Clean energy for EU islands

CLEAN ENERGY TRANSITION AGENDA

HOLMÖNS HUF UTVECKLINGSFORUM

HOLMÖN

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Introduction for writers of the Clean Energy Transition Agenda

The Clean Energy Transition Agenda is a strategic roadmap for your island's transition towards clean energy, as desired by the island community. It is the result of an island-wide participatory process that brings together all relevant stakeholders to analyse the island dynamics, develop a shared vision and build transition pathways towards this vision. The Transition Agenda lays the strategic foundation to develop decarbonisation plans that cover the technical, financial, and organisational aspect of your island's clean energy transition.

As a complement to this template, the Islands Transition Handbook guides island communities through the Transition Agenda writing process. The handbook is available online in English, Spanish, French, Greek, Croatian, Portuguese, Dutch and Italian. The sections and subsections of this template refer to specific chapters of the Island Transition Handbook.

The content that the Authors need to modify is highlighted in [green brackets]. The descriptions on how to fill in the agenda are written in *grey italics.* Please remove both the highlights and the *grey italic text* upon completion.

The objective of this template is to structure your Clean Energy Transition Agenda. The template is meant to be adapted to fit your island's specific needs. Islands are encouraged to develop their own visual identity and may choose alternative ways of delivering their Transition Agenda – such as an interactive webpage, a poster, etc. – as long as the minimum requirements listed below are fulfilled.

A Clean Energy Transition Agenda needs to meet the following **content requirements:**

→ It consists of at least two parts: one part that describes the current situation on the island and a second part thatfocuses on the island vision and on the pathways needed to achieve this vision.

→ Part I at least includes:
- A general description of the island geography, economy and population.
- A description of the current energy system.
- A stakeholder mapping that covers the relevant island stakeholders.
- An analysis of the policy and regulation that overarches the plan.

→ Part II at least includes:
- A vision statement that covers the entire island,
- A description of the governance of the transition process,
- The identification and description of the main pathways of the transition process.
- A monitoring strategy

→ The Clean Energy Transition Agenda contains the Clean energy for EU islands logo and mentions the Clean energy for EU islands initiative.

Please note that a Transition Agenda is a 'living document'; thus, its content may evolve over time. Through their transition process, islands may have different versions of their Transition Agenda (one at the beginning, and several as the transition develops). To avoid misunderstandings, please clarify the version month and year in the title page of the Transition Agenda.

For any questions, do not hesitate to contact the Clean energy for EU islands secretariat through info@euislands.eu.

For more information about the activities of the secretariat consult www.euislands.eu.

Preface

This Island Clean Energy Transition Agenda for Holmön [Island] is the strategic and tactical roadmap for the transition process towards clean energy as desired by the stakeholders on the island.

This Island Clean Energy Transition Agenda (CETA) was developed jointly by Holmöns Development Forum (HUF) and Swedish Archipelago Federation (SRF) [Stakeholder 1], [Stakeholder 2], etc. with the support from Södertörns University and Stockholm Environment Institute [Stakeholder 3], [Stakeholder 4], etc.

*The core team that represents the island stakeholders and takes responsibility for the development of Clean Energy Transition Agenda is known as the **Transition Team**. The Transition Team has a key coordination and facilitation role; therefore, its members need to be committed with both resources and availability.*

The Transition Agenda must be approved by the entire Transition Team and the island's main stakeholders before being officially published.

Table of contents

Part I: Island Dynamics

Part I of the Clean Energy Transition Agenda aims at providing a picture of the current status of the island. This includes a description of the geographical, economic, and political situation on the island, but also an analysis of the Energy System and of the Stakeholders that are important for the Clean Energy Transition.

Geography, Economy & Population

Geographic Situation

Describe the island's geographical features that are relevant for the transition process.

Holmön Islands is a group of islands in strait between the Bothnic Sea in the south and the Bothnic Gulf in the north. There is no land connection to Holmön. There is a ferry operating on a daily basis. The port on the mainland is located at Norrfjärden (WGS84: N63°51'45.8''; E20°44'20.9'') about 30 km north of the town of Umeå. The port on Holmön, which is the northernmost island, is located in Byvken (WGS84: N63°48'18.7''; E20°52'4.7'') on the north side of the island. The distance of the ferry line is about 10 km. The ferry tour one way takes about 40 min.

The total area of the islands is about 56 km^2. The highest point is 22 m above sea level. There is old agricultural land around the village, which is located along 4 km of the main road from the north. There are about 25 km of roads that can be used by cars and about 5 km more that only can be used by ATV vehicles or MTB-bikes.

The rest of the land is forest. About 60 % of the land area and the sea around the islands is a marine reserve and Natura 2000 area. The area is globally unique due to three factors: low land, land elevation with 9 mm/year, and brackish sea water. There is no similar biotope on earth.

Demographic Situation

Describe the relevant demographic considerations in the context of the transition process.

Holmön is the largest and northernmost island and is the only inhabited island. There are approx. 60 full time residents and approx. 550 part time residents. The part time residents together are about equal to 100 full time resident ships. There are about 2-4 daily commuters. Currently there are no schoolchildren commuting.[1]

In the beginning of 1900-century the population on Holmön was at its most and about 450 inhabitants. There was a large depopulation period during 1930-ies due to the global depression. Next depopulation wave came in the 1950/60-ies, when most of the small scale

[1] Holmöns Utvecklingsforum. *Projekt Holmömodellen - Förstudie kring servicelösningar i skärgård och landsbygd*, 2020, URL: https://www.holmon.se/huf/om-forstudien-holmomodellen/holmomodellen/.

farms were closed down and there was a huge lack of work possibilities on the island. In the late 1960-ies the population had decreased to around 100. The depopulation continued slowly and in the mid-1990-ies the population was down to about 60. During the first decade of the 2000-century the population increased to about 100, with young couples settled on the island and starting families and getting their first children. After 2010 the depopulation began again because the school was closed down and the young families were forced to move to the mainland.

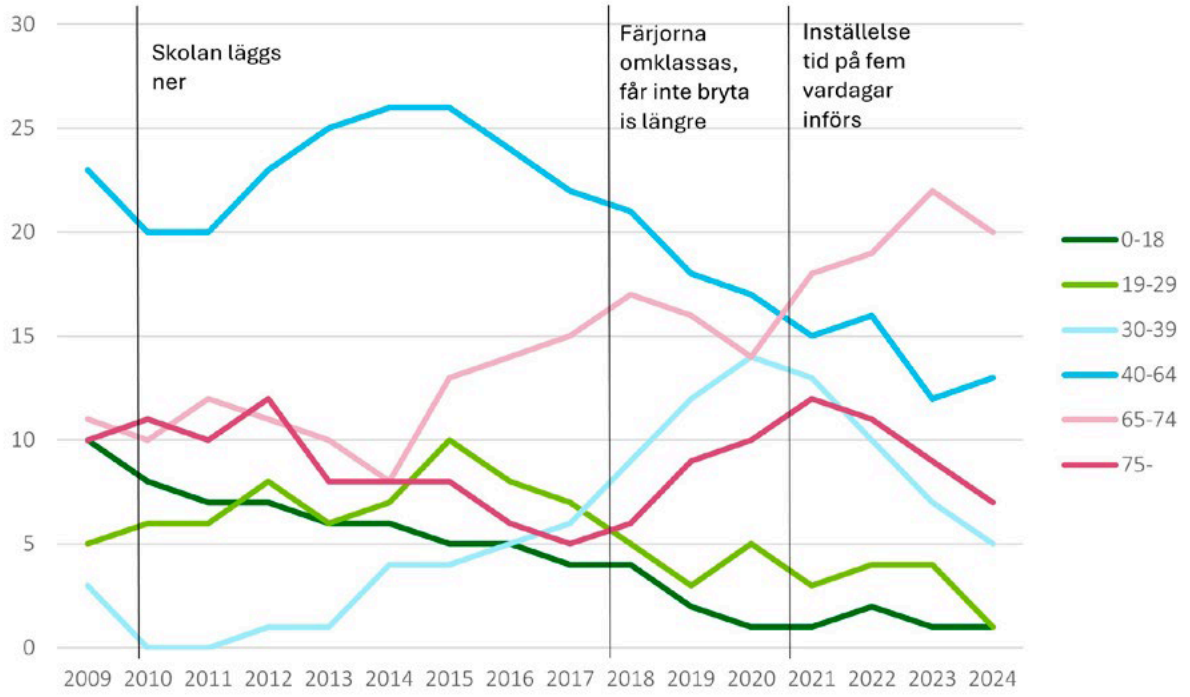

Figure 1. *Age distribution over the last 15 years. In 2010 the school was closed, in 2018 the ferries were reclassified and not allowed to break ice and in 2021 a delay time of 5 weekdays was introduced. See more in the text. Figure from footnote 2.*

The age distribution of inhabitants registered on Holmön over the 15 last year is shown in figure 1. It can clearly be seen that the population of young adults and children have decreased since the school was closed in 2010. There is also a general reduction in the population, except for the newly retired not needing to commute, since commuting became difficult after the restrictions of the ferry tours were introduced. First, in 2018, when the ice restriction was introduced, which increased the number of cancelled the winter tours, and second, in 2021, when a five weekdays delay time for helicopter transports when the ferry tours had to be cancelled due ice conditions, was introduced.[2] The consequence of the last

[2] Bergvall Kalén J, Otterbjörk J. *SYSTEMANALYS 2025 - Med ön som katalysator. Lokala modeller för hälsa och social välfärd i arktiska landsbygder. Genomförbarhetsstudie inom SustainGov.* Umeå Kommun, 2025.

restriction was that one or more tours were cancelled during 50 days in winter 2023, which made it impossible to commute and many inhabitants had to partly live on the mainland during winter.

Local Government

Describe the role of the local government in the transition process.

Holmön was its own municipality up until 1976. Today Holmön is part of Umeå Municipality in Västerbotten County. The population of Holmön only comprises a minute fraction of the whole municipality with a population of 130 000. The city of Umeå, with about 90 000 inhabitants, is the central location of the municipality and county capital. The rural developers in the municipality support this project.[3]

Economic Activities

Describe the main economic activities on the island and relate these to the impact on the island's greenhouse gas emissions.

On the island there is a country store that is open daily all year around. The country store also functions as a post office (all islanders have a post box at the shop), pharmacy, library, café, and agent for governmental bottle shops (you order on-line and get delivery to the shop). The shop turnover is about 3 MSEK. The shop gets deliveries with the ferry three time per week in summer time and one time a week in autumn, winter and spring. Post is delivered daily. The shop also has a small lorry for goods transports between the ferry and the shop (approx. 200 m).[4]

There are two youth hostels on Holmön, one open only during summer and one open all year round. There are also three self-catering accommodations of which two are open all year round.

Moreover, there are some craftsman businesses, which do building and maintenance of houses and other craftsman services. There are also some tourism and other businesses on Holmön, e.g. a Boat museum, boat service with seal watching, transports and tours around Holmön, bee farming, sheep farm.

Connection to the mainland

Describe the island's relation to the mainland including physical connections like ferry routes, bridges, or electrical cables (although this should be further developed in the Energy System Description section). Also refer to other dependencies (e.g., if the island is part of a municipality or region on the mainland).

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[3] Umeå Municipality website, 2025, URL: https://www.umea.se/.
[4] Holmöns Lanthandel board, personal communication 2025.

Holmön has a ferry connection on a daily basis. There are submerged cables for electrical power supply. There are also some private boat charter businesses that make transports to the mainland. In winter time when the sea freezes and the ice is thick enough, a track is maintained for goods transports with snowmobiles and sledges. No ice road is maintained.

Energy System Description

The scope of the description of the island's energy system depends on the available technical expertise on the island. A complete diagnosis of the energy system is recommended for each of the relevant energy vectors on the island, for example:

- *Electricity*
- *Heating and cooling*
- *Transport on the island*
- *Transport to and from the island*

Accurate, recent, and detailed information on energy consumption and on the sources of greenhouse gas emissions allows developing a relevant plan and promotes an efficient allocation of resources. Although the Secretariat encourages islands to carry out an energy analysis as exhaustive as possible, the lack of data on a certain vector should not pose a limitation to developing a Clean Energy Transition Agenda. The aim of this section is to give a snapshot of the vectors that dominate energy consumption on the island and generate the highest CO_2 emissions. If no official data is available, energy consumption and emissions can be estimated based on certain assumptions.

More information on how to develop the Energy System Description of the island (including how to gather data or how to estimate it in case it is not available) can be found in the Islands Transition Handbook, Chapter 3 'Understanding the Island Dynamics', Section: 'Energy System description'.

Islands that have developed a baseline emission inventory can insert a summary of the results in their Clean Energy Transition Agenda. For guidance on developing a baseline emissions inventory, islands are referred to the reference material developed by the Covenant of Mayors [1]. Please note that a complete baseline emission inventory is not a minimum requirement to complete a Clean Energy Transition Agenda.

The gathered data on all energy vectors can be summarised in Tables 1 and 2 (below). The Energy System Description section is not limited to data though: it should also include text describing how energy is generated and consumed on the island in order to provide a full picture of the island's energy system.

There is no commercial fuel supply on the island. Everyone has to transport their own supply of fuel from the mainland on the ferry. Business actors usually transport fuel in smaller tanks (< 500 L) for diesel or in 20 L jars (petrol). Private persons transport fuel in 10 – 20 L jars (diesel or petrol). The price of fuel has varied over the past year but is currently about 17 SEK/L for both petrol and diesel. Add everyone's transport cost from the mainland.

There is a cable supply with electricity power from the mainland to a distribution station on the island. From this station there is an air-based power grid system divided into three major sections on the island. There is also a limited ground-based grid system to consumers in the vicinity to the distribution station, e.g., the country store. The mainland cable capacity is about 0,7 MW and the grid on the island has a capacity of about 0,7 MW. The municipal power company, Umeå Energi, also has an electrical generator using diesel as back-up if the electrical supply from the mainland should fail for a longer time.[5]

There are seven PV-installations on private houses. Their overproduction is distributed to the grid.

There is no wind power installed on the island.

Survey on energy usage among private households

A digital survey, made in Google forms, was posted on the Holmön portal (URL: www.holmon.se) on 2025-07-04 to investigate the energy usage among private households on the island. The survey was open during the summer 2025. A number of 32 respondents had answered the survey at the end of August.

Accomodation

Of the respondents, 25 % were full time households, 37 % were part time households (> 2 month), 34 % were part time households with their own summer house (1 week - 2 month), and 3 % were visitors with rented accommodation 1 - 4 weeks. The number of residents per household varied between 1 - 9 (see Figure 2).

[5] Umeå Energi, survey response 2024.

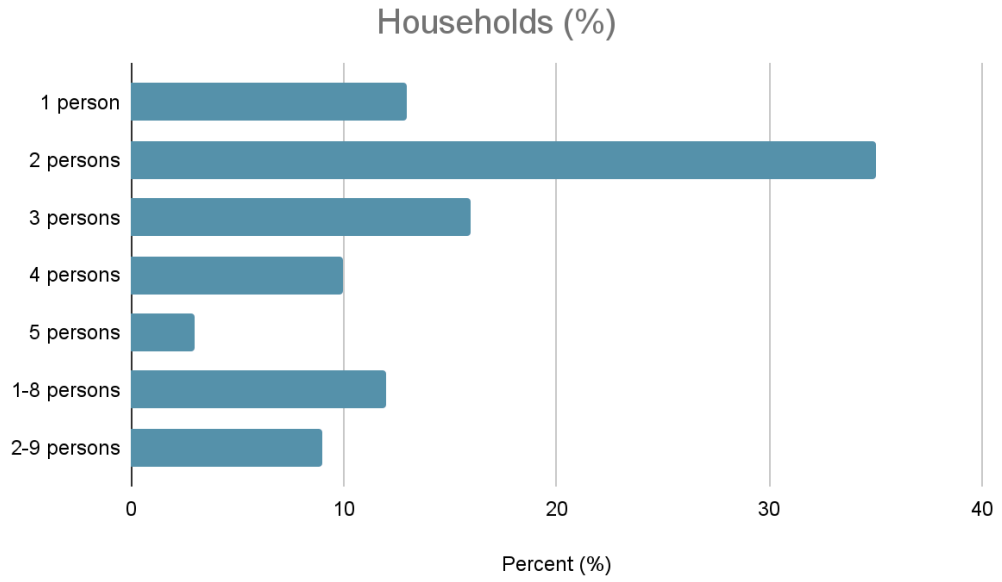


Figure 1. *Residents per household*

About 50% of the households lived in all-season houses heated all year, 16% lived in all-season houses with only support heating during winter and 34% lived in summer houses that are shut down during winter.

Heating of houses

There are many different heating sources used in the houses on Holmön. Several houses can also have two or more heating sources, e.g., direct electric heating in combination with air/air heat exchanger, geothermal heating in combination with wood boiler, etc. In figure 3, the occurring heating sources are presented in percent of responses. Please observe that the total percentage exceeds 100% since several houses have more than one heating source.

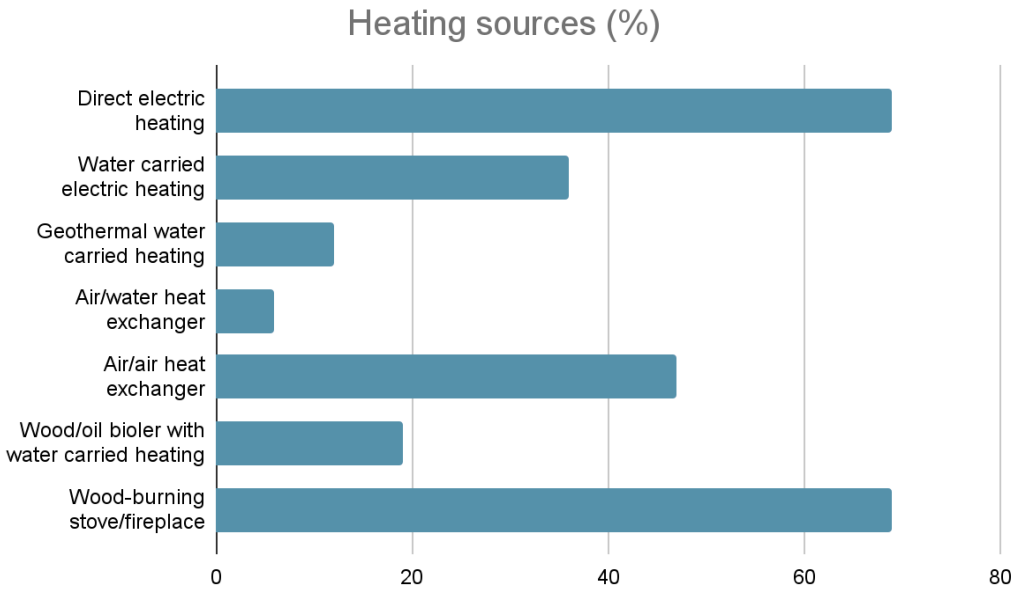


Figure 3. *Heating sources used in the houses. Several sources can be used in one house.*

There are also different sources for production of hot water. About 78% of the houses have separate electric water heaters, 25% have water heaters in combination with a water carried heating system in the house, 6 % have no water heater and 3 % do not have running water at all.

Electricity contracts

The households can also have different types of electricity contracts. In figure 4, the different types of contracts are presented. There are no households that do not have an electricity contract or have their own portable electric generator as their only electricity source.

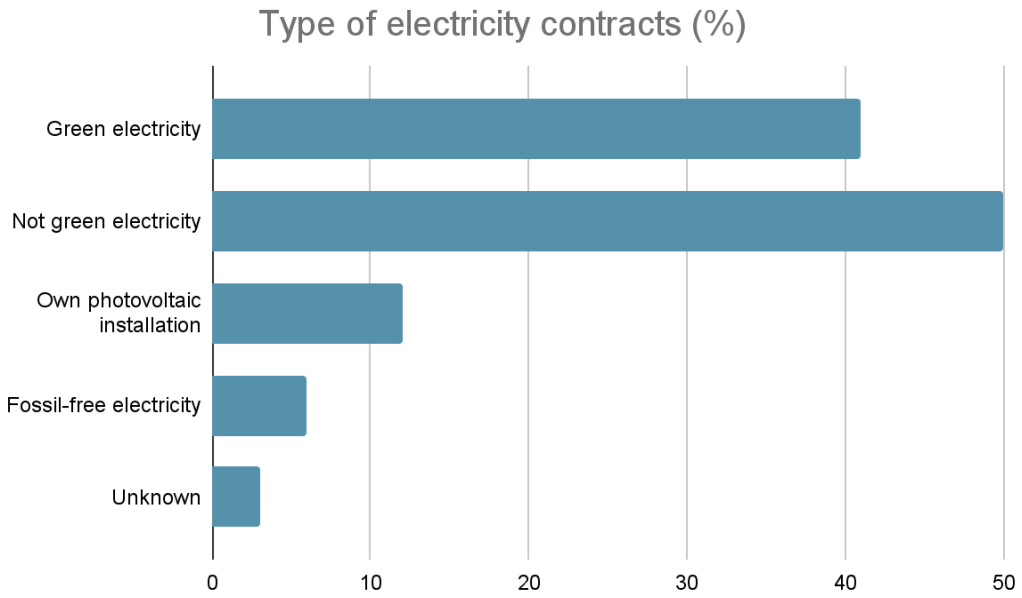


Figure 4. *Type of electricity contracts.*

Electricity consumption

The electricity consumption varied between the 32 respondents from 0 - 35 000 kWh, with 3 respondents who responded “unknown”. The respondents had together a total annual electricity consumption of 250 723 kWh.

Four of the respondents declared that they had their own photovoltaic electricity production facility. Their total annual production was 67 500 kWh. Two of them had an overproduction and sold a total annual production of 21 000 kWh to the grid.

Consumption of other energy sources

The consumption of fire wood varied among the households from none up to 15 m^3/year. The total annual consumption of firewood was 80 m^3.

None of the respondents declared that they were using fuel oil.

Energy consumption for vehicles

Automobiles

Nine of the respondents declared that they did not have an automobile on Holmön. Twentythree declared that they have an automobile on Holmön. Of these, 11 respondents

have petrol powered automobiles, 3 have diesel automobiles, 1 have both a petrol and and a diesel automobile and 2 have hybrid or electric automobiles. The total annual fuel consumption among the respondents were 2 800 L petrol and 860 L diesel. One response was “Do not know”.

Tractors/ATVs/moped/MC/Electric bicycle/snow mobile

Sixteen respondents do not have a tractor, ATV or similar. Seven respondents have petrol powered ATV and three respondents have diesel powered tractors. The total annual fuel consumption was estimated to be 860 L petrol and 55 L diesel.

Seventeen respondents declared that they do not have any moped or MC. Nine respondents have one or more moped or MC, of which one has an electric moped. The total annual fuel consumption was estimated at 260 L of petrol.

Two respondents declared that they have snow mobile and together used 150 L/year of petrol.

Two respondents have electric bicycles that were charged on Holmön about 10 times/year.

Chain saws and similar machines

Twentyfive of the respondents declared that they have chain saw and/or clearing saw that have two-stroke engines that use oil-mixed fuel. One respondent has an electric machine. The estimated annual fuel consumption for these machines were 270 L petrol. One respondent declared “Do not know” the fuel consumption.

Fifteen respondents declared that they have and use electric wood-copper/-splitter. The total annual time they were used was estimated to 272 hours.

Boats

Eight respondents do not have a boat. Three respondents declared that they have a boat with an electric battery operated engine. Sixteen respondents have boats and the annual fuel consumption varied significantly from 2 - 1 500 L. Most of the respondents use between 2 - 60 L/year, while a few are larger consumers of 400 - 1 500 L/year. The total annual fuel consumption for boats were estimated to 2 500 L. One respondent declared “Do not know” the fuel consumption.

Businesses

The major business actors on Holmön have been interviewed to collect basic data on fuel usage. There are five business activities on Holmön island that are larger consumers of fossil fuel. Together they annually use about 12 m^3 diesel and 2,5 m^3 petrol.

All of these five businesses and most other individual companies are located at the owners homestead and the company's electric consumption is included in the household electricity contracts.[6]

The country store is also a large energy consumer. The building is heated with floor heating and there is also an air/air heat exchanger with both heating and cooling as a complement. The annual electricity consumption is estimated to be 47 000 kWh.[7]

There are also some tourist companies offering lodging on the island. Most of these companies are only active during the summer season

Electricity capacity and consumption

The municipality power company, Umeå Energi, has supplied basic data of the power capacity and consumption on Holmön.[8] These data are presented in table 1.

Transports between Holmön and the mainland

The communication between Holmön and the mainland is operated by the The Swedish Transport Administration's road ferries. A questionnaire on basic data regarding the ferry line to Holmön was submitted to the ferry line manager. In tables 2 - 4 basic data of the ferry line, the ferries and the ferry schedule are presented. Figure 5 shows a map with the ferry line marked. Figure 6 shows the ferry schedule, which is divided into 3 seasons, summer, spring/autumn and winter.[9]

There are about 36 000 single-way person tours each year with the ferry, based on data from 2018. The travel frequency varies significantly over the seasons. There are about 21 500 single-way person tours during June to August, while the remaining tours occur during the rest of the year (see figure 7).[10]

In figure 8 the transport of vehicles for the past years are shown. Data are reported as personal car units (PBE), i.e., vehicles up to 6 m length. During spring 2020 the ordinary ferry Capella was renovated and the smaller back-up ferry Helena Elisabeth was in use. During winter January, February and March ice conditions occasionally stopped the ferry from operation for many days and no vehicles could be transported. This was particularly dominant during winter 2022 (February) and winter 2024 (January to March).[11]

[6] Individual companies, personal communication 2024-2025.
[7] Holmöns Lanthandel AB board, personal communication 2025.
[8] Umeå Energi, survey response 2024.
[9] Färjerederiet Holmön Line manager, personal communication 2024.
[10] Färjerederiet Holmön Line manager, personal communication 2025.
[11] Färjerederiet Holmön Line manager, personal communication 2025.

Table 1. *Basic data on electricity capacity and consumption*

Energy source	Numeric value	Comment
Annual electric energy demand of the island [GWh/year, MWh/month]	1,84 GWh 260MWh	2023 December 2023
Wind energy installed power capacity [MW]	0	No wind energy plants installed
Photovoltaic (PV) installed power [MWp]	50 kW	7 PV-installations on private houses. Overproduction is distributed to the network grid
Renewable energy generation [GWh/year, MWh/month]	32 MWh/year	2024
Potential for Renewable generation increase in the next years [MW]	≈ 0,3 MW	Rough estimation of grid capacity with regards to power quality
Electrical grid capacity [MW]	≈ 0,7MW	Limited by power quality
Electrical connection with mainland (if any) [MW]	≈ 0,7MW	Limited by power quality

Table 2. *Basic data of the Holmön ferry line.*

DATA on ferry service	INPUT VALUE	Notes
Port Island Location	WGS84 N 63°48'18.7" E 20°52'4.7"	*See map in figure 1*
Port Mainland Location	WGS84 N 63°51'45.8" E 20°44'20.9"	*See map in figure 1*
Route, distance (Nautical Miles)	Ca 10 km ca 6 nm	
Route time (hours)	40 min	

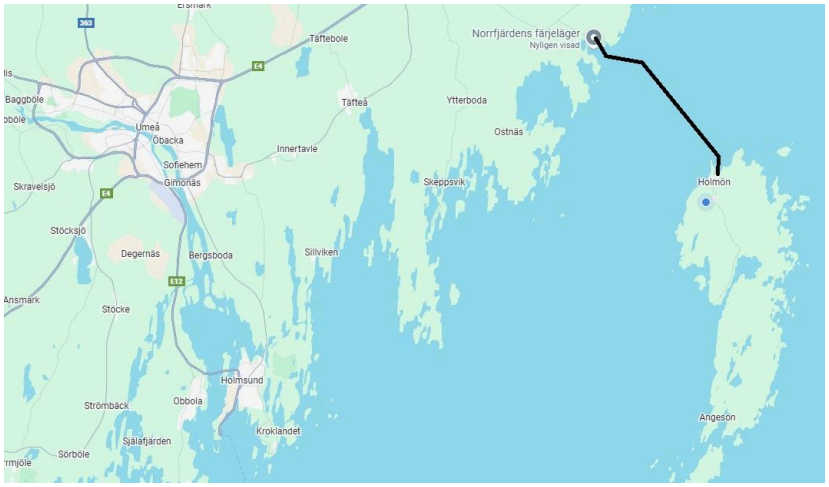


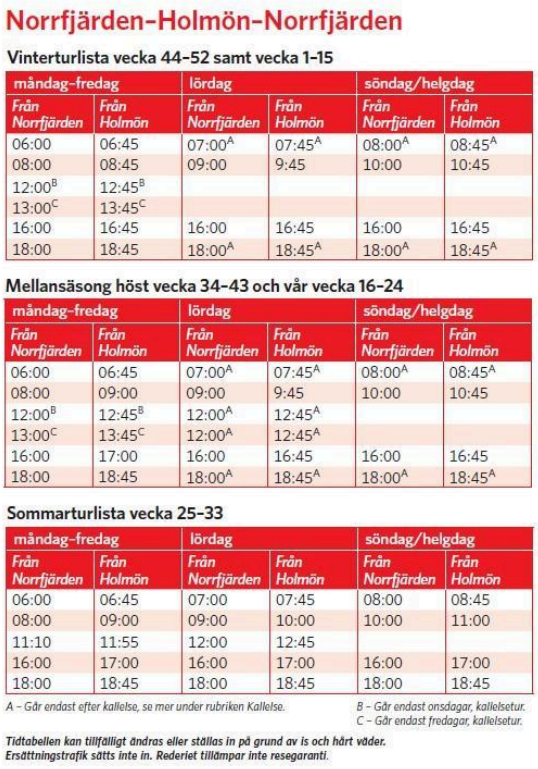
Figure 5. *Map showing the ferry line to Holmön. To the left in the map, the city of Umeå can be seen. The black line shows the ferry track.*

Table 3. *Basic data on the ferries*

DATA on ferries	**INPUT VALUE**	**Notes**
Vessel average speed (kn) Capella (ordinary Helena Elisabeth (back-up)	 9 knots 9 knots	
Vessel length [m] Capella (ordinary) Helena Elisabeth (back-up)	 LOA 33,3 m width 6,6 m LOA 22,1 m width 6,6 m	
Vessel tonnage [t] Capella (ordinary) Helena Elisabeth (back-up)	 201 tons 113 tons	
Vessel payload [t] Capella (ordinary) Helena Elisabeth (back-up)	 25 tons 3 cars/1 lorry 150 pax 17 tons 1 car 59 pax	
Fuel type and consumptions (tons or l or m3) Capella (ordinary) Helena Elisabeth (back-up)	 55 L/T & R 66 L/T & R	

Table 4. *Data on the ferry schedule*

DATA on the ferry schedule	INPUT VALUE	Notes
Scheduling (round trip per day)	Winter 4 tours/day + an extra tour wed Spring/Autumn 4 tours/day + extra tours wed, fri and sat Summer 5 tours/day	



Norrfjärden–Holmön–Norrfjärden

Vinterturlista vecka 44–52 samt vecka 1–15

måndag–fredag		lördag		söndag/helgdag	
Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön
06:00	06:45	07:00[A]	07:45[A]	08:00[A]	08:45[A]
08:00	08:45	09:00	9:45	10:00	10:45
12:00[B]	12:45[B]				
13:00[C]	13:45[C]				
16:00	16:45	16:00	16:45	16:00	16:45
18:00	18:45	18:00[A]	18:45[A]	18:00[A]	18:45[A]

Mellansäsong höst vecka 34–43 och vår vecka 16–24

måndag–fredag		lördag		söndag/helgdag	
Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön
06:00	06:45	07:00[A]	07:45[A]	08:00[A]	08:45[A]
08:00	09:00	09:00	9:45	10:00	10:45
12:00[B]	12:45[B]	12:00[A]	12:45[A]		
13:00[C]	13:45[C]	12:00[A]	12:45[A]		
16:00	17:00	16:00	16:45	16:00	16:45
18:00	18:45	18:00[A]	18:45[A]	18:00[A]	18:45[A]

Sommarturlista vecka 25–33

måndag–fredag		lördag		söndag/helgdag	
Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön	Från Norrfjärden	Från Holmön
06:00	06:45	07:00	07:45	08:00	08:45
08:00	09:00	09:00	10:00	10:00	11:00
11:10	11:55	12:00	12:45		
16:00	17:00	16:00	17:00	16:00	17:00
18:00	18:45	18:00	18:45	18:00	18:45

A – Går endast efter kallelse, se mer under rubriken Kallelse.

B – Går endast onsdagar, kallelsetur.
C – Går endast fredagar, kallelsetur.

Tidtabellen kan tillfälligt ändras eller ställas in på grund av is och hårt väder.
Ersättningstrafik sätts inte in. Rederiet tillämpar inte resegaranti.

Figure 6. *Ferry schedule valid during 2024. The schedule is divided into three seasons winter, spring/autumn and summer.*

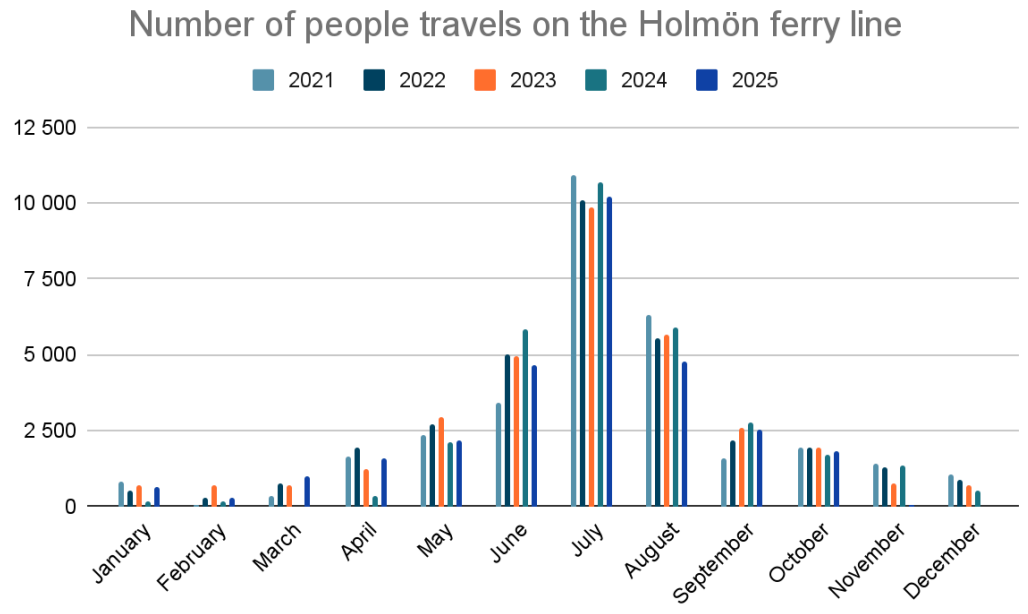


Figure 7. *Number of single-way people travels on the Holmön ferry line during 2021-2025 to October.*

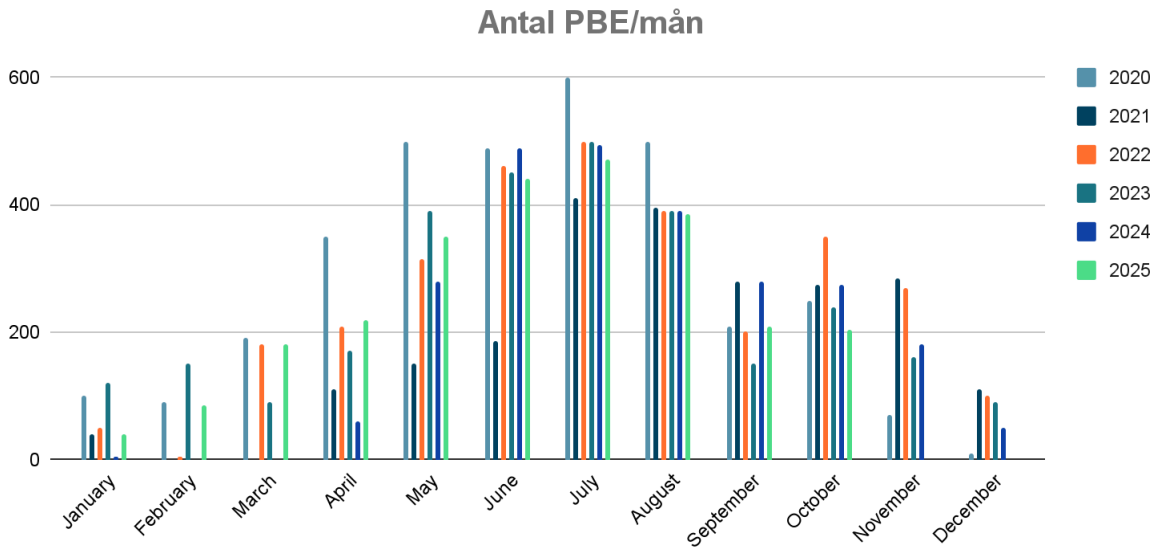


Figure 8. *Personal Car units (PBE), up to 6 m length, that were transported on the ferries each month during 2020 - 2025 up to October. A vehicle up to 12 m = 2 PBE.*

Conclusions from the current situation analysis

Based on the survey among households, interviews with business actors and the interview and questionnaire to the municipality power company and the ferry line manager, the outcome from the "Holmömodellen" and "Ön som katalysator" projects and acquired knowledge over the years by other means, the following conclusions have been made:

- The total annual electric consumption is about 1.84 GWh. The Swedish mean CO_2 emission from electricity production is about 20 g/kWh.[12] The CO_2 annual emission from Holmöns electricity consumption is consequently about 36.8 kg CO_2.
- Approximately 80 houses are kept warm all year round and remaining about 120 houses only during summer part of the year.
    - Several houses have more than one heating source.
    - Based on the survey it can be assumed that houses used all year on average consume electricity with 15 000 KWh/year and houses used parts of the year on average consume 3 000 kWh/year.
    - This means an average consumption of electricity for all residents will be 1,68 GWh and the remaining 0,16 GWh will be consumed by commercial actors. Here it has to be recognised that many commercial actors have their business at home and their business consumption is registered in their household consumption.
- It has been a challenge to estimate the fuel consumption. It has also been assumed that standard values for energy in diesel and petrol (see table 5) and CO_2 emission (see table 6) can be used to calculate the energy use (MWh) and CO_2 (kg) emission on Holmön.
    - There are five business activities that are larger consumers of fossil fuel. Together they use about 12 m^3 with diesel and 2,5 m^3 petrol.
    - An estimate of the fuel use by private households has been made from the survey and general knowledge. It is about 100 cars on Holmön, of which 90 run on petrol, 10 on diesel, 50 ATVs (petrol), 50 mopeds/motorbikes (petrol) and 30 snow mobiles (petrol) permanently located on the island and about 50 small boats with outboard engines < 150 hp (petrol) owned by full or part time residents.
    - Based on the survey it can be assumed that the average annual fuel use by the cars is 50 L, ATVs 50 L, mopeds/motorbikes 20 L, snowmobiles 50 L and boats is 50 L.
    - Adding this up, gives a total use of about 14 m^3 of petrol and 13 m^3 diesel.
    - Over that, there are part-time residents that take out cars from the mainland for shorter periods of time. Their fuel use is very difficult to assume.

[12] *El och fjärrvärme, utsläpp av växthusgaser.* Naturvårdsverket, 2025. URL: https://www.naturvardsverket.se/data-och-statistik/klimat/vaxthusgaser-utslapp-fran-el-och-fjarrvarme/.

- When the municipal power company and municipal water/wastewater/garbage company comes to the island for maintenance or repair they bring their own vehicles and fuel from the mainland. No data on consumption is available.
- The municipal power company has an electrical generator using diesel as back-up if the electrical supply from the mainland should fail for a longer time. There is no data available on the nominal fuel consumption per running hour. However, the generator is rarely used, less than two occasions annually.

The total energy use on Holmön is summarized in table 7. On site production of electricity is summarized in table 8.

Table 5. *Standard values for energy content in various sources.*

Energy source	**Amount and unit**
Petrol	8.76 kWh/L
Diesel	9.7 kWh/L
Marine diesel	11.86 kWh/kg
Fuel oil	13.12 kWh/L
Fire wood	4.4 kWh/kg

Table 6. *CO_2 emission from different energy sources.*

Energy source	**Amount CO_2 and unit**
Petrol	2.64 kg/L
Diesel	2.39 kg/L
Marine diesel	0.27 kg/kWh
Fuel oil	0.264 kg/kWh
Fire wood	0.39 kg/kWh

Table 7. *Summary of the final energy consumption on the island.*

Data for year 2024	Final energy consumption [MWh]	CO_2 emissions [kg]
Electricity consumption		
Residential, including heating and hot water	*1 680*	*33.6*
Primary sector	*160*	*3.2*
Transport on the island		
All transports and machines (e.g. chainsaw etc)	*248,7*	*68 030*
Transport to and from the island		
Maritime transport	*1 165.2*	*26 525*
Heating and cooling		
Wood and pellets	*176*	*68 640*
TOTAL	**1 750**	**163 196**

Table 8. *Electricity produced onsite.*

Data for year 2024	Total energy production [MWh]	Primary energy consumption [MWh]	CO_2 emissions [tonne]
Diesel generators (only back-up)	–	–	–
Solar Photovoltaics	*50*	*--*	*--*
Wind	–	*--*	*--*
TOTAL	**50**	**–**	**–**

Stakeholder mapping

This section should provide an overview of the local actors that are relevant for the clean energy transition on the island. In a later stage, this exercise will be useful to determine the governance of the transition and to organise the stakeholder consultations. A comprehensive stakeholder engagement register, built up from individual cells as given below, can be used to identify the decision makers that are important in the process.

Besides the name of the contact and the organisation, the perspective of the stakeholder on the transition can be described. What aspect of clean energy transition affects the stakeholder? What opinion do they have on the transition process? This allows identifying the frontrunners on the island whose engagement in developing the island transition path in Part II is desired.

More information on stakeholder mapping can be found in the Islands Transition Handbook, Chapter 3 'Understanding the Island Dynamics', Section 'Stakeholder mapping'.

Civil society organisations

For every relevant organisation, the following details are recommended:

Holmöns Utvecklingsforum (HUF) [Holmön Development Forum]
Active actor from Holmön in the project. Project leader at Holmön is part of the HUF board Olle Nygren is contact person and project leader from HUF and Holmön

Businesses

Damina AB and Jongården
Damina AB and Jongården is owned by the project leader on Holmön. Jongården has a PV facility with a battery storage system at Jongården homestead. Olle Nygren is contact person.

Public Sector

Governmental Actors

Umeå Municipality
The municipality rural developers support the project The municipality has not so far been active in the project The municipality rural developer Jennie Bergvall Kalén

Umeå Energi
The Municipality energy company responsible for the electric grid on the island and the distribution cables from the mainland. Have supplied basic data on the grid and cable capacity and total electricity consumption. UE has so far not been actively engaged in the project. [If applicable, contact person in the organisation]

The Swedish Transport Administration's road ferries
Operates the ferry line to the mainland. Have supplied basic data on the ferries capacity, fuel consumption and statistics on transports (vehicles and passengers). But have so far not been actively engaged in the project. [If applicable, contact person in the organisation]

[Organisation name]

[Perspective on the transition]

[Engagement in the transition]

[If applicable, contact person in the organisation]

Economic Activities

There are no active economic actors on the island.

[Organisation name]

[Perspective on the transition]

[Engagement in the transition]

[If applicable, contact person in the organisation]

Schools and Academia

There are no schools on the island. Today, children have to commute to the mainland for day care or school. Currently there are no children in day care or school age living on the island, so no children are commuting.

Higher Education and Research

[Organisation name]

[Perspective on the transition]

[Engagement in the transition]

[If applicable, contact person in the organisation]

Secondary Education

[Organisation name]
[Perspective on the transition]
[Engagement in the transition]
[If applicable, contact person in the organisation]

Primary Education

[Organisation name]
[Perspective on the transition]
[Engagement in the transition]
[If applicable, contact person in the organisation]

Policy and Regulation

Local policy and regulation

Are there any initiatives you are aware of? Please list them ☺

Regional policy and regulation

Sweden is split in 21 regions, which are the local self-governing bodies and are formally responsible, together with municipalities, to formulate local energy plans, set policy targets, and coordinate stakeholders working in the energy field. Local and regional authorities are supported by 14 regional "energy offices" (energikontor in Swedish) that support local and national energy and climate targets by leading collaborative, impartial projects that aid municipalities, regions, and businesses in transitioning to sustainable practices. Their broader mission is thus to enhance society with a focus on energy and sustainability.

Furthermore, SKR's (Sveriges Kommuner och Regioner, eng. Swedish Municipalities and regions) mission is to serve as a unified voice for Swedish municipalities and regions in relation to the national government and EU institutions. While SKR is not responsible for specific regulations, it is a very important actor in the energy and climate policy field, especially when it comes to the representation of smaller regions and municipalities that lack the resources for larger-scale strategic projects. Additionally, SKR works strategically with promoting Swedish issues at the EU level.

National policy and regulation

In 2017, Sweden introduced a comprehensive climate policy framework, aiming to achieve zero net greenhouse gas emissions by 2045. This framework includes a Climate Act, climate targets, and a Climate Policy Council, created to provide long-term guidance for policy and market stability, ensuring adherence to the Paris Agreement regardless of political changes. The Climate Act, effective January 2018, requires the government to present an annual climate report and a climate policy action plan every four years, aligning climate and budget goals.

Sweden's climate targets consist of a long-term goal for zero net emissions by 2045, with milestone targets of reducing emissions by 40% by 2020, 63% by 2030, and 75% by 2040, all compared to 1990 levels. Additional reductions will be achieved through supplementary measures, such as carbon capture and international verified emissions reductions. Furthermore, emissions from domestic transport, excluding domestic flights, must decrease by at least 70% by 2030 compared to 2010. This climate goal emphasizes Sweden's commitment to making its vehicle fleet fossil-independent by 2030.

The Climate Policy Council, an independent body, evaluates government policies for alignment with climate goals, ensuring scientific rigor and fostering societal debate. The Swedish Environmental Protection Agency (EPA) supports these efforts by providing data

and analysis, aiding in the development of Sweden's climate policy action plans, with the next update due in 2023.

The primary objective of Sweden's energy policy is to follow the EU's core principles: supply security, competitiveness, and environmental sustainability. This policy aims to promote efficient, sustainable energy usage, a cost-effective energy supply with minimal impacts on health, environment, and climate, and to support the shift toward a sustainable society.

The Swedish Parliament has also set specific goals for 2030 and 2040:

- By 2030, Sweden aims to improve energy efficiency by 50% compared to 2005, measured in energy use per GDP.
- By 2040, Sweden targets 100% fossil-free electricity production.

In June 2024, the Swedish government presented the updated National Energy and Climate Plan 2021-2030, structured around five national target dimensions: greenhouse gas emission decrease, energy efficiency, energy security, the domestic energy market, and research, innovation and competitiveness.

European policy and regulation

The Green Deal is the main driver for the energy system transition across the EU, including islands, for which there is limited targeted energy-related regulations at EU level. However, islands and the “Clean Energy for EU Islands secretariat” are mentioned in the Green Deal as part of a longer-term plan to provide clean energy to all EU islands, for which the EU is particularly aware of their vulnerability to climate change.

The Green Deal is based in an EU Member States agreement for EU to become the first climate neutral continent by 2050. The Fit for 55 policy framework was established in 2021 and further quantifies a target for 55% reduction of greenhouse gas emissions by 2030 (compared to 1990 levels), replacing the previous target for 20% reduction by 2020.

There are several initiatives taken under the Green Deal and Fit for 55 umbrella that are relevant to the island context for renewable energy. Since the first announcement on the Green Deal in December 2019, the following policies and regulations relevant to energy and islands have been proposed and implemented:

- The Green Deal Investment Plan and Just Transition Mechanism
- The European Climate Pact, established in 2020 and promoting the involvement of communities and organizations in climate action
- The Offshore Wind Renewable Energy strategy
- The Communication for a new approach for a sustainable blue economy
- The REPower EU plan, developed as a response to the energy price crisis resulting from the war in Ukraine, aiming for affordable, secure, and sustainable energy for Europe
- New rules for renewable hydrogen under the Renewable Energy Directive

- A 2030 target for new zero-emission city buses and a 2040 target for 90% emission reduction for new trucks
- The revised Energy Efficiency Directive with a target for 11.7% energy efficiency improvement by 2030
- The Alternative Fuels Infrastructure Regulation, promoting charger deployment for electric vehicles
- A proposal for a new European Wind Power Action Plan
- A Directive on Empowering Consumers for the Green Transition
- A strengthened Energy Performance for Buildings Directive
- An electricity market design reform

In particular, part of the REPower EU plan focused on renewables, such as wind and solar, and how permitting processes can be accelerated by classifying areas of interest for establishing renewable energy projects.

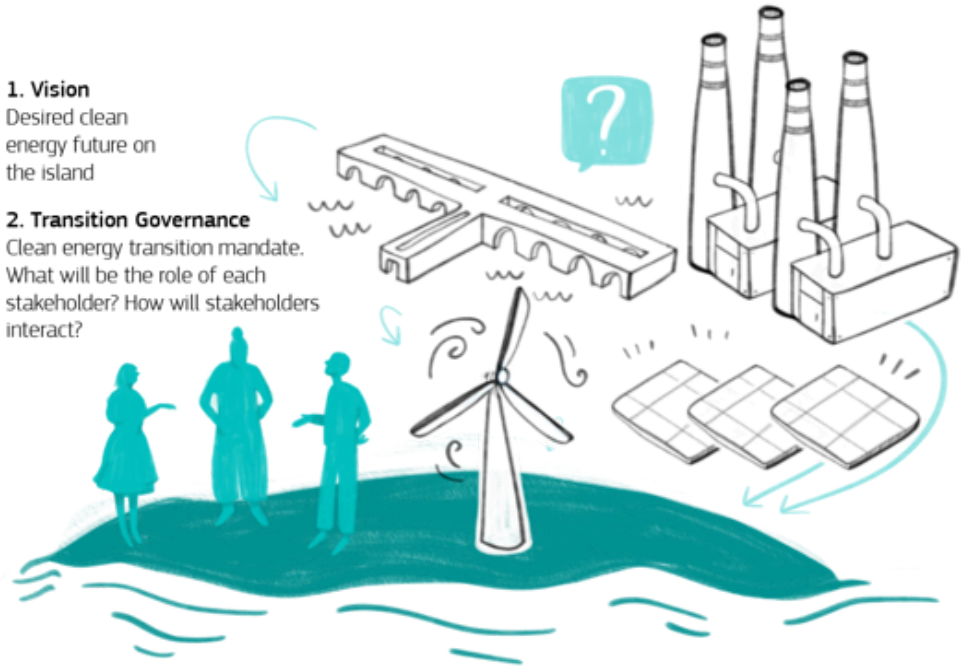
On August 20, 2019, Nordic Ministers adopted a vision for the Nordic Council of Ministers, setting three key priorities for the next four years: a green, competitive, and socially sustainable Nordic region.

In the Green Nordic Strategy Area, joint and coordinated efforts are underway to support integrated energy and climate plans for the Nordic countries. To help meet 2030 targets, a Nordic Energy Policy Cooperation Programme (2022–2024) was created, covering themes like renewable energy research, sector electrification, system integration, offshore wind cooperation, hydrogen strategies, and carbon capture.

The North Sea Energy Cooperation (NSEC), comprising Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, and Sweden, along with the European Commission, fosters regional cooperation on offshore renewables. Another partnership, the Baltic Energy Market Interconnection Plan (BEMIP), connects gas and electricity markets in Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden, and Norway (as an observer). In 2020, a group dedicated to advancing offshore wind in the Baltic Sea was established.

Part II: Island transition path

The following graph aims to guide the authors in the development of the second part of the Transition Agenda. The Sections of Part II and how the content in each one is related to the rest is illustrated. The figure is added for guidance in the template and should be removed in the final version of the Clean Energy Transition Agenda of your island.



Vision

*The clean energy vision aims to establish a shared goal for the transition process. It can best be expressed as a **sentence or paragraph** that describes how the island stakeholders see the transitioned island in the future. This statement provides insight into future transition activities.*

*A vision can be developed in a **vision workshop** in which all the relevant island stakeholders participate. The workshop may start by envisioning the island in the future and answering to the following questions: How will the island look like in 2030, in 2050? How will people live? How will they move from one place to another? Etc. For more information into how to organise and facilitate a workshop, please check the secretariat's Workshop Facilitation Guide.*

More information on how to develop an island's clean energy vision can be found in the Islands Transition Handbook, Chapter 4, 'Developing an Island Vision' section: 'Creating the Vision'.

Transition Governance

While the Stakeholder Mapping section aimed at listing the relevant stakeholders in the transition process, the Transition Governance section focuses on determining the role of each actor in achieving the clean energy vision. A clear governance structure is key for the success of the transition process.

To establish how the transition process will be governed, the following questions should be answered:

- *What is the role of each stakeholder in the process and what are their resources and drivers of the transition?*
- *How do the stakeholders interact and collaborate in the transition?*
- *What is the role of local authorities? To what extent can ownership by citizens and local businesses be foreseen?*
- *How can interests, motives, and policy of the various stakeholders be aligned towards the common vison?*

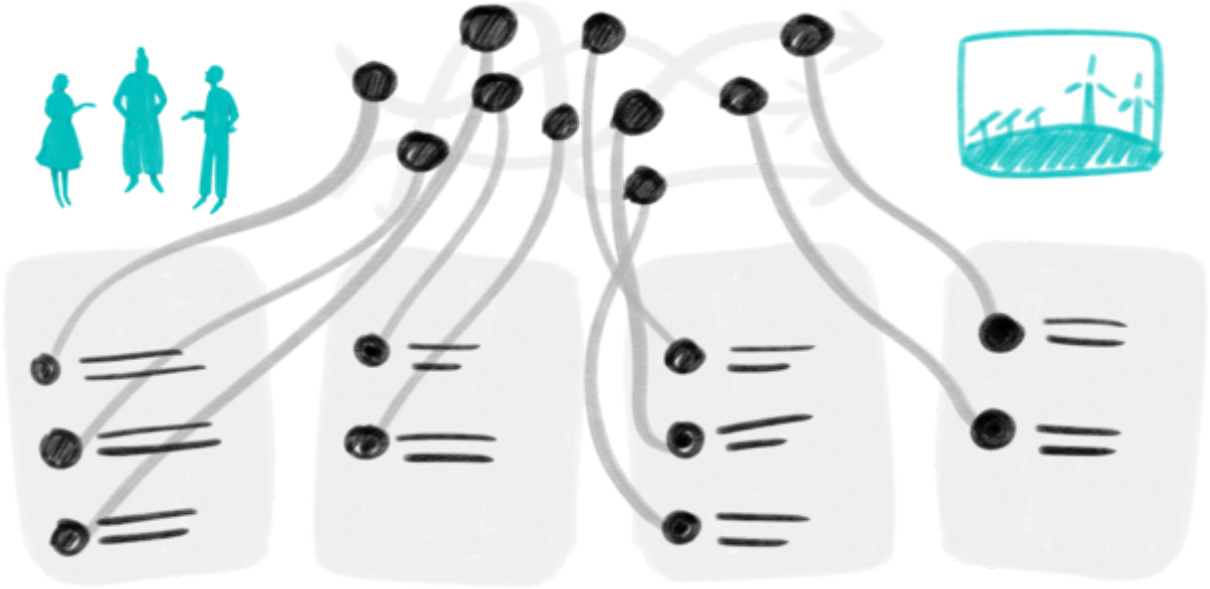
Along with these questions, the mandate of the Transition Team needs to be clarified. An example of such mandate would be: 'An independent platform that is set-up by the municipality with an advisory board from renewable energy cooperatives', 'a local chamber of commerce', etc.

More information on how to develop an island's clean energy vision can be found in the Islands Transition Handbook, Chapter 4, 'Developing an Island Vision'.

Pathways

Once the vision for the island has been set, transition pathways allow visualising the potential paths to transition from the current situation to the desired future. These pathways will be based on possible solutions, for example: replacing fossil fuel by renewable generation or promoting clean transportation. By connecting the possible solutions and building pathways, the transition team can identify synergies and point out limitations and barriers.

More information on how to construct pathways can be found in the Islands Transition Handbook, Chapter 5 'Exploring Island Transition Pathways', Section 'Developing islands pathways'.



Pillars of the Energy Transition

The pathways built to accomplish the vision from the current situation are based or depend on more specific solutions (for example, fossil fuel generation is planned to be replaced by renewable energy, namely solar and wind). At this point, the solutions should be classified according to the pillars of the energy transition. Following the energy vectors suggested in the Energy System Description section, the Secretariat recommends using the following pillars:

- *Electricity generation,*
- *Heating and cooling,*
- *Transport on the island,*
- *Transport to and from the island.*

Once classified, the solutions may be further developed in the pillars section. Following with the example above: the foreseen wind and solar projects may have suggested timelines, capacity, organisational structures, etc. that can be further explained at this point.

Islands with an ongoing planning process that identifies other pillars are welcome to use them as long as all the pillars above are covered. Islands are invited to include additional pillars, such as demand reduction and energy efficiency, according to the local context.

*For each one of the pillars, a **general objective** is identified. Subsequently, one or more **strategies** to achieve that goal may be outlined followed by the direct **actions** to be taken to move forward.*

More information on how to develop clean energy transition pillars can be found in the Islands Transition Handbook Chapter 5 'Exploring Island Transition Pathways', section 'Pillars of the energy transition'.

Monitoring

Monitoring is an important part of the learning process of the transition. Both the transition process and transition governance should be monitored and assessed to track their evolution. The aim of the monitoring is to generate feedback based on the measured results which allows for improvement of the transition process while it is ongoing.

Transition processes are uncertain by nature; thus, the Clean Energy Transition Agenda cannot be a static document. Through periodic reporting, the Agenda should be revised and adjusted to accommodate changes.

A self-assessment matrix is available at: euislands.eu/transition-indicator together with videos explaining how to fill it in. The results of the self-assessment matrix, together with an explanation of the reasons to each score, should be summarised in this section of the agenda. Self-assessment should be conducted at least twice a year, and the evolution of the scores may be updated in subsequent versions of the Transition Agenda.

More information on how to monitor the transition process can be found in the Islands Transition Handbook Chapter 7: Monitoring the Transition.

Indicator 1: Clean Energy Transition Agenda

[Score]
[Summary of discussion]

Indicator 2: Vision

[Score]
[Summary of discussion]

Indicator 3: Community – Stakeholders

[Score]
[Summary of discussion]

Indicator 4: Community – Organisation

[Score]
[Summary of discussion]

Indicator 5: Financing concept

[Score]
[Summary of discussion]

Indicator 6: Decarbonisation plan – Island diagnosis

[Score]
[Summary of discussion]

Indicator 7: Decarbonisation plan – Data

[Score]
[Summary of discussion]

Indicator 8: Decarbonisation plan – Action Plan

[Score]
[Summary of discussion]

Indicator 9: Multi-level governance

[Score]
[Summary of discussion]

References

[1] Bertoldi P. (editor), Guidebook 'How to develop a Sustainable Energy and Climate Action Plan (SECAP) – Part 2 - Baseline Emission Inventory (BEI) and Risk and Vulnerability Assessment (RVA), EUR 29412 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-96929-4, doi:10.2760/118857, JRC112986

Available at:

publications.jrc.ec.europa.eu/repository/bitstream