LECo

Local Energy Communities

Northern Periphery and Arctic Programme
2014–2020

EUROPEAN UNION

Investing in your future
European Regional Development Fund

Community Energy Planning

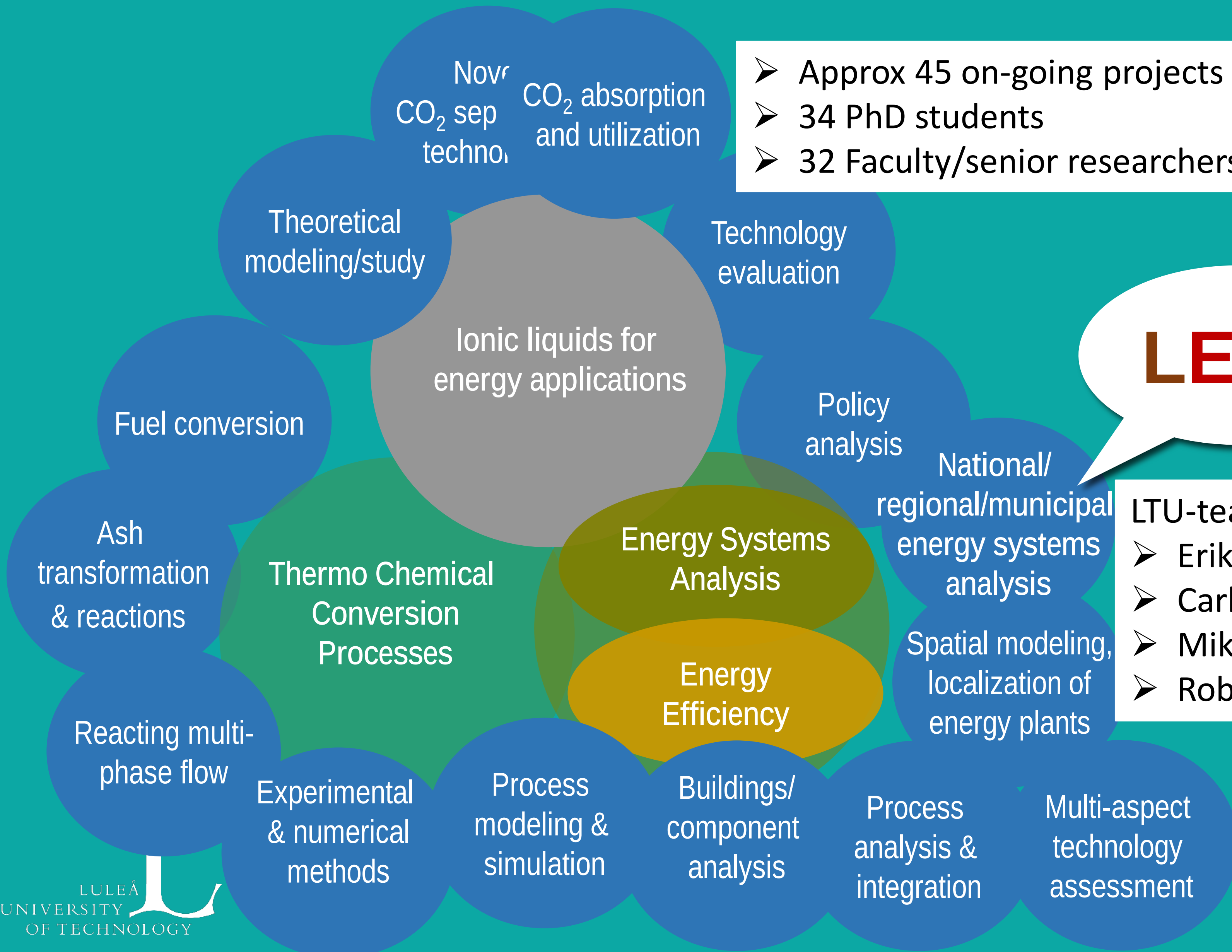
Robert Fischer

Phd-candidate, Luleå university of technology (LTU)

LECo-online conference 11th nov 2020

LTU: Competence and research areas

- Approx 45 on-going projects
- 34 PhD students
- 32 Faculty/senior researchers/post docs



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LTU-team for LECo:
- Erik Elfgren
- Carl-Erik Grip
- Mikael Risberg
- Robert Fischer

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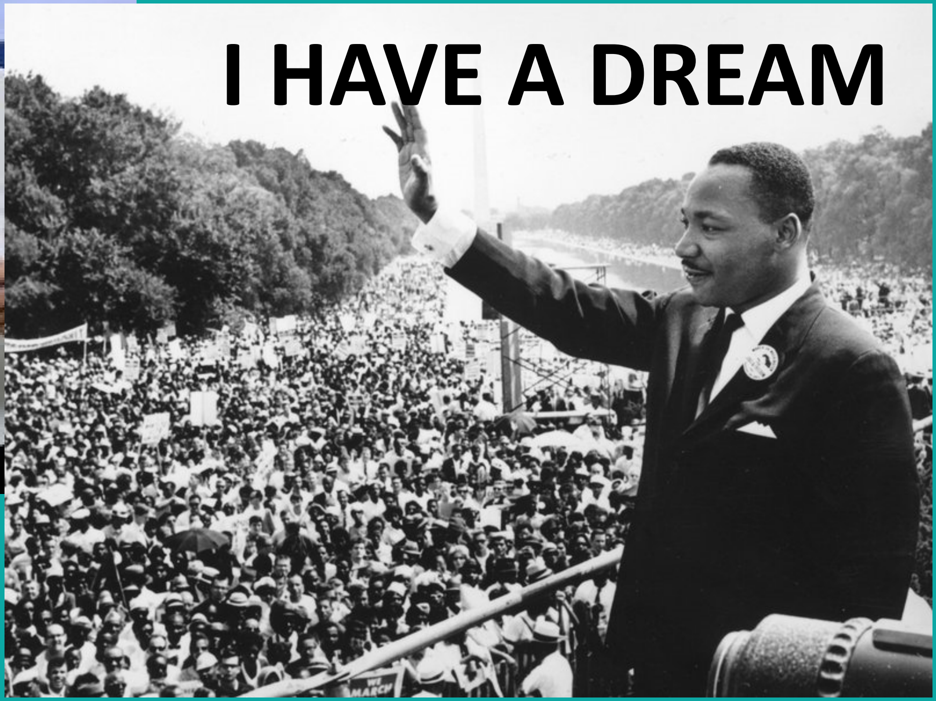
How does a community energy project start?

FreeArt.com



Agence France Presse/Getty Images

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Outline

- A typical LECo community
- **Which energy projects** found its way into Action Plans of LECo communities?
- **Which tools** are available for energy planning and how do they support the planning process?
- **Which outcomes** do we get with energy planning?

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A typical LECo ”community” (Finland, Sweden, Ireland, Germany)

Small towns (urban):

- groups representing a suburb or a distinct part of a suburb (neighborhood), one street, a community building.

Rural:

- a farm or a group of farmers, a community building, a village with a few 100 households or smaller.

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Which energy projects found its way into Action Plans of LECo communities?

- **Behavior change**: Information campaigns, capacity building, gamification (competition in energy saving)
- **Energy efficiency**: Lighting (LEDs), building envelope (insulation), appliances (AAA+), heating controls
- **Heating technology**: Heat pumps, solar thermal, renewable fuels (woodchips, pellets)
- **Renewable energy**: Solar PV (rooftop, ground-mounted), biogas, biofuels, wind energy, hydropower
- **(Transport**: car-sharing (behavior), electrification)
- **(District heating** (waste heat, biofuels, heat pumps))

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Which factors influenced the choice for a LECo project?

…well, it depends:

- **Experience in the community** with similar projects
- **Socio-economic situation** in the community
- Age, standard of the **building stock**
- The **country´s policies**, availability of **funding** for community energy projects and **technical support** from e.g. **independent energy agencies**.
- **Support from local politicians**, authorities?

AND – NOT TO FORGET:

- **Community energy projects are citizen driven!**

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Which tools are available for energy planning and how do they support the planning process?

There are many challenges from the early idea of one individual ("I have a dream")… to a bankable project… to a finished project… to proper O&M… therefore:

- Buildup of experience and creating a feeling of **"Yes, we can!"** with successful **small projects** is crucial.

- When it comes to **bigger projects,** then a professional approach with **feasibility studies**, project planning, project and financial management, etc. is expedient.

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Which tools? A "tool" is not always a difficult to learn and expensive software application:

Looking inside – assessing the "as is"- situation with questionnaires, interviews, at seminars:

- Building stock, standard, heating systems used, …
- Interest, skills and experience in the community…
- Transport situation for commuting, school busses, etc.
- **Results**: Data. Visualization of and learning about the "as-is" situation as well as comparing with similar communities

Looking around – key factors influencing a community from the outside: LECo conducted PESTLE analysis:

- **P**olitical, **E**conomic, **S**ociological, **T**echnological, **L**egal and **E**nvironmental key factors.

Find more details e.g. here:

- https://www.cipd.co.uk/knowledge/strategy/organisational-development/pestle-analysis-factsheet

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Which tools? …software…

Selection criteria of software for LECo included:

- Free or low cost; easy to learn; support is available
- Low requirements on data input
- Covers electricity, heating and transport sectors
- Provides hourly results, ideally over a one year period.
- Proven and frequently used for similar purposes

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Which tool for LECo:

EnergyPLAN

Advanced energy system analysis computer model

Fulfills the mentioned criteria and:

- A reference case is relatively ”easy” to model.
- Allows quick simulation of many options.
- Delivers results in graphical and tabular format.
- Calculates energy balances, energy system costs and CO2-emissions, etc.

EnergyPLAN was developed by the Sustainable Energy Planning Research group at Aalborg University, DK. Download from: https://www.energyplan.eu/

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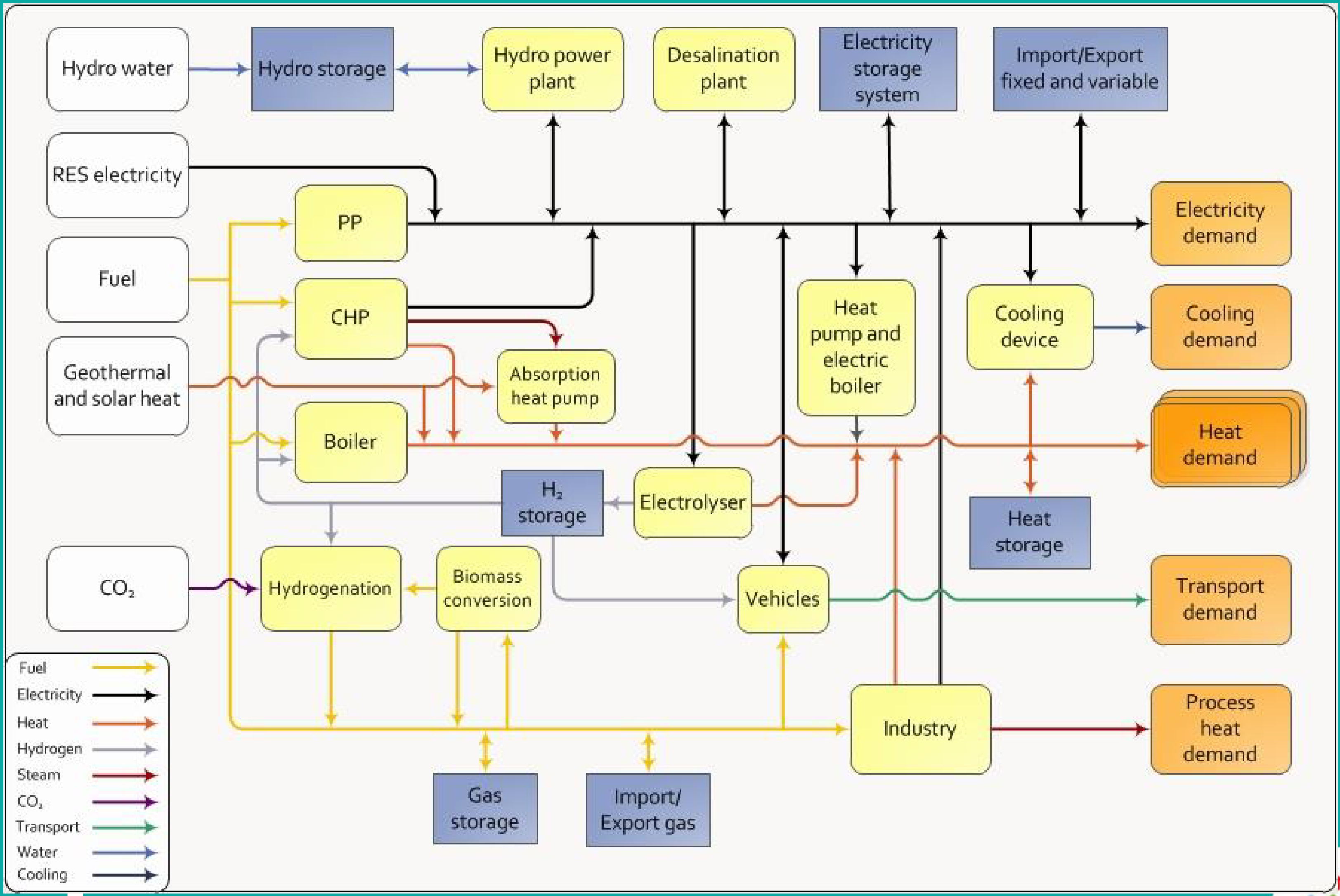
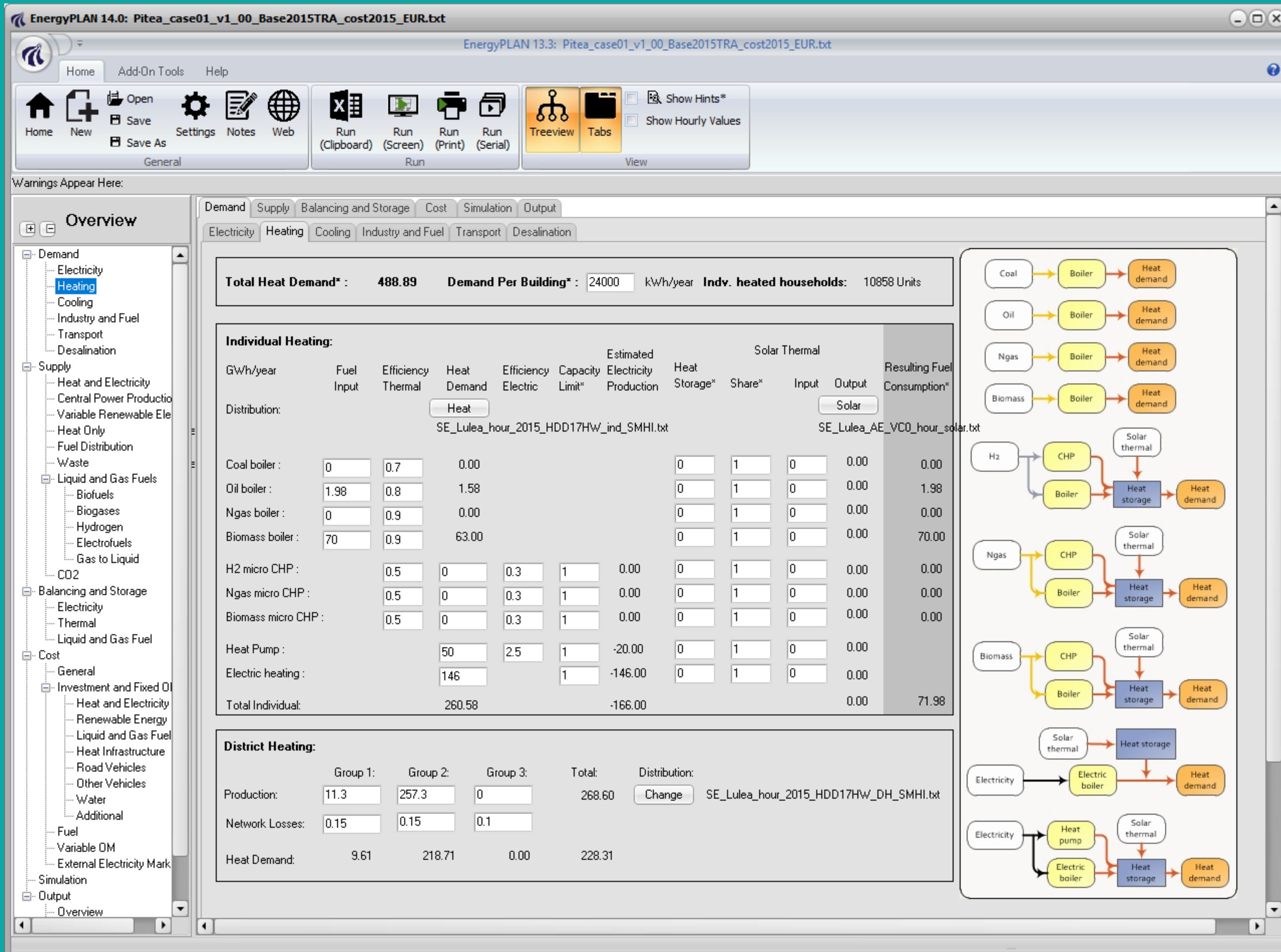
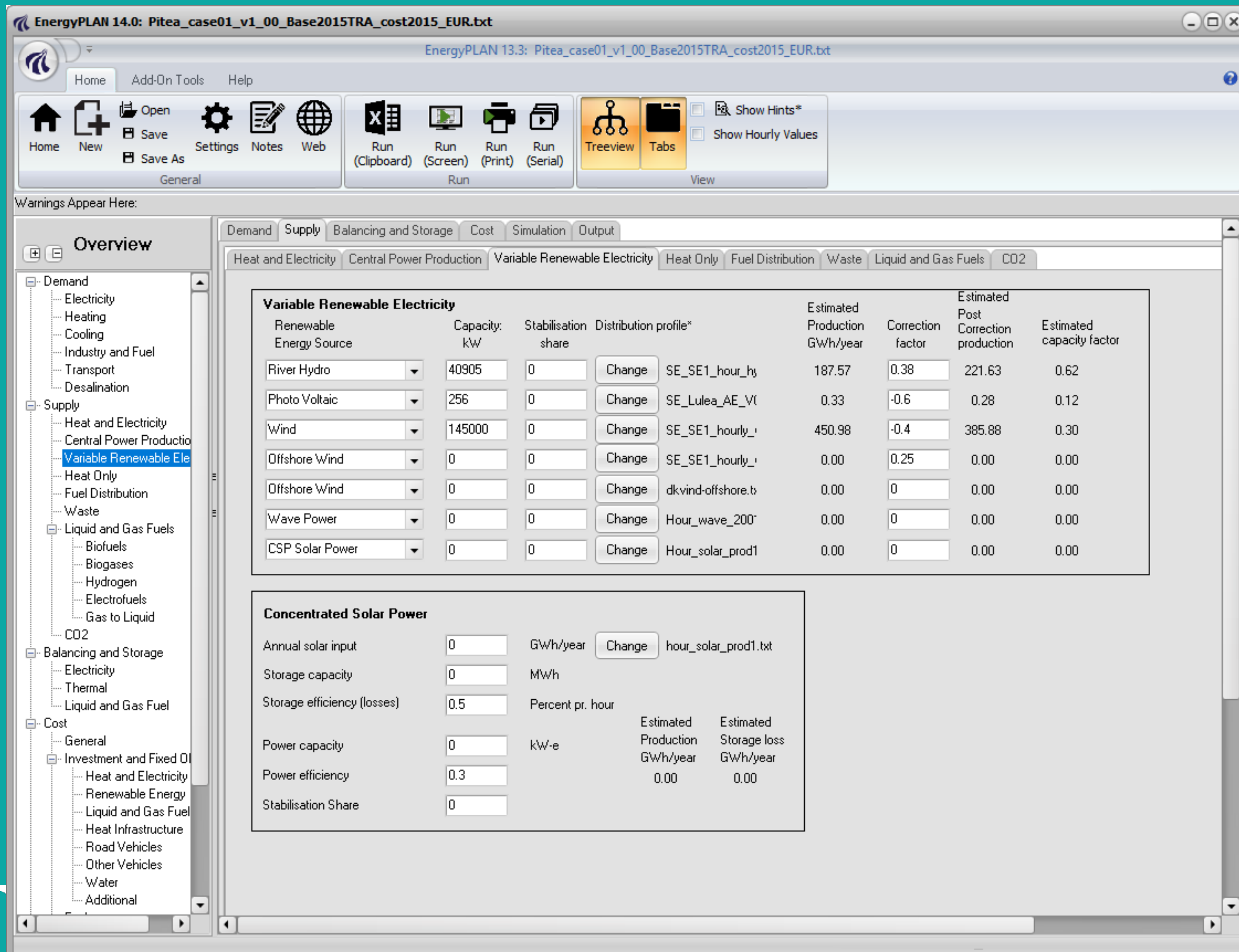
EnergyPLAN – Energy system model:



EnergyPLAN user interface: Demand



EnergyPLAN user interface: Supply



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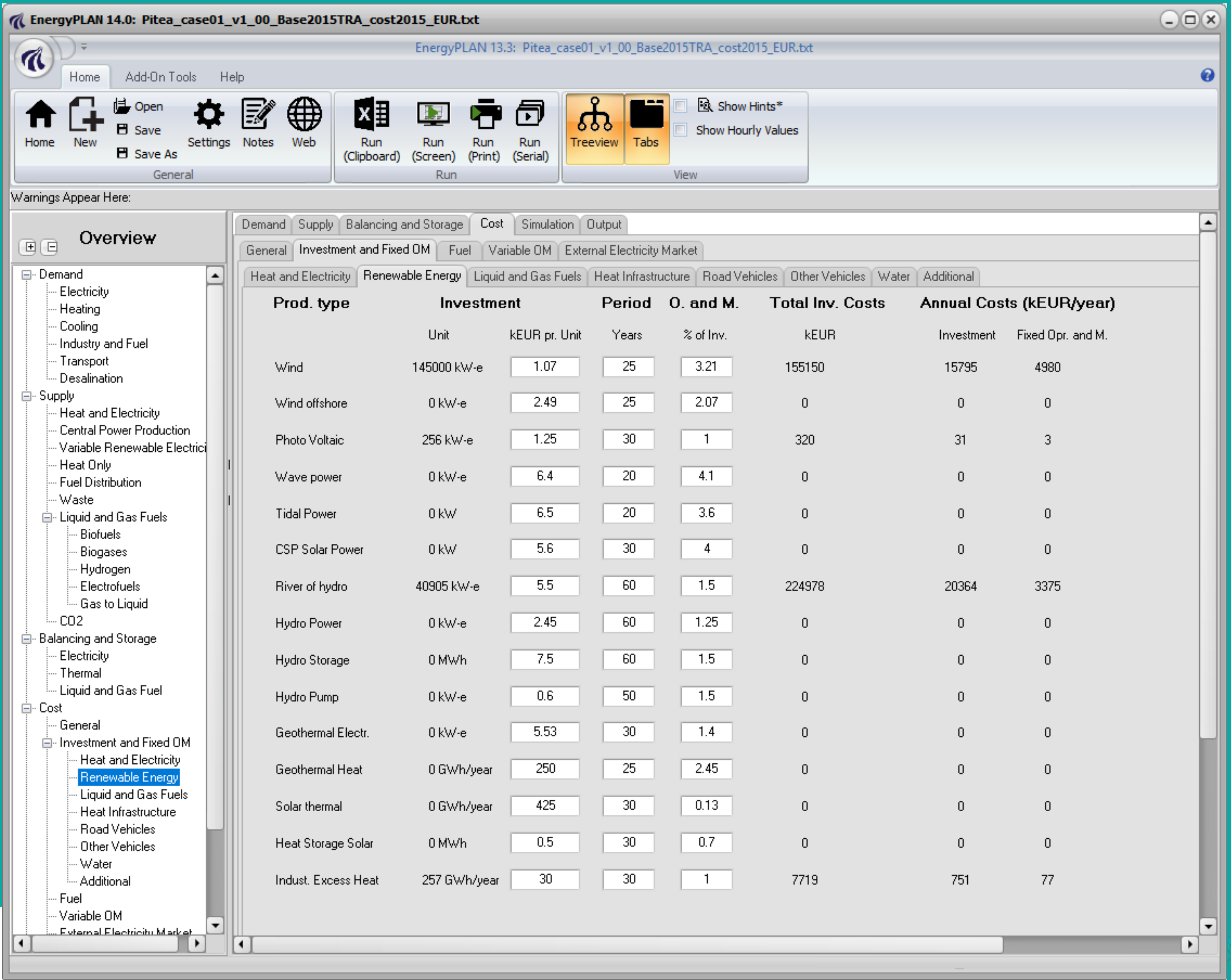
EnergyPLAN user interface: Cost



Prod. type	Investment Unit	Investment kEUR pr. Unit	Period Years	O. and M. % of Inv.	Total Inv. Costs kEUR	Annual Costs (kEUR/year) Investment	Annual Costs (kEUR/year) Fixed Opr. and M.
Wind	145000 kW-e	1.07	25	3.21	155150	15795	4980
Wind offshore	0 kW-e	2.49	25	2.07	0	0	0
Photo Voltaic	256 kW-e	1.25	30	1	320	31	3
Wave power	0 kW-e	6.4	20	4.1	0	0	0
Tidal Power	0 kW	6.5	20	3.6	0	0	0
CSP Solar Power	0 kW	5.6	30	4	0	0	0
River of hydro	40905 kW-e	5.5	60	1.5	224978	20364	3375
Hydro Power	0 kW-e	2.45	60	1.25	0	0	0
Hydro Storage	0 MWh	7.5	60	1.5	0	0	0
Hydro Pump	0 kW-e	0.6	50	1.5	0	0	0
Geothermal Electr.	0 kW-e	5.53	30	1.4	0	0	0
Geothermal Heat	0 GWh/year	250	25	2.45	0	0	0
Solar thermal	0 GWh/year	425	30	0.13	0	0	0
Heat Storage Solar	0 MWh	0.5	30	0.7	0	0	0
Indust. Excess Heat	257 GWh/year	30	30	1	7719	751	77

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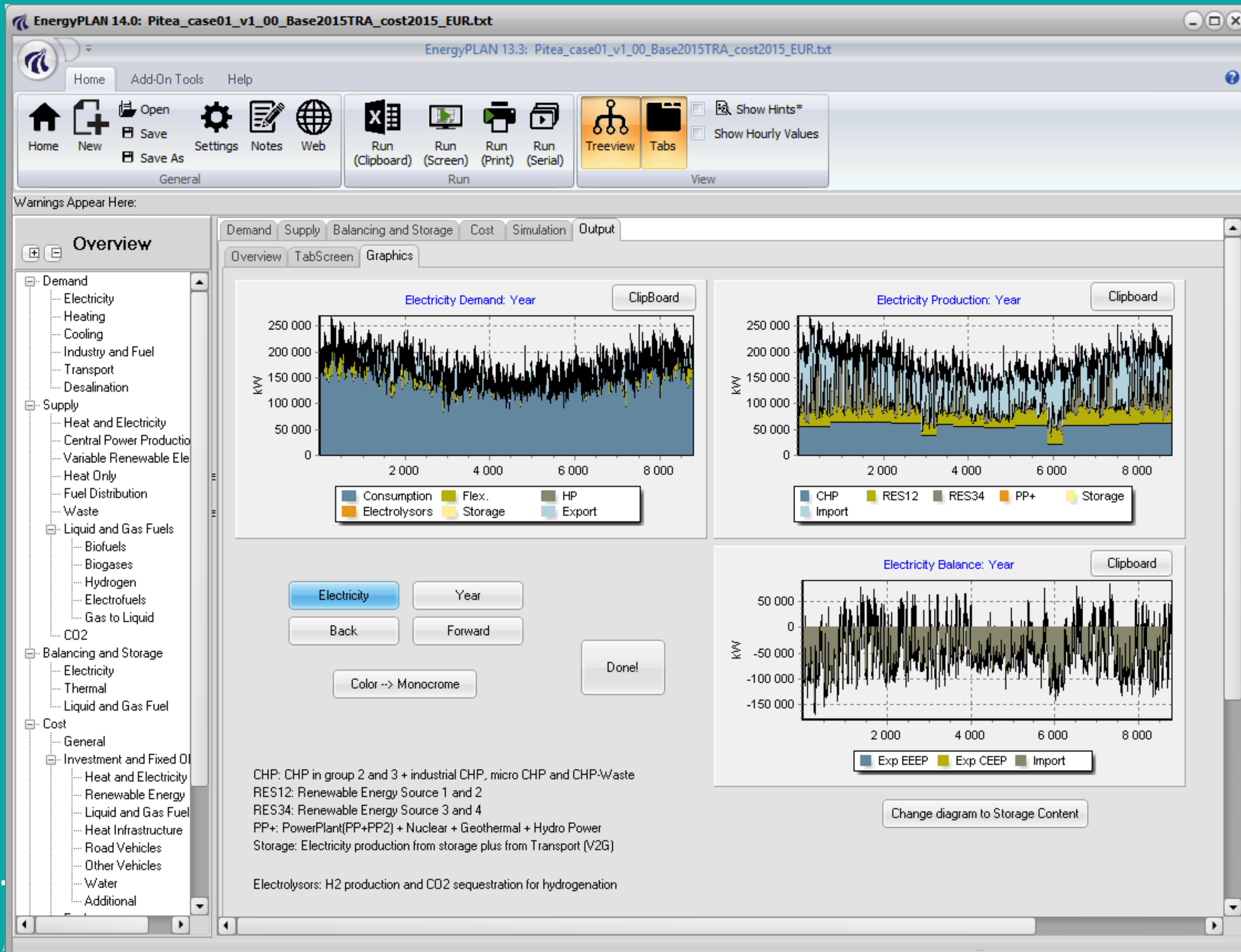
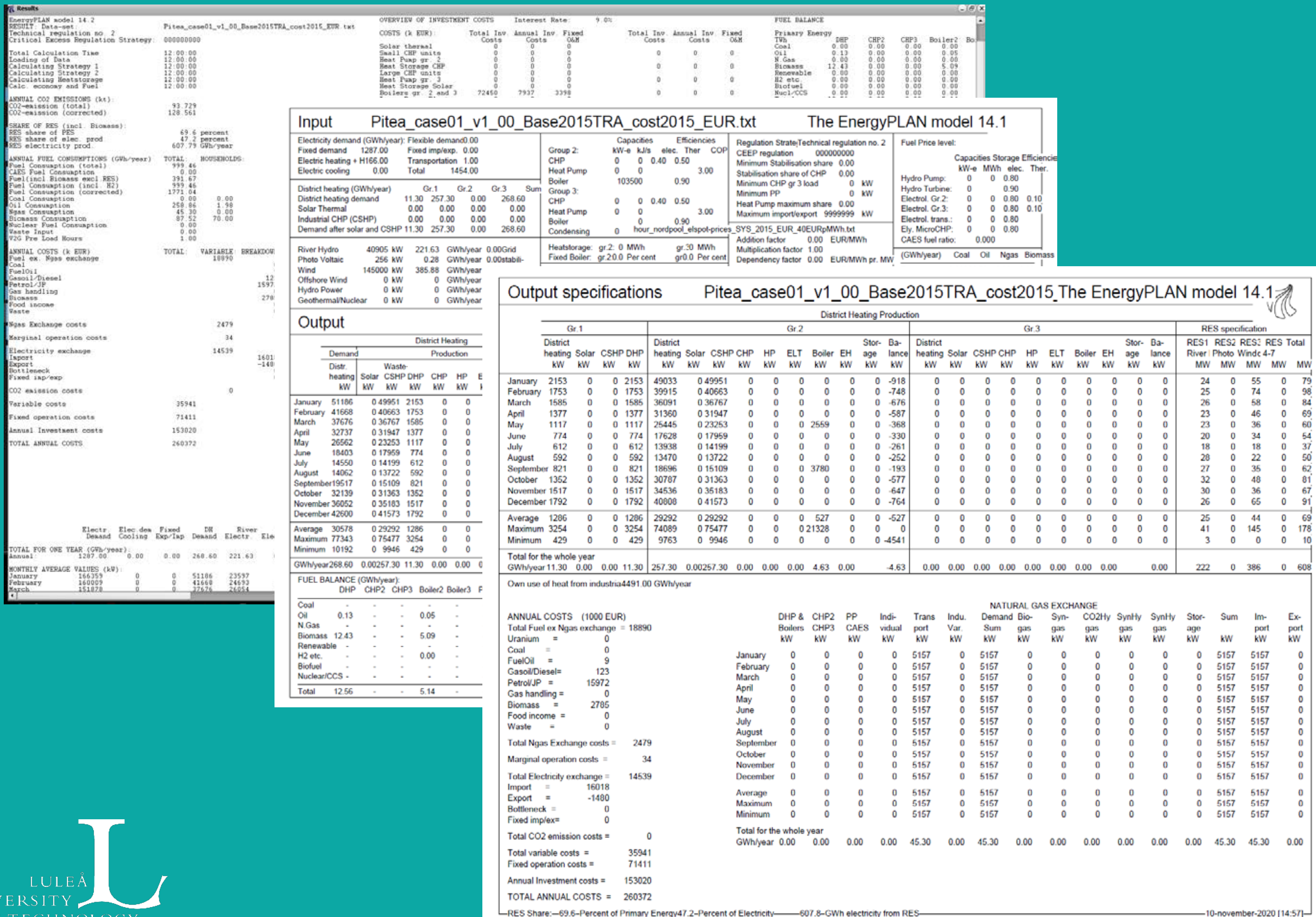
EnergyPLAN user interface: Outputs



EnergyPLAN user interface: Outputs



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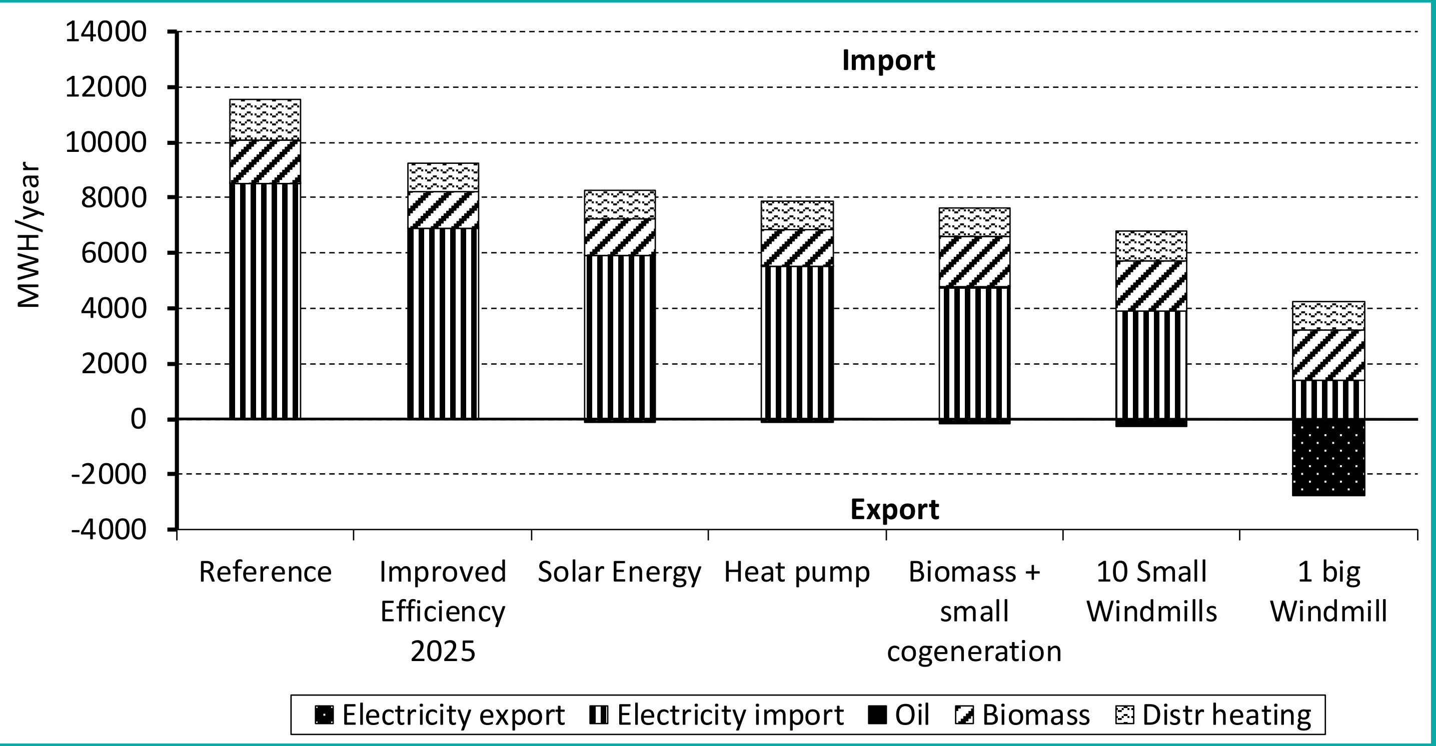
EnergyPLAN: Studying scenarios

Process: Stepwise implementation: **Reference case → Improved Efficiency → Solar Energy → Heat pump → Biomass + small cogeneration → Wind power with 10 small wind mills → 1 big wind mill.**



EnergyPLAN model and scenarios for Vuollerim, Jokkmokk.
Report in LECO deliverable T2.5.3.
By Carl-Erik Grip and Silva Hermann

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Which outcomes did we get with energy planning for LECo-WPT2.

13 community Sustainable Energy Action Plans (**cSEAPs**) 3 for Finland, 5 for Ireland, 5 for Sweden. **Content:**

- Policy and regulatory framework
- Funding sources
- RE supply potentials
- Energy system and scenarios:
    - Input data
    - Reference energy system
    - Scenario assumptions
    - Scenario results
- Action Plan

WP T2.6. cSEAP – Eskola, Kannus

1 Introduction

Eskola is a village which is a part of the city of Kannus situated in the Central Ostrobothnia region in Western Finland. Eskola has a population of 500. There are three major industrial workplaces in Eskola: a window and door factory, a sawmill and a concrete foundry. Although Eskola is it is a rural village, there is very little agriculture in the village (Figure 1).

Figure 1: Village of Eskola

2 Policy framework

Finlands National Energy and Climate Strategy for 2030 targets an 80–95% reduction in greenhouse gas emissions by 2050 (tem.fi 2017). The Strategy promotes decentralised electricity and heat production based on renewable energy. Wood heating in rural areas and urban centres are supported, replacing fossil-based heating and reducing electricity demand for heating.

Municipal councils prepare local master plans, which adhere to regional plans and direct the preparation of local detailed land use plans.

The regional plan for Central Ostrobothnia 2018-2021 proposes the increased production of renewable energy, especially wind power and the usage of wood fuel.

3 Funding sources

Most central support instruments for energy investments in Finland are feed-in tariffs, emission trading, energy taxation, and investment grants ("energy aid"). Small-scale production of electricity has been promoted and barriers for it removed (Table 1).

Table 1: Support mechanisms improve the economic profitability of small-scale energy production

The aid beneficiary	Publicly financed economic incentive for small-scale production (2014)	
Household	Tax credit for domestic projects, 45% of labor costs under certain conditions	Exemption for duty on electricity for systems <50 kW, share ca. 20% of the total price of used electricity (energy, transmission and taxes)

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In conclusion:
Which outcomes can we expect from community energy planning?

- **Inside**: Detailed understanding of energy use, behaviour, potentials for energy saving.
- **Outside**: Key factors influencing a community from the outside (PESTLE).
- **Learning** takes place during the entire process.
- A **reference case** of the community energy system
- **Scenario results**, including technical and financial parameters.
- **Energy Action Plan**

Thank you for your interest!

Kiitos! Danke! Tack!

Your questions?

The Project Partners

Centria University of Applied Sciences (Lead Partner) (FIN), Western Development Commission (IRL), The Gaeltacht Authorigy (IRL), Luleå University of Technology (SWE), Jokkmokk Community (SWE), Arctic University of Norway (NOR), Renewable Energies Agency (GER)