Research Network on Industrial Decarbonisation

NEWSLETTER #17

June 2023
Editors: Holger Wiertzema and Timo Gerres

Early Summer Greetings

Summer is approaching quickly, and it is time for another newsletter from RENEW Industry which might possibly enjoy in the sun. As always, this newsletter contains many publications related to reducing industrial emissions in general but also for specific sectors. Also, there is a range of events mentioned in this newsletter. Enjoy reading!

As you read on you may notice some changes in the layout of the Newsletter. This is since we have migrated the Newsletter from Mailchimp to Gmail.

Do you have content to share, ideas or other thoughts?

- Contact us: renew.industry@gmail.com
- Remind a colleague to join!
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- Visit our blog for (intermittent) updates

Features: Electrification of the basics materials industry

By Alla Toktarova

The European energy-intensive basic materials industry is under pressure to significantly reduce carbon dioxide emissions to meet the targets set out in the Paris Agreement. The rapid decline in the cost of renewable electricity makes expanded electrification an attractive option for eliminating the dependence of the industry on fossil fuels.
In her PhD thesis, Alla Toktarova applied techno-economic optimization modelling to investigate how electrification of the basic material-intensive industry in the EU can interact with the electricity system. Specifically, the work examines the ability of basic material industry to take advantage of

flexibility options in the production processes to avoid high-cost electricity and facilitate the integration of wind and solar power. Her research indicates that an electrified industry can achieve low costs for hydrogen and electricity by avoiding high-electricity-price hours. This can be accomplished through operational flexibility of the industrial capacity, in combination with the storage of hydrogen and commodities.
Based on the modeling results, she found that the availability of low-cost electricity generation can be a determining parameter for the geographical location of new industries with high operational flexibility and high hydrogen intensity, such as the ammonia industry. Given the current locations of the industry, a hydrogen pipelines network allows for moving the electrolyser capacity from industry-intensive regions to regions with access to low-cost electricity.
Finally, the electrification of the energy-intensive basic materials industry in the EU could increase the electricity demand by around 44 percent (by 1,200 TWh). The future EU electricity demand with the current locations of the industrial plants will be primarily met by solar, wind and nuclear power. For a deeper dive into Alla's research, we invite you to view her work https://research.chalmers.se/person/allat.

Projects and initiatives

[Projects]
Clean Air Task Force: Mapping the cost of carbon capture and storage in Europe. LINK
Clean Air Task Force: The cost of carbon capture and storage in Europe. LINK

ScienceForUkraine

#ScienceForUkraine is a community group of volunteer scholars and students around the world to help scholars and students affected by the Russia's war in Ukraine. LINK

Events

Here, you can find tips about upcoming events and summaries from past events that might have skipped your attention.

UPCOMING EVENTS

[Conference]
The UK Industrial Decarbonisation Research and Innovation Centres (IDRIC) second annual conference
16-17 May at the Oval, London, UK
More information and registration: LINK
LinkedIn-Post: LINK

[Conference]
11th International Conference on Industrial Ecology
July 2-5 2023, Leiden, the Netherlands
More information and registration: LINK

[Conference]
Transforming Consumption-Production Systems Toward Just and Sustainable Futures
July 5-8, 2023. Wagening, the Netherlands
More information and registration: LINK

[**Summer School**]
Technology and Sustainability modelling for net-zero industries
The course is co-organized by Radboud University, Politecnico di Milano, and CO2 Value Europe, in the context of the Horizon 2020 INITIATE project.
July 10-14, 2023. Radboud University, the Netherlands.
More information and registration: LINK

[Conference]
eceee's Zero Carbon Industry 2023
November 15-16, 2023, Antwerp, Belgium
More information and registration: LINK

[Discussion Forum]
GEEE Task Force on Energy Efficiency in Industry, Bi-monthly open discussion forum of the UNECE Task Force on Industrial Efficiency
June 15, 2023
Registration: LINK

PAST EVENTS

[Webinar]
OECD: Implications of low-carbon hydrogen production on renewable energy systems webinar, March 13, 2023
LINK

[Webinar]
In March “Energy vs Climate” asked: “Can Contracts for Difference Keep Canada Competitive?” The recording of his webinar are available as podcast or via youtube. LINK

[Conference]
The UK Industrial Decarbonisation Research and Innovation Centres (IDRIC) second annual conference 16-17 May at the Oval, London, UK
More information and registration: LINK

[Report launch]
"Petrochemicals and climate change: Powerful fossil fuel lock-ins and interventions for transformative change" a recording of the presentation and panel sessions is now available. LINK

Please let us know if you want your event featured in this newsletter!

Open positions

We aim to publish all open positions we receive via the network. Do you know of an open position in the field? Send us an email: renew.industry@gmail.com. Positions with short notice could be relevant to some of our members, and we can share them with the network tween the newsletters.

[Senior Program Associate, Industry]
Climateworks Foundation, San Francisco, US
LINK

[Researcher]
Global Energy Monitor is seeking an experienced Researcher who will work primarily as part of GEM's Heavy Industry Program, working on specific trackers within heavy industry. The researcher may also support other GEM projects as needed.
LINK

Open calls

[Joint call]
The CETPartnership Joint Call 2023 is the second annual co-funded call under the CETPartnership. To cover different topics and RDI types, the Call is structured into 12 Call Modules, aimed at different energy technologies and/or systems as well as both research and innovation-oriented approaches on different Technology Readiness Levels (TRLs), complementing and completing each other.
LINK

Recent publications

This section combines peer-reviewed journal publications, project reports and other scientific work that has been published recently. We use four generalised categories (Technology, Policy & Economics and others) to group the work. Please feel free to share any publication you would like to see listed here in the next newsletter, by sending an email to renew.industry@gmail.com.

General / cross-sectoral / circular

[PhD Thesis] A. Toktarova, "Electrification of the basic materials industry – Implications for the electricity system," Chalmers University of Technology, Gothenburg, 2023. LINK

[Peer-reviewed] R. Román-Collado, M. T. Sanz-Díaz, and L. Yamuza Blanco, "Key drivers of the textile and clothing industry decarbonisation within the EU-27," Journal of Environmental Management, vol. 334, p. 117438, May 2023, doi: 10.1016/j.jenvman.2023.117438.

[Peer-reviewed] T. Gerres, J. P. Chaves, and P. Linares, "The effects of industrial policymaking on the economics of low-emission technologies: the TRANSid model," *Energy Storage and Saving*, Apr. 2023, doi: 10.1016/j.enss.2023.03.003.

[Peer-reviewed] C. D. S. Cachola, M. Ciotta, A. Azevedo Dos Santos, and D. Peyerl, "Deploying of the carbon capture technologies for CO2 emission mitigation in the industrial sectors," Carbon Capture Science & Technology, vol. 7, p. 100102, Jun. 2023, doi: 10.1016/j.ccst.2023.100102.

[Peer-reviewed] G. Diner, C. Bataille, and M. Jaccard, "Regional variability and its impact on the decarbonization of emissions-intensive, trade-exposed industries in Canada," Climate Policy, pp. 1–15, 2023, doi: 10.1080/14693062.2023.2200380.

[Peer-reviewed] S. G. Subraveti, E. Rodríguez Angel, A. Ramírez, and S. Roussanaly, "Is Carbon Capture and Storage (CCS) Really So Expensive? An Analysis of Cascading Costs and CO_2 Emissions Reduction of Industrial CCS Implementation on the Construction of a Bridge," *Environ. Sci. Technol.*, vol. 57, no. 6, pp. 2595–2601, Feb. 2023, doi: 10.1021/acs.est.2c05724.

[1]

[Peer-reviewed] Z. Zhang, P. Yi, S. Hu, and Y. Jin, "Achieving artificial carbon cycle via integrated system of high-emitting industries and CCU technology: Case of China," *Journal of Environmental Management*, vol. 340, p. 118010, Aug. 2023, doi: 10.1016/j.jenvman.2023.118010.

[1]

[Peer-reviewed] I. Rattle, A. Gailani, and P. G. Taylor, "Decarbonisation strategies in industry: going beyond clusters," *Sustain Sci*, Apr. 2023, doi: 10.1007/s11625-023-01313-4.

[Report] Climateworks Centre and CSIRO, "Pathways to industrial decarbonisation," Australian Industry Energy Transitions Initiative, 2023. LINK

[Policy Brief] S. Otto & S. Oberthür. 2023. Advancing international cooperation for the decarbonisation of energy-intensive industries: the G7 Climate Club and beyond. NDC ASPECTS. LINK

Steel

[Peer-reviewed] C. Bataille, S. Stiebert, O. Hebeda, H. Trollip, B. McCall, and S. S. Vishwanathan, "Towards net-zero emissions concrete and steel in India, Brazil and South Africa," *Climate Policy*, pp. 1–16, Mar. 2023, doi: 10.1080/14693062.2023.2187750.

[Peer-reviewed] W. Liang *et al.*, "Life cycle assessment of blast furnace ironmaking processes: A comparison of fossil fuels and biomass hydrochar applications," *Fuel*, vol. 345, p. 128138, 2023, doi: 10.1016/j.fuel.2023.128138.

[Peer-reviewed] J. Perpiñán, M. Bailera, B. Peña, L. M. Romeo, and V. Eveloy, "Technical and economic assessment of iron and steelmaking decarbonization via power to gas and amine scrubbing," *Energy*, vol. 276, p. 127616, Aug. 2023, doi: 10.1016/j.energy.2023.127616.

[Peer-reviewed] F. Superchi, A. Mati, C. Carcasci, and A. Bianchini, "Techno-economic analysis of wind-powered green hydrogen production to facilitate the decarbonization of hard-to-abate sectors: A case study on steelmaking," *Applied Energy*, vol. 342, p. 121198, Jul. 2023, doi: 10.1016/j.apenergy.2023.121198.

[Peer-reviewed] B. Kazmi, S. A. A. Taqvi, and D. Juchelková, "State-of-the-art review on the steel decarbonization technologies based on process system engineering perspective," *Fuel*, vol. 347, p. 128459, Sep. 2023, doi: 10.1016/j.fuel.2023.128459.

[Peer-reviewed] A. Devlin, J. Kossen, H. Goldie-Jones, and A. Yang, "Global green hydrogen-based steel opportunities surrounding high quality renewable energy and iron ore deposits," *Nat Commun*, vol. 14, no. 1, p. 2578, May 2023, doi: 10.1038/s41467-023-38123-2.

[Report] OECD (2023), The Heterogeneity of Steel Decarbonisation Pathways, OECD Publishing, Paris. doi: 10.1787/fab00709-en.

Chemicals / plastics

[PhD Thesis] Z. Janipour, "Socio-Technical Dynamics of the Transition to Net-Zero in the Chemical Industry," Radboud University, Nijmegen, 2023. LINK

[Peer-reviewed] F. Klaucke *et al.*, "Chlor-alkali Process with Subsequent Polyvinyl Chloride Production—Cost Analysis and Economic Evaluation of Demand Response," *Industrial & Engineering Chemistry Research*, 2023, doi: 10.1021/acs.iecr.2c04188.

[Report] A. Hasanbeigi and A. Sibal, "Deep Decarbonization Roadmap for the PVC Industry in the U.S.", *Global Efficiency Intelligence*, 2023. LINK

[Peer-reviewed] E. Norvaiša *et al.*, "Assessment of decarbonization possibilities in Lithuania's chemical industry," *Energy Sources, Part B: Economics, Planning, and Policy, 18:1*, 2023, doi: 10.1080/15567249.2023.2214912.

[Peer reviewed] Ammonia Production from Clean Hydrogen and the Implications for Global Natural Gas Demand (in Sustainability 2023, 15(2), 1623). doi: 10.3390/su15021623

[Peer reviewed] Tilsted et al. Ending fossil-based growth: Confronting the political economy of petrochemical plastics, One Earth, 2023, doi: 10.1016/j.oneear.2023.05.018.

Cement / ceramics / glass

[Peer-reviewed] T. Watari, Z. Cao, A. C. Serrenho, and J. Cullen, "Growing role of concrete in sand and climate crises," *iScience*, p. 106782, Apr. 2023, doi: 10.1016/j.isci.2023.106782.

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[Peer-reviewed] S. Griffiths *et al.*, "Decarbonizing the cement and concrete industry: A systematic review of socio-technical systems, technological innovations, and policy options," *Renewable and Sustainable Energy Reviews*, vol. 180, p. 113291, Jul. 2023, doi: 10.1016/j.rser.2023.113291.

[Working paper] G. Glenk, K. Anton, R. Meier, and S. Reichelstein, "Cost-Efficient Pathways to Decarbonizing Portland Cement Production," *SSRN Journal*, 2023, doi: 10.2139/ssrn.4434830.

Out of the scientific box

In this section, we keep track of news, op-eds, blog posts, videos and other content on industrial decarbonisation that has gained attention beyond the research community. Have you spotted something? Contact us: renew.industry@gmail.com!

[In the News] An in-depth take on bilateral US-EU trade relations in light of industrial transition policies was published in "Foreign Affairs" on April 25. The authors are Saha Sagatom, Noah Kaufman, Jain Guatam and Chris Bataille. LINK

[In the News] Financial Times asked Koch Blank from the Rocky Mountain Insititute about Sweden´s bet on green steel. LINK

[Podcast] Can the EU's carbon border adjustment mechanism accelerate progress on China's emissions trading system? This question was addressed in the OIES Podcast Series from the Oxford Institute for Energy Studies in mid-March. Another of their highly informative podcasts addresses to the role of waste-to-energy using carbon capture technologies. Links to full episodes can be found on their website. LINK

[Magazine] The April 2023 edition of "CONCRETE", the magazine of the UK Concrete Society, published an editorial with the provoking title "The Confused World of Low-Carbon Concrete". LINK

[Newsletter] Sign-up for the updates of the United Nations UNIDO Industrial Decarbonization Accelerator! LINK

[Online Tool I] What is the carbon content of trade flows? Check out the interactive Carbon Voyage tool developed by Global Efficiency Intelligence. LINK

[Online Tool II] Carbon capture and storage costs mapped for Europe! Includes features that allow you to play around with different scenarios and parameters. Published by the Clean Air Task Force. LINK

[Interview] Listen to this interview with SophieHowe, the world's first "commissioner for the unborn", in Wales. During her seven-year term, she, among other things, managed to stop all new road planning projects in the nation. LINK

From the Twitter feed (#industrydecarbonisationtwitter)

Aside from water, there's no material on Earth we use more than concrete. That's why it's so important to figure out how to decarbonize it. @BillGates

@agailani90 - thanks a lot for using twitter to share your research on industrial decarbonisation strategies with us!

"South Korea's decision to back slide on heavy industry emissions target is disappointing" @RENEW-Industry

Thanks, @nworbmot for sharing @MadedduSilvia´s interview on industrial electrification with us!

More than happy to promote @joanshelseth and Bellona´s take on the EU Net Zero Industry Act.

@JoernRichstein on Germany's multi-billion€ #CCfD/#KSV program for climate-neutral industry.

Getting to know the Network

The RENEW Industry Network aims to connect researchers and strategists focused on industrial decarbonisation. We continue to grow with more than **500 members** working at universities and institutes located in **20 different countries**, including many European countries but also the U.S., Canada, India, Australia and beyond.

From time to time, we include a short interview with a network member on their research topic and ongoing work on industrial decarbonisation. **Do you want to introduce yourself in this section, or share your latest research with the network**? Contact us: renew.industry@gmail.com

Get involved!

The RENEW Industry Network is constantly looking for interested researchers who want to share their work, organise events or in other ways interact with other researchers in the field. Any ideas are welcome, regardless of whether you want to be involved in our activities on a regular basis, or do a short one-off stunt.

We are looking forward to hearing from you!
Contact us via email at renew.industry@gmail.com or drop us a direct message via Twitter at @RENEWIndustry!

/The RENEW-Industry coordinators

Timo Gerres, *Institute for Research in Technology, Comillas Pontifical University, Madrid, Spain*

Johan Rootzén, *IVL Swedish Environmental Research Institute, Gothenburg, Sweden*

Caitlin Swalec, *Global Steel Plant Tracker, Global Energy Monitor, California, United States*

Holger Wiertzema, *NRL Norddeutsches Reallabor, HAW Hamburg, Germany*

Max Åhman, *Environmental and Energy Systems Studies, Lund University, Sweden*

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