

A man and a child are walking away from the camera on a wooden boardwalk that stretches across a forest floor. The man, on the left, is wearing a dark jacket, blue pants, and brown boots, and has a backpack. The child, on the right, is wearing a blue hooded jacket and dark pants. They are walking towards a bright light source, likely the sun, which is low on the horizon, creating a strong backlight effect and illuminating the scene with a warm, golden glow. The forest is composed of tall, thin trees, and the ground is covered with low-lying vegetation and fallen leaves. The overall mood is peaceful and contemplative.

CLIMATE SOLUTIONS FROM FINLAND



Come together

Finns have always cherished clean nature, water and air. The Climate Barometer survey shows that four out of five Finns consider that urgent action is necessary to slow climate change. Our schools teach about sustainable development, and the voices of young people are heard in political decision-making.

Finland is among the global forerunners in climate change mitigation. We were the first country to introduce a carbon tax, in 1990; the first to create a circular economy road map; and our climate target is among the most ambitious in the world: to be carbon-neutral by 2035.

We are also good at turning knowledge into action. Climate solutions have been developed in Finland on all levels. Individuals as well as communities, cities, companies and decision-makers are all in. Industries across the board, from technology to forestry and trade, have all created their own road maps to carbon neutrality. We aim to provide solutions to the global climate challenges by minimising Finland’s carbon footprint and maximising our carbon handprint.

We have long acknowledged that we can only thrive through co-operation. This is why we want to share our experiences and what we have learned with other countries. A more sustainable and happier future is built together.

Mari Pantsar
Director, Carbon-neutral circular economy
The Finnish Innovation Fund Sitra

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Ministry for Foreign Affairs of Finland, 2021.
Text: Otavamedia
Layout design: Otavamedia
Cover photo: Tiina & Geir / Cultura Creative



Photo: City of Lappeenranta



Photo: Roni Rekomaa / Lehtikuva



Photo: Jussi Nukari / Lehtikuva



Photo: Roni Lehti / Lehtikuva



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A more sustainable and happier future is built together!

Comprehensive schools focusing on climate education – with hope

Siiri Niskala, a ninth-grade student at Rantavitikka Comprehensive School in Rovaniemi, says that she has learned about climate change and related issues in almost every subject at upper comprehensive school.

Climate change has been approached from both a scientific and an artistic perspective.

“I’ve gained huge amounts of knowledge, and I’ve particularly enjoyed the varied discussions we’ve had on the topic,” says Niskala.

Sanna Leinonen, a geography and biology teacher, nods in agreement. Climate education is part of the national curriculum, and although it begins in the lower grades, it is weighted towards the last years of comprehensive school.

“Teaching always takes a solution-oriented approach. We think about what everyone could do without generating climate anxiety,” says Leinonen.

Niskala is satisfied with the teaching she has received. She understands that individual choices matter, but is also aware that major, structural decisions are made elsewhere.

“It’s important to pay attention to your everyday choices. I recycle and collect litter from the streets. I’m also on the youth council, so I know that voting can make a difference.”

Leinonen says that, in addition to providing basic knowledge about the phenomenon, students are taught how to find information for themselves: how to distinguish scientific and researched data from the flood of information on the internet.

Niskala, who will start high school next year, tells us about a poster that she made during art class. Her artwork takes a stand, showing people and the Earth living in harmony with each other.

“I wish everyone could live a good, balanced life in peace.”

Her teacher agrees.

INFORMATION ACROSS SUBJECTS

The Teacher’s Climate Guide is an open website that describes climate change from the perspective of different school subjects. The site suggests ideas for all kinds of subjects, from chemistry to music.

“Even just a few years ago, many teachers may have thought that climate change would only be covered in geography and biology lessons. But this is no longer the case,” says climate educator **Pinja Sipari**, who created the site.

The site’s materials are also available in English: teachers-climate-guide.fi

Photo: Ville Rinne

Ninth-grade student Siiri Niskala and her geography and biology teacher Sanna Leinonen experiencing typical Finnish forest on a field trip.

YOUNG PEOPLE AT THE HEART OF DECISION-MAKING

The Youth Agenda 2030 Group was established four years ago as part of the Finnish National Commission on Sustainable Development, with the task of ensuring that young people’s voices are heard in the debate on sustainable development. The group consists of members aged 15–29 from all around Finland. During their year-and-a-half term, they do grassroots work and debate issues with decision-makers. For example, in 2019 the Youth Agenda 2030 Group organised a youth climate conference at Finlandia Hall in Helsinki in collaboration with Sitra, the Finnish Innovation Fund. A Youth Agenda 2030 representative also sits at the climate policy roundtable, which seeks to reach an understanding of how Finland can become carbon neutral by 2035.

Expert: **Riina Pursiainen**, Specialist, Prime Minister’s Office



Photo: Jussi Heikkinen / City of Helsinki

Nurturing biodiversity is our common duty

“People in Finland have a relationship with nature that is as diverse as nature itself,” says Dr. **Petri Ahlroth**, Director of the Biodiversity Centre. Finns have traditionally enjoyed nature as a way of revitalising themselves after the working day and as an energising force in their free time.

“The pandemic has further deepened our relationship with nature. Nature has an undeniable power to make us feel whole,” says Ahlroth.

However, loss of biodiversity is a major concern. According to the Intergovernmental Science-Policy Platform on Biodiversity and

Ecosystem Services (IPBES), biodiversity is now deteriorating at an unprecedented rate all across the world. Globally, about a million plant and animal species are at risk of extinction – many within the next few decades. Biodiversity is also deteriorating in Finland. According to the latest endangered species report (aka the Red List), one in every nine species in Finland is already endangered. Half of Finland’s habitats are endangered.

“When we lose biodiversity, nature becomes more homogeneous. And everyone suffers as a result.”

In a way, diversity is nature’s immune system. It helps the natural world to adapt to changing conditions, such as climate change and disease. Biodiversity provides vital services for all of us, known as “ecosystem services”. A loss of biodiversity reduces – or in some places completely destroys – nature’s ability to provide ecosystem services.

“We should not, however, lose hope,” says Ahlroth.

He stresses that Finland has a huge amount of expertise that can be used to revitalise, restore and manage ecosystems. He points out that properly functioning ecosystems are in the best interests of all of us – and our economy.

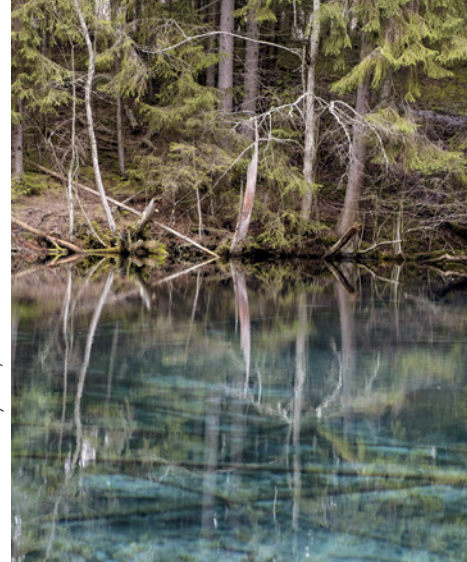
Ahlroth welcomes the fact that, in recent years, an increasing number of operators have become interested in how they can safeguard biodiversity, including those in the construction and food industries.

“This is a favourable development, that we’re ready to work on it. It’s our duty to pay more attention to our consumption habits and the circular economy.”

Ahlroth sees Finnish environmental expertise as an export product that is in demand.

“We have an opportunity to lead by example, share information, and raise awareness. All this supports our shared planet and its future.”

Photo: Sakari Roysko / Lehtikuva



Kiikunlähde, a natural spring in Hollola, Lahti region.

MANAGEMENT ALONGSIDE PROTECTION

The Helmi Habitats Programme 2021–2030 was launched by the Ministry of the Environment and the Ministry of Agriculture and Forestry. It seeks to strengthen biodiversity by conserving and restoring swamps, and restoring meres, traditional biotopes, forested habitats, small bodies of water, and coastal nature.

However, conservation alone is not enough.

“Habitats weakened by human activity need both management and restoration in order to return to their natural state,” says **Hanna-Leena Keskinen**, a specialist at the Ministry of the Environment.

Correctly targeted efforts to safeguard and restore biodiversity also help species and habitats to adapt to climate change. Intact, well-functioning ecosystems provide the ecosystem services that are essential for wellbeing, such as carbon sequestration, flood protection and pollination – even in a changing climate.

“SAVE THE BEES” CAMPAIGN LEADS TO ALMOST 76,000 CONCRETE ACTIONS

Maarit Puttonen, a producer at the Finnish Broadcasting Company (Yle), says that she has rarely run a campaign that has made everybody smile. Puttonen and her colleagues were responsible for the most important environmental action of summer 2020: the “Save the Bees” campaign, which encouraged people to build insect hotels, establish meadows, and plant bee-friendly flowers. The campaign was a great success.

“Bees inspired almost 76,000 actions. With this campaign, we wanted to draw attention to loss of biodiversity and the plight of bees.”

Globally, more than 40 per cent of pollinators are threatened with extinction. Almost one-fifth of Finland’s most important pollinator species are endangered. These include bees, bumblebees and butterflies. Pollinators play a key role in maintaining biodiversity.

Although the campaign is no longer active, people are still doing good things for bees. This makes Puttonen happy.

“It’s great that people are still helping bees. This isn’t a sprint – it’s a marathon, and that requires endurance.”



Photo: Reima Flyktman / Lehtikuva

HARNESSING TECHNOLOGY FOR A GOOD, SUSTAINABLE LIFE

Last summer, Sitra was selected to develop solutions to activate Europeans in the fight against climate change, in collaboration with 16 international partners. The PSLife-style project, which was launched this autumn, contains a package of localisable measures to help individuals find their own way of living a good, sustainable life. In addition to helping individuals, the technological solution uses consumption-based carbon footprint calculations to provide companies and decision-makers with information about residents’ everyday goals, motives and preferences with respect to sustainability.

Expert: **Tuula Sjöstedt**, Communications and Public Affairs Lead, Sitra, the Finnish Innovation Fund



Neighbourly help in a village community

The sheep arrive in Kairala every summer from the neighbouring village of Luiro.

A mutual agreement has been made: Kairala's 80 residents look after the sheep in the summer, and in exchange the sheep keep the village's meadows in good order. This cooperation has worked very well for everyone involved.

Niina Kangas, chair of the Kairala Village Association, says that this tradition of working together has always been strong in Kairala and the neighbouring villages. About ten years ago, the villagers began renovating old buildings and doing some landscaping in their spare time.

"Our village landscape is valuable, and we want to take care of it," says Kangas.

The volunteers repair things such as log cabins and shingle roofs. The villagers also clean up the

landscape, for example, by collecting and burning brushwood. Last summer, the mailboxes along the village high street were standardised.

After work, the villagers – both young and old – spend the evening around a campfire. Kangas says that these events play an important role.

"It's great to spend time together, and these moments are especially meaningful for our older residents."

And the work being done by the villagers has not gone unnoticed. Last year, the Lapland Building Tradition Society gave the Kairala villagers a cultural environment award, which delighted everyone. Kangas has also heard that tourists often admire Kairala as a village that has been nurtured with love.

"It's great that people remember Kairala!"

COMMUNAL WORK: TOGETHER WE ARE MORE

Hannu Salmi, Professor of Cultural History at the University of Turku, says that communal work is a tradition that goes back a long way in Finland. When communities wanted to achieve big things, they needed to call on the help of their neighbours and even people from the next village.

"Communal work is a tradition that was born out of a sense of community and a desire to work together."

Salmi still sees parallels with the past in today's volunteer work. We help each other move house and with yard work.

"We still want to achieve things together. This volunteer spirit is a Finnish speciality, and something we can be proud of," he says.

CITIZEN PANELS

The fight against climate change affects society as a whole. To find solutions for adapting to climate change that are fair and acceptable to everyone, it's important to prepare them in wide-ranging cooperation. In Finland, citizen panels with people of different ages and backgrounds have been used for this purpose. The role of citizens in ensuring a fair transition is also investigated in the "Deliberating Climate Actions" project.



A FRIEND OF THE SAIMAA RINGED SEAL

As winter approaches, **Petter Sairanen** always wonders how snowy it will be this year. Winters with little snow are a threat to the Saimaa ringed seals, who need ice and snow to build their dens. There are just over 400 Saimaa ringed seals in the entire world, and they all live in Lake Saimaa.

That's why Sairanen, who lives on the lake-shore, has for years been shovelling snow into drifts to help the seals. He also helps to count seal dens. Saimaa ringed seals are important to this writer.

"This is a unique animal – one that belongs here just as much as us. It needs protecting."

Several winters ago, when Sairanen was counting dens, a seal cub greeted him from one of the dens.

"We looked each other in the eye for a moment. I said 'hi'. Situations like these leave you with an incredible feeling."

Environmental brainstorming in the residents' association

Two years ago, residents in the Ankkuri district of Lahti set up a lending centre where residents could borrow litter pickers to keep the area tidy. Both the City of Lahti and the EU's Green Capital project have funded the litter picker lending centre, and its activities have now been expanded to other residential districts.

Thanks to the project, Ankkuri is much cleaner and tidier than before.

"In the early days, we used to organise communal cleanup events, but there's no need for them anymore, as the area is otherwise kept clean and tidy," says **Niko Niemi**, chair of the residents' association.

In 2020, the pandemic posed new challenges for cleanliness, as people spent more time outdoors and also ate more snacks outside.

"We contacted the City to tell them that there weren't enough waste bins, and as result, we got larger bins for the area," says **Anne Antila**, a member of the association.

Antila thinks that the impact of the lending centre has been more than just aesthetic.

"Picking up litter will naturally make the place look tidier, but it also keeps the lake clean, as cigarette butts and plastics won't end up in the water."

As Ankkuri is located on the shore of Lake Vesijärvi, cleaning up the water has a direct impact on association members.

The association is very active, and organises a variety of events to increase residents' awareness of their environment. One example of this was an organised walk during which the city gardener told participants about the vegetation in the area. During this event, the walkers came up with the idea for an area of natural meadow, which was implemented by sowing meadow plant seeds in several areas.

"Local biodiversity is important to us. You can hear the icterine warblers singing on a nearby hill, and we're eagerly awaiting to find out whether the meadows will attract more butterflies," says Niemi.



Photo: Visit Lahti

CITIES AS CLIMATE ACTORS

Urbanisation, and particularly the growth of several of the largest cities, has been continuing in Finland for decades. Housing, business activities and jobs are increasingly concentrating on cities, which increases their responsibility in the fight against climate change.

It is a municipality's task to provide its residents with the opportunity to live a good life, such as supplying clean water and energy, and organising waste management and sustainable transport. A sustainable municipality makes responsible decisions and treats its residents equally.

Cities and municipalities play a key role in achieving sustainable development goals. Municipalities of all sizes have numerous means of reducing climate emissions. Networking helps cities and municipalities to achieve their goals, as ideas and successful examples can be shared with everyone.

Lahti, a city of 120,000 inhabitants in Southern Finland, has long been exemplary in its environmental efforts. Lahti is a great example to others, as a large proportion of Europeans live in smaller towns and cities such as Lahti. The city stresses the importance of cooperation, and takes the views of local residents into account. Its long-term efforts were rewarded in 2021, when Lahti was chosen as the European Green Capital.



Lake restoration paves the way to becoming the European Green Capital

About ten per cent of Finland's geographical area consists of lakes and other inland bodies of water. As urbanisation began accelerating in the 1900s, the discharge of wastewater into lakes had devastating effects, but determined environmental efforts towards the end of the century improved the condition of many lakes.

In 2017, the condition of Finland's lakes was assessed as good on average. Of the 4,500 lakes that were classified, about a quarter were in excellent condition, while only 0.5 per cent were in the worst condition. About 800 lakes were classified as still having room for improvement.

One of the rescued lakes was Vesijärvi.

"In the 1970s, people realised that Vesijärvi, which was located in a growing industrial city, was the most polluted lake in Finland. It was

completely unusable for recreational purposes," says **Milla Bruneau**, Executive Director of the Lahti European Green Capital project.

Although the city stopped discharging wastewater into the lake, it remained in a terrible condition for a long time. Actual conservation work began in the 1980s. Extensive surveys, cooperation and determined efforts in many areas gradually led to an improvement in the lake's condition. Although the lake's water quality has now improved, people are still working in the best interests of the region's waterways.

The Lake Vesijärvi Foundation monitors waters in the Lahti economic area. The foundation's activities enable long-term monitoring and research that will assure high-quality restoration work. The environmental research and development work that began in Vesijärvi was expanded

to other sites, and is currently very notable in Lahti. Thanks to its long-term efforts, the city was chosen as European Green Capital 2021.

Local residents involved in environmental efforts

Nature is present in the everyday lives of most people in Finland. Therefore they understand its value and are willing to act.

Lahti stresses the importance of cooperation and input from residents. Both residents and a variety of organisations have been involved from the outset. Residents have enthusiastically participated in activities such as catching nuisance fish to promote ecological balance in the lake.

"It was easy to get residents involved in Vesijärvi projects, as the condition of the lake is something that affects them and arouses strong emotions."

Workable solutions as an example to others

Lahti's status as a European Green Capital is an indication of its workable solutions. Lahti stopped using coal in 2019, and the city's district heating is now emission-free. Only one per cent of its waste ends up in landfill.

It also has a clear direction for the future.

"We're aiming to be a completely waste-free city by 2050, and carbon neutral by 2025. There are still some issues to resolve, such as transport and construction. But being chosen as a European Green Capital is not our goal – it's just the beginning," says Bruneau.



MOBILE APP ENCOURAGES RESIDENTS TO REDUCE TRANSPORT EMISSIONS

The City of Lahti aims to become carbon neutral by 2025. Its CitiCAP project encouraged residents to make climate-friendly transport choices in 2020.

The CitiCAP project experimented with personal emissions trading, in which the app monitored users' transport usage and automatically measured their carbon footprint. Every user was given a weekly emission budget in line with their personal life situation. Users would "underspend" on their budget if they chose a more sustainable mode of transport, such as cycling or walking, instead of using a private vehicle. Underspending was rewarded with a variety of products and discounts.

Of the 2,500 users who took part in the pilot, 36 per cent said they had reduced their transport emissions during the project.

Engaging everyone in Ii

Over more than a decade, the approximately 10,000 residents of Ii succeeded in reducing their municipality's emissions by 80 per cent. Ii's municipal strategy needed revising after its previous tech-driven economy fell into crisis. Decision-makers took the important decision to stimulate the economy through sustainable means, as climate efforts were not seen as putting the brakes on business.

This relatively small municipality serves as a good example to other places both in Finland and abroad. Its success was due to the joint efforts of the whole municipality working in the best interests of the climate. Residents were asked for their ideas and input on the design of green services. The views of different age groups were heard in different ways – some residents were even interviewed at home. Bold practical experiments were also carried out.

Some examples of climate action in Ii include:

- The municipality of Ii has stopped using oil heating and all public municipal-owned properties have switched to local energy sources, such as geothermal heating.
- The region produces more than ten times as much clean energy as it consumes.
- During office hours, municipal employees use fully electric cars, which are also rented to residents in the evenings and at weekends.
- Measures planned in accordance with residents' wishes include a new cycle lane, a green municipal centre, and direct bus lines.
- Ii has improved the circulation of goods and materials with the aim of being waste-free.
- Every year, Ii holds a national climate festival – ClimateArena – to seek solutions to climate change with the help of society as a whole.



In Ii climate education is actively practised from kindergarten to elementary school. "Save water" says the poster.

Hinku network connects pioneers

Hinku is a network of pioneers in climate change mitigation. It brings together municipalities, companies and experts who are committed to making significant reductions in emissions.

The Hinku network of municipalities was created in 2008, when a small group of business leaders came up with the idea for a new kind of social responsibility initiative in collaboration with the Finnish Environment Institute. Reducing emissions to boost a municipality's vitality was seen as a common goal, and five municipalities decided to take part in the pilot project. Since then, more municipalities have steadily joined them, inspired by participants' favourable experiences and the positive attention received by the project. The network now consists of 79 municipalities and five provinces that have committed to an 80 per cent reduction in emissions by 2030 (in comparison to 2007 levels). The network is coordinated by the Finnish Environment Institute (SYKE).

SYKE calculates greenhouse gas emissions for all Finnish municipalities on an annual basis, and also suggests measures that municipalities can take to reduce their emissions. The network also provides communication support and expert assistance in municipal-specific matters, as well

as support for allocating EU funding and regional development funds to municipal climate efforts.

The Hinku network's activities can be easily adapted to other locations, and similar networks have been established in the Nordic countries. The target for 2021 is to launch a joint Nordic project aimed at creating a more standardised basis for assessing municipal emissions in different countries. The exchange of information between Nordic municipal networks will also be strengthened to help mitigate climate change. SYKE and its partners have long been planning to take the Hinku concept to Vietnam, and will continue to further this plan after the pandemic has subsided. Their goal is to create a functional network that will enable the country to carry out environmental and climate work. If the concept succeeds in Vietnam, it will be extended to other countries.

Since 2012, the Finnish Environment Institute has been acknowledging exemplary reductions in emissions with the Hinku-teko Award. Examples of award winners include companies that have switched to low-emission energy solutions, a sports club that introduced electric cars, and a rock festival that reduced its carbon footprint in many ways.

Some examples of award-winning action:

- In Finland, indoor ice rinks play a major role in the hobbies of people of all ages. In 2019, the indoor ice rink in Ylöjärvi was the first in Finland to install a cooling system equipped with smart technology. This system uses up to 30–40 per cent less electricity than traditional technologies.
- The chemical company Kiilto uses a combination of geothermal heat/cooling and waste heat generated in its polymerisation process to heat and cool its production facility, where it manufactures industrial adhesives and products for the construction industry. Thanks to the hybrid system introduced in 2018, the facility's consumption of natural gas fell by a third, and its carbon dioxide emissions also decreased significantly.
- Finland loves its many summer festivals. Ilosaari-rock in Joensuu calculates its carbon footprint every year and works to reduce it in multiple ways. More than 90 per cent of the electricity consumed by the festival is green electricity. The decor is primarily made of recycled materials, and the carbon footprint of any products sold is kept to a minimum. People are encouraged to come to the event by public transport or using shared rides.

Helsinki Energy Challenge – a competition for new ideas

Photo: Kari Ylitalo / City of Helsinki



The City of Helsinki's energy systems are in need of a radical overhaul. The City organised recently the Helsinki Energy Challenge competition to get inspiration and momentum for renewing its heating system. The competition generated 252 ideas that can also be freely shared with other cities all across the world.

Helsinki aims to be carbon neutral by 2035. The suggestions and knowledge acquired via the competition will be utilised in the carbon-neutral heating roadmap that the city is now drawing up. This roadmap is important for gaining an understanding of the overall picture and investments required to design a sustainable heating system.

The competition showed that many different types of solutions can achieve the goal of emission-neutral heating. Optimising energy production and consumption will be increasingly important in future solutions.

One of the main points to keep in mind is that the new heating system must be flexible and able to take future technologies into account without, however, waiting for them to become available. The competition's top entries shared a common vision: heating should be electrified. The future heating system should consist of several sub-solutions and operators that have been optimised to work together.

The jury gave awards to four entries:

- A flexible plan based on comprehensive decentralised production solutions
- A proposal based on auctions for emission-free heat production
- A comprehensive plan that combines new forms of energy storage with AI electrical heating technologies
- An energy island where energy is produced and stored, and which can be combined with other uses
- The selected entries both illustrate the diversity of the challenge and seek to resolve the complex issues involved in overhauling energy production. The award-winning teams have significant expertise both in Finland and abroad.



Photo: Teemu Leinonen

Solar panels of LUT University.



Photo: Laura Vanzo / Visit Tampere

A tramway, nicknamed “Rasse”, is the city of Tampere’s latest climate action.

GREEN LAPPEENRANTA

Lappeenranta won the European Commission’s 2021 European Green Leaf Award.

Lappeenranta:

Plans to be carbon neutral by **2030.**



In **2017**, it was the first city in the world to use only EKOenergy-certified electricity, and started purchasing only biogas and electric vehicles.

12% of its workforce is in the environmental business.

A significant proportion of Finland’s energy research and teaching takes place at LUT University.

TAMPERE: CLIMATE ACTION AN IMPORTANT ELEMENT OF FINANCIAL PLANNING

Tampere has introduced a climate budget that will help the city to achieve its goal of carbon neutrality. The climate budget will be used to monitor the city’s progress towards carbon neutrality and the adequacy of its climate action. Tampere’s goal is to be carbon neutral by 2030.

Its climate budget contains a breakdown of items from the city’s regular budget that are aimed at mitigating climate change, adapting to climate change, or promoting sustainable transport. The climate budget presents the financial resources that have been allocated to climate action, and illustrates how much action the city is taking towards its climate objectives annually. The budget also shows the impact of its action on emissions. Tampere’s climate budget is openly available on the city’s website and in its budget.

CARBON FOOTPRINT OF A BUILDING’S ENTIRE LIFECYCLE

According to the World Green Building Council, buildings and construction account for 39 per cent of all global greenhouse gas emissions. This figure includes the impact of both the construction and use of buildings – the latter being clearly greater.

In Finland, construction and buildings generate about one third of all greenhouse gas emissions. Due to the country’s northern location, buildings must be heated for much of the year. Climate action has long focused on improving the energy efficiency of buildings. The energy efficiency of new buildings is already extremely good, with new energy regulations that came into force in 2018 resulting in nearly zero-energy construction.

In the future, there will be a greater focus on the carbon footprint of each building’s entire lifecycle. New construction regulations on carbon footprints are slated for introduction by 2025. Construction guidelines currently being prepared by the Ministry of the Environment will cover both the beginning and end of a building’s lifecycle, including the manufacture of materials, actual construction, and the prevention and recycling of construction waste. Several construction projects are already being carried out using low-carbon principles.

Low-carbon urban single-family housing

Honkasuo, a new area of wooden construction in Helsinki, is an example of how low-carbon construction principles are being taken into account in city planning. Five detached houses with an extremely small carbon footprint were completed in spring 2021, one of which is home to **Ville Könönen**’s family of five.

The family was originally interested in the area due to its close proximity to their former home.

“When the houses went on sale, we found out that it was also part of a low-carbon development project. This really got me interested, and I started to follow the project more and more as construction progressed,” he says.

The five houses are part of a pilot project being run by the Ministry of the Environment. The project seeks to help people calculate a building’s climate impact throughout its entire lifecycle.

“We thought that, in an area focusing on wood construction, more consideration would be given to environmental issues and other solutions – and that felt good.”

Quantity of CO2 emissions during the construction phase came as a surprise

Könönen is familiar with energy-saving solutions, as he works in the ventilation sector. However, he still learnt a lot from the construction project.

“I was surprised by the quantity of carbon dioxide emissions that were generated during the construction phase – and even beforehand, starting with the manufacture of the materials.”

The materials used to build the houses were chosen so as to leave the smallest possible carbon footprint. A solid wood frame was employed, as it is a low-carbon material in terms of manufacture, construction, use and recycling. Concrete with a smaller carbon footprint was used for the concrete sections. A carbon-neutral house can be built by keeping its overall carbon footprint low and using materials that bind a lot of carbon. The houses have also been made ready for solar power, giving residents the option to transform their homes into zero-energy buildings that produce as much energy as they consume.

When assessing the environmental impacts of housing, transport connections and the location of services must also be taken into consideration. Honkasuo can be easily reached by bus and train, and services can be found close by. There are also plenty of forests in the vicinity.

ARCHITECTURAL POLICY PROGRAMME TAKES CLIMATE ISSUES INTO ACCOUNT

Finland is internationally renowned for its high-quality architecture. At an individual level, architecture has a significant impact on every person's quality of life. Steering construction in a more high-quality direction enables everyone to live in a pleasant environment, while also minimising the environmental burden caused by construction. As urban areas continue to grow, urban planning is increasingly under the spotlight.

A proposal for Finland's new architectural policy programme was completed in January 2021. The impact of construction on the climate plays a prominent role in the new programme. The proposal includes items such as improvements in assessing the impact of urban planning on emissions; a concept for a circular economy neighbourhood; and a new award for high-quality, sustainable construction.

The architectural programme also seeks to strengthen cooperation between actors who have an impact on the built environment. This cooperation will create a construction culture that will strengthen the Finnish economy in a sustainable manner, offer solutions to global issues, and create a good everyday living environment.

Climate change is driving change through every sector of society. It is also one of the main themes of the proposed architectural policy programme.

Photo: Aamos Kantola



DECARBON HOME – TOWARDS CLIMATE-WISE LIVING

People in Finland value decision-making based on knowledge and research. Limiting the carbon dioxide emissions generated by construction and housing requires multidisciplinary research to establish more climate-friendly operating models.

The Decarbon Home research project promotes a sustainability transition in housing and construction. The project is studying and developing participatory solutions to the challenges posed by climate change and housing segregation.

One of the project's aims is to understand residents' experiences and create opportunities for them to make climate-wise choices. Particular attention is being paid to suburbs and sparsely populated areas. There is great potential for improvement in the energy efficiency of suburban buildings from the 1960s and '70s, which are due for renovation. In sparsely populated areas, some detached houses require repairs, measures to increase energy efficiency, and even a new kind of heating system.

Decarbon Home is implemented by several expert organisations, cities and other stakeholders.

JÄTKÄSAARI CIRCULAR ECONOMY QUARTER

Finland is known as a pioneer in the circular economy. New innovations are being developed in areas such as housing in order to realise the principles of the circular economy in people's everyday lives.

The Jätkäsaari Circular Economy Quarter in Helsinki is being designed and built in accordance with a carbon-neutral concept based on the circular economy. This concept will also apply to future life in this communal quarter. The exact requirements for the quarter's circular economy will be identified during the design of its various spaces and functional practices.

The quarter's structures will be durable and adaptable, and their components will be easily separable for later reuse. The materials will be either renewable, such as wood, or recyclable, such as steel, brick and wood. A new model for circular economy construction can be created from the practice of salvaging materials from demolished buildings.

KIDE HOTEL – RESPONSIBLE TOURISM IN LAPLAND

Millions of euros have been invested in sustainable tourism in Finland over the last few years. Lapland tourism also revolves around the principles of sustainable development.

The KIDE Hotel is located in Pudasjärvi, at the base of the fells. Its values include providing a sustainable tourist experience, protecting nature in the national park, supporting local operators, and encouraging sustainable habits and activities.

Sustainable development ideology was also taken into account in the hotel's construction. KIDE is built from Finnish wood and is heated using geothermal energy. Smart functions help to optimise its energy consumption.

During the hotel's construction, some of the work stages were transferred from the construction site to the factory, generating recurring ecological benefits.



Photo: Ramboll

RAMBOLL VILLAGE – AN ENERGY-EFFICIENT OFFICE

The working environment forms part of a workplace's image, and an attractive workplace is an advantage in recruiting new talent. Working life has undergone major changes during the 21st century. A modern working environment must meet the new needs of working life, while also taking sustainability issues into account.

Ramboll Village, the Finnish headquarters of consulting and engineering company Ramboll, provides an excellent working environment for engineering experts. LED lighting makes the premises both more functional and more pleasant, as the lighting can be adjusted as needed and makes the most of natural daylight. The property has locked and covered bike shelters, as well as good staff facilities and plenty of charging stations for electric cars.

About 50 per cent of the office's energy needs are covered by locally produced renewable energy, with the aid of geothermal heat, energy recycling and solar power. The property's carbon dioxide emissions are less than half of those generated by a building that uses traditional district heating and water-based cooling solutions. The property has been awarded both a LEED Gold certificate and a Green Office certificate.



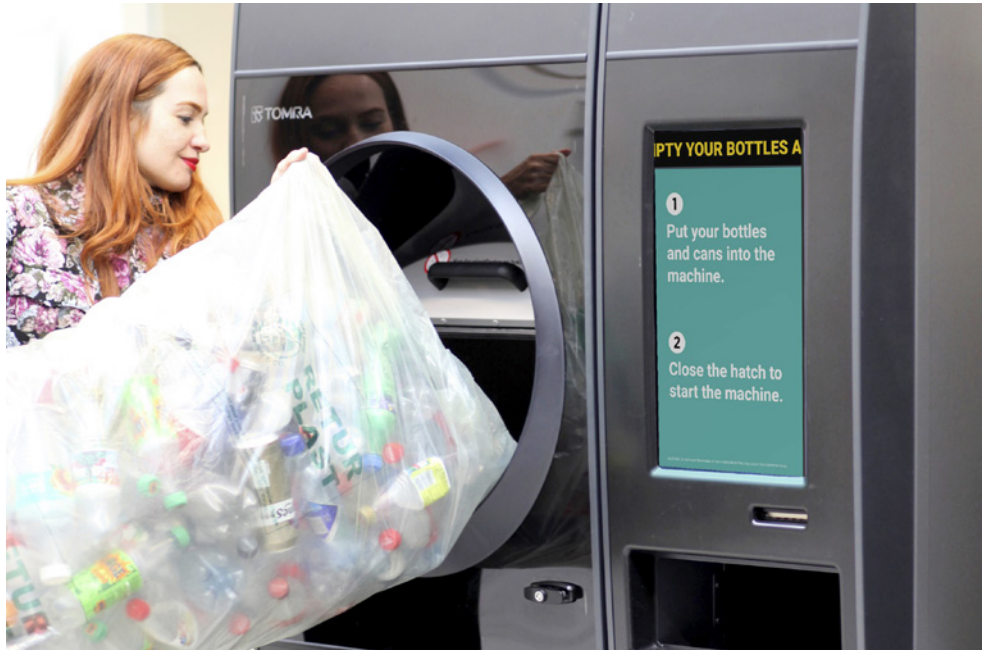
Photo: KIDE Hotel

A NEW DIRECTION FOR THE FINNISH ECONOMY

Finland has ambitious goals when it comes to developing a circular economy. The vision of Finland’s programme is for the country’s economy to be founded on a carbon-neutral circular economy by 2035.

Finland wants to reduce its consumption of non-renewable natural resources and increase its sustainable use of renewable natural resources. According to the Government’s decision in principle, the total consumption of primary raw materials in 2035 should not exceed 2015 levels. The circular material use rate should be doubled by 2035. An increasing number of Finnish companies have seized circular economy opportunities.

Municipalities play a key role in promoting the circular economy. The new low-carbon circular economy agreement that Finland is introducing provides one way of furthering its natural resource goals. The idea is for municipalities, companies and other operators to join the agreement and make voluntary commitments.



Recycling is seen as a natural civic obligation in Finland today.

Photo: Tomra

HOW WILL WE PROMOTE A CIRCULAR ECONOMY?

- Indicators and data are being developed so that we can verify the degree to which materials are being preserved. Companies will then be able to demonstrate the positive impacts of their business.
- Operating models that promote a circular economy are also being developed. Consumers are being offered access to products without the need to own or maintain the items themselves.
- Circular economy expertise will be integrated into both the education system and work skills.
- Incentives to transition to a circular economy will also be developed in the form of taxation, for example.

Finland paves the way for a circular economy

A circular economy is an economic model in which natural resources are consumed only within the limits of the Earth’s carrying capacity. In a circular economy, products and business models are designed so that materials remain in circulation for as long as possible. The goal is not to recycle, but rather to minimise the amount of waste than ends up needing to be recycled.

In spring 2021, the Finnish Government approved a strategic programme to promote a circular economy. The goal is to create a new foundation for transitioning to a circular economy by 2035. By introducing this programme, the Government wants to strengthen Finland’s role as a pioneer in the circular economy.

The programme is based on the world’s first circular economy roadmap, which was drawn up in Finland in 2016. This roadmap is also available to other countries, and can be adapted to their

needs. The roadmap defined the steps that Finland will take as it transitions to a circular economy by 2035. It was created to be updated, and it has already been revised to make its goals even more ambitious.

“Although there are differences in the way different countries operate, the roadmap contains some easily adaptable elements,” says **Mika Sulkinoja**, a leading specialist at Sitra, the Finnish Innovation Fund.

The roadmap has attracted a lot of international interest, and the Finnish Innovation Fund has created a guide to help others draw up their own roadmaps. For example, the African Circular Economy Alliance is looking into using the Finnish model, and promoting the circular economy is also being actively discussed in Southeast Asia.

Meeting the needs of an increasingly electrified society is another globally topical theme. Ensuring the availability and recycling of minerals

and rare earth metals will play a decisive role, as they are in increasing demand for smart technology. Changes in labour requirements are yet another major theme. Although some sectors are suffering, and there is no longer any use for certain kinds of expertise, the circular economy will create new jobs for others.

Favourable developments for the climate have long been seen in the economy, as many larger investors have begun to favour low-carbon operations. However, the transition to a carbon-neutral society requires a collective will and awareness among various organisations in public procurement.

“Finland is an open society with a transparent way of doing things. It’s relatively easy for a small country to pilot projects and test opportunities. Research and product development are also at a good level,” says Sulkinoja.

THE WORLD CIRCULAR ECONOMY FORUM

The World Circular Economy Forum (WCEF) is a global initiative of Finland and the Finnish Innovation Fund Sitra. WCEF brings together over 4,000 business leaders, policy makers and experts from around the world to present the world’s best circular economy solutions. Organised annually with international partners.

2017 The first WCEF was held in Helsinki, Finland with 1,600 participants from nearly 100 countries.

2019 In Helsinki again with over 2,200 participants.

2021 Online from Canada, with more than 9,000 participants from all continents.

2018 In Yokohama, Japan with more than 1,100 participants.

2020 Online from Helsinki, with more than 4,300 participants from 143 countries.

WCEF+Climate, hosted online from the Netherlands in April 2021, gathered over 2,200 people and more than 50 commitments to an Action Statement for achieving climate neutrality.

The annual main event and all WCEF+ events are available for online participation. Side events can be organised any other time of the year.

END-OF-LIFE TEXTILES PROCESSED INTO RECYCLED MATERIAL

Textiles that end up as waste are a global problem, driven by the production of vast amounts of cheap products. Mixed fibres have been difficult to reuse, as there has been no way of determining their composition. The situation has improved dramatically in Finland, as a new end-of-life textile processing plant has opened as the “missing link” in the country’s textile recycling chain.

It is the first plant in the Nordic countries to engage in the large-scale industrial processing of end-of-life textiles for reuse. The plant, built by the circular

economy company Rester, opened up in 2021. It is able to process an estimated 10 per cent of Finland’s annual volume of end-of-life textiles.

The plant receives textiles from companies for processing, including work clothes, textiles from the hospitality industry, and offcuts that have to date mainly ended up being incinerated. These textiles are processed into recycled fibres that can be used to make yarn, fabric, insulation materials for the construction and shipping industries, acoustic tiles, and composites.



Photo: Roni Lehti / Lehtikuva

The large-scale industrial processing of end-of-life textiles into recycled fibres is filling the missing link in textile recycling chain.

BIOWASTE RECOVERY AND LESS FOOD WASTE

Finland has committed to the UN’s Sustainable Development Goal of halving food waste by 2030. Reaching this target will require thoughtful purchases with regard to food and drink.

The “Love Every Crumb” campaign, which focuses on reducing food waste, was launched as part of these efforts. The campaign is being run as a collaborative effort between several agencies and organisations. Major grocery chains, restaurants and municipal waste management companies are getting involved, and are using the campaign materials to remind customers and residents to make thoughtful choices that will minimise food waste.

Biowaste must also be collected more effectively, both in homes and at workplaces. Finland is aiming to increase its municipal waste recycling rate from 41 to 65 per cent by 2035, and biowaste will play a key role in this.

Properties containing at least five apartments are obliged to sort their waste into separate containers for metal, glass, cardboard, paper, plastic, biowaste, and incinerable waste. **Lotta Salminen**, an environmental advisor from the waste management company Lounais-Suomen Jätehuolto, says that Finland has good waste sorting systems.

“Containers for sorting everyday household waste are located in housing companies’ yards, and there are all kinds of services that accept different kinds of sorted waste, such as domestic appliances and scrap metal. There is, however, still room for improvement in waste sorting.”

Lounais-Suomen Jätehuolto provides information and advice on how to sort waste properly. In addition to sorting waste, it is important to make choices that generate as little waste as possible. In the case of biowaste, this means buying only as much food as you really need.

Photo: Marimekko



Marimekko x Spinnova demo outfit.

FASHION FROM SPINNOVA’S ECOFIBRE

Two of the textile industry’s major problems are the carbon dioxide generated during manufacturing and the synthetic fibres that end up as waste. Spinnova has developed a cellulose-based fibre that is low-emission, biodegradable, and also recyclable in the same process. This process also consumes only a fraction of the water required to process cotton.

Today’s consumers are interested in sustainability, and this has opened up opportunities to make significant international cooperation agreements. Until now, bioproduct-based clothing has been relatively expensive, but cooperation with brands such as Adidas, H&M and Marimekko has made available to a larger target group. Spinnova is already manufacturing cellulose-based fibre at its pilot facility, and its first commercial plant is scheduled for completion in late 2022.

As a result of careful research, Spinnova and its partner KT Trading have also succeeded in developing a leather waste fibre that can be manufactured without harmful chemicals.

Photo: Sulapac



SULAPAC OFFERS AN ALTERNATIVE TO PLASTIC

Sulapac wants to replace plastic packaging with more sustainable materials. The company has developed a wood-based material that resembles plastic. Sulapac’s products are completely biodegradable and do not release any microplastics. The pulp can also be processed using existing plastic product equipment.

Various combinations of bio-materials and wood fibres are used to manufacture things such as packaging material, straws and clothes hangers. Sulapac’s aesthetically pleasing products are particularly popular among cosmetics companies.

NESTE PRODUCES FUEL FROM WASTE

Oil refiner Neste’s target is to increase its use of waste and residues to account for one hundred per cent of the company’s total consumption of renewable raw materials by 2025. Its renewable diesel sold in Finland is already made of 100 per cent waste and raw material residues. The waste and raw material residues used by Neste include used frying fat, animal fat waste from the food industry, waste and residues from vegetable oil production, fish fat waste from the food industry, and technical corn oil.

WHEN DATA CENTRES GO CLIMATE NEUTRAL

Finland is an industry forerunner in advanced data centres, hosting such players as Google and Yandex. The data centre for the CSC - IT Center for Science, located in Kajaani, Finland, just added a world-class asset with a supercomputer called LUMI (Finnish for 'snow').

LUMI uses 100 percent hydropower energy. It will also produce 20 percent of the area's district heating, harnessed from the centre's waste heat.

LUMI is one of the most competitive supercomputers in the world, with a theoretical computing power of more than 200 quintillion calculations per second – equivalent to that of over 1.5 million modern-day laptops. In addition to crunching all those numbers in an instant, LUMI will also be one of the world's leading platforms for artificial intelligence.

LUMI data centre at CSC's data centre in Kajaani, Finland.

Finnovators, assemble!

The fight against climate change requires innovations. Technological breakthroughs have the power to change the everyday lives of millions of people – and often, all you need is a solid idea as your starting point.

When it comes to creating a truly sustainable agenda, Finns recognise that environmental issues know no boundaries. We must impact change on a global scale, or all is lost. To do this, we need to network, find partners and embrace a systemic approach around the world.

Finland's game plan calls for the discovery of new innovations with the most impact, turning these winning concepts into practical solutions – which, in time, will become best practices, amplified and multiplied across the planet. The quality of the Finnish innovation environment has been ranked as one of the best in the world by the Bloomberg Innovation Index, for instance.

Tiina Nakari-Setälä, Head of Business Development at VTT Technical Research Centre of Finland, says that mitigating climate change takes many forms in Finland, from smart traffic and sustainable energy production to biomaterials and green fuels. Nakari-Setälä says that the uniqueness of the local innovation environment arises from functional society, educated people

and forward-looking industry, which has always emphasised robust innovation.

"Finland is a small, hi-tech country where collaboration between various players comes quite naturally," she says.

R&D is in the national DNA of Finland, which has more researchers per capita than just about any other OECD country and one of Europe's highest R&D investment rates as a share of GDP.

According to Nakari-Setälä, there are still plenty of new frontiers for Finnish pioneers to blaze: for example, sustainable and smart construction, packaging and new kinds of recyclable textiles are brimming with promise.

"At VTT, we work very closely with companies of all sizes, from startups to major international players, to assist in the launch of this next wave of innovation," she says.

Professor **Jari Hämmäläinen**, Vice Rector for Research and Innovation at LUT University, was the long-time Scientific Committee Chair for European Cooperation in Science & Technology (COST). He says that climate change is a threat which requires all sciences to contribute.



The Carbon Ego app visualises how travel, living, housing, eating and consumption habits impact your CO2 missions.

“We need engineering and technology, but we also need behavioural and societal sciences to meet this challenge,” he says, adding that the technology for wind power, for example, has existed for a long time, but it took a shift in global attitudes to create the foundation for the present, favourable situation.

Discussing innovation excellence, Härmäläinen notes that many of the green advances of today are made in ecosystems with companies – big and small – benefiting from scientific research. He sees Finland as having a certain “ecosystem edge”.

“We’ve been able to create agile ecosystems which bring together widely varied expertise,” says Härmäläinen.

And what is the secret behind successful, sustainable ecosystems? Härmäläinen says the answer has something to do with the Finnish mindset: pooling resources to secure the best possible results is something Finns have always done.

“There’s a sense of community and mutual trust in these ecosystems that allows new ideas to take root,” he observes.

Credited with about 100 inventions in areas such as mobile communications and data transmission – and the holder of a dozen patents – Härmäläinen has a clear idea when inspiration and innovation may strike. He also knows when that *Eureka!* moment is likely to remain elusive.

“When you’ve set up an entire workshop to focus on innovations, it may be that nothing comes from that. On the other hand, when you’re just about dozing off in a boring seminar somewhere, you may suddenly get a winning idea,” he says.

HIGH FIVE IN FINNISH INNOVATION

- Best business environment in the world (Global Innovation Index 2020).
- Highest digital competitiveness in the EU (Digital Economy and Society Index 2020).
- Achieved the goals of inclusive and equitable education and affordable and clean energy, according to the Sustainable Development Report by UN (2021).
- Top spot on sustainability efforts in the Europe Sustainable Development Report 2020.
- Happiest country in the world for fourth year in a row (The World Happiness Report 2021).

Set the green bar high – Finnish industries compose their own low-carbon road maps

Finland intends to be climate neutral by 2035 – and, in doing so, set the bar at world-record height. In comparison, the EU aims to be climate neutral by 2050. After reaching climate neutrality, Finland will push for climate negativity. But how will these ambitious targets be reached?

The Finnish way is to draw up low-carbon road maps in cooperation with companies and organisations in the relevant sectors. As a consequence, 13 sectors, including such heavy hitters as energy and tech, have prepared their own road maps.

Recognising that a dramatic change is required for the transition to a low-carbon society, these road maps provide a more detailed picture of the scale and cost of the needed measures. They show that the goal of a climate neutral Finland by 2035 is fully achievable for industry and other sectors – with existing or upcoming technologies.

To reach the lofty target, we need a favourable investment environment as well as innovators, early adaptors and a total commitment to the just green transition.



Photo: Tim Bird

The energy sector has reached its goals faster than originally targeted. District heating is a major player in Finland.

Get active, stay active!

Helena Soimakallio, Executive Director for Sustainable Development at the Technology Industries of Finland, says that industries have taken an active role in the sustainable revolution. For instance, all major sectors are now planning or preparing further steps on their road maps, including more thorough reviews and means to put the results into practice.

“Energy and material efficiency as well as corporate responsibility have always been important to Finnish industry, but climate hasn’t been the driving force behind key decisions until now,” Soimakallio says, adding that now that the market for sustainable solutions is there, the customers are there – and Finnish companies are responding.

“We’ve already seen a paradigm shift towards clean technologies and other sustainable solutions – and that shift is only intensifying,” she says.

Electrification of society is now one of the key drivers in the green transition. Strong growth in the use of renewables for low-carbon energy production is facilitated by flexible energy systems.

In addition, improving energy and material efficiency and decreasing the need for primary energy are top priorities – along with local energy production and storage, for instance. Enabling

efficient, clean energy communities with a large share of renewables is the goal.

Soimakallio cites various solutions that are shaping the face of Finnish industry today: overall digitalisation, improvements in energy efficiency, the use of secondary streams, low-carbon raw material sources, deploying digital twins, energy efficiency of buildings and ICT.

“Furthermore, there are new business models that focus on sustainability, low carbon and circular economy from the very beginning,” she adds. “In many cases, the technology already exists – now it’s a matter of piloting and moving it to industrial scale.”

According to Soimakallio, Finnish industries have hit the ground running, striving for those green innovations. But why are companies so keen on going low-carbon?

Soimakallio believes that Finnish R&D – and in larger context, the Finnish mindset – is geared towards making these types of pivots.

“We have great multi-disciplinary collaboration in R&D operations – as well as flat-out performance,” she says. “That’s a great foundation to build on.”

TALK TO THE HAND!

Carbon Handprint highlights companies’ fight against climate change – with a positive angle.

The idea behind the Carbon Handprint – another winning green concept from Finland – is that a company can develop products and services that allow its customers to reduce their carbon footprint. Via carbon calculation, you discover the size of the Carbon Handprint caused by the company’s product: the bigger the Handprint, the better.

The Carbon Handprint gets bigger when you, say, improve energy efficiency, reduce the use of materials, make climate-friendly choices of raw material, develop product recyclability or reduce the amount of material waste.

Developed by VTT and LUT University with support from the European non-profit business network Climate Leadership Coalition, the Carbon Handprint allows companies to push for the positive and show true climate leadership.

Large Finnish companies such as Nokia and Neste are already reporting their annual Carbon Handprint. Neste, for example, reported that in 2020, its customers were able to reduce greenhouse gas (GHG) emissions by a total of 10 million tonnes.



Common Ground

Most sustainable results are achieved when policymakers and researchers work together.

Climate policy is teamwork all the way. Finland is deepening the cooperation between policymakers and researchers by forming scientific task groups to support the drafting of legislation as well as national strategies. Through cooperation, a sufficient knowledge base for policy making emerges; a base which correlates with the new requirement of preparing a climate change impact assessment on every law.

The target: getting a better handle on issues such as the circular economy, biodiversity and climate change.

The “green policy revolution” has been in the works for quite some time. The Climate Change Act took effect in Finland in 2015 and is now being updated. According to the Act, Finland must reduce its greenhouse gas emissions by at least 80 percent by 2050 from 1990 levels.

According to Finland’s Government Program, the country will be climate neutral by 2035, and this goal is to be inscribed into the revised, strengthened Climate Change Act as well.

Upgrading of the legislation started in 2020 and could be concluded in 2022. With the updated Climate Change Act, Finland aims to further strengthen participation.

One example of this is hearing the views of the indigenous Sámi people in Lapland. The Arctic area is warming three times faster than southern regions, posing a severe threat to the way of life of the Sámi who traditionally practice reindeer herding.

In the spirit of full inclusion, an internet survey has been launched in six languages, targeting different age groups all over Finland.

Spurred on by legislation, Finnish businesses are striving towards structural changes to ensure a more sustainable future. In addition, many Finnish municipalities and cities have set even more ambitious climate goals than the national ones and are

sharing their best practices. Municipalities have shown a very progressive mindset: just look at the City of Lahti, the European Green Capital 2021.

Finns from all walks of life recognise that the climate situation is serious. As the magnitude of issues in the climate arena is so vast, we must pool all resources – and everybody is called to contribute.



Windmills and reindeer at the top of Olostunturi fell in Muonio.

Innovating for change

In Finland, innovation policy, in coordination with sectoral policies, has been an important, effective tool for change.

“Innovation policy enables the green transition in a variety of ways – and change can take place quite rapidly, too,” says **Paula Kivimaa**, Research Professor at the Finnish Environment Institute (SYKE). Kivimaa has studied the connections between public policy and innovation, with recent focus on smart traffic and energy transition in society.



Photo: Jussi Hellsten

One example of the recent pace is a research project she was involved in, the Smart Energy Transition. When it began in 2015, the status of the energy transition was very different from now.

“Less than five years on, a lot of things had already changed for the better and the energy transition was fully under way. Many of the things speculated as alternatives had become reality.”

Kivimaa points out that during the last few years, we have seen renewables rise, with wind and solar nearly pushing coal out of the picture.

“Construction and real estate are also becoming more energy efficient and carbon conscious while transport is being electrified, along with industry,” she says, describing the “green spurt” of the past five years.

“When you have technologies in place,” she adds, “it’s easier to create more ambitious policies for sustainability transitions.”

As various sectors come together to combat a shared problem, breakthroughs often occur. Similarly, uniting public policy makers, industry leaders and top academic minds under a common green flag is working well in Finland.

“One example of this is how transport, communications and innovation policies have facilitated the development of Mobility as a Service (MaaS), where Finland is a leader.” In the coming years, MaaS has potential in the global transportation market, with all means of travel centralised and easily accessible via smartphone. However, the COVID-19 pandemic as well as increased focus on reducing transport emissions are likely to influence how far this will spread.

Kivimaa especially credits people in industry for taking a big role in the energy transition.

“Recently, companies seem even more oriented towards the future energy transition than decision-makers,” she notes.

Forum Virium Helsinki has supported the realisation of several robot bus projects, like Fabulos in the city’s Pasila district.

Photo: Linda Tammisto



The housing company Helsingin Salvia, in Helsinki’s Eko-Viikki neighbourhood, is the first residential apartment building utilising solar electricity in Finland. Solar panels on its façade serve a dual role as balcony railings.

HELSUS – A PIONEER IN SUSTAINABILITY SCIENCE

Sustainability science seeks practical solutions to global challenges through an interdisciplinary approach and cooperation between a broad range of actors. One of the pioneers in sustainability science is HELSUS (Helsinki University Institute of Sustainability Science*). This institute was established in 2018, and its research focuses on fundamental societal changes that will lead to sustainable wellbeing for both humans and nature.

HELSUS brings together the expertise of seven faculties, and provides an attractive

international and multidisciplinary research community for researchers working on sustainability issues. There is active dialogue between research institutes and other civic actors. Another of Finland’s strengths is its broad range of habitats and research environments, from cities in the south to the Arctic region of the north, and from the forests of the east to coastal regions in the west.

* www2.helsinki.fi/en/helsinki-institute-of-sustainability-science

WORLD FIRSTS: SEEKING SUSTAINABILITY

Finland was the first country to introduce a carbon dioxide (CO2) tax, based on the carbon content of fossil fuels, in 1990. The basic idea behind the carbon tax is to make commodities with heavy emissions more expensive in relation to low-emission alternatives.

Finland was also the first country to publish a national Climate Change Adaptation Strategy (2005) and a roadmap to a circular economy (2016).

END OF COAL BY 2029

Finland will ban coal-fired power and heating generation as of 1 May, 2029. The Government made the decision to ban coal in 2019, making Finland one of the first countries to phase out coal. Currently, coal accounts for around four percent of Finland’s power and heat generation.

Energy companies have already responded to the challenge. For example, in the capital city of Helsinki, the Hanasaari coal power plant, one of the country’s biggest, is closing in 2023, two years ahead of the original schedule.

The coal ban is part of Finland’s National Energy and Climate Strategy to 2030. Coal will be the first fossil energy source to be banned in Finnish energy production.

The ban will promote a low-carbon energy system, drive the use of renewable energy sources and ensure a healthy living environment. According to estimates, it will cut carbon dioxide emissions by approximately one million tonnes a year, while also reducing other emissions such as sulphur dioxide and heavy metals.

The Nordic Hub for Energy Technology

Photo: City of Vaasa / Christoffer Björklund



There's a real energy revolution brewing in the Vaasa region on Finland's west coast. Representing more than 160 companies, from startups to listed companies, EnergyVaasa is the largest energy technology hub in the Nordic countries.

EnergyVaasa is also a world leader in various technologies, such as smart electrical solutions, sustainable energy, flexible power generation and digitalisation.

In the coming years, additional investments in energy technology infrastructure will further boost EnergyVaasa.

Under the EnergyVaasa concept, local universities, energy technology companies and municipalities are working together on research, product development, innovation and education. The mission for the leading energy hub in the Nordics is clear: to create more sustainable technologies for saving the planet.

CREATING A HEALTHIER PLANET

Neste, a Finnish company, creates solutions for combating climate change and accelerating the shift to a circular economy. It helps transport and cities, as well as customers in the aviation, polymers and chemicals sectors, to make their business more sustainable. Neste is the world's largest producer of renewable diesel and sustainable aviation fuel refined from waste and residues, while also introducing renewable solutions to the polymers and chemicals industries. The company is also a technologically advanced refiner of high-quality oil products, exploring ways to use waste plastics as a raw material for new plastics and developing chemical recycling to combat the plastic waste challenge.

In 2021, Neste placed 4th on the Corporate Knights' Global 100 list of the world's most sustainable companies. In 2020, 94 percent of the company's comparable operating profit came from renewable products. Neste manufactures its high-quality, renewable products in Finland, the Netherlands and Singapore. Its aim is to become a global leader in renewable and circular solutions.



Photo: Wärtsilä

Visions of future shipping – EXERGO – Unlimited Energy Storage.

MASTERING MARINE

The transition towards decarbonised operations is key for the maritime industry, with stricter regulations on ship emissions coming into force worldwide. Over the coming years, industry players must work together to develop economically viable options that meet the International Maritime Organisation's (IMO) emission targets.

As it stands, Finland has plenty of experience in boosting maritime innovation. Wärtsilä, a global leader in smart technologies and complete life-cycle solutions for the marine and energy markets, is one of the innovative companies helping marine industries change course. By emphasising sustainability, efficiency and data analytics, Wärtsilä maximises the environmental and economic performance of vessels around the world with its advanced engines.

Furthermore, the company has been making significant investments in zero-carbon fuels, such as green ammonia and hydrogen.



FOOD OUT OF THIN AIR

Global food production through agriculture alone is facing vast challenges. But what if you could make protein out of thin air? Finnish startup Solar Foods is doing just that.

Solar Foods is an exciting new food tech company that has invented and patented a unique bio-process for the production of its 'miracle protein' Solein, using only air and electricity in the process. Using fermentation to grow protein is certainly a novel approach to solve the global food crisis.

According to Solar Foods, its concept represents a completely new way for humanity to harvest food, as Solein is made up of whole cells that are 65–70 percent protein. The macronutrient composition of the cells is similar to that of dried soy or algae.



HAVE YOU TRIED PULLED OATS YET?

Pulled Oats® is a completely plant-based food, featuring oats, yellow peas and fava beans. The maker of Pulled Oats, Finnish company Gold & Green, is on a mission to provide people with healthy, planet-friendly food without compromising taste.

Pulled Oats is made by mechanically heating and abrading the ingredients – with no additives in the mix. Since its launch in 2016, Pulled Oats® has become a household name in Finland, Netherlands and Australia, and it's presently being sold in the food service sector in Europe and the USA.

Finnish startups raised

€951 MILLION IN 2020

– doubling the amount of investments from 2019.

European leadership towards global climate neutrality

Biodiversity is a prerequisite for human health and wellbeing. It also plays a key role in mitigating and adapting to climate change. The pandemic has made this relationship between biodiversity and climate change even clearer.

The aim of the global, legally binding Paris Agreement is to limit the increase in the average global temperature to one and a half degrees Celsius compared to the pre-industrial era. There's still a lot of work to do, which means we must pick up the pace of climate action over the next few years. The European Union plays a key role in international climate negotiations, and is seeking to get other major countries and regions to commit to ambitious emission reduction targets.

The EU has committed to reducing its emissions by at least 55 per cent by 2030, and is also aiming to be the first continent to become climate neutral by 2050. In 2019, the EU published the **European Green Deal***, a programme that seeks to reduce emissions in all sectors from transport to agriculture and energy production, and to do so in a sustainable and fair manner. In order to achieve this, the EU will be amending its common climate

and energy policy over the next few years. EU countries have also committed to using at least 30 per cent of their coronavirus recovery funding to promote climate action.

When it comes to international climate policy, Finland operates through the EU and seeks to promote its common objectives. The Nordic countries also engage in close cooperation. Nationally, we want to achieve carbon neutrality by 2035, which gives weight to our actions. Our strengths include state-of-the-art energy technology and versatile solutions for the bioeconomy and circular economy. There's also international demand for this kind of expertise. Exporting effective emission-reduction solutions to the rest of the world is another way of engaging in climate policy.

In addition to effective EU influencing and sharing climate and circular economic solutions, Finland is also looking for solutions to the climate crisis through proactive climate diplomacy. **Jan Wahlberg**, Climate Ambassador at the Ministry for Foreign Affairs, says that the focal points of Finland's climate diplomacy are expanding the Coalition of Finance Ministers for Climate Action, promoting climate cooperation and reducing the

use of black coal in the Arctic region, and development cooperation with respect to meteorology and preparedness in particular. These goals will be furthered bilaterally as well as through regional and international organisations. Tackling the climate crisis also involves conflict prevention, human rights, and promoting peace and sustainable development. That's why ensuring security by mitigating climate change is also mentioned in Finland's Government Report on Finnish Foreign and Security Policy (2020).

valtioneuvosto.fi/en/-/government-report-on-finnish-foreign-and-security-policy-2020-security-and-global-responsibility-sharing-go-hand-in-hand-1

*ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en



Photo: Coalition of Finance Ministers for Climate

COOPERATION BETWEEN FINANCE MINISTERS LEADS TO NEW TOOLS FOR CLIMATE ACTION

The Coalition of Finance Ministers for Climate Action was created in 2019 on Finland's initiative. The coalition brings economic policy tools into the fight against climate change: taxation, budgeting, funding and public procurement are all important policy instruments for emission reductions. The coalition supports strengthening the climate competence of finance ministries and mainstreaming climate change in economic policy making. The coalition consists of more than 60 countries, and covers about 63 per cent of global GDP and almost 40 per cent of the world's greenhouse gas emissions.

www.financeministersforclimate.org

BLACK CARBON PLAYS A KEY ROLE IN CLIMATE WARMING IN THE ARCTIC REGION

On average, the Arctic is warming twice as fast as the rest of the world. The melting of Arctic ice sheets is in turn accelerating global warming. Black carbon plays a major role in this. Black carbon dust is created by forest fires and flaring (the burning of unwanted gases in oil and gas production), for instance. Air currents carry the carbon to Arctic regions, where it absorbs heat and accelerates climate warming and the melting of snow and ice. The member countries of the Arctic Council have committed to a 25–33 per cent reduction in emissions by 2025 in relation to 2013 levels. Reducing emissions from black carbon is one of Finland's policy priorities in the Arctic. Important means of achieving this goal include modernising thermal and electric power plants and reducing emissions from shipping.

CLIMATE CHANGE IS ALSO A QUESTION OF EQUALITY

Different genders have different opportunities to use resources, services and information, and to exercise decision-making authority; and this also impacts an individual's ability to adapt to climate change. The UN has estimated that, globally, women make up 70 per cent of those who are either living in poverty or have been made vulnerable to it as a consequence of climate change. Drought increases the burden on women, as water and energy become more difficult to obtain. Women and girls suffer more from the consequences of disasters. Women are also farmers and food producers. Promoting gender equality must therefore be taken into account in all climate action. Largely thanks to Finland's proactivity, gender equality has also been entered into the Paris Agreement.



Photo: Michael Tewelde / Lehtikuva

Villagers and volunteers planting trees in Kenya.

A better life for millions with development cooperation funds

Storms and droughts, floods and diseases. Scarcity of food and clean water, the accelerating pace of migration, and competition for natural resources. Climate change is causing enormous problems, especially for the poorest countries – and these problems pose a serious threat to global security.

Finland takes climate sustainability and low-emission development into account in all of its development cooperation. Climate action can also support other sustainable development goals. In emerging countries, climate action is supported through numerous channels from small NGO projects to large multilateral climate funds.

Empowering women has been proven to have an impact on the wellbeing of the community as a whole. Women in emerging countries have everyday insights into how we can mitigate and adapt to climate change. That's why Finland takes equality perspectives into account in all of its development work.

Thanks to its excellent results, one of the flagships in Finland's development efforts is the Energy and Environment Partnership (EEP), which was launched in eastern and southern Africa in 2010. EEP Africa currently operates as a fund managed by the Nordic Development Fund (NDF). It supports activities in 15 countries in eastern and southern

Africa.

The EEP has given people in the target countries faster access to renewable energy while promoting sustainable and participatory green growth. In particular, it has improved the living conditions and livelihoods of the poorest people. Cooperation with local actors has created thousands of jobs for women and young people in particular, and has brought renewable energy into hundreds of thousands of homes. At the same time, carbon dioxide emissions have been reduced or avoided, and savings have been made in energy-related costs.

WHAT HAS EEP AFRICA ACHIEVED?

Cumulative results since 2010:

15

Projects implemented in countries

12

Different clean energy technologies



€94 M

Annual savings in energy-related costs

€50 M

invested in 250 projects



8,750

direct jobs created
40% for Youth
37% for Women

eepafrica.org/portfolio/results/

5.1 M

People with enhanced energy access

1.5 M

tons CO2 emissions reduced or avoided

263 GWh

Clean energy generated per year



Meteorology brings together innovations and development work



Photo: Vaisala

Nine out of ten natural disasters are related to climate change. Over the past decade, disasters have claimed the lives of hundreds of thousands of people and affected the lives of almost two billion.

In addition to mitigating climate change, we need the means to adapt to it on a large scale, including ways of predicting and preparing for weather and climate risks. This is where meteorology – one of Finland’s development policy priorities – can be of assistance.

The Finnish Meteorological Institute (FMI) is a veteran when it comes to international cooperation in the field of weather and climate: it has carried out international projects in more than 100 countries. The Finnish company Vaisala is the world’s leading supplier of weather systems,

and sells weather observation and measuring equipment to more than 150 countries every year. Together, the FMI and Vaisala cover both equipment (such as weather radar, sounding stations and lightning location systems) and weather forecasting and warning systems, end products, and meteorological training.

With the aid of civic organisations and other local actors, those requiring information can obtain it in a timely and intelligible format. The FMI’s local partners include the Red Cross and Red Crescent.

It is seamless cooperation like this, between public and private-sector actors – the Ministry for Foreign Affairs, the FMI, Vaisala and the Red Cross – that makes Finland’s offering so special.

SMARTMET HELPS WITH FORECASTING

One of the FMI’s top products is the SmartMet weather forecasting system, which collates meteorological observations, including data produced by weather radar, satellites and weather forecasting models. The system helps meteorologists to analyse and visualise data on their own workstations, and to issue weather forecasts and warnings based on this information. The system is already in use in more than 30 countries. It is partially based on open source code, and the FMI does not charge licence fees for its use.

Vietnam is one of the countries that is using SmartMet. Meteorological cooperation with the Vietnam Meteorological and Hydrological Administration has been going on for ten years with Finnish and other international funding (including from the World Bank). A team of about ten people from the FMI were responsible for exporting the system to Vietnam, including a project manager and the institute’s own weather forecasters and IT experts.

SmartMet was used during the 2020 typhoon season, when Typhoon Vamco hit Vietnam’s region. The system provided earlier and better weather forecasting data, which helped people to prepare for the arrival of the typhoon and minimise the damage it caused.

Photo: Heikki Saukkomaa / Lehtikuva



ONE EURO SAVES TEN

Weather and climate services benefit not only disaster risk management, but also all sectors of society from transport and energy to agriculture, water and healthcare. Developing these services is one of the most cost-effective ways of adapting to the impacts of climate change: on average, investments are estimated to generate a benefit worth ten times their value. This means that every euro spent on developing a weather service generates savings of ten euros.

Did you know?

Is your lifestyle good or bad for the environment?

Test yourself and find out if you are
a threat or an opportunity.

After a brief test,
you'll get tips tailored for you.
They'll help you save time and money
and improve your quality of life.

And our planet will thank you!
Test yourself!

Sitra lifestyle test: lifestyletest.sitra.fi/

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