What makes a city sustainable

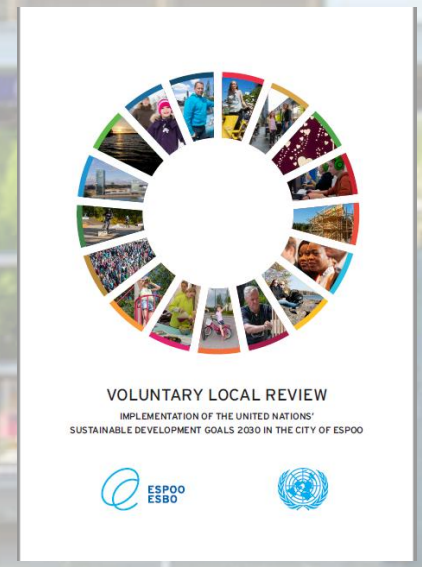
#UBCTALKS How do cities work with the UN Agenda & SDG´s

and integrate them in their

strategies?

27 October 2020

Dr. Ville Taajamaa, City of Espoo



SUSTAINABLE DEVELOPMENT GOALS

ESPOO
ESBO

themes

In complex environments actions need direction

What is the Agenda 2030? – *I mean really…*

Role of cities in sustainable development

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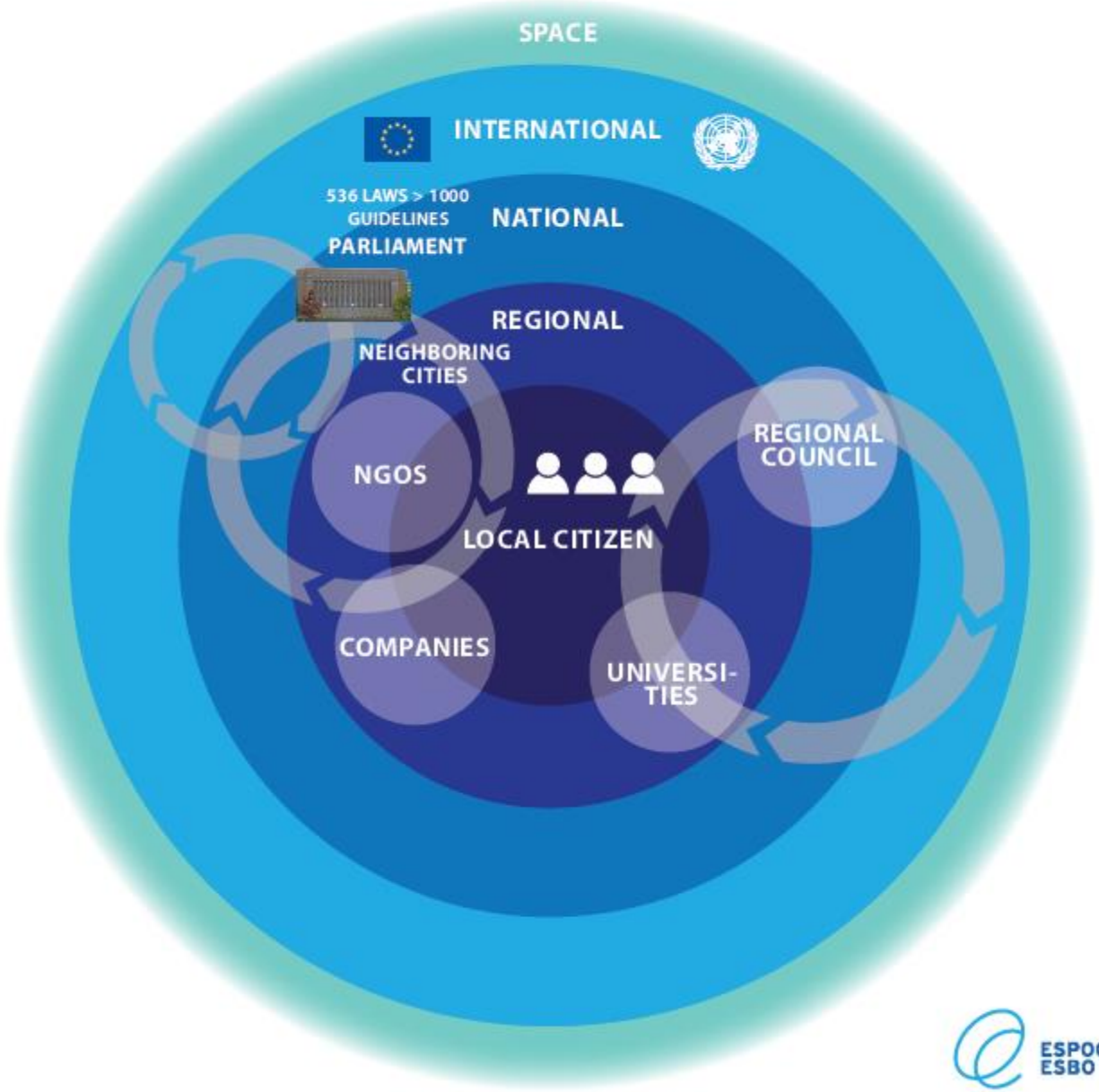
OPERATIVE ENVIRONMENT OF CITY OF ESPOO



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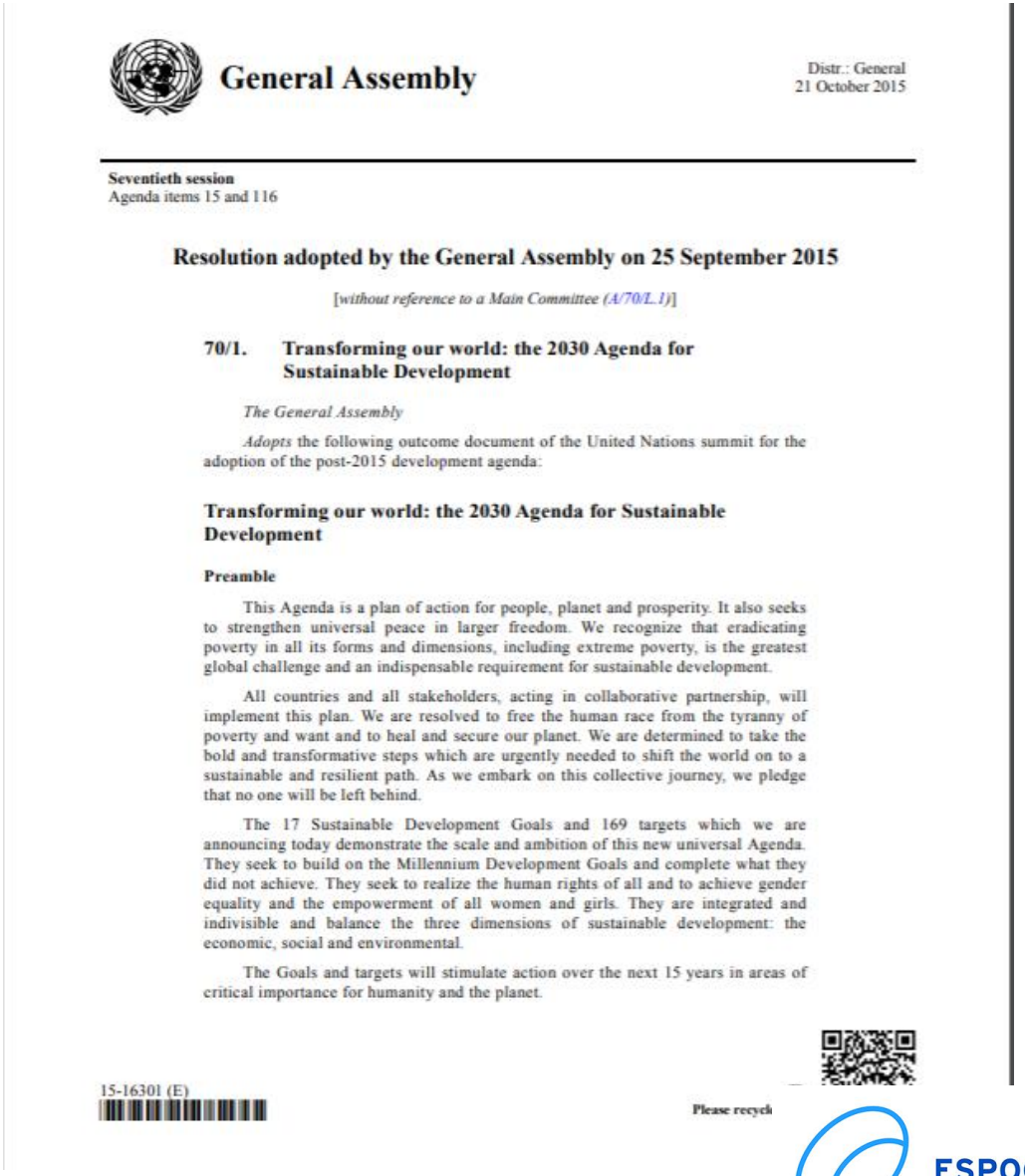
”Espoo Story”

Who we are,
where do we come from.. ..and what we do..

Agenda 2030

UN´s ” Story for humanity”



General Assembly

Distr.: General
21 October 2015

Seventieth session
Agenda items 15 and 116

Resolution adopted by the General Assembly on 25 September 2015

[*without reference to a Main Committee (A/70/L.1)*]

70/1. Transforming our world: the 2030 Agenda for Sustainable Development

The General Assembly

Adopts the following outcome document of the United Nations summit for the adoption of the post-2015 development agenda:

Transforming our world: the 2030 Agenda for Sustainable Development

Preamble

This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.

All countries and all stakeholders, acting in collaborative partnership, will implement this plan. We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind.

The 17 Sustainable Development Goals and 169 targets which we are announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what they did not achieve. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.

The Goals and targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet.

15-16301 (E)

Please recycl

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SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

SUSTAINABLE DEVELOPMENT GOALS

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VOLUNTARY LOCAL REVIEW

IMPLEMENTATION OF THE UNITED NATIONS'
SUSTAINABLE DEVELOPMENT GOALS 2030 IN THE CITY OF ESPOO

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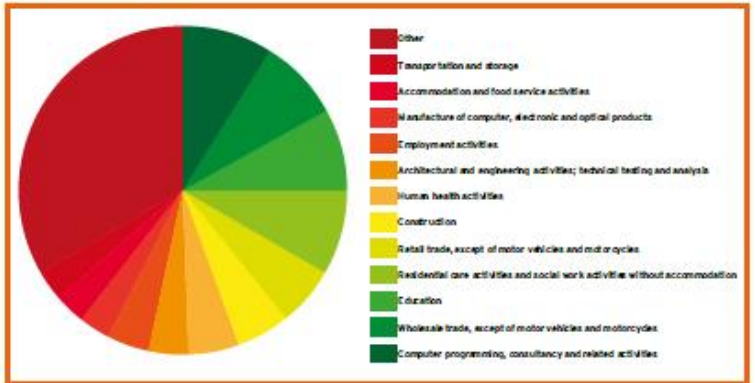
BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

LARGEST FIELDS OF BUSINESS ACCORDING TO NUMBER OF JOBS IN ESPOO IN 2017. SHARE OF ALL JOBS.



- Espoo's economic structure is diverse. There are approximately 121 000 jobs (2017), and according to scenarios there will be 134 000 jobs in 2030. The growth has been approximately 2-3%/year during the past three years.
- Trade, software and consultation, education and social and health services are the biggest employers in Espoo
- Aalto University and universities of applied sciences offer high-quality education for example in the field of technology
- Urban structure and infrastructure develop quickly (Urban structure of five city centres, metro, Jokeri Light Rail, Espoo city rail line, one-hour train connection to Turku).
- 88,8% of residents in Espoo live within 300m radius from the closest public transportation stop and 97,1% of residents live within 600m radius from the closest public transportation stop (City of Espoo and Helsinki Region Transport 2020).
- Vehicle-kilometre has stayed on previous years' levels even though the number of inhabitants has increased. Greenhouse gas emissions have decreased notably.
- Housing production remains high. In 2018, an estimated 3700 dwellings were built. 32 500 new dwellings will be completed by 2028.
- Concentration of the urban structure and considerable housing production will pose challenges to high-quality environment construction and landscaping.

According to the 2019 survey of local business in Espoo (510 interviews):

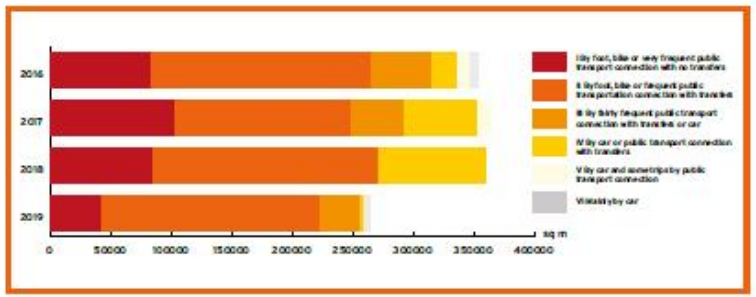
- the companies located in Espoo rated the business climate in Espoo good (3,56/5).
- the companies located in Helsinki rated the business climate in Espoo even more positively (3,86/5).
- the most important factor in the result is how communication between the City and the companies function.
- the companies want to grow. 53% of companies estimate that they will have more personnel than in the previous year. However, finding suitable work force has become more difficult (especially considering jobs demanding higher education).

THE FOCUS OF CITY PLANNING IS ON LAND USE DEVELOPMENT AREAS THAT ENABLE SUSTAINABLE MOBILITY AND URBAN STRUCTURE.

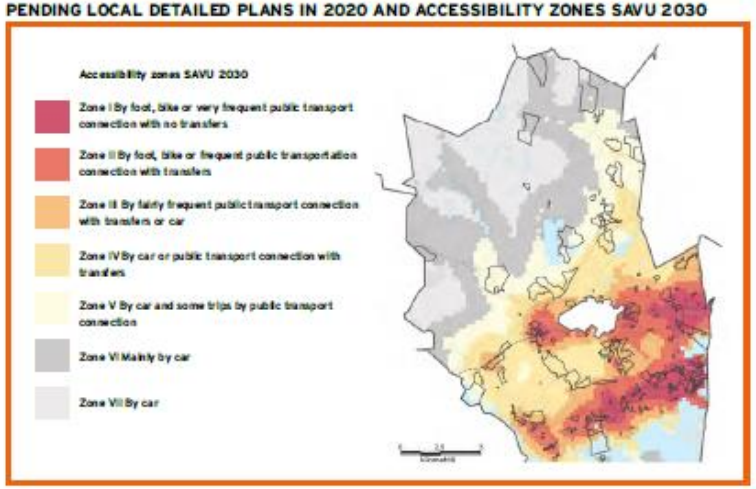
The accessibility zones (SAVU) describe regional accessibility by public transport, walking and cycling. The zones describe how easily and by which mode of transport residents can typically access areas of services and workplaces. SAVU framework has been developed by the Helsinki Region Transport (HSL). Ninety-seven (97) per cent (%) of the gross floor area of housing in local detailed plans, approved in 2019 by the City Planning Committee, were located in zones supporting sustainable modes of transportation (SAVU 2025, zones I-III).

BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

THE LOCATION BY REGIONAL ACCESSIBILITY ZONES SAVU 2025 OF GROSS FLOOR AREA (SQUARE METRES) OF HOUSING IN LOCAL DETAILED PLANS APPROVED IN 2016 - 2019



PENDING LOCAL DETAILED PLANS IN 2020 AND ACCESSIBILITY ZONES SAVU 2030



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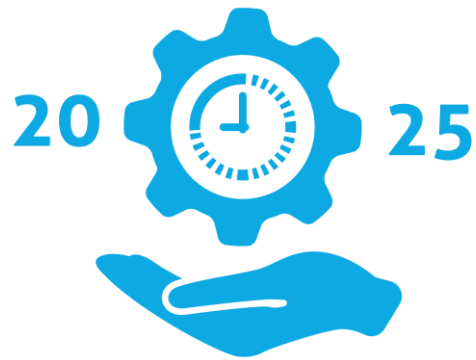
Role of Espoo



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ESPOO CLEAN HEAT - CARBON NEUTRAL DISTRICT HEAT IN ESPOO IN THE 2020S

The City of Espoo and Fortum are completing one of the city's largest climate action with the Espoo Clean Heat project: district heating in Espoo will be carbon neutral in the 2020s.

Already in 2015, the City of Espoo and the Espoo-based energy company Fortum committed to making the district heating system in Espoo, Kauniainen and Kirkkonummi fully carbon neutral. As a member city of the UN's sustainable development leadership programme, Espoo has committed to developing solutions that support carbon-neutral urban life. Carbon-neutral district heating is a major climate action for the city as the majority of the emissions of Espoo are generated from heating.

Espoo's and Fortum's development work was accelerated in autumn 2019 by setting a new interim target to discontinue the use of coal in 2025. The 2020s carbon neutrality project is known as Espoo Clean Heat. With the project, Fortum will close one of its two coal units in Espoo for good in early summer 2020. A new biomass heat plant is already operational to compensate this. Its fuel will be wood material that would not be used by other industries.

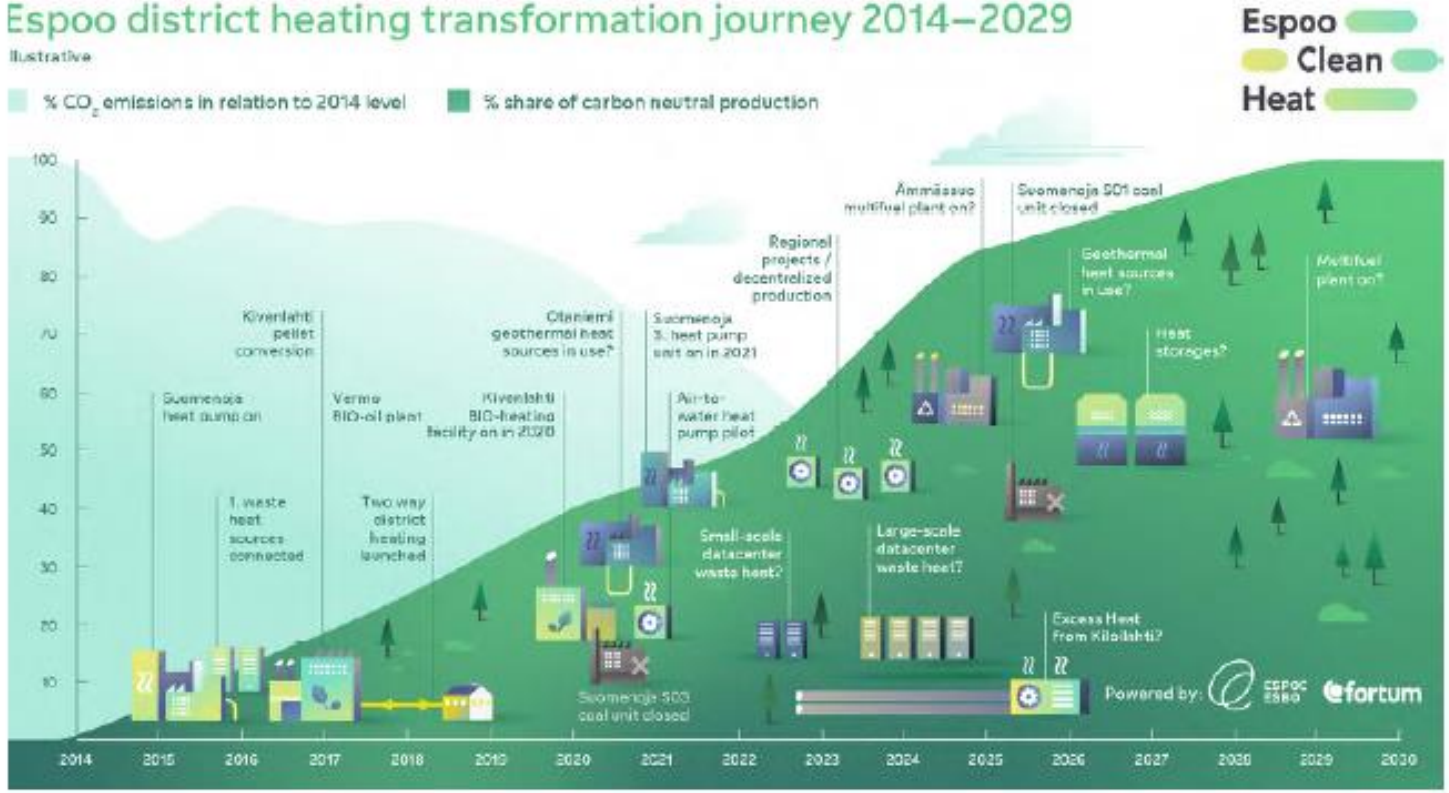
New solutions will be sought to replace the remaining coal use, for example in utilising the excess heat from data centres, wastewater and industry, electrical heat pumps, geothermal heat, smart solutions for flexible consumption and bioenergy. The aim is primarily to find fuel-free heating solutions.

An example of future solutions is the use excess heat from data centers. If a large data centre could be attracted to a location near the Espoo district heating network, excess heat could be used efficiently for district heating. This way, the cooling air would not be wasted and instead could be conveyed to heat homes. Data centres use clean electricity as a rule, so the impact could even be carbon-negative.

More information: minna.oberlson@fortum.com

Espoo district heating transformation journey 2014–2029

Illustrative



ZERO EMISSION ENERGY FROM DEEP BEDROCK

The production of geothermal heat using the natural heat of the bedrock is a promising and emission-free way of producing heat on a global scale. Finnish energy company St1 is piloting geothermal heat production on an industrial scale in Espoo for the first time. The project drills to a depth of over 6 kilometres in hard granite bedrock under challenging conditions in Finland.

Launched in 2015, the globally unique research and development project in Otaniemi, Espoo, has progressed according to planned stages, although it has required more time and investment than expected. The pilot project aims to test and develop technically sound and economically viable solutions for all work stages of the geothermal business concept in order to commercialise geothermal heat production on an industrial scale after the pilot.

Renewable geothermal heat increases the flexibility of heat production and reduces emissions in Espoo. The geothermal heat plant is estimated to produce up to 40 MW of heat at its best and to cover up to 10% of the district heat demand in Espoo. Geothermal district heating is ideal for densely populated city centres. According to the City of Espoo's strategy, the city is a pioneer in the fight against climate change and aims to reduce the carbon footprint of its residents. The goal is to produce and exploit renewable energy with zero emissions in the city.

REVOLUTIONISING FINLAND'S DISTRICT HEATING

St1 is piloting geothermal heat production for the first time with Fortum, an internationally recognised Espoo-based energy company, which will buy the thermal energy produced by the completed plant for the district heating network in Espoo. The geothermal heat project, which is piloting a completely new form of energy production in Finland. Successfully launched, it could revolutionise district heat production both here and in many other countries. The project in Otaniemi is one of the most significant renewable energy projects in Finland, the success of which is of considerable importance for Finland's energy self-sufficiency and the reduction of emissions: district heating is the most common form of heating in Finland, and 2.7 million Finns live in buildings heated by district heating. If the geothermal heat production concept can be commercialised, we will be heading towards a future in which heat can be produced completely without emissions, burning nothing.

Challenges have arisen along the way, but they have been resolved. Progress with the project has required, for example, the development of drilling technology and, consequently, the first ever successful drilling of a hole over 6 kilometres deep in Finland's hard bedrock. The project has increased Finnish geoenergy expertise to world class levels in drilling, stimulation and flow analysis.

The challenging stimulation phase of the project, i.e. the testing the water flow in the bedrock fractures, was also completed year 2019. Learning from previous foreign projects, the pumping of water to produce the necessary microearthquakes in the bedrock was done in a very controlled manner to minimise the environmental damage to momentary noise nuisance. The water flow in the bedrock was carefully monitored with geophones installed in the deep boreholes in cooperation with the Institute of Seismology at the University of Helsinki. After the above ground piping and installation work is completed, the target schedule for the start of commissioning of the plant is in the fall.

> **The commissioning of the plant is expected to start in Fall 2020. It will be the world's deepest geothermal heat plant, which produces heat completely free of emissions.**

KEY FACTS

- When the project is completed, it will enable the production of heat practically without fuel, completely emission-free – it will revolutionise the production of district heat.
- The project has attracted international attention and increased Finnish expertise in the field to world class levels in drilling, stimulation and flow analysis.
- Geothermal heat can help the City of Espoo reduce its climate emissions. On a larger scale, the success of the project is of great importance for reducing emissions and energy self-sufficiency both in Finland and more widely in the Nordic countries.

WHAT HAVE WE LEARNED?

- The project is a unique research and development project – the first of its kind in the world – so there is bound to be plenty of challenges and uncertainties until enough experience has been gained in the production of the pilot plant.
- The commercial success of future projects will require the use of the lessons learned from the pilot project in order to optimise the timetable and cost-effectiveness.
- Comprehensive planning and project management for the different phases will also be developed to speed up the follow-up projects.

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ESPOO ESBO

Gasum

CIRCULAR ECONOMY IS AN EFFECTIVE TOOL FOR REDUCING TRAFFIC EMISSIONS

Circular economy is the word of the day. The City of Espoo is at the heart of circular economy: renewable biogas is produced in the area, and local companies have switched to gas-powered vehicles. Energy company Gasum and IKEA Finland use biowaste generated in IKEA stores as raw material for biogas production.

Biogas is a smart and versatile form of energy. The biogas produced by energy company Gasum is produced in Finland from biodegradable waste from households, agriculture and businesses, among others – it is 100% renewable. The use of biogas for transport can reduce the greenhouse gas emissions generated during the lifecycle of fuel by up to 85%. The use of biogas also reduces emissions from city traffic, such as nitrous oxides and particulate matter, which significantly improve air quality in cities.

Gasum owns 13 biogas plants in Finland and Sweden, and the company also buys biogas from three partner plants in Finland. Gasum also has two new biogas plants being built at the moment. The current volume of biogas produced in produced in Metropolitan area (including Espoo) corresponds to the annual fuel demand of approximately 1,000 buses or 30,000 passenger cars.

ESPOO BASED COMPANIES PIONEERING IN LOW CARBON MOBILITY

More than 80 companies in Espoo have already managed to reduce their emissions through the use of biogas for transport. The choice of biogas has been influenced not only by Finland's emissions targets, but also by the increased environmental awareness of consumers and the values of companies themselves. For example, a national wholesaler, an environmental service specialist and the grocery chain Lidl have switched to using biogas for their logistics.

Gasum and IKEA Finland started cooperation in 2017, resulting in the production of renewable and low-emission biogas from biowaste from the restaurants of IKEA stores. At the same time, gas filling stations were built next to IKEA stores. The first station was opened at the store in Espoo, and later ones also in Vantaa and Raisio. The filling stations are available to both IKEA customers and other users of gas vehicles.

KEY FACTS

- Biogas is a renewable and low-emission form of energy suitable for both transport fuel and industrial energy.
- Biogas is produced in Finland from, for example, biowaste from households, food waste from grocery stores and sewage sludge, at several Gasum biogas plants.
- In biogas production, the nutrients in biowaste and side streams can also be recycled in different applications by means of recycled fertiliser products.
- Several Espoo-based companies have managed to reduce their emissions through the use of biogas for transport. The choice of biogas has been influenced not only by Finland's emissions targets, but also by the increased environmental awareness of consumers and the values of companies themselves.
- Biogas would be ideal for both public transport in Espoo and for fuel in the city's own transport equipment to reduce its carbon footprint.

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ESPOO ESBO

SMART CITY WITH AUTONOMOUS FIRST AND LAST MILE SENSIBLE 4

Autumn 2019, the cooperation between the City of Espoo and Sensible 4 brought self-driving public transport to reality when a self-driving pilot with the autonomous shuttle bus GACHA was organised in the Espoo Kera area. The key point of the pilot was to offer the employees working in the Kera area the possibility to use GACHA for last-mile transportation, for example between the railway station and an office building. The pilot supported the goal of providing people with access to safe, affordable and sustainable transportation.

There are over one billion cars in the world, and every year over 70 million new ones are manufactured. Mobility and transportation produce a significant portion of pollution and greenhouse gases globally. In order to change this unsustainable direction, we need to change the way people use transportation. Our vision is clear. We believe in a world that is not based on the current model of private car ownership. The future of transportation as we see it, is shared, electric and driverless, with fewer cars on the roads and more space for people.

THE STORY OF GACHA

How can this vision become a reality? Sensible 4 has developed GACHA, a shared driverless shuttle bus for last-mile usage, capable of driving in all weather conditions. By integrating autonomous shuttles into the already existing public transport system, GACHA can contribute to society by offering transport solutions to areas outside the public transport network and thereby reduce the use of privately-owned cars. Our self-driving shuttle bus navigates smoothly in urban environments and offers sustainable on-demand transportation all year round.

Self-driving serves all kinds of areas from business parks and campuses to recreational venues. No matter where, a smart self-driving transport system sustainably frees up space for people, nature and active urban life. On top of that, our self-driving solution consumes very little energy and requires only a minimal amount of resources.

There is still a lot of work that has to be done before self-driving cars become the norm. One of the biggest challenges autonomous vehicles face is changing weather conditions. Most of the self-driving vehicles are only able to drive in ideal weather conditions. Another challenge is posed by human drivers who break traffic laws. When a car driven by a human breaks the law, the robot does not know what to do. Since self-driving cars are robots and robots act according to what they are told, this can lead to dangerous situations. To achieve a safer and more sustainable city, awareness has to be raised about these issues.

FUTURE PLANS

To make our vision become a reality, we are planning our next step to bring GACHA to different locations within the European Union, Asia and the Middle East. During 2020, we are also going to continue the pilot programme with the City of Espoo in order to establish a permanent self-driving route in the city by 2022.

ABOUT SENSIBLE 4

Sensible 4 is a Finnish self-driving technology company developing full-stack software for autonomous vehicles. Their unique technology combines information from multiple sensors (sensor fusion), allowing their self-driving cars to operate even in the most challenging of weather conditions. Sensible 4 recently raised $7 Million from Japanese tech investors in their Series A round. Their technology was awarded Best Startup at the prestigious Dubai World Challenge for Self-Driving Cars in October 2019, and their autonomous shuttle bus GACHA has collected multiple design awards.

KEY FACTS

- One of the biggest challenges autonomous cars face is changing weather conditions. Most self-driving cars are only able to drive in ideal weather conditions.
- When a car driven by a human breaks the law, the robot does not know what to do. Since self-driving cars are robots and robots act according to what they are told, this can lead to dangerous situations.
- To achieve a safer and more sustainable city, awareness has to be raised about these issues.

More information: info@sensible4.fi

> **Bad weather has been the biggest obstacle for driverless vehicles up to this point. Sensible 4's software allows vehicles to operate in all weather conditions and environments.**

GACHA

Self-driving Shuttle Bus for All-weather Conditions

FACTS ABOUT GACHA:

Type: Autonomous shuttle bus
Autonomous level: SAE level 4
Developed by: Sensible 4
Designer: MUJI

Maximum capacity: 10+6 persons (seated and standing)
Maximum speed autonomously: 40km/h
Demo drives on public road: 34

ESPOO ESBO

CITY AND UNIVERSITY COOPERATE TO ADDRESS GRAND CHALLENGES

Aalto University

The City of Espoo and Aalto University work closely together, with room for courage and experimentation. The common goal is to build a sustainable future. A developing city is seen as a living lab that can be developed together to be more functional and sustainable. This cooperation is comprehensive, including cooperation in education and research, regional development, the promotion of the international competitiveness of the Helsinki metropolitan area and Finland, and the bold search for new solutions.

Aalto University is a multidisciplinary scientific community where science and art meet technology and business. The university aims to develop solutions to solving grand societal challenges challenges of the world in key fields and at their interfaces by building a strong, creative community to support new thinking. As the first university in Finland, Aalto University signed universities' international Sustainable Development Goals accord. In 2019, about one tenth of all the university's theses, including doctoral dissertations, and a total of nine of the Master programmes, focused on the thematics of sustainable development.

WORLD-CLASS INNOVATION AND CREATIVITY CLUSTER

The City of Espoo and Aalto University are jointly developing the Otaniemi campus area as a world-class innovation and creative community. In expanding the sustainable campus area, it has been vital that the city's land use planning decisions have allowed the proper mixing of laboratories, university facilities and student housing. This has enabled the building of vibrant innovation environments that will generate cooperation and new solutions.

In addition to high-quality research and teaching, the campus has growth-focused, high skilled companies and startups. The technology cluster interacts with the university, the city, and other key players in the region and attract foreign companies to the region. A dense competence cluster attracts participation. The common goal of the city planning is also to develop intelligent public transport in Otaniemi campus. The campus now has a metro station, and a tram line will also be built in the coming years. Walking and cycling are encouraged.

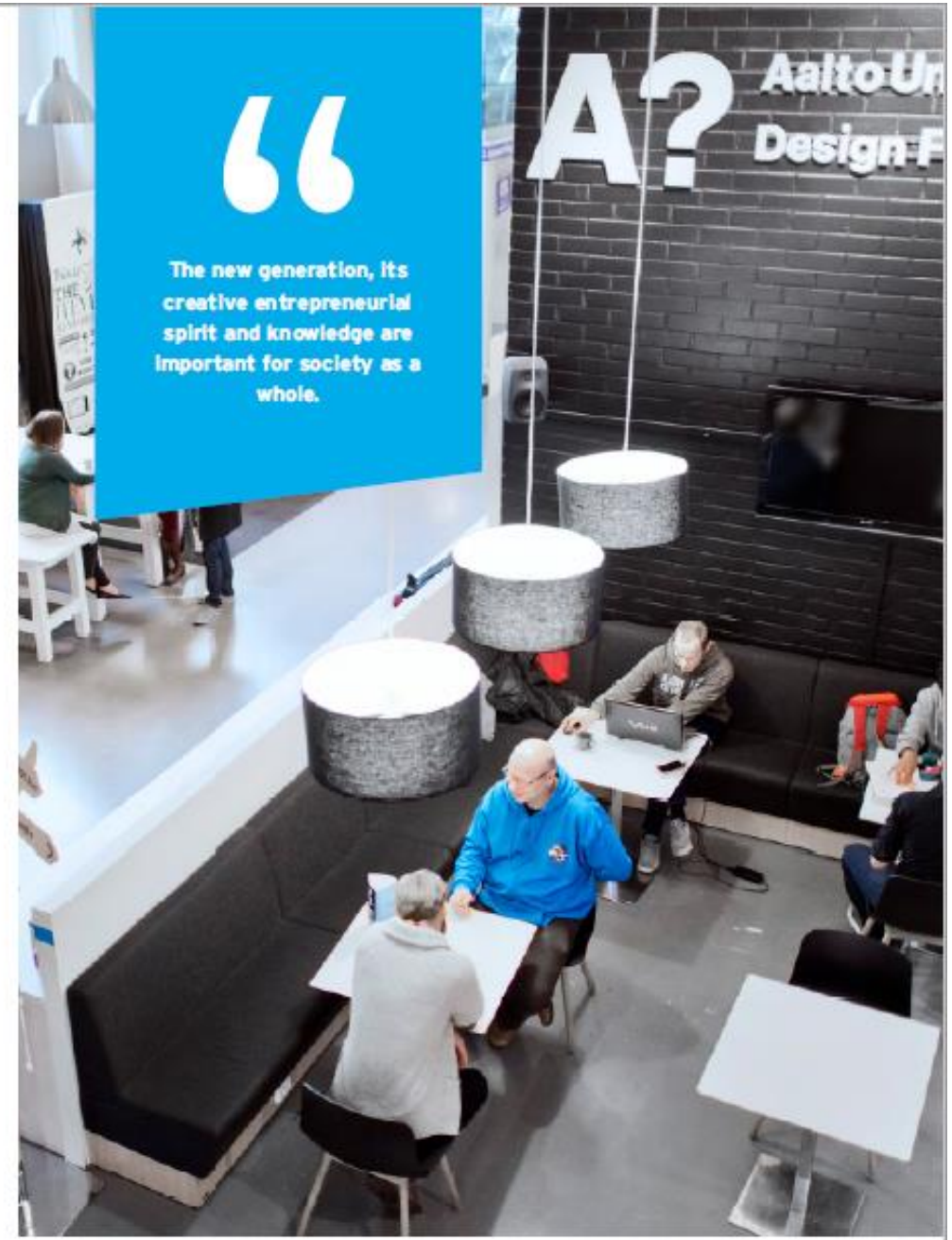
BROAD-BASED LEARNING CREATES DRIVERS OF CHANGE

Aalto University and Espoo wish to build an innovative society and educate game changers, and they therefore work in an open-minded, and they therefore work in an open-minded way to promote wide-ranging learning together. The new generation, its creative entrepreneurial spirit and knowledge are important for society as a whole.

Espoo participates in Aalto innovation activities by financially supporting the professorship of Urban Economics, the Master's Programme in Urban Studies, the joint Urban Academy of the cities and universities in the Helsinki metropolitan area, and by supporting summer camps run by students for entrepreneurship, by giving challenges the city faces to students to solve, or by testing products developed by students. The Aalto Junior activities offer students and teachers in schools and general upper secondary schools opportunities to learn and discuss solutions for improving the environment through science, the arts and finance. Co-operation has also been carried out in entrepreneurship education and it is also possible for students in Espoo's general upper secondary schools to attend university courses.

In the "School as a Service" concept, universities and schools have combined their resources and forces to promote wide-ranging learning. General upper secondary schools that work in close cooperation with the university are sharing exercise and laboratory facilities and other resources, have been located in the campus area. The concept sees school as a versatile service and not just as a physical space, as in the traditional model. Cooperation creates opportunities to develop new pedagogical skills in learning and to develop the school's operating culture.

More information: sanna-kaisa.rautavaa@aalto.fi



> The new generation, its creative entrepreneurial spirit and knowledge are important for society as a whole.

ESPOO ESBO

CO-CREATION IN THE HEART OF ESPOO

Urban Mill is a space, a community and a service situated at Aalto University campus in the heart of Espoo Innovation Garden, Finland. Urban Mill brings together important actors to help solve wicked problems of urban life. It shows how the built environment can be planned and designed based on actual use. It is an innovation hub with the theme of Creative Sustainable City and its activities include e.g. developing new digitally-enabled service concepts. Urban Mill builds long-term collaboration through new solutions that are tested rapidly and flexibly.

Urban Mill started as a public-peer-private partnership in 2013. The main partners of the program are the City of Espoo, Aalto University and Academic Engineers and Architects in Finland TEK. A private company is responsible for developing the Urban Mill concept, operating the space and arranging the services.

URBAN MILL IS A GLOBAL FOCAL POINT FOR URBAN INNOVATION CO-CREATION

Urban Mill brings urban developers together with residents and other users of the urban environment. Public and private sector institutions, researchers, new entrepreneurs and students have a place to share ideas with the users of the built environment. Urban Mill is a venue for events and a smart coworking space for entrepreneurs and developers. Our partners exhibit results both physically and virtually. Simultaneously, Urban Mill is an innovation accelerator that is connected to other spaces needed by our community.

SERVICES, PARTNERSHIPS AND MEMBERSHIPS

- Action and event spaces: Diverse self-service spaces for our community to share. Our space is also available to organizations outside our network who want to showcase, develop and prototype their own urban innovations.
- Ecosystem services: A wide spectrum of services supporting innovation, development, testing and business, including co-location services to establish business in the area. Urban Mill is a great entry into the opportunities, networks and resources available in the Espoo Innovation Garden, the biggest innovation hub in Nordics
- Partnership: Several alternatives for organisations and institutional actors to join the program and become part of the community.
- Membership: Alternatives answering the needs of different sized organisations in different development phases - from micro entrepreneurs to big enterprises.

KEY FACTS

Memberships and programs include the use of shared spaces, discounts on event spaces, the possibility to use the 3D cave and technology provided together with Aalto Built Environment Laboratory, Smart Screens, thematic networks and access to Urban Mill's service network.

More information: kari.leikkola@urbanmill.fi
http://www.urbanmill.org

Urban Mill

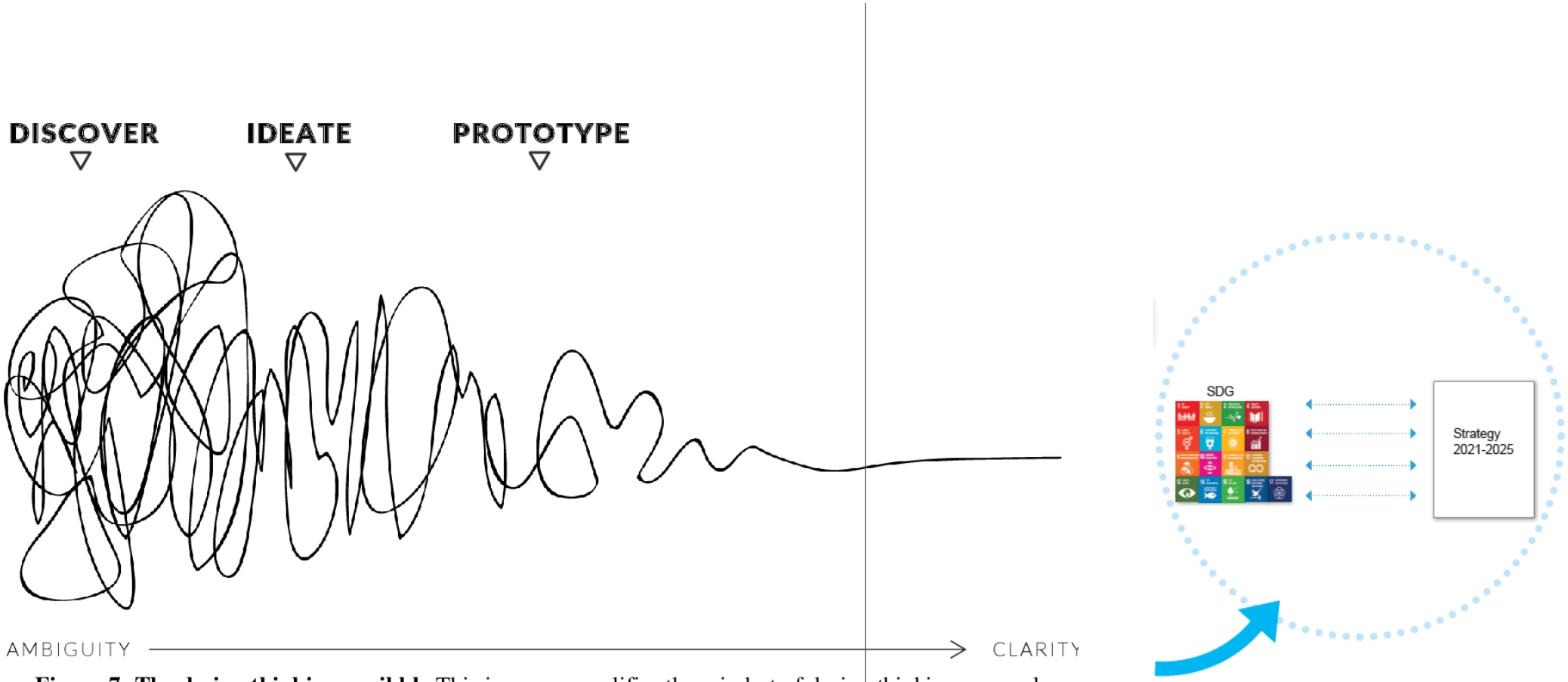


Figure 7: The design thinking squibble This image exemplifies the mindset of design thinking – namely, a willingness to nurture controlled chaos, distill and synthesize it into clarity, and iterate towards an ultimately clear but initially undefined product or service.