

Smart city lighthouse demonstrations for positive energy blocks in Espoo, Finland

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 Horizon 2020
 This project has

 European Union funding for Research & Innovation
 and innovation p

 Topic: LC-SC3-SC
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Sustainable energy Positive & zero cARbon Communities

* validate innovative solutions for planning, deploying and rolling out integrated energy system as an efficient mean for the urban transition into a
citizen centered ZEIO Carbon
ecosystem enabling a high quality of life "





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Espoo's goals





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Espoo's demonstration blocks



Leppävaara center: upgrading existing Sello shopping center toward PEB



Lippulaiva block in Espoonlahti: planning and construction of a new PEB



Kera district: city planning demo with PED

ADVEN





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Lippulaiva shopping center

- Total gross area of the block 189,503 m², with 550 residential apartments, shopping center 44,000m²
- Geothermal heating/cooling, 4MW regenerative heat pump.
- PVs
- Electricity battery
- EV charging capacity
- Smart electricity control strategies, demand side management and participation to Nordpool's electricity reserve market



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Demonstration topics in Lippulaiva





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Sustainable energy system production and smart control strategies









- Highly energy efficient building
- Large ground source heat pump solution for heating and cooling (4MW) with 50,000m of bore holes and possibility to store thermal energy,
- Regenerative: solutions to circulate thermal energy (such as waste heat from grocery stores and waste water).
- Thermal energy to surrounding residential buildings (550 apartments).
- Developing **smart control strategies** which drive efficient use of energy.
- PV panels on roofs and facades 700 MWh/a
- Assessing the potential to use a **battery energy storage** system as emergency power and **active participation** in Nordpool electricity market. 1,5 MW/1,5MWh



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E-mobility



- Boosting eMobility in the whole Espoonlahti district
- **EV parking** and **charging capacity,** possibility to 250 cars
- Supporting **e-bicycling** with appropriate parking and charging infrastructure in Lippulaiva
- Metro station underground: connection point for public transport



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People engagement



- Piloting ways to engage and encourage
 citizens' energy positive ways of behavior
- Improving the awareness of existing ones during the construction time
- Encouraging people to use **positive district solutions** for their daily lives
- **Co-creation of shopping center** in collaboration with young consumers



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Energy solutions in Lippulaiva



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Example: Electricity battery and participating in reserve markets





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Example: Electricity battery and participating in reserve markets

Electricity consumption in Lippulaiva

Electricity production in Lippulaiva:

- PV panels (roof and facade)
- Electricity battery
- Purchased green electricity



- Minimizing own electricity bill with smart control system when following hourly electricity price
 - Utilizing electricity battery
 - Minimizing demand peaks
- Extra profit when participating in Fingrid's demand side management markets and reserve markets



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Beyond demonstrations

- Replication
- Business opportunities
- Knowledge exhange
- Recommendations
- Bold city visions 2050







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