ACTION PLAN FOR DEVELOPMENT OF CLEAN AND STABLE ENERGY PRODUCTION IN THE PYHÄJOKI ECONOMIC AREA

Presentation

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AFRY

PYHÄJOKI

POHJOIS-POHJANMAA
COUNCIL OF OULU REGION

ACTION PLAN FOR EXPLORING THE POSSIBILITIES

Background

The action plan to support clean and stable energy production and further processing possibilities at the Hanhikivi site identifies

(1) feasible regional objectives and a route map to achieve them

(2) provides a comprehensive review of the infrastructure and development measures conducted in the area and the actions required to activate them.

The action plan also includes an opinion poll on the attitudes of the local population towards a possible major energy investment.

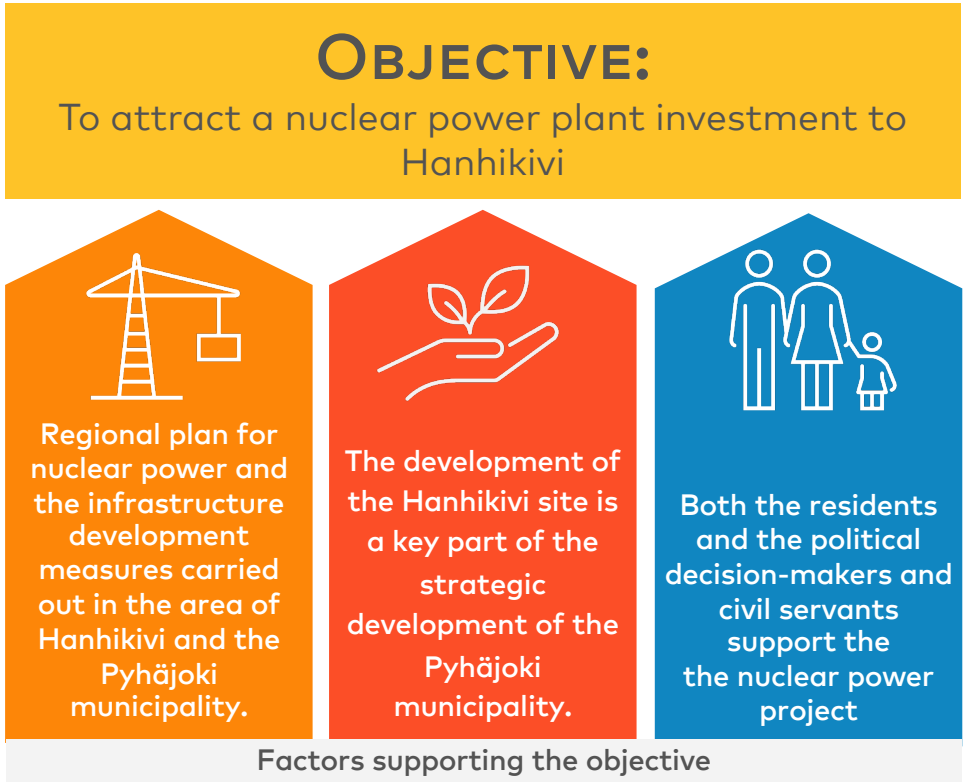
Basic project information

The municipality of Pyhäjoki launched the project entitled Development of Clean and Stable Energy Production in the Pyhäjoki Economic Area in February 2023. The Council of Oulu Region has granted AKKE funding for the project. The project will run from 13 February 2023 to 31 December 2024 and it aims to explore various possibilities for energy production and further processing in Pyhäjoki. The project aims to find the best solutions in terms of technology, finances and timeline, using the infrastructure already constructed and the local operating environment. The work will also identify national and international operators in the energy industry and engage them in the development of the energy sector in the region.

AIMING FOR A NUCLEAR POWER INVESTMENT TO HANHIKIVI

Objective and factors for development of the site

- The main objective is to attract a nuclear power plant investment to Hanhikivi. The site is also suitable for other major energy projects.
- This is supported by:
  - The Hanhikivi regional plan for nuclear power
  - The development of Hanhikivi (infrastructure and services)
  - The development of the Hanhikivi site is a key part of the strategic development of the Pyhäjoki municipality. The municipality of Pyhäjoki has excellent readiness and existing partnerships, other municipalities in the economic area support the investments
  - The residents and political decision-makers and civil servants support the nuclear power project.



MORE THAN TWO OUT OF THREE ARE IN FAVOUR OF A NUCLEAR POWER PLANT IN THE SITE

Residents' attitudes towards a possible investment

70 %

ARE IN FAVOUR OF

a new nuclear power plant in the site

71 %

ARE IN FAVOUR OF

other major energy investment

Respondents to an opinion poll in the area express very positive attitudes towards a potential major energy project. Up to 70% of respondents are in favour of a new nuclear power project. According to the poll, it would be important to attract new activities to the area. The results are similar to a survey made by Taloustutkimus in April 2024 that examined e.g. residents' opinions towards nuclear power plant investments*

*Kuntien asukaskokemus, Tutkimusraportti, Pyhäjoki, Timo Myllymäki & Kari-Pekka Töyrylä Taloustutkimus Oy

EXPECTATIONS HIGH TOWARDS THE PROJECT

Residents attitudes towards a possible investment

- A new investment is expected to bring jobs, residents and expertise to the area, contributing to its vitality. According to the residents, it would be important to launch some kind of project in the site for the vitality of the region.
- Residents emphasize the potential employment effects and generation of tax benefits.
- From a local perspective, it is important that any major new energy investment is safe and is managed in a resident-friendly way.

Expectations	Concerns
+ The vitality effects of the investment in the economic area	- The safety of the investment
+ Employment effects and tax benefits in the area	- Resident-friendliness
	- Environmental effects
	- Partners' backgrounds

The purpose of the opinion poll was to document the attitudes of the regional administration and population towards a new major energy investment using qualitative and quantitative questions.

The poll was carried out between 24 and 27 June 2024 and was answered by 210 residents.

READINESS OF THE PYHÄJOKI AREA GOOD FOR AN INVESTMENT

● Condition good / commendable; no significant challenges / obstacles

◑ The situation is satisfactory; some areas require attention

Topic	Current situation	Priority (1–3) at the start of major investment	Comments
Demographics	●	1	The region has a limited supply of highly educated labour to meet the needs of a major project. Developing cooperation with the nearest university cities (Oulu, Kokkola) is important. A major investment can be expected to increase the attractiveness of the region also for the highly educated population.
Schools and day-care centres	◑	2	Investments in early childhood education and care buildings are required, especially at the start of the major project. A site for a new day-care centre exists. Based on the interviews, a major project would accelerate the decision to invest, and there is good capacity to improve the situation.
Services (public and private)	●	1	Private service providers (e.g. restaurants) disappeared after the previous project failed. Attracting entrepreneurs to the area is expected to be easier following a major investment. The development of private services and the available municipal services will facilitate the better retention of labour in the region.
Hanhikivi site and environment	◑	2	There are nature reserves near Hanhikivi. It is important that these areas are taken into account in the planning and implementation of a major investment. Separate EIA studies must be carried out for new projects. However, previous EIA decisions give new operators some reassurance as to the suitability of the site, particularly for a major energy project.
Economic structure / industry / sub-supplier networks	●	3	A major investment is likely to bring new operators and sub-supplier networks to the region.
Land use / zoning	●	1 / 3	Depending on the nature of the major investment, the zoning of the area may need to be changed. The Hanhikivi site is zoned as an area for energy production use (nuclear power) in the regional and master plan.
Energy infrastructure	●	2	New electricity transmission connections to the grid to meet the needs of a major energy investment. Fingrid has the capacity to implement a 400 kV connection, timeline c. 4 years from the decision.
Demographics	◑	1	The region has a limited supply of highly educated labour to meet the needs of a major project. Developing cooperation with the nearest university cities (Oulu, Kokkola) is important. A major investment can be expected to increase the attractiveness of the region also for the highly educated population.

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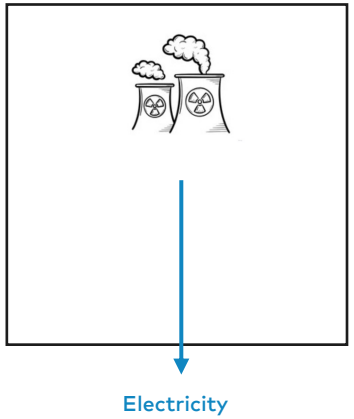
FOCUS ON THE FOUR ALTERNATIVE SOLUTIONS FOR THE HANHIKIVI SITE (BASED ON THE PREFEASIBILITY STUDY)

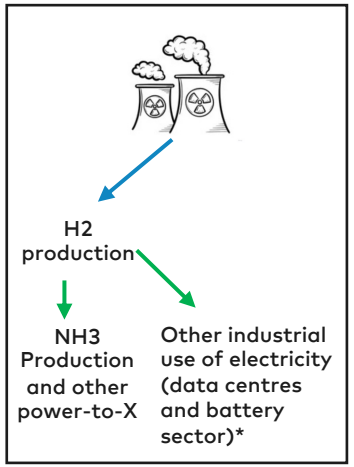
1

Nuclear power production (for the electricity market, larger end-users through direct contracts or the Mankala model)



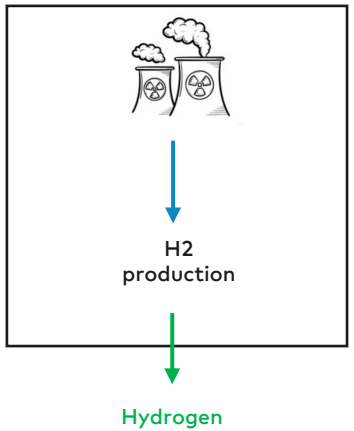
2

Nuclear power production for on-site hydrogen and ammonia production



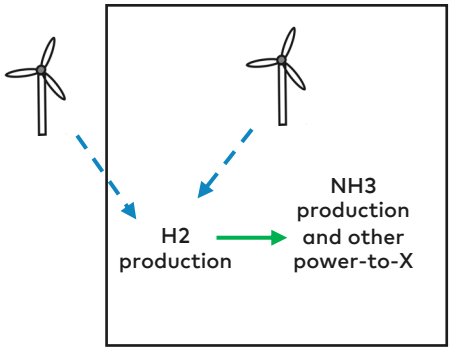
3

Nuclear power production for on-site hydrogen production and transport via hydrogen pipeline



4

Nuclear power production for on-site hydrogen production and transport via hydrogen pipeline



The prefeasibility study identified four feasible solutions for the utilization of the Hanhikivi site. Three of these options use nuclear energy and one uses renewable energy as the energy source. Each option will result in the production of electricity, hydrogen or ammonia for the market, classified as either green (RFNBO) or low-carbon, depending on the production method. Green hydrogen refers to hydrogen produced from renewable energy sources. Blue hydrogen is hydrogen that is produced from fossil fuels, but the carbon emissions are not released into the atmosphere but captured and stored. RFNBO = Renewable Fuels of Non-Biological Origin. Green hydrogen fulfils the EU's RFNBO criteria, which will increase its demand and value, partly because the EU is obliging companies to use RFNBO fuels to an increasing extent.

* The study identified data centres and the battery sector as potential options, but these were not examined in the prefeasibility study and are therefore not discussed in more detail in the route map section of this action plan.

PRESENTATION AND ASSESSMENT OF THE VARIABLES FOR THE POSSIBLE SOLUTIONS

Summary of variables from the point of view of possible energy investment

- The study analysed more than ten different variables that, if realized, could affect the attractiveness or feasibility of the possible solutions.
- The variables are divided into negative (constraints/threats) and positive (drivers).
- For each variable, the likelihood of its occurrence, the timeframe for its clarification and the size of the impact if it were to occur were assessed.
- All three nuclear power scenarios involve a substantial number of both negative and positive variables.
- The third option, unlike the others, also involves uncertainty about the timetable of the hydrogen pipeline in the area.
- The lack of a capacity mechanism or other additional revenue is the most significant negative variable for the nuclear scenarios, while the growing demand in northern Sweden and a possible positive nuclear trend are the biggest positive variables.

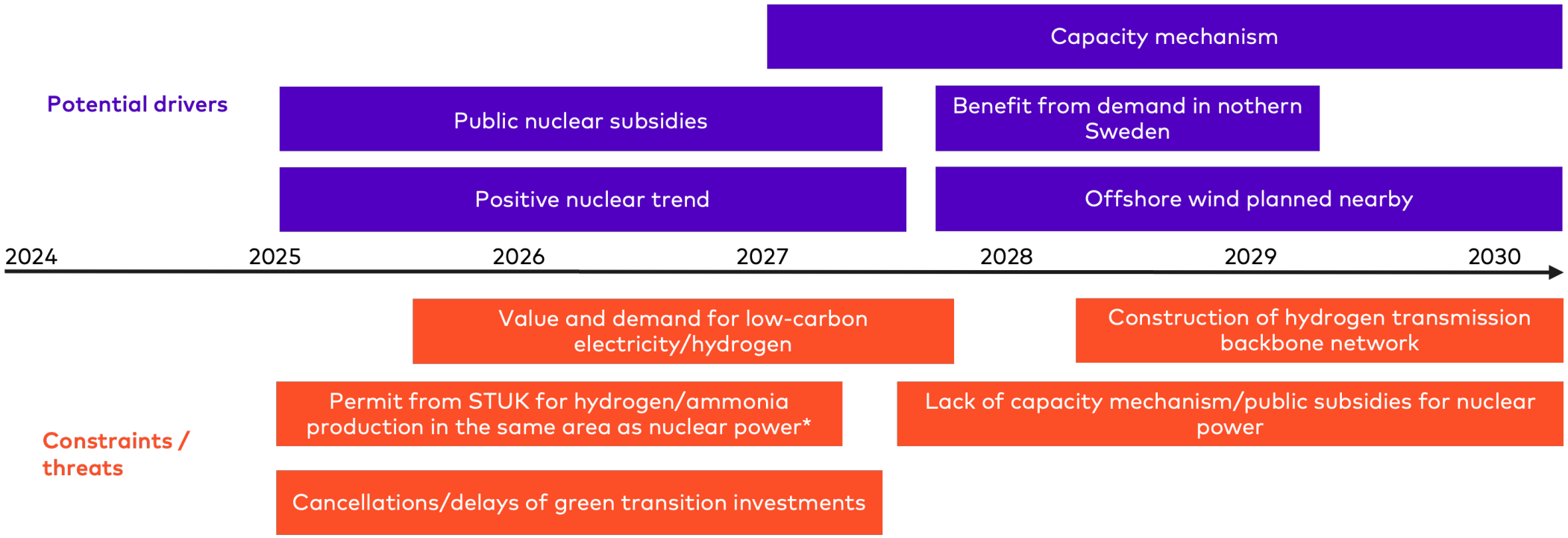
THE ALTERNATIVE SOLUTIONS HAVE REMARKABLE DIFFERENCES IN COMPLEXITY AND PROBABILITY

Summary of probabilities from the point of view of energy investment

Constraint* / Opportunity / driver* / Timeframe for clarification — The brightness of the spheres refers to the likelihood of the variable, and the number of spheres refers to the impact of the variable if it were to occur		Nuclear power production (for the electricity market / larger end-users through direct contracts or the Mankala model)	Nuclear power production for on-site hydrogen and ammonia production	Nuclear power production for on-site hydrogen production and transport via a hydrogen pipeline	On-site production of hydrogen and ammonia, based on purchased renewable power or local renewable power production
Low value/demand for low-carbon hydrogen/ammonia/electricity (low-carbon classification)		○○○	●●●●	●●●	●●
Lack of capacity mechanism / public subsidies for nuclear power		●●●●	●●●●	●●●●	
Construction and timeframe of construction of a hydrogen transmission backbone network				●●●●●	
Cancellations or delays of green transition investments / negative investment trend		○○○○	○○○○	○○○○	○○○○
Permit from STUK to hydrogen/ammonia production in the same area with nuclear power			○○○○○	○○○○○	
Capacity mechanism		○○○○	○○○○	○○○○	
Public subsidies for nuclear power		○○○	○○○	○○○	
Growing demand for electricity/hydrogen in northern Sweden and wind power opposition		●●●●●	●●●●●	●●●●●	●●●●●
Positive nuclear trend (statements from Fortum and Helen, EU-level debate)		●●●●●	●●●●●	●●●●●	●●●
Large amount of offshore wind power planned near Pyhäjoki					●●●

ESTIMATED TIMEFRAME FOR THE CLARIFICATION OF VARIABLES

Summary of probabilities from the point of view of energy investment



* Depends on the time of the application. AFRY has sent a request for information on the estimated duration of the process to STUK.

RECOMMENDATIONS

Summary of the recommendations

RECOMMENDATION 1

The municipality of Pyhäjoki should strengthen the assessment of different investment options and the opportunities for joint implementation.

RECOMMENDATION 2

Energy-intensive industrial activities should be pursued in the area, which will support the conditions for new nuclear power investment to the area.

RECOMMENDATION 3

The municipality of Pyhäjoki, the region of North Ostrobothnia and Northern Finland should strengthen lobbying to promote the conditions for nuclear power in order to attract investment to the area.

RECOMMENDATION 4

Once the action plan is complete, comprehensive strategic communication of the contents of the action plan and the results of the study should be aimed at those considering major investments and the media.

RECOMMENDATION 1

THE MUNICIPALITY OF PYHÄJOKI SHOULD STRENGTHEN THE ASSESSMENT OF DIFFERENT INVESTMENT OPTIONS AND THE OPPORTUNITIES FOR JOINT IMPLEMENTATION

The Hanhikivi site is well prepared for a large-scale energy investment. A nuclear power plant investment is pursued for the site as a first priority.

The use of the site for nuclear power production is supported by the existing regional plan for nuclear power, the support of the population (70%) for nuclear investment and the infrastructure development measures carried out in the area.

Nuclear power production for the electricity grid is the primary objective, but nuclear power production for hydrogen or ammonia plants in the area is also a possible alternative. The challenge with these options is the long lead times of nuclear projects. Hydrogen or ammonia production in the area would not exclude SMR projects and would therefore be a more flexible solution than conventional nuclear projects. The identification of ways forward and the assessment of different investment options increases the strategic flexibility of investment decision-making.

RECOMMENDATION 2

ENERGY-INTENSIVE INDUSTRIAL ACTIVITIES SHOULD BE PURSUED IN THE AREA

THIS WILL SUPPORT THE CONDITIONS FOR NEW NUCLEAR POWER INVESTMENT TO THE AREA

In terms of the variables related to the various possible solutions, no obvious barriers have been identified that would prevent a major investment in the area

The attractiveness of the different options could be positively influenced by a potential capacity mechanism, public subsidies for nuclear projects, the growing demand for electricity and hydrogen in northern Sweden, a positive nuclear trend and the significant offshore wind capacity planned near Pyhäjoki.

Five variables have the potential to negatively influence the possible solutions - at this point it was not considered likely that any of the variables analysed would prevent a major energy investment in the region. The identified threats include the low market price or demand for nuclear electricity and/or hydrogen, the lack of a capacity mechanism and nuclear subsidies, the timetable for the construction of the hydrogen transmission network, the trend of cancelling green transition investments and the permit from STUK to locate a hydrogen/ammonia plant near nuclear power production.

A conventional nuclear project is the best option for the vitality of the region

All the nuclear options examined during the assignment (options 1-3) are linked to the fate of the capacity mechanism. For a potential investor, the focus is on getting the maximum value for the investment and ensuring a smooth investment and construction process without unnecessary and costly delays. If the investment options are examined from the point of view of ensuring municipal vitality, securing any major energy investment in the area would be important - regardless of the sector. In this way, the size of the investment directly affects the ranking of the investment options. In other words, a single conventional nuclear power plant project would, in principle, generate the greatest employment effects and would therefore be the best option for the municipality.

RECOMMENDATION 3

THE MUNICIPALITY OF PYHÄJOKI, THE REGION OF NORTH OSTROBOTHNIA AND NORTHERN FINLAND SHOULD STRENGTHEN LOBBYING TO PROMOTE THE CONDITIONS FOR NUCLEAR POWER IN ORDER TO ATTRACT INVESTMENT TO THE AREA

Public opinion is favourable. 70% of respondents are in favour of a new nuclear power project.

According to the poll, it would be important to attract new activities into the area. The support and acceptance of local residents towards a potential investment supports the decision-making of organizations considering investment. The region recognizes that the decision to sell is up to the seller to decide and that the municipality can only have an indirect effect on it.

The indirect influence of the municipality includes promoting and describing the current state of the Hanhikivi site; the political and administrative environment of the municipality, the region and the province; social acceptance; and the municipality's willingness to cooperate.

RECOMMENDATION 4

ONCE THE ACTION PLAN IS COMPLETE, COMPREHENSIVE STRATEGIC COMMUNICATION OF THE CONTENTS OF THE ACTION PLAN AND THE RESULTS OF THE STUDY

SHOULD BE AIMED AT THOSE CONSIDERING MAJOR INVESTMENTS AND THE MEDIA.

The time to develop the Hanhikivi site is now

The action plan will give a strategic boost to the development of the site, which is necessary to increase its attractiveness. The key question is whether Hanhikivi will make it onto the list of operators considering major investments. Inter-municipal and regional cooperation in the provision of services works well in the Pyhäjoki economic area. Strengthening cooperation in lobbying will strengthen the ability of the economic area to attract the investment to Hanhikivi. The contents of this action plan form the basis of communication with those considering major investments and the media.

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