European Commission

Clean energy for EU islands: Study on regulatory barriers and recommendations for clean energy transition on the islands **Sweden**

Study on regulatory barriers and recommendations for clean energy transition on the islands - Sweden

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Readers' Guide

This Study on legal and regulatory barriers for the clean energy transition on Swedish islands is the result of a consultative process. Based on an inventory of the current legislation and information gathered via surveys and interviews, the Clean energy for EU Islands Secretariat has brought together relevant stakeholders to identify barriers to the clean energy transition on Swedish islands, and formulated recommendations to overcome them.

After an introduction and explanation of the methodology, the first Chapter of this Study provides an overview of the existing policy and legislation for clean energy on Swedish islands.

The second Chapter contains the identified and prioritised legal and regulatory barriers, based on the survey and the interviews (see Annex 1 for a detailed assessment), and the recommendations, based on the Focus Group Meetings and hybrid National Stakeholder Meeting (see Annex 2 for more information).

Introduction

Small size, remoteness and climatic vulnerability lead to an unfavourable condition and make that islands are susceptible to external factors. While islands are particularly vulnerable to climate change, many islands have abundant renewable energy potential, which can be tapped to lead decarbonisation.

Even if harvesting of this reliable, clean, and competitive sources of energy remains a main challenge for island communities in the EU, islands present unique opportunities to become leaders in clean energy transition.

While it is often technically and financially possible to develop renewable energy projects on islands, EU, national, regional, and local legal frameworks are not always fit-for purpose. This study is the third deliverable of the Task Force 2 – Think Tank on legislation and regulation for islands of the Clean Energy for EU Islands Secretariat. It builds further on the Regulatory inventory of legal and regulatory information on clean energy development for 15 Member States, available online at the website of the Clean Energy for EU Islands Secretariat.

This **Study** identifies existing and emerging legal, regulatory and policy frameworks for the development of local decarbonised energy systems on Swedish islands. It aims to provide insight in whether the legislation fosters or hinders the energy transition and the ability of islands to develop and implement their plans. It processes analysed input from literature review, surveys, interviews, workshops, and highlights best and worst practices, inspiring examples, failures and their lessons learned, and provides recommendations for overcoming them.

Methodological approach

Different methods of information collection were used by the Think Tank to complete the information needs for the detailed inventory:

- Desk research completing the information for the selected Member States was conducted.
- In-depth surveys were created and sent to the consortium's network. 32 stakeholders were engaged, and the survey was made public on the website. There were 13 responses to the survey.
- Information templates were sent to regulators, national authorities, and relevant stakeholders.
- Eight semi-structured open-ended interviews (Annex 1 for more details) with national and regional legislators, regulators and academic institutions and relevant actors (TSO, citizens, authorities, businesses, and communities) of local energy initiatives were organised. This helped clarify the rationale behind, and interpretation of existing legal developments. In these interviews we identified the key action drivers, opportunities, and obstacles for the implementation of the action plans they encountered, including possible ways to address, or overcome them.
- Experiences (successful or unsuccessful) from local stakeholders, available through one-on-one contacts, articles in local newspapers or as part of communication provided by (local) advocacy groups were integrated. The contacted actors included those that were identified during the project work from Phase I of the Secretariat and those related to project experiences that arose from the technical assistance in Task Force 1.
- Two online meetings with the Sweden Focus Group. The Focus Group consists of experts and representatives of national, regional and local stakeholders relevant for clean energy transition on EU islands. The first meeting was organized on 3rd of May and focused on the

discussion of the key barriers to clean energy project, while the second one, organized on 23rd of August, focused on the barriers for overcoming the priority regulatory barriers (Annex 2).

- The National Stakeholder Meeting was hybrid and it was held in Stockholm and online on 28th of September 2022 (Annex 2 for more details).

Policy and Legislation for clean energy on Swedish Islands

Introduction to the Swedish Energy sector – Relevant Actors

Throughout the report several key stakeholders in the Swedish Energy sector will be referred to. Therefore, hereunder a short overview of these actors and their role is given.

Swedish energy policy is defined by the national government. The main national stakeholder responsible for energy is the **Ministry of Infrastructure**.[1] On the national level, the Ministry is supported by the **Swedish Energy Agency**[2] (Energimyndigheten), responsible for matters of the supply and use of energy in Sweden, and leading Sweden's transition to a sustainable energy system. The **Energy Market Inspectorate**[3] (Energimarknadsinspektionen) is responsible for energy distribution and trade through well-functioning energy markets (electricity, district-heating and natural gas).

The electricity transmission system (220-400 kV) is owned by the Swedish government and managed by the **Svenska Kraftnat** as Transmission System Operator (TSO). In comparison to other electricity systems Sweden's 20-130 kV electricity grid is owned and operated by regional system operators (mainly three companies **Vattenfall Distribution, Ellevio, and E.on Elnät Sverige**) , in addition to the TSO. Vattenfall is the largest owner and operator of regional electricity distribution grids. Finally, local grids (below 20 kV) are owned and operated by 170 companies of which 129 are municipal.[4] Svenska Kraftnat is responsible for the overall balance of the electricity system in Sweden, while regional system operators are responsible for their regions.

Vattenfall is a state-owned electricity company. Vattenfall produces, distributes, and sells electricity, heat, and gas, primarily in the Nordic countries, Germany, and the Netherlands.

Sweden is part of the common Nordic electricity market, **Nord Pool**, which was started by TSOs from Sweden, Norway, Denmark, and Finland and currently includes all the Nordic, Baltic, Central Western European and UK markets, and more.

Swedish islands and their governance

Sweden has 267 570 islands,[5] 984 of which are inhabited. Swedish islands cover a total area of 12 112 km² (3% of land area), located in 20 regions. Gotland is the largest island with 2,994 km², Öland comes second with 1,342 km². There are several islands with an area between 50 and 100 km² and a very high number of smaller islands. Of the total population of Sweden, 17% lives on the islands, a large part of them on the islands of Södermalm in Stockholm and Hisingen in Gothenburg. This corresponds to 1 602 930 people. .
Swedish islands are treated the same as municipalities/administrative units on the mainland. The only exception is the island of Gotland, which is a separate region, while the rest of the islands are considered an integral part of Sweden as mainland. For the purposes of this paper the islands will

[1] https://www.government.se/government-of-sweden/ministry-of-infrastructure/
[2] https://www.energimyndigheten.se/en/
[3] https://ei.se/
[4] https://www.ri.se/sites/default/files/2021-11/Power%20Distribution%20SE.pdf
[5] https://www.scb.se/hitta-statistik/statistik-efter-amne/miljo/markanvandning/strandnara-markanvandning/pong/statistiknyhet/kust-strander-och-oar-2013/

be referred to as separate entities, regardless of the question if they are interconnected with the mainland.

General policy

According to the **Integrated National Energy and Climate Plan for Sweden**[6] for the period 2021-2030, the Member State does not have a national 2030 target for renewable energy, but it has set a target of reaching 100% renewable electricity production by 2040. For the heating sector, the share of renewable energy (RE) in final energy consumption for heating and cooling will increase slightly from the current level to 69% by 2030. When it comes to the transport sector the 2030 target is set to 47.7% of RE in total final consumption.

There is no national strategy for the islands. Island municipalities, as other municipalities, are expected to align with the national strategy. Most islands are considered as part of the Sweden mainland, except for Gotland. While there is the Swedish Association of Local Authorities and Regions (SALAR), there are no known island associations or national platform for exchange of experience specifically related to islands. Swedish islands and island municipalities are looking to the national government for the guidance or a roadmap towards energy transition. There are regional energy offices (Energikontoren)[7] that have as goal to help respective regions reach their energy and climate goals and to create the right conditions for that.

Gotland island has a regional government which is also a municipality. Gotland has been connected to the mainland since the 1960s. The interconnection is expected to be improved in the coming period due to the ongoing plan of the cement industry (Cementa) to electrify its production. Such improved interconnection would help increase capacity for integration of renewable energy on Gotland island. Gotland has its own energy strategy and related financing. It has been identified by the national government as the region that should provide an example for the energy transition. Gotland has formed its own energy agency for planning and implementing the energy transition on the island.

The electricity sector is regulated through the Electricity Act (1997:857).[8] In addition, for implementation of the electricity projects, aside from the Electricity Act the main legislation includes the Electricity Ordinance[9], and Environmental Code.[10] More details on specific national legislation and regulation and their support to clean energy transition can be found within the Regulatory inventory.[11]

Sweden has a fully liberalised energy market. Swedish electricity prices are defined for four separate regions and used to solve the bottlenecks. DSOs can affect the dynamic pricing based on the local situation on the grid. There is an ongoing discussion on how the local energy markets will be implemented. When it comes to local energy markets, Gotland for example would be one local market.

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[6] https://energy.ec.europa.eu/system/files/2020-03/se_final_necp_main_en_0.pdf
[7] https://www.energikontorensverige.se/om-oss/
[8] http://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/ellag-1997857_sfs-1997-857
[9] https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/elforordning-2013208_sfs-2013-208
[10] https://www.government.se/49b73c/contentassets/be5e4d4ebdb4499f8d6365720ae68724/the-swedish-environmental-code-ds-200061
[11] https://clean-energy-islands.ec.europa.eu/countries/sweden

Sweden is working on national, regional, and local flexibility markets. National flexibility markets already exist. But there are no clear rules of operation yet. Part of the discussion is on the need to implement more price areas and the extension to flexibility services.

Clean energy support systems

In Sweden there are no island specific support systems in place at national level. Sweden provides support schemes for PV and onshore wind energy. The support instruments for heating are, in general, technology neutral. In the transport sector Sweden supports use of biofuels and RES-fuelled vehicles (electric, hydrogen etc.) and their needed charging infrastructure.

Support schemes are:

- Quota system: the single largest and most significant RES support mechanism in Sweden. Energy suppliers are obliged to prove that a certain quota of their electricity production was generated by RES.
- Tax regulation mechanisms: ensure different tax privileges to RES.
- Tax reductions for households[12]: The installation of renewable energy devices and the replacement of conventional heating sources with renewable ones may be deducted from tax.
- Energy and carbon dioxide taxes: Energy and carbon dioxide taxes are levied on the supply, import and production of fossil fuels for heating purposes. Renewable energy sources are exempt from these taxes.
- Nitrous oxide tax: The producers of heat are obliged to pay a tax according to their nitrous oxide emissions. Heat producers using renewable energy sources are exempt from this obligation.
- Tax regulation mechanism: Companies supplying, importing, and producing fossil fuels are obliged to pay energy and carbon dioxide taxes. Biofuels are exempt from these taxes.
- Biofuel quota: Fuel suppliers are obliged to increase the share of biofuels in diesel- and petrol fuels in order to reduce the greenhouse gas emissions.
- Climate leap - Includes two support mechanisms:
    - Klimatklivet[13] - the investment support that makes it possible to invest in fossil-free future technology and green transition. It can be applied for by companies, municipalities, regions and organizations throughout Sweden.
    - Industriklivet[14] - The broad R&D support for local and regional climate measures also enables subsidies for RES-T (renewable transport) projects. Within Industriklivet, grants can be made for preliminary studies, research, pilot and demonstration projects and investments in process industry emissions and greenhouse gases, negative emissions, and strategically important initiatives within industry.
- Electric bus premium: The government subsidies electric and hybrid buses in order to increase their share in public transport.
- Climate premium: The government subsidies electric and hybrid heavy machinery purchases in order to increase their share.

[12] https://www.skatteverket.se/privat/fastigheterochbostad/gronteknik.4.676f4884175c97df4192860.html
[13] https://www.naturvardsverket.se/klimatklivet
[14] https://www.energimyndigheten.se/forskning-och-innovation/forskning/industri/industriklivet/

- Bonus system: The bonus-malus system incentivises legal persons (both private persons and companies) to purchase low-emitting vehicles through subsidies and tax discounts, and taxes newly bought high-emitting vehicles more heavily.

RES projects authorisation process

Authorisation procedure is often managed by the regional government, mostly on an application/approval basis.

Electricity and heating grids

Electricity grids

In the electricity networks, grid access is technology-neutral. Hence, RES are not given priority.
As discussed above, while there are three main regional distribution system operators, there are 170 local distribution system operators. The majority of local distribution system operators are municipally owned. The country has a smart meter penetration rate of 100%. The electricity supplier switching rate for household customers in 2018 was 11.3%.

Heating grids

The Act on District Heating (2008:263)[15] establishes rules for operation of district heating plants and grids. Companies operating a district heating network are obliged to negotiate terms with the operator of a heating plant. After negotiations, the plant can be connected under negotiated or regulated grid connection.

Supported energy efficiency measures

When it comes to improving energy efficiency, Swedish policies take the form of support for small actors and obligations for larger stakeholders. This support includes advisory services, financial support for R&D, and the survey of energy efficiency requirements for large companies (250 employees and an annual turnover of over EUR 50 million), industries and energy producers.

Supporting policies

Sweden has a relatively developed framework of RES policies and certification systems (including mandatory trainings) in place. Public authorities are obliged to make purchases and other forms of procurement that are in line with the energy efficiency and low-emissions standards set out by national and EU legislation. Sweden also highlights the importance of regional and local competency-building by offering climate and energy advising.

Self-consumption and community energy

Sweden has not incorporated any supportive legislation for energy communities in its legislation or political system yet. However, other changes in legislation[16] already make it easier for energy communities to share energy. Energy communities are allowed to own and operate microgrids without having to obtain the grid operators permission.

[15] http://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/fjarrvarmelag-2008263_sfs-2008-263

[16] Ordinance (2007: 215) on exemptions from the requirement for a network concession according to the Electricity Act (1997: 857) available here

The Swedish Energy Market inspectorate (EI) has developed a proposal for the transposition of the Clean Energy Package.[17] The terms from the Clean Energy Package are fairly literally translated. Energy sharing is possible to a limited extent, for collective self-consumption within the same building and with one connection to the grid. The aim of the EI was that energy communities should be easy to set up with minimal bureaucracy. Prosumers and micro-producers are exempted from some fees or are subject to lower rates than larger producers.

[17] https://www.regeringen.se/4afc14/contentassets/8d350a3c57644a9faf9ffe7678743961/eir2020_06_kapacitetsutmaningen-i-elnaten.pdf

Identified barriers and recommendations to overcome them

This second Chapter contains the legal and regulatory barriers, which were given priority by Swedish stakeholders during the detailed assessment of the current regulatory framework. Stakeholders were consultated through a survey and through interviews (see Annex 1 for a detailed assessment). For each of the identified regulatory barriers, the Secretariat proposes recommendations. Both barriers and recommendations were further discussed within the Focus Group Meetings (see Annex 2 for more information).

Regulatory barriers for the energy transition on the Swedish islands are presented in the order of their priority given by the stakeholders. Some of the identified barriers are barriers for renewable energy development that exist both on the islands and on the mainland. Moreover, a few national stakeholders pointed out that in their opinion there are no special barriers to energy transition on the islands in comparison to other parts of Sweden. This aspect is further discussed under Barrier 2. In the recommendations, the focus lies on the concrete barriers encountered by islands. The table below represents the list of barriers (marked in blue) and the proposed recommendations (marked in white).

Barrier 1. **Lack of visibility of island challenges and vision for island energy transition**

Recommendations:

1.1 Mandate a committee of the experts on the national level for clean energy transition on the islands

1.2 Develop national island policy and integrate it into NECP

1.3 Guidance and support in the development and implementation of local energy action plans

1.4 Create a framework for local stakeholder engagement in energy projects

Barrier 2. **Lack of security of supply on the islands**

Recommendations:

2.1 Develop long-term grid planning to prepare for island energy transition

2.2 Support the use of demand-response, flexibility services and microgrids on the islands

2.3 Channel funding from the EU towards regional and local (grid) development

Barrier 3. **Lengthy approval procedures for clean energy projects**

Recommendations:

3.1 Seek compromises between sectors and support research & innovation

3.2 Develop national spatial planning guidelines

3.3 Master Plan per island to define go-to areas and simplify procedures

Barrier 4. **Lack of clear regulation for energy communities and energy sharing**

Recommendations:

4.1 Develop an enabling framework for energy communities on islands

4.2 Introduce a simplified authorisation procedure for energy communities

4.3 Increase local stakeholder awareness

REPowerEU – Proposal for amendment of RED II (and EPBD & EED)[18] and Recommendation on speeding up permit-granting procedures for renewable energy projects

On 18 May 2022 the European Commission has presented the REPowerEU Plan, its response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. There is a double urgency to transform Europe's energy system: ending the EU's dependence on Russian fossil fuels, which cost European taxpayers nearly €100 billion per year, and tackling the climate crisis. There are three main axes:

- Saving energy;
- Diversifying supplies and supporting our international partners;
- Accelerating the rollout of renewables.

Regarding the latter, a massive scaling-up and speeding-up of renewable energy in power generation, industry, buildings, and transport will accelerate our independence, give a boost to the green transition, and reduce prices over time. The Commission proposes to increase the headline 2030 target for renewables from 40% to 45% under the Fit for 55 package. Setting this overall increased ambition will create the framework for other initiatives, including among others:

- A dedicated EU Solar Strategy to double solar photovoltaic capacity by 2025 and install 600GW by 2030.
- A Solar Rooftop Initiative with a phased-in legal obligation to install solar panels on new public and commercial buildings and new residential buildings.
- A Commission Recommendation to tackle slow and complex permitting for major renewable projects, and a targeted amendment to the Renewable Energy Directive to recognise renewable energy as an overriding public interest. Dedicated 'go-to' areas for renewables should be put in place by Member States with shortened and simplified permitting processes in areas with lower environmental risks. To help quickly identify such 'go-to' areas, the Commission is making available datasets on environmentally sensitive areas as part of its digital mapping tool for geographic data related to energy, industry, and infrastructure.

These two last tools are particularly relevant for islands as renewable energy development is often hampered by spatial planning constraints and complicated permitting procedures. Where relevant references to these tools are made in text boxes.

[18] Proposal for Directive amending Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency

1. Lack of visibility of island challenges and vision for island energy transition

Even though Sweden's energy policy is well-integrated with its climate objectives, Swedish islands suffer from a lack of guidance for the energy transition from the national bodies. Islands face specific challenges. Islands face specific challenges includeas seasonality of economic activity and energy demand, priorities in use of limited natural resources by different sectors (tourism, industry, energy, etc.), access to mainland (transport and needed resources), environmental protection and energy security. These island-specific challenges undoubtedly affect islands' development and energy transition priorities. However, there is no systematic analysis of the specific state of the Swedish islands with regards to their energy systems. In some cases, islands are part of a larger municipality. Their priorities are not always given sufficient attention in the overall municipality or regional needs and priorities,. Due to all these factors, there is currently no visibility of island energy needs and challenges on the national level, which has resulted in a lack of an island specific vision or policy from the national authorities. Moreover, there is lack of understanding among many national and regional stakeholders on why island policy or actions should be a focus in the overall national strategy and policy.

While the Swedish Energy Agency has been active on different actions regarding electricity[19], there is a lack of policies from other governmental agencies to achieve the full decarbonisation of the islands.

Transport on the island and to/from the island is an important aspect of island development and especially of the energy transition. There are already several energy transition actions in the transport sector on some islands (Gotland[20], Skaftö[21], Öckerö[22], Lidingö[23]). Moreover, pioneers in the shipping industry.[24] have been leading the island energy transition with regards to maritime transport The Initiatives for maritime transport are usually taken up by the operator (contracted every 10 years). Different authorities, such as National Traffic Authority or regional or local government have defined procurement requirements for the decarbonisation of transport. Although, the decarbonisation of transport is dictated through national legislation under various national procurement laws.[25], the reality of the transport energy transition is not the same for all the islands. For some islands the action is from national, while for others from the local level. Such legislation forces regional bodies and local governments to take climate and sustainability into consideration in their procurement requirements. This has been seen as effective, as local governments usually focus on the economic aspects and the costs of the transport, and not on sustainability.

Another issue that small communities are facing is the lack of technical expertise and resources. Smaller islands, outside of the Stockholm region, have very little knowledge on the energy system.

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[19] Electric mobility and collaboration with Gotland region/island.

[20] https://electreon.com/projects/gotland ; https://cleantechnica.com/2022/07/25/scania-helps-db-schenker-go-fossil-free-on-swedish-island-of-gotland/ ; https://chariot-electricbus.com/public-operator-nobina-in-sweden-values-e-mobility-and-has-made-an-order-for-122-new-electric-buses/

[21] https://www.ellevio.se/privat/energismart/framtidens-energi/elektrifieringsvag-pa-sjon/

[22] https://www.tidningen.se/ockero-kommun/da-blir-farjorna-till-ockero-kommun-eldrivna/

[23] https://www.mynewsdesk.com/se/fossil-free-marine/pressreleases/fossil-free-marine-lanserar-vaerldens-foersta-dnv-verifierade-marinstation-miljoesaekerhet-paa-en-helt-ny-nivaa-3184349

[24] https://www.itf-oecd.org/sites/default/files/docs/decarbonising-maritime-transport-sweden.pdf

[25] https://www.government.se/government-policy/central-government-adminstration/public-procurement---how-it-works-in-sweden/#:~:text=Swedish%20procurement%20legislation%20is%20based,mutual%20recognition%20must%20be%20followed.

Moreover, there are currently no incentives that could help them to gain the expertise and investigate this issue.

Recommendation 1.1: Mandate a committee of the experts on the national level for clean energy transition on the islands

To provide more visibility to the challenges and needs of Swedish islands energy transition, the energy, (electricity, heating and transport) situation on the Swedish islands needs to be assessed. In the short term, the National government, specifically the Ministry for Infrastructure, should give a mandate to a committee of experts to analyse the current situation of the energy sector and transition on the Swedish islands.

The committee of experts should bring together experts that understand the functioning of electricity, heating, and transport sectors, Swedish multi-level government regulation, and challenges in implementation of energy projects on the Swedish islands. The analysis should review variation of Swedish islands to understand their characteristics and challenges. As a result of the analysis of the current state-of-play the committee should provide an overview and deeper understanding of the current situation and the challenges and priorities of the islands which would help accelerate the energy transition. The report should include guidelines or indications for the relevant national stakeholder on how to best support the energy transition for the islands. The results should at least be increased visibility of island challenges and greater awareness of the need for systemic action.

In the long term the sustainable island development topic should be included in the plans of existing national, regional, and local bodies in order to ensure good collaboration between different sectors. Such systematic approach to island development will provide adequate monitoring and evaluation of island challenges and implementation status of the energy transition with regards to foreseen targets, as discussed in recommendation 1.2 below.

Due to their size and typically compact communities, islands could be used as innovation centers and become best practice examples for the rest of Sweden on how the energy transition can be implemented. Lessons learned could be transferred to municipalities on the mainland.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- Association of local governments and regions
- TSO, DNOs, DSOs
- Swedish Energy Agency
- Research institutes and Academia
- Local stakeholders (Civil sector, Private sector)

Recommendation 1.2: Develop national island policy and integrate it into NECP

We recommend that the Ministry of Infrastructure, department for Energy and Digital Development sets up island specific policies to provide clarity on island development, keeping into account regional and local differences of small municipalities, and the different sizes, regional features and energy

systems characteristics of the islands. The next NECP[26] should clearly identify the role of islands in the energy transition of Sweden.

Sweden's policies have increased the focus on sustainable and inclusive regions and engagement of stakeholders at the regional level. This includes a formalised forum for dialogue between the national government and politicians as well as civil servants at the regional level.[27] Such regional policy includes attention for rural and urban development but does not include islands as a separate category. This is a pity as regional energy agencies Energikontoren[28] can be a support to implementation and monitoring of defined island policy.

Moreover, even though regional energy and climate plans exist in Sweden, there is a need for a clear vision of the island energy transition in the regional plans. This process should include local island stakeholders in order to address local needs and priorities. As mentioned above, the maritime and transport sector have taken the lead in roadmaps for decarbonisation. Existing roadmaps, such as the roadmap of the Swedish industry association Energi Företagen,[29] and the Swedish Shipbuilders Association[30] can serve as an example. The Energy Institute of Gotland is also currently working on energy roadmaps. Such roadmaps can be adapted to be more tailored to other islands.

Experiences from Gotland can serve as an example for policies for other Swedish islands, taking into account that most islands have less human capacity and resources than Gotland. The Gotland region has been identified by the national government as the region that will be an example region for the energy transition. [31] The Swedish Energy Agency was given the mandate to do this. The Gotland government has taken initiative to collaborate with the Swedish Energy Agency and other stakeholders to plan and implement the energy transition on the island.

Regulatory best practice

Island specific policies

Ireland

Regarding Strategic Planning, specific attention – in a cross-sectoral way – is given to islands in Ireland in the Policy Document 'Our Rural Future': rural development policy for 2021-2025[32]. In Chapter 10 'Supporting the Sustainability of our Islands and Coastal Communities' 12 Policy Measures are mentioned for the Islands and Coastal communities, the main one being the 10 Year policy for Islands Development to 2030. It promises an extensive consultation process with island communities and will address issues such as housing, health, energy, utilities, waste management, climate change, education, digital connectivity, employment, infrastructure, and transport. Specifically for islands, the Irish Government is developing a new national policy for the development of the islands around Ireland, called the 'new National Policy for the Future Development and Sustainability of Communities on the Offshore Islands of Ireland[33]. This new 10-year Policy for Islands Development to 2030[34] will focus on developing new opportunities for islanders and building sustainable futures for island communities. "*The Programme for Government commits to the production of a long-term plan outlining how Ireland will take advantage of the significant potential of offshore energy on the Atlantic Coast and achieve 5GW capacity in offshore wind by 2030 off Ireland's Eastern and Southern coasts. This plan will position Ireland to become a major contributor to a pan-European renewable energy generation and*

[26] https://energy.ec.europa.eu/system/files/2020-03/se_final_necp_main_en_0.pdf
[27] https://www.oecd.org/cfe/_Sweden.pdf
[28] https://www.energikontorensverige.se/om-oss/
[29] https://www.energiforetagen.se/fardplan-energi/
[30] https://www.sweship.se/wp-content/uploads/2015/08/Klimatf%C3%A4rdplan_Svensk-sjofart_Klimat_web.pdf
[31] https://www.gotland.se/
[32] https://www.gov.ie/en/publication/4c236-our-rural-future-vision-and-policy-context/
[33] https://www.gov.ie/en/publication/02a4d-island-policy-consultation-paper/
[34] https://www.gov.ie/pdf/?file=https://assets.gov.ie/132413/433aebac-f12a-4640-8cac-9faf52e5ea1f.pdf#page=91

transmission system." The focus with the Irish islands when it comes to energy transition is on using the islands as testing sites for the innovative technologies and behavioural change.

Italy

In Italy, the Decree of Ministry of Economic Development of 14 February 2017 defined objectives and incentive methods for renewable energy in the small Italian islands non-interconnected with the electricity grid of the continent. Specifically, it established the minimum development objectives for the production of electricity and thermal energy from renewable sources, and the methods for supporting the investments needed for their realisation. According to several stakeholders, this Decree has been proven very useful for all Italian Islands. On Salina Island for example, a project of 200kW PV has been developed for the association of hoteliers of Salina. Via the Decree this project receives Feed-in Tariffs, which is now, with high energy prices, particularly relevant. Also, for Pantelleria the Decree was effective: the municipality has presented 5 projects on energy efficiency in municipal buildings that have been all financed via the Decree.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- Ministry of the Environment
- Ministry of Defence
- Ministry of Finance
- Swedish Mapping, Cadastral, and Land Registration Authority
- Swedish Energy Agency: Energimyndigheten
- Association of local governments and regions
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

Recommendation 1.3: Guidance and support for the local level in the development and implementation of local energy action plans

In addition to policies and roadmaps, islands need specific guidance and resources from the national and regional government on how they could accelerate the energy transition. Local energy and climate action plans, aligned with regional roadmaps, are needed to specify local energy needs and priorities. The clean energy transition agenda[35] or Sustainable energy and climate action plans[36] can be used as a template.

Most Swedish islands are part of the municipality located on the mainland. As mentioned above, there is a lack of technically skilled personnel on the local level for preparation of the energy plans and projects. The national government should define and implement support schemes to provide advisory services, such as capacity building and/or technical assistance to local and regional governments for the realisation of local energy plans. A starting point can be to discuss the current needs and priorities with the Association of local governments and regions and local stakeholders . Existing education programmes of the Swedish Energy Agency[37] or academic institutions can be consulted to find which support is already being offered.

[35] https://clean-energy-islands.ec.europa.eu/assistance/clean-energy-transition-agenda
[36] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC112986/jrc112986_kj-na-29412-en-n.pdf
[37] https://www.energimyndigheten.se/om-oss/stod-och-bidrag-att-soka-pa-energiomradet/

The Swedish Energy Agency currently provides funding and loans for companies investing in clean energy. The agency offers one to two calls per year for grants.[38] Such funding is made to companies, without focus on regional, local or island stakeholders. We suggest the organization of specific support and awareness raising campaigns that will help local stakeholders and local governments to organise, plan and prepare viable projects for funding. Moreover, the calls should be relatively consistent in the required documentation allowing streamlining of the project preparation. The national or regional governments should collaborate with the Swedish Energy Agency, to include islands energy priorities in the planned national calls or organise a separate call for island projects. In that sense islands can be excellent candidates for multisectoral[39] projects (including energy and water, waste, tourism or social innovation) and for innovation project implementation.

REPowerEU – RES Simplify

The RES Simplify report contains some useful recommendations and examples on guidance

Guidelines for authorities and stakeholders act as a helping hand when it comes to the realisation of renewable projects. They inform and describe the RES-E permitting process and thus increase expertise and knowledge amongst all parties involved. Stakeholders can follow a clear cook-book recipe and have direct access to the standard ingredients (templates for all application documents etc.) they have to use during project permitting.

Spain: Some Autonomous Communities, such as Andalucía and Extremadura, published a guiding document explaining step by step how to install a renewable energy system for self-consumption.

Italy: Good practice by the competent authority to provide project developers with guidance on the application process at the beginning of the authorisation procedures, as for example the 'MUTA portal' of the Lombardy region.

UK: The Scottish Government has published "Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments" which provides guidance on good practice principles for communities, businesses, local authorities and others (Scottish Government 2019).

Support can take the form of workshops for municipalities, guidelines for energy transition and examples of roadmaps from similar municipalities or regions. Where there is not enough capacity on the islands, the taskforce can provide support through technical assistance to engage external support for projects. More technical knowledge of the DSOs and TSOs can also be mobilised to help sustainable development of island regions.

Actors involved:

- **Swedish Energy Agency: Energimyndigheten**
- **Association of local governments and regions**
- **Energikontoren (Energy regional offices)**
- Ministry of Infrastructure, Minister for Energy and Digital Development
- Ministry for Enterprise and Innovation
- Academia
- Local stakeholders (Civil sector, Private sector)

[38] https://www.iea.org/articles/swedish-energy-agency

[39] Stockholm Environment Institute works with islands to develop multifunctional projects and test innovation in Sweden and abroad. One example is Gridless solutions project https://www.sei.org/projects-and-tools/projects/sei-initiative-on-gridless-solutions/

- National/regional stakeholders (trade and industry associations)

Recommendation 1.4: Create framework for local stakeholder engagement in energy projects

Enabling local citizen and stakeholder ownership of energy production is crucial for local acceptance of the energy transition. However, in Sweden there seems to be a lack of awareness among relevant stakeholders, including national policy makers, of the need for decentralisation of the energy system. Therefore, there is a need for awareness raising regarding decentralisation of the energy sector among all levels of the government. Based on the analysis from recommendation 1.1., a dedicated committee of experts can identify the main stakeholders and the strategy for awareness raising campaign.

In order to foster the energy transition on the local level, the national policy should require participation of local stakeholders in energy projects on the islands. The requirement could be implemented through a share of local ownership, or additional financial support for projects that include local stakeholder involvement. Engagement of the local stakeholders including both civil sector, local government and local SMEs can help foster sustainable development as local stakeholders can see their economic benefit in the energy transition and can guide the transition to include their local needs and priorities.

REPowerEU – RES Simplify

The RES Simplify report contains some useful recommendations and examples for early engagement in local information, dissemination, and discussion.

Citizens and other stakeholders' acceptance of projects play a vital role in renewable expansion. The acceptability of projects can be increased with the right participatory approach. On a general level, such activities should inform the public on the relevance of renewable energy in fighting climate change and related threats. With respect to specific projects, participation has to begin with the launch of a project and allow stakeholders to influence its concept rather than just confronting them with final plans and decisions.

France: Even if there is no obligation to consider the opinions of local communities upstream of an onshore wind project, a wind energy company has set up an ethical charter. This charter stipulates for a greater consideration of the local community in order to encourage a transparent and broad communication so that the population can better understand the general framework of the development of a given project. Thanks to this informal impulse, parliamentary discussions should take place to provide for a legal basis to a public consultation in the pre-planning stage.

Ireland: Despite the fact that community engagement is not mandatory for onshore wind projects, the Wind Energy Ireland (WEA), former Irish Wind Energy Association (IWEA), recommends its member to engage in local information and dissemination activities at a very early stage of project development. Project developers organise venues and inform local residents door-to-door on the prospective realisation of an onshore wind energy project. In this way, issues can be resolved at a very early stage and the possibility of an appeal later in the planning permission process can be avoided. It should also be noted that this approach is slowly followed in the deployment of offshore wind projects. Although the legislative framework is not yet in place, project developers have initiated information campaigns for local marine communities. Main aim is to inform the local residents on the offshore wind project and answer questions on the possible effects on marine flora and fauna.

Netherlands: Site selection for offshore wind energy in the Netherlands takes place through an extensive participative process. This participative process is a process which takes years in total to finish and takes into account the opinions of all stakeholders. The industry organisation HollandSolar, together with the relevant stakeholders, has drawn up, a Code of Conduct for ground-mounted PV installations. The PV sector is bound by the agreements contained in this Code.

Portugal: In Portugal it is possible for every stakeholder to participate via a website: PARTICIPA. This portal acts as a digital forum in which NGOs, civil society, associations and virtually anyone can participate and issue opinions about projects placed for public consultation in the country.

Regulatory best practice

Participation of local stakeholders in energy projects

Scotland – Local Energy Scotland developed a 'Community and Renewable Energy Scheme (CARES) Toolkit,' a step-by-step guide for the process of developing a renewable energy project. A specific module of this toolkit deals with 'Shared Ownership', explaining some of the legal structures that exist such as, Owner operator, Commercial developer led, Joint ventures, Shared revenue, Split ownership, etc.

Spain, Balearic Islands – The Balearic Climate change and Energy Transition Law[40], approved in February 2019, requires the public administrations of the Balearic Islands to support participation of citizens, civil society organisations and local renewable energy communities in the deployment and management of renewable energy systems. More precisely, Article 49 of the Law defines that the local participation of at least 20% should be encouraged or obliged for RES projects with less than 5.0 MWp or more than 5 MWp, respectively.

The national government, together with the group of regional energy offices Energikontoren and the Association of local governments and regions should create a platform where local stakeholders from different islands can connect, share ideas, and identify common projects. Such platform can be used for awareness raising, capacity building, exchange of best practices and forms, and providing information on available regional, national and EU level support mechanisms.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Energikontoren (Energy regional offices)**
- Ministry of the Environment
- Ministry of Defence
- Ministry of Finance
- Association of local governments and regions
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

REPowerEU – RES Simplify

The RES Simplify report contains some useful recommendations and examples for financial participation of affected municipalities

Support and acceptance by the local population and administration can be enhanced by ensuring that they benefit economically from new RES plants. This can be achieved by allowing municipalities to financially benefit from projects, e.g. in the form of a payment per kWh from the RES producer. Income should be bound to specific public policy measures that benefits citizens as well, like social services (e.g. kindergarten, health services) or infrastructure (e.g. streets or public transportation).

[40] http://www.caib.es/sites/canviclimatic2/es/llei_de_ccite/

Denmark: Four schemes are currently in place to enhance project acceptance: The so-called "RE-bonus scheme", which obligates the developer to pay neighbours an annual bonus corresponding to a specified part of the capacity of the plant; the "loss of value scheme", which requires the developer to compensate any loss of value to residential property equal to or higher than 1% of the property value; the "option-to-sell scheme", which allows some neighbours within a distance of six times the height of a wind turbine or 200 m from a ground-mounted solar PV plant to sell their property to the project developer; and finally the "green fund scheme", which obligates the developer to pay EUR 11,827 (DKK 88,000) per MW onshore wind equivalents to the relevant municipality, which can use the funds to support e.g. local green initiatives.

Germany: In order to increase the public acceptance for wind parks, an amendment to the Renewable Energy Act (EEG, 2020) was taken in 2020, allowing plant operators to pay municipalities up to EUR 25,000 annually for each wind turbine in their community. With a further revision of the EEG 2021, the option to agree payments with the affected municipality has been extended also for large PV.

Netherlands: The Regional Energy Strategies prescribe a participation grade of 50% with the locals for renewable energy projects. The project developer, together with the environment and the competent authority, draws up a participation plan for each wind project. For ground-mounted PV, similar participation plans are drawn up.

Ireland: The draft Wind Energy Development Guidelines foresee certain project acceptance measures. These provisions have been included in the Irish Renewable Electricity Support Scheme. Firstly, project developers are obliged to engage in consultations with the local community, before applying for planning permission. Secondly, a community report should be prepared and should set out how the project development will affect the local community and how local community participation will be assured throughout the whole lifetime of the project. Thirdly, a "Community Benefit Fund" is established. The Fund will be supported from renewable electricity produced by installations under the national support scheme (auctions) (EUR 2/MWh). Fourthly, Community Ownership is promoted. This is achieved by creating a separate group of projects (the so-called "community-led" projects) that participate in the auctions on the national support scheme. It should be noted that these are fairly new and ambitious measures and it remains to be seen if they are effective.

2. Lack of security of supply on the islands

Quality of supply and stability of the electricity grid is high in Sweden[41]. However, security of supply from the point of view of continuity of supply is comparable or worse than in most European countries (based on System Average Interruption Duration Index and System Average Interruption Frequency Index)[42]. The Swedish national energy system is structured around centralised large-scale power productions.[43] Historically Sweden, Norway and Finland have always had a strong transmission system operator (TSO) where the electricity must be transmitted from the North, where most of the large capacity generation is located, to the South, where most of the demand is. When the consumption increases, the electricity grid simply cannot sustain the supply of power, due to the long distance over which it has to be transported.[44]

Furthermore, a rather limited grid capacity on the Swedish islands not only causes electricity shortages, but also represents a significant constraint to the implementation of new large scale renewable energy projects. The DSOs and TSOs do not have special guidelines for operation on the islands. From the perspective of grid connection, there are two types of islands: those that are connected with through direct current (DC),and those that are connected through alternating current (AC).Gotland is one of the islands connected with a DC cable. It is important to note that power outages on islands with this type of connection are more common and lengthy. For the islands with DC connection to the mainland, there are no clear responsibilities regarding which party should function as a TSO and is responsible for balancing. Additionally, on Gotland, the customers cannot participate in the Swedish balancing markets.

In addition, Sweden, Norway, and Finland have a specific planning of the grid and energy market. The grid is seldom a buyer of flexibility. There is a planning for a "10-year-winter" for the electricity markets and demand flexibility. This means that the demand is planned so that the country can be ready for a 10-year-winter[45] that would require a lot of capacity. Therefore, the rules are made such that back-up capacity is overdesigned: grid capacity use is more constrained to keep available for expected high 10-year-winter demand. Hence, the colder the winter the more there is a need for flexibility of the local grid, if renewable energy is to be used in decentralised manner. This concept and difference in the flexibility market is specific to Sweden. When harmonising with EU legislation, one has to be creative in defining the possible flexibility services that would make sense for the Swedish energy system. In 2015 the Swedish government tasked the Swedish Energy Market Inspectorate to define measures for increasing use of demand side flexibility to improve, among others, efficiency of energy use. The inspectorate defined the measures in the report published in 2016, where main measures included increasing awareness, providing hourly data, and creating a regulatory framework for aggregators[46]. In addition, the recently completed CoordiNet project[47] tested various options for flexibility market and services in the five regions of Sweden, including Gotland. As a result of the project, a new flexibility regulation is currently being prepared.

Even though islands security of supply is usually discussed from the point of view of the interconnections and the need for enforcement of the grid, there are many other options to be considered, including for example island systems, microgrids, storage, demand side management, flexibility services. Moreover, for some islands,

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[41] https://www.ri.se/sites/default/files/2021-11/Power%20Distribution%20SE.pdf
[42] https://cdn.eurelectric.org/media/5089/dso-facts-and-figures-11122020-compressed-2020-030-0721-01-e-h-6BF237D8.pdf
[43] Libertson, F. Competing socio-technical narratives in times of grid capacity challenges: the representative case of Sweden. Energ Sustain Soc 11, 4 (2021). https://doi.org/10.1186/s13705-021-00279-4
44 Ibidem.
[45] Exceptionally cold and long winter
[46] https://ei.se/download/18.5b0e2a2a176843ef8f582/1608542148119/Measures-to-increase-demand-side-flexibility-in-the-Swedish-electricity-system-Ei-R2017-10.pdf
[47] https://coordinet-project.eu/projects/coordinet

either because of their topology or low population growth, it is very costly to upgrade the grid and it would be more suitable to apply local solutions. DSOs are currently not incentivised to use any other solution but to implement more connections, as their revenue is mainly based on the expansion of the grid.

Responsibilities of Distribution System Operators (DSOs) on the islands

Distribution system operator (DSO) is defined in the Electricity Directive as a "natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity". DSOs are fully regulated, allowed revenue is determined by national authorities, and unbundled companies, supply and generation, should be legally separated from the distribution. However, in cases where the DSO has less than 100 000 customers or the system is isolated[48], the no full legal unbundling is obligatory[49]. This can be the case for many DSOs on the islands.

Traditionally DSOs have roles of: system operators, to secure a reliable flow of electricity through their network to their customers; information providers, to assure efficient access for its users; and neutral market facilitators, providing non-discriminatory access to their network for other system users (electricity generators, service providers etc.).[50]

Based on the recast of the Electricity Directive (2019/944/EC) within the Clean Energy Package, the scope of activities that **can be handled** by DSOs has been extended to: managing smart metering and data; unlocking flexibility, and procuring flexibility services on a market-based approach. In addition, **under certain conditions** national authorities may allow DSOs to have the following responsibilities: plan and connect EV charging infrastructure[51], which includes the recharging points for EVs and integrate local storage facilities[52], own, develop, manage, and operate storage facilities.

Here we provide what are the responsibilities of DSOs operating on the islands in a few Member State examples.

Portugal
The Portuguese islands archipelago Azores is considered an isolated system. Therefore, the electricity grid is operated by the vertically integrated company, Electricidade dos Açores (EDA). EDA is responsible for generation, transmission, distribution, and the electricity market on Azores islands.

Spain
Energy systems on the Spanish islands, Canary islands and Balearic islands, are the responsibility of Red Electrica de España, a partly state-owned and public limited Spanish corporation which owns and operates the national electricity transmission grid in Spain. In addition, Red Eléctirca is the system operator in Non-Peninsular Territories. Although the market is liberalised (with Law 54/1997), Endesa is the only company responsible for thermal generation and distribution of electricity on the islands. Endesa is also one of the main suppliers of electricity in Spain as well as on the islands. It used to be state owned company, today it is a private company with majority ownership by the Italian Enel.

Ireland
ESB Networks is the distribution system operator in Ireland. ESB Networks is state owned. ESB Networks is also responsible for the Irish islands. Irish islands are part of the wholesale, Single Electricity Market (SEM) that is run by Single Electricity Market Operator (SEMO). SEMO is a joint venture between the transmission system operators in both jurisdictions – EirGrid and System Operator Northern Ireland (Soni). ESB is responsible for the electricity network

[48] Art. 35 of the Electricity Directive 2019/944/EC https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944
[49] https://cdn.eurelectric.org/media/5089/dso-facts-and-figures-11122020-compressed-2020-030-0721-01-e-h-6BF237D8.pdf
[50] https://cdn.eurelectric.org/media/5089/dso-facts-and-figures-11122020-compressed-2020-030-0721-01-e-h-6BF237D8.pdf
[51] Art. 33 of the Electricity Directive 2019/944/EC https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944
[52] Art. 36 of the Electricity Directive 2019/944/EC https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944

from 110 kV and lower. For Ireland it is specific that the network length per capita is four times the European average and overhead lines outnumber underground cables with the ratio 6 : 1.[53]

Italy
Electricity network infrastructure including transmission and distribution is 94 % owned by Terna. Terna is a 29.9 % state owned company. The rest of the distribution system (6 %) is public and owned by the local distribution system operators.[54] Italy had 128 distribution network operators who are responsible for specific areas based on the concession rights. Italian islands defer based on their size, with 30 considered small islands, and between interconnected (9) and non-interconnected (21) small islands. For small islands with less than 100 000 consumers, the local electricity company is not fully legally unbundled but is required to be functionally unbundled for different activities (generation, distribution, supply), in line with the EU directive and National Law no 124 from 4 August 2017. In regard to 21 non-interconnected island systems, they are not integrated in the wholesale market. The Italian regulatory energy agency (ARERA) has suggested a hybrid system for these islands to assure there is no regulated price, but also that these small systems are not part of the wholesale market creating distortions[55].

Croatia
Croatia, similar to Ireland, Croatia has no specific policy for the islands in comparison to the mainland when it comes to the electricity grid. Croatia has one DSO, named HEP-Operator Distributcijskog Sistema (ODS) whose roles and responsibilities extend to the Croatian islands. HEP-ODS is publicly owned company unbundled from the previously vertically integrated electricity company HEP. HEP-ODS is a state owned company.

Greece
Greek islands are characterised by 29 non-interconnected electricity systems. Greece has one DSO, Hellenic Electricity Distribution Network Operator (HEDNO), responsible for operation, maintenance, and development of the electricity distribution network. HEDNO has two responsibilities[56]: distribution network operator for the whole territory of Greece, and system and market operator for the non-interconnected islands (NII).[57] Therefore, on Greek non-interconnected islands HEDNO is responsible for the management of the production, market operation and the management of systems of these islands. HEDNO is a 51% state owned company.

Recommendation 2.1: Develop long-term grid planning to prepare for island energy transition

A particular feature of the Swedish market is the centralised nature of the grid and the resulting grid constraints. As a result, small municipalities and islands are the ones faced with the congestion problems. There is a need for a more decentralised system.[58] To tackle outages, overhead lines in local grids are, for example, being replaced by underground cables so that the grid will be able to better withstand an increasing number of storms.[59] The challenges of the electricity grids on the islands need to be further analysed by the committee described in the recommendation 1.1.

As part of the long-term planning, the focus on grid planning should shift from the perspective of the electricity demand driven, to a broader approach planning for smart and flexible island systems. A clear, overarching political vision for grid regulation is required if the electrical grid is to be a

[53] https://www.esbnetworks.ie/who-we-are/our-networks

[54] https://cms.law/en/int/expert-guides/cms-expert-guide-to-electricity/italy
[55] https://www.arera.it/it/docs/19/322-19.htm
[56] https://deddie.gr/en/deddie/i-etaireia/ruthmistiko-plaisio/
[57] Non-interconnected islands are considered those whose electricity distribution network is not connected to the mainland transmission or distribution network.
[58] Libertson, F. Competing socio-technical narratives in times of grid capacity challenges: the representative case of Sweden. Energ Sustain Soc 11, 4 (2021). https://doi.org/10.1186/s13705-021-00279-4.
[59] https://www.iva.se/globalassets/info-trycksaker/vagval-el/vagvalel-swedens-future-electrical-grid.pdf

facilitator for development of the whole system.[60] There is a role for the national government as well as the national regulator to develop a tariff methodology that effectively incentivises network operators to take a forward-looking approach. New tariffs can make it more interesting for DSOs to invest in alternative grid solutions as opposed to simply grid expansion. That way the focus can also be placed on smaller local municipalities, and islands that may not have many inhabitants but need access to storage and flexibility services. New methodologies should consider long-term planning and be predictable, since a change of direction every four years makes it difficult for network operators to invest in long-term projects.

Moreover, energy communities in Sweden are allowed to own and operate microgrids without having to obtain the grid operators permission. This makes it much easier for energy communities to share energy. A move towards communities can help remove some of the grid constraints and risks of congestion (see also the recommendations under barrier 4).

REPowerEU – RE, grids and storage regarded as 'overriding public interest'

Article 1(10) of the proposed amendment to RED II inserts a new Article 16d to ensure that plants for the production of energy from renewable sources, their connection to the grid, the related grid itself or storage assets are presumed to be of overriding public interest for specific purposes.

Renewable energy sources are crucial to fight climate change, reduce energy prices, decrease the Union's dependence on fossil fuels and ensure the Union's security of supply. For the purposes of the relevant Union environmental legislation, in the necessary case-by-case assessments to ascertain whether a plant for the production of energy from renewable sources, its connection to the grid, the related grid itself or storage assets is of overriding public interest in a particular case, Member States should presume these plants and their related infrastructure as being of overriding public interest and serving public health and safety, except where there is clear evidence that these projects have major adverse effects on the environment which cannot be mitigated or compensated. Considering such plants as being of overriding public interest and serving public health and safety would allow such projects to benefit from a simplified assessment.

Member States should implement long-term grid planning and investment consistent with the planned expansion of renewable energy production capacities, taking into account future demand and the objective of climate neutrality.

Member States should establish simplified procedures for repowering existing renewable energy plants, including streamlined procedures for environmental assessments, and adopt a simple-notification procedure for their grid connections where no significant negative environmental or social impact is expected.

Member States should ensure that system operators (i) apply a transparent and digital procedure for grid connection applications; (ii) provide information on grid capacities; and (iii) optimise the use of grid capacity by allowing its use by power plants combining multiple complementary technologies

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Swedish Energy Agency: Energimyndigheten**
- **TSO**
- **DSOs/DNOs**
- Swedish Energy Markets Inspectorate (Ei)
- Regional system operators
- Svenska Kraftnat, TSO

[60] https://www.iva.se/globalassets/info-trycksaker/vagval-el/vagvalel-swedens-future-electrical-grid.pdf

Recommendation 2.2: Support the use of demand-response, flexibility services and microgrids on the islands

Next to long-term planning, regulation should support stakeholders investing in grid-supporting storage, flexibility and smart grids in municipalities and islands. As mentioned in the recommendation above, new tariff methodologies should be designed to stimulate flexibility solutions that benefit both the prosumer and the network owner. Sweden was part of the EU project CoordiNET[61] which finalized in 2022. As a part of the project, Swedish pilots established flexibility markets aimed at reducing grid constraints and improving and innovating on the coordination between TSO and DSOs.[62] The CoordiNET pilot in Gotland has used a SWITCH platform for peer-to-peer trading between producers and consumers in cases of grid maintenance causing limitations and curtailment by renewable power production. As a result of this project, the Swedish government is preparing a regulatory framework for flexibility market and services.

Successful pilot programs by the Swedish Energy Agency can also be a benefit to islands. Aside from Gotland, a pilot microgrid has been operating on the Arholma[63] island. Using these examples, tailored pilots can be implemented on islands in line with the local or regional energy and climate plans. Results from pilots can serve as an example for further investments in the Swedish mainland. Through the pilots, coordination among TSO, DNOs and DSOs can be improved, which can help islands to become more self-sufficient if needed. Moreover, the pilots can be used to increase the know-how of local DSOs. Knowledge exchange and lessons learned from different pilots should be supported.

Concerning storage, electricity grid companies may own energy storage, but this right is limited to the use for the purpose of covering grid losses or temporarily replace lost electricity connection in case of power cuts.[64] Legislative changes to the Swedish Energy Storage Act are proposed in order to make storage more attractive for grid companies.[65] To cope with the insufficient grid capacity, battery storage is of critical importance. The national government should therefore prioritise legislation on energy storage and communicate clearly what the rules are, so that grid operators and market participants are pushed to move towards storage solutions.

While this is needed for the whole country, an (island specific) support system for storage would help overcome the barrier of insufficient grid capacity on the islands and provide an alternative solution. Batteries as a form of short-term storage have advantages over pumped storage in terms of modularity, land use, efficiency, and cost. However, pumped hydro can serve as a better seasonal storage. National policies can have a strong positive influence on the attractiveness of electricity storage.

Additionally, regulatory sandboxes are ways for authorities and regulators, tasked with implementation and enforcing of specific legislation, to test innovative approaches and technologies in real-life situations through time limited implementation of an exception to the existing legislation

[61] https://nordicelforum.org/wordpress/wp-content/uploads/2019/12/3C-D-NordEnergi-flexprojekt-NEMF-slut.pdf
[62] https://coordinet-project.eu/pilots/sweden
[63] https://www.vattenfalleldistribution.se/var-verksamhet/innovation/arholma/
[64] https://www.iva.se/globalassets/info-trycksaker/vagval-el/vagvalel-swedens-future-electrical-grid.pdf
[65] https://www.iva.se/globalassets/info-trycksaker/vagval-el/vagval-el-lagring.pdf

and regulation.[66] Sweden is already developing regulatory sandbox programmes.[67] We recommend to include the possibility for DSOs to experiment with different designs of electricity tariffs (hourly tariff, time of use tariff, etc.). More specifically, we recommend that the local island municipalities serve as demarcated pilots. This way incentives for clean energy transition on the islands can be tested without a permanent change in the enabling framework. It also gives room to evaluate the success of the experiment. Successful experiments can facilitate a change in legislation to help islands and small local municipalities to become more self-sufficient.

REPowerEU

Innovation and sandboxing

Article 1(3) of the proposed amendments to RED II inserts a new paragraph 2a in Article 15 requiring the Member States to promote the testing of new renewable energy technologies while applying appropriate safeguards:

> '*Member States shall promote the testing of new renewable energy technologies* ***in pilot projects in a real-world environment****, for a limited period of time, in accordance with the applicable EU legislation and accompanied by appropriate safeguards to ensure the secure operation of the electricity system and avoid disproportionate impacts on the functioning of the internal market, under the supervision of a competent authority.*'

Consideration 18 of the Recommendation highlights that barriers resulting from permit procedures might also affect the future deployment of innovative decarbonisation technologies needed for climate neutrality. Setting up regulatory sandboxes, which is to say the testing, in a real-life environment, of innovative technologies, products, services or approaches, which are not fully compliant with the existing legal and regulatory framework, could support innovation and facilitate the subsequent adaptation of the regulatory environment to accommodate them.

Member States are encouraged to put in place **regulatory sandboxes** to grant targeted exemptions from the national, regional, or local legislative or regulatory framework for innovative technologies, products, services, or approaches, to facilitate permit granting in support of the deployment and system integration of renewable energy, storage, and other decarbonisation technologies, in line with Union legislation.

Regulatory best practice

Frameworks for storage

Few countries currently provide a comprehensive regulatory framework for energy storage, with the majority of jurisdictions currently allowing storage to be defined as "generation" for the purposes of licensing and other regulatory requirements. However, some countries like the UK, Belgium and Ukraine have provided a more elaborate framework, mainly regarding revenue streams to help different storage technologies to develop, for example capacity markets, ancillary services, and other grid services.

Belgium has changed its Electricity law to have a specific definition of storage[68]: 'Energy Storage' means, in the electricity system, the postponement of the final use of electricity until a time later than that at which the electricity was generated, or the conversion of electrical energy into a form of energy that can be stored, the storage of such energy, and the subsequent conversion of such energy into electrical energy or another energy. While 'electricity' storage' means energy storage where electricity is taken from the grid via the same installation in order to be fully injected back into the grid later on, taking into account efficiency losses. Noteworthy is that the Electricity Law does not assimilate electricity storage to electricity generation, and consequently a generation licence is not required.

[66] https://www.consilium.europa.eu/en/press/press-releases/2020/11/16/regulatory-sandboxes-and-experimentation-clauses-as-tools-for-better-regulation-council-adopts-conclusions/

[67] https://www.iea-isgan.org/wp-content/uploads/2019/05/ISGAN_Casebook-on-Regulatory-Sandbox-A2-1.pdf

[68] Article 2.62 and 2.6 of the Electricity Act

Regarding revenue streams a Capacity Remuneration Mechanism (CRM) was recently introduced in Belgium by the country's Transmission System Operator. Beginning of October 2021, the first CRM auction was organised to select capacity offers for delivery period 2025-2026: a (priced) demand curve was set by Royal Decree, and prequalified capacity holders were able to submit bids to the market (for existing or new capacity). Some Battery Energy Storage Systems participated in the auction. Also, Ancillary services to maintain frequency and voltage at appropriate levels exist in Belgium and Battery Energy Storage Systems can participate in them.

In the United Kingdom, there are at least six markets that batteries can operate in, covering wholesale, balancing, ancillary services, time-of-use, stabilisation, and infrastructure. National Grid issues contracts for short-term generating capacity to cover sudden failures at power stations and other significant network issues. These typically cover events lasting a few seconds or minutes in duration. As a result of these characteristics, the differing services are typically available to different classes of generators (or demand reduction technologies), each having different technical and regulatory requirements. Some of these include: Short Term Operating Reserve (STOR), Demand Management (DM), Fast Reserve and Frequency Response. Energy storage is particularly suitable for both Fast Reserve and Frequency Response since both of these services require the rapid (second-by second) provision of reliable power which energy storage technologies are ideally placed to deliver.

The UK Government provides for funding to install new renewable energy storage technologies in the country under the Longer Duration Energy Storage Demonstration (LODES) competition[69]. As part of this initiative, the government has awarded £6.7m ($9m) to 24 projects across the country under the LODES competition, which is worth £68m ($91m) of capital funding in total.

An example of a recently developed legal framework specifically for storage can be found in Ukraine; law No. 5436-d "On the Amendment of Certain Laws of Ukraine Regarding the Development of Energy Storage Facilities" was adopted in February 2022[70]. The Law introduces (Energy Storage Facilities) ESF operators as the new participants in the electricity market. Individuals and legal entities (except for pumped hydro power plants) can become ESF operators and use ESF to sell electricity and/or provide balancing or ancillary services with the use of ESF. Energy storage activity is generally subject to licensing, but some exceptions are foreseen. The Law does not establish any special incentives in relation to ESF, which would thus have to operate in the merchant market.

Until recently, few countries had a specific support system for storage. Some countries, like the exemplary list below, provide support for (residential/small-scale) storage either as 'stand-alone' or combined with PV.

- Since 2019 Flanders (Belgium) grants rebates (premium) for the purchase of domestic batteries to encourage solar power self-consumption[71]. The Flemish government has extended the premium until 2024 and released additional budgets. The rates are as follows: 0-4kWh: 225€/kWh, 4-6kWh: 187.5€/kWh, 6-9kWh: 150€/kWh, Above 9kWh: no additional premium. Maximum premium per battery: 1725€, max 40% of invoice incl. VAT.
- In Germany, the KfW funding for renewable energies (Program 270) has been very successful. It is a low-interest promotional loan for (among others) the construction, expansion, and acquisition of systems for the use of renewable energies, such as battery storage and photovoltaic systems. With the KfW 270 development loan, you finance up to 100 percent of the investment costs for an electricity storage system or the acquisition costs of a photovoltaic system in general.
- In Malta, a subsidy is given for an installation of new PV system with an inverter and battery storage facilities[72]. It covers 80% of eligible costs of the Battery Storage up to a maximum of €3,600 per system and €600/kWh.
- In the Azores region of Portugal, a specific subsidy for projects on production and storage of electricity from renewable resources covers 25% percent of the eligible costs, up to a maximum of EUR 4,000 per establishment[73].
- In Ireland, the Solar PV scheme provides subsidies for the purchase and installation for roof-mounted PV (up to 2kWp and with battery storage up to 4 kWp). The 2kWp of PV systems are subsidised (EUR 900 per kWp). If

[69] https://www.gov.uk/government/collections/longer-duration-energy-storage-demonstration-lodes-competition
[70] For a good summary: https://ceelegalmatters.com/ukraine/19309-the-regulatory-framework-for-energy-storage-in-ukraine-has-been-expanded
[71] Decision of the Flemish Government of 28 June 2019
[72] Promotion of Renewable Energy Sources in the Domestic Sector – Grant Scheme 2021/RES; https://www.rews.org.mt/#/en/sdgr/463-2021-renewable-energy-sources-scheme
[73] PROENERGIA. DLR 14/2019/A & Ordinance 73/2019

the roof-mounted PV is combined with battery storage, then an additional grant for further 2kWp is offered (EUR 300 per kWp). Consequently, the maximum level of support reaches EUR 2,400 (Ch. 2 Solar PV Scheme).

- Austria has launched a rebate program for solar-plus-storage installations offering homeowners 250€/kW of solar rooftop generation capacity and €200/kWh of storage.
- In Italy rebates exist for two different kind of projects – installations of PV systems linked to storage systems, and the deployment of standalone storage systems linked to existing solar arrays. For this second category of rebates will cover 100% of project costs.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Swedish Energy Agency: Energimyndigheten**
- Swedish Energy Markets Inspectorate (Ei)
- DSOs,
- Regional system operators (DNOs)
- TSO

Recommendation 2.3: Channel funding from the EU towards regional and local (grid) development

Funding from the EU should be used to stimulate DSOs towards grid expansion to invest in research and investment in a more decentralised system. The national government should pay particular attention to the island regions when developing plans allocating EU funding.

The Just Transition Fund prioritises the least developed regions, outermost territories, and islands of the EU. For example, the Greek government provides financial support to six Greek islands through the Just Transition Fund in order to tackle issues expected following the planned withdrawals of local petrol-fuelled power stations[74]. Sweden could envisage in its implementation of the Just Transition to channel funding towards local grid development and decentralisation (support to regional energy agencies), in particular islands with a DC connection that suffer most from long power outages.

For example, the Trans-European Networks for Energy (TEN-E)[75] include large scale projects, though attention should be given to how they benefit islands in the energy transition process. Every 2 years, the European Commission draws up a new list of projects of common interest (PCIs). More information on the benefits of PCI can be found here. PCIs have the right to apply for funding from the Connecting Europe Facility (CEF), which has for the period 2021-2027 a budget of 25 billion with 5.8 billion for energy.

We recommend that the national government, through the committee of experts from recommendation 1.1, collects feedback on the local needs and priorities and re-evaluates the funding planning to include the islands' sustainable transition. The stakeholder engagements under recommendation 1.4, can serve as useful input for such an re-evaluation. The committee can produce a report on the different needs, depending on regional and local priorities.

[74] https://energypress.eu/jtf-support-for-6-islands-closing-high-cost-polluting-local-power-units/
[75] https://energy.ec.europa.eu/topics/infrastructure/trans-european-networks-energy_en

Regulatory best practice

Island specific policies

Spain

Spain has a dedicated budget for clean energy development on islands under the Recovery and Resilience Facility. The Spanish NECP already provided for the need for progress in the energy transition on the islands. Within this axis of ecological transition, the Spanish Recovery and Resilience plan, in its Component 7 "Deployment and integration of renewable energies", includes in line with the provisions of the NECP, a vision of island specificity in the energy transition and the promotion of renewable energies in the islands, the improvement of the functioning of their energy systems through storage and the implementation of "Smart Islands" projects, as well as citizen participation through renewable energy communities. There is even a chapter called 'Sustainable energy on the islands through the promotion of an Agenda for Energy Transition in the Islands, support for projects for the penetration and integration of renewable energies in island and non-mainland systems". The allocated budget amounts to 700 million Euro with one third of the funds going to the Balearic Islands and two thirds to the Canary Islands, given their larger population and the fact that they do not have systems connected to the mainland.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Ministry of Finance**
- Swedish Energy Agency: Energimyndigheten
- Local and regional governments
- Local stakeholders, private and civil sector
- Academia

3. Lengthy approval procedures for clean energy projects

Clean energy projects are facing complex and lengthy authorisation and permitting procedures, especially the wind energy projects, as detailed in Annex 3. The projects' applications have to go through several consultative bodies and be accepted by the municipality before project realisation. Consequently, the total permitting procedure for wind farms may exceed 10 years. As a result, even though many islanders, including Gotlanders, are willing to increase wind power production, few wind farms are being constructed.

Furthermore, the permitting process is particularly long in case of new grid infrastructure projects. The length of these procedures (which are also lengthy for regular expansion of the grid) is one of the reasons many investors prefer mainland locations above the islands in Sweden.

Moreover, island territories and their surrounding areas are often covered by the environmental restrictions through spatial plans. In these regions it is some cases not allowed to install RES plants, even on rooftops on the whole island.

Another factor contributing to the lengthy procedures are the conflicts of interest in permitting procedures between wind power developers, the Swedish Armed Forces, municipalities, and environmental protection groups. National interests are focused on environmental protection of certain lands and water areas.[76] Plans for clean energy transition must therefore be assessed taking into account this national interest, and effects and impact of climate change.

Recommendation 3.1: Seek compromises between sectors and support research and innovation

In order to address the lengthy procedures and the conflicts of interest we recommend that the different institutions involved in spatial planning, such as the Swedish Armed Forces, the Ministry of Infrastructure, Department for Energy and Digital Development, the Ministry of the Environment and the Ministry for Enterprise and Innovation, and their underlying agencies, propose new legislation for permitting and authorisations procedures. The Swedish building code and the Swedish environmental codes should be updated to include energy transition and climate change considerations in the procedures. Such legislative change requires negotiations between the different ministries and cooperation between the respective agencies.

Regulatory best practice

UK

Experience from the United Kingdom – with the Offshore Wind Sector Deal in March 2019 and the cooperation between the wind sector and the military that followed - has shown that it is possible to adapt military training areas in order to find an adequate balance between energy, climate, and air protection issues. In addition, the wind energy sector has developed a technical solution for dynamic beaconing of wind turbines in military training areas in order to reduce the night-time visual impact on local residents.

Concerning the municipalities and the environmental protection interests, negotiations between different sector bodies could focus on support given to research and innovation for clean energy adapted to smaller municipalities and islands. EU funding such as presented in recommendation 2.3, can be redirected to research & innovation on clean energy transition on islands. This also falls

[76] https://www.naturvardsverket.se/amnesomraden/skyddad-natur/olika-former-av-naturskydd/omraden-av-riksintresse/

in line with the focus of environmentally driven business development in energy issues, as stipulated in the National Strategy for Sustainable Regional Growth and Attractiveness 2015-2020.[77]

Engaging municipalities who have the power to approve and reject wind projects is key. For this reason, the engagement of local stakeholders (cfr. recommendation 1.3) could also help to influence municipalities to see the different interests in prioritising clean energy. The platform could also be used to explore priorities and potential other solutions that match needs and priorities on Swedish islands, including smaller, multi-functional and community co-owned projects. Finally, ministries can use these negotiations to reassess the national interests. With increasing attention and need for prioritising clean energy, energy and climate should become a factor of national interests (Riksintresse).

Actors involved:

- **Ministry of Defence, Swedish Armed Forces**
- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Ministry of Environment**
- Ministry for Enterprise and Innovation
- Swedish Energy Agency: Energimyndigheten
- Swedish Environmental Protection Agency
- Swedish Agency for Marine and Water Management
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

Recommendation 3.2: Develop national spatial planning guidelines

As mentioned above the clean energy transition on the islands should be supported instead of obstructed by spatial planning constraints. In Sweden, there are initiatives to draw up spatial planning supported by a variety of stakeholders. At the national level, the Ministry for Enterprise and Innovation is responsible for the Swedish Building and Planning Act and collaborates with the National Board of Housing, Building and Planning.[78] Stockholm is the only county however, to have regional land-use plans.[79] The Swedish national strategy for sustainable regional growth and attractiveness 2015-2020 addresses the need for local municipalities to work together with regional and national actors.[80] Municipalities are responsible for their own spatial planning, within the framework set out at the national level.[81] Since islands are typically part of mainland municipalities, it is important that the islands energy situation and priorities are taken into account within municipal spatial plans.

Therefore, there is a need for guidelines from the national level, for the integration of clean energy projects in the spatial planning at the municipal level, that take into account islands. The goal of the

[77] https://www.government.se/contentassets/ad5c71e83be543f59348b54652a0aa4e/swedens-national-strategy-for-sustainable-regional-growth-and-attractiveness-20152020---short-version.pdf
[78] https://archive.nordregio.se/Metameny/About-Nordregio/Nordic-working-groups/nwgcityregions/The-spatial-planning-systems-in-the-Nordic-region/index.html
[79] https://www.oecd.org/regional/regional-policy/land-use-Sweden.pdf
[80] https://www.government.se/contentassets/ad5c71e83be543f59348b54652a0aa4e/swedens-national-strategy-for-sustainable-regional-growth-and-attractiveness-20152020---short-version.pdf
[81] https://www.boverket.se/en/start/building-in-sweden/developer/planning-process/

guidelines is to facilitate municipalities to develop their spatial plans. The Ministry for Enterprise and Innovation in collaboration with the committee of experts (recommendation 1.1) could be mandated to propose these guidelines.

The guidelines should detail how to plan clean energy projects with regard to land use priorities, and the national environmental protection interests. Such guidelines have to take into account the characteristics of islands and small municipalities, and seek compromises between nature conservation, military activities, preservation of historical sites, tourism, industry, and sustainable and clean energy. The existing regional plans for the Stockholm county, including the archipelago, can serve as an example. The use of the guidelines would help assure that the approval process is not additionally complicated or delayed during the process of adoption of local plans.

Actors involved:

- **Ministry for Enterprise and Innovation**
- Swedish Mapping, Cadastral, and Land Registration Authority
- Swedish Energy Agency: Energimyndigheten
- Swedish Environmental Protection Agency
- Swedish Agency for Marine and Water Management
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

Recommendation 3.3: Adopt Master plan to define go-to areas and simplify procedures

As mentioned above, the lengthy permitting process is one of the reasons why investors prefer mainland locations to the islands in Sweden. Integration of spatial planning and sectoral strategies is fundamental in identifying and accessing suitable land for renewable energy projects but is not a common practice. In light of the land-use conflicts mentioned above, we recommend developing an integrated approach via the creation of a detailed regional Master Plan (including islands) that leads to approval of the preferred areas or sites for clean energy development. This Master Plan should define go-to areas specifically for one or more renewable energy sources. Consequently, projects in these zones should be subjected to fast-track and simplified permitting procedures and lightened environmental impact assessments, not undermining the need for nature conservation. The regional Master Plan should be taken into account when preparing/updating the Municipal Master Plans.[82] A similar approach is already seen with the National wind energy strategy[83]. However, the go-to areas are yet to be defined.

Designating go-to areas and simplifying procedures will help to remove the obstacle. The aim is to make it attractive for investors to exploit locations on islands and serve as push for DSOs to expand grid. In 2013, the Swedish Government directed a committee to investigate and write a report on regional spatial planning, including coordination at the regional and local level.[84] This report can serve as a basis for designing simplified permitting procedures and go-to areas.

[82] https://www.boverket.se/sv/samhallsplanering/sa-planeras-sverige/kommunal-planering/ and https://www.boverket.se/sv/samhallsplanering/sa-planeras-sverige/planeringsfragor/vindkraft/

[83] https://www.energimyndigheten.se/nyhetsarkiv/2021/nationell-strategi-for-en-hallbar-vindkraftsutbyggnad/

[84] https://archive.nordregio.se/Metameny/About-Nordregio/Nordic-working-groups/nwgcityregions/The-spatial-planning-systems-in-the-Nordic-region/index.html

The expert committee (recommendation 1.1) in collaboration with the Ministry of Defence, the Ministry of Infrastructure, Department for Energy and Digital Development, and the Ministry for Enterprise and Innovation or their respective agencies, should take the lead in setting up a masterplan which suits the national needs. Local and national stakeholders can consult the plans for the relevant islands and regions. Authorities such as the Swedish Mapping, Cadastral, and Land Registration Authority, the Swedish Energy Agency, and the Swedish Environmental Protection Agency should assess the plans in accordance with their expertise.

REPowerEU – Renewable go-to areas

Article 1(1) adds a new definition to Article 2 of Directive (EU) 2018/2001, to define 'renewables go-to area'. Which means *a specific location, whether on land or sea, which has been designated by a Member State as particularly suitable for the installation of plants for the production of energy from renewable sources, other than biomass combustion plants*. Article 1(4) inserts a new Article 15b on the obligation for Member States to identify the land and sea areas necessary for the installation of plants for the production of energy from renewable sources in order to meet their national contributions towards the 2030 renewable energy target. Article 1(5) inserts a new Article 15c on the obligation for Member States to adopt a plan or plans designating 'renewables go-to areas', which are particularly suitable areas for the installation of production of energy from renewable sources.

> A faster roll-out of renewable energy projects could be supported by strategic planning carried out by Member States. Member States should identify the land and sea areas necessary for the installation of plants for the production of energy from renewable sources in order to meet their national contributions towards the revised 2030 renewable energy target set out in Article 3(1) of Directive (EU) 2018/2001. The identification of the required land and sea areas should take into consideration the availability of the renewable energy resources and the potential offered by the different land and sea areas for renewable energy production of the different technologies, the projected energy demand overall and in the different regions of the Member State, and the availability of relevant grid infrastructure, storage and other flexibility tools bearing in mind the capacity needed to cater for the increasing amount of renewable energy.
>
> Member States should designate as renewables go-to areas those areas that are particularly suitable to develop renewable energy projects, differentiating between technologies, and where the deployment of the specific type of renewable energy sources is not expected to have a significant environmental impact. In the designation of renewables go-to areas, Member States should avoid protected areas to the extent possible and consider restoration plans. Member States may designate renewable go-to areas specific for one or more types of renewable energy plants and should indicate the type or types of renewable energy that are suitable to be produced in each renewable go-to area.

A possible simplification can be to explore options for a single permit, for instance for any clean energy project on the islands or for a specific size and type of the project which is considered priority in strategic documents.

REPowerEU – accelerated procedures.

As explained above, the proposed amendment to the renewable energy directive foresees in the identification of go-to zones.

> In the designated renewables go-to areas, renewable energy projects that comply with the rules and measures identified in the plan or plans prepared by Member States, should benefit from a presumption of not having significant effects on the environment. Therefore, there should be an exemption from the need to carry out a specific environmental impact assessment at project level in the sense of Directive 2011/92/EU of the European Parliament and of the Council[85].

[85] Directive 2011/92/EU of the European parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

The designation of renewables go-to areas should allow renewable energy plants, their grid connection as well as co-located energy storage facilities located in these areas to benefit from predictability and streamlined administrative procedures. In particular, projects located in renewable go-to areas should benefit from accelerated administrative procedures, including a tacit agreement in case of a lack of response by the competent authority on an administrative step by the established deadline, unless the specific project is subject to an environmental impact assessment. These projects should also benefit from clearly delimited deadlines and legal certainty as regards the expected outcome of the procedure. Following the application for projects in a renewables go-to area, Member States should carry out a fast screening of such applications with the aim to identify if any of such projects is highly likely to give rise to significant unforeseen adverse effects in view of the environmental sensitivity of the geographic area where they are located that were not identified during the environmental assessment of the plan or plans designating renewables go-to areas carried out in accordance with Directive 2001/42/EC. All projects located in renewables go-to areas should be deemed approved at the end of such screening process.

Article 1(6) of the proposed amendment replaces Articles 16 of Directive (EU) 2018/2001, extending the scope of the permit-granting process, clarifying the start of the permit-granting process, and asking for the most expeditious administrative and judicial procedures available for appeals in the context of an application for a renewable energy project. Article 1(7) inserts a new Article16a, which regulates the permit-granting process in renewables go-to areas. Member States shall ensure that the permit-granting process referred to in Article 16(1) shall not exceed one year for projects in renewables go-to areas. The permit-granting process for the repowering of plants and for new installations with an electrical capacity of less than 150 kW, co-located energy storage facilities as well as their grid connection, located in renewables go-to areas shall not exceed six months. Article 1(8) inserts a new Article 16b, which regulates the permit-granting process outside renewables go-to areas. Member States shall ensure that the permit-granting process referred to in Article 16(1) shall not exceed two years, for projects outside renewables go-to areas. Article 1(9) inserts a new Article 16c, which regulates the permit-granting process for the installation of solar energy equipment in artificial structures.

Member States should establish timeframes and lay down specific procedural rules with a view to ensuring the efficiency of the legal proceedings related to access to justice for renewable energy projects.

Member States should create a single unified application process for the entire administrative permit application and granting process. Simultaneous applications should be prioritised over sequential applications if different authorisations are required, including for related grid projects.

Member States should introduce fully digital permit-granting procedures and e-communication to substitute the use of paper. Relevant information should be made available to project developers centrally as part of an online manual of procedures, including templates for applications, environmental studies, and data, as well as information on options for public participation and administrative charges.

In line with REPower EU national government should ensure that local and regional bodies involved in authorisation process have adequate capacities to respond to the needs for an accelerated energy transition. As part of this reinforcement, regional energy agencies should also be supported.

REPowerEU – Sufficient and adequate staffing

The recommendation on permitting stipulates that Member States should ensure sufficient and adequate staffing, with relevant skills and qualifications, for their permit-granting bodies and environmental assessment authorities. Member States should use the Union and national funding opportunities available for upskilling and reskilling, in particular at regional and local level, and consider setting up an Alliance for sectoral cooperation on skills to bridge the skills gap of staff working on permit-granting procedures and on environmental assessments.

Actors involved:

- **Ministry of defence, Swedish Armed Forces**
- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Ministry for Enterprise and Innovation**

- Swedish Energy Agency: Energimyndigheten
- Swedish Mapping, Cadastral, and Land Registration Authority
- Swedish Environmental Protection Agency
- Swedish Agency for Marine and Water Management
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

4. Lack of clear regulation for energy communities and energy sharing

In Sweden hydro and nuclear power are the main sources for energy. These technologies are often owned by a few national or multinational companies. Development of energy communities has therefore been relatively slow. Even though the lack of a legal framework is not facilitating the development of energy communities in the Member State, there is a lot of interest in this concept on the islands. For example, inhabitants of Gotland, expressed their interest in organising energy communities and getting involved in energy sharing. The Gotland energy centre[86] provides further clarification and aims to engage people in the energy transition through energy communities.

In response to the EU legislation on energy communities and energy sharing, the Swedish Energy market inspectorate (Energimarknadinspektionen) was mandated to analyse the necessary measures to transpose the European rules for energy communities and energy sharing.[87] Energy communities are allowed to own and operate microgrids without having to obtain the permission from the grid operators. This is however limited to own consumption. Third party ownership and sharing is not permitted.[88] The Swedish government was also called by the members of Parliament to take measures to strengthen energy communities.[89] The legislation for renewable and citizen energy communities has been prepared by the EI but not yet adopted[90]. It is not yet clear how the implementation will look like. As a result, there currently is no clear benefit to local stakeholders to engage in anenergy community[91].

In addition, there is no economic incentive to do local energy sharing or Peer2Peer trading. This concept was experimented on Gotland through CoordiNet project, but energy taxation does not encourage citizens or investors to favour clean energy sources. Based on the energy price on the island, islanders do not feel the difference between locally and nationally produced energy, except for the solar installation on their roofs.

Energy sharing between consumers in apartment buildings has recently been made possible in Sweden.[92] It is possible to a limited extent, i.e., for collective self-consumption within the same building and with one connection to the grid. Prosumers are exempted from some fees or are subject to lower rates than larger producers.

Recommendation 4.1: Develop enabling framework for energy communities on the islands

[86] https://energicentrum.gotland.se/
[87] https://www.ei.se/om-oss/publikationer/publikationer/rapporter-och-pm/2020/ren-energi-inom-eu---ett-genomforande-av-fem-rattsakter---ei-r202002
[88] *https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-2007215-om-undantag-fran-kravet-pa_sfs-2007-215*
[89] https://www.riksdagen.se/sv/dokument-lagar/dokument/svar-pa-skriftlig-fraga/atgarder-for-att-starka-energigemenskaper_H912285
[90] https://www.iiiee.lu.se/article/policy-brief-energy-communities-sweden
[91] https://mdpi-res.com/d_attachment/energies/energies-14-04982/article_deploy/energies-14-04982-v3.pdf?version=1635493186
[92] https://www.energimyndigheten.se/nyhetsarkiv/2022/63-miljoner-till-30-projekt-for-resurs--och-energieffektiv-bebyggelse/?_t_id=3AX-vxQQrH9MhC6RqlpAHQ%3d%3d&_t_uuid=g9TLwy%2fnSAiJb572YzoXmg&_t_q=energigemenskaper&_t_tags=language%3asv%2candquerymatch&_t_hit.id=Energimyndigheten_Content_Pages_NewsPage/_b9c6d13f-eaf2-409f-87cb-215ab9a4b8a5_sv&_t_hit.pos=2

Energy communities aim to be beneficial to islands by improving the local economy through involvement of local communities and businesses in the energy transition process and achieving a just transition. The involvement of energy communities in the energy transition aims to help increase knowledge of energy topics, implementation of energy efficiency measures and uptake of renewable energy. Lack of transmission capacity to the mainland in the event of overproduction means that there are restrictions on the amount of renewable energy which may be installed.

A move towards well-designed communities could help to remove some of the obstacles of grid expansion and risks of congestion.

Therefore, prioritisation of guidelines for implementation of the regulatory framework for energy communities should be one of the main points of attention for the clean energy transition on the Swedish islands. The proposed translation of the European concepts into Swedish legislation results in terms that are not commonly used in Sweden. Such guidelines for implementation may help bridge the gap between the European framework and the Swedish context.

REPowerEU

Consideration 18 of the Recommendation highlights that the lack of **public acceptance of renewable energy projects** is another significant barrier to their implementation in many Member States. To address this, the needs and perspectives of citizens and societal stakeholders should be taken into account at all stages of renewable projects development – from policy development to spatial planning and project development – and good practices for ensuring just distribution of the various impacts of installations among the local population should be encouraged.

Regarding **facilitating citizen and community participation**, Member States should stimulate the participation of citizens, including from low and middle-income households, and energy communities in renewable energy projects, as well as take measures to encourage passing the benefits of the energy transition on to local communities thus enhancing public acceptance and engagement. Member States should implement simplified permit-granting procedures for renewable energy communities, including for the connection of community-owned plants to the grid

Facilitating participation and increasing stakeholder awareness are important to stimulate energy communities. Energy communities and any community/local stakeholders' involvement in energy projects represent a new approach for both energy sector and local stakeholders. We recommend faster adoption of the regulation to provide clarity to the ecosystem in which energy communities should operate. In order to enable uptake of energy communities, the regulatory framework should provide support/benefits for energy communities involved in sustainable energy projects. The support can be in the form of incentives for specific projects, tax benefits and technical assistance for starting an energy community. The Swedish Energy Agency is currently exploring pilots for energy communities.[93] This could provide relevant input for creating a facilitating framework and relevant services.

REPowerEU – facilitating citizen and community participation

Regarding facilitating citizen and community participation, Member States should stimulate the participation of citizens, including from low and middle-income households, and energy communities in renewable energy projects,

[93] https://www.energimyndigheten.se/nyhetsarkiv/2021/lokala-satsningar-pa-energigemenskaper-kan-ge-nya-insikter-for-framtidens-energiomstallning/?_t_id=3AX-vxQQrH9MhC6RqlpAHQ%3d%3d&_t_uuid=g9TLwy%2fnSAiJb572YzoXmg&_t_q=energigemenskaper&_t_tags=language%3asv%2candquerymatch&_t_hit.id=Energimyndigheten_Content_Pages_NewsPage/_2bcbb908-a677-42b8-be01-784beb96a008_sv&_t_hit.pos=1

as well as take measures to encourage passing the benefits of the energy transition on to local communities thus enhancing public acceptance and engagement. Member States should implement simplified permit-granting procedures for renewable energy communities, including for the connection of community-owned plants to the grid and reduce to a minimum production licensing procedures and requirements, including for renewables self-consumers.

The EU Solar Strategy highlights that better information is key to enhance clarity and predictability on the benefits of self consumption for potential investors, citizens and SMEs. Investment costs, financial support, increase of property value, network tariffs, generation and consumption profiles and return on investment are all relevant factors impacting investments. One-stop-shops in Member States should share such information and give citizens advice on both energy efficiency measures and solar energy projects in an integrated manner, from the technical requirements to administrative steps and support measures.

Community energy projects still face significant barriers, including difficulties in securing financing, navigating licencing, and permitting procedures or developing sustainable business models. In addition, as they are often initiated by a group of volunteers, they suffer from limited time and lack of access to technical expertise. Member States should establish appropriate incentives and adapt administrative requirements to the characteristics of energy communities. An integrated 3-step "learn-plan-do" programme could help energy communities build technical expertise and secure access to financing. The assessment and removal of existing barriers would level the playing field with more professionalised and established market participants.

Actors involved:

- **Ministry of Infrastructure, Department of Energy and Digital Development**
- **Swedish Energy Markets Inspectorate (Ei)**
- **Swedish Energy Agency**
- Ministry for Enterprise and Innovation
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

Recommendation 4.2: Introduce a simplified authorisation procedure for energy communities

As previously discussed, permitting procedures are lengthy and complex, which creates further barriers for an energy community to get started. Therefore, another important support mechanism would be to introduce simplified procedures for energy communities to realise clean energy projects. This can be a task for the Islands taskforce, in collaboration with the EI. The simplified procedure will also help to address congestion and obstacles concerning grid expansion.

Local and regional stakeholders also need to be made more aware of the possibilities with energy communities. Increased knowledge-sharing and capacity building of citizens, local actors, and municipalities, in addition to the abovementioned framework will aid in stimulating communities. While there is some political willingness to deal with the topic of renewable energy, we recommend to instore a local contact point charged with (renewable) energy topics at municipal level, and specifically advising island inhabitants on the frameworks for energy communities and energy sharing. To keep knowledge and tasks streamlined, this local contact point would be advised to collaborate with the Islands taskforce.

REPowerEU – Sufficient and adequate staffing

The recommendation on permitting stipulates that Member States should ensure sufficient and adequate staffing, with relevant skills and qualifications, for their permit-granting bodies and environmental assessment authorities. Member States should use the Union and national funding opportunities available for upskilling and reskilling, in

particular at regional and local level, and consider setting up an Alliance for sectoral cooperation on skills to bridge the skills gap of staff working on permit-granting procedures and on environmental assessments.

Another option is to create a one-stop shop at national level to address some of the specific challenges. This recommendation addresses the point of getting the right information since it is a complex matter. The focus should lie on training and education. The national government could help setup a platform, trainings, or conferences with island stakeholders to foster the discussion, give light to the best practices, or even provide funding for mentorship programs. This can be coordinated and monitored by the Islands taskforce.

REPowerEU – One-stop-shop

The recommendation on permitting stipulates that Member States should design a one-stop-shop for granting permits for renewable energy projects required in Directive (EU) 2018/2001 in such a way as to limit the number of authorities involved to what is necessary and maximise efficiency, taking into account public resources and the benefits of concentrating technological, environmental, and legal expertise.

Some best practices are given in the best practice box below.

Regulatory best practice

Scotland – Local Energy Scotland developed a 'Community and Renewable Energy Scheme (CARES) Toolkit,' a step-by-step guide for the process of developing a renewable energy project. A specific module of this toolkit deals with 'Shared Ownership', explaining some of the legal structures that exist such as, Owner operator, Commercial developer led, Joint ventures, Shared revenue, Split ownership, etc.

Spain, Balearic Islands - The Balearic Climate change and Energy Transition Law[94], approved in February 2019, requires the public administrations of the Balearic Islands to support participation of citizens, civil society organisations and local renewable energy communities in the deployment and management of renewable energy systems. More precisely, Article 49 of the Law defines that the local participation of at least 20% should be encouraged or obliged for RES projects with less than 5.0 MWp or more than 5 MWp, respectively.

Actors involved:

- **Swedish Energy Market Inspectorate (Ei)**
- Ministry of Infrastructure Ministry of Infrastructure
- Ministry of the Environment
- Local governments

Recommendation 4.3: Increase local stakeholder awareness

As possibilities are limited, lack of awareness of the possibilities and advantages of the clean energy transition is also an issue. Platforms to motivate consumer dialogue for energy communities, such as https://energigemenskaper.se/info/, exist. But the challenge remains how to reach different groups and types of citizens.

To overcome this problem of misinformation about RES or lack of information we recommend developing a central platform for information on RES (special focus on wind energy) and collect

[94] http://www.caib.es/sites/canviclimatic2/es/llei_de_ccite/

information on the individual projects. The national body which is responsible for one-stop shop, discussed in recommendation 4.2, can also be responsible for the central RES platform. For each clean energy project, it is recommended to ensure a dialogue between the various stakeholders at each stage of the project via existing local structures, focus should thus also lie on training municipal staff in providing information on renewable energy projects to citizens. (see also recommendation on local stakeholder engagement and recommendation 2 of this barrier).

REPowerEU - public acceptance of renewable energy projects

Consideration 18 of the Recommendation highlights that the lack of public acceptance of renewable energy projects is another significant barrier to their implementation in many Member States. To address this, the needs and perspectives of citizens and societal stakeholders should be taken into account at all stages of renewable projects development – from policy development to spatial planning and project development – and good practices for ensuring just distribution of the various impacts of installations among the local population should be encouraged.

Actors involved:

- **Ministry of Infrastructure, Department for Energy and Digital Development**
- **Swedish Energy Agency**
- Ministry of Finance
- Ministry of the Environment
- Local stakeholders (Academia, Civil sector, Private sector)
- National/regional stakeholders (trade and industry associations)

Conclusions

The Clean energy for EU islands secretariat conducted an analysis of the legal and regulatory framework which supports clean energy projects in Sweden. The resulting Regulatory inventory is publicly available online. Based on the analysis of the inventory and information gathered via surveys and interviews, the Clean energy for EU islands secretariat has brought together relevant stakeholders in Focus Groups and a National Stakeholder Meeting to identify barriers to the clean energy transition on Swedish islands, and formulated recommendations to overcome them. This mission has gained in importance since the publication of the REPowerEU package.

Sweden has taken steps to decarbonise the overall economy and the energy sector. While there are best practice projects on a few islands (See Annex 1), the island of Gotland has taken the most proactive approach in planning and implementation of its energy transition. The Gotland region has involved national, regional and local stakeholders to ensure optimal approach to planned activities. In addition, the Swedish Transport Administration has been active in helping decarbonise marine and road transport on the islands. This is best practice that should be followed by other countries, especially related to small islands. Energy sector stakeholders, such as DSO Vattenfall, have been active in implementing pilot projects on Swedish islands to test future proof approaches such as microgrids, local flexibility services, and energy sharing.

The energy transition requires decarbonisation and decentralisation. In this respect Sweden has involved regional governments to prepare energy and climate plans to identify actions that need to be done on the regional level. While this is a good approach, a systemic overview of the state of energy systems on Swedish islands is missing. As most islands are part of the mainland municipalities, their energy challenges are often overlooked. Therefore, based on the discussion with Swedish stakeholders involved in the projects on Swedish islands and aware of island challenges, we recommend, as a first step, the systemic analysis of islands and their energy challenges and needs. Such analysis can be used to define informed policy and support mechanisms to accelerate the energy transition on Swedish islands.

The Swedish electricity network is organised around large scale generation plants and requires significant grid capacity to transfer electricity from generation points to all consumers. Islands are often at the ends of such system. Their systems are characterised by grid constraints. The 10-year-winter planning represent an additional constraint to the whole system because of the high back-up capacity required to be available during winter months,
. In a decentralised energy system, islands can provide a source of electricity, use it locally and help not just balance its own system but possibly also support the rest of the connected system. For this to happen, actions are needed for long-term grid planning, to prepare smart and flexible grids for higher RES integration, to support the use of demand side management, microgrids and local flexibility markets, and to channel both EU and national funding to support first pilot projects and then full implementation.

Climate change and the energy crisis require agile planning and accelerated implementation. Today, authorisation procedures across Sweden take long time. For islands investment takes even longer, as projects usually require reinforced grids. This, together with spatial constraints on where RES projects can be implemented, leaves many islands without viable options for the energy transition. The existing process for spatial planning needs to be re-assessed in light of climate change and with the view to island characteristics and local needs. Specific areas can be pre-identified where implementation of clean energy projects is possible and authorisation can be accelerated.

Finally, the clean energy transition on the islands can not happen without involvement of local stakeholders. Their acceptance of the projects is key. Involvement of local stakeholders in the energy transition through ownership and direct benefits can ensure that local economy benefits, and that the energy transition answers the needs of the local community through multi-functional projects. Faster development and implementation of supportive regulation for energy communities, removal of barriers for energy sharing and Peer2Peer exchange, and awareness raising on all levels is needed for decentralised implementation of energy transition.

The proposed recommendations are in line with existing activities in Sweden but require leadership from the national government, improved coordination and engagement with local and regional stakeholders involved in energy projects on the islands, and setting up an overall energy system that is aimed at decarbonisation and decentralisation.

Annex 1 – Detailed analysis of the survey results

The survey for legal and regulatory barriers for clean energy on Swedish islands has been sent to 37 contacts, representing 23 stakeholders from national and local governments, academia, energy associations, and NGOs. In addition, the survey was publicly accessible and could have been forwarded to more contacts or organisations for which we cannot account. The survey has been completed by 13 respondents.

Respondents of the survey are representatives of 4 stakeholder groups. The respondents are relatively distributed among the different stakeholder groups with national government bodies representing 31%, island municipalities 46%, regional bodies 15%. The fourth stakeholder group is academia represented with 8% of respondents or 1 hence representative.

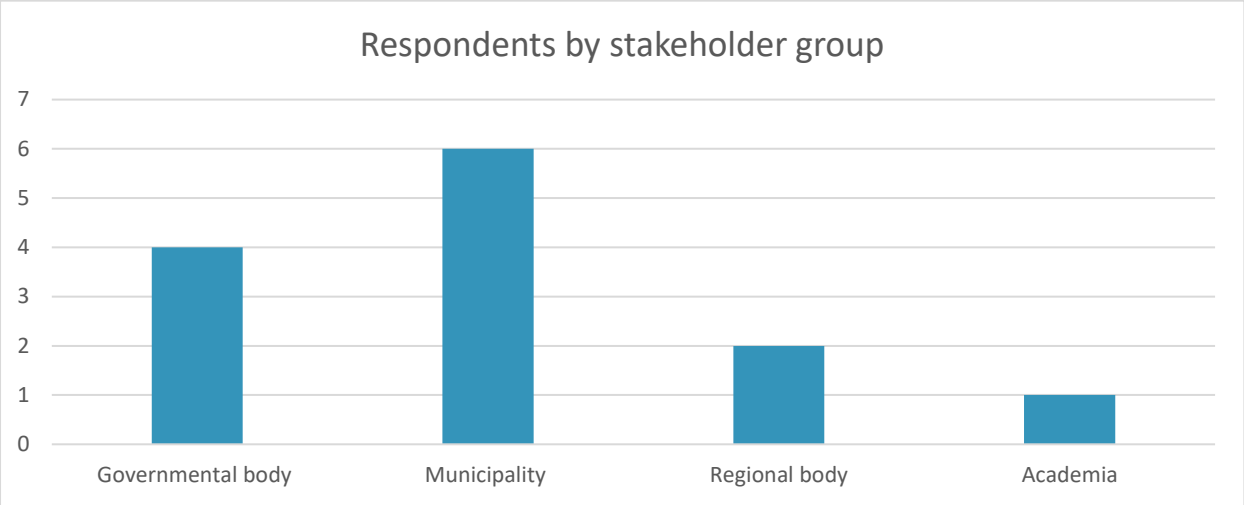

Figure 1 - Overview of the respondents by stakeholder group

Aside from the surveys, eight semi-structured interviews were organized with representatives from the Ministry for infrastructure, Swedish Energy Agency, Energy Market Inspectorate, Svenska Kraftnat (TSO), Stockholm Environmental Institute, Energy Agency for Southeast Sweden, Gotland Region, and Swedish Shipowners' Association.

The barriers which were identified as the most important by respondents of the survey were the following (from the least to most important):

- Lack of long-term vision on how different land use on islands are coordinated to assure sustainable economic development
- Insufficient capacity due to grid infrastructure constraints
- Long permitting procedure (>2 years)
- Conflicts of interest in permitting procedure between wind power developers, the Swedish Armed Forces, and municipalities and renewable energy seen as conflicting to environmental protection
- Lack of legal framework for energy communities

These and other barriers are elaborated upon in more detail in the sections below.

General

Survey results:

The survey has asked the respondents to give their opinion on the following three statements regarding **strategic energy planning for clean energy** on Swedish islands using a Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing strong disagreement to 5 representing strong agreement.

Statements	Rating
Island(s) energy plans would help align local and national regulation, spatial plans, restrictions for clean energy (renewable energy in electricity, heating & cooling, and transport; energy efficiency and community energy) projects and funding	4.2
National obligation for islands to develop energy action plans would lead to accelerated realisation of clean energy projects on islands	3.6
Islands should be better integrated in the National Energy and Climate Plans	3.9

If we take into account only barriers that are considered important, with an aggregated rating of 4.0 and above, meaning all respondents either agree or strongly agree with the statement, only the statement that "Island(s) energy plans would help align local and national regulation, spatial plans, restrictions for clean energy (renewable energy in electricity, heating and cooling and transport; energy efficiency and community energy) projects and funding" was put forward by the respondents.

"National obligation for islands to develop energy action plans would lead to accelerated realisation of clean energy projects on islands" is the statement which was put forward by respondents from the municipality.

Respondents from all the stakeholder groups but one (municipality) agree with the statement "Islands should be better integrated in the National Energy and Climate Plans."

From the interviews with Swedish stakeholders, the following general observations, and barriers for clean energy development on Swedish islands have been retained:

- Islanders are motivated to increase own production in order to decrease energy costs and mitigate climate change. For example, Gotland offers free advice to citizens regarding implementation of renewable energy and energy efficiency projects, and they receive on average three calls/cases a day. Local storage is only recently picking up and is not as much used yet.
- There is an overall lack of roadmap/guidelines for the energy transition from the national level to islands or municipalities.
- There is no need for a national strategy for islands as islands are treated as municipalities.
- While there is some follow up from the Swedish Energy Agency on different actions regarding electricity, there is a lack of involvement from other governmental agencies to realise the full decarbonisation of the islands/municipalities. The transport sector is an example where there is no overall coordination from the national level of decarbonisation actions or plans, even though there is the Swedish Transport Authority.

Renewable energy

General

Survey results:

The survey has asked the respondents to rate the following seven **general barriers to renewable energy projects** on Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Barrier	Rating
Support schemes limited to large scale clean energy projects	2,6
Lack of guidelines for clean energy projects tailored to islands	3,6
Lack of island specific support schemes for renewable energy	3,1
Lack of support for implementation of charging infrastructure	2,7
Lack of long-term planning developed at regional/island level (e.g., lack of clear renewable energy targets)	3,0
Lack of awareness and/or capacity of the stakeholders for developing clean energy projects	2,7
Lack of clarity regarding financial, social, or environmental benefits to islanders	2,7

If we take into account only barriers that are considered important, with an aggregated rating of 4.0 and above, none of the barriers were put forward by respondents. The following barrier is considered by respondents as relatively important and rated the highest among others:

- Lack of guidelines for clean energy projects tailored to islands.

"Lack of guidelines for clean energy projects tailored to islands" is rated as "fairly important" by municipality and academia.

While none of the stakeholder groups rate any of the above barrier as very important, there is lack of consensus on what is a priority. For example, lack of island specific support schemes for renewable energy, lack of support for implementation of charging infrastructure, and lack of clarity regarding financial, social, and environmental benefits to islanders are all rated fairly important by regional body stakeholder group, while other stakeholder groups find these to be slightly important. On the other hand, lack of long-term planning developed at regional/island level is rated to be fairly important only by academia stakeholder group, and lack of awareness and/or capacity of the stakeholders for developing clean energy projects is rated fairly important only by municipality stakeholder group. This lack of consensus could indicate lack of communication or exchange of priorities among various stakeholders.

Interview results:

From the interviews with Swedish stakeholders, the following **general barriers for renewable energy** development on Swedish islands have been retained:

- There are more opportunities and support for large renewable energy projects than for small scale renewable energy projects or community projects.
- There is a general lack of resources and funding opportunities to take real actions for the decarbonisation of Gotland's energy supply.
- Due to the general lack of guidelines for energy transition from the national level to the islands, there is also lack of guidelines how to create synergies between energy and tourism priorities. There is a high peak of population and energy demand in summertime. However,

many members of seasonal population are opposed to offshore wind farms, while islands have limited land for the renewable projects.

- Clear guidelines are also missing when it comes to the transportation sector, which includes road but also maritime transport.
    - For the main island, Gotland, most goods, and people are transported by sea. The regional government procures transport services via contracts (public tenders). The current contract, with Destination Gotland, runs until 2027. There were already certain climate and energy requirements established in the tender. For the next procurement period as of 2027, there are discussions ongoing as to whether or not the government can actually require fossil-free transport. From the sector perspective the question comes down to whether it will be possible from a technical and economical point of view.
    - Besides Gotland, several ship operators are investing in LNG propelled ships, assessing the biofuels options – blending in 10% and increasing the share, and assessing electrification of the vessels.
- Based on the energy price on the island, islanders do not feel the difference depending on where the energy comes from, except in the case of self-consumption.

RES projects authorisation process (permitting and spatial planning)

Survey results:

The survey has asked the respondents to rate the following eight barriers to renewable energy development regarding **permitting and spatial planning** on Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Barrier	Rating
Conflicts of interest in permitting procedure between wind power developers, the Swedish Armed Forces, and municipalities	4,4
Complex administrative procedure	3,9
Long (>2 years) permitting procedure	4,4
Lack of permitting exemption for small-scale systems (PV, battery, EV chargers)	2,2
Lack of physical planning of the local energy transition by Swedish municipalities	2,2
Spatial planning legislation related to protected areas restrictions and RES installations not adjusted to the local island's characteristics	2,3
Renewable energy projects seen as conflicting to environmental protection of the islands/area around islands.	4,0
Lack of long-term vision on how different land use on islands are coordinated to assure sustainable economic development.	4,1

If we take into account only barriers that are considered fairly to very important, with an aggregated rating of 4.0 and above, four barriers were put forward by respondents, from least to most important:

- Renewable energy projects seen as conflicting to environmental protection of the islands/area around islands
- Lack of long-term vision on how different land use on islands are coordinated to assure sustainable economic development
- Long permitting procedure (>2 years)
- Conflicts of interest in permitting procedure between wind power developers, the Swedish Armed Forces, and municipalities

"Renewable energy projects seen as conflicting to environmental protection of the islands/area around islands" is rated "very important" by respondents representing regional body and "fairly important" by respondents from academia and municipality. Of all the barriers in this survey this barrier has highest correlation to "Complex administrative procedure." This means that respondents that highly rated one barrier also highly rated the other barrier.

"Lack of long-term vision on how different land use on islands are coordinated to assure sustainable economic development" is rated "very important" by the respondents from regional body and "fairly important" by municipality and academia stakeholder groups.

"Long (>2 years) permitting procedure" is rated "very important" by municipality and academia, and "fairly important" by the respondents from the regional body stakeholder group. Of all the barriers in this survey this barrier has highest correlation to "Conflicts of interest in permitting procedure between wind power developers, the Swedish Armed Forces, and municipalities." This means that respondents that highly rated one barrier also highly rated the other barrier.

"Conflicts of interest in permitting procedure between wind power developers, the Swedish Armed Forces, and municipalities" is rated "very important" by the respondents from regional body and municipality stakeholder groups and "fairly important" by responders from the academia stakeholder group.

Interview results:

From the interviews with Swedish stakeholders, the following **barriers, and observations** for renewable energy development, **regarding permitting and spatial planning** on Swedish islands have been retained:

- For wind farms, the process is long as it takes around 10 years. The issue is that the municipalities (also on the islands), by law, had to develop a 'wind power establishment plan' around 10 years ago. However, they did not develop them, as at the time the wind turbines were smaller and did not have much impact on the surroundings.
- Recently more power has been given to municipalities, they have the last say in whether or not to accept the implementation of wind turbines on their municipal territory (or island). A rejection decision by a municipality cannot be revoked by regional or national authorities. However, this has led to numerous rejections of wind farms.
- To solve the issues with the rejected or long permitting procedures, there were initiatives to draw up some sort of spatial planning supported by a variety of stakeholders. A couple of years ago, on Öland, an anonymous 'survey' was held and identified 12 suitable locations for wind power. However, due to changes in the municipal government and the fact that they have the power to reject wind power projects, no new wind power projects have been developed.
- A barrier is in the length of the permitting process in cases where new grid infrastructure is needed. The length of these procedures (which are also lengthy for regular expansion of the grid) is the reason many investors find other locations than the islands.

- There is a need for an energy transition roadmap for the islands. For example, EV charging infrastructure is installed based on the demand and the municipality is not yet involved in planning. For Gotland, this is currently in the process of energy transition as the energy institute of Gotland is working on their own energy roadmap.

Grid

Survey results:

The survey has asked the respondents to rate the following 4 **grid connection barriers** to renewable energy development on Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Barrier	Rating
No priority access to the grid for renewable energy	2,3
Insufficient capacity due to grid infrastructure constraints	4,3
Limited sustainable back-up options to assure security of supply	3,8
Lack of systematic approach to grid development needs for integration of RES	3,9

If we take into account only barriers that are considered fairly to very important, with an aggregated rating of 4.0 and above, only one barrier was put forward by respondents:

- Insufficient capacity due to grid infrastructure constraints.

"Insufficient capacity due to grid infrastructure constraints" is rated "very important" by the respondents from the municipality stakeholder group and as "fairly important" by academia, regional body, and governmental body stakeholder groups.

Interview results:

From the interviews with Swedish stakeholders, the following **barriers, and observations** for renewable energy development, **regarding the grid**, on Swedish islands have been retained:

- Islands tend to have weak, end-of-line connections, which cannot currently absorb the energy that could be produced on the islands. For example, in Öland, large amounts of wind energy produced in wintertime cannot be put on the cables, and thus the wind turbines have to be turned off (curtailed). Storage options (like hydrogen) are being assessed.
- To develop additional grid infrastructure, requires a lengthy procedure, therefore islands can currently not implement large RES projects. This issue applies for the whole of Sweden. The laws that govern expansion of electricity grid are inefficient and even when grid expansion is in the grid plans it can take up to 10 years to implement.
- New business models are needed that include grid operators, community, and energy generators, to implement projects that provide flexibility and can benefit both the local citizen and the network operator. This can be encouraged through incentives.

Energy Efficiency

Survey results:

The survey has asked the respondents to rate the following five **energy efficiency barriers** to renewable energy development on Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Barrier	Rating
Lack of incentives for island municipalities to get involved in the energy and climate training and advisory services offered to municipalities in general	2,0
Lack of clear energy efficiency targets for islands	2,0
Lack of clear regulations for energy service companies	1,8
Energy efficiency in generation/transport/use is not considered the first priority in strategic documents/regulation	3,8
Lack of availability of easy-to-use support schemes (including funding)	3,0

If we take into account only barriers that are considered important, with an aggregated rating of 4.0 and above, none of the barriers were put forward by respondents. The following barrier is considered by respondents as relatively important and rated the highest among others:

- Energy efficiency in generation/transport/use is not considered the first priority in strategic documents/regulation

"Energy efficiency in generation/transport/use is not considered the first priority in strategic documents/regulation" is rated "fairly important" by respondents from regional body and academia.

Interview results:

From the surveys and interviews with Swedish stakeholders, the following **barriers for energy efficiency** on Swedish islands have been retained:

- Lack of knowledge on the local level in organising energy efficiency projects. People are inspired to implement energy efficiency measures when there is free advice, like in the case of Gotland region.
- Lack of political support for energy efficiency.
- Mandatory renovation targets from revised RED II and EED will bring the needed incentive.
- In Sweden in general, funding for energy efficiency has decreased over the last years.

Self-consumption and community energy

Survey results:

The survey has asked the respondents to rate the following seven **community energy projects and energy sharing barriers** to renewable energy development on Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Barrier	Rating

Lack of legal framework for energy communities	4,0
Collective self-consumption is currently possible only behind one connection point	3,3
Lack of political support for community/citizen involvement	3,5
Community energy initiatives have to meet the same requirements as traditional energy companies (burdensome, complex permitting procedures, high financial requirements, etc.)	3,3
Lack of institutionalised platforms for information exchange, awareness raising and capacity building on local or regional level (advisory services, information campaigns, best practices etc)	3,6
Lack of financial/funding mechanisms for collective/community involvement in clean energy projects	3,8

If we take into account only barriers that are considered important, with an aggregated rating of 4.0 and above, only one barrier was put forward by respondents:

- Lack of legal framework for energy communities

"Lack of legal framework for energy communities" is rated "fairly important" by all stakeholder groups.

Aside from this, "Lack of financial/funding mechanisms for collective/community involvement in clean energy projects" was rated "fairly important" by all respondents except for the respondents from the "government body" stakeholder group. Finally, "Lack of institutionalised platforms for information exchange, awareness raising and capacity building on local or regional level (advisory services, information campaigns, best practices etc)" was rated "very important" by respondents from the regional body and academia stakeholder groups. On the other hand, it is rated as "slightly important" or "not at all important" by respondents from the municipality and government body stakeholder groups.

Interview results:

From the interviews with Swedish stakeholders, the following **barriers for self-consumption and community energy** on Swedish islands have been retained:

- A recent change in legislation[95] has improved the situation for energy communities. Energy communities are allowed to own and operate microgrids without having to obtain the grid operators' permission. This makes it much easier for energy communities to share energy (complexity of the process is reduced).
- While there is support for renewable energy projects through tax support, the renewable energy projects organised by the community where the generated energy would be used by the community are not economically feasible due to energy tax on self-produced electricity.
- The new legislation allows for energy sharing in apartment buildings or within the building if it is small system. However, energy communities and their co-ownership of plants are not regulated.

[95] Ordinance (2007: 215) on exemptions from the requirement for a network concession according to the Electricity Act (1997: 857) available here

- Lack of knowledge on energy communities from crucial energy sector stakeholders, including politicians and grid operators.
- Lack of transmission capacity to the mainland in the event of overproduction means that there are restrictions on the amount of renewable energy which may be installed on the islands. What is provided as the only solution is to increase transmission capacity even though there are many different solutions that include flexibility and storage.

Other barriers

Socio-economic barriers or issues discussed in the interviews:

- Temporary residents to the islands having a major say in which renewable energy should be installed on or close to the island. There is no systematic planning or priority balance between energy and tourism.

Technical barriers discussed in interviews:

- Lack of focus on solutions that include flexibility and storage for increase integration of renewable energy in the Swedish system.
- Lack of implementation of solutions for decarbonisation of maritime transport.

Measures to overcome the identified barriers

Survey results:

The survey has asked the respondents to rate the following eleven **measures for overcoming barriers** for clean energy projects on the Swedish islands based on their importance using Likert scale. The results are presented in numerical form showing the average from all responses. The numerical representation is from 1-5, with 1 representing not at all important to 5 representing very important.

Measure	Rating
An island specific strategic document that will find compromises between environment conservation, agriculture, preservation of historical sites, tourism, and sustainable and clean energy.	3,5
Involvement of key stakeholders in preparation of island specific strategic document	4,2
Regulation for local energy markets	3,1
Capacity building or advisory services on clean energy projects specific for islands	3,4
Support schemes for small RES installation beyond tax benefits	2,5
Simple and quick permitting procedures for heat-pumps	1,5
Regional/local one-stop shop for clean energy projects on the islands	2,5
Single permit for clean energy projects on the islands	1,7
Support for EV charging infrastructure and its installation	2,4
Develop enabling framework (clear regulation and financial mechanisms) for operation of energy services companies	3,2

Increasing awareness of stakeholder on economies of community energy projects	3,3
Political support and awareness raising for energy sharing	3,8
Create enabling framework (regulation, financing, permitting procedures, social support) for energy communities, cooperatives, and other community energy initiatives	4,3

If we take into account only measures that are considered important, with an aggregated rating of 4.0 and above, two measures were put forward by respondents. They include from least to most important:

- Involvement of key stakeholders in preparation of island specific strategic document
- Create enabling framework (regulation, financing, permitting procedures, social support) for energy communities, cooperatives, and other community energy initiatives

"Involvement of key stakeholders in preparation of island specific strategic document" is rated "very important" by regional body and "fairly important" by governmental body, academia, and municipality stakeholder groups.

"Create enabling framework (regulation, financing, permitting procedures, social support) for energy communities, cooperatives and other community energy initiatives" is rated "very important" by regional body and academia. Of all the measures and barriers in this survey this measure has highest correlation to the following barriers: "Lack of systematic approach to grid development needs for integration of RES," "Lack of institutionalised platforms for information exchange, awareness raising and capacity building on local or regional level" and "Lack of financial/funding mechanisms for collective/community involvement in clean energy projects." This means that respondents that highly rated this measure also highly rated the three mentioned barriers.

Interview results:

From the interviews with Swedish stakeholders, the following **measures to overcome some of the above-mentioned barriers** for clean energy development on Swedish islands have been retained:

- Regulation for local energy markets: some grid operators are very keen on enhancing renewable energy; offering solar panel packages, discounts, etc. However, as it is a regulated market many of them (they are small and local) do not have the institutional capacity to offer anything. For them it is too complicated, and they leave it to the market. Islands often have a small grid operator, and the island municipality does not have the capacity to help them out.
- Islands and municipalities/regions should have local energy transition roadmap for themselves.
- Island citizens should be able to be involved in ownership and operation of renewable energy projects.
- Awareness rising is key to many things. For citizens but also companies. A larger level of creativity and willingness is required from citizens to participate in the energy transition. Citizens are used to always having energy and there is little patience for interruptions. It is difficult to introduce a transition in an area/infrastructure where there is a certain level of expectations.

Best practice examples of clean energy project on Swedish islands

- Gotland transport sector:
  - Maritime: Ferry company on Gotland got two new ferries with LNG and added 5 % biogas and they want to make it to 100 % biogas by 2030. Also looking into hydrogen. This is the only transport from the island to the mainland.
  - Road transport: The electric vehicles and charging infrastructure pilot project on Gotland is operated by Swedish energy agency. Aside from this, electrification of transport is implemented based on demand.
- Gotland heating is completely renewable with biomass district heating in more urban areas – 4 district heating. In rural areas, citizens use heat pumps, electric heating, or wood for heating. Biomass based heating is more economical than electrical heating for now.
- Gotland region has Gotland Energy Agency[96], which is part of the group of 16 regional energy offices under Energikontoren Sverige[97]. Gotland energy agency has adopted development strategy – Together towards 2030. The Agency is guided by the Steering committee which includes members from: GEAB – Energy company; GUBIS – Umbrella organization for Gotland's development corporations (citizen-based initiatives); LRF – national farmer's organisation with local representation; Länsstyrelsen – The county administrative board; Medborgarstol – Member applies from the public for a one-year mandate; Region Gotland – Regional development responsibilities and municipal services; Tillväxt Gotland – Business organisation that hosts 800 companies on Gotland; Uppsala Universitet CampusGotland – University and Energimyndigheten – Swedish Energy Agency. In Addition Energy agency organizes the Municipal Energy and Climate Advisory which is publicly available free services to citizens and business to provide energy advice, increase knowledge and raise awareness. This service is sought out at least few times a day by local stakeholders.
- Skaftö[98] - electric ferry traffic between Lysekil and Skaftö is being organized to decarbonise public transport.
- Öckerö[99] - Swedish Transport Administration is helping electrify ferry transport between mainland and islands and between islands. Ferries are electrified one by one.
- Lidingö[100] - Fossil Free Marine is launching the world's first DNV-verified marine station - environmental safety on a whole new level. Fossil Free Marine, a Swedish company started in 2019 by co-founders Niklas Sjöö and Karl-Oskar Tjernström, is now launching its new unmanned floating marine station . More than ten years of development time lies behind the unique functional design, which the company describes as "a reverse engineering from a large number of regulations, most taken from the strictly regulated land-based fuel industry". The charging starting will be used for electric boats that are operating between the islands.
- Arholma[101] - Microgrid being tested on an interconnected island, to be used in case of disconnection in the supply. This microgrid includes electricity grid with smart control of local PV production, energy storage and electricity consumption. This project is implemented in collaboration with DSO Vattenfall.

[96] https://energicentrum.gotland.se/wp-content/uploads/2022/09/In-english_Energicentrum.pdf
[97] https://energicentrum.gotland.se/wp-content/uploads/2022/09/In-english_Energicentrum.pdf
[98] https://www.ellevio.se/privat/energismart/framtidens-energi/elektrifieringsvag-pa-sjon/
[99] https://www.tidningen.se/ockero-kommun/da-blir-farjorna-till-ockero-kommun-eldrivna/
[100] https://www.mynewsdesk.com/se/fossil-free-marine/pressreleases/fossil-free-marine-lanserar-vaerldens-foersta-dnv-verifierade-marinstation-miljoesaekerhet-paa-en-helt-ny-nivaa-3184349
[101] https://www.vattenfalleldistribution.se/var-verksamhet/innovation/arholma/

- Lidö[102] - project aiming to transform this small island into zero CO2 emissions island. It includes activities in regards to transport, waste, food industry and accommodation.

[102] https://nordregioprojects.org/carbon-neutral-islands/zero-island-lido-in-sweden/#/home

Annex 2: Sweden Stakeholder Meetings

Sweden Focus Group

Sweden Focus Group invited members:

- Ministry of Infrastructure, Energy Sector
- Swedish Energy Agency
- Energy Market Inspectorate
- Energy agency for Southwest Sweden
- Municipality of Landskrona
- Gotland region
- Svenska Kraftnat
- Vattenfall
- Swedish Association of Local Authorities and Regions
- Stockholm Environmental Institute
- IVL Swedish Environmental Research Institute
- Swedish Shipowner Association

First Sweden Focus Group (SEFG1) meeting

Title	CE4EUI - Sweden Focus Group - Study on regulatory barriers and recommendations for clean energy development on islands.
When	Wednesday, 3rd of May 2022, 13:00-15:00 CET.
Where	Online

List of attendees

Stockholm Environmental Institute

Vattenfall

Gotland Energy agency, Gotland island

Landskrona municipality

Swedish Shipowner Association

The Sweden Focus Group Meeting 1 (SEFG1) focused on the barriers highlighted in the Report: Detailed Regulatory Analysis Sweden.

Lucija Rakocevic presented the whole process from the current Report to the Study on regulatory barriers and recommendations for clean energy developments on the islands.

Lucija Rakocevic presented the main findings outlines in the report. Which barriers are found to be the most important. The participants agreed with the main identified barriers and their priority, which include:

- Lack of long-term vision on how different land use on islands are coordinated for sustainable economic development with clean energy transition;
- Lengthy permitting procedures;
- Insufficient capacity due to grid infrastructure constraints and
- Lack of enabling framework for energy communities.

In addition to above mentioned main barriers, the following barriers and topics were discussed:

- Grid capacity and constraints depending on the island connection
- Responsibilities of DSO and TSO and how this affects the energy transition
- Unclear implementation of the flexibility market
- Priority of the sectors in the sustainable development of the islands
- Energy taxation does not support local solutions or energy exchange
- Lack of legislation for community involvement in the energy sector
- Lack of energy expertise of local governments and
- Energy transition of the transport coordinated by different stakeholders

Second Sweden Focus Group (SEFG2) meeting

Title	CE4EUI - Sweden Focus Group - Study on regulatory barriers and recommendations for clean energy development on islands.
When	Tuesday, 23rd of August 2022, 13:00-15:00 CET.
Where	Online

List of attendees

Stockholm Environmental Institute

Vattenfall

Landskrona municipality

Ministry of Infrastructure, Energy Sector

The Swedish Focus Group Meeting 2 (SEFG2) focused on the concrete recommendations proposed for the four priority barriers identified in the Study on barriers and recommendation for clean energy transition on Swedish islands.
The resulting discussion among stakeholders focused on the following topics:

- Islands as a special focus in the energy transition
- Taskforce for islands on the national level
- Legislation on Energy communities not yet clear enough for implementation
- Go-to areas from the REPower EU and RED directive

National Stakeholder Meeting

Title	CE4EUI – Sweden National Stakeholder Meeting- Study on regulatory barriers and recommendations for clean energy development on islands.
When	Wednesday, 28th of September 2022, 08:30-13:30.

The NSM was hybrid event held in the Stockholm Environmental Institute in Stockholm and online. The meeting was attended by representatives of Stockholm Environmental Institute, Vattenfall, Municipality of Landskrona, IVL Swedish Environmental Research Institute and National Association of the Archipelago (Hvens Byalag, Skärgårdarnas Riksförbund).

During the National Stakeholder Meeting on legal and regulatory barriers and solutions to clean energy transition on Swedish Islands, stakeholders discussed proposed measures and their experiences in implementation of projects and regulation in regards to Swedish islands.
The participants spoke about long-term vision on how the islands energy transition should be implemented and the challenges of the energy transition on the Swedish islands. The proposed recommendations and course of action was discussed. In addition security of supply on the islands, lengthy approval procedures caused by various sectoral constraints for implementation of clean energy projects on the islands. Finally the need for engagement of local stakeholders in the energy transition through energy communities and sharing was discussed with elaboration on proposed measures.

During National Stakeholder meeting all four barriers and proposed recommendations were discussed, as shown below.

Barrier 1. **Lack of visibility of island challenges and vision for island energy transition**

Recommendations:

1.1 Set up a taskforce for the islands on the national level
1.2 Provide clarity on island development within the national policy and NECP
1.3 Guidance and support in the development and implementation of island energy action plans
1.4 Local stakeholder engagement in energy projects

Barrier 2. **Lack of security of supply on the islands**

Recommendations:

2.1 Develop long-term planning for island security of supply assessing various options
2.2 Support the development of storage, demand-response, and smart-grids on the islands
2.3 Channel funding from the EU towards grid development

Barrier 3. **Lengthy approval procedures for clean energy projects**

Recommendations:

3.1 Seek compromises with the Swedish Armed Forces & municipalities and investments in research & innovation
3.2 Spatial planning guidelines for implementation of clean energy projects
3.3 Master Plan per island to define go-to areas and simplify procedures

Barrier 4. **Lack of clear regulation for energy communities and energy sharing**

Recommendations:

4.1 Develop facilitating services and a framework for energy community projects on islands
4.2 Introduce actors on location and a simplified procedure for energy communities
4.3 Increasing stakeholder awareness on advantages of clean energy projects

Annex 3 – Permitting procedure for clean energy projects

Sweden does not have a national 2030 target for renewable energy, but it has set a target of reaching 100% renewable electricity production by 2040. According to the Swedish Energy Agency 2016 trajectory, the share of RES-E will be 65% of final consumption by 2030. The same trajectory predicts a slight increase in RES-HC compared to the 2016 level: a 69% share of RES by 2030.

Onshore and offshore wind are rapidly expanding RES-E technologies in Sweden, regardless of the fact that they face significant obstacles in the permitting process. Most prominently, there are conflicts of interest between wind power developers, the Swedish Armed Forces, and municipalities, which have the right to veto a wind power project. In addition to these challenges imposed on onshore wind, offshore wind development is further complicated by the numerous authorities involved in the various permitting procedures, the staff of which may be inexperienced by the relatively novel offshore technology.

The amount of small and medium-sized heat pumps has expanded rapidly in Sweden: more than half of Sweden's detached houses have a heat pump installed. Ground-sourced (geothermal) heat pumps are one of the most common heat pump types in the country, and as ground-sourced heat pumps often require some sort of permitting or at least registration procedure, they are the heat pump technology covered in this section. The permitting is rather uncomplicated and quick, which may constitute a reason heat pumps have gained popularity quickly in Sweden. The details of the authorisation procedure will be explained for wind onshore and offshore, as well as geothermal, while other technologies will be commented on if the procedure is simpler for them.

Main steps in the permitting procedure are:

1. Site selection
2. Administrative authorisation
3. Grid connection permit
4. Other (only relevant for wind onshore and wind offshore)

Competent authorities involved in the whole permitting process include the following institutions:

- Swedish Energy Agency
- Swedish Energy Markets Inspectorate
- Swedish Armed Forces/Ministry of Defence
- Ministry of Enterprise and Innovation
- Ministry of the Environment
- Geological Survey of Sweden
- Land and Environmental Court
- County Administrative Board
- Municipalities, municipal building committees

Site selection procedure

Site selection procedure is based on the Environmental Code.

Wind onshore and nearshore: The two main things wind power developers have to bear in mind in the site selection process are the preliminary willingness of the municipality to have a potential wind farm in their area, and the compatibility of the area with military land use interests. It is also advised for the wind power developer to investigate the intended site's proximity to the electricity

grid and the available grid capacity. Sweden does not have a central, coordinated plan for wind power development, neither onshore nor offshore. Regional level spatial plans or marine plans may identify suitable sites, but these plans serve as recommendations and not as binding guidelines. In Sweden, municipalities are the authorities responsible for most spatial planning, preparing, and adopting comprehensive plans for the municipality as a whole, and development plans for residential areas.

According to the Environmental Code (Chapter 3 Art 9), all objects exceeding the height of 20 m outside of densely populated areas and 45 m in densely populated areas that could affect the national interests of the Swedish Armed Forces are required to receive referral of the Armed Forces. In practice, this function is fulfilled as a consultation with a special spatial planning team of the Ministry of the Defence. There is a chance for a preliminary consultation with the Ministry of Defence to determine whether the area is suitable for wind power development, or if there are national security constraints blocking the project.

Geothermal: Site selection is not highly relevant for small and medium-sized ground-sourced heat pumps as most areas are, by default suitable for them, with the exception of groundwater reservoirs.

Administrative authorisation process

Environmental permit (wind onshore and offshore): In Sweden, the environmental permit procedure entails several elements that are often processed as separate permitting procedures, e.g., EIA, building permit, environmental permit, and consultation of stakeholders. The legal basis for the environmental permit is established in Chapter 9 of the Environmental Code (1998:808), which also applies to wind power installations. The environmental permit process includes conducting an EIA, which is codified in more detail in the Chapter 6 of the Environmental Code (1998:808). An environmental permit is needed when:

- two or more wind turbines are located together and each of them have a total height over 150m;
- one wind turbine has a total height over 150m and is located in such a constellation as previously mentioned; or
- a wind turbine has a total height over 150m and is located together with another such wind turbine if its operation starts later than the operation of another wind.

The competent authority for applying for an environmental permit is usually the county administrative board but in case of projects with fewer than 2 wind turbines under 150m or fewer than 7 wind turbines under 120m, the planning authority is the municipality in which the project would be located. EIA is included in the environmental permitting process and involves consultations with potentially affected stakeholders and the general public. Once the developer submits the EIA to the county administrative board, the application materials and the EIA are made available for public consultation as well as a round of comments from other relevant authorities. In Sweden, the municipality in which the wind power project would be located has the right to veto the said project at any point of the environmental permit process.

Smaller wind power projects (e.g., are exempted from the environmental permit procedure and can simply notify the county administrative board. However, they may require a building permit (see below).

Environmental permits usually contain provisions about the deadline for commissioning the wind farm. It is not possible to extend the validity of the permit: instead, the applicant has to submit a new application and start the procedure over from the beginning.

Nearshore wind turbines are permitted in a similar manner as onshore turbines if they are located less than 12 nautical miles from the coast, in the Swedish territorial waters. In addition, water-based permits, and a permit according to the Continental Shelf Act are necessary for all installations located on sea.

Building permit: Not all RES installations need a building permit, but most small or medium-sized wind turbines that do not require a separate environmental permit do. 'Mini-installations' with the maximum height of 20m and maximum rotor diameter of 3m may be exempted from a building permit if they are not located on a building or are not closer than their own height to a building. The second category of small installations, 'yard installations' are wind turbines between 20m and 50m of height and/or have rotors with a diameter of more than 3m. They are required to obtain a building permit but are usually exempt from the environmental permit. Wind power projects larger than the limits for 'yard installations' are required to obtain the environmental permit, and the procedure also integrates the building permit process.

The competent authority for applying for a building permit is the Building Committee of the local municipality (Chapter 9 section 20, Planning and Building Act). The building permit procedure includes a hearing of neighbours or other locals that would be directly affected by the planned installation. When granted, the building permit decision also contains information on the period of validity of the permit and the authority in charge of possible inspections (Chapter 9, section 40 Planning and Building Act).

Permits for small and medium-sized ground-sourced heat pumps: Most heat pumps are not subject to any permitting procedures, with the exception of geothermal heat pumps requiring a certain amount of drilling. They are subject to the ordinance 1998:899, which states that all heat pump installations extracting heat from the ground, surface water or groundwater are required to either report their activity or apply for a permit. The installer is also required to report on the conducted drilling activity to the Geological Survey of Sweden. The minimum requirement is that the installations are reported to the municipality, in which they are located (art. 17, Ordinance 1998:899). The municipality also has the right to require the installations to acquire a 'drilling permit' (names vary in different municipalities) (ordinance 2013:251; ordinance 1998:899). The municipality can decide for itself how the permit is applied and what is required for an application.

Small heat pumps (less than 10 MW) that draw heat from earth or water do not need to apply for an environmental permit (SEPA, 2020).

Grid connection permit

In order to connect a new RES installation to high voltage power lines, a grid connection permit (concession) is necessary. The concession is required when a new power line has to be built in order to connect the electricity generating installation to the transmission network. The permit is granted by the Swedish Energy Markets inspectorate. The application has to contain information on the transmission capacity, the necessary voltage, compliance of the Environmental Code, and alternative transmission routes. There are two types of concessions: a permit for an individual transmission line or for the whole geographical area. The procedure is rather similar for the two types, but slightly different documents and consultations are required for each (arts 5 and 7, Electricity Ordinance).

The Swedish Energy Markets Inspectorate will assess the application and usually ask for additional information before sending it to referral authorities for consultation. When consultation is completed, the Swedish Energy Markets Inspectorate examines if, based on the comments from the referral authorities, any additional information is needed. The project developer may then react to the comments of involved authorities and submit supplementary information before the final assessment by the Swedish Energy Markets Inspectorate is taken.

The decision regarding a grid connection application is made by the Swedish Energy Markets Inspectorate within three years of the receipt of a complete application by the Inspectorate (Chapter 2 Art 1 Electricity Act). If the matter is to be decided by the Government, a decision shall be made within five years from the receipt of complete application by the grid authority (Art 10 Ordinance on Electricity). In practice, the process is often delayed.

It is not necessary to obtain a grid connection (concession) permit if the RES installation is so small it requires no high voltage lines constructed. Therefore, small RES installations that can be connected to the distribution grid, such as small PV installations or wind turbines, are exempted from the concession procedure. They have to, however, comply with the standards and requirements of the DSO.

Other (only relevant for wind onshore and offshore)

Heritage conservation: Any wind power developer needs to consider The Heritage Conservation Act (1988:950), which protects antiquities, churches, and certain buildings. As such, a wind power project needs approval from the county administrative board, which states that the construction does not interfere heritage conservation. In accordance with Chapter 2 of the Heritage Conservation Act (1998:950), the county administrative board may decide on an archaeological investigation at the relevant location to determine whether there is a conflict of interest with heritage conservation. The wind power developer is therefore advised to contact the county administrative board early in the process to determine the need for such an archaeological investigation.

Natura 2000: If the project is located on a Natura 2000 area or near one, the impacts of the project and its construction to the local environment and its protected species have to be assessed according to the EU law. Natura 2000 assessments are often required for onshore and offshore wind projects, prior to they enter into the environmental permitting procedure.

Permits for offshore wind only:

Continental shelf permit: All infrastructure placed in the sea located on the continental shelf area, including infrastructure for offshore wind installations, require a continental shelf permit, which is applied for from the Ministry of Enterprise and Innovation. This applies to both 'public water' areas and Sweden's exclusive economic zone.

Exclusive Economic Zone permit: Any commercial activity in Sweden's economic area require permission from the Swedish Government according to art. 5 of The Swedish Exclusive Economic Zone Act (1992:1140). This applies to cables, pipelines, or constructions, and thus, is applicable to, for example, offshore wind turbines. The permit is requested from the Swedish Ministry of the Environment.

Water activity permit: All power stations, such as hydropower dams or tidal energy infrastructure, installed in sweet water areas are required to apply for a water permit according to the Chapter

11 of the Environmental Code. The competent authority for water permits is the Land and Environmental Court.

Marine Natura 2000: There are almost 300 Natura 2000 areas in the Swedish waters or in the Swedish EEZ, and in order to establish an offshore wind park in or near those areas, the project developer has to obtain the approval of the Land and Environmental Court.