

LUT Universities



FUELING THE FUTURE: **LUT'S** BIOENERGY PROJECTS FOR EU FUNDING AND COLLABORATIVE SUCCESS

BF & VTT: EU-funding bio & Renewable fuel calls, 10th May 2023

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LUT IN FIGURES

1969 founded – combining technology and business from the start, 2022 adding Social Science and Humanities

6 600 Bachelor's and Master's students, 1 027 scientific publications, 470 doctoral students

1 200 staff members, 96 nationalities, 2 campuses, 1/3 of first-year students are foreign nationals

107M€ (2022) Annual funding, of which Horizon Europe 6.1M€ (2022, 11 projects)



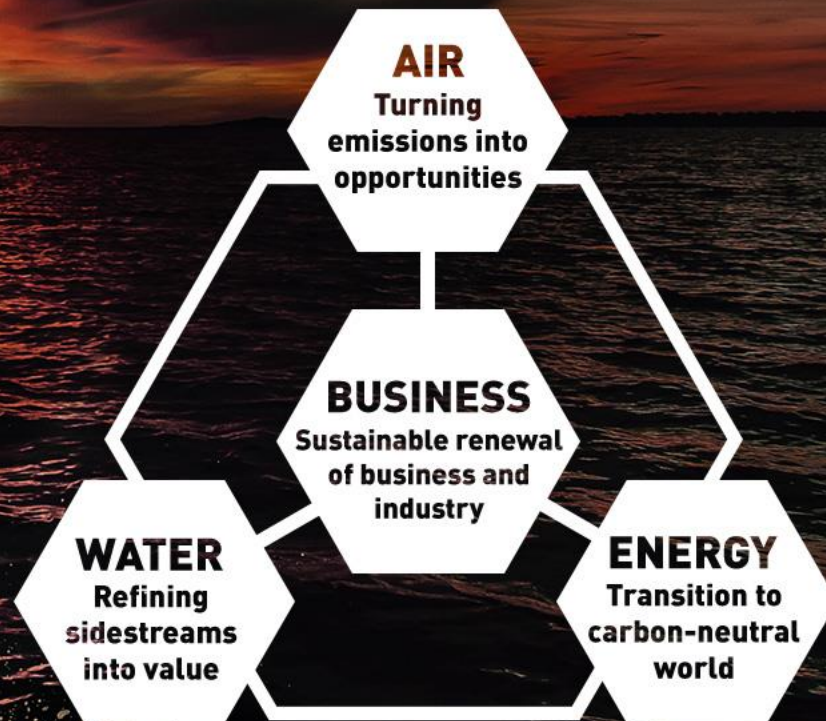
17 projects at from HEU (2021-2022)

9 projects from HEU Cluster 5

LUT is a member of CBE and CleanH2
European Partnerships under Horizon

LUT UNIVERSITY STRATEGY 2030 • TRAILBLAZERS – Science with a Purpose

SYSTEM EARTH





LUT IN BIO- & RENEWABLE ENERGY CONTEXT

Example 1: demonstration of High yield biofuel production from residues or industrial side streams and renewable power for example ethanol, methanol, methane, aviation fuel or ship fuel etc.

- In a previous EU call : cooperation with a gasification company LUT and others demonstrating value chain of high-yield methanol
- In future calls: Cooperation with access to side streams containing for example acetic acid from paper and pulp industry, biochar product etc. would be desired or producing gasifier

Example 2: Small- Scale Biorefineries areas producing more valuable products for example anti-microbial agents

- LUT has ongoing project with Jane and Aatos Erkko foundation production of anti-microbial agents for textiles from garden residues and autumn leaves and successful proof of concept has been done
- In the future, demo at TRL 5 planned in the ongoing project but on longer term an EU project would be great opportunity to demonstrate the technology together with companies for example equipment providers or companies handling the feedstock

+ These were just 2 examples but we are interested in a lot of different other topics!

- Hydrogen, CO₂ capture and utilization, waste- water treatment, biorefineries, renewable energy, heat pumps, batteries, energy storage, gas separation, biopolymers and composites etc.



CASE: H2 AND P2X RESEARCH AT LUT

»» Research Focus Areas

- »» Power electronics for water electrolysis
- »» Water electrolyser systems
- »» Grid integration
- »» Power-to-Liquid, Power-to-Food
- »» Alkaline electrolysis
- »» Hydrogen valleys – Southeast Finland H2 valley

Projects

- Neo-Carbon Energy
- Neo-Carbon Food
- P2XEnable
- POQELYZER
- HYGCEL
- FinH2
- NordH2_hub

Alkaline and PEM electrolyzers

- Power quality
- Energy efficiency

PEM cell test bench

- Upcoming
- Parallel cell tests

PEM electrolyzer cell

- Together with FZJ

250 kW PHIL

- Power electronics testing

CO₂ capture system

- Together with LUT Chem. Eng.

Methanol synthesis system

- Together with LUT Chem. Eng.

CO₂ electrolysis

- Solid carbon materials

Neo-Carbon Food research pilot

- Together with VTT
- Electrobioreactor with in situ water electrolysis



Fig. PHIL system.

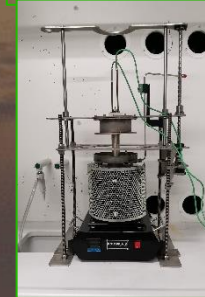


Fig. Power-to-Food pilot.



CASE: GREEN ELECTRIFICATION (GE) TRACKS AT SOUTH KARELIA

TRACK 02: SYNTHETIC BIOFUELS AND P2X

- CO2 capture and utilisation
- Green hydrogen
- Synthesis processes

RELATED HORIZON EUROPE Projects (FOUR)

- HEU-CALBY2030
- HEU-THREADING CO2
- HEU-HERCCULES
- HEU-BUTTERFLY

OTHER HORIZON EUROPE Projects FROM GREEN ELECTRIFICATION (FIVE)

As Coordinator: HEU-DRIVE2X, HEU-HIPO, HEU-SEED

As Beneficiary: HEU-VOLTCAR, HEU-AMIGOS

- 15M€ to Finland within four GE tracks (1-4)
- 8M€ for Finnish companies
- Skills with the Secondments

Live overall stat for Green Electrification HEU proposals, 28 submissions, 9 funded, 5 in reserve list



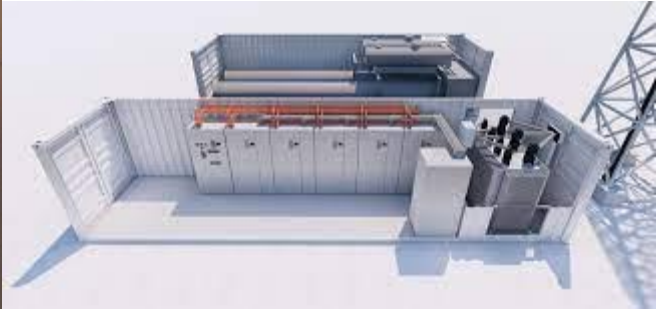
LUT SPINOFFS IN THE DOMAIN



SOLAR FOODS ACCELERATES PRODUCTION OF CLIMATE-FRIENDLY PROTEIN WITH INVESTMENT FROM THE FINNISH CLIMATE FUND
08/04/2021



P2X
Your breath is turning into fuel – Soletair Power's machine demonstrating P2X Fuel Production at Expo 2020 Dubai
Soletair Power · 7/30/2021



Neovolt enters collaboration with Woikoski: Finland to become the frontrunner in hydrogen technology
October 8, 2021



LUT HORIZON TOPIC (FALL 2023)

Topic budget: 15 M€

EU funding : 7.5 M€ (X2)

TRL 6-7

HORIZON-JU-CBE-2023-IA-01: SMALL SCALE BIOREFINING IN RURAL AREA

- + **Scope:** Demonstrate the technical suitability and economic viability of **small-scale decentralised biorefinery concepts**, which may include modular and mobile units. Develop, demonstrate and validate resource-efficient technologies with a view to **add value to locally available resources** (underutilised biomass; by-products; residues; solid, liquid and gaseous waste and residual streams) at the point of origin. Small-scale biorefineries offer diversification opportunities for local rural stakeholders by:
 - Processing their biomass **directly at source**, and/or
 - Providing **additional sources of income** with biorefinery products based on circular use of local resources
- + **Expected outcomes:**
 - Deployment of sustainable, inclusive, and reliable biobased value chains in rural areas with a focus on fair **economic returns at local (farm) level**
 - Improved **circularity and resource efficiency** via practical application of the circular (bio)economy concept, e.g., by maximising the **valorisation** of residual biomass
 - New skilled **jobs opportunities** and **investments** in the bio-based sectors in rural areas, particularly in regions with underdeveloped capacities, improved **innovation capacities** and product **portfolio extension** in primary production sectors and **SME's**



LUT HORIZON TOPIC (FALL 2023)

Topic budget: 12 M€

EU funding : 4 M€ (X3)

TRL 4-5

HORIZON-CL5-2023-D3-02-07: DEVELOPMENT OF NEXT GENERATION ADVANCED BIOFUEL TECHNOLOGIES (RIA)

- + **Scope:** Development of next generation technologies for the production of **novel advanced liquid and gaseous biofuels** from biogenic residues and wastes including CO₂ and organic part of wastewater or micro-algae (including cyanobacteria), through chemical, electrochemical, biochemical, biological and thermochemical pathways, or a combination of them.
 - Focus should be on **high conversion efficiency** and **low to near-zero carbon emissions** from overall production
 - Overall, proposals are expected to improve competitiveness and minimize GHG emissions through **synergies** with renewable hydrogen and other renewable energy technologies for **processing energy**.
 - The new technologies should also address specifically **uses in fuel cells** for **all transport** modes for electricity generation from biofuels used as renewable energy carriers with high conversion efficiency and low pollution.
 - The sustainability and GHG emissions should be assessed by an LCA and ways along the value chain to reduce them to and below net zero should be developed.
- + **Expected outcomes:**
 - Increase availability of **disruptive emerging advanced** biofuel technologies.
 - Accelerate the readiness of **cost-effective and highly performing future technologies** of advanced biofuels for all economy sectors.
 - Reinforce the **European scientific basis** and **European technology export potential** for advanced biofuel technologies.



WHAT IS THERE FOR YOU?

- A **company partner** can demonstrate the proposed concepts in an **industrially relevant environment** and at an **appropriate scale**. The integration of the proposed technology in **existing value chains** and the relevance to several European contexts would be an added value; Provide elements related to the **replicability and scalability** of the technology
 - + The partners have a chance to be part of the ongoing **bio and renewable fuel economy evolution in Finland**
 - + Join as a 'Partner' with a dedicated budget for person salary and equipment (**Funding rate: 60% IAs and 100% RIA**)
 - + **Test** and enhance your **ideas and opportunity** through participation and reciprocal knowledge transfer
 - + **International consortium** with well-renowned European companies and research organisations
 - + Build your **relevant business case** for further planning in the bio-renewable fuel value chain.

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Clean energy, water and air are life-giving resources for which we at LUT University seek new solutions with our expertise in technology and business.

We help society and businesses in their sustainable renewal.
Our international community consists of 7500 members.
Our campuses are in Lappeenranta and Lahti, Finland.



