

Co-creation of Smart Energy City: examples from Tartu



September 28, 2018
Raimond Tamm, Deputy Mayor
City of Tartu

Tartu – City of Good Thoughts

- Second-largest city in Estonia
- Research and education centre
- University of Tartu was founded in 1632
- Centre of medical and biotechnological landscape
- Fast developing ICT sector
- Increasingly popular tourist destination



- Tartu first mentioned in written: 1030
- Population: ca 100 000

Tartu Sustainable Energy Action Plan 2015-2020

Tartu Sustainable Energy and Climate Action Plan 2030: under preparation



SEAP and SECAP

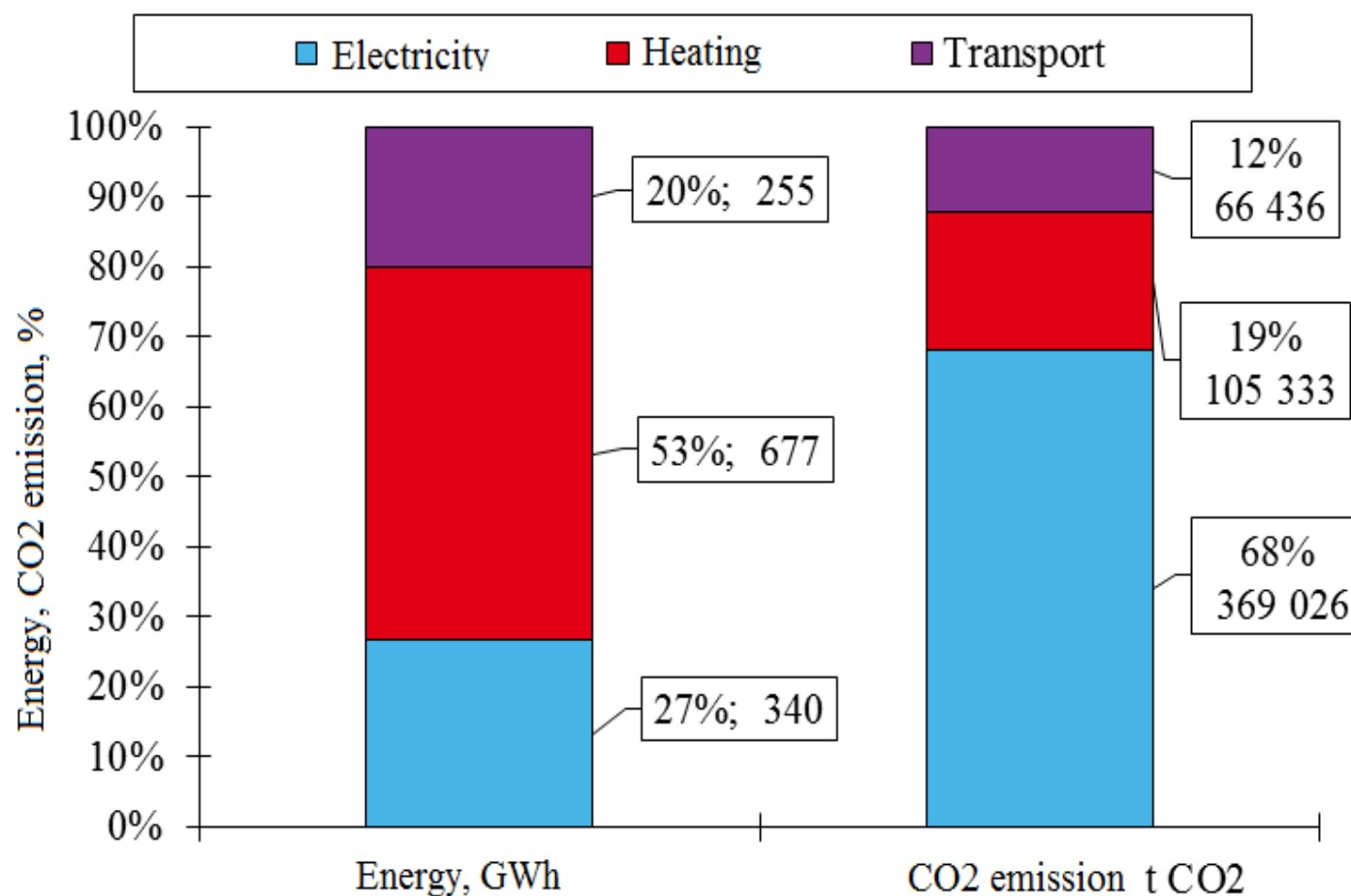
Sustainable Energy and Climate Action Plans

Sustainable Energy Action Plan

- is a key planning document aimed at promoting energy efficiency and the use of energy from renewable energy sources in a local authority's territory
- overall objective of reducing CO₂ emissions by a minimum of **20%** by the year 2020
- key sectors are the following:
 - Municipal buildings equipment/ facilities
 - Tertiary (non-municipal) buildings equipment/facilities
 - Residential buildings
 - Transport
 - Public lighting
 - Green public procurement
 - Local energy production

- Are strategic plans promoting energy efficiency, use of renewable energy sources and **adaptation** to climate change
- overall objective of reducing CO₂ emissions by a minimum of **40%** by the year 2030
- Key sectors:
 - Municipal buildings equipment/ facilities
 - Tertiary (non-municipal) buildings equipment/facilities
 - Residential buildings
 - Transport
 - Public lighting
 - Green public procurement
 - Local energy production
 - Land Use Planning,
 - Environment & Biodiversity, Economy

Energy consumption and CO² emissions in Tartu



PRIORITY

**Energy
efficiency**

**Renewable
energy**

Source: Sustainable Energy Action Plan 2015-2020 for the City of Tartu



www.smartencity.eu



TOWARDS SMART ZERO CO₂ CITIES ACROSS EUROPE
VITORIA-GASTEIZ + TARTU + SØNDERBORG



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691883

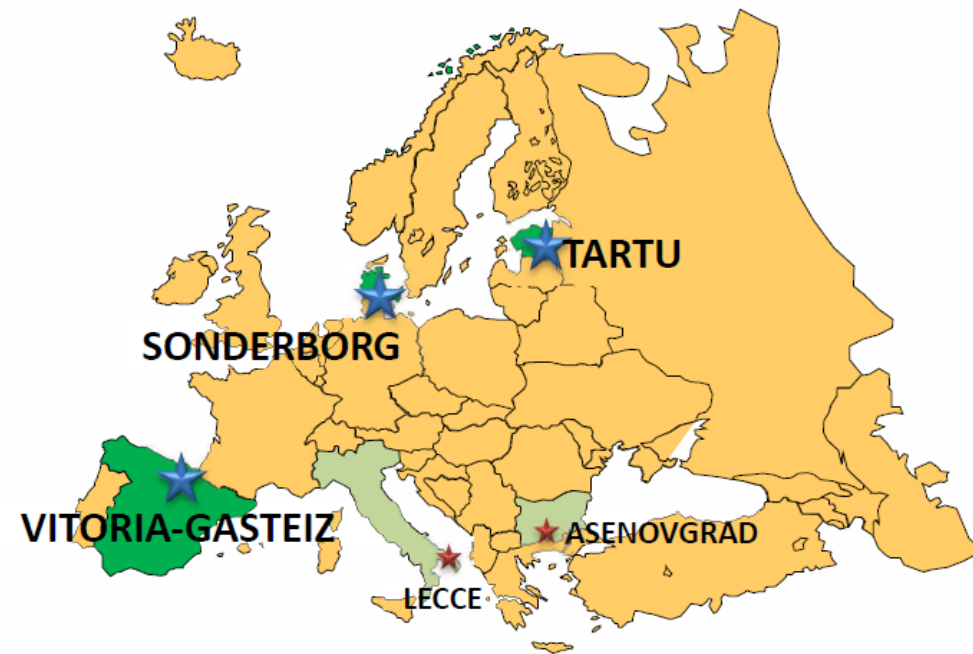


European
Commission

Horizon 2020
European Union funding
for Research & Innovation

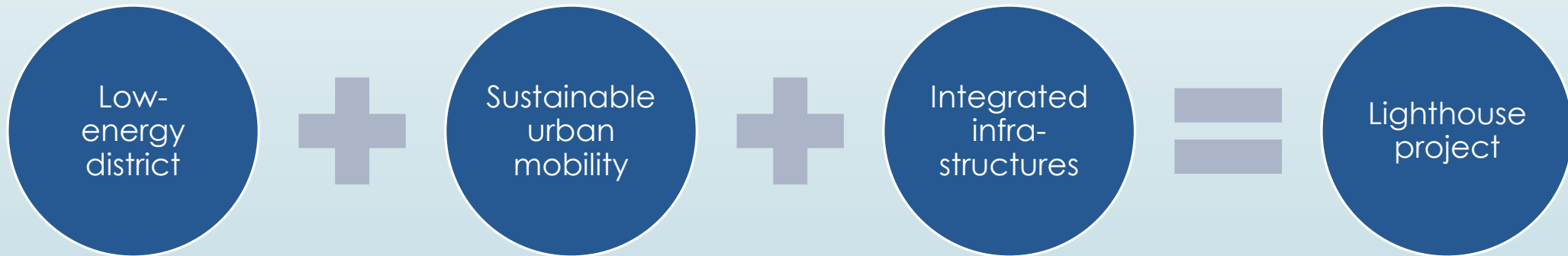
smar+
en
ci+y

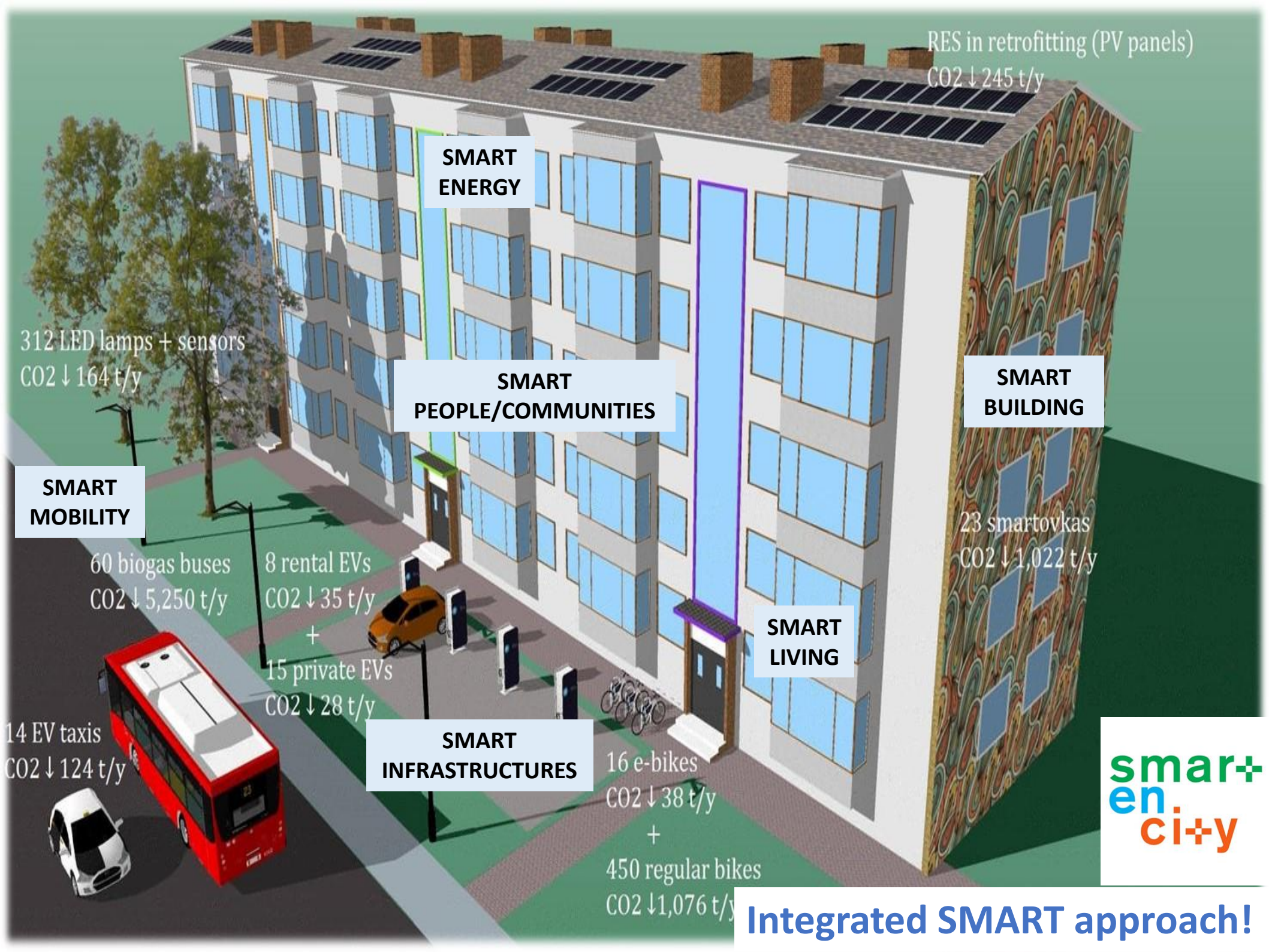
- Initiative „*Smart cities and communities*“
- 42 proposals were placed, only 4 are funded
- Project period: **Feb 2016 – July 2021**



TARTU – the first and only SCC Lighthouse from Eastern Europe

- 3 sectors combined – energy, transport and ICT
- Innovate, integrate, replicate!





RES in retrofitting (PV panels)
CO2 ↓ 245 t/y

**SMART
ENERGY**

312 LED lamps + sensors
CO2 ↓ 164 t/y

**SMART
PEOPLE/COMMUNITIES**

**SMART
BUILDING**

23 smartovkas
CO2 ↓ 1,022 t/y

**SMART
MOBILITY**

60 biogas buses
CO2 ↓ 5,250 t/y

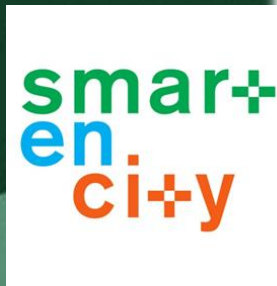
8 rental EVs
CO2 ↓ 35 t/y
+
15 private EVs
CO2 ↓ 28 t/y

**SMART
LIVING**

**SMART
INFRASTRUCTURES**

16 e-bikes
CO2 ↓ 38 t/y
+
450 regular bikes
CO2 ↓ 1,076 t/y

14 EV taxis
CO2 ↓ 124 t/y



Integrated SMART approach!

LOCAL PARTNERS



DISTRICT HEATING

Heat & power combi-stations

Ca 90% of heat production is based on local fuels – peat and wood chips

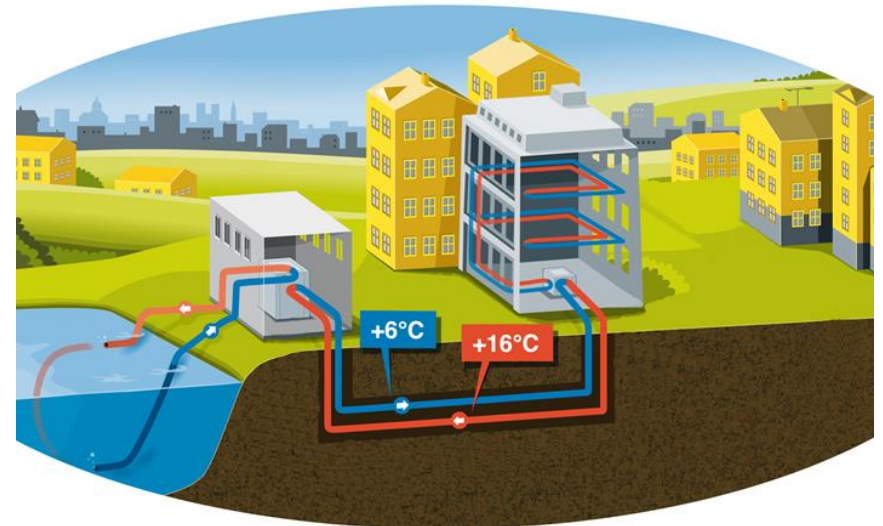
SELF-SUSTAINED
ENERGY

SECURITY OF SUPPLY

PRICE OF FUELS



- Residual heat from district cooling system into district heating system (heat pump)
- Renewable energy for district cooling station: PV panels (67kW power rating) and river water



smar+
en
ci+y

Target: reducing CO₂ emission in the cooling sector by 70%.

Production of biogas at local water company

Sewage sludge in anaerobic process in metan tank

Combined heat & power production

Biogas capacity 150 m³/h

SELF-SUSTAINED
ENERGY

SECURITY OF SUPPLY

PRICE OF FUELS



Production of biogas at closed Aardlapalu landfill

Collection of landfill gas.

Combined heat & power production.

Ca 500 m³/h, methane content ca 50%.



Street lighting

Target: 100% LED lights, smart management system, electricity 100% from renewable energy sources.

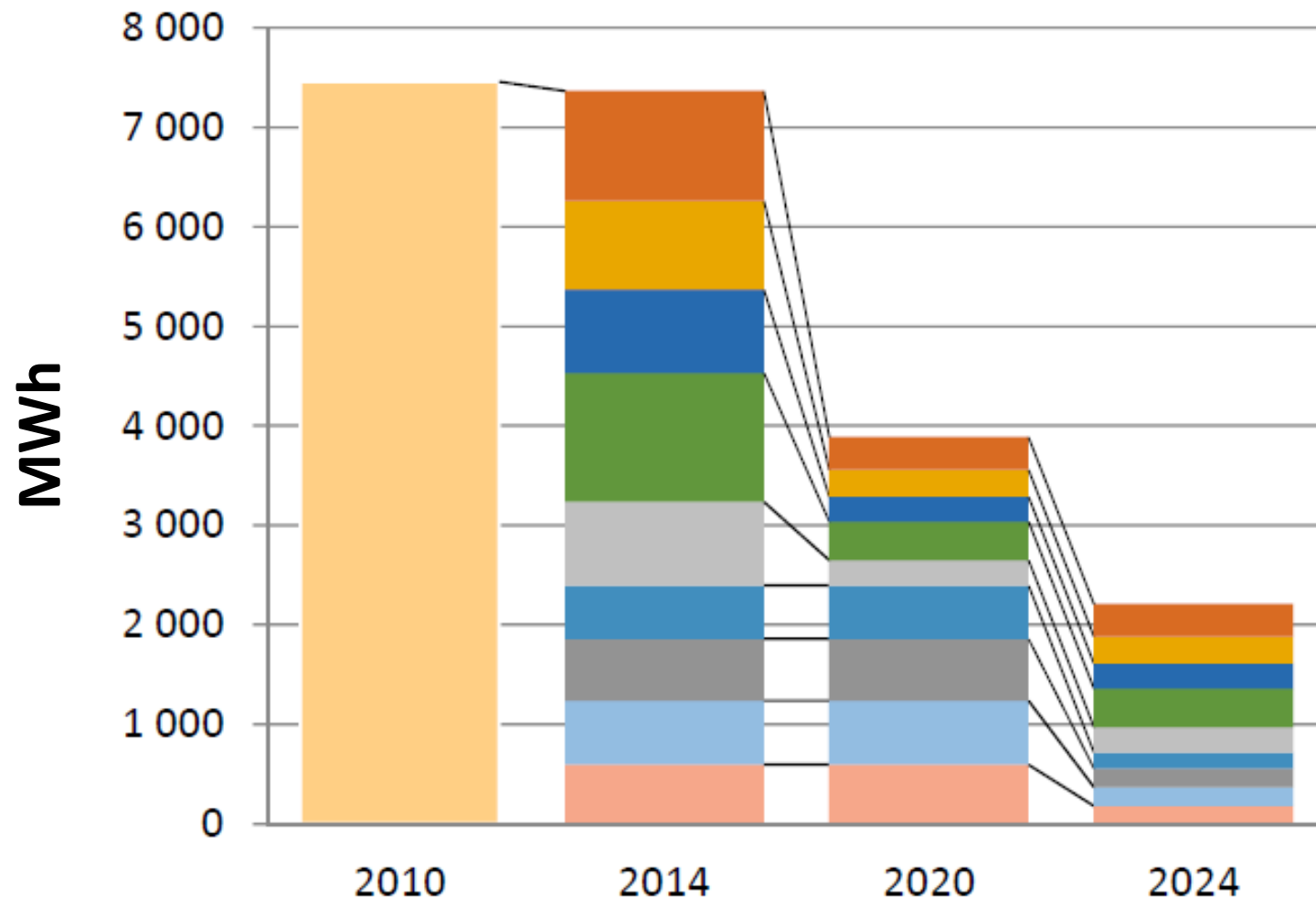
13 000 lamps in total, use of power ca **7 GWh** (ca 1 mEUR) annually.

Ca **2500** sodium lamps have been replaced by **LED lamps**.

LED lamps help to save **60%** of energy on average



Energy consumption in Tartu street lighting



Nearly zero-energy buildings

New public buildings

Kindergarten



Harbour building



Challenge: indoor climate vs energy consumption

Low energy consumption

New private buildings

Office building



Apartment building





Target 2020: 20% decreased energy consumption in the housing sector, share of renewable energy in electricity consumption at least 10%.

smar+
en
ci+y

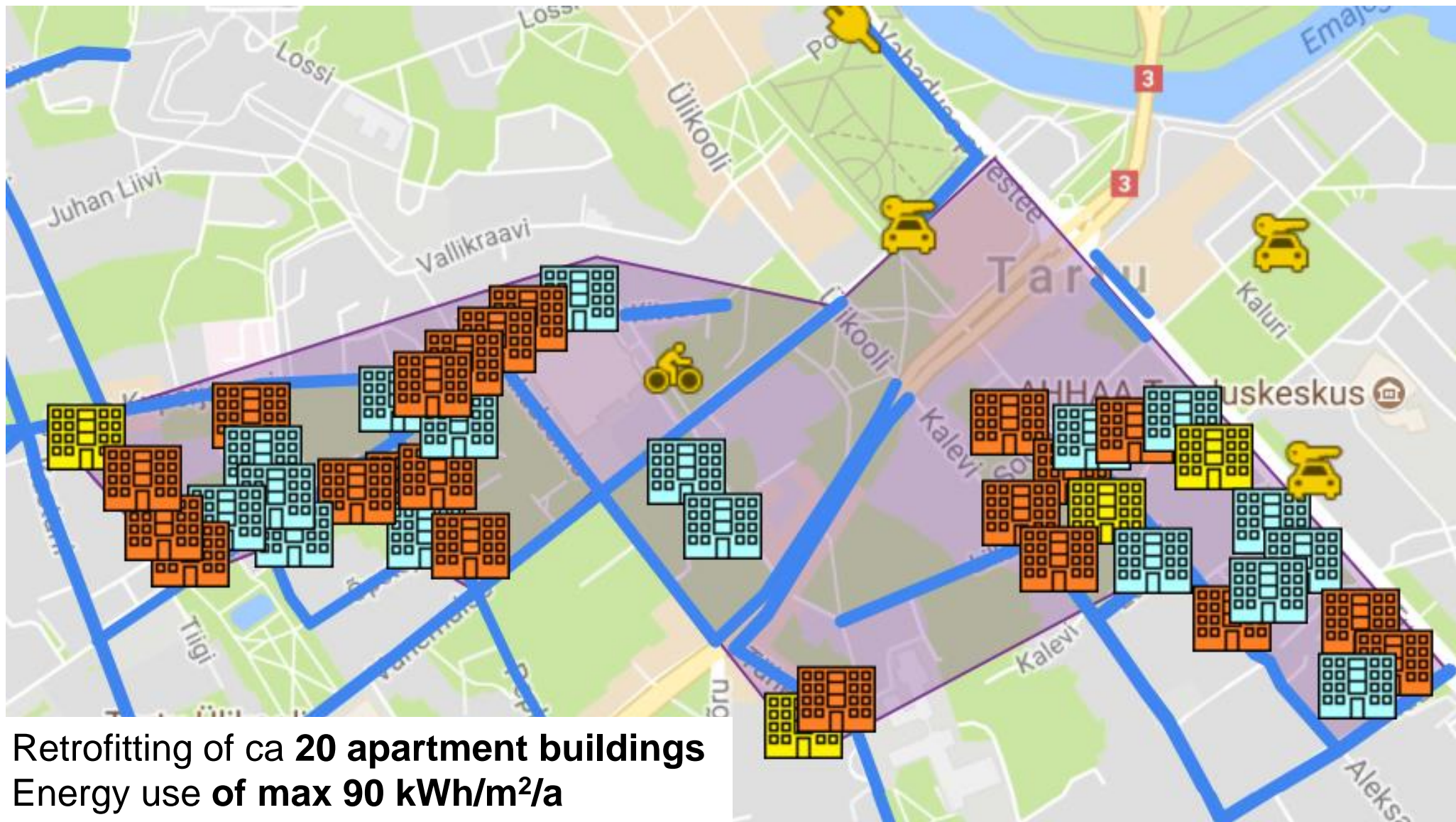
Ambition: developing a model for turning old Soviet apartment buildings into smart buildings and replicating the solution elsewhere

when the old meets the new

THE CHALLENGE

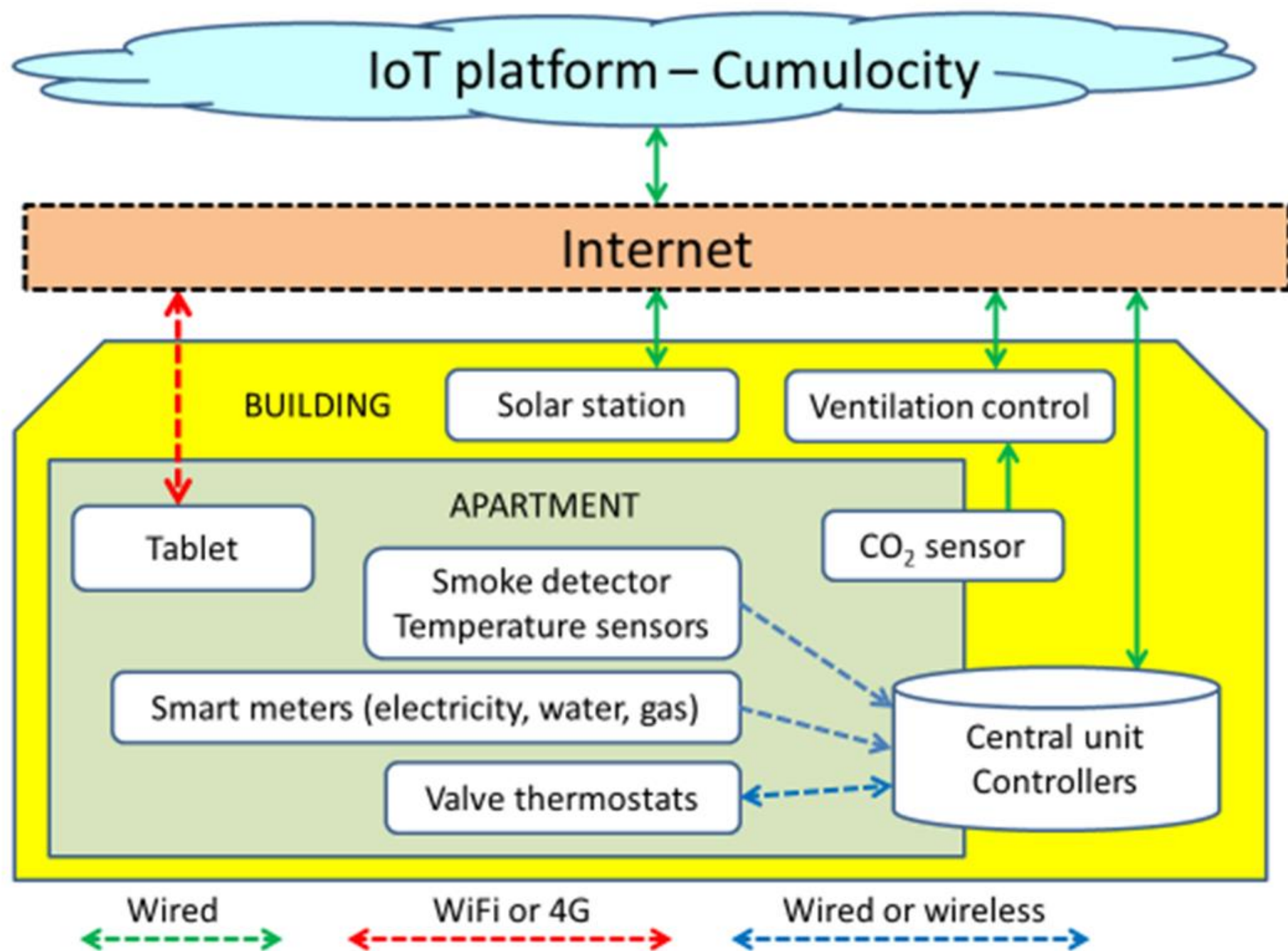
high number of quickly deteriorating brick and panel buildings with an energy consumption of 270 kWh/m²/year

Source: et.wikipedia.org



Retrofitting of ca 20 apartment buildings
Energy use of max 90 kWh/m²/a

Smart home scheme



Sustainable mobility: electric vehicles

Estonia has **extensive public charging network for electric cars**. 11 public fast chargers also in Tartu.

2 electric car rental points in Tartu

Ca 40 electric taxis in Tartu

- No CO₂ emission – green electricity
- Remarkably decreased noise pollution





Re-use the batteries of electric cars!

To save and use renewable (solar) energy

Solar panels: power rating 50 kW.

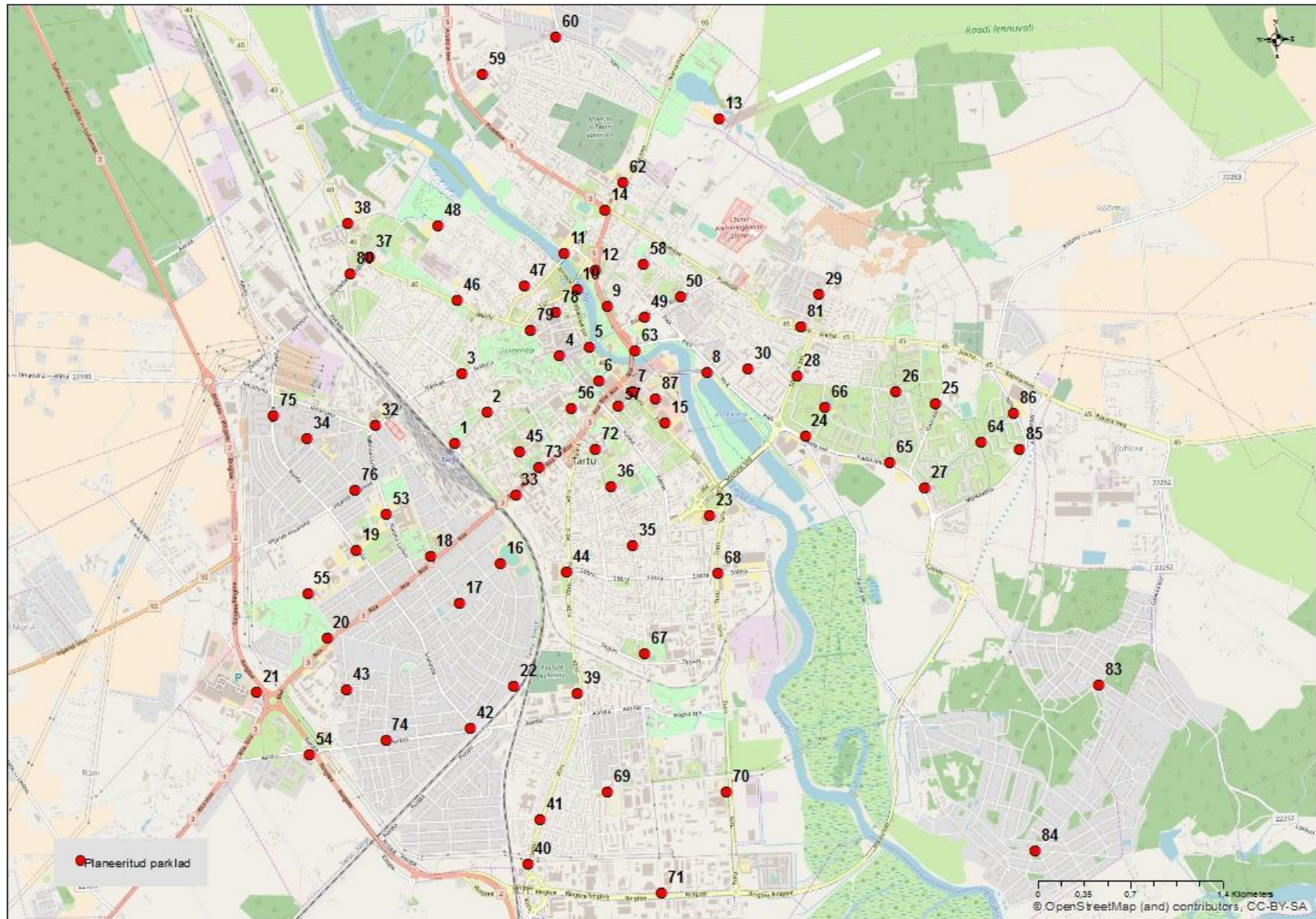


Bike sharing system (will start operation in spring 2019)



- ✦ Integrated into public transportation system
- ✦ 750 bikes (incl 500 e-bikes) and 60 stations
- ✦ Docking system with possibility to lock the bike and finish session out of station – more flexibility for users
- ✦ GPS, GSM – all smartness integrated into bikes (basis for more new business opportunities and models)

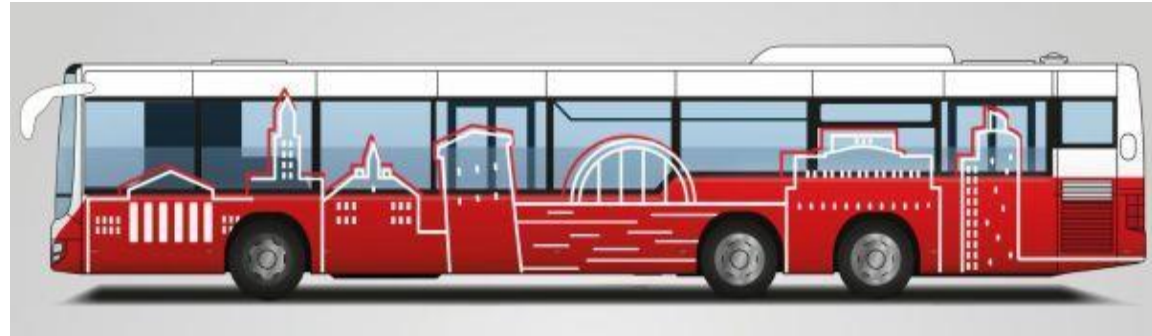
Citizens were involved to determine the locations





During 2014-2017 construction and renovation of **100 km** cycling and walking lanes





100% (bio?)gas buses in public transport (starting from 01.07.2019)



Raimond Tamm

raimond.tamm@raad.tartu.ee