

CIENCE PARK Constants

Conceptual design of a bio- and circular economy based business ecosystem for the industrial area in Naantali

Final report

26 MAY 2021



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WHY NAANTALI

Strengths of Naantali are excellent location nearby Turku, good road and rail connections and efficient operating environment and infrastructure



LOCATION

- Excellent location nearby Turku and Raisio
- The Naantali site has hosted chemical and process industries subject to an environmental permit for a long time
- Turku airport
- Port of Turku
- Port of Naantali
- Deep waterway (15.3 meters)
- Three piers in refinery area
- Railway connections
- E18 ring road (part of TEN-T¹ network) and E8 road



KNOW HOW AND BUSINESS ECOSYSTEM

- Readily available workforce with expertise in chemical and process industries
- Over 310 000 inhabitants in Turku region
- 20 000 enterprises in the region
- ~47 000 students in the region
- About 525 Master of Science technology study places in Universities in Turku and 1200 engineering study places at Universities of Applied Sciences
- Proximity to Smart Chemistry Park in Raisio, i.e., an innovation platform for delivering solutions to the bio- and circular economy



SCIENCE

- There are six higher education institutions in Turku.
- For instance, University of Turku, Åbo Akademi University, Turku University of Applied Sciences, Novia University of Applied Sciences
- Åbo Akademi has research groups with expertise in process chemistry, sustainable process engineering and natural material technology – all supporting the innovation activities of an industrial bio- and circular economy ecosystem in Naantali
- Many vocational schools in Turku regions and also in Raisio



OPERATING ENVIRONMENT AND INFRASTRUCTURE

- The Naantali site is optimal for chemical process operations, which are at the heart of the industrial bio- and circular economy
- There is strong operating environment and infrastructure in maritime industry, chemical industry, medical and biotechnology and food production and industry in Turku region
- Industrial commodities are produced nearby like steam and electricity



1. Trans-European Transport Network, Sources: City of Naantali, City of Turku

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EXECUTIVE SUMMARY: CONCEPTUAL DESIGNS

Three bio- and circular economy business concepts for Naantali based on regional strengths, potential markets and identified investment needs

(Som		 Turku region is pioneering textile recycling with a pilot plant in Paimio
4L	Textile ecosystem	 Based on recycled and novel textile fibres Including regenerated textile fibre manufacture, thread spinning mill and airlay fabric production
	Plastic ecosystem	 Utilising the local knowhow in hydrocarbon processing and good logistics for Baltic Sea imports Combined mechanical and chemical recycling of plastics with cost saving possibilities and development synergies
	Biorefining ecosystem	 Relying on Turku region's strengths in process chemistry Comprising a biorefinery based on extraction and biomass fractionation unit to supply e.g. producers of high value functional biochemicals and biomedical products, and companies in the textile ecosystem
	Additional options	 Battery ecosystem based on the recycling of the metals But Vaasa has prepared for the entry of battery material plants for several years The products from Terrafame's battery chemical plant will be shipped via the Port of Hamina-Kotka



Contents

Executive summary

- 1. Introduction
 - Location -
 - Infrastructure -
 - **Business environment** -
- 2. Conceptual designs
 - Textile ecosystem
 - Plastic ecosystem -
 - Biorefining ecosystem -
- 3. Key findings and recommendations 27

5



Introduction

INTRODUCTION - NAANTALI REFINERY AREA

The Naantali refinery storage area is quite large but Neste Oyj will continue some of terminal operation in the area

INFORMATION OF STORAGE AREA

- The size of the refinery area in Naantali is 300 ha
- Neste Oyj will continue the terminal operation in some of the areas
- The tank area is in northwest of the area and some of the area will continue as a terminal area for the Neste Oyj

Underground tanks

- Rock cave, below groundwater level 252 000 m³
- Steel-surface tanks built into the rock (7 pcs) 28 000 m³

Above ground tanks

- Fixed roof tanks (134 pcs) 450 000 m³
- Floating roof tanks (4 pcs) 106 000 m³
- Floating double roof tanks (34 pcs) 254 000 m^3
- Storage bullets and column tanks (12 pcs + 3 pcs) 940 m^3
- Columns and 7 tanks are from the bitumen plans, one storage bullets stores hydrogen, the others LPG and additives
- Ball tanks (5 pcs) 5 200 m³





Sources: 1 Ympäristölupapäätös Nro 45/2007/2

There are three piers, which depth is from 8 meters to 15 meters in the area

INFORMATION OF THE PORT AREA IN NAANTALI

- The waterway is 15.3 meter wide and starts from south of Utö
- The waterway is lit and there are 19 lines in the waterway
- There are 15 piers in the port of Naantali and three of them are in Neste Oyj refinery area

Neste Oyj, Pier 1:

 Navigable depth 8.0 meters and the maximum length of vessel is around 170 meters

Neste Oyj, Pier 2:

Navigable depth 10.0 meters and the maximum length of vessel is around 200 meters

Neste Oyj, Pier 3:

- Navigable depth 15,3 meters and the maximum length of vessel is around 300 meters
- There are also other piers in the port area in Naantali. The largest piers are 15-17, which are coal and grain piers. Navigable depth in these piers are 13.0 meters and the maximum length of vessel is 370 meters



Source: Finnish Transport Infrastructure Agency

INTRODUCTION - LOGISTICS

Refinery area is located close by E18 ring road. Poor road conditions in some parts of the road but improvement project is on going

ROAD TRANSPORT

- E18 ring road (the Finnish National Road 40) from Naantali to Turku owned by state
 - Poor road conditions in some parts of the road (pavement damages)
 - Currently improvement project between Kausela and Kirismäri, will be completed by the end of 2023
 - Improvement project in city centre of Naantali (187 M€) is scheduled to begin in 2023 and last three years
 - Improvement project between Naantali-Raisio (158 M€) is currently under planning (2021-2023)
 - The implementation is scheduled to begin in 2026 and last three years
- Nesteentie is owned by city of Raisio
- Vantotie is owned by city of Raisio and Neste Oyj
- Viestitie is owned by city of Naantali

Private owned roads are marked in grey colour in the map





Source: Väylävirasto

INTRODUCTION - LOGISTICS

Direct railway connection to the refinery area and port of Naantali, part of the tracks are in poor condition but some improvements will be ready in 2021

RAILWAY TRANSPORT

- Direct single track railway connection to the refinery area and port of Naantali mainly owned by state. Track, which is located near by refinery area is owned by Neste and track, which is located in port area is owned by port of Naantali
 - Non-electrified track and the part of track from port of Naantali is in very poor/poor condition.
- Improvement project between Turku-Helsinki and railway connection between Espoo-Salo (shortcut trough Lohja) and Salo-Turku (double track)
 - The aim is that the improvements designs will be completed by the end of 2023
 - Espoo track design is currently on going and Turku railway yard and Kupittaa double track improvements are planned to start this year
 - The improvement project is planned to be completed by 2030
- Improvement project between Turku-Uusikaupunki-Hangonsaari (68 kilometres, 21 M€)
 - Improvement project includes electrification of the track between Turku-Uusikaupunki-Hangonsaari and some small improvements
 - The improvement project will be ready in 2021





Source: Väylävirasto

POTENTIAL AREAS IN NAANTALI REFINERY AREA FOR NEW ECOSYSTEMS

There are 3 main areas identified that have their own characteristics and challenges





Area 1 has not significant elevation differences but nature conversation area, protected areas and nature path limit the construction possibilities

CHARACTERISTICS OF THE AREA 1

- Nature conversation areas (three areas) are located near by the refinery area (Vanto hardwood forest) marked in dark grey in the map.
- Timalipolku (nature path) starts from parking slots and goes around Perttala area, which is near by Raisionlahti (picture b)
- In environmental impact assessment of Naantali refinery expansion projects 2018 was defined many natural sensitive areas
 - In north of the refinery area is two hardwood areas, where is oak trees and the areas are protected. They meet section 29 of the Nature Conservation Act. Other hardwood area is located close by the nature conversation area and other one is in Perttala area close by railway tracks (picture a).
 - Furthermore coastal area is marked as a bat area
 - Path area is marked with brown lines and hardwood areas with green lines
- + Located close by the railway connections and main roads
- + Not significant elevation differences
- Close by nature conversation areas and partly in nature paths

Source: City of Raisio, Paikkatietoikkuna





POTENTIAL AREAS IN NAANTALI REFINERY AREA FOR NEW ECOSYSTEMS

Area 2 has significant elevation differences especially in 20 hectares area, other areas are slightly flatter but significantly smaller

CHARACTERISTICS OF THE AREA 2

- + Located close by the main gates, waste water treatment systems and other infrastructure
- Elevation differences are significant in the areas

TERRAIN HEIGHT PROFILE







POTENTIAL AREAS IN NAANTALI REFINERY AREA FOR NEW ECOSYSTEMS

Area 3 is the largest area, but far away from the main infrastructures and the area requires new road connection

CHARACTERISTICS OF THE AREA 3

- + Large unified area and quite flat
- + Power plant is located near by the area
- Located far away from main infrastructure for instance waste water treatment systems
- Require new road connection
- No direct rail connection







INFRASTRUCTURE

Most of the industrial infrastructure such as electricity and waste water treatment systems are in the Naantali refinery area



ENERGY

- Electricity consumption in the area has been 170 GWh/a corresponding to about 20 MW average power.
- Naantali Power plant produces electricity 800 GWh/a.
- Fingrid has 110 kV between Naantali-Lieto
- Possible expansion to 400 kV
- Kraftnät Åland AB has 110kV submarine cable to Åland
- Caruna Oy, Naantali cable 110kV Neste
- Refinery produces about 680 GWh/a steam (Refinery produces feed water to steamers)
- Fortum Power and Heat has provided steam to the refinery



WATER

- Connection to Raisio-Naantali water utility of the municipality
- The usage has been around 700 000 m³/a
 - Process water 200 000 m³/a
 - Boiler water production 460 000 m³/a
- Seawater intake for cooling purposes, 40 millions m³/a

Waste water treatment system

- Oil drainage wells
- Biological waste water treatment
- Surface water collection and treatment
- Demineralized water 460 000 m³/a (60 m³/h)

Sources: Kraftnät Åland AB, Fingrid Oyj, Turun Seudun Energiantuotanto Oy, Ympäristölupapäätös Nro 45/2007/2



CARBON DIOXIDE

- Naantali Power plant
- Parainen Cement plant
 - Distance to the area around 45 kilometres by roads
- Air Liquide and Linde
 - Liquefied carbon dioxide possible by truck



OTHER

- Treatment of combustible fugitive emissions
- Factory air, nitrogen station
- Steam connection and pipe for the supply of combustible gases to the Naantali power plant
 - No district heating
- Fire and rescue department



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Conceptual designs

CONCEPTUAL DESIGNS: INTRODUCTION

Three bio- and circular economy business concepts for Naantali based on regional strengths, potential markets and identified investment needs

(JT)	Textile ecosystem	 Turku region is pioneering textile recycling with a pilot plant in Paimio Based on recycled and novel textile fibres Including regenerated textile fibre manufacture, thread spinning mill and airlay fabric production
	Plastic ecosystem	 Utilising the local knowhow in hydrocarbon processing and good logistics for Baltic Sea imports Combined mechanical and chemical recycling of plastics with cost saving possibilities and development synergies
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TEXTILE ECOSYSTEM

Textile ecosystem based on recycled and novel textile fibres requires anchor investor for textile fibre production e.g. Infinited Fiber





TEXTILE ECOSYSTEM: COMPANIES

Lounais-Suomen Jätehuolto and Infinited Fibre could be the anchor companies in the textile ecosystem

LOUNAIS-SUOMEN JÄTEHUOLTO (LSJH)



- A regional waste management company owned by 17 municipalities; Turku and Salo with 43% of the shares.
- It has 4 waste treatment centres and 8 sorting stations.
- In the nationwide Telaketju network, the firm is developing textile material recycling.
- The aim is to build an end-of-life textile processing plant in Turku region, i.e. a €22m investment, which would have an input of 15 kt/a of textile waste and require a site of 3 ha.

WHY IN NAANTALI?

- Turku region has a relatively long history in R&D on end-of-life textile and serves as a national hub for the know-how.
- The textile processing plant could be linked to
 - regenerated textile fibre production,
 - Naantali power plant and infrastructure, and
 - biorefining ecosystem.
- Naantali provides a possibility for textile waste imports from the Baltic Sea region.

INFINITED FIBER COMPANY (IFC)



- A developer of a textile technology, which turns cellulose-based materials (e.g. cotton, viscose and other textile waste) back into Infinna[™] textile fibres.
- It operates pilot facilities in Espoo and Valkeakoski with a combined capacity of 150 t/a.
- The company is planning to build a €220m production plant in Finland, with a capacity of 30kt/a and post-consumer textile waste as feedstock, expected to start in 2024.
 - The decision on the site (15 ha) is expected by 09/2021.

WHY IN NAANTALI?

- LSJH will supply raw material to Infinited Fiber's plant from its planned textile waste plant.
- There might be synenergies with the other business concepts in the long run, as
 - the biorefining ecosystem with CH-Bioforce could provide additional feedstock, and
 - it could offer feedstock for chemical recycling of plastics.
- Proximity to Infinited Fiber's partner H&M Group.



TEXTILE ECOSYSTEM: COMPANIES

The circular textile ecosystem would benefit from a range of downstream operations within the value chain, located in Naantali

RENEWCELL

RENEWCELL

- A Swedish textile recycling technology company.
- Through its patented process, the company can upcycle cellulosic textile waste, e.g. cotton clothes, into a new material, i.e. Circulose[®].
- It is planning to build a textile recycling plant, with a capacity of 60 kt/a and startup in the first half of 2022, at Ortviken industrial site in Sundsvall, Sweden.

WHY IN NAANTALI?

- Turku region has knowhow in end-of-life textile treatment.
- Possibility to extend Nordic co-operation, as Valmet is already the main equipment supplier for the Sundvall plant.
- There might be synergies with the biorefining ecosystem, as CH-Bioforce could offer an additional feedstock.
- Relative proximity to Renewcell's operations in Sundsvall.

PURE WASTE TEXTILES

- A Finnish developer and retailer of recycled fabrics, with a production plant, based on the recycling of industrial surplus fabrics and cutting waste, in India.
- Part of the firm's turnover comes from private label products made for other brands and companies, and it also sells yarn and fabric to larger clothing companies.



NORDIC UPSTREAM



- A Finnish interior design and construction company.
- It has tested textile waste as a raw material in the manufacture of sound insulation boards and furniture design.
- The products made from recycled material can perform better in terms of both acoustics and stability than the products currently on the market.

WHY NAANTALI?

- Pure Waste is planning to establish a subsidiary that would build a full-scale wire spinning mill in Finland.
- The spinning mill could sell the yarn to the knitting and weaving industry and directly to the brand owners for further processing, or subcontract fibre processing to other fibre manufacturers.
- The firm is applying funding, together with LSJH and Nordic upstream, for textile recycling ecosystem.

WHY NAANTALI?

- Sound insulation and interior design might offer additional end uses for waste textiles, resulting in a more economically viable and sustainable textile ecosystem.
- The company is applying funding, together with LSJH and Pure Waste, for textile recycling ecosystem.



TEXTILE ECOSYSTEM: SWOT

Companies show interest in the Naantali business ecosystem, but some potential projects have a very tight schedule

STRENGHTS

- Imports from the Baltic countries via Turku/Naantali harbours.
- Proximity to heat and electricity supply, as textile fibre manufacturing is a relatively energy-intensive process.
- Access to large amounts of high quality water required in textile fibre processes can be provided.
- Turku region's process chemistry knowhow and academic support.

OPPORTUNITIES

- A separate collection of textile waste must be arranged in the EU countries by 2025.
- LSJH's textile waste treatment plant under consideration could be situated in Naantali to form a vital part of the textile ecosystem.
- Higher quality feedstocks could offer an economically viable option, if sorting is done at origin.
- IFC is interested in the use of recycled feedstocks but also dissolving pulp, providing a link to CH-Bioforce in the biorefing ecosystem.

WEAKNESSES

- Given the relatively large area requirement of a textile fibre plant, a sufficient site needs to be available at rather short notice.
- It might not be feasible to transport textile waste over long distances.
- Regenerated textile fibre production could require significant investments in water treatment and other infrastructure at site.

THREATS

- Timeline critical, as some companies, identified here, have applied for Business Finland's funding that requires the projects to be finalised in two years.
- LSJH is planning to build a textile waste treatment plant in Topinoja but has not applied for an environmental license, yet.
- The availability of textile waste can be limited, as another treatment plant is very likely built in Scandinavia



PLASTIC ECOSYSTEM

Chemical recycling of plastics could utilise the local knowhow in hydrocarbon processing combined with good logistics for Baltic Sea imports



1. In the long run, synergies might be found between the plastic and textile ecosystems, as a polyester recycling plant may start at a later stage. But the link between the ecosystems is still seen as relatively weak.



PLASTIC ECOSYSTEM: COMPANIES

Naantali could offer a platform for chemical recycling of plastics, driven by Fortum and Neste with their expertise in waste and hydrocarbon processing

FORTUM

- A European energy company with activities in >40 countries, providing electricity, gas, heating and cooling and resource efficiency solutions.
- It has a mechanical recycling plant for plastics in Riihimäki, currently the only one in Finland.
- Fortum acquired in 2020 Crisolteq, which is a specialist in recycling of valuable metals in lithium-ion batteries, and has R&D activities in Raisio, industrial-scale hydrometallurgical recycling facility in Harjavalta and production plant in Tornio.

NESTE

NESTE

- A Finnish oil refining, marketing, engineering and technology company, with operations in 14 countries.
- It refines waste, residues and other raw materials into renewable fuels and sustainable feedstock for plastics and other materials.
- It develops chemical recycling of plastic waste and is introducing waste plastic as refinery raw materials.

WHY IN NAANTALI?

- Fortum has already an R&D unit with a circular economy focus in Raisio via its Crisolteq acquisition.
- The company is looking at options to combine its mechanical plastic recycling with chemical processing of plastic waste.
- The mechanical plastic recycling plant could be linked to
 - the chemical recycling plant, and
 - Naantali power station and Salo waste incineration plant.
- Naantali provides a possibility to import plastic waste, in particular higher value fractions, from the Baltic Sea region.
- Proximity to Turku/Naantali harbours offers cost-effective logistics for plastic recirculates.

WHY IN NAANTALI?

 Neste could be interested in combining its chemical recycling of plastics with mechanical plastic recycling operations run by a business partner.



PLASTIC ECOSYSTEM: SWOT

Plastic ecosystem is highly dependent on a few key players and how they see Naantali against other sites in Finland

STRENGHTS

- Knowhow in process chemistry and engineering.
- The Naantali industrial site is currently used for industrial chemical processes, thus indicating the suitability of the site also for chemical plastic processing.
- Possibility to connect to the TSE multifuel plant.

WEAKNESSES

- The domestic volumes of plastic waste does not allow for plastic recycling
- The reform of the waste legislation is slowing down the development of the processing plants for materials collected under the responsibility of producers.

OPPORTUNITIES

- Some major players see Naantali as a potential location for a chemical plastic recycling site with a capacity of 20-40 kt/a alongside a mechanical recycling facility.
- Synergies between mechanical and chemical recycling of plastics are seen as significant.
- Importing of plastic waste from e.g. Scandinavia and the Baltic States could support the economic viability of plastic recycling.
- Funding for the development of domestic production and know-how could enable progress in plastic recycling.
- Tightening plastic recycling targets in the EU and limits of mechanical recycling

THREATS

 The ecosystem synergies need to outperform increased logistic costs, if one new large plant would replace the current Riihimäki facility.



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BIOREFINING ECOSYSTEM

Strength of the Turku region is in process chemistry and the ecosystem needs biomass fractionation unit to supply downstream players





BIOREFINING ECOSYSTEM: COMPANIES

CH-Bioforce has a major role in the biorefining ecosystem, depending on its ability to get funding for a process scale-up

CH-BIOFORCE



- a Finnish start-up company, developing biomass fractionation technology.
- It has R&D facilities and pilot plant at Raisio Smart Chemistry Park.
- The company is planning an investment in an industrial scale production plant and looking for companies interested in technology licencing.

WHY IN NAANTALI?

- CH-Bioforce's production process could offer bio-based alternatives, especially in the textile, thus providing a link between the biorefining and textile ecosystems.
- Furthermore, some biomass fractions could possible be used in medical applications, resulting in synergies with the business and R&D knowhow of the Turku region.





BIOREFINING ECOSYSTEM: SWOT

Biorefining ecosystem has limited potential as stand-alone, but could be an extension to the textile ecosystem

STRENGHTS

- Biorefinery products can be used as an additional feedstock in the textile ecosystem.
- The Turku region has a long tradition in strong expertise in process chemistry and advanced R&D facilities in the local universities.
- Bio-based industries have a favourable investment environment in Finland, and bioproducts are forecast to have positive market prospects globally.
- The scale of the demo plant is relatively small, allowing local/regional feedstock procurement.

OPPORTUNITIES

- CH-Bioforce is planning to build a demo plant for its biorefining process, which could provide the core/flagship operations for the ecosystem.
- Manufacturing of upgraded products, in particular high value added items (e.g. medical/cosmetics), could provide an option for bio-based business, as these products can be made further from the origin of the biomass source.
- FP-Pigments, one of the investors in CH-Bioforce, has operations in Germany and the US, which could help the establishment of international business.

WEAKNESSES

- There are no large volumes of economically viable biomass sources nearby Naantali.
- The forest industry side streams, which are the most significant/potential biomass source in Finland, are typically processed close to their generation, emphasising the importance of the main biorefining process in the ecosystem.

THREATS

- Timeline critical, as some companies, identified here, have applied for Business Finland's funding that requires the projects to be finalised in two years.
- CH-Bioforce's technology has not been demonstrated on industrial scale, yet.



Key findings and recommendations

KEY FINDINGS

The textile ecosystem appears the most viable approach for the development of Naantali, followed by concepts based on plastic recycling and biorefining

- The textile ecosystem stands out as the most promising option for the Naantali industrial area.
 - The possibilities for the ecosystem to flourish depend on the key companies' willingness to investigate the opportunities Naantali could provide them as a new business site and their long-term commitments to develop their operations in the region.
- The plastic ecosystem relies on decisions to be made on the future infrastructure related to collection, sorting and recycling of plastics in Finland and to some extent in the Baltic Sea area.
 - Logistics and infrastructure support Naantali as a location for mechanical and chemical plastic recycling plants.
 - But, the lack of precise knowledge about the availability of suitable sites (number and characteristics) in the industrial area makes the development of plastic business there less attractive and a rapid progress on this front more difficult.
- The realisation of the biorefining ecosystem is highly dependent on CH-Bioforce and its ability to get funding for the scale-up plant.





KEY FINDINGS

The development company with experienced staff needs to start providing identified firms with exact info to support their selection of a business site

- The planned development company of the Naantali industrial area should be able to start operating immediately. Site selection - The loss of current businesses, infrastructure and human resources available in the region need to be avoided, as 2021 they provide essential cornerstones for the future development of the ecosystems. - Some of the companies, identified as key investors in the ecosystems, have applied for Business Finland funding with a two-year timeline. Environmental - The Turku region competes for e.g. the textile and plastic ecosystems with other potential locations in Finland permitting and Baltic Sea area, as limited feedstocks do not allow for multiple large-scale operations in the Nordics. 2021-23 - Currently, the EU's post-covid-19 recovery plan directs funding to bio- and circular economy based activities. - Already this year, the potential investors in the area need to be able to select the Naantali site as identified location for their environmental permitting process. Investment decision 2023 Provided that arrangements for industrial operations start promptly, new bio- and circular economy based process industries could start commercial business in five years. - The environmental licensing process takes roughly two years and construction of a plant another two years. - Trade support would be also needed for the companies starting their business, in addition to the infrastructure **Construction &** provided by the Naantali ecosystem. commissioning - Neste's ambitions have also an impact on the pace of the development in the industrial area. 2023-24 - If the creation of new business operations in Naantali is seen as a long-term process¹, the work can take over a decade and would most likely need completely new resources, as e.g. skilled labour, network of subcontractors (>50 firms) and services (e.g. fire brigade) might no longer be readily available. Commercial



1. cf. building of the battery ecosystem in Vaasa

RECOMMENDATIONS

Fast actions by the development company needed to enable growth

- The development company should instantly acquire key personnel
 - with deep knowledge on the business fundamentals in the region, incl. Neste's and other firms' assets,
 - capable of giving both technical and economic advice,
 - with understanding on the principles of the circular economy,
 i.e., the industrial actors that enable the circular economy, and
 - equipped to answer inquiries on the site in depth.
- The possibilities to establish industrial operations in the Naantali refinery site need to be immediately investigated and mapped in detail.
- The connections to the required infrastructure to enable industrial productions and logistics have to be built as soon as possible.
- The development of the ecosystem has to
 - consider both technical and economic challenges,
 - be coordinated consistently, and
 - involve, in close cooperation, all relevant local businesses and other partners.



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KNOW HOW AND BUSINESS ECOSYSTEM

- Readily available workforce with expertise in chemical and process industries
- Over 310 000 inhabitants in Turku region
- 20 000 enterprises in the region
- ~47 000 students in the region
- About 525 Master of Science technology study places in Universities in Turku and 1200 engineering study places at Universities of Applied Sciences
- Proximity to Smart Chemistry Park in Raisio, i.e., an innovation platform for delivering solutions to the bio- and circular economy



SCIENCE

- There are six higher education institutions in Turku.
- For instance, University of Turku, Åbo Akademi University, Turku University of Applied Sciences, Novia University of Applied Sciences
- Åbo Akademi has research groups with expertise in process chemistry, sustainable process engineering and natural material technology – all supporting the innovation activities of an industrial bio- and circular economy ecosystem in Naantali
- Many vocational schools in Turku regions and also in Raisio



OPERATING ENVIRONMENT AND INFRASTRUCTURE

- The Naantali site is optimal for chemical process operations, which are at the heart of the industrial bio- and circular economy
- There is strong operating environment and infrastructure in maritime industry, chemical industry, medical and biotechnology and food production and industry in Turku region
- Industrial commodities are produced nearby like steam and electricity



1. Trans-European Transport Network, Sources: City of Naantali, City of Turku

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