thyssenkrupp has developed a solution which efficiently captures CO₂ during cement production. By using pure oxygen instead of ambient air for limestone burning, highly concentrated CO₂ is produced. This gas is easier to capture and recycle than waste gas from conventional combustion.

<https://www.thyssenkrupp.com/en/cop23/>

on processing industries: re and pilots

“To meet the Paris goals full decarbonisation of all new heavy industry will be necessary by mid-century or earlier. It is technically possible, but to get there we need a shared vision amongst all stakeholders, consistent pricing or regulatory policies to drive investment in near-commercial technologies, innovation and demand support for emerging technologies, and supporting institutions.

Dr. Chris Bataille, IDDRi



“Industrial decarbonisation will require significant innovations in existing processes, products and, most importantly, business models along the value chain of basic materials.”

Tomas Wyns, Institute for European Studies



“Our production uses resources so efficiently that only products of societal value leave our plants. Our ambition constantly challenges the limits of the possible.”

Eva Blix, Swedish Steel Industry Organisation



“Only 15 % of the materials that we use in German industry comes from recycling processes.”

Dr. Henning Wilts, Wuppertal Institute



“Cross-industrial production networks are a necessary step towards a sustainable industry. They can be developed only by interdisciplinary research and industrial consortia.”

Prof. Dr. Gorge Deerberg, Fraunhofer UMSICHT



“Industry needs a level playing field to develop and employ the low carbon production processes of the future.”

Dr. Brigitta Huckestein, BASF SE

How to spur industrial progress roadmaps, funding and cooperation



Panel Session 3 with:

Dr. Artur Runge-Metzger, Director 'Climate Strategy, Governance and Emissions from non-trading sectors', DG Climate Action;

Shiro Kobayashi, Sustainability Director, Nippon Sheet Glass;

Johannes Kerner, BMWi IIC6;

Dr. Gerhard Dell, Managing Director, Government Oberösterreich;

Michael Theben, Director, MWIDE NRW.

Chaired by **Timon Wehnert**, Wuppertal Institute & **Dr. Christoph Wolff**, ECF

The goal of creating a net zero society has been taken up by forerunning policymakers and companies. Representatives from the EU and the German government, as well as from two industrialised regions (North-Rhine Westphalia and Upper Austria), made it clear that they are prepared to take significant action in cooperation with industry and have already implemented novel policy instruments

to better align their efficiency and innovation activities with the needs of stakeholders. Arthur Runge-Metzger outlined the European Commission's willingness to deliver strong support to innovative projects implemented by industry, as currently half of their innovative projects are not being realised. The newly established ETS Innovation Fund will be an instrument for this.

“Encouraging examples from industry and policy are important steps towards a net zero society. Supporting and funding these industrial innovation activities as well as outlining long-term roadmaps are crucial.

Timon Wehnert, Wuppertal Institute



“In the coming 2-3 years, private-public financing instruments will have to be shaped in support of large-scale testing of advanced near-zero carbon industrial technologies which are supposed to overhaul Europe's industry after 2030 and to drastically reduce its carbon footprint.”

Dr. Artur Runge-Metzger, DG Climate Action



“Clear goals and ambitious measures for efficient energy consumption led to a decoupling of energy demand and economic growth in Upper Austria - energy efficiency is a key factor in global competitiveness.”

Dr. Gerhard Dell, Government Oberösterreich



“There is no (German) energy transition without heat transition, also in industry.”

Johannes Kerner, BMWi IIC6;



“Currently, there is high motivation to increase efforts in the research and development of low-carbon technologies.”

Michael Theben, MWIDE NRW



“Our glass products have unique roles to play in society's attempt to reduce greenhouse gas emissions and mitigate the effects of climate change.”

Shiro Kobayashi, Nippon Sheet Glass

Make it happen: the role of international innov industry, energy and clim



Panel Session 4 with:

Eva Svedling, State Secretary to the Minister for International Development Cooperation and Climate, Sweden;

Dr. Reinhold Achatz, CTO, thyssenkrupp;

Prof. Dr. Stefan Lechtenböhmer, Director, Future Energy and Mobility Structures, Wuppertal Institute;

Prof. Dr. Joyashree Roy, Professor of Economics at Jadavpur University, Kolkata in India and IPCC AR4&5 CLA on Industry.

Chaired by: **Dr. Martin Porter**, ECF & **Prof. Dr. Lars J. Nilsson**, Lund University

The concluding panel with leading representatives made it clear that all stakeholder groups are ready to take on the challenge of achieving GHG neutrality along the whole supply chain. The panellists agreed that the innovations (often radical) towards near-zero emissions in processing industries need to be supported. This so-called "great leap" for industry also needs to significantly step up in terms of its ambition for policy, industries and society. Companies are instrumental not only in terms of their own emissions, but also as solution providers for technological or business models, and it is important for them to invest in order to maintain their competitiveness. This motive holds true not only

for European but also for e.g. Indian industries as top IPCC expert Prof. Joy emphasised.

A large proportion of the emissions from industry are process-related and can only be reduced with the development of new breakthrough technologies. Developing these new technologies is costly and involves risks, but nevertheless offers a comparative advantage for those companies and countries who take the lead in order to significantly reduce GHG emissions. Sweden is planning to take this lead, according to Deputy Minister Svedling, as it has started a long-term investment programme into a fossil free industry at a cost of €30 million per year.

Prof. Lechtenböhmer concluded that a new vision of integrated industrial policy is needed. This vision needs to:

- be supported by industries as well as by societal stakeholders;
- include policies on energy, the circular economy and on trade, as well as on innovation and digitalisation; and
- regard itself as one of the key instruments for achieving global GHG mitigation targets.

ation, trade, ate policies

“ *Some actors are taking the lead in deep decarbonisation for industry but broad and sequential policy strategies at the international, regional and national levels are yet undeveloped.* ”

Prof. Dr. Lars J. Nilsson, Lund University



"All our examples show that decarbonisation of our global environmental metabolism needs not only innovation and technology, but also needs international cooperation."

Prof. Dr. Stefan Lechtenböhmer, Wuppertal Institute



"Deep decarbonisation in Indian industries needs much wider and cross sector policy integration."

Prof. Dr. Joyashree Roy, Jadavpur University



"thyssenkrupp develops solutions to advance towards net GHG neutrality throughout the full supply chain as intended by the Paris Agreement."

Dr. Reinhold Achatz, thyssenkrupp



"Taking the "Industrial Leap" - the importance of long-term policies - industry and government working together to develop breakthrough technologies."

Eva Svedling, State Secretary to the Minister for International Development Cooperation and Climate, Sweden

There is already a lot of knowledge and experience to share. The conference panel sessions showed that there could be a nucleus for greater international collaboration to advance this challenging topic, which is undoubtedly too demanding to be tackled unilaterally by individual companies or governments.

A short film about the conference as well as the presentations can be found on the Wuppertal Institute's website:

<https://wupperinst.org/en/topics/economy/energyintensive-industry/>



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