

Sustainable energy **P**ositive & zero c**AR**bon **C**ommunities**S**

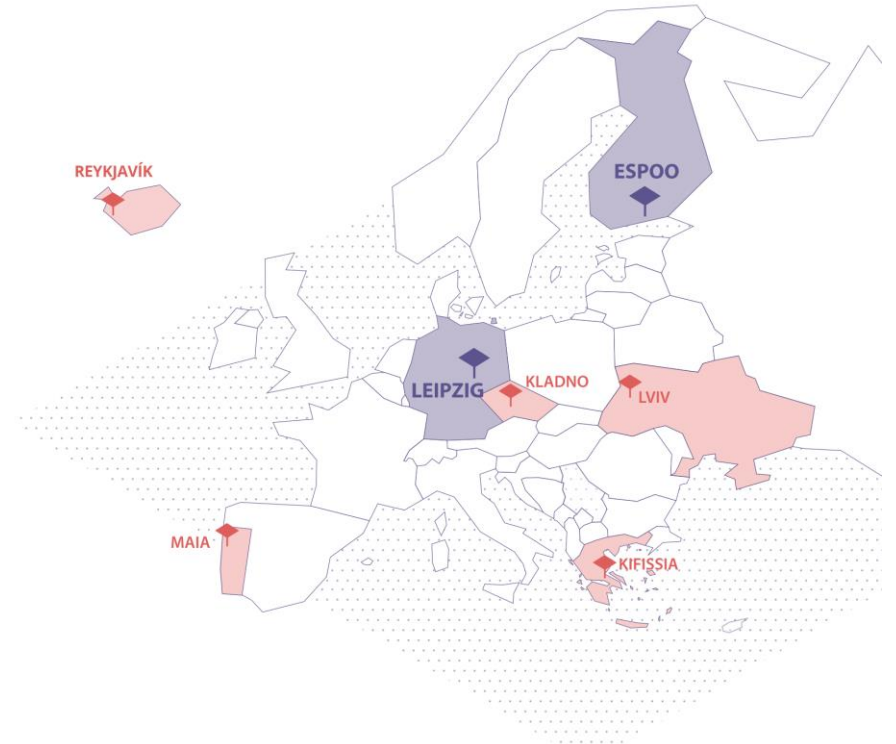
# PED Challenges and Opportunities from a City point-of-view: The SPARCS project

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# Horizon2020: SPARCS (2019-2024) project

- ▶ International smart city themed **research and innovation project**
- ▶ Over 30 partners; 2 *Lighthouse* and 5 *Fellow* cities
- ▶ Future **Positive Energy Districts**, or 'PEDs'
  - ▶ "Districts that produce more energy than they consume"
- ▶ Focus on transforming the built environment towards zero-carbon:
  - ▶ Local energy systems, renewable energy, flexible solutions, energy efficiency
  - ▶ Sustainable mobility, e-mobility and charging solutions, mobility behaviours
  - ▶ Citizen engagement, human-centric solutions



# Espoo and SPARCS

## Goals

- Positive Energy Districts (PED's) to enable the use of new sustainable and local energy solutions
- Electric mobility
- Citizen engagement, and fostering sustainable everyday life
- Co-creation in the development of new sustainable and smart solutions

## Objective

Citizen-centric and  
carbon neutral  
district





Turku 1,5 hours

Stockholm 1 hour

Tampere 2 hours

Helsinki Airport

Shanghai 12,5 hours

KAUKLAHTI

ESPOON KESKUS

SPARCS

KERA

LEPPÄVAARA

15 minutes to Helsinki city centre

SPARCS

ESPOO

AALTO UNIVERSITY (OTANIEMI)

HELSINKI

TAPIOLA

KEILANIEMI

10 minutes to Helsinki city centre

HELSINKI CENTRAL RAILWAY STATION

30 minutes to Helsinki city centre

SPARCS

KIVENLAHTI

URHEILUPUISTO

NIITTYKUMPU

MATINKYLÄ

Tallinn 1,5 hours

FINNOO

SPARCS

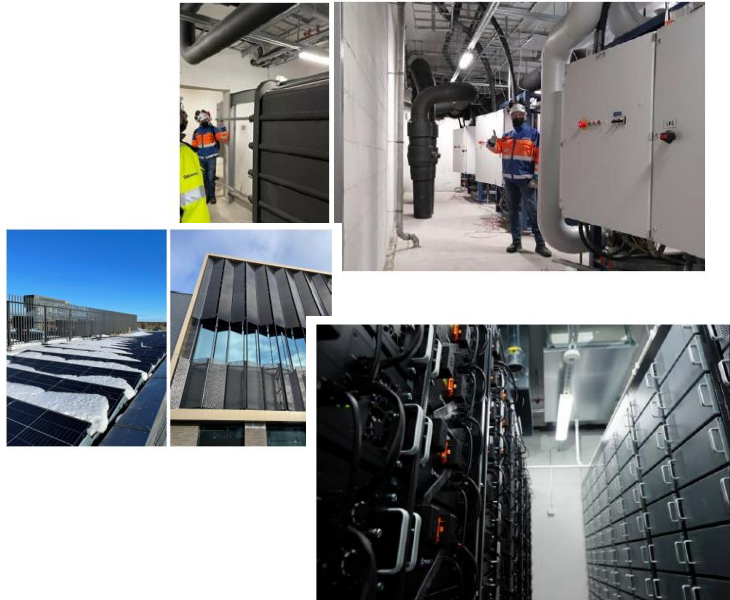
ESPOONLAHTI

KAITAA

SOUKKA

	Jokeri Light Rail		Metro
	Major road		Espoo City Rail Link 2028
	Railway		

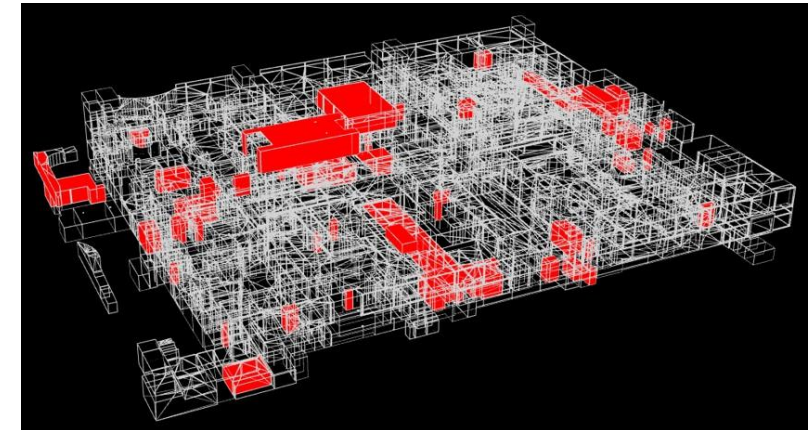
# Examples of SPARCS demonstrations



Citycon and Adven implemented a ground-source heat pump for heating and cooling, solar panels on the roof and facade, and battery storage at the Lippulaiva center



Plugit Finland implemented an electric bus charging system in the Sello bus terminal for the local public transport operator HSL

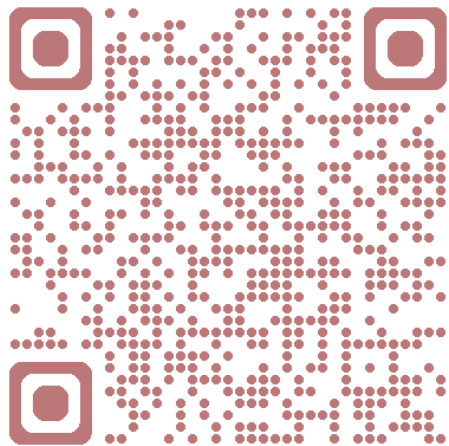


VTT developed a digital twin to visualize, monitor and forecast the energy performance of the Sello shopping center

# Lippulaiva buddy class "kummiluokka"

- Local 7th grade classes in Espoo: Espoonlahden koulu and Mainingin koulu
- "Lippulaivan kummiluokka"
- Objectives:
  - To engage and listen the wishes of youngsters concerning development of shopping centre in Espoonlahti area
  - To plan Lippulaiva shopping centre together with youngsters
  - To engage and educate young people regarding sustainable development (energy solutions, sustainable mobility etc.)
  - Buddy class actions included research related actions



[Front page](#)[Co-creation model toolkit](#)[Info](#)[in Finnish/Suomeksi](#)

# Co-creation model Toolkit

## For Sustainable and Smart Urban Areas

[Instructions](#)

[Link to co-creation model toolkit \(PDF\)](#)

We have divided the toolkit into six themes that are key to the regional co-creation process. The section **Prerequisites** will introduce you to the process of developing a sustainable and smart city, its benefits and prerequisites. The section **Identification of starting points** describes issues that are important in the preparatory phase of co-creation more tangibly. The section **Solutions development** unfolds the co-creation process, especially in creating sustainable mobility and energy communities, as well as valuable **co-creation** experiences from the City of Espoo's Kera area. Finally, we will present **methods** and **roles**, and explore the possibilities for co-creation further.

1. Prerequisites

[Collaborative process](#)  
[Benefits and drivers](#)  
[Collaborative city](#)  
[Resources and skills](#)  
[The city as systems](#)

2. Identification of starting points

[Area type and task delimitation](#)  
[Sustainable and smart as objectives](#)  
[Identification of operators and consortia](#)  
[Forms of implementation](#)  
[Agreements](#)

3. Solutions development

[Co-creation of mobility](#)  
[Co-creation of energy](#)  
[Co-creation of green infrastructure](#)  
[Case Kera](#)

4. Co-creation methods

[Applicable methods](#)

5. Roles of the operators

[Roles of the operators](#)

6. Things to think about in the future

[Opportunities for co-creation](#)

# Possibilities, drivers, challenges and obstacles from a Nordic PED viewpoint

- ▶ During SPARCS, the City of Espoo arranged three workshops to assess PED's from a Nordic viewpoint
- ▶ Workshops were completed in collaboration with Finnish SPARCS partners and other Finnish cities from PED lighthouse projects
- ▶ During the workshops, PEDs were assessed from technical, social and economical viewpoints using a SWOT template



Picture: Alena Bureika

# Possibilities and drivers

- ▶ A strong technical base drives PED innovation -> Smart meters, IoT, automation, etc...
- ▶ Utilization of waste heat provides clear benefits in cold climates
- ▶ Supporting the electricity grid to facilitate electrification of mobility and district heating
- ▶ Collaboration at multiple levels between multiple stakeholders
  - ▶ Grassroot level development and build-up of local communities
  - ▶ Co-creation between the municipality and local land-owners, utilities, research organizations, etc...
  - ▶ Between municipalities on a national and international level
- ▶ PEDs need to provide a financial driver -> Demand response, own production, energy savings...

# Challenges and obstacles

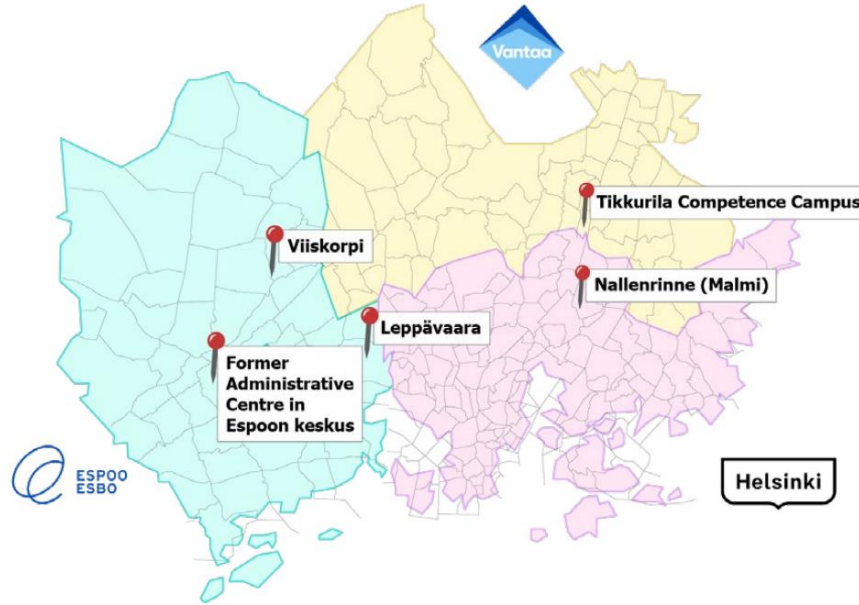
- ▶ Local renewable electricity production does not meet the PED demand -> Virtual PED frameworks must be used
- ▶ Optimization at district level vs city level, what is the role of district heating?
- ▶ Fragmented land ownership can lead to difficulty in planning and decision making
- ▶ How to balance planning to reduce risk of increasing inequality between districts?
- ▶ Activity and interest is required from residents, how to increase engagement?
- ▶ Legislation does not always support PED's
  - ▶ e.g. energy community legislation has strict guidelines on sharing electricity between property lines
- ▶ Payback time of solutions varies



# ENPA - Energy as a service in urban district areas

The ENPA project explores the procurement of low-carbon energy service solutions at the district and block level, using real pilot sites in the Helsinki metropolitan area. The objectives of the project are:

- Develop district energy service models
- Create an operational model for cities
- Improve the district energy market



## ENPA Project in a Nutshell

### Implementing Organizations

City of Helsinki  
City of Espoo  
City of Vantaa  
Metropolia University of Applied Sciences

### Funding

ENPA is co-funded by the European Regional Development Fund (ERDF) and is part of the Helsinki+Espoo+Vantaa Innovations (HEVi) program. The funding authority is Helsinki-Uusimaa Regional Council.

### Budget

924 043 € (EU funding 554 425 €)

### Duration

November 1, 2023 – October 31, 2026

# Materials

- ▶ Important reports:
  - ▶ [SPARCS 2050 City Vision](#)
  - ▶ [Holistic Impact Assessment of Demonstration Activities- updated version 2](#)
  - ▶ [Espoo demonstrations, energy: Interoperability of holistic energy systems in Espoo](#)
  - ▶ [Espoo demonstrations, mobility: EV mobility integration and its impacts in Espoo](#)
  - ▶ [Espoo demonstrations, engagement: Optimizing People Flow and User Experience for Energy Positive Districts](#)
  - ▶ [Replicating the smart city lighthouse learnings in Espoo: technical, social and economic solutions with validated business plans](#)
  - ▶ [Replication and Upscaling plan Espoo](#)
- ▶ [Scientific papers](#)
- ▶ Compilations of results:
  - ▶ [Kera energy and mobility playbooks](#)
  - ▶ [Finnoo energy and mobility playbook](#)
  - ▶ [Buddy Class guidebook](#)
  - ▶ [Co-creation model guidebook](#)
  - ▶ [SPARCS Final Book](#)



[www.sparcs.info](http://www.sparcs.info)  
[SPARCS MOOC](#)



# Sustainable energy Positive & zero cARbon Communities

<https://www.sparcs.info/>

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Stadt Leipzig



CÂMARA MUNICIPAL DA MAIA



KLADNO



ΔΗΜΟΣ ΚΗΦΙΣΙΑΣ



ESPOO



SIEMENS



PLUGIT

CITYCON

ril



Adven

Fraunhofer



BABLE



Wohnen & Service Leipzig GmbH

Leipziger  
Stadtwerke

CENERO



verd

seecon  
Ingenieure



UNIVERSITÄT  
LEIPZIG

spi

Sociedade Portuguesa de Inovação

NEWENERGYWORLD  
NEW

中国三峡

OR

Reykjavik  
Energy



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UNIVERSITY  
IN PRAGUE

Suite5  
We Deliver Intelligence



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