

Environmental impact assessment

Karoliina Jaatinen
8th of November 2019

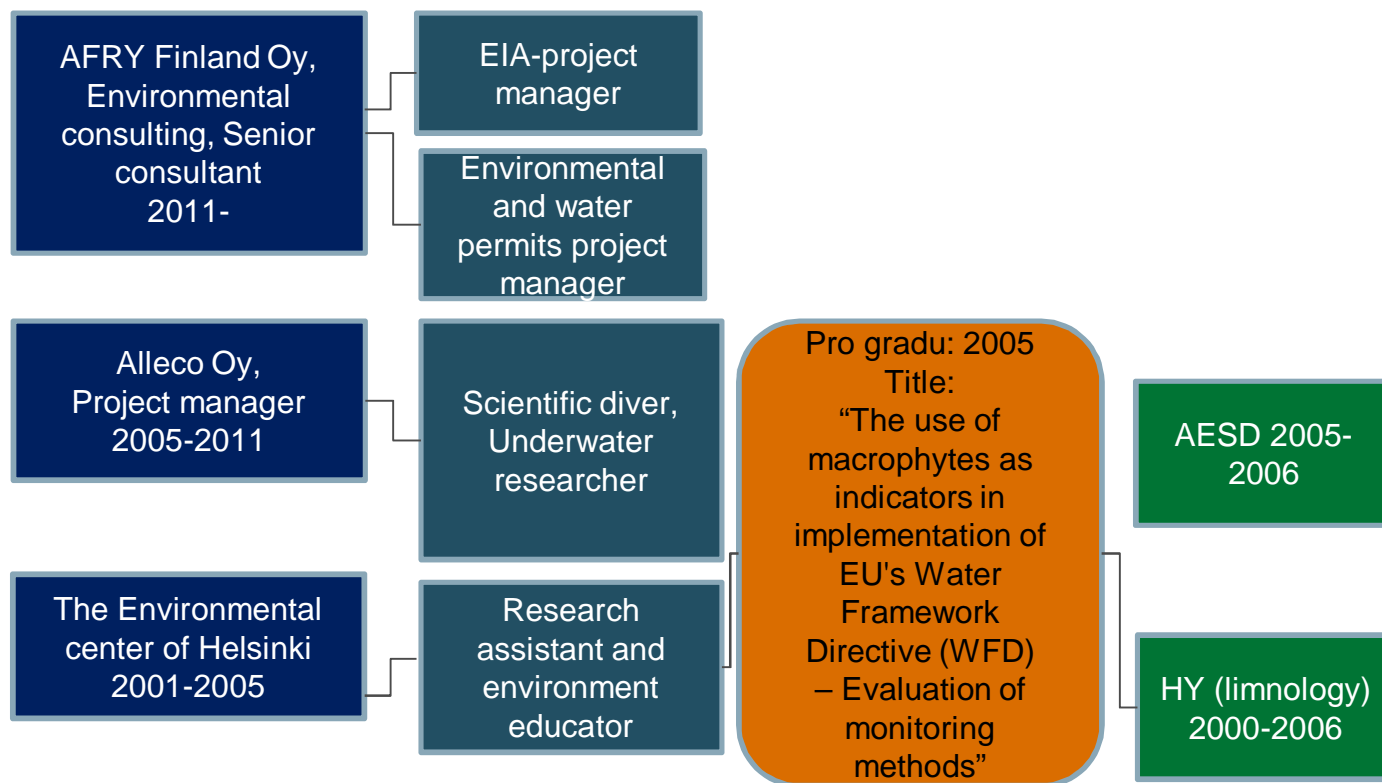
WAT-E2140 SUSTAINABILITY IN ENVIRONMENTAL ENGINEERING

CONTENT

1. My experience
2. Alleco Oy 2005-2011 > Pöyry Finland Oy until 2019 > ÅF Pöyry > AFRY Finland Oy since 2020
3. The legal basis of EIA in Finnish/European frame of reference
4. EIA Process
5. Two examples of EIA Process:
 1. The railway tunnel between Finland and Estonia
 2. The sewage treatment plant and the biogas plant in Koukkujärvi, Nokia
6. Summary - Discussion



1. My education



EIA-EXPERIENCE

- Project manager in more than 30 projects.
- Specialties include environmental impact assessment, environmental permit applications and environmental legislation.
- Experience of nuclear, hydro, offshore and on-shore wind power, power line projects, waste water treatment, biogas, biorefinery as well as dredging and sea dumping projects.
- Key expertise is in the assessment of aquatic impacts of energy production and industry.

AFRY FINLAND OY MORE THAN TRADITIONAL ENVIRONMENTAL CONSULTING

- Delivering consulting, engineering, project execution and operational services.
- Global community of talented people working closely with clients locally.
- Inspiring new solutions by connecting deep expertise and profound insight.
- Contributing to projects that make a difference.



ENVIRONMENTAL SERVICES FOR CLIENT'S NEEDS

STRATEGIC PLANNING

- Climate change services (carbon footprint and handprint, LCA, net positivity)
- Circular economy
- Environmental strategy
- Corporate social responsibility
- Environmental and occupational health & safety management systems
- Health, safety and environmental audits (HSE)
- Environmental risk assessments
- Environmental Due Diligence (EDD)
- Lenders environmental advisor services (e.g. ESDD/ESIA)

TRANSACTIONS AND EXIT

INVESTING

- Geoscientific investigations for rock and soil
- Urban planning and land use
- Environmental impact assessments (EIA)
- Social impact assessments (SIA), stakeholders engagement
- Environmental permit applications
- Contaminated soil, sediment and structure studies
- Nature surveys and Natura assessments
- Water system monitoring
- Noise and vibration measurement and modelling
- Flow and water quality modelling of inland and coastal waters, air quality modelling

DURING OPERATION

THE LEGAL BASIS

- The EIA Directive (85/337/EEC), amendments 1997, 2003, 2011
- Environmental Impact Assessment (EIA) Directive (2014/52/EU)
- Act on Environmental Impact Assessment Procedure 252/2017
- Decree on Environmental Impact Assessment Procedure 277/2017
 - Lists the types of projects that must always be subjected to EIAs
 - The list has been updated 1.2.2019
 - Can also be required for other projects, if similar impacts are expected
- EIA act in English:
<https://www.finlex.fi/fi/laki/kaannokset/1994/en19940468.pdf>

THE AIM

- To assess environmental impacts of projects
- To use the assessment in planning and decision-making
- To increase the information available to citizens and their opportunities to participate.
 - The environmental impact assessment of plans and programs (SOVA)
 - Transboundary environmental impacts
 - NATURA Assessment

DIRECT AND INDIRECT IMPACTS ON

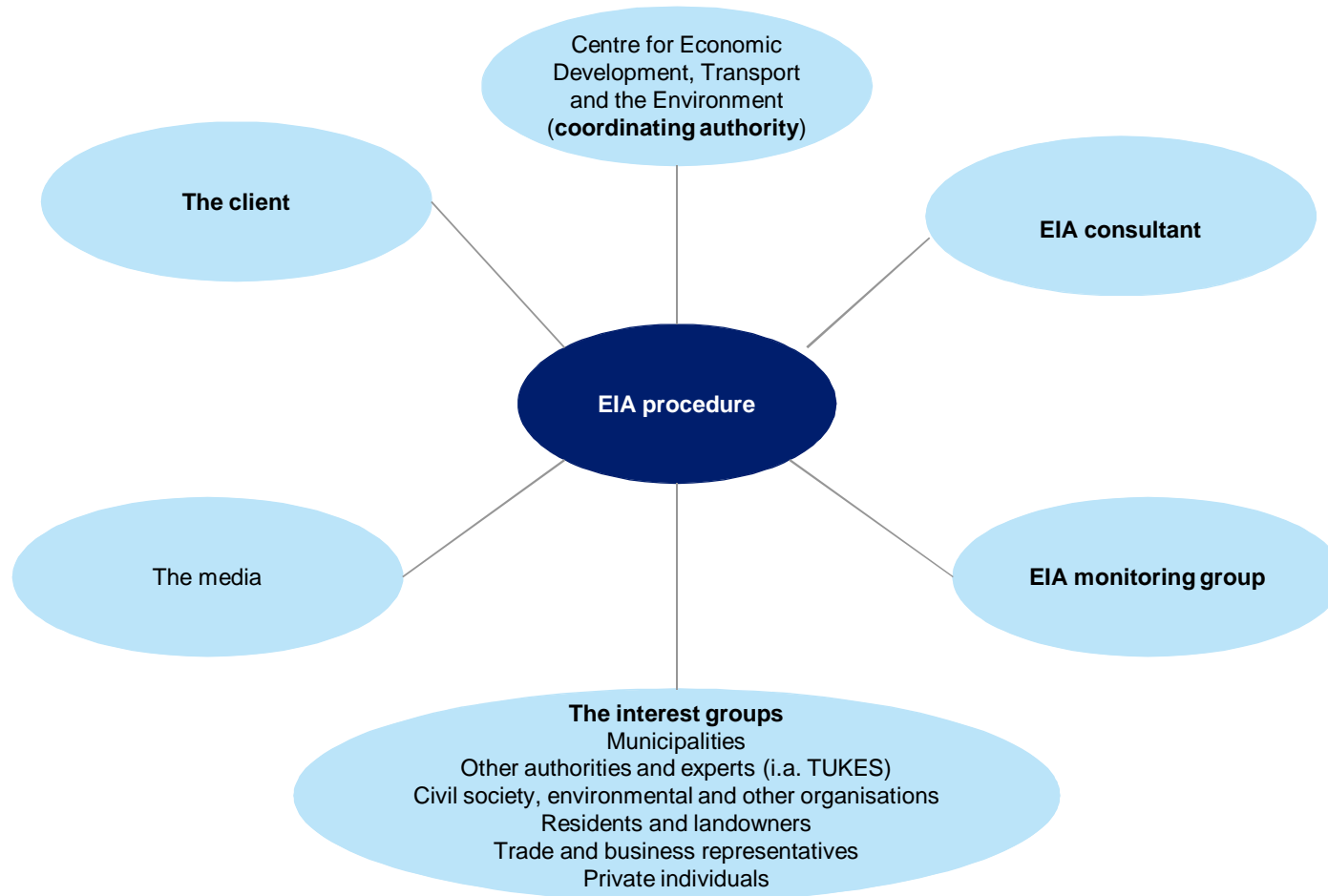
- a) human health, living conditions and amenity
- b) soil, water, air, climate, organisms and biological diversity
- c) the urban structure, assets, landscape, townscape and cultural
- d) heritage
- e) the utilisation of natural resources
- f) the interaction between the factors listed in points a–d

The authorities in Finland related to the EIA and permitting

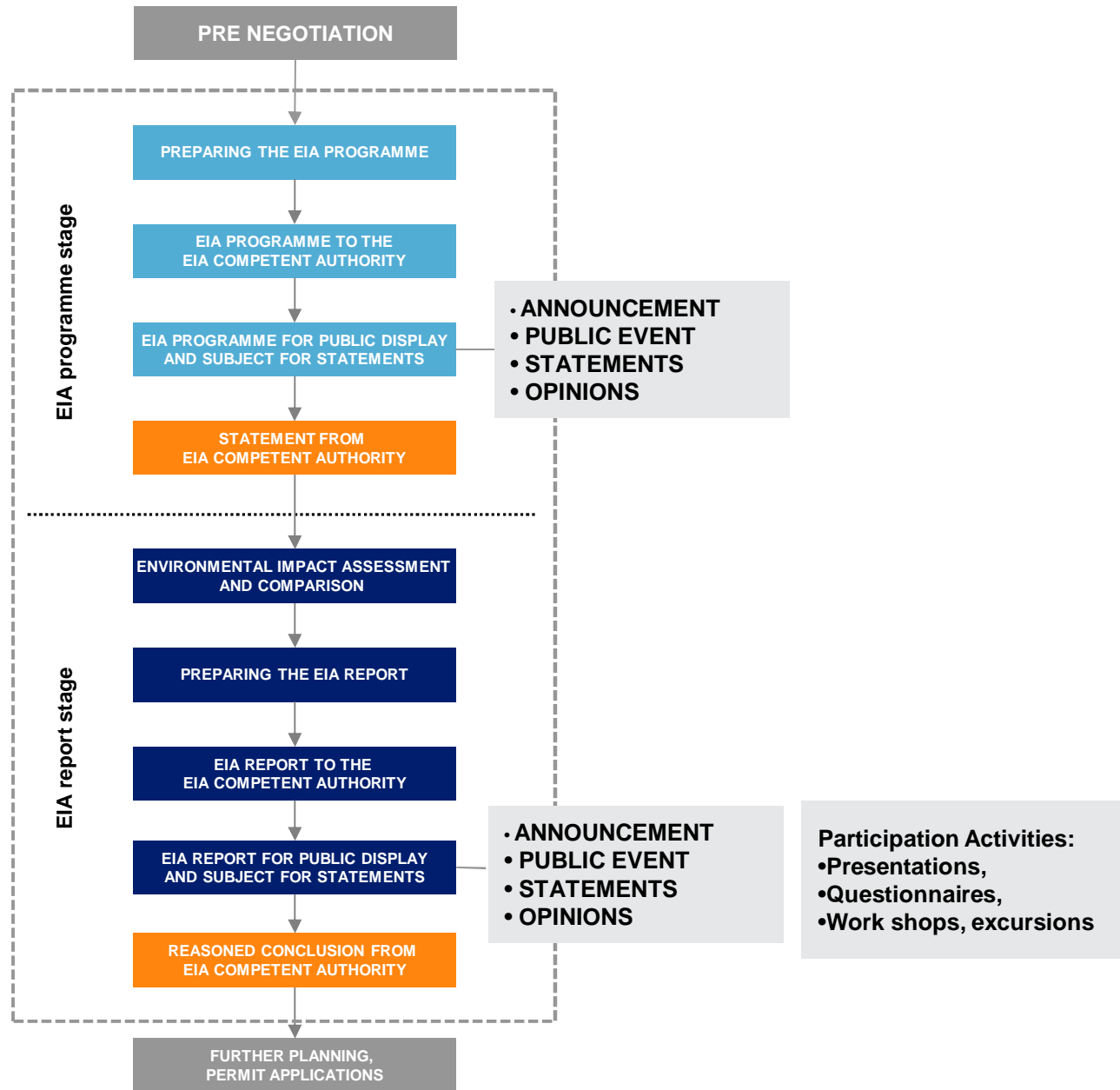


- **Regional State Administrative Agencies (AVI):**
 - Decisions on licenses and permits pursuant to the Environmental Protection Act and the Water Act
- **Regional Centres for Economic Development, Transport and the Environment**
 - Use and management of water resources
 - Reporting and monitoring the state of the environment
 - Environmental protection (supervisory, capacity building, EIA, permit..)
 - Steering and monitoring of land use
 - Use and management of water resources
- **Municipalities**
 - Land use
 - Environmental protection (permitting, supervising, capacity building)
 - Use and management of water resources: general development and organisation of the water supply
- **TUKES (Finnish Safety and Chemicals Agency)**
 - Chemical permits

The roles in an EIA procedure



The EIA procedure



EIA PROGRAMME

- Sufficient Information
 - The project and the developer
 - Alternatives (0-alternative)
 - Plans, permits and other decisions
 - Description of the environment
 - Investigations already carried out and planned, details of the methods
 - Delimitation of the impacted area
 - A plan for arrangements - the assessments and related participation
 - Estimate of the project planning and implementation schedule

EIA REPORT

- How the project and its alternatives relate to land use plans and other plans and programs
- Operations and technical solutions of the project:
 - products, outputs, raw/other materials, transport, the types/amounts of waste, discharges and emissions, construction and operational stages of the project (incl. dismantling)
- Information used
- Description of the environment and the assessment of the environmental impact of the project
- Possibility of environmental accidents and their consequences
- Comparison of the alternatives
- Feasibility of the project

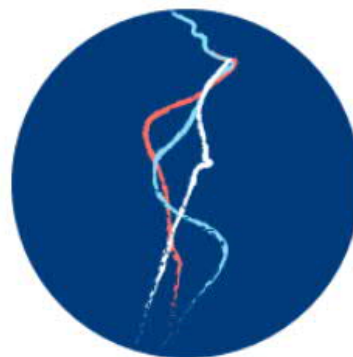
EIA REPORT

- Deficiencies and uncertainties
- Proposal for preventing and limiting adverse impact
- Proposal for monitoring the impacts
- Description of the stages of the assessment procedure (incl. the participation)
- Account of how the coordinating authority's statement on the assessment programme has been taken into account

EIA CASE 1.

**FINEST ENVIRONMENTAL IMPACT
ASSESSMENT**

**THE RAILWAY TUNNEL BETWEEN
FINLAND AND ESTONIA**



**FINESTBAY AREA
DEVELOPMENT**

CONTENT

- **The content of the EIA Programme**
- **Project alternatives**
- **Technical description**
- **Environmental impact assessment and the methods used**
- **Participation, interaction and communication**
- **The timetable of the EIA process**



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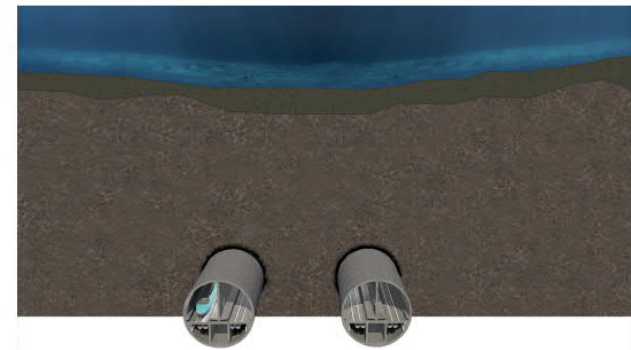
- **Two phases in the EIA Process: 1) EIA Program 2) EIA Report**
- The EIA programme is a plan (working programme) regarding the arrangement of the environmental impact assessment procedure and the studies required for it.
- the EIA report presents a description of the likely significant environmental impacts of the project and its alternatives
- Separate EIA documents in Finland and Estonia

JOULUKUU 2018
YMPÄRISTÖVAIKUTUSTEN ARVIOINTIOHJELMA



FINEST BAY AREA

Rautatietunneli Suomen ja Viron välillä



PÖYRY

A-INSINÖÖRIT

Fira

FINEST BAY AREA PROJECT

GENERAL PRINCIPLES OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

- To examine the project's environmental impacts for the entire planned tunnel route alternatives and related activities.
- Both construction and operation phases have to be examined.
- The EIA procedure has to be conducted both in Finland and Estonia in compliance with the national legislation.
- International hearing has to be arranged due to the international dimension of the project and possible transboundary effects.

- The coordinating authorities in the international processes are:
 - The Uusimaa Centre for Economic Development, Transport and the Environment
 - Finnish Ministry of the Environment
 - Estonian Ministry of Environment

Finest Bay Area Development Oy

PROJEKTIPÄÄLLIKKÖ

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kaavoittaja

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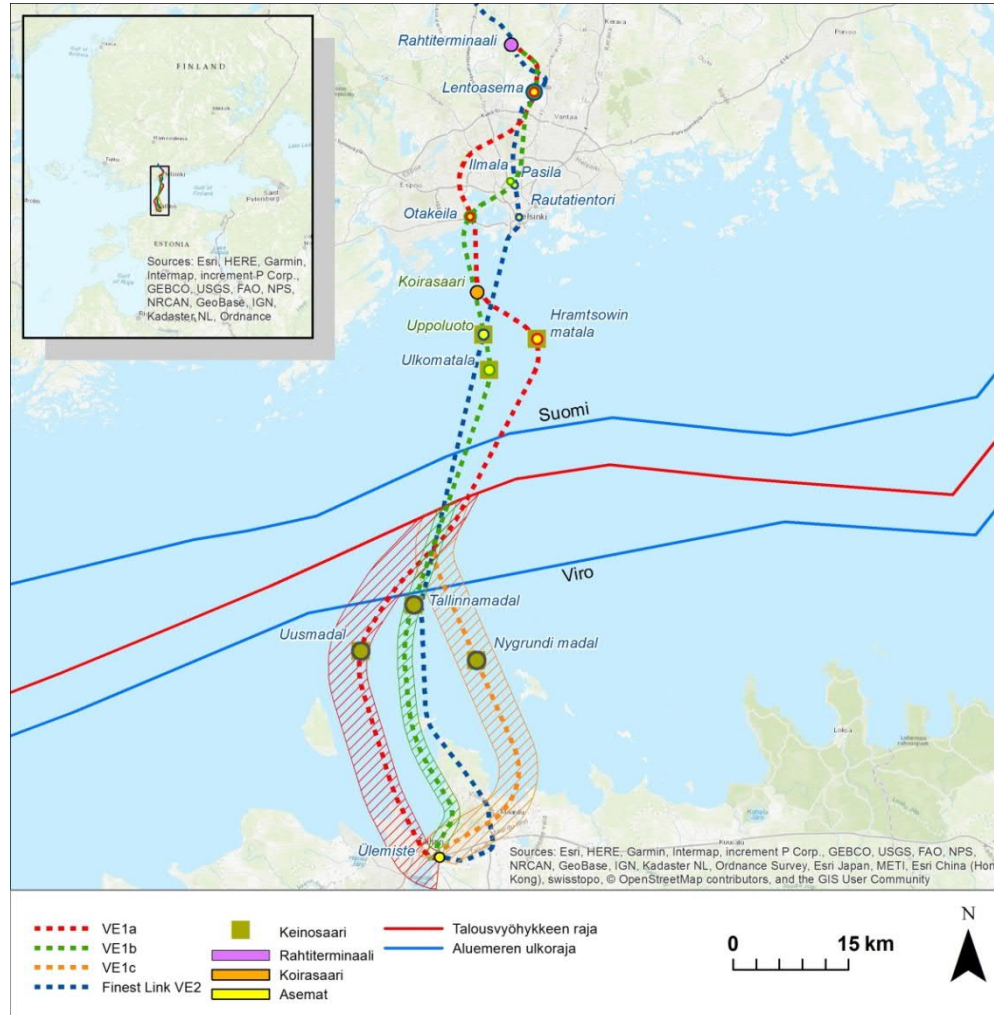
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➤ EIA & technical designing: 40 experts in Finland and Estonia

FINEST BAY AREA PROJECT

POSSIBLE ROUTES

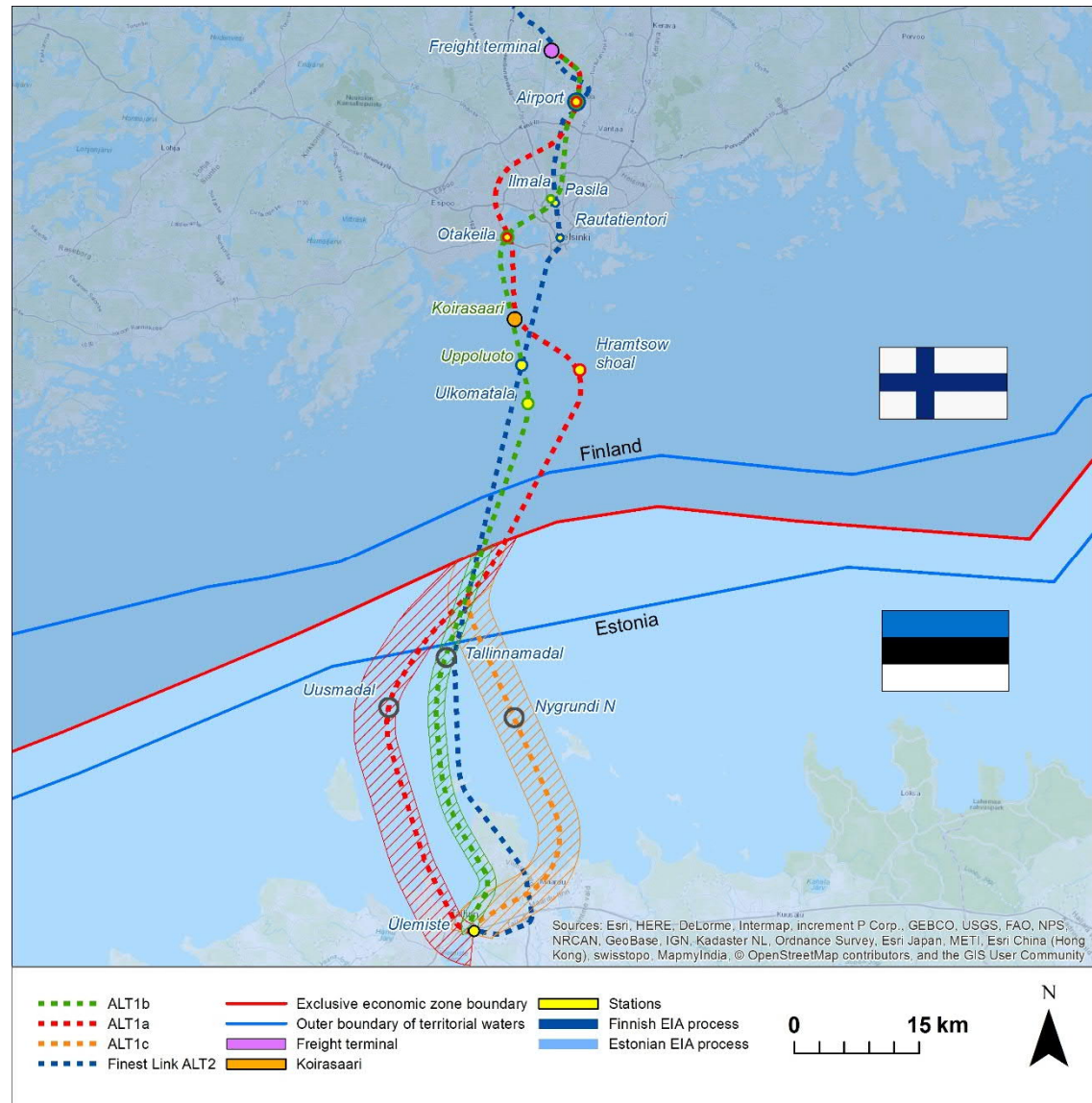


- Four lines to be studied during the EIA procedure in Finland
 - red VE1a and green VE1b
 - VE2 reference line from the Finest Link feasibility Study
- 3 different comparable alternatives in the EIA procedure and a "0+-alternative"
- Cargo terminal
- Stations:
 - Helsinki-Vantaa Airport
 - Ilmala / Finnopolis
 - Otakeila
 - "The Island"
 - Tallinn Ülemiste Airport
- Access tunnels
- Artificial island
- Shafts

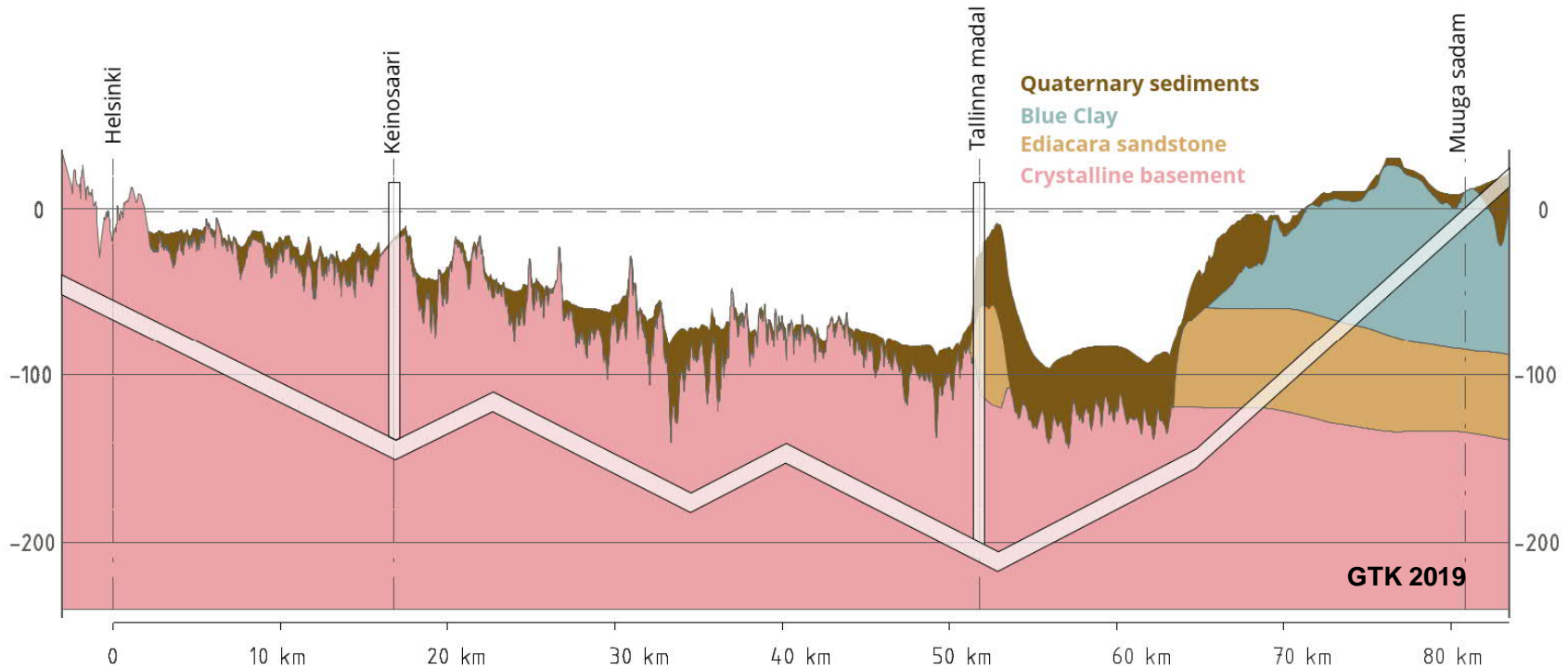
SCOPE OF EIA IN EACH COUNTRY

- The EIA of each country will generally be limited to impacts in the country until the exclusive economic zone boundary
- The technical description will be done as a whole irrespective of the frontiers
- EIA of each country will also cover the transboundary impacts of the facilities in the country – for example the transboundary environmental impact of the artificial islands.
- The EIA will utilise the EU guide “*Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects*”

➤ **The assessments of total impacts**



TECHNICAL DESIGN

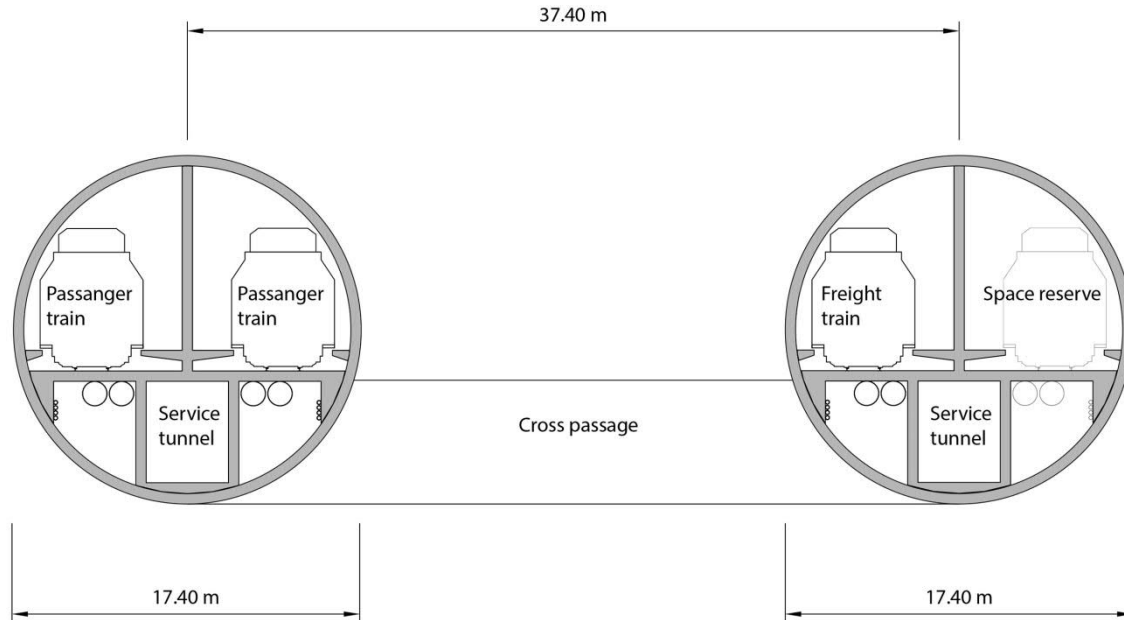


TUNNELS WILL BE EXCAVATED USING TBM AND DRILL & BLAST
Tunnels are deep underground all the way

- The depths of the stations are 30-80 meters
- The deepest vertical point of alignment at the depth of -250m from the sea level.

THE PRELIMINARY CROSS SECTION

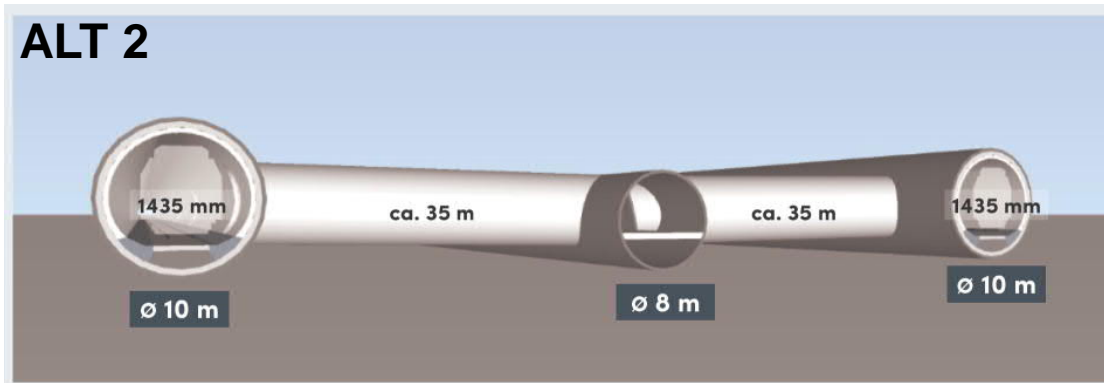
ALT 1a + 1b



- Two railway tunnels
- Exit cross tunnels
- Diameter up to 17,4 m
- Total excavated amount of rock more than 80 million m³

A-insinööri Oy

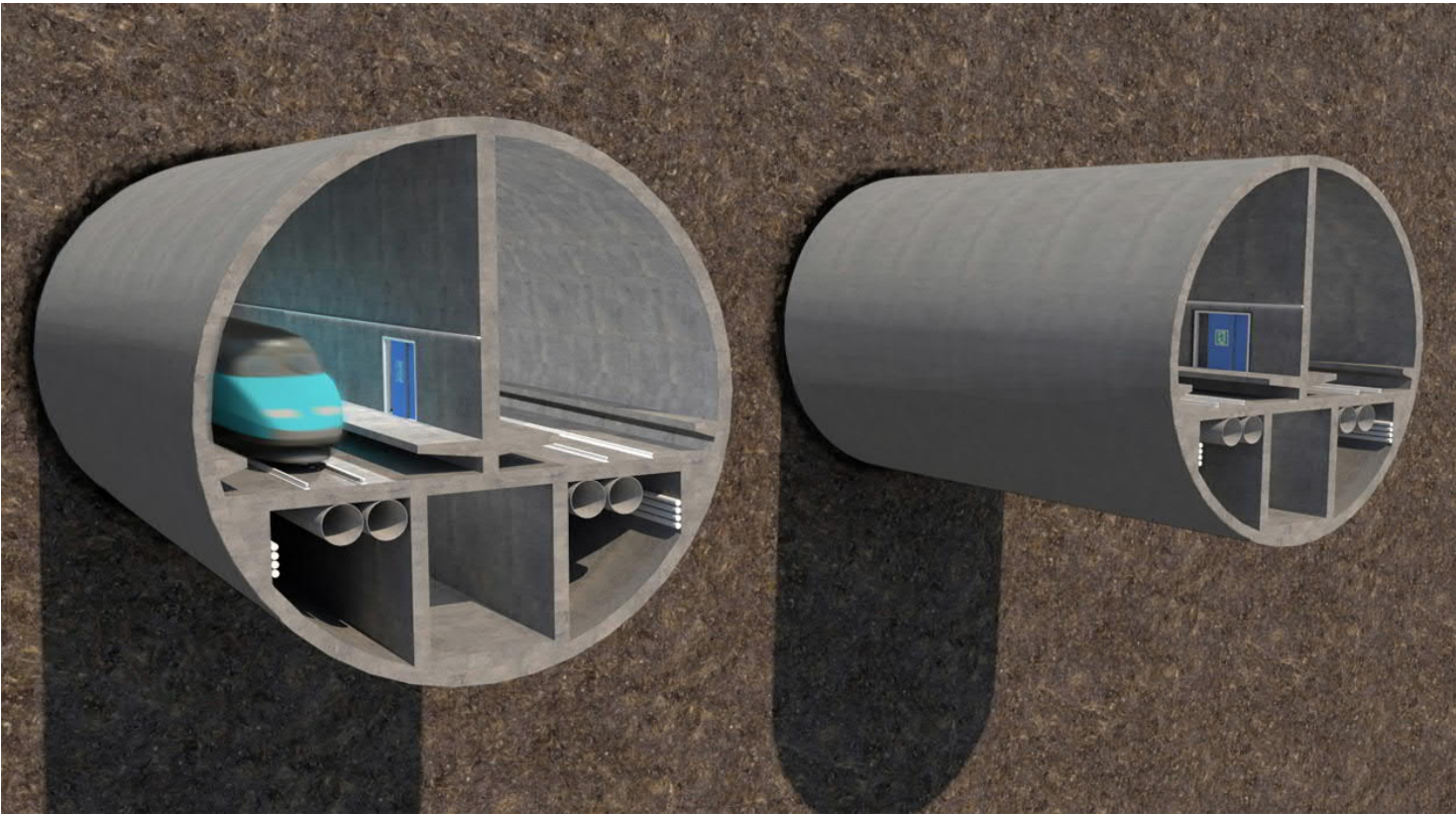
ALT 2



FinEst Link 2018

TECHNICAL DESIGN

THE PRELIMINARY CROSS SECTION AT THE STATION ALT 1A + 1B



ALT 1a + 1b

A-insinööri Oy

EIA REPORT

Different impact categories investigated are:

- Seabed
- Soil, bedrock and groundwater
- Hydrology and water quality
- Marine environment
- Fish & fisheries
- Noise
- Vibration
- Traffic and traffic safety
- Air emissions
- Flora, fauna and protected sites
- Land use and built environment
- Landscape and cultural environment
- People and society
- Waste and waste handling
- Exceptional accident situations
- Transboundary impacts



EIA REPORT

- New separate studies are also needed for the EIA report. These include:
 - Underwater archeological surveys
 - Underwater nature inventory by diving
 - Sea bed sediment quality survey
 - Birdlife studies
 - Fisheries studies
 - Unexploded ordnances (UXO's) study
 - Water quality and flow modelling
 - Traffic modellings



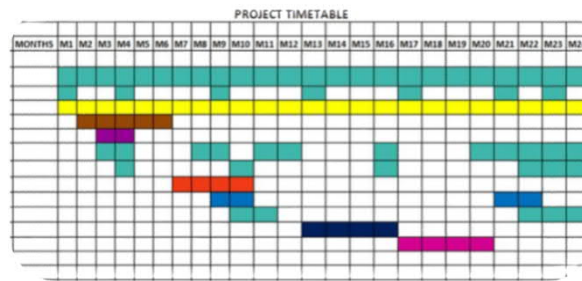
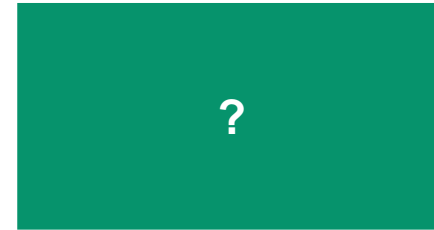
Pictures: Jouni Leinikki, Karoliina Jaatinen, GettyImages

COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT DURING THE EIA PROGRAMME

- The project has been in the news for a long time both in Finland and Estonia
- Communicating will be continued throughout the EIA procedure
- Important stakeholders have been engaged to participate and kept in the project development
- Stakeholder interaction will be organized as:
 - 1) Public hearing events in both EIA programme and reporting phases
 - 2) A work shop including inhabitants from the costal area, companies and other significant actors
 - 3) Panel discussion for the near by inhabitants – Experts will answer the questions
 - 4) Questionnaire for the inhabitants and/ or work shop to discuss the route alternatives and the location of the artificial island

GROUP WORK 1: EIA FROM THE CONSULTANT'S POINT OF VIEW

1. What are the most important things that an EIA consultant has to take into account when executing an EIA process?
 - Think this from the consultant's point of view!
 - Try to find out at least 3 things.

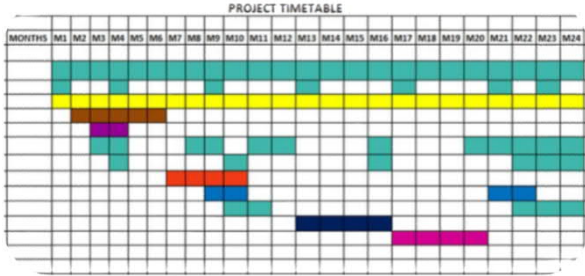


EIA FROM THE CONSULTANT'S POINT OF VIEW

Sufficiency

Timetable

Budget



FUNDAMENTALS IN AN EIA PROCEDURE



THE LEGAL BASIS - EIA INQUIRY TO THE AUTHORITY

- What to do if the project is not in the list of the project type that always needs an EIA?
- EIA inquiry to the authority!
- The brief environmental description of the project has to include all relevant information available from the project.
- The description will allow the ELY center to make a decision on the necessity of EIA for the project.
- The brief environmental description/impact assessment as well as the inquiry letter to the authority has to be delivered in a language required by the authority.
- **If it is possible, that the project could have significant impacts on the nature, humans or other sectors that have been described in the EIA act, has an EIA process to be applied on the project**

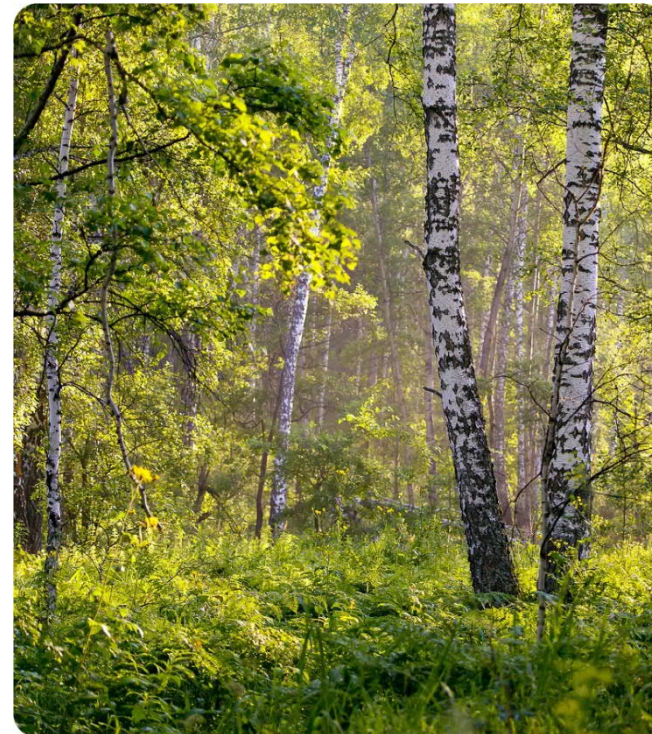
**Case 2:
Harnessing the Warmth of
Summer:
Cavern Thermal Energy Storage**

***“We have a plan
to phase out fossil fuels
by 2026”***

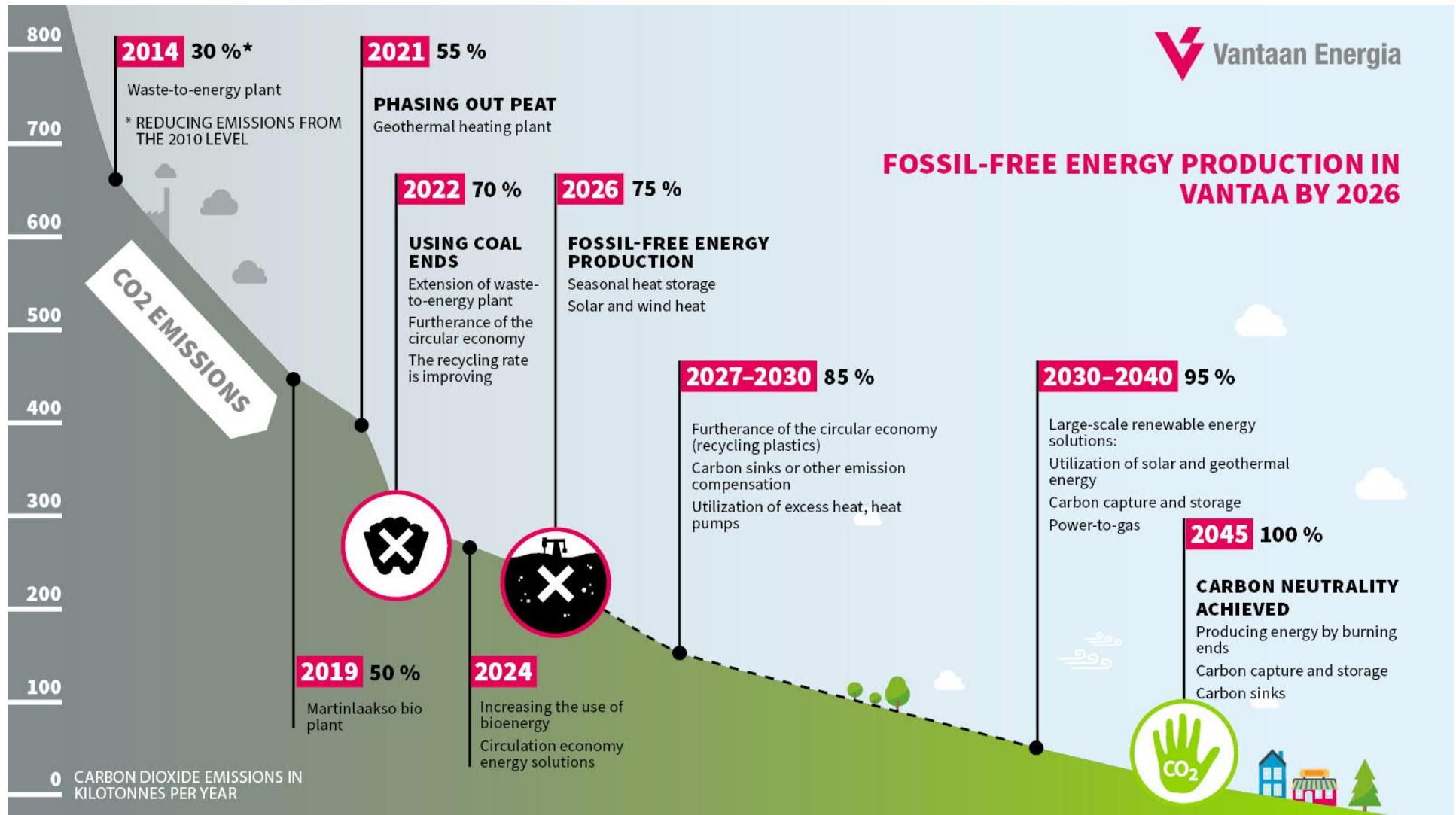


MOVING TOWARDS FOSSIL-FREE ENERGY PRODUCTION PROJECT BY PROJECT

- The Commission's European Green Deal is an ambitious plan for a sustainable, resource-efficient and competitive Europe. A transition to a more circular energy system with energy efficiency at its core is key for reaching that target.
- The challenges we all face require new solutions. Vantaan Energia is ready to do more than what is necessary and explore innovative new technologies with an open mind.
- Vantaan Energia is an energy company located in southern Finland, with a plan to phase out the use of fossil fuels in the Vantaa area by 2026.
- Vantaan Energia intend to make this happen with energy generated from the energy use of waste, renewable energy sources, and energy storage solutions.

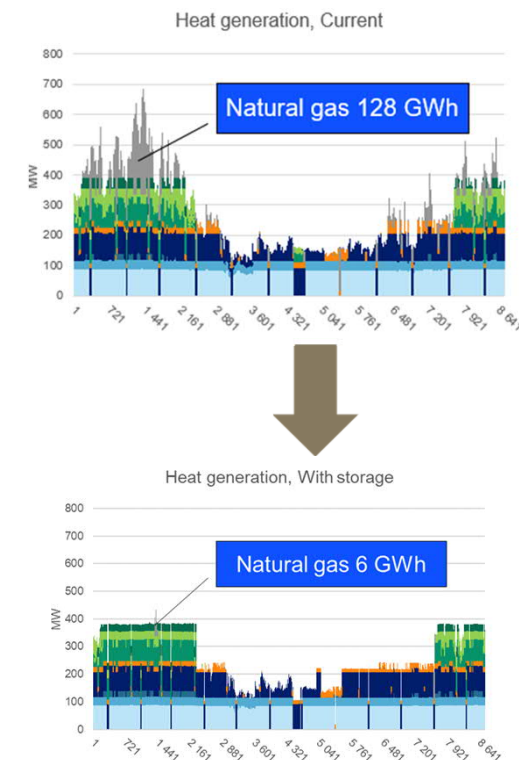


FOSSIL-FREE ENERGY PRODUCTION IN VANTAA BY 2026



INNOVATIVE SEASONAL STORAGE FACILITY

- Vantaan Energia is planning to invest in an innovative Rock Cavern Thermal Energy Storage System, a gigantic 1,000,000 m³ seasonal storage facility of thermal energy, making it the biggest energy storage in the world.
- The facility stores 90 GWh of energy, which is equivalent to the annual heat consumption of a medium-sized town.
- The facility is based on the resource-efficient and innovative storage of very large amounts of hot water at above 100°C, which reduces the required volume and decreases excavation costs remarkably.
- The facility enables the seasonal storage of summer waste heat, recovered surplus heat from waste disposal and solar energy during low heating demand. The stored energy will replace heat production by natural gas in cold winter days.
- The facility could serve as a model for future heat storage projects across Europe.

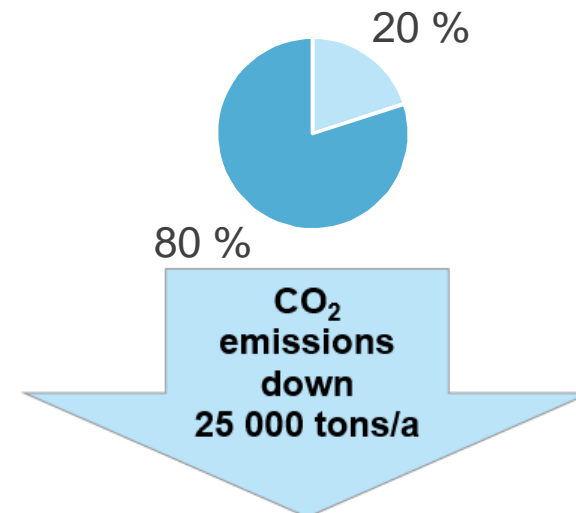


CAVERN THERMAL ENERGY STORAGE

- Seasonal Thermal Energy Storage is crucial for our goal of completely carbon-free and non-combustion based energy production in the future.
- The storage will accelerate the integration of intermittent renewable energy production into the grid since excess energy can be stored, and thus the financial and technical viability of these projects increases.
- The use of stored energy instead of fossil fuels and the integration of additional renewable energy sources will cut down our CO₂ emissions by over 25 000 tons per year.
- The facility also offers a huge potential for other services such as providing flexibility in heat consumption and demand.

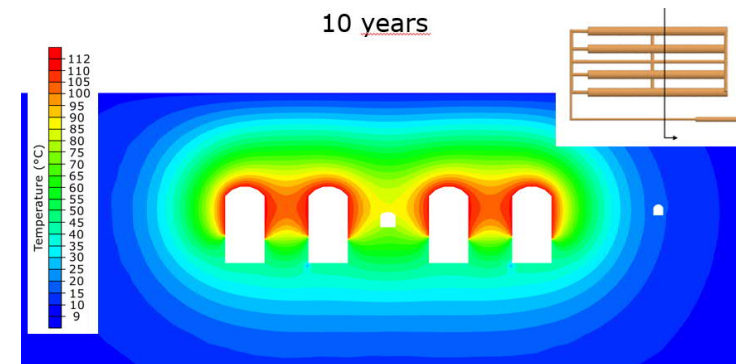
Heat to be used (122 GWh/a)

■ Bioenergy ■ Waste heat



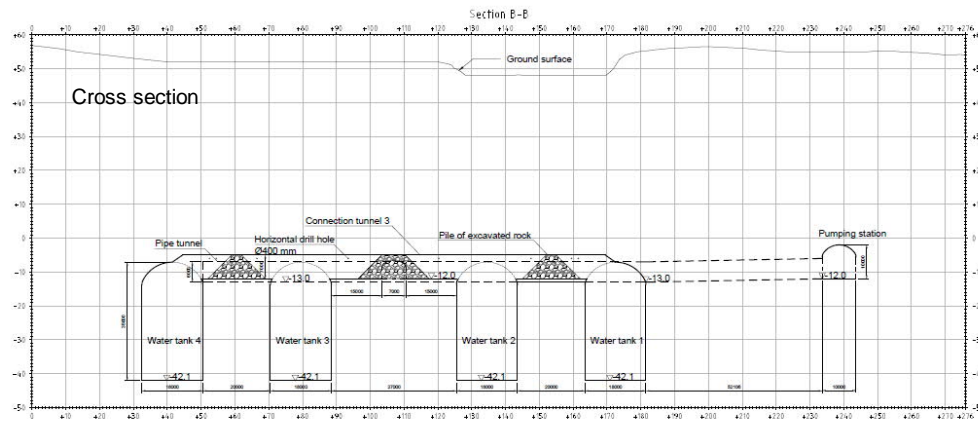
TECHNICAL DETAILS

- Technical description
 - Excavated granite rock thermal energy caverns
 - Energy capacity 90 GWh
 - Located close to Tikkurila in Eastern Vantaa 14 km north-east from the city of Helsinki.
 - Excavation is planned to start in 6/2022 and is expected to last 3 years.
- Estimate for total investments costs is ca. EUR 90 million
- Main environmental impacts in the construction phase are **noise, dust and vibration from rock excavation**. The transportation of excavated rocks causes a **significant amount of heavy traffic**, but it can be directed to the main network.
- At the earliest the storage could be in operation by 2025.

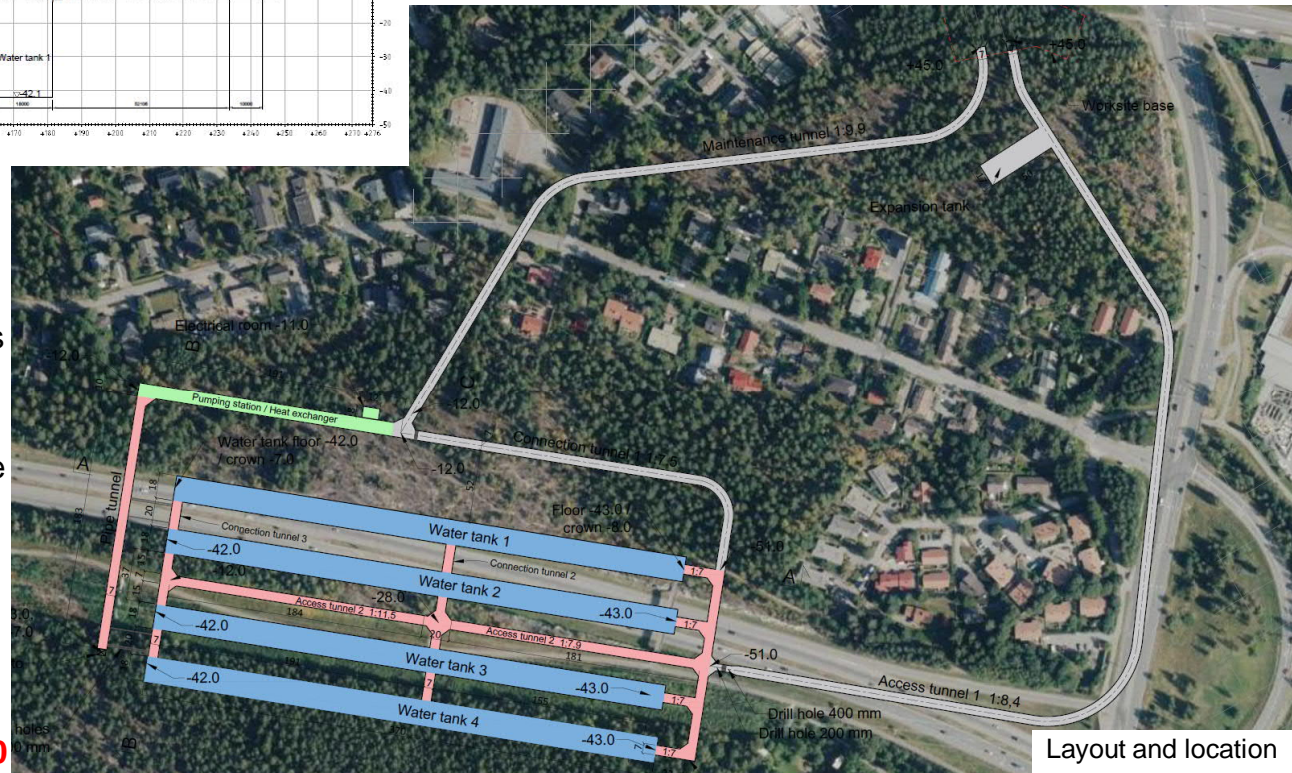


- Heat modelling
 - Rock temperature around heat storages after 10 years
 - Modelling for heat, rock movements and rock stresses has been made for storages

LOCATION AND LAYOUT



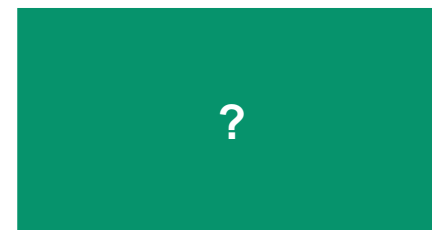
- The facility would be located under the E18 road
- Water storage's crown depth 60 meters under surface
- Four separate 220 000 m³ heat storage caverns, planned total storage volume ca. 900 000 m³
- Planned storage cavern length 370 m, height 35 m, width 18 m
- **Planned excavated volume 1 030 000 m³**



Layout and location

GROUP WORK 2: SHOULD AN EIA PROCESS TO BE APPLIED THE VANTAA ENERGIA PROJECT?

1. What could be the biggest impacts?
2. Could they be significant?
3. Could the EIA bring some benefits also to the project?



GROUP WORK 2: SHOULD AN EIA PROCESS TO BE APPLIED THE VANTAA ENERGIA PROJECT?

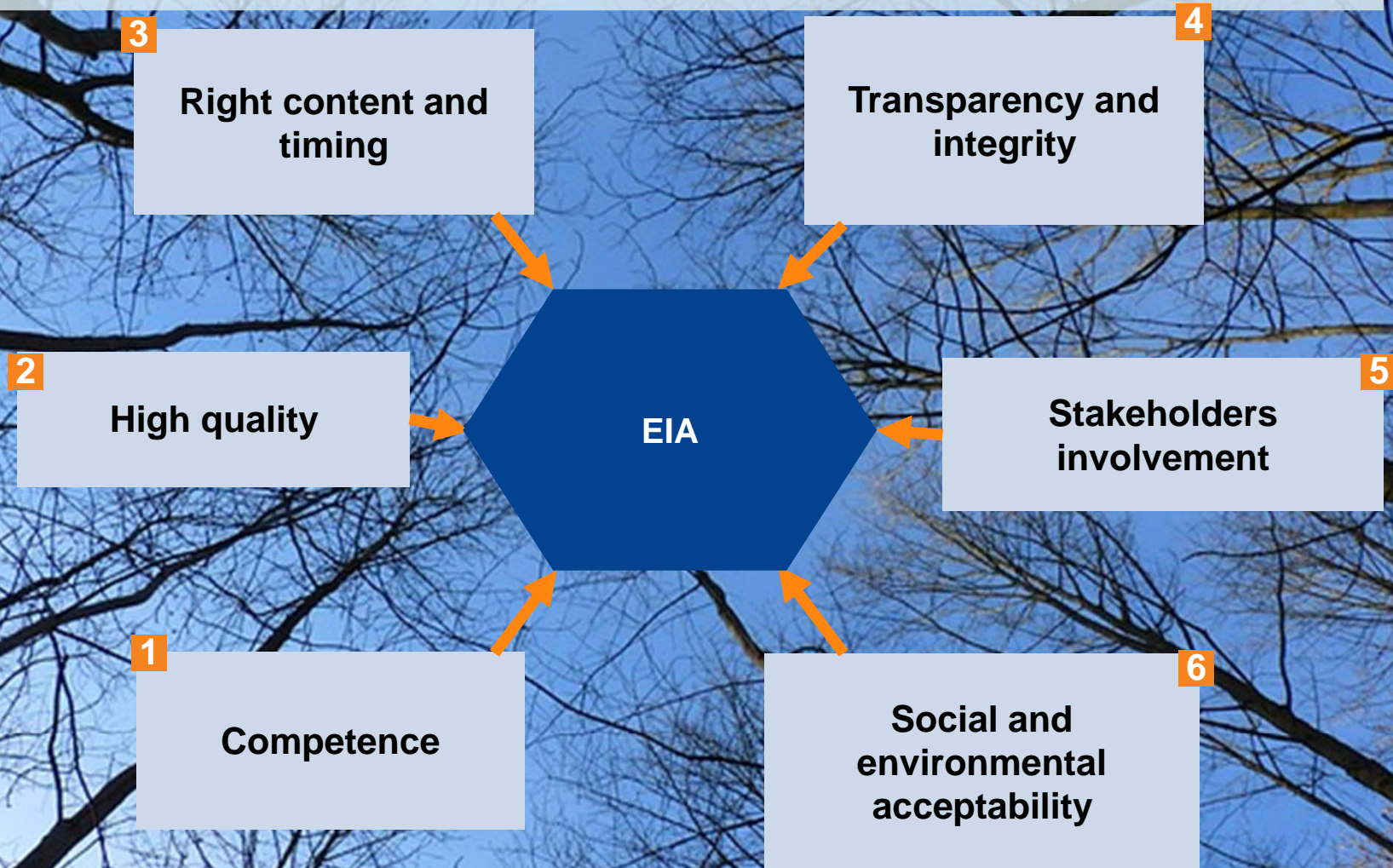
1. What could be the biggest impacts of the project?
2. Could they be significant?
3. Could the EIA bring some benefits also to the project?



THE CHALLENGES IN AN EIA PROCEDURE

- Initial data
- Publicity
- Balancing between different expectation
- Involvement
- Timetables

THE KEY FACTORS FOR A SUCCESSFUL EIA PROCEDURE





THANK YOU!

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