

# "Lounapuisto is a circular economy diamond"

## The vision of Lounapuisto 2035

### The operational environment and markets of circular economy

By 2035, at the global level, tensions between East and West is still strong due to the chain of events that started with the war in Ukraine in 2022, and so many countries have sought to develop self-sufficiency and reduce import dependency due to the consequences of the war, such as supply problems and price increases related to the consequences of the war, such as the restriction of East imports and the rise in availability and prices associated with economic sanctions.. This has been particularly pronounced in the energy, agriculture and mining sectors, but the same effort has also been reflected in industry, construction, services, freight and passenger transport, and telecommunications. From a circular economy point of view, this factor has played a major role, particularly in the use of side streams from the domestic production processes.

In 2035, the availability of virgin raw materials will become more limited, and the prices of many materials will have risen significantly. Technological innovation has focused on finding and using substitutes for scarce and expensive raw materials and on recycling and more efficient use of existing materials. To promote the use of side streams from production processes, the public sector is making efforts to systematically map material flows and side streams from production processes in different sectors such as agriculture, construction and various industries. The active sharing of information and services will create better opportunities for actors to conduct responsible business in line with circular economy principles.

Key areas for development related to the usable side streams include:

- identification of the usable side streams
- collection and related logistics
- technical separation and purification
- matching supply and demand
- networks of operators and distribution services.

While price remains the key decision criterion for consumption decisions, pricing is rarely used as a policy tool to influence consumption decisions. Price changes come from the market, and therefore not only policy but also actors' choices are largely reactive, as shown by the COVID-19 pandemic and the debate on security of supply and domestic sovereignty due to the war in Ukraine and related international sanctions. Environmental considerations and progress in the circular economy are strongly dependent on the prices of production factors and commodities as well as on economic cycles, to which market actors then react. Correct timing of business activities is important for their profitability. The adage that being ahead of the curve is a good way to be quickly forgotten applies to the circular economy too.

However, awareness of environmental challenges has gradually changed the consumption habits of some parts of the population, and as a result, different circular economy business models in some economic sectors have become more and more popular.

The traditional selling and owning of consumer durables have been replaced by providing access to them through a range of sharing services. There has also been an increase in product life extension and repair, re-use, and re-purposing of products.

In addition to virgin raw materials, the use of materials that are side streams of existing production and consumption processes is increasing. Efforts have been made to support this development through policy guidance, but mainly in a reactive way, in response to EU and national policies. The focus is on sharing of information and economic incentives.

Key waste fractions/side streams for which collection, logistics and recovery of the side streams are being developed include

- bio-waste and biomasses
- plastics
- electronics
- construction and demolition waste
- soil and minerals
- slags and ashes.

The UN Sustainable Development Goals (SDGs) have influenced policy and communication in the EU and Finland, but increasingly also branding and acknowledging consumer preferences in industry. In particular, the circular economy is central to the achievement of SDGs 7 (affordable and clean energy), 9 (sustainable industry, innovation and infrastructure), 12 (responsible consumption) and 17 (cooperation and partnership).

## Elements of the Lounapuisto Vision 2035

### ***ENERGY: "Lounapuisto produces sustainable renewable energy"***

Energy is an essential part of the circular economy, and Lounapuisto aims to be energy positive, i.e. to produce more energy (both energy carriers – electricity, heat and possibly cooling – and biofuels) than is consumed by the operators in Lounapuisto itself. The aim is to achieve a responsible and transparent energy economy at local level, with the environmental impact and opportunity costs of energy production clearly highlighted. In this respect, Lounapuisto is a good national benchmark for an energy-positive circular economy park.

An energy-positive Lounapuisto will make use of a wide range of energy sources and energy production methods. Reasons for this include national self-sufficiency efforts and the emphasis on security of supply in the face of global crises and international political uncertainties. There is competition between different energy sources, some of which are seen as temporary solutions. So-called "power to x" (P2x) technologies, where the (surplus) electricity produced is used for various energy production, transformation and storage solutions, will be used during the transition period.

These technologies can play a crucial role, for example in the hydrogen economy. In 2035, Lounapuisto will be home to, for example,

- wind and solar power generation
- biogas production and distribution
- energy production based on renewable solid fuels
- hydrogen production by electrolysis
- electricity and heat storage
- production of heat and electricity from combustible by-products (from municipal waste) for which no other use can be found.

#### *Biogas is a versatile intermediate circular economy solution*

The agricultural material and by-product streams provided by Salo's important arable land and the significant share of biowaste in municipal waste provide a good basis for biogas production in and/or around Lounapuisto and for the development of a biogas ecosystem.

Possible raw materials for biogas production include

- separately collected bio-waste
- landfill gas
- straw
- manure
- fast-growing, protein-rich plants
- energy willow
- lake reed
- biomass from buffer strips and fallow areas
- sludge from sewage treatment plants.

Many of these feedstocks and side streams can also be used as solid fuels. Their use depends on business conditions, which are mainly influenced by energy price developments, availability and price of raw materials, demand for biogas, technological developments (not only biogas production technologies but also demand-side and energy alternative technologies such as battery and hydrogen technologies) and possible policy decisions with obligations and incentives.

The main use of biogas in 2035 will be for transport, and a biogas filling station in the Lounapuisto area serves that purpose. Another use will be for electricity production.

#### *Hydrogen brings solutions for the future*

Lounapuisto will also contribute to hydrogen production. To enable the electricity-intensive P2x processes, Lounapuisto will have wind and solar production and electricity storage. In 2035, a hydrogen ecosystem will be developed alongside the biogas ecosystem. Later biogas will be replaced by hydrogen, either completely or at least partially.

In addition to fuel cell-based energy production and transport, hydrogen will be used to produce ammonia to be used as a raw material for the fertiliser industry. The availability of ammonia has

been substantially reduced because of the war in Ukraine. The most important of the other uses of ammonia is direct fuel use.

*Heat recovery and storage is an effective way of balancing seasonal variations in energy consumption*

Lounapuisto has a functioning heat well, which supports the district heating production of the city of Salo. The heat well can also serve as a source of geothermal heat when there is not enough thermal energy to store in the heat well during the production phase. If necessary, additional boreholes can be drilled and extended as drilling technology develops.

On the consumption side, waste heat recovery from exhaust air and wastewater offers the potential to improve the energy performance of buildings, especially when integrated with other energy systems. The two-way heat transfer option allows buildings to be energy positive, also in terms of heat.

*Materials that do not have other circular economy solutions are recovered for energy*

The waste incineration plant in Lounapuisto is an essential part of the circular economy park, both for energy production and waste management. A significant proportion of municipal waste consists of waste fractions for which there is no separate collection, but also includes materials that could have alternative uses. The development and deployment of technology to separate these materials could, at best, make separate collection unnecessary.

Despite the development of waste sorting and separate collection, considerable amounts of unsorted municipal waste continue to accumulate. The circular economy solution for such waste is thermal recycling, i.e. the use of so-called energy waste in combined heat and power generation. This is essentially linked to the carbon cycle, i.e. the capture and utilisation of the carbon dioxide released by the incineration of energy waste (CCU).

***CIRCULATION OF MATERIALS: "Profitable circular economy packages are being developed in Lounapuisto"***

Lounapuisto is actively promoting the circular economy also for non-energy materials. Significant quantities of materials suitable for other uses are currently sent for thermal recycling with unsorted municipal waste. Therefore, technologies and know-how to separate waste fractions, integrate different waste fractions, and tolerate the contamination of waste fractions are key to the development of the circular economy of materials in Lounapuisto.

Another key area for development is a business model to enable matching the separation and recycling of waste fractions, which currently is the responsibility of consumers, with the material needs of circular economy operators. For many materials, the aim can be to achieve closed-loop recycling as far as possible.

Knowledge of the availability of different raw materials and recoverable waste fractions is essential for the uptake of circular economy activities. Lounapuisto is part of a materials gateway, which

serves both suppliers and users of materials. The aim is to develop the portal into a digital platform with a national reach, similar to the online services for car dismantlers and spare parts users.

The main material streams and waste fractions that will be exploited in Lounapuisto are bio-waste, plastics, electronics, end-of-life vehicles and machinery, construction and demolition waste, soil and minerals, slags, and ashes. Existing operators in the area include companies that actively exploit and further develop these material flows.

***PARTNERSHIPS AND COOPERATION MODELS: "Lounapuisto has a network and business cooperation that encourages innovation and investment"***

*A good atmosphere in Lounapuisto – everyone wants to try new things*

Lounapuisto is a close-knit community, where some actors already know each other. The atmosphere is open and enthusiastic about the business opportunities offered by the circular economy. It is easy for new actors to come to Lounapuisto and get to know its network of partners. The basic idea is to implement circular economy activities and to develop and test new circular economy solutions.

*A single contact point enables easy implementation of the intra-regional operating model in Lounapuisto*

In the initial phase, the role of the 'anchor actors' will be important. However, there is an easily accessible operator in Lounapuisto; a coordinating organisation, which can take the form of a company, a cooperative, or an association. A wide range of circular economy stakeholders, including companies, municipalities, the public sector, and the third sector, are active in Lounapuisto. A key feature of the concept is reciprocity; when you give, you get.

All actors in the area have a stake/membership in a coordinating organisation whose main tasks include organising the services needed in the area, coordinating common issues, dealing with the authorities in cooperation with the necessary actors, e.g. in matters of legal permits, internal and external communication, responding to contacts, and organising joint meetings, study visits, etc. The operator's resources will come from the various actors in the region and in the cooperation network, from the City of Salo, other public sector operators and project funding to be applied for separately.

*The Lounapuisto ecosystem includes the key players in the circular economy and is constantly evolving*

The vision described above describes Lounapuisto in 2035. The Lounapuisto ecosystem will evolve over time towards the vision. The vision is not intended to be static but contains many different elements, the emphasis between which may change over time as activities seek their direction and priorities. New elements and actors may also be added to the vision as necessary, as the issues and actors highlighted in this vision are not all-inclusive. The approach of the Lounapuisto circular economy ecosystem will evolve organically; when a need is identified, efforts will be made to find workable solutions.

The circular economy is a way of restructuring society's production, consumption and logistics in order to more effectively address the UN Sustainable Development Goals (SDGs). The initial phase of

Lounapuisto has been based on the development of waste management and has focused on energy production, as the largest and most active players in the region in the visioning process so far have also been active in the field of energy. Other circular economy activities will also emerge alongside energy as the network of actors in Lounapuisto expands and the use of production side streams develops.

***DATA AND KNOW-HOW: "Lounapuisto is producing nationally significant data for the development of the circular economy".***

*Lounapuisto is a centre for circular economy research*

Lounapuisto provides a good and effective platform for developing cooperation between the companies and other actors. It makes use of the strategies, guidelines, studies and materials provided by the network's external members (e.g. Sitra, Syke, Motiva, the Ministry of the Environment, the Ministry of Employment and the Economy, the Technical and Economic Development Centres). Communication campaigns are also organised in cooperation between the various actors. Cooperation is active and open; information is available to all and there is also the courage to experiment. The activities of Lounapuisto generate new knowledge and the aim is to move from tacit knowledge to public knowledge, thus developing the identity of Lounapuisto as a centre for circular economy research.

*Research and education institutions play a key role in the development and training work on the circular economy implemented by Lounapuisto*

Development ideas from circular economy companies provide a good starting point for publicly funded (e.g. EU Horizon Europe, Business Finland, Academy of Finland) research and development projects, which can be led by, for example, the universities and research institutes in the network. Innovations are well-identified and developed into working practical solutions. Circular economy work is a long-term process, so when the environment changes, the network expands and the circular economy develops, we must constantly learn new things – identify the innovations, develop new applications, and ensure the future experts. Over time, Lounapuisto will expand, allowing those who have been active in the area for longer to mentor newer entrants. It will also provide circular economy training services through its network of partners, in which research and education institutions play a key role.

***AREA AND FACILITIES: "Lounapuisto is an actor beyond its geographical area"***

Lounapuisto's core activities are located in the Korvenmäki area of the city of Salo. The area of the circular economy park corresponds to the park-like image, as it is landscaped with abundant planting. Constant attention is paid to the cleanliness of the area.

In addition to its core activities, Lounapuisto offers a comprehensive range of services to meet the needs of businesses in the area, but also of businesses, organisations, public authorities, and other actors of the Lounapuisto network located elsewhere. These include office hotel services with

meeting and conference facilities such as AV equipment, catering services, material banks, distribution services, and services related to official matters such as licensing.

The services provided by Lounapuisto are also used nationwide and Lounapuisto is part of the network and division of labour among the of the Finnish circular economy parks.