

# City of Espoo Finland: Our Objective Is to Reach Carbon Neutrality by 2030



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## The UN SDGs sustainable development goals

On 25 September 2015 193 heads of states agreed to give their citizens latest by December 2030 a life within the frame of peace, rights and wellbeing. Country representatives had been negotiating on behalf of their people for more than 6 years how this frame should look like. They defined 169 targets for each of these 17 Sustainable Development Goals in order to ensure that everybody on all continents (from all sectors of life, reflecting all diverse religious and political realities) can be on board – with nobody left behind. While the SDGs are not legally binding, countries committed to implement them.

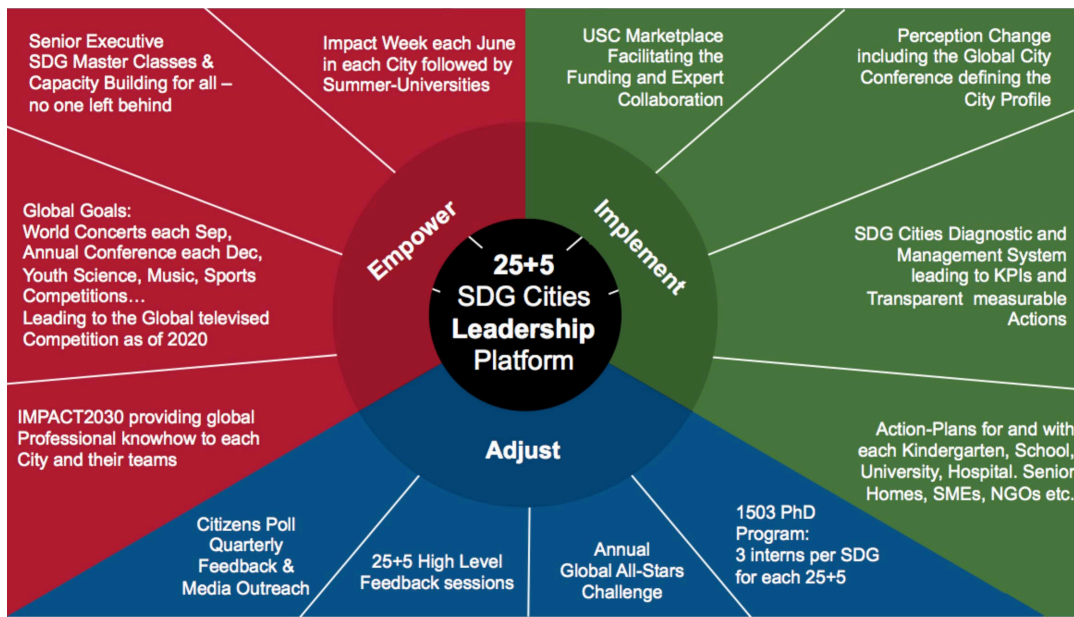
Targets for 2030 include access to affordable and reliable energy while increasing the share of renewable energy in the global energy mix. This would involve improving energy efficiency and enhancing international cooperation to facilitate more open access to clean energy technology and more investment in clean energy infrastructure.

SDG 25 + 5 Cities Leadership Program covers all continents representing the rich diversity of Cities invited by this UN initiative to take the lead to illustrate that the global goals can become a reality for their citizens by 2025, 5 years ahead of schedule. This Leadership Program and the Platform together with the UN Partnership Program, UNECE and UNOPS provide the Cities with investments for SDG realization, acceleration tools for international recognition and unique programs to educate and mobilize all members of the participating communities.

Empowering is the key word in the SDG 25+5 program. This means mobilizing all the potential actors for and with the people. While most of the cities have already an impressive action plan in place improving the life of their citizens, the 25+5 SDG Cities Leadership Platform provides a constructive and ongoing dialogue between the City leadership of each of the selected Cities on the one side and each of the global experts per SDG on the other side to understand the existing projects in place, providing additional insights and options for solutions and funding.

Roland Schatz, the UNGSII Founder and Senior Advisor to the General Director of the UN, is the key person in moving to action. The 25+5 SDG Cities Leadership platform is nothing more – but as well nothing less: starting with 25 cities operating in 5 different realities all over the world and 5 indigenous communities to showcase: we have all we need to reach all 17 SDGs latest by 2025. Roland Schatz describes these forerunner cities to become shining lighthouses for the others.

Michael Möller Director General United Nations of Geneva, writes about the SDG 25+5 Cities Leadership Program: “Establishing closer collaboration between us - between cities, international organizations, businesses - that is one part of the equation. The other, equally important part, is to explore collaboration on specific issues. Take, for example, urban infrastructure. UN Habitat estimates that 70% of the urban infrastructure that will exist in 2050 has not yet been built. Now here is an opportunity disguised as a challenge. We need to raise our ambition: Science demands it. The global economy needs it. And humanity depends on it. The SDGs are our common roadmap towards our shared destination - a fair globalization that leaves no one behind. If “you win-I lose” calculations dominated Cold War-era international relations, the SDGs are the paradigm shift necessary for the new polycentric system that does away with zero-sum games.”



## The European Union policy

On 28 November 2018, the European Commission presented its [strategic long-term vision](#) for a prosperous, modern, competitive and climate-neutral economy by 2050. The strategy opens a thorough debate involving European decision-makers and citizens at large as to how Europe should prepare itself towards a 2050 horizon and the subsequent submission of the European long-term Strategy to the UN Framework Convention on Climate Change by 2020.

What the cities could and should do? The European Committee of the Region CoR is the EU’s official assembly of cities and regions. The CoR calls for a closer cooperation between the EU and Member States’ regional and energy policies. Streamlining the various support schemes for renewable energy is essential to reach the objectives of the Energy Union and those of the Paris agreement as well as the UN Sustainable Development Goals SDGs.

The Energy Union Strategy is built on the ambition to achieve, in a cost-effective way, a fundamental transformation of Europe's energy system, moving to more sustainable, secure and competitive ways of delivering energy affordably to consumers. Research and Innovation and the use to best available knowledge constitute a crucial pillar to fulfil this objective.

The CoR urges the EU and its Member States to provide better planning and long-term investment policies for renewable energy projects, with guaranteed financial support mechanisms so that local energy activities and also ownership can be placed on a more influential and secure footing.

Accordingly, the CoR calls on Member States to set up dedicated finance support schemes for local energy communities, particularly during the planning and set-up phases. EU cities and regions recommend the development of grant-to-loans, guarantees and affordable credit opportunities with ready access to technical information and guidance about setting up, financing and operating community projects and innovative ownership structures.

Cities and city-driven regions are the future powerhouses of change. Cities are already by now laboratories for transformative and sustainable solutions. On a very practical level close to the citizens' daily interests is the city refurbishment and better spatial planning including green spaces can be major drivers to renovate houses and attract people to live again close to work, improving living conditions, reducing travel time and associated stress. To protect Europe's citizens from the adverse effects of the changing climate, planning and building public infrastructure to withstand more extreme weather events will be an imperative no regret option. In this respect, the EU has started to capitalising on and expanding the role of regions, cities and towns.

The EU's activities on the Covenant of Mayors movement are an example of collaboration that allows local authorities to learn from one another. The joint European Commission and European Investment Bank URBIS initiative is a tangible example of EU assistance for cities in the development of their investment strategies. The Urban Agenda for the EU, which reinforces the urban dimension of relevant EU policies, also plays an initiator role.

### **Espoo the forerunner city**

Espoo, with our 300 000 inhabitants, is the fastest growing city in Finland. We are part of the capital region Helsinki. According to an international comparative study conducted by Tilburg University during the Dutch Presidency of the EU in 2016, Espoo is the most sustainable city in Europe. Sustainability was measured using economic, sociocultural, and ecological sustainable development metrics, follow-up study in 2017 ranked Espoo again #1 most sustainable city in Europe. Espoo aims to continue being the most sustainable city in Europe and it is also underlined in Espoo Story, the city strategy for current city council term 2017-2021.

City Council approved in September 2017 the Espoo City's main strategic goal to reach the carbon neutrality already by 2030. The necessary measures are planned by not only the city but also by all other public authorities – and the actions are implemented by the help of large scale public-private collaboration and multi-stakeholder partnerships. Citizens play a crucial role. The new political instrument is the Sustainable Development Policy Programme chaired by five key council members and five key civil servants. The programme owner is the Mayor of the City.

The extent to which the co-operation between various partners can be developed and implemented is key in terms of the success of the programme. The programme features a network management project which supports the City of Espoo's partnership co-operation. The goal of the project is that the City of Espoo and its partners are willing and able to set common development targets and resource their implementation. The targets are set to implement the Espoo Story in accordance with the programme targets.

Espoo was awarded as "The most Intelligent community in the world" in June 2018 and in July UN called Espoo to join SDG 25+5 Cities Leadership Program as a forerunner city, to reach UN Agenda2030 Sustainable Development goals already by year 2025.

Espoo's objective is to reach carbon neutrality by 2030. In 2016, Espoo's greenhouse gas emissions reached 4,3 tons (CO<sub>2</sub> equivalent) per resident, deriving mainly from heating, electricity and

transport. Compared to 2015, Espoo's emissions decreased by 5 % in 2016. To reach these city objectives, Espoo resident-specific emissions would need to decrease with 80% by 2030 (compared with 1990). The key to sustainable growth has been partly the urban network structure which relies on network of five city centres with approximately 50 000 inhabitants each and these centres are connected to each other and to other parts of the metropolitan area by the metro and by the railroad.

Resilient work towards smart and sustainable future has been a joint effort of the city, companies, research and educational institutes and citizens. This ongoing and continuously developing co-operation in different levels has developed into unique way of collaboration targeting strategically towards sustainable solutions. In Espoo all four levels needed for successful sustainability work are present: Espoo city strategy is aiming strongly towards more sustainable city, novel operational models enable new ways of working and co-operation, projects and solutions created in wide collaboration are truly making difference. Then there is the forth level which is the most important: people. Espoo city staff as well as business and other collaborators and most important stakeholder, our citizens, are the ones making sustainability happen in Espoo as it is today.

Current challenges in Espoo are: how to grow sustainably, how to provide healthy, safe environment for everyone to live, work, play and enjoy, how can we do that in respect to the environment and in socially, culturally and economically sustainable way? One solution to these challenges is the high ambition level. In Espoo we are determined to come up with new solutions to the current challenges, together with our partners.

Espoo is the home of the largest innovation and technology ecosystem in Northern Europe, which means we have the right people, right companies with needed expertise close to us. Espoo is committed to be the best partner as a city, providing test bed, platform for piloting new solutions which can then if successful be scaled up, meaning exported and utilized in other parts of the world to tackle e.g. climate change.

In Finland we are very proud of our clean and prestige nature. That is the key why best solutions for smart and sustainable city are created here. City of Espoo is proud partner in collaboration with companies who create better solutions for sustainable future globally.

## **How do we operate?**

Espoo has set in the city strategy a cross-administrative development programme "Sustainable Espoo" for the council term 2017-2021 to implement actions towards the carbon-neutrality 2030 objective. These actions are implemented in collaboration with companies, RDI institutions, NGOs and local residents. The focus of the programme period is the implementation of fast-acting methods in the promotion of carbon neutrality. The programme aims to that by 2030:

- Energy production in Espoo is completely renewable and based on smart, energy efficient, flexible and energy-saving solutions of clean technology, including a significant increase of waste-heat recovery.
- Energy storage will support the emergence of new competitive business models.
- All city-owned property implement demand-response. In 2018, target is that all 15 000 homes in city-owned buildings utilise demand-response.
- Public and private transport is emission-free, including: significant increase of the use of electrical cars and decreases of emissions by 2030, dense network of charging stations for both public and private transport, emission free public transport by 2030, autonomous buses in traffic, increasing the modal split of bicycling up to 15 % by 2024 by improving bike lanes and park-and-ride facilities, MaaS to West Metro and Rail Line connecting traffic.

- Land-use and town planning supporting a low emission life-style.

Espoo joined the Covenant of Mayors 2020 commitment already in 2010 and, within the framework of the validated SEAP, committed to reducing the total volume of its greenhouse gas emissions by 20% from the 1990 level by 2020. Subsequently, Espoo has also signed (in February 2018) the Covenant of Mayors 2030 commitment to reduce the city's greenhouse gas emissions by 40% by 2030. The updated SECAP will be published within two years from signing the commitment. The process to updating city's own climate programme is going on to match the commitment of carbon neutrality by 2030.

The municipalities in the Helsinki Metropolitan Area share the municipal federations of transport, water and waste management, making cooperation across the region a necessity.

Climate work in Espoo is aligned with the joint climate strategy of the Helsinki Region Environmental Services Authority HSY, which is a municipal body producing waste management and water services. HSY collects emission data on a yearly basis for the municipalities and sectors. Additionally, the City of Espoo, together with the wider metropolitan area, has an ambition to become the best test bed in the world for smart and clean solutions by 2021.

Espoo is a founding partner in the Smart & Clean Foundation, which works in the Helsinki Metropolitan Area, to accelerate the creation of significant solutions that are clean, smart and impactful in terms of the climate change and circular economy. Smart & Clean brings together cities, businesses, governmental operators, and research & educational institutes. The ambitious project aims to create growth and world class breakthroughs in five sectors: emission-free mobility, resource wise citizens, world's smartest urban energy, circular economy, and built environment.

Through the Six City (6Aika) cooperation, Espoo also cooperates actively and has established knowledge sharing platforms and contacts with the Lighthouse cities of Helsinki and Tampere, enabling efficient dissemination and transfer of SCC1 project results and best practices. 6Aika collaboration also provides co-developing tools and methods together with other Finnish cities. Additionally, Espoo is involved in many international climate commitments and agreements. Additionally, Espoo is located in the Helsinki Region which totaling close to 30 municipalities has set goal for carbon neutrality by 2035.

Espoo functions as a platform for Smart City development. Espoo's strategy lines that Espoo will be developed based on the City as a Service principle meaning that the city actively collaborates with local industry, RDI institutions, NGOs and the residents in service development and opens its services for co-creation. Espoo is a significant platform also for development of energy solutions. Espoo and its industry and RDI stakeholders have a long tradition of building partnerships also for energy solutions in the city to increase the diversity of sustainable energy production in Espoo.

The biggest companies in Finland in the fields of electricity and heating (Fortum), fuel and biofuels (Neste) and gas and biogas (Gasum) are located and testing their solutions in Espoo. On a broader scale, solutions created in Espoo also support development of business models based on circular economy and ambitious goal is to create new solutions to be exported and spread globally.

The modern district heating system in Espoo is being systematically developed to achieve considerable reduction of CO2 emissions. Conversion to wood pellets at the Kivenlahti heat plant and construction of the Fortum's new biomass fueled heat plant started during 2018; the goal is to stop using coal in Espoo's district heat production in the 2020s. The Espoo city as a whole has an ambitious aim to become a carbon-neutral by 2030. Also, the district cooling network in Espoo will

be expanded and use free cooling as a source of energy. In both district heating and district cooling systems, heat pumps will be also used to combine in a smart way energy sources that otherwise would be wasted.

Currently a deprived industrial area, Kera will be rebuilt into a residential district with 14,000 citizens and 10,000 jobs. Residential housing construction in the area is expected to begin in 2019-2020 with 200-400 homes per year, approx. 1,000,000 m<sup>2</sup> gross floor area of new space (530,000 m<sup>2</sup> for housing, 147,000 m<sup>2</sup> for retail and business) and a total investment of 3 billion €. This new area will be testbed for piloting of new solutions for energy, heating, e-mobility and smart city, which will be enabled by local 5G network by Nokia, which has its headquarters located in the area.

Urban Energy planning is an efficient means for seeking carbon neutrality. The urban planning programme period in Espoo will involve preparing energy analyses at the master plan and local detailed plan levels, and utilising energy planning expertise to fulfill climate goals. A low-emission lifestyle is supported through land use planning. In terms of town planning, the city's central role in the emission reduction efforts is to indicate and assign sites and spaces suitable for production of renewable energy.

Integrated Energy Infrastructures in Espoo Espoo is mainly serviced by centralised district heating (DH), and outside of the DH buildings are commonly heated with oil, electricity and wood. As new construction dominated by detached housing has moved further and further away from the DH network, this type of heating cannot be provided for these buildings, especially in the northern and central parts of Espoo. The solution to this is a hybrid heating model where centralised and decentralised energy management arrangements operate side-by-side on market terms and where densely built-up areas, such as areas with blocks of flats, are supplied with centralised district or block heating while more loosely built-up areas are covered with decentralised heating.

Heating management for the less dense areas can be implemented based on block heating or decentralised building-specific energy production. Decentralised energy production relies on renewable energy sources, which are ideally ecological, free and abundant. The primary form of heating in the decentralised model is geothermal heating, which is readily available practically throughout Espoo. The forms of energy production that support this mainly utilise solar power, bioenergy and hydropower.

### **Systemic collaboration with all the stakeholders is the key**

The City of Espoo has a collaboration agreement with the local energy company Fortum to develop together carbon neutral Espoo by 2030. Among others, the city and Fortum together are making various city level energy system developments, such as developing carbon neutral and affordable district heating; and optimising the use of existing infrastructures and resources. For example, the thermal demand-response capacity will be increased for the district heating system. SmartLiving service was first used in around 5000 homes around Espoo, and is now upscaled to cover all the 15 000 apartments owned by Espoon Asunnot (public housing owner).

This also increases the thermal demand response capacity for the district heating operated by Fortum. The smart energy service for homes improves energy awareness of residents. In early 2018, Fortum has also as the first in Finland, opened its district heating system enabling selling waste heat to the district heating grid (Figure 9), turning district heating customers into prosumers. Other developments include Fortum broadening the energy services for district cooling, demand response and supporting wide-scale local RES and PV increase.

Local RES pilots are already on-going, such as the large pilot for deep geothermal heat pump plant with a target of drilling 7 km deep bore hole and connecting it to district heating in Otaniemi district by ST1 Ltd. City of Espoo itself also pushes the demand for RES, as it is planning to upgrade its own energy contracts to RES based energy contract both for heat and electricity.

In Espoo the forerunner position could not be reached without great collaboration with innovative partners like Aalto University, VTT Technical research center of Finland, and several companies and organisations. In the following there are some highlights of Espoo partners and collaboration which has supported Espoo on the way towards smart and sustainable city.

### **An example: Fortum - Driving the change for a cleaner world**

Fortum, having its head-office in Espoo, is the largest energy company in Scandinavia. It is a leading clean-energy company developing and offering solutions for our customers in electricity, heating, cooling, as well as solutions to improve resource efficiency. It also provides services for the power generation industry and solutions for consumers so that they can be smarter in their energy choices.

- 2029 Carbon neutral commitment and agreement by Fortum and city of Espoo.
- 15000 apartments at Espoo connected to heating demand response by Fortum SmartLiving concept
- Eco heat used in all city's rental apartments
- Fortum 2-way District Heating concept launched to buy excess heat from any building according to our public pricing
- 15% of Fortum district heating energy based on excess heat from municipal waste water
- Data centers and a hospital producing excess heat to Fortum district heating network
- 40MW Geothermal district heat project ongoing with a partner, 6.5km reached
- New bio-based district heating production units to replace coal
- Vermo bio oil unit 40 MW (ready)
- Kivenlahti pellet unit 70 MW (ready)
- Kivenlahti bio chip unit 57 MW (starts 2020)
- CO2 neutral Fortum district Cooling available in southern Espoo
- Energy saving week organized together by city of Espoo and Fortum yearly in October
- Number of public Fortum e-car charging stations increased to 50 charging points at Espoo

### **An example: St1 - Energy company that challenges the conventional**

- Company St1 Deep Heat has been developing the Scandinavia's first deep (6,4km) geothermal heat plant to distribute heat to approximately 20 000 Espoo inhabitants through the city district heating network. Plant will be in operation early 2020
- St1 Local Energy has transformed several individual locations (block houses, detached houses, offices) in the city of Espoo from fossil fuels to ground sourced heat pump (GSHP) solutions with heat wells from 200-600m deep
- St1 is offering RE85, ethanol-based car fuel made out of WASTE renewable and sustainable raw materials, in 3 petrol Stations in city of Espoo.

### **An example: Gasum - Cleaner tomorrow through efficient gas solutions**

Gasum is a forerunner in sustainable Nordic energy solutions and circular economy.

- All the organic matter in the sewage sludge created in Espoo's wastewater treatment process is utilised by the Suomenoja biogas plant. The upgraded biogas is then injected to the natural gas grid and sold at Gasum's CNG filling stations in Espoo.

- Various companies operating in Espoo have acquired gas-fueled vehicles and use the locally produced biogas in their logistics and/or passenger car fleets:
  - Over 70 companies in Espoo have currently vehicle fleets, which use locally produced biogas
  - For example, the environmental management company “Eerola-yhtiöt” (a Espoo based company) was the first company in Finland to fuel its vehicles with 100 % renewable biogas produced from its own waste. “Eerola-Yhtiöt” has switched to biogas in its heavy-duty as well light vehicle fleet.
  - Moreover, companies in Espoo, such as Nokia, are promoting vehicles using biogas in their updated company car policies.
- The gas filling station network in Espoo is also expanding. The latest filling station was opened in conjunction with IKEA’s store in Espoo. IKEA is enhancing the local circular economy by turning all their biowaste into biogas, which is then being sold at the filling stations.

### **An example: Neste Corporation**

Cities, municipalities, and various progressive companies around the world continue taking the voluntary initiative to significantly reduce emissions from their fleet by replacing conventional diesel with renewable fuel. Neste Corporation helps its customers reduce climate emissions by developing cleaner solutions for transportation, aviation, and marine uses, as well as renewable solutions for the chemical and plastics industries.

- Renewable transportation fuels, particularly Neste MY Renewable Diesel, a drop-in solution for all diesel-powered passenger cars and heavy transport, makes a measurable climate impact globally and in our key markets locally. When produced from waste and residues, its use enables 90% reduced greenhouse gas emissions on the average compared to those from the use of conventional diesel.
- In 2018, the Public Works Department at the City of Espoo decided to use [Neste MY Renewable Diesel](#) (TM) in all of its diesel powered machines. Neste MY Renewable Diesel is produced entirely from waste and residues. The transition to renewable diesel is part of the City of Espoo's target to make Espoo completely carbon neutral by 2030. The aim is for the City of Espoo to switch all of its diesel engines to renewable diesel in stages.
- Cities, counties, and various local actors in Europe and in the US continued setting their own climate goals and seeking for cooperation to find alternative, cost-effective means to reduce emissions. Californian cities and local actors continued leading the way in this area, e.g.:
  - San Diego’s Vista Unified School District’s school buses
  - Pasadena, California Fire Department
  - WestCAT, a Californian public transportation service.
- In Finland, Neste MY Renewable Diesel has also been adopted by the City of Porvoo, and by companies such as Lassila & Tikanoja and DB Schenker. Other users of Neste MY Renewable Diesel are the Finnish airport operator Finavia, in its airport buses at Helsinki Airport, and the non-governmental aid organization UFF in its logistics chain. As part of Europe's largest coordinated advanced biofuels project BioSata, Neste provides Helsinki City Construction Services, Stara, with premium-quality, entirely waste and residue based Neste MY Renewable Diesel to be used in Stara's working machines and trucks.

### **Strong industrial commitment: Climate Leadership Coalition (CLC)**

Climate Leadership Coalition (CLC) was founded in 2014 by major industrial companies Neste, Fortum, Kone, Outotec, Caverion all having headquarters in Espoo together with Sitra and ST1. CLC



develops business opportunities and solutions for the mitigation of climate change and encourages organisations to join the transition. CLC currently comprises more 53 organisational members and 16 personal members. The City of Espoo is member in CLC as well as Aalto University, Gasum, Nokia and VTT, all having headquarters in Espoo. The total market value of the CLC membership represents more than half the value of the Helsinki stock exchange.

The coalition's first project was to develop the capital region (Helsinki, Espoo, Vantaa) to become a test bed for smart and clean solutions. This resulted to Smart & Clean Foundation. CLC's role is to initiate new projects and for example

- the Deep Heat geothermal project by ST1 in collaboration with Fortum and Espoo and
- Bio100 - project to decarbonise urban transportation and commercial vehicles in the capital area by enabling a rapid transition to renewable biofuels by 2020

Project ideas were presented in a CLC meetings resulting to concrete projects later.

In additions CLC initiated an analysis of the Helsinki stock exchange (OMX) carbon footprint. After the first study in 2015, the footprint decreased by 20% in 2016 and a further 16% in 2017. Our projects are run by CLC members, Sitra being the most active in developing new solutions.

In 2018, the CLC board concluded that the "Carbon Law", i.e. halving emissions by 2030, 2040 and 2050 should be the level of ambition. Within this framework, the CLC has initiated three long-term projects: proactive procurement and citizens engagement, effective carbon pricing and nature-based climate solutions.

The CLC's key focus areas are climate financing, risk management and carbon pricing, carbon footprint and handprint, built environment, transport, energy, the circular economy and citizen engagement. This fits extremely well to the interests of the Espoo City.

The CLC in June 2018 called on the EU and its Member States to make the European Union Paris Agreement-proof, by setting and agreeing on new, sufficiently ambitious climate targets:

1. The EU should set a target for achieving net-zero emissions at the latest by 2050 or earlier taking the IPCC findings into account.
2. Based on the target, the EU should agree on a binding carbon budget for the remaining GHG emissions.
3. The EU should revise and align the 2030 and 2040 targets with the net-zero target.

Several leading companies in the Nordics have already set, or are exploring ways to set, science-based net-zero targets by 2030, and a large majority said they could set net-zero GHG emissions targets in the right policy environment. It clear that tackling climate change and reaching carbon neutrality is impossible without an effective public-private-people collaboration and partnerships.