

Climate action in Joensuu 2017

Walking and
cycling

Heat recovery

Public transport

Green Park

Energy and water savings

Geothermal

Carbon
sinks

Solar energy

Procurement
Climate

Biofuels cars

Carbon Sinks Green Park

Procurement Public
transport

sinks Geothermal Lighting

Energy and water savings heat
Heat recovery

Climate Carbon

Walking and

Cycle street

Climate Square bus rides

Niskakatu cycle parking station

JOJO-liikenteen tasarahatunnit

The city's electric cars

Employee bikes

Take a Bus campaign

Employee bikes

Cycle street

Transportation

Climate Square bus rides

Ylisoutaja bridge

Ylisoutaja bridge

The city's electric cars

Niskakatu cycle parking station

JOJO public transport discount hours

Take a Bus campaign



Finland's first cycle street opened on 25 August 2017

- A continuous cycling route from the northern neighbourhoods to the city centre along Kauppakatu covering three blocks between Yläsatamakatu and Rauhankatu.
- Paved with red asphalt with separate lanes for pedestrians on the sides. Motor vehicles can also use the cycle street, but only on the cyclists' terms.
- The development plan for cycling and walking extends up to 2030. The cycle street is the first major implementation of the operational programme, and further cycle streets will be established in the future.

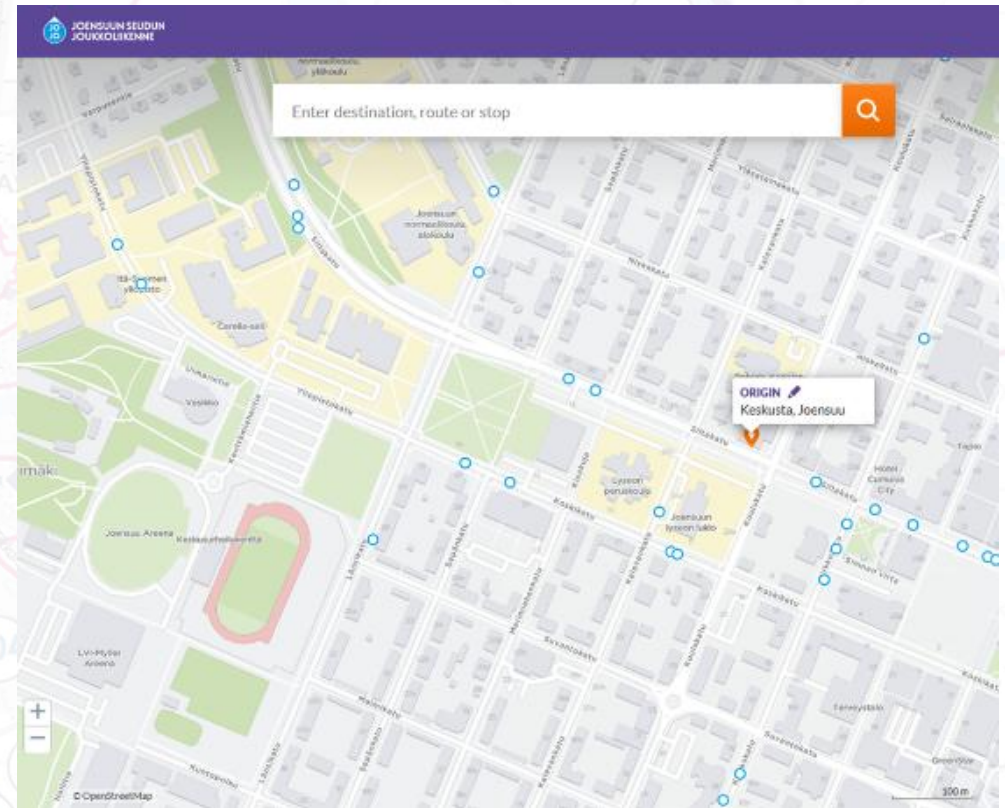


Cycle routes

- Several 5.5-metre-wide cycle routes were opened in October 2017.
- The red side is intended for cyclists and the grey for pedestrians.
- The Rauhanpuisto route continues as a cycle street towards the city centre. Cyclists from Rantakylä and Mutala are encouraged to take this route to the city centre.
- Another cycle route is located by the river.

Digitransit mobile application

- Public transport route suggestions and timetables
- <https://joensuu.digitransit.fi/>



Public transport

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Take a Bus campaign

Each year *on the car-free day*, 22 September, the Joensuu Region *public transport is free of charge*



Take a Bus monthly campaign in autumn 2017

- Organised by the Climate Square project and the Joensuu Region public transport
- 30 participants were selected to travel free of charge on JOJO buses for a month
- The objective was to encourage the use of public transport instead of a private car and gain information about public transport quality through travel experiences shared on social media

Ylisoutaja bridge

- The foot and cycle bridge was completed in 2014
- LED lighting on the handrails and side beams of the bridge
- Bridge of the Year 2015
- *around 2,500 people use the bridge each day*



Niskakatu cycle parking station

- In front of the Centrum shopping centre
- *Parking spaces replaced by bicycle racks*



Employee bikes

- Available for city employees at different locations in Joensuu
- Three at the Muuntamontie unit for employee travel

Cycle parking station for Prisma employees

- *Lockable cycle parking area* for employee bicycles

JOJO public transport discount hours

During the hours

1 zone = €2

2 zones = €3

3 zones = €4

Affordable bus rides by the Climate Square

- Transportation from the directions of Valtimo, Kesälahti and Ilomantsi
- Support from local companies
- Farmari agricultural exhibition
 - return ticket €5
 - Very popular, 50 persons per route
- Ilosaarirock festival
 - return ticket €10

The city's electric cars

- Employees working at Muuntamontie 5 and 6 have a shared *Nissan Leaf electric car* at their disposal
- Joensuun Vesi water company's meter maintenance uses two e-NV200 electric vans



Fortum power plant heat recovery using a flue gas condenser

Energy from solar panels

Polarsol Oy

Green Park

Enocell Oy: fuel oil replaced by biofuels

Joensuu Vesi heat recovery from water

Solar energy map

Geo-energy map

Central Hospital heat recovery from exhaust air and transfer into district heating water

Energy from solar panels

Energy production

Polarsol Oy

Geo-energy map

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Central Hospital heat recovery from exhaust air and transfer into district heating water



Solar panel energy for the Eno, Tuupovaara and Kiihtelysvaara woodchip heating plants: Power from Biomass project

- Heating companies involved in the project:
 - Eno Energy Cooperative
 - Tuupovaara Energy Cooperative
 - Kiihtelysvaara Energy Cooperative
 - Kontio Energy Cooperative
 - BioWin Karelia Oy
- The investments received 25% of energy funding from Tekes, and joint procurement lowered the price of investment
- The estimated total output of the joint procurement is around 52 MWh/a
- Solar energy systems are monitored and useful practical data is gathered
- The project has been led by Kim Blomqvist from the Karelia University of Applied Sciences



Eno woodchip heating plant Photo: Urpo Hassinen

Solar power system joint procurement

- Directed at households, residents, companies and communities in the Carbon Neutral Municipalities HINKU network
- 35 private property owners joined, the majority of which were households Of the participants, 12 came from Joensuu
- Joensuu Science Park and several properties from Lönnrotintie in Eno, Joensuu, took part

Solar energy

Solar energy

Solar energy

Solar energy

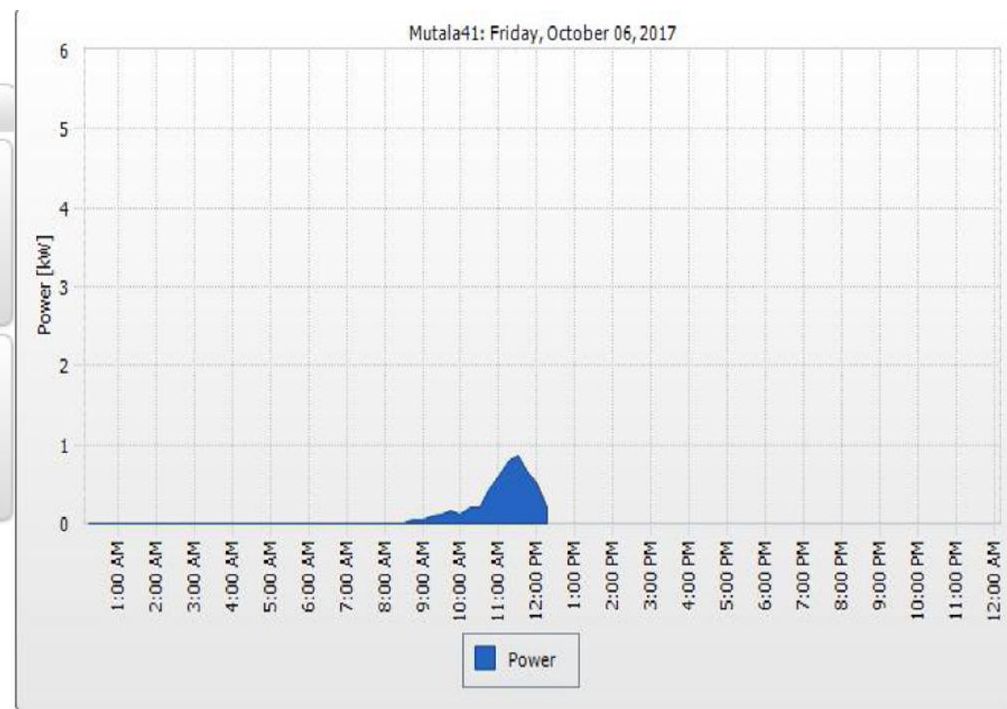
Solar energy

Solar energy

Private solar energy plants

- Solar energy systems acquired by private individuals have also become

PV System Overview | Mutala41



Solar energy

Solar energy

Solar energy

Solar energy

Solar energy

Solar energy

Energy from biogas at the Kuhasalo wastewater treatment plant

- Sludge separated from wastewater is condensed and fermented
- The gas created in the fermenter is stored in a 500 m³ gas holder and burned in a gas generator, heating plant or surplus combuster



Joensuun Vesi heat recovery from wastewater

- The Kuhasalo wastewater treatment plant has two heat pumps with a total power of 800 kW
- The temperature of treated wastewater is around 8–14 degrees depending on the weather, and *3–4 degrees of this are recovered through a heat pump process*
- The heat is stored in a 10 m³ storage tank from which the water is directed further at about 60 degrees



Green Park business park

- Business park in Penttilä, a 5,200 m² industrial unit
- *Heating solutions based on district heating and geothermal heat*
 - The annual heating requirement is around 1 MW
 - Geothermal heat covers 10% of the need (ten 200-meter boreholes in total)
 - A hybrid system with a 3-circuit district heating substation, three T2 heat pumps and a 3,000 L storage
 - 114 solar energy panels with a total power of around 30 kWp

Fortum cogeneration plant heat recovery using a flue gas condenser

- The flue gas condenser helped the power plant *increase the heat capacity with around 30 MW, while cutting down carbon dioxide, sulphur and particulate emissions*
- Flue gas from the boiler is cooled to a temperature where water vapour is condensed into liquid, and the condensing temperature is then used as district heat
- The overall efficiency and energy efficiency of solid fuel increased with the implementation of a flue gas condenser
- The total production capacity of the plant is 130 MW of district heat and 50 MW of electricity
- The cogeneration plant provides district heating for 42,000 people in Joensuu and electricity to the national grid

Central Hospital heat recovery from exhaust air and transfer into district heating water

- Fortum buys and uses the surplus heat through an open district heat network
- Introduced with the M extension project of the Central Hospital
- *The surplus heat can be used to heat around 300 detached houses each year*



Heat recovery

Heat recovery

Heat recovery

Heat recovery

Heat recovery

Energy from solar panels

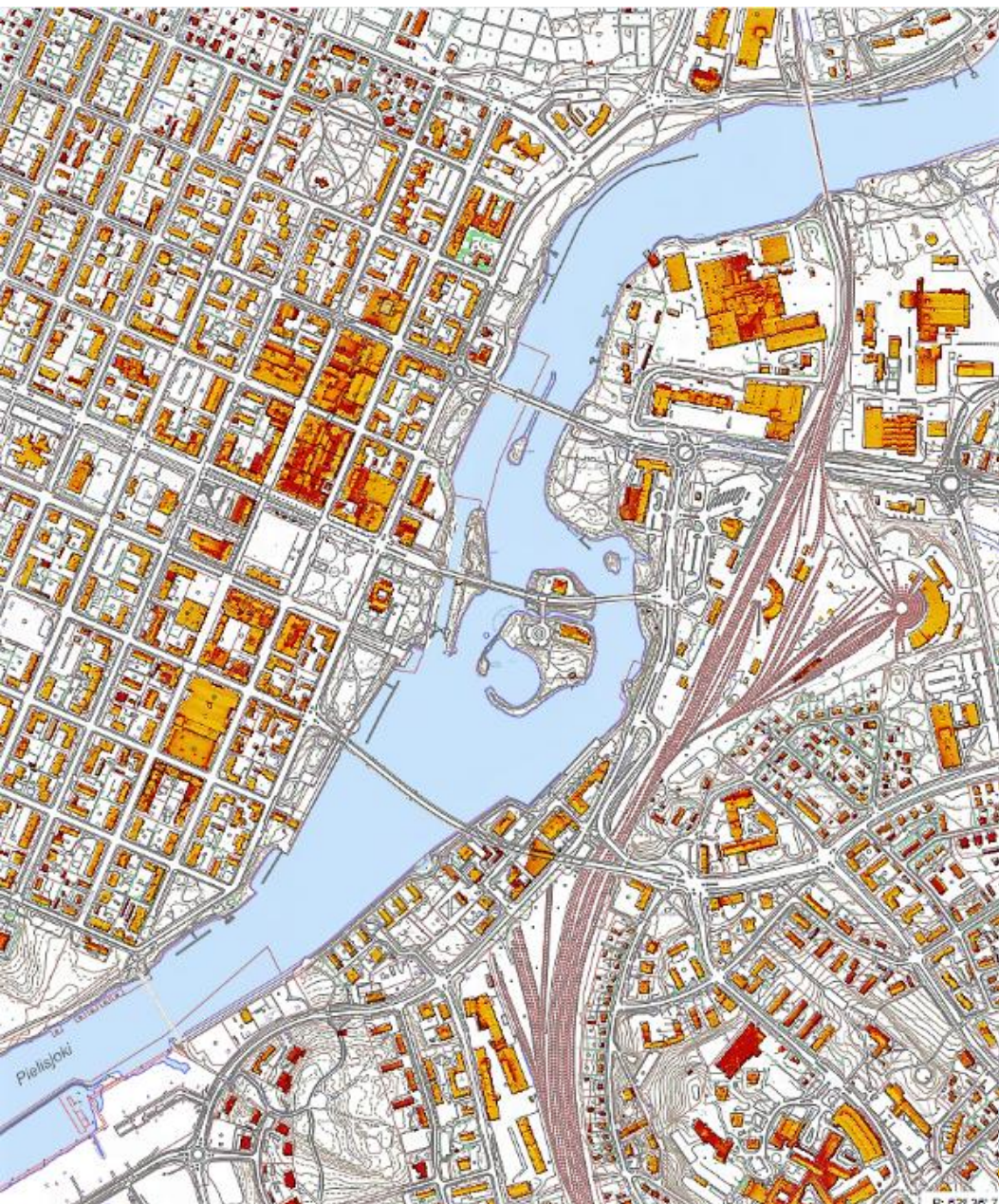
- Police Station and Court Building site at the city centre, As Oy Iitankulma housing company
 - A total of five apartment blocks, of which *four will receive solar panels on their roof*
 - The total area of the panels is 150 m²
 - The electricity generated is used as property electricity





- Joensuu Kuntokeidas

- Local exercise company
- Kuntokeidas has *192 solar electricity panels with a power of a little over 50 kWp*
- The estimated annual output is 45,000–47,000 kWh
- The system was implemented in late autumn 2016



Solar energy map

- Available from the map service of the City of Joensuu
- Helps to discover the most potential locations for solar energy systems
- The more yellow the colour, the more potential the location

Solar energy

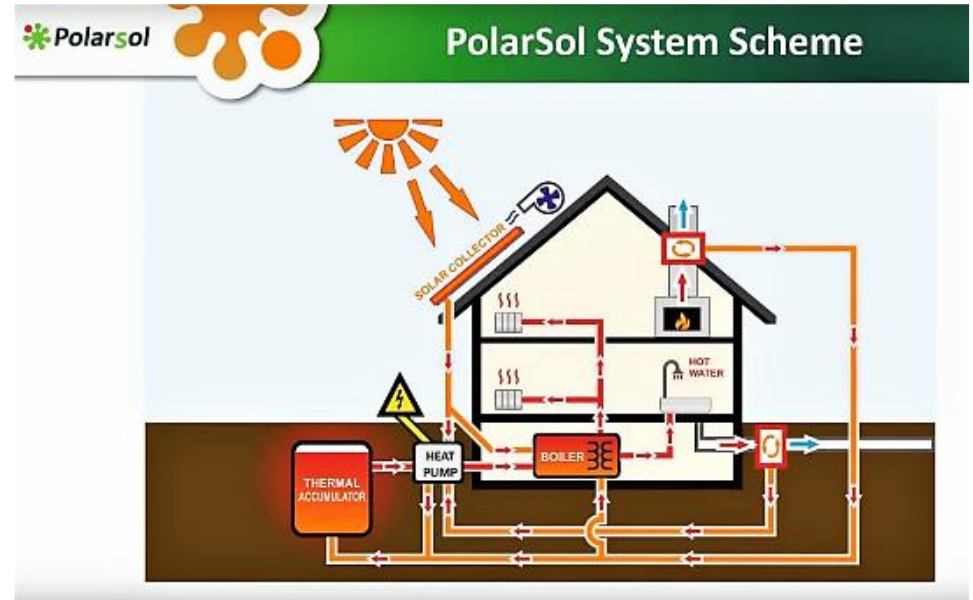
Solar energy

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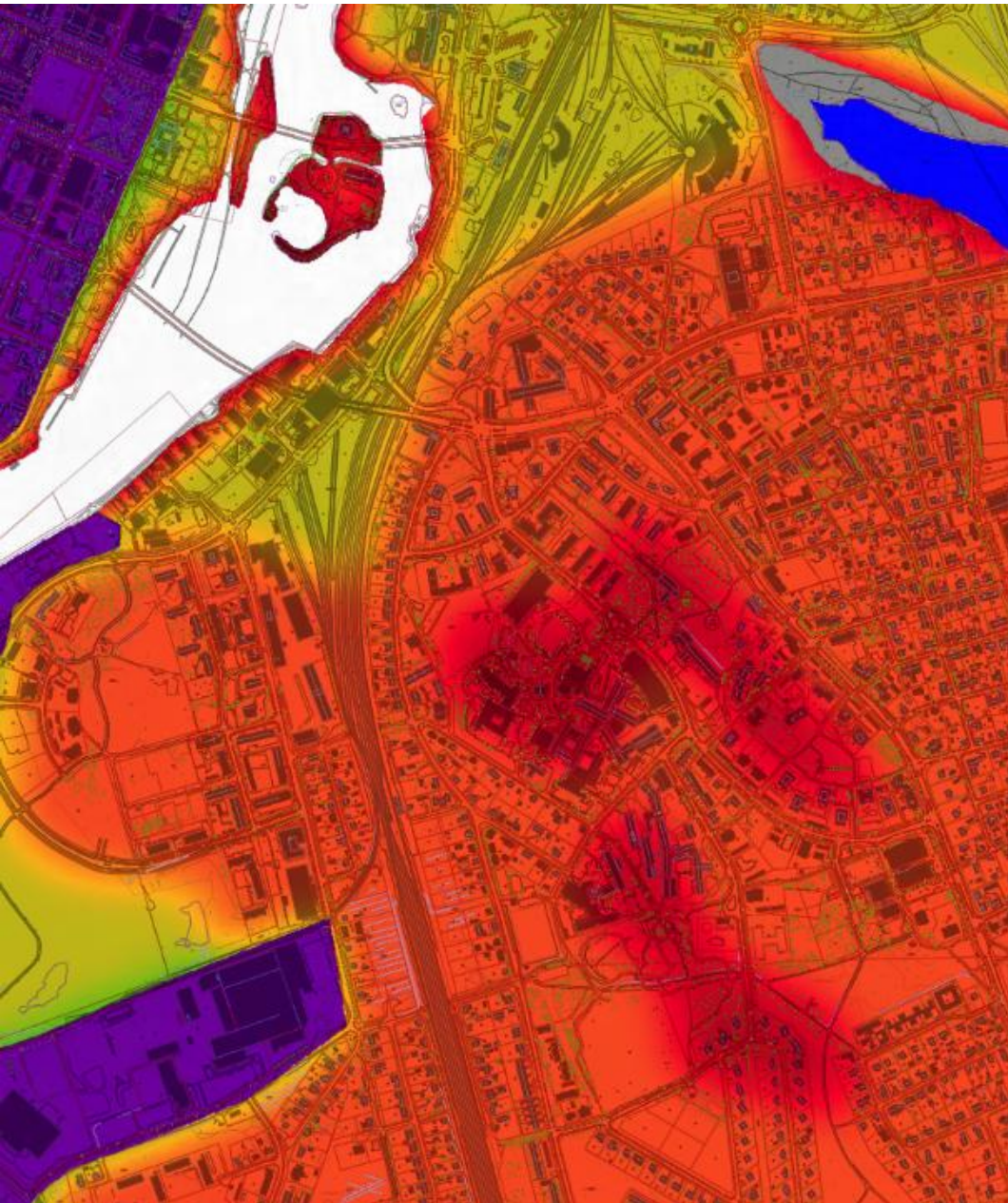
Polarsol Oy

- A hybrid system including
 - *Solar air thermal collector*
 - *Water heater*
 - *Heat accumulator*
 - *Waste heat recovery*
 - *Heat pump*
 - *Control system*
- Can be used in detached houses, apartment blocks and industrial properties alike



Solar electricity system providers in Joensuu include:





Geoenery map

- Available from the map service of the City of Joensuu
- Helps to discover the geothermal potential of a property
- The darker the shade of red, the greater the potential (the grid plan area in purple is not included in the mapping)

As Oy Kaltimonrinne housing company



- Since properties with oil heating located in Eno, such as As Oy Kaltimonrinne, switched to *wood-based district heat* produced by the Eno Energy Cooperative, *around 2 million litres of oil have been replaced annually*
- The idea is to replace imported oil with cheaper, local forest energy and promote employment in the region

Enocell Oy: fuel oil replaced by biofuels

- Sawdust is dried, ground and burned in pulverised combustion
- Annually, 70–80% of oil is replaced, target is at 90%
- *Corresponds to two truckloads of heavy fuel a day*
- The required drying energy is obtained from the waste heat of the chimney



*Smart LED outdoor lighting at
Penttilänranta*

Replacement and rationing of street lighting

Joensuun Elli energy and water saving measures

Energy efficiency

Smart LED outdoor lighting at Penttilänranta

Joensuun Elli energy and water saving measures

Replacement and rationing of street lighting

Outdoor lighting and traffic lights: the city's new alliance-based service contract competition

- The maintenance and construction of outdoor lighting and traffic lights in communal areas in Joensuu has been procured as a multi-annual comprehensive contract. The next contract period is between 1 January 2018 and 31 December 2020.
- According to the budgetary guidelines of the City of Joensuu, procurement must focus on innovative solutions. Furthermore, whenever possible, procurement should support **ecologically sustainable solutions**.
- The contract may be continued past 2020, if the alliance targets are met in terms of customer satisfaction, productivity, **energy efficiency** and development work.

Projects receiving green funding



Karhunmäki School

- Construction favoured the use of wood and looked for sustainable and energy-efficient technical solutions
- The E-value of the building is 89 kWh/m² (energy class A): 47.7% below the upper limit of 170 kWh/m² determined for day care centres

New school at Nepenmäki

- The property uses district heating. The energy solution also includes solar energy and wind power, mainly for educational purposes
- The E-value is 96 kWh/(m²a) (energy class B)
- Will be completed in August 2018



Energy savings

Energy savings

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Energy Efficiency Agreement

- The City of Joensuu has joined the Energy Efficiency Agreement for 2017–2025.
- The energy saving target is 7.5% and an intermediate target for 2020 is 4%.
- The agreement covers all buildings, street and outdoor lighting, water and waste management and the city's transports and working machinery.
- Joensuun Elli student housing, Joensuun Kodit rental housing and the Joensuu Science Park have made separate energy efficiency agreements as part of the Joensuu consortium.

Energy savings

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Energy savings

Smart LED outdoor lighting at Penttilänranta

- A kilometre-long foot and cycle path is illuminated with 50 dimmable LED lights that are activated by a motion sensor
- As a cyclist or a pedestrian passes, the lighting illuminates from a 10% standby mode to a full 100% and dims back to standby mode once the person has passed
- *Electricity consumption has decreased by 70%*



Replacement and rationing of street lighting

- *Mercury vapour lamps replaced by LED lighting*
- Rationing of street lighting during the summer: Outdoor lighting turned off entirely for June and July excluding the city centre
- At other times, lighting is rationed at the city's residential and industrial areas
- In Eno, Kiihtelysvaara, Pyhäselkä and Tuupovaara, outdoor lighting is turned off between 11 pm and 5 am as well
- Furthermore, Joensuu annually takes part in the *WWF Earth Hour climate event* by turning off the lighting from the city's traffic routes, parks and nearby areas in the city centre and in Hammaslahti



Prisma shopping centre

- *Lighting replaced with more energy-efficient LED lighting and a new control system implemented*
- The renewal covers almost all of the 60,000 m² property (including the car park) and the outdoor area
- Estimated annual savings of 2,000 MWh

Joensuun Elli energy and water saving measures

- Properties include *energy production*, such as geothermal heating and cooling, and solar energy is utilised in warm water and electricity
- Energy efficiency the key in machine and equipment procurement
- Exhaust air temperatures are monitored
- Water meters are monitored in order to locate leaks
- Taps and showers save water
- Energy-saving light bulbs have been replaced by LED lighting

The logo for Kotivo Oy features the word 'KOTIVO' in a large, grey, sans-serif font. The letter 'O' is replaced by a white house icon. To the right of the text are a green downward-pointing triangle and a green circle. The text 'Kotivo Oy' is written in a smaller, purple, sans-serif font below the 'KOTIVO' text.

Kotivo Oy

- Specialises in the optimisation of heating energy
- A smart, room-specific heating control system that observes the presence of people, the external temperature and weather forecasts
- Home temperature can be adjusted with a smart device
- On average, annual heating energy savings of properties using the system have risen up to 40%

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Energy savings

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ENO online school tree planting campaign

Penttilä cherry orchard

Allotment gardens

Hukanhauta apple orchard

Green corridors

Local berry picking spots

Carbon sinks

Allotment gardens

Green corridors

ENO online school tree planting campaign

Hukanhauta apple orchard

Penttilä cherry orchard

Local berry picking spots



ENO online school tree planting campaign

- The ENO online school focused on sustainable development operates in over 150 countries and involves nearly 10,000 schools
- The ENO Green Cities network consists of over 40 cities, including Joensuu since 2013
- The target is to plant *100 million trees* by 2017, when Finland turns 100

Carbon

Carbon sinks

Carbon

Carbon

sinks

Carbon

Carbon

Carbon

Carbon sinks

Penttilä cherry orchard

- 24 cherry trees in total
- The so-called *edible park* harvest is free for all
- The trees were bought by local companies and communities
- A part of the Climate Square climate responsibility projects



Hukanhauta apple orchard

- By Omenatarhantie ("Apple Orchard Road")
- Around 30 different apple trees
- *Apples can be picked freely*



Photo: Kari Väkeväinen

Allotment gardens

- Available for rent in Mutala, Hukanhauta, Pilkko, Marjala and Utra

Local berry picking spots

- For example in Mutala, Repokallio and Siilainen

Green corridors

- Create ecological connections between different areas in the city and support environmental diversity

Fair Trade Town

Green electricity

Eco-procurement
network

Observation of environmental criteria in around 70% of
procurement

Fair Trade Town

Procurement

Eco-procurement
network

Green electricity

Observation of environmental criteria in around 70% of
procurement

Fair Trade Town

- Joensuu received the title of Fair Trade Town in 2009
- *The City of Joensuu offers fair trade coffee at its events, fair trade tea, sugar and honey also used*
- Joensuu communicates on issues related to fair trade and responsible consumption

Eco-procurement network

- Joint network of all public procurers
- Promotion of public procurement cooperation in making *environmentally-friendly acquisitions*

 Ekohankintaverkosto

E-invoices

Electronic building permits

Electronic services

Electronic building permits

Miunpalvelut service

E-invoices

Electronic permits and services

- Electronic building permits: <http://www.joensuu.fi/sahkoinen-lupahakemus>
- The Miunpalvelut electronic portal, such as water meter readings, for example: <https://miunpalvelut.fi/joensuu>
- All invoices from city services are available as e-invoices. E-invoice means that an electronic invoice is delivered directly to your online bank: <http://www.joensuu.fi/lasku-kaupungilta>

Low-carbon April

Renewable Energy
Meetup at Kerubi

Climate partnership

Solar energy event

Low-carbon Living in Joensuu 2030

Future transportation

Everyday Renewable Energy

Climate Square

Solar energy event

Low-carbon April

Climate partnership

Everyday Renewable Energy

Low-carbon Living in Joensuu 2030

Future transportation

Renewable Energy Meetup
at Kerubi



Climate Square courses at the adult education centre

- More time – less clutter
- Eco cleaning and stain removal
- Box farming
- How to find high-quality clothing
- Vegetarian cooking for meat eaters

Seminars and events

- Our Future Food discussion
- Clinic on sustainable product development
- Sustainable Meal workshop for restaurants
- Low-carbon Living in Joensuu 2030 seminar
- Solar energy event
- Future Transportation seminar
- Renewable Energy Meetup at Kerubi
- Everyday Renewable Energy seminar





Climate partnership

Martat



- Encouraging companies and communities to take climate action
- Based on the Carbon Neutral Joensuu 2025 objective
- Signing the climate commitment
 - Climate actions selected by the company to improve the current state of affairs
- 26 climate partners by 2017

KAHVILA & KAKKUKAUPPA



Climate partnership

Climate partnership

Climate partnership

Climate partnership

Climate partnership



- New climate partners:

Ilosaarirock festival (20 June 2017)

Fastroi Oy (20 June 2017)

Joensuun Juhlapukuvuokraamo/ Joen Juhla-Asu (29 May 2017)

Kukka- ja Viherpalvelu Leinikki Oy (23 May 2017)

Nordpap Oy (10 May 2017)

JK-Lämpö (10 May 2017)

Itä-Suomen Siivouspalvelu Oy (7 March 2017)

Joensuu-Jukola 2017 (27 February 2017)

Climate partnership

Climate partnership

Climate partnership

Climate partnership

Climate partnership

Low-carbon April in 2016

- *Five households aiming to reduce their carbon and material footprint for a month*
- Included product and service trials
- Households were able to reach results with relatively small everyday changes



Wetland partners

Varaslampi wetland

Karhunmäki wetland

Adapting to climate change

Karhunmäki wetland

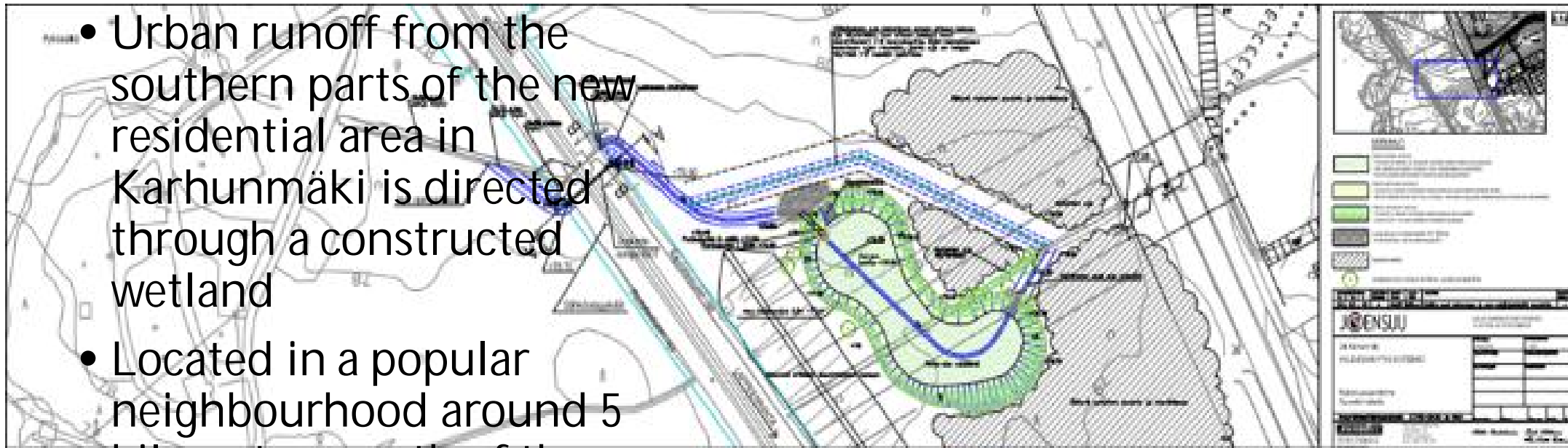
Wetland partners

Varaslampi wetland



Karhunmäki wetland

- Urban runoff from the southern parts of the new residential area in Karhunmäki is directed through a constructed wetland
- Located in a popular neighbourhood around 5 kilometres south of the city centre



Wetlands

Wetlands

Wetlands

Wetlands

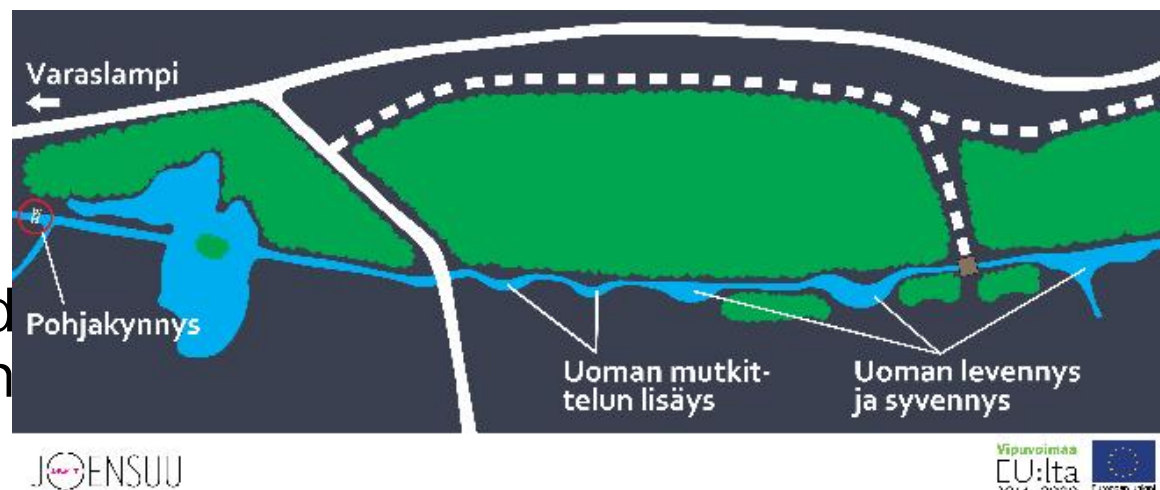
Wetlands

Wetlands

Niinivaara urban wetland

Climate Square wetland partner project

- An open ditch flowing into Varaslampi was restored into a wetland and around 100 tonnes of aquatic plants were removed from the pond
- The restoration increased meandering, deepened and widened the water flow and constructed a sill
- 12 companies/communities supported the implementation of the restoration
- The project also saw the first use of EM mudballs in Joensuu



Sorting

Property-specific plastic waste collection

Sorting

Waste management

Property-specific plastic waste collection

Sorting

Property-specific plastic waste collection



Property-specific plastic waste collection

- At some Joensuun Elli student housing properties since summer 2017. Collection containers in seven locations
- At Polkka Oy's central kitchen in Siilainen in summer 2017

Sorting

Sorting

Sorting

Sorting

Sorting

Sorting

Fishing

Local food circle

Insects as food

Organic food

Food/agriculture

Organic food

Insects as food

Local food circle

Fishing



Fishing

- Fishing sites:

City fishing guide published in 2016

<http://joensuunkalastuskunta.fi/joensuunkalastusopas.pdf>

Local and organic food circles

- Organic food circle in Joensuu:
<https://www.facebook.com/joensuunluomupiiri>
- REKO: <https://www.facebook.com/groups/1565234677134163/>

Insects for food from the Niittykumpu farm

- So far, the Niittykumpu farm has grown two-spotted crickets as fodder for poultry, fish and pigs
- Since April 2017, they have tested growing house crickets for human nutrition
- The farm has been included in the free KasvuOpen programme that develops the idea of insects as food
- Insects are rich in protein and their fatty acid composition is good
- The Finnish Food Safety Authority Evira has allowed the use of insects as food in 2017.



The owners of Niittykumpu farm. Photo: Janne Ahjopalo.

The Green Flag certificate of the Marjala School

Fortum Power and Heat Oy's pyrolysis oil

Other climate action

Fortum Power and Heat Oy's pyrolysis oil

The Green Flag certificate of the Marjala School

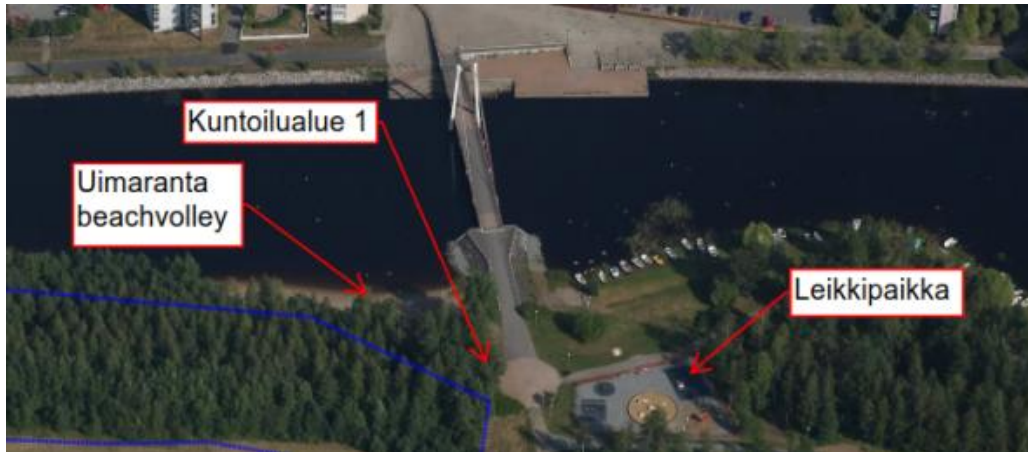
Joensuun Pihapetäjä wooden apartment building in Penttilä

- Energy class B and E-value 100.
- Energy produced by the solar panels (100 m²) on the roof used as property electricity
- In addition: Windows with better U-value and ventilation heat recovery
- Net floor area 1,730 m², 40 apartments, 6 floors



Marjala outdoor gym

- Includes exercise bikes that produce energy and can be used to charge a mobile phone battery, for example



Joensuu-Jukola awarded the EcoCompass certificate

- The event is committed to continuous environmental development
- An auditor from the EcoCompass system ensured that Joensuu-Jukola met the planned environmental targets

Central environmental targets for Joensuu-Jukola:

Implementing the EcoCompass environmental system

Reducing traffic emissions: free parking for buses, shared rides, use of local services/products.

Reducing environmental impact of food: promotion of local food, vegetarian options

Carbon footprint compensation: planting of spruces with the ENO online school

Minimising paper consumption: electronic competition instructions and timetables

Increasing environmental consciousness in volunteer training and communication



Marjala School

- *The Green Flag certificate*
- Promotion of environmental education and reducing the environmental load
- Examples include active measures in decreasing food waste with regular biowaste measurement and noting the economical use of warm water

Fortum Power and Heat Oy's pyrolysis oil

- Bio-oil production plant established in 2013
- Bio-oil from fast pyrolysis
- Raw material mainly from North Karelia: forest residues, woodchip, sawdust
- *Replaces heavy and light fuel* in district heating production or in industrial heat and steam production; in future may also act as a raw material for various biochemicals or traffic fuels
- The Joensuu bio-oil plant can reach an annual production of 50,000 tonnes, corresponding to the heating requirement of over 10,000 detached houses.