

Innovation for a Clean Energy Transition

Conference, Brussels

Report

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This report has been produced as part of the project “*Conversion of Low Grade Heat to Power through closed-loop Reverse Electro-Dialysis*” or **RED Heat-to-Power** for short. The logos of the project partners are shown below. More information is available under www.red-heat-to-power.eu.



This work has been carried out by:

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1. Introduction

On the 5th of June 2018, the RED Heat-to-Power project organised a high-level event with the title “Innovation for a Clean Energy Transition.”. The event constituted a session of the Policy Conference of EUSEW 2018, which took place in Brussels between 5 and 7 June. The RED Heat-to-Power project co-organised the event with the following organisations:

- United Nations Industrial Development Organization
- AkzoNobel Specialty Chemicals
- RED Heat-to-Power project
- CEPI - Confederation of European Paper Industries



The event had a prominent position of the programme, being placed in the main room, following the opening session of the conference and as a result was attended by more than 250 people, while many more followed through the webstreaming service.

The main purpose of the event was to highlight the pathways towards the clean energy transition, the possible challenges that could be encountered as well as potential solutions to overcome them. According to a recent report published on tracking clean energy progress (IEA, 2017), only three out of 26 technologies were classified as green, indicating that it is on track towards a sustainable energy transition. This raises the alarm that global efforts are not aligned to reach the energy goal (Sustainable Development Goal 7) of the 2030 Agenda, as well the objective of the Paris Agreement.

Potential solutions to bridge the gap include innovative low carbon technologies seen through Industry 4.0. These technologies include solar, geothermal and wind, digitized mini-grids as well as practices in energy management. This event is part of a bigger process, as results from the Vienna Energy Forum 2018 Special Session will be discussed, along with efforts to continue this conversation post-event. This is envisioned to be carried out with representatives in policy, the private sector and academia, who also represent the target audience of the event. The content of the event aims to provide solutions via innovative low carbon technologies as well as energy-saving practices which will result in reduced greenhouse gas emissions that can help combat climate change and air pollution. These solutions also help meet the targets of the EU 2020 Energy strategy.

2. Keynote Speech by Jakop Dalunde, MEP, European Parliament

To meet our commitments to the Paris Agreement, achieving sustainable energy production is imperative. Our ambitious commitment to realising a net zero carbon economy by 2050 is important and necessary, but this commitments will mean little if we don't act upon it.



A recent IEA report delivers a good overview of the current situation in the energy sector. For instance, wind turbines produced power equal to 44% of Denmark's energy consumption in 2017. However, at the same time, 87% of energy used for heating and cooling in the EU comes from fossil fuels. This is unsustainable.

We have technology progress where it takes place but we also cannot lose site of the bigger picture. We have seen improvement in some areas but are still lacking the progress we need in other areas to fulfil our Paris commitments.

Although the Commission is adamant in its commitment to lead from the front in the clean energy transition, this does not always translate into action. For example, the Commission's proposal for a binding share of renewables is only set at 27% by 2030; the European Parliament's position is 35%. Increasing this ambition from 27% to 35% would increase investments in renewable energy by 92 billion euros and lead to 136,000 new jobs in the clean energy sector.

Ambitious targets for increasing renewables and energy efficiency are crucial. They also provide a comprehensive framework for public and private actors that are contributing to the clean energy transition.

Clear goals create predictability, which in turn leads to investment certainty and long-term thinking and planning, which is good for consumers and investors. Only then can we fully profit from the opportunities that the clean energy transition provides, such as new green jobs and cutting edge R&D. Industry, local governments and other stakeholders should not be alone in this endeavour. The EU has to provide ample financing instruments and a good program to implement best practices and fund research into smart energy systems, renewables and more efficient batteries.

The new framework program for research and innovation – Horizon Europe – will have an important role to play. With a budget of almost 100 billion euros, it's the EU's largest program ever for research and innovation. The last framework program set a goal of spending 35% of its money on climate action. However, the European Court of Auditors has calculated that only 24% went to climate action, which is far from enough. I hope that the Commission re-evaluates its priorities and will show that it is fully committed to climate action, not only in the objectives of the program but also in its implementation.

We must stop subscribing to the notion that ambitious targets are undermining European industry; the relationship is the opposite. Ambitious targets drive innovation, which in turn drives market success. If we are to transform the challenges of the clean energy transition into opportunities, we must act forcefully and we must act now.

2. Presentations

Takeshi Nagasawa, Senior Programme Management Expert, United Nations Industrial Development Organization

Mr Nagasawa gave an introduction to UNIDO, its mandate and activities. UNIDO was established in 1956, covers 168 Member States and 7 regional offices and has 656 employees and 1600 staff members. It oversees a regular budget of 86 million USD plus contributions from Member States of 220 million USD.

He explained some of the highlights of the Vienna Energy Forum 2018 Special Session which discussed energy systems, innovation & technology, and partnerships. The key messages coming from this Special Session are:

- **The demand to simplify solutions** for the complex energy and climate agenda, which has opened the space for entrepreneurship in clean energy.
- **Cleantech-focused incubators** can bridge the knowledge gap and provide assistance from concept to commercialisation.

In addition, UNIDO has launched a report on Industry 4.0 – defined as the integration of virtual and physical systems in the manufacturing sector – which has the potential to contribute greatly to the 2030 Agenda and the Paris Agreement, most notably through Big Data, Internet of Things, Blockchain and other technologies. UNIDO is now discussing with new stakeholders how to start new Industry 4.0 projects.

Nicola Rega, Climate Change and Energy Director, Confederation of European Paper Industries

The paper industry is the fourth largest energy consumer in Europe but is responsible for less than 1% of GHG emissions in Europe, due to important policies implemented in recent years. Mr Rega said that the industry has undertaken a 2050 roadmap which is on track in terms of direct, indirect and transport emissions. Indeed, it seems that the paper industry is ten years further ahead in reducing emissions (2015 levels are as targeted for 2025). Another finding is that what was unknown territory ten years ago is now becoming mainstream R&D, so the technological gap is narrowing. Moreover, the paper industry is successfully decoupling its growth in production from its CO₂ emissions, thanks to being innovative, looking at new solutions, valorising its own products and opening up new markets.

He said that efforts still have to be stepped up to reach 2050 targets. To address technology deployment, technologies must be commercially available by 2030 at the latest. This is necessary to align with the industry's investment cycles. In addition, in the area of finance, the scale of investments required to totally reshape industry is unprecedented and cannot be done by public finance, so needs a smart way to make this happen without destroying the balance sheets of industrial companies. Finally, he pointed out that a market for low carbon products and solutions is necessary, to enable companies to create products and solutions which are also creating added value and attracting investments.

Marcel Halma, Head of Global Public and Government Affairs, AkzoNobel Specialty Chemicals

Mr Halma said that setting ambitious targets to drive innovation needs the right conditions. It is possible to decarbonize an industry but it requires effort. Decarbonization is a key word, but there is a point in every industry when a step change is required to put the technologies and innovations in place this decade to reach the 2050 goals. Decarbonization does not just refer to energy but also relates to the full value chain, with carbon in products and the circular economy.

He said that energy discussions are too heavily focused on supply, and believes that demand is more important. Regarding funding, there is a lot of focus on renewable energy which is good, but energy efficiency is as critical.

Another remark is not to forget industry. A lot of attention is put on the built environment, but industry has a lot to contribute to the energy transition. For example, there are numerous assets in different industries that can provide flexibility. This however requires both innovation and big data.

Another innovation that Akzo Nobel is working on is private-public partnerships, for example between Google, DSM, Philips, Akzo and citizens in the Netherlands to build a wind park. Hydrogen is also a very important energy carrier with huge potential in the chemical industry, especially when made with renewable energy.

In conclusion, he said that a system approach is needed, including both energy and materials. The innovation policy needs to look at breakthrough policies. Funding of innovation is critical; most funding stops when the innovation is finished, which is not good enough.

Michael Papapetrou, RED Heat-to-Power project coordinator, Senior Project Manager, WIP Renewable Energies, RED Heat to Power

Mr Papapetrou described the results of a study into the energy used by industry, which amounts to around 3000 TWh every year. About 20-30% of this is lost in the form of waste heat and other energy losses. Technically it is possible to recover about half of that; around 300 TWh is recoverable per year from different industries, although it makes financial sense only to recover part of this.

He then explained the technology of Reverse Electrodialysis (RED) which generates electricity based on differing salinity levels, for example between seawater and fresh water. An RED Heat Engine can produce this from artificially treated water in a closed loop. For this to work, low temperature waste heat is needed (from industry for example). The result is clean, high-value electricity generated where and when needed. It's also very flexible.

Innovation and regulation are the drivers necessary to recover industry's waste heat. The RED Heat to Power is one of the many innovative ways to make use of this heat to generate electricity.

3. Open discussion

When asked if the EU is on track with its climate goals, **Mr Dalunde** said that different parts of the EU are partly or fully on track, such as Sweden, where the carbon tax is set at 120 EUR – or eight times higher than that specified in the European ETS. This high carbon price ensures that investors and consumers make the cleanest decisions, thus helping the country decouple growth from its emissions. In his view, Europe has to implement a higher carbon price. The current reform of the ETS is not enough; a price of 40-50 EUR is necessary to ensure decent investment in renewables and clean technology. A lack of forward-looking policy could result in a lack of investment certainty and will create a lot of stranded assets. Emergency solutions implemented in 2040-2050 will be harmful for consumers and industry. It's better to take responsibility now.

Mr Rega said that what is key is to have technologies that can be deployed. Also, now there is a new challenge; looking at the whole value chain. In addition, more options are coming up which are great but have to be fitted into the existing installation or environment. The question is how to do we make them financially attractive, particularly when dealing with companies with operations across the world. How do we manage to unlock the financing element? If this is solved, then the carbon price becomes irrelevant.

Mr Nagasawa pointed to the potential of partnership between the EU and UNIDO. For example, UNIDO has 120 energy projects in renewables and energy efficiency, which are implemented in the form of capacity building and demonstration projects which ultimately create jobs and generate income. One example is the Low Carbon Low Emission Clean Energy Technology Transfer (LCET) program in Kenya and Ethiopia to reduce GHG emissions and enable micro power generation for rural communities.

Mr Halma is aware that the cooperation between the different elements in a system could be improved. For example, Akzo Nobel uses a lot of heat, but in most cases low temperature heat has no price on the market so is usually dumped, although there is now a project to use it locally. But even so, this waste heat doesn't give the company any credit: there is no incentive to use waste heat. In the same way, ETS does not generate an incentive for frontier companies like Akzo Nobel to keep on investing. Furthermore, it takes a long time to get from lab to commercialisation. To be successful in Europe, he believes we need to speed up how we bring innovation to the market.

On the subject of selling waste heat, **Mr Dalunde** recently visited a bioenergy plant in Sweden that sells their excess energy to their local municipality. In addition, many data centres in northern Sweden produce a lot of heat and sell it to municipalities. Such a system-wide approach is a good way forward.

To a question from the audience on whether RED Heat to Power is feasible, **Mr Papapetrou** said that currently it is not. It is an idea conceived a few years ago, with funding to build the first prototypes in a lab. This illustrates the important principle that it takes many years and a lot of effort to bring an a new technology to fruition.

On the question as to how digitalization can be used in the energy transition, **Mr Dalunde** believes it can help to better understand how we are producing and using renewable energy as there are still inefficiencies in this area. It will also enable transport to better managed.

A delegate asked about the future of the paper industry in the light of a possible paperless economy in 2050. **Mr Rega** said that the term "paperless" often just relates to an office, but paper is

associated with much more than writing paper, such as tissues, toilet paper, sanitary towels, packaging (a very sustainable way to reuse paper and cardboard), as well as a lot of new innovative products such as heat-sensitive paper labels on baby food. The paper industry is also heavily investing in the bioeconomy and has founded the European Bioeconomy Alliance and is making further investments in the circular economy. Every day, more raw material is growing equal to 1500 football pitches. Industry 4.0 is a very useful tool to help the industry use energy and raw materials more efficiently.

On the question as to how the EU's transition efforts could become more innovative in finding ways to stop Member States from subsidizing fossil fuels, **Mr Halma** said that the future is not in subsidizing fuels; it's necessary to consider the whole system including the materials in a circular economy. Funding energy is out of date, and should be phased out sooner rather than later. A lot of money goes into subsidizing renewables – which is fine – but no equal amount is spent on subsidizing biomaterials, the bioeconomy, or energy-intensive industries.

A delegate asked about higher carbon pricing, and how can EU industry tackle international competition where carbon is free? **Mr Dalunde** believes it's better to use the EU's soft power to promote climate action in other countries, by only having trade agreements with countries that implement the Paris Agreement and put in place a price on carbon. If that fails, a kind of carbon inclusion mechanism could be considered. So if you a product is exported to Europe that is polluting, the equivalent price of the ETS is paid by the exporter. He believes that carbon pricing is likely to be the norm.

On another question as to the economic feasibility of the RED Power to Heat project, **Mr Papapetrou** said it's important to look at the bigger picture on what to expect from disruptive innovations and how industry 4.0 can be used. He said we have to classify our expectations from incremental change to disruptive change, both of which are useful. Using big data is not generally disruptive. IT-enabled improvements in process industries can be very useful and can pay back fairly quickly, but what IT controls is the technologies that are already there. Improving technologies takes time.

A delegate asked what innovative technologies are supported by the EU? **Mr Papapetrou** said that the Horizon Europe budget of 100 billion euros will be spent to support thousands of new technology projects. Recovery of waste heat to convert low temperature heat to electricity is just one such project. There are many projects on different vectors such as integrating the heat, electricity, hydrogen, gas and water networks. He said the validation criteria are very good as they look at the potential impact of products as to which receive funds.

A delegate asked how disruptive innovative technologies can be supported to become the turning point that the EU needs? **Mr Dalunde** believes that rather than using precious public resources in promoting low carbon investments, we should rather make high carbon investments unattractive. Public resources should be used for healthcare, pensions, etc., not to promote low carbon investments.

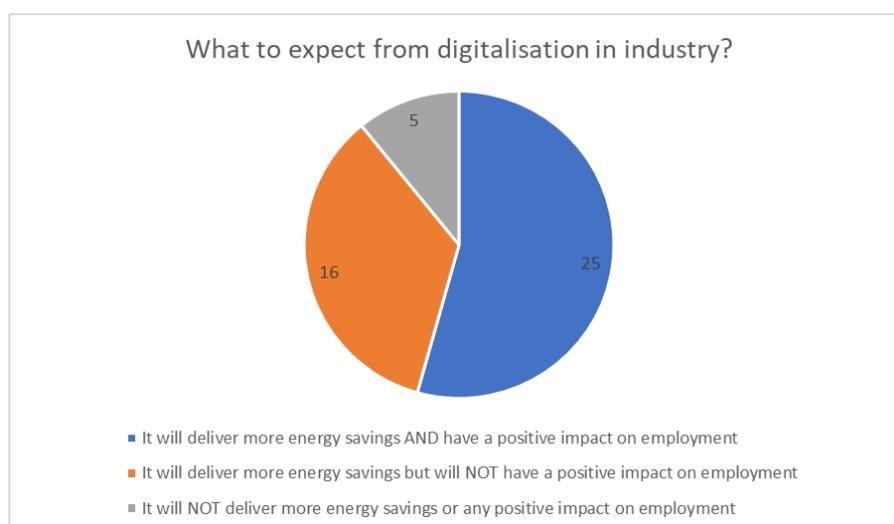
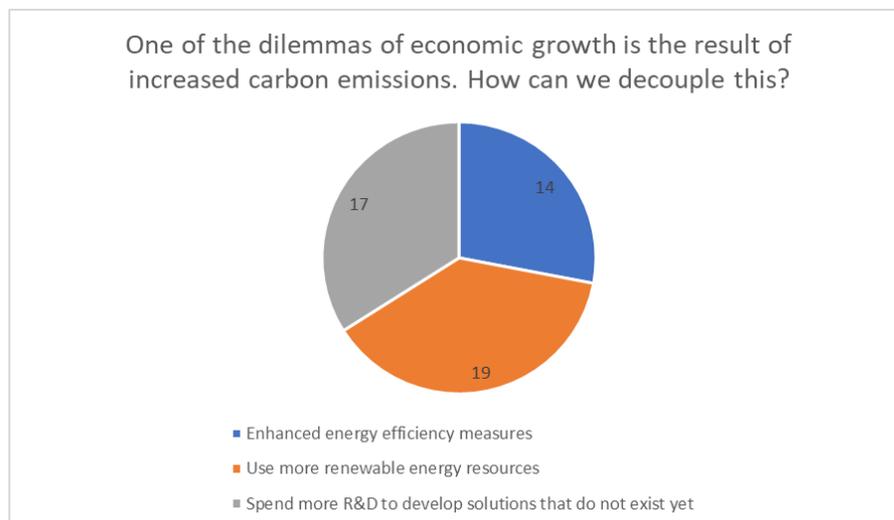
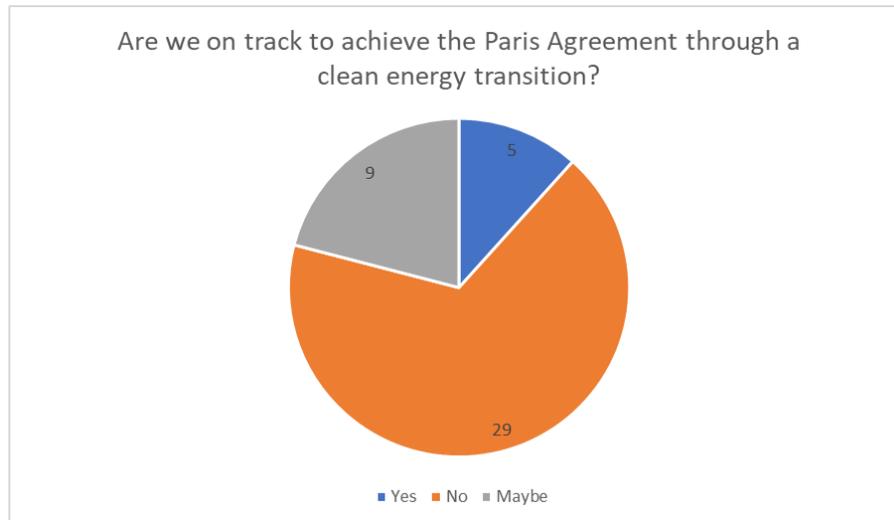
Annex

Questions from delegates

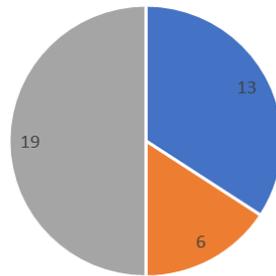
(in order of number of votes received for each question)

- How can the EU's transition efforts become more innovative in finding ways to stop Member States subsidizing fossil fuel usage?
- On higher carbon pricing, how can EU industry tackle international competition in countries where carbon is free?
- The EU wants to develop a battery industry. How does it plan to secure rare earth materials (i.e. cobalt) when China is lobbying the exporting countries so strongly?
- From an economic perspective, is the RED Heat-to-Power technology feasible?
- Disruptive innovation will bring the target year(s) forward. Then, how can these technologies be supported to actually become the turning point the EU needs?
- What innovative technologies, aside from reverse electro dialysis, are currently supported by the EU?
- Have you discussed clear criteria and metrics to assess the degree of innovation in new proposals and projects?
- What is the basic ecosystem for innovation in the energy sector in a region?
- I believe that in 2050 there will be no more paper. We will be paperless. Invest and innovate in Bioeconomy!
- I heard we must create added-value products from the low carbon economy, but how can people pay for it? Taxes seems to be the only solution! Is there any policy?
- What support is provided to innovation in O&M that brings major improvements and is more easily applied in the field than so called "disruptive" technologies?
- What is the main current economic driver for decarbonizing industry?
- Energy intensive industries could be great enablers but are inherently risk averse to new innovation. How would the panel support the companies to adopt?
- How is the EU's experience on renewable energy & innovation relevant in non-EU countries, especially developing countries?
- How important is "Green ICT"? What can its impact be in decreasing the carbon footprint of distinct business sectors?

Slido Poll Results



What would be most useful in attracting low-carbon investments in industry?



- A market pull for low-carbon products
- Mobilise private green financing to support industry transformation
- Use public finances to de-risk investments in first-of-its-kind low-carbon solutions