

## Brief

*How to make the most of the missions of Horizon Europe?*

## SUSTAINABLE ENERGY TRANSITION PATHWAYS

*Key Takeaways from  
Universities Finland (UNIFI): Moonshots  
of the 2020s on Energy and Mobility*

Meeting was held on the 8th of October 2018 in Brussels. The meeting was timely since there was the publishing of IPCC 1.5 C report on the same morning. The message of the report was similar to that of our speakers: "Rapid actions are needed!"

LUT President **Juha-Matti Saksa** opened the session with regards from Finnish Universities (UNIFI) and said that it is task of our generation to take actions and search for new innovative solutions to save the planet Earth.

In his keynote talk, Professor **Christian Breyer** highlighted the urgency of 100% renewable energy system and introduced different technology options for the transition pathways. He summarized his message to following 10 key takeaways:

**1.** Climate Change forces a drastic and fast change of the energy system

**2.** 100% renewable energy is technically feasible and economically viable

**3.** Full hourly resolved modeling ensures energy supply throughout the year

**4.** Key energy system components are solar PV, wind energy, batteries, Power-to-X solutions (incl. CCU = Carbon Capture and Utilisation)

**5.** Energy transition to 100% RE eliminates GHG emissions, reduces cost and creates jobs

**6.** Electricity demand will drastically rise due to broad electrification of the energy system

**7.** Unavoidable CO<sub>2</sub> point sources utilised for CCU: cement mills, pulp& paper, incinerators

**8.** CO<sub>2</sub> direct air capture will emerge to the main CO<sub>2</sub> source for CCU

**9.** Fossil-CCS (Carbon Capture and Storage) to be avoided, whereas Negative Emission Technologies are needed

**10.** Not many have yet understood what 10 €/MWh for PV generation really means – never in history has electricity been this low cost. This allows conversion of electricity with water and air to fuels, chemicals, etc. for reasonable cost.

Assistant Professor Milos Mladenovic discussed the future of mobility and highlighted the importance of cities and citizens as drivers of change.



Associate Professor **Tero Tynjälä** gave examples of key technologies enabling negative emissions and called for large-scale actions to demonstrate the CO<sub>2</sub> mitigation actions from cradle to grave.

Dr **Johannes Schaffert** introduced Store&Go project, presented status of different power-to-gas pilot plants in the project, and brought up the importance of greening the existing gas infrastructure and its role as energy storage.

Mr **Marco Franza** introduced the vision of European Energy Research Alliance (EERA) and called for emission free Europe by 2050 and more ambitious emission reduction targets from the EU.

Mr **Matti Rautakivi** sent his regards over video, where 100% renewable vision of Wärtsilä was presented.

Panel discussion with questions from the audience led by Professor **Jari Hämäläinen** LUT Vice President for research and innovation wrapped up the event.

Some ideas for missions were suggested for the next Horizon Europe framework program period to be further formulated during the autumn 2018 by EU stakeholders:

**1.** Demonstrate commercial scale production of power-to-liquid fuels utilising solar/wind energy and renewable carbon by 2024?

**2.** Demonstrate operation of CO<sub>2</sub> capture, transport, storage, utilisation and long-term sequestration infrastructure in real environment by 2024.

**3.** Demonstrate energy system island operation with high share (>70 %) of variable RE production in real environment (energy independent areas) in several different locations in Europe (Nordic countries, Central Europe, Mediterranean countries) and/or globally.

**4.** Strengthen European leadership in renewable energy technologies, annual increase in revenues >15 %, over 3 times more renewable energy production and clean technology jobs by 2025.

## For more information:

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- All the presentations are available in: [www.lut.fi/brussels](http://www.lut.fi/brussels)
- For other UNIFI Horizon Europe moonshots: [www.unifi.fi/brussels](http://www.unifi.fi/brussels)

*Warmest thanks for all speakers and participants!*

