Energy production contributes about

1/3*

of CO_2 emissions

**(traffic excluded)*

CARBON NEUTRAL JOENSUU 2025

Reaching the goal through action

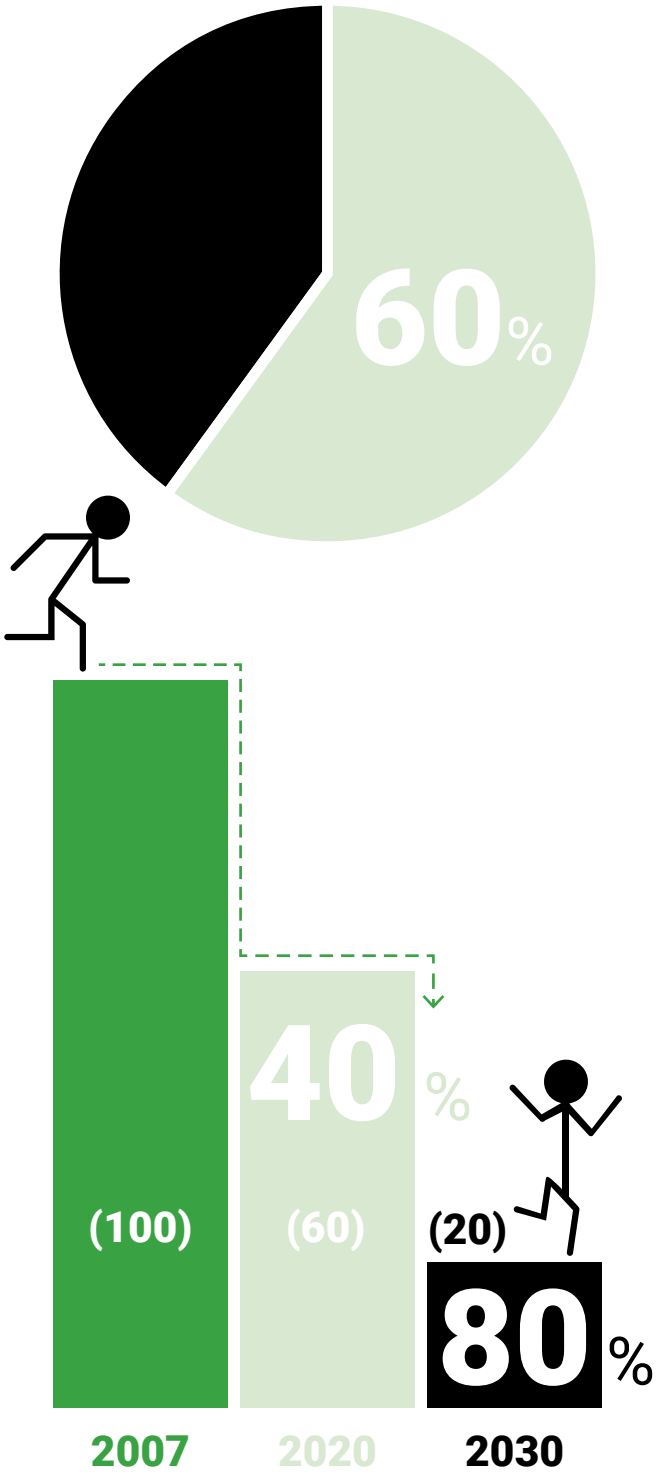
In the current decade, traffic has produced

27-30%

of all greenhouse gas emissions

AIMING AT A CARBON NEUTRAL JOENSUU BY THE YEAR 2025

Joensuu will be carbon neutral when the greenhouse gas emissions are equal to the carbon sinks. In order to reach this goal, Joensuu must reduce its greenhouse gas emissions by at least 60% from the level of 2012.



The following procedures will be utilised to reach the goal:

- Reducing the greenhouse gas emissions from land use and increasing carbon sinks
- Reducing traffic emissions and the use of private transportation while increasing the use of low- to zero-emission transportation
- Reducing the energy consumption by 2025 by at least 25% compared to 2007
- Basing at least 90% of the energy consumption on renewable energy sources in 2025
- Reducing the amount of waste and resulting greenhouse gas emissions while increasing recycling and waste recovery
- Making climate-friendly and responsible procurements in Joensuu
- Decreasing the greenhouse gas emissions by businesses operating in Joensuu
- Having the citizens of Joensuu understand the climate impacts of their choices and actions and reduce their greenhouse gas emissions

The goal is to reduce greenhouse gas emissions by 80% by the year 2030.

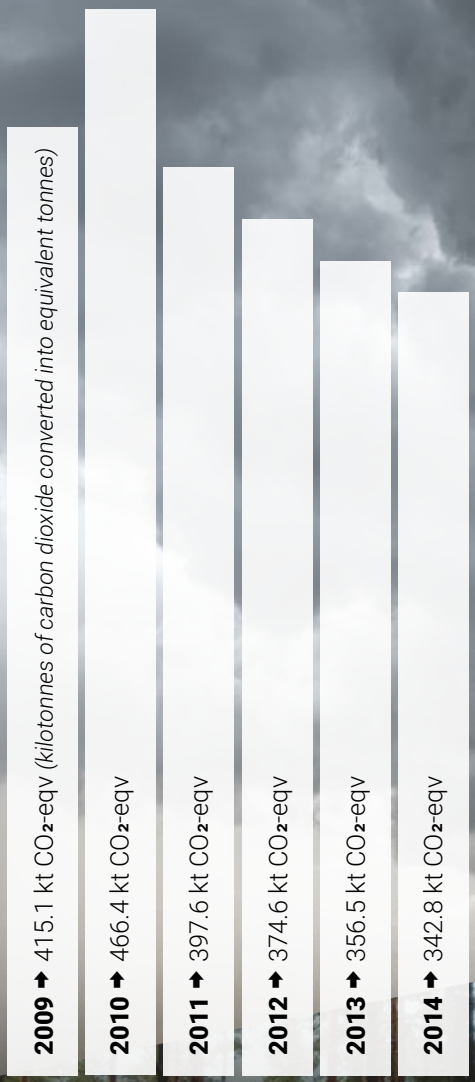
THIS IS WHERE IT STARTS

THESE WILL BE UTILISED

THERE IS EVEN MORE

GREENHOUSE GAS EMISSIONS IN JOENSUU

The graph below shows Joensuu's greenhouse gas emissions between 2009 and 2014 with industrial emissions excluded.
Source: Joensuu CO_2 report



THE MOST IMPORTANT SOURCES OF GREENHOUSE GAS EMISSIONS ARE ENERGY PRODUCTION, ENERGY CONSUMPTION AND TRAFFIC.

NATURE ACTS AS A CARBON SINK, ABSORBING CARBON.

The importance of carbon sinks is highlighted in the pursuit of carbon neutrality. Therefore, their amount must be increased. In 2011, the climate sinks in Joensuu amounted to about 145 kt CO_2-eqv, consisting of the biomass of trees and the carbon balance of mineral soil. The amount of carbon sinks in 2025 should be equal to 40% of the emissions in 2012, i.e. about 180 kt CO_2-eqv.

The total amount of greenhouse gas emissions in Joensuu in 2012 was about 460 kt CO_2-eqv. Here is how the emissions are divided between different sectors:

LAND USE AND PLANNING HAVE AN EFFECT

Unifying the community structure

Complementary construction will be planned in areas with ready-made municipal technology, i.e. streets and networks. This will reduce the emissions caused by construction and save energy. Additionally, greenhouse gas emissions caused by traffic will be reduced as the need for transportation will decrease and distances become shorter.

Energy-efficient residential areas are the key

Comprehensive public transportation can be arranged for a dense residential area. The availability of services can be ensured, meaning that grocery stores, day care centres, schools and possibly even jobs will be near. Regional heating can be constructed or district heating introduced in the area, as there will be enough users. Planning can influence building orientation and reduce energy consumption.

Penttilä, Multimäki and Karhunmäki are new residential areas in which energy-efficiency will be taken into account.

Land use planning can also be used to prepare for growing weather phenomena by planning run-off rainwater processing and maintaining natural diversity in unified green areas.

According to calculations, energy-efficient planning can be used to reduce greenhouse gas emissions by up to

10%

on a regional level and even more on a residential area level.

MATO-20 is a **land use implementation programme** utilised in Joensuu which compiles services, community technology and investments.

In 2016, Joensuu will have a **complementary construction programme**, the aim of which is to create a denser and more economical city structure.

TRAFFIC – ARE YOU A SMART COMMUTER?

Greenhouse gas emissions are reduced when more people use the same vehicle, meaning that more people can be transported with the same amount of emissions.

In 2014, there were about 41,200 automobiles in Joensuu, of which about 36,000 were passenger cars. About 559 million kilometres (347 million miles) were driven in Joensuu that year, with the resulting greenhouse gases amounting to a total of 188,670 tonnes. Private cars contributed about 57% of this. **According to predictions, the amount of kilometres driven will increase by about 20% by the year 2030**. Correspondingly, greenhouse gas emissions will decrease by about 27% in that time span, as vehicles will be replaced with lower-emission models and bio-fuels and electric cars will be utilised.

In the current decade, traffic has produced

27–30%

of all greenhouse gas emissions.

Considering your transportation can significantly reduce emissions

In fact, do you even need to go anywhere, or could you take care of your affairs online or by phone, for example? If you have to go, could you go on foot or by bike? If your destination is far away, could you take a bus or a train? If a private car is your only option, could you arrange a carpool?

When it is time to get a new car, could you choose a low-emission model? What about sharing or renting a car?

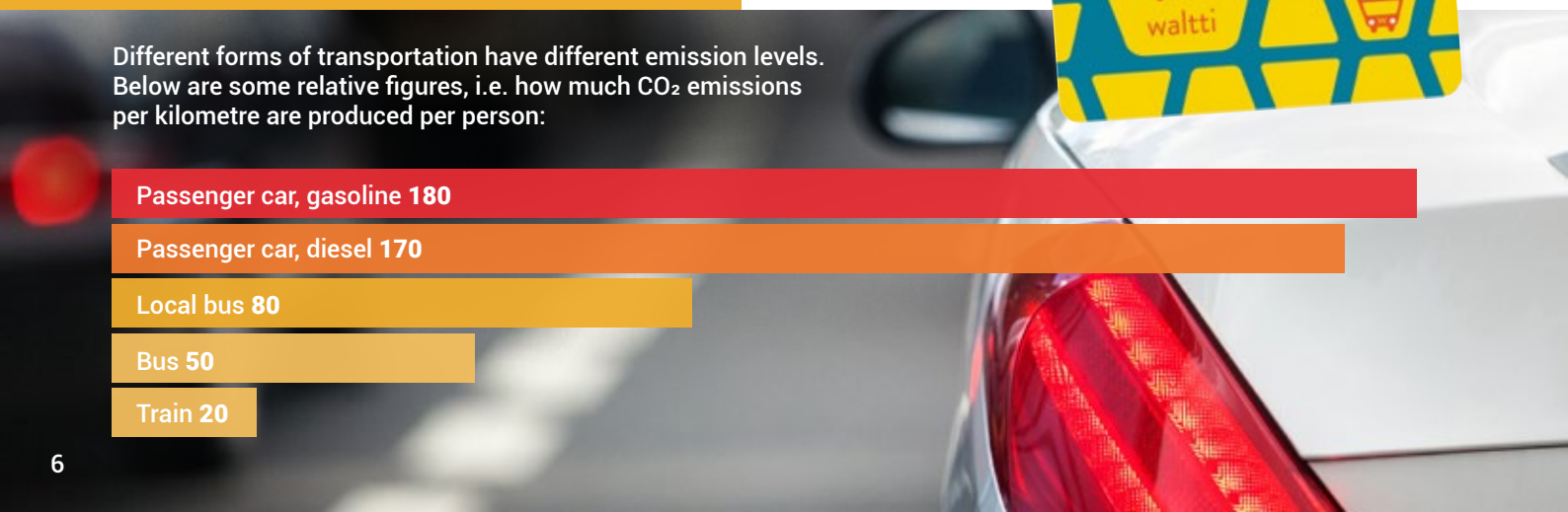
Joensuu was named the biking municipality of 2014

Biking plays a significant role in transportation. **In Joensuu, 32% of all everyday trips are made by bike**(traffic survey, September 2012). The citizens of Joensuu ride their bikes all year round: more than half of those biking in summer ride their bikes in winter as well. The terrain of Joensuu gives the city excellent conditions for biking. Approximately 70% of the citizens live less than 6 km (3.7 mi.) away from the market square, so for many, biking is the fastest way to get around.

JO JO JOENSUUN SEUDUN JOUKKOLIIKENNE

Take a bus! Joensuu features the JOJO buses, which you can recognise by the purple logo. With the Waltti travel card, you can travel with ease. On the car-free day, 22 September, JOJO bus rides have been free for two years now, giving a great opportunity to try the bus out!

www.joensuu.fi/reitit-ja-aikataulut (in Finnish)



Different forms of transportation have different emission levels. Below are some relative figures, i.e. how much CO_2 emissions per kilometre are produced per person:

- Passenger car, gasoline **180**
- Passenger car, diesel **170**
- Local bus **80**
- Bus **50**
- Train **20**

ENERGY-EFFICIENCY CREATES SAVINGS

Energy can be used more efficiently

The energy class of devices tells about consumption, so everything begins from A. The most efficient form of lighting is the LED lamp, which saves energy. The lighting can also be guided, meaning that the lights turn off when no-one is there. A good example of this is the smart street lighting by Penttilä.

When making procurements, the City of Joensuu takes the energy class and life-cycle of the equipment into consideration.

OLD CAN BE IMPROVED!

Buildings have opportunities

When planned properly, an energy renovation creates savings. **With construction, the energy-efficiency can be influenced** by choosing a low-emission form of energy and building materials. Great savings can be created by recovering heat from exhaust air as well as replacing equipment with lower-consumption models.

The **Smart Rantakylä-Utra project** involves charting the methods with which the old Rantakylä-Utra suburb with its blocks of flats will be turned into a modern, energy- and resource-efficient SmartCity part of town. At the same time, the aim is to reduce the carbon footprint of the area significantly and to take natural diversity into consideration.
The theoretical energy-saving potential is up to 40%.

In 2014, a heat energy recovery system was completed in the Kuhasalo waste water treatment plant of the water company Joensuun Vesi. Heat is recovered from the treated waste water.

By monitoring energy consumption, you can map out where energy is being consumed and think what could be done differently.

RENEWABLE SOURCES FOR ENERGY PRODUCTION

Renewable energy sources reduce emissions. The use of wood, biomass, water power, wind, solar power and geothermal heat can be increased. **The most significant renewable energy sources currently in use in Joensuu are water power and biomass.**

The City's map service provides **geo-energy maps** that indicate where building a geothermal heat system is viable considering the quality of the soil.

Solar energy maps help you find out the solar energy potential of the roofs on your property.

The maps are provided by the map service of the City of Joensuu

http://kartta.jns.fi/IMS

District heating production in Joensuu

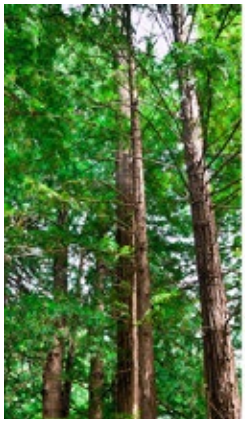
Co-producing district heating and electricity reduces greenhouse gas emissions. In terms of district heating, the key factor is the Fortum Power and Heat Oy power plant in Joensuu, where 72% of the fuels used in 2014 were renewable. Chipped wood is also used to heat the Eno, Kiihtelysvaara, Heinävaara and Tuupovaara urban areas. Hammaslahti utilises peat as well.

Decentralised energy production is sensible in many scales

It is good to have additional energy along with a main heating system. An air source heat pump, solar panels, solar heating and an oven are good alternatives.

An oil boiler can be replaced with geothermal or pellet heating at the end of its service life.

Energy production contributes about one third of CO_2 emissions(traffic excluded).



LESS WASTE, MORE RECYCLING

A more material-efficient production, i.e. reducing the amount of wasted material, creates savings in terms of both raw materials and production.

In 2014, the total amount of **waste received by the Kontiosuo waste centre was about 74,000 tonnes.**

Of this amount, **about 39,000 tonnes have been utilised or delivered for recovery.**

According to the 2014 sorting survey conducted by Puhas Oy, mixed household waste brought to the landfill contained an average of

BIO-WASTE 40%
PLASTIC WASTE 17%
CARDBOARD, PAPERBOARD AND PAPER 15%
METAL 3%
GLASS 3%
OTHER 22%

According to the survey, more than half of the mixed waste could be utilised with more efficient sorting.

Reuse is also a viable option that creates savings. Items can be recycled through donations or recycling centres and flea markets.

Waste management contributes about 5% of greenhouse gas emissions, which also includes the emissions produced by waste water treatment.

The winds of change are blowing

Producer responsibility for packaging waste will come into effect in its entirety in 2016. In practice, the biggest change will be the collection of household plastics. Maintaining the packaging waste collection network will be carried out by Finnish Packaging Recycling RINKI Ltd.

The Riikinvoima waste incineration plant in Leppävirta will be completed during 2016. The Kontiosuo waste centre will only accept waste that is not suitable for energy use. Thus, in the future, the household waste currently being collected as mixed waste will be utilised as energy.

Mixed household waste brought to the landfill contained an average of

40%

of bio-waste

2014 sorting survey conducted by Puhas Oy

The majority of waste brought to the landfill was mixed community waste (about 75%) and construction waste (about 13%).

SUSTAINABLE PROCUREMENTS AND SERVICES

Sustainable procurements take energy- and material-efficiency and responsibility into account. The aim is to reduce the amount of emissions and waste created.

There are many kinds of procurements. Choices in equipment, products, services, transportation and form of energy production are procurements. The use of equipment and production of services carry many kinds of environmental effects that should be made clear when making procurements.

Quality materials and durable products should be favoured. Making environmentally friendly procurements and avoiding unnecessary ones will save costs and reduce the environmental burden.

Life-cycle estimates and criteria based on life-cycle thinking, such as eco-labels, provide good tools for comparing environmental friendliness.

Reduced energy consumption will create savings for both the user and the environment. The life-cycle of a product is also a significant factor: a more durable product has a longer service life.

Food production plays a major part. Food production, processing and transportation create a burden on the waters and produce greenhouse gas emissions. Additionally, what we eat and how much food is wasted have an effect on greenhouse gas emissions. Vegetarian food is more environmentally friendly, local food saves transportation and organic food saves the environment. Utilising leftover food from restaurants and canteens and expiring grocery store products by donating them to charity, for example, reduces waste and emissions.

There are many procurements. **The total value of items and services purchased by the City of Joensuu annually is about 100 million euros.** The City has also decided to promote innovative procurements and using environmental and social criteria when making procurements.

Electric services reduce the need for transportation. The new services are also interactive, meaning that you will receive a reply and a decision faster. This saves paper as well.

In 2009, Joensuu became the fourth city in Finland to be named a Fair Trade City by Fairtrade Finland.

In 2015, the City of Joensuu procured a fully electric car for the residents of Muuntamontie to share.

BUSINESSES HAVE AN IMPORTANT ROLE

For businesses, energy-, material- and resource-efficiency create production savings and increase profitability.

Choices that take the environment into consideration help the climate. Carbon neutral production and a smaller carbon footprint are also an indication of a business' environmental responsibility.

Clean technology production, a.k.a. cleantech, refers to all products, technologies and services that cause less damage to the environment or consume fewer natural resources in their production process or use than their competitors. Cleantech is a rapidly growing industrial and service production field both in Finland and around the world.

In 2015, a climate commitment has been undertaken by

Artpark - Aurinkocafé, Hotel GreenStar, **Pohjois-Karjalan Martat ry**, **Abloy Oy** and **John Deere Oy**.

INVOLVING THE CITIZENS

In households, the majority of greenhouse gas emissions is produced by housing and energy consumption, traffic and foodstuffs.

Household energy consumption constitutes about **20%** of the total consumption.

CONSIDER THE FOLLOWING:

Your consumption habits

- Buy quality local products: they last long and provide jobs
- Favour seasonal products and have a weekly vegetarian day!

House heating

- Does your house have water radiators? Switch to district heating! You can see the coverage of the district heating network in your area at **lampokartta.fortum.com**. If district heating is not available, geothermal heating is a good alternative.
- If your house has electric radiators, get an air source heat pump and switch to green electricity!

Smart transportation

- Could your family manage with one car? Alternate between the bus and the car for more variety on your work commutes!
- Do you jump on the bus, on the bike or behind the wheel in the morning? Would it be time to enjoy the scenery more and walk to work?

REACHING THE GOAL THROUGH ACTION, I.E. WHAT WE CAN DO:

Sign the Climate Pledge. Encourage your friends and co-workers to sign it as well. https://ilmastolupaus.fi

Want to help the climate more actively?

Contact your local organisations or the Climate Square project. www.joensuu.fi/climatesquare

There is an organic and local food circle operating in Joensuu that anyone can join.

For more information, visit www.joenluomu.net

Remember, there are many car rentals in Joensuu. There is no reason to purchase a car for sporadic drives.

eneuvonta.fi

You can borrow an energy consumption meter from the library. It will show you how much power the devices in your home consume.

You can find national energy counselling at www.eneuvonta.fi (in Finnish)

NATURE HAS ITS PART

About 80% of the total surface area of Joensuu is forest land and 14% water bodies. Thus, there are plenty of carbon sinks in Joensuu: the area of the forest land is about 2,095 km² (809 mi.²), of which 9.45 km² (3.65 mi.²) are conservation areas. Carbon sinks absorb more carbon than they release.

Vegetation absorbs carbon

Carbon is absorbed into plants as they photosynthesise. Trees and other plants remove carbon from circulation and thus reduce the increase of carbon dioxide in the atmosphere. In other words, forests are important. The vegetation on fields and the organic matter in the soil absorb carbon as well. Forests and fields must be taken care of so that they work as carbon sinks. Plants also produce oxygen by photosynthesising carbon dioxide and water. Forests also have berries, mushrooms and many other things.

Parks and green areas

Green areas are also significant recreation places for people. Through them, rainwater is absorbed into the ground and their vegetation captures dust and provides cover from the wind. The green plan of Joensuu defines the important green areas and green corridors to be preserved.

Biodiversity

In nature, everything plays a role. Nature itself can manage without people. However, people cannot manage without nature, which is why nature in its entirety is worth protecting. Conservation areas – old forests, swamps, ridges, waterfowl habitats – and many other forms of nature act as carbon absorbers.

And remember, not everything is about tonnes and kilowatts. Moments in nature are valuable by themselves.

ADAPTING IS PREPARING

With climate change, extreme weather phenomena will increase. There will be more rain and more powerful storms. Cold and dry seasons will also become longer.

There must be back-up energy sources, and run-off rain water must be retained and absorbed. Street and road maintenance must be increased.

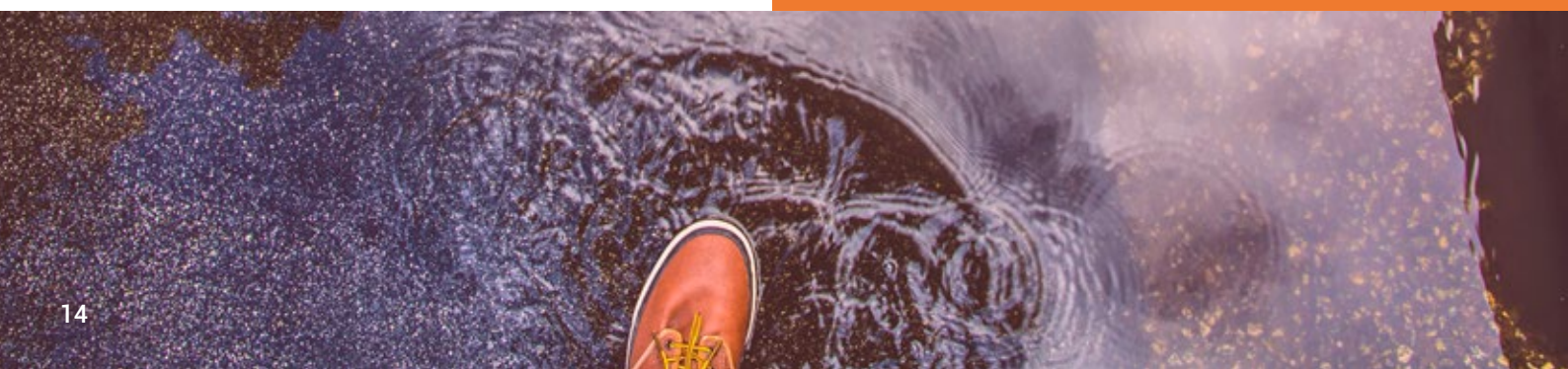
For the urban areas of Joensuu, controlling run-off rainwater is one of the most important adaptation measures. Handling the run-off rainwater at its source will prevent problems from accumulating at rainwater network discharge sites.

Green roofs are one way to adapt to increasing rains. The major buildings in Joensuu are yet to have green roofs, but there are some small ones already.

With climate change, buildings may require less heating. On the other hand, they may require more cooling in the summer.

CHANGE CAN BE PREPARED FOR

In Joensuu, power lines will be replaced with ground cables, run-off rainwater will be retained and absorbed, a wetland for run-off rainwater will be built in Karhunmäki and the operation of the energy network in exceptional situations will be improved.



THE CITY OF JOENSUU HAS ALREADY STARTED

2005 ✓ Association of Finnish Local and Regional Authorities' climate campaign

2008 ✓ Finnish municipalities' energy efficiency agreement

2009 ✓ Regional climate strategy

2011 ✓ Eco-support operations began

2013 ✓ Climate programme

2014 ✓ The City joined the European Covenant of Mayors

✓ SEAP Sustainable Energy Action Plan

✓ The INKA Innovative Cities project

✓ The Smart Cities project

2015 ✓ The City joined the HINKU Carbon Neutral Municipalities project

✓ The CLIMATE SQUARE project

✓ ESCO partnership projects

HOW THE PROCEDURES ARE MONITORED

- A SEAP report regarding the Covenant of Mayors commitment will be drawn up in 2017.
- A climate programme follow-up report will be drawn up and the programme updated in 2017.
- Greenhouse gas emissions will be monitored annually with a CO_2 report and the Kasvener calculation model.
- Follow the Climate Square project's website at (www.joensuu.fi/climatesquare).

Joensuu's commitments:

- Joensuu has been involved in the Association of Finnish Local and Regional Authorities' climate campaign since 2005.
- The 2013 climate programme of the City of Joensuu includes the procedures described in this brochure.
- The European Covenant of Mayors, which the City joined in 2014. Commitment to reduce greenhouse gas emissions by 40% from the level of 2012 by 2020. A SEAP Sustainable Energy Action Plan was drawn up.
- The City of Joensuu joined the HINKU Carbon Neutral Municipalities project in 2015. The goal is to reduce greenhouse gas emissions by up to 80% from the level of 2007 by 2030.
- Finnish municipalities' energy-efficiency agreement 2008–2016, reducing the energy consumption of the municipality's own properties by 9% from the level of 2005. The project will continue after 2016 and Joensuu will be involved.

Joensuu's projects:

- The INKA Innovative Cities (2014–2017) project. The theme of Joensuu is Green Growth – here comes the goal 'Carbon Neutral Joensuu 2025.'
- The 'Climate Square gives tools for low-carbon society' project 2015–2017, joint procedures with businesses, citizens and communities to reduce greenhouse gas emissions.
- The Smart Rantakylä-Utra project (SmartCity) began in the autumn of 2014.
- The ESCO partnership projects for increasing properties' energy-efficiency were started in 2015 by the City's facility centre.
- With the 'towards an ecologically sustainable sporting culture' project, a climate programme will be drawn up for the City's sporting services.

WHAT ELSE COULD WE THINK OF?

TRAFFIC

Could local railway transportation be possible after all? Could sharing cars work? What about more charging stations for electric cars and other alternative fuels? Bicycles for the new travel centre and hotels would be welcome! Additionally, there is a need for proper parking facilities for the bicycles of the citizens of Joensuu!

WORK

Could there be more teleworking? And could business meetings be replaced with online negotiations or instant messaging services? New ideas and alternatives can save energy and money at workplaces!

HOUSING AND CONSUMPTION

What about at home? Try going low-carbon for at least a little while, try the food circle's services, agree on a joint procurement with a relative or your neighbour, ride a bike or walk to work or build a green roof of your own.

BUSINESS ACTIVITIES

There are business ideas in being low-carbon! The sky is the limit. Create something new from old and be inspired by all the possibilities recycling can offer. You decide.

EVERYWHERE

Plant trees and bushes, for example one for each month. And who can come up with a competition where the goal is to reduce emissions? Joint activities are needed – what are the things you can do?

Theme years as boosters

2014 CLIMATE CHALLENGES
– Joensuu approved the climate programme and joined the Covenant of Mayors

2015 PUBLIC TRANSPORTATION
– free and affordable rides and future transportation

2016 ENVIRONMENTAL KNOWLEDGE
– ignorance is not bliss

2017 ENERGY PRODUCTION
– more wood to the fire

2018 MATERIAL- AND ENERGY-EFFICIENCY
– more from less

2019 CARBON SINKS
– you cannot bypass nature

2020 SMART TRANSPORTATION
– there are many ways to get from A to B

JOENSUU