Swedish Wind Centre

Background and existing activities in the field

Motivation

Sweden has set some of the world's most ambitious long-term climate and energy goals. Under the Climate Policy Framework and Climate Act, Sweden aims for net-zero greenhouse gas emissions by 2045, followed by negative emissions thereafter. In line with this pathway, Sweden has adopted a target of 100 % fossil-free electricity by 2040. Achieving these objectives will require a rapid and robust expansion of wind power as a cornerstone of the future electricity system, regardless of the level of nuclear that will be built.

Wind energy is already central to the Swedish electricity mix. Over the last decade, the share of wind power has increased from single digits to roughly a quarter of total electricity production. During last year, wind power provided 25% of Sweden's electricity on annual basis, but also provided more than 50% of the electricity consumption on hourly basis during multiple hours throughout the year with strong wind conditions, thus surpassing both nuclear and hydro in both electricity production and installed capacity.

The government and transmission system operator anticipate that the Swedish electricity demand will roughly double to around 300 TWh over the next two decades, driven mostly by electrification of transportation, and energy-intensive industry. This combination of rapid demand growth and high climate ambition makes continued, system-oriented wind power deployment an urgent national priority. The industrial and political context reinforces this need. Sweden's globally competitive, export-oriented industries including steel, cement, petrochemical, manufacturing and data- and battery-intensive sectors are planning large-scale electrification through the use of green hydrogen, all of which depend on abundant, predictable access to low-cost electricity. At the same time, recent years have revealed significant bottlenecks and uncertainties: permitting lead times, local acceptance, grid constraints, volatile power prices and evolving security considerations in the Baltic Sea have all contributed to periods of slower investment and cancelled projects. For example, more than 100 GW of offshore wind projects that were until recently in various stages of development around Sweden, particularly in the south where demand is growing fastest, but investors currently face an uncertain framework with no dedicated offshore plan and limited state support for grid connections. A national research centre focused on wind energy can provide independent expert advice, tools and processes needed to facilitate a rapid electrification. A national centre is key to a successful establishment during the specific conditions that are present in Swedish conditions, containing a variation from onshore forested conditions to specific Baltic Sea conditions that vary from other areas of interest where international research is concentrated.

The proposed Swedish wind energy research centre will also be a key instrument for delivering on European Union climate and energy commitments. Under the European Green Deal and Fit for 55 package, the EU has pledged to cut net greenhouse gas emissions by at least 55 % by 2030 and to achieve climate neutrality by 2050.

In summary, establishing a national research centre for wind energy in Sweden is a timely and necessary response to national and European climate objectives, to the urgent need for large-scale electrification, and to a rapidly evolving political and industrial landscape. It will provide a stable, long-term knowledge base that enables Sweden and the EU to expand wind power in a way that is technically robust, economically efficient and socially sustainable.

Areas of expertise

The new centre, or rather extension of the existing Swedish Wind Centre, has an extensive experience and expertise at both academic and industrial actors. In this section, the academic and industrial background expertise is highlighted. This background is connected to planned thematic areas according to the research agenda further elaborated in chapter Research agenda.

Social, economic and planning aspects of wind power

Current research in the field connects to state-of-the-art developments in participatory planning, digital modelling, and GIS-based decision support systems. The main actors in Sweden are the Swedish University of Agricultural Sciences (SLU), Uppsala University (UU) and Chalmers University of Technology (Chalmers).

Research on planning of wind power within the consortium spans from empirically-grounded analyses of feasible deployment rates to the spatial, political, and institutional conditions that shape where wind power is built and which policy instruments are most effective. A central contribution is the development of methods to estimate realistic and achievable expansion speeds, drawing on historical deployment trajectories, inflection-point detection, and analysis of the socio-technical and political drivers behind observed growth patterns. In addition, significant emphasis is placed on siting dynamics and spatial heterogeneity. By analysing GIS-level data of actual installations, the work demonstrates that wind power uptake is not merely focused on the windiest sites but is shaped by land-type constraints (protected areas, competing uses), grid-access and local siting policy. This work highlights that deployment is strongly policy-driven and that acceleration depends on stable permitting regimes, sustained financial support, and the management of local acceptance and land-use conflicts.

Other performed research is on, the evolution of policy frameworks, and where wind power is placed. Analyses on what shapes the acceptance or rejection of wind power in local communities is also studied.

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Wind energy siting

The excellence within this field spans from atmospheric physics, boundary layer flows to fundamental understanding of local conditions and site suitability, and how wind turbines and farm are influenced by these conditions. This has a strong connection to other thematic areas, such as Operation and maintenance and Integration. Specific focus is given to Swedish specific conditions.

UU, KTH, Chalmers, SMHI, RISE and LU are the main actors within this focus area. UU and SMHI have a long experience of mesoscale and boundary layer meteorology. UU, KTH, Chalmers, LU and RISE all have a long experience of microscale modelling. The expertise spans from direct numerical simulations (DNS) to global circulation modelling. UU and KTH also have large experimental activities where UU focus on field measurements and KTH on wind tunnel activities. The activities are in the international forefront in this field.

The academic partners have a broad and active research program in wind energy siting, with a strong focus on conditions typical of the Nordic region. This includes forested terrain, cold-climate considerations, complex topography and the Baltic Sea offshore environment. The research activities integrate field measurements, modelling and observational and reanalysis datasets, enabling robust site assessments spanning multiple spatial and temporal scales.

The research activities address the full atmosphere-surface system relevant for siting. Offshore studies investigate how coastal and marine environments frequently display non-standard wind profiles, such as low-level jets and enhanced vertical shear, which strongly influence turbine energy yield, wake recovery and fatigue loading. Complementary advances in coupled atmosphere–wave–ocean modelling demonstrate that these interactions can significantly alter wind resource estimates compared with stand-alone atmospheric models, underscoring the importance of integrated assessment methods in offshore siting.

On land, the centre partners lead research on wind energy in forested and complex terrain, where vegetation structure and topography modify boundary-layer flow, turbulence, and thus expected production and operational uncertainty.

Wind-farm-scale siting is tackled through experimental and computational studies of wake dynamics and flow interaction, examining how e.g. turbine spacing and flow modified by the terrain influence performance. These results support optimisation of farm layouts to minimise wake losses.

Foundational work on boundary-layer turbulence improves understanding of atmospheric variability at turbine hub height. This is crucial for reducing uncertainty in resource assessment and load predictions. The combined use of in-situ observations, advanced simulations and reanalysis data ensures that methodology and results are both scientifically rigorous and directly applicable to real-world planning and decision-making.

Included in this part is also novel numerical method development pushing the limit for how fast high-fidelity modelling can be achieved by using the so-called Lattice Boltzmann method om combination with GPU usage. This resulting in ability for industrial actors to apply a higher level of modelling accuracy.

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Environment and material

The material science is mainly performed by LTH, LTU, UU, Chalmers Industriteknik, Chalmers and RISE while the environmental focus is more pronounced at SLU, KTH and Chalmers. Several generators for wind turbines with the focus on permanent magnet synchronous generators have been developed and constructed. Research in the use of permanent magnets that are based on alternative permanent magnetic materials (free from, or with reduced usage of rare earth metals) to create more sustainable wind turbine generators are also carried out. The expertise in fibre composite materials spans all relevant scales that govern the performance of composite structures, such as those used in wind turbine blades. The influence of processing conditions on the performance of materials and structures is a key aspect considered in most of the research. Research regarding long-term performance and damage tolerance of composites exposed to harsh conditions (e.g., time, temperature, and humidity), multifunctional composites, joints, modelling of composite processes, repair techniques, and recycling methods are carried out.

Minimizing the negative effects on the environment is an important aspect in the planning of new wind power production. Low and well verified environmental effects have the last years also been increasingly important arguments in marketing of new products in the energy systems area. Different types of effects need to be assessed, including effects of production, maintenance and recycling of the turbine and its connected technical systems as well as the ecological effects on the land or water around the plant. Studies on the effects on wildlife and the marine environment have been performed e.g. at SLU while LCA studies on the plant itself have been reported e.g. at KTH.

The construction phase is normally responsible for the most severe negative climate effects of a plant, with loads connected to use of especially materials and energy. It is important that he assessment of new solutions are based on high quality research including a life cycle perspective. This is especially emphasized for involved materials with more complex life cycles due to probable recycling (e.g. metals), cascade use (most materials involved) and capacity for long term storage of biobased carbon (e.g. wood). Studies on the effects due to recycling of involved materials are presented by e.g. Chalmers, while advanced time dynamic LCAs of biobased production materials are presented by e.g. SLU.

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Operation and maintenance
The core of operation and maintenance (O&M) engineering lies in optimizing asset availability with respect to costs, benefits, and risks. The discipline encompasses decision analysis, value of information, reliability theory, maintainability, and maintenance supportability, including spare parts logistics, inspection, condition monitoring, diagnostics, asset degradation, prognostics, risk assessment, and life-cycle cost analysis. Accurate prediction of the remaining useful life of components, systems, and entire wind parks is essential for effective engineering asset management of wind turbine plants, with hybrid approaches combining physics-based and data-driven methods playing a key role. The adoption of IoT and emerging sensor technologies enables efficient data acquisition, while machine learning and AI techniques provide powerful tools for advanced diagnostics and prognostics. By understanding, modelling, and updating degradation processes using data, it becomes possible to optimize O&M strategies, enhance plant performance, and extend the service life of assets.

LTH, LTU and Chalmers are the main actors within this research area. LTH focuses on service life management combining and optimising jointly technical and economic performance wind parks on the basis of decision and value of information analysis.

LTU hosts an advanced centre for condition monitoring with SKF that educates PhD students and developed methods and systems for condition monitoring of rotating machinery using signal processing approaches and machine learning/AI technologies that has strong synergies with SWC. Chalmers is mainly focusing on multi criteria optimising of operation of turbines what are producing energy as well as supplying ancillary services. Also, Chalmers has expertise with relation to condition assessment for energy infrastructures based on wave and vibration based non-destructive testing techniques, with broad proficiency in guided wave propagation, structural dynamics, signal processing and machine learning.

SMHI delivers weather warnings and operational forecasts in the range from minutes to several days as well as products tailored to the user needs. UU also focus on wind farm operation and optimization.

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Integration in the power system
The integration of wind power into the power system needs both excellent component knowledge as well as system knowledge and is the key to success within the area of electrical systems and components. Excellence in both theory building as well as experimental verification is vital for success. When wind power reaches a certain level in the power system, it must deliver ancillary services such as control of voltage and frequency, inertia and black start capabilities and not only

energy. Here different flexibility strategies to handle large scale system wind power variation should be evaluated based on techno-economic modelling and analysis. Second, the ability should be verified for large wind farms to remain synchronized to the power grid in a safe and stable manner during grid disturbances at all different types of system states. Third, the capability should be assessed for large wind farms, with/without assisted energy storage systems, to provide ancillary services to the power system to improve its stability during contingency events.

Chalmers, KTH, RISE, LU and UU are the main actors in this area. Chalmers has driven the development of generators for high voltage as well as dc-collection grids, with both dc systems as well as dc-converters being developed on both a theoretical and experimental path. Chalmers also has a long history of research experience and state-of-the-art knowledge in wind power and their grid integration issues.

RISE has experience from dc based offshore grid systems as well as frequency regulation of the grid based on wind power. LU has experience of non-synchronous generation and knowledge on fault behaviour and on frequency dynamics, as well as on using wind power for black start and how to connect more wind power to existing grid through active network management. KTH has since decades worked with many types of wind power integration: system reliability, balancing wind power with hydro power, balancing with electric vehicles, wind power for system voltage control and minimizing of wind curtailments. All research is done in collaboration with network companies and uses models of actual networks or even field tests. UU is performing research on the resilience of the power system when the amount of wind power is increased. UU has also led research into the predictability of the wind energy system at different time scales and has established a collaboration with SVK to increase the knowledge on limits and uncertainty in wind energy forecasting.

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Infrastructure

The consortium possesses a large set of infrastructures. This includes two in house owned turbines, field measurement equipment, permenent meteorological test site on east Gotland, large set of wind tunnel infrastructure, vibration labs, climate chambers, composite lab, available large computer clusters and test beds for sustainable composite production, corrosion testing in seawater and for surface analysis and surface design. In addition, the industrial partners own and operate several wind farms in Sweden and provide excellent source of field operational data and good access to measurements on industrial-scale turbines and wind farms.

International collaboration

The existing international activities by the academic partners consist of a large share of collaboration through international research projects. It does also contain participation in a number of international key collaboration organizations such as European Academy for Wind Energy, European Energy Research Alliance and International Energy Agency.

The European Academy for Wind Energy (EAWE) brings together academic actors in the field of wind energy in Europe and results in many collaborations and is an initiative basis for EU projects etc. EAWE also organizes annual conferences, annual PhD seminar as well as hosts a scientific journal. UU, KTH and Chalmers are active members in EAWE.

The European Energy Research Alliance Joint Program on Wind Energy (EERA JP Wind) is of strategic importance as the organization has a strong connection to the EU Commission and has an impact on calls in the area as well as to ETIP and the wind industry. UU, KTH, Chalmers and RISE are active partners. The organization is a basis for joint EU applications. In addition, EERA organizes annual conferences and thematic seminars.

Additionally, the research partners are active in a number of International Energy Agency wind (IEA Wind) tasks gathering international expertise in different thematic fields. The partners have e.g. participated in the following tasks: Task 25 Integration, Task 31 Wake Bench, Task 34 WREN and Task 42 Lifetime extension, Task 43 Digitalization, Task 44 Farm Flow Control, Task 45 Recycling, Task 47 Aerodynamics, Task 51 Forecasting, Task 55 REFWIND and Task 57 Joint assessment of models.

In addition, researchers from SWC are active in a large number of international projects, of which many are financed by EU.

With this, international contacts are collaborative rather than competing. SWC’s focus on Swedish conditions, will stimulate further collaboration since our research will be acknowledged as contributions to knowledge gaps in the international wind power research.

The research and innovation needs

SWC has during 2024 - 2025 together with academic and industrial members developed a research agenda The SWC research agenda outlines the opportunities and needs for Swedish wind energy research, emphasizing areas of national relevance while highlighting Sweden’s contributions to international research efforts. The agenda aims to advance knowledge and innovation tailored to Swedish conditions, addressing gaps where international actors partly have limited engagement. By identifying strong Swedish competencies and aligning them with global challenges, the agenda aims to enhance Sweden’s role in the international wind energy research community.

The research topics and questions presented in SWC’s research agenda, have been developed with special focus on the industry partners’ research needs. The agenda is based on several different international research agendas within wind power where industry partners ranked the importance of research topics, as well as added missing topics. The resulting research areas are described in section Research agenda. The SWC competence centre therefore has an excellent basis for research, in both academia and industry.

Vision, strategy and goals

Vison and strategy

The vision of SWC is that wind power should be a cost-effective and reliable power source for Sweden and the world. The Centre's contribution will be to develop both the technical and the social, economic and planning aspects of wind power. This is achieved by;

- **gathering academic research** in wind power related activities in Sweden in the existing centre in order to be able to meet the future challenges and the extensive expansion of wind power in Nordic conditions but also with an international perspective
- **connecting expertise from industry and academy** as a base for need-driven research within identified knowledge gaps
- **delivering competence** throughout a number of projects resulting in PhD dissertations and postdoctoral researcher (postdoc) projects
- **ensuring increased knowledge** in both academia and industry by addressing future challenges together
- special focus on **knowledge transfer to industry through dissemination activities.**

The success criteria for reaching the vision for the SWC are:

- being a large network within wind power for national issues regarding wind power, whether the questions come from industry, academia or society.
- that the industry partners are active in the projects, either by participation directly in the projects or by being in the reference group to decide scope and direction of an ongoing project
- that the industry partners act as a stakeholder community that gives advice on the overall SWC strategy via the programme council based on their own industrial needs and priorities as well as pre-established research roadmaps
- collaboration between academic partners in the same project
- that researchers within SWC also are participating in international research projects and in international wind power organisations.
- that researchers within SWC and industry partners are contributing towards cross-industry standards and best practice guidelines
- that equipment and infrastructures at the industry partners are used in the projects

The proposed research themes, see more in section Research agenda, covers all areas needed for making wind power cost-effective and reliable. The coming research projects will therefore be within the themes. The centre of excellence will bring together actors from both academia and industry. This will create an environment where partners will get to know each other. This will be stimulated by projects but also annual events, seminars etc. Together, this will result in closer collaboration and that academic activities develop in a suitable direction.

In 2037 the needs of the wind industry will be different from today. Collaboration between academia and industry will still be needed and therefore there is a role for SWC to play even after 10 years of operation. The knowledge that has been developed in the Swedish Wind Centre during its 10 years of operation will be a solid base to meet the future challenges for wind power in Sweden and internationally.

Goals

Overarching goals

- Established a long-term cooperation between academia, industry and public sector within wind power.
- Research results that will contribute to the transition to a sustainable power system.
- Decreasing the gaps between state-of-the-art research and daily practice in industry.
- Implementation of the results by participating companies and other societal stakeholders.
- Foundation of a national gathering point bringing stakeholder together.
- Excellent need-based research is being conducted in active collaboration between industry and academy.
- Knowledge from research projects is used in courses at the participating universities, preparing new engineers for work in wind energy sector.

In addition to the overarching goals, the centre has identified the following key performance indices for easier evaluation of the centre progress.

KPIs	2027-2031
# Journal publications	20
# Conference proceedings	18
# PhD students in projects	9
# Postdocs in projects	6
# Industry partners per project	3
Gender balance ratio in the centre	40/60
# Workshops and seminars with relevant stakeholders	40
# Research summaries	12
# Persons engaged in mobility programme	6
# Public dissemination activities	10
# International cooperation extended by partnership in associated international	3
# International scientific participants in centre activities	10

Needs and benefits for involved stakeholders

With electricity prices going down, wind power developers and owners need to optimise the planning, operation and maintenance of wind turbines in order to lower the levelized cost of energy (LCOE). Wind power is increasingly seen as one important part of the energy system, and therefore the interaction between wind power and storage, district heating and hydrogen for example needs to be studied to see the possible benefits and challenges. With an increasing amount of wind power in the electric grid, the grid owners see new challenges with power quality and ancillary services, as well as how to best use the existing grid. How to address the industry needs are described in the research questions in **Error! Reference source not found.**. The benefits for participating companies are listed below.

- Increasing the degree of confidence for the wind resource assessment of a wind project investment.
- Guidelines and best practise when developing wind energy in Nordic conditions.
- Best practice in modelling and faster models.
- Improved possibilities to optimize wind farm layout and control.
- Tackle challenges with larger and larger turbines.
- Decreased CO_2 emissions from materials used in the turbine.

- More efficient and intelligent operation of the wind turbine in Nordic conditions, considering the entire project costs and avoidance of unfavourable operations.
- Reducing the uncertainty of the lifespan of the turbine and its components in Nordic conditions.
- Increased knowledge of wind turbine's direct effect on the power system.
- A systematic and cost-effective grid planning for both transmission system operators (TSOs) and distribution system operators (DSOs).
- Alternative solutions to local grid solutions for DSOs.

Implementation and outcomes

Project plan

The overall focus of the centre is wind power in Nordic conditions such as challenges regarding forested areas, cold climate, complex terrain and the specific conditions of the Baltic Sea as well as the Western Sea. The research areas are divided into five themes as described in Research agenda**Error! Reference source not found.**: Social, economic and planning aspects of wind power, Wind energy siting, Environment and material, Operation and maintenance as well as Integration in the power system. The centre encompasses the whole chain in wind power development; from planning a site to decommissioning. The themes are described in detail below. The project portfolio will be divided between the different themes. The funding between the five different research themes will be roughly 25/20/10/20/25% for Social, economic and planning aspects of wind power/Wind energy siting/Environment and material/Operation and maintenance/Integration in the power system

A preliminary plan of the different projects within stage 1 of SWC can be seen in **Error! Reference source not found.**. The main part of the projects in SWC will be PhD and postdoc projects in order to build competence. These projects can be complemented with a work package done by a senior researcher, in order to increase the progress of the projects and deliver usable results to the participating companies faster. About 70% of the project funding within SWC will go to PhD students. The remaining 30% will go to postdocs and senior researchers. The centre will strive for at least three industry partners in each project.

The plan is to start up several PhD projects early in 2027 so that they can reach dissertation during the first five years of SWC. This will be followed by two calls of postdoctoral project, one during 2027 and one later to catch upcoming research needs. To be able to start PhD projects in 2027, the centre plans to have a call for projects already during autumn 2026. By not starting all projects at the same time, the centre will continuously contribute with new competence within wind power and also deliver results from the research at a more even pace. The exact number of projects depends on the distribution between PhD and postdoc projects. This will be determined when SWC commences and the specific projects will be decided. With this project plan, we ensure a continuous development. The active leadership and continuous communication with stakeholders ensures that the research needs are addressed and modified when needed

With the Swedish Wind Centre in operation for 10 years it will be natural for the industry and academy to continue the cooperation and adapt the research to the new needs that have arisen. By gathering national expertise with international connections, the partners will see the added value created and by fulfilling the goals of SWC, the centre will very probably be an establish arena for the foreseeable future.

Research agenda

Research agenda has been developed in the existing SWC, on how see section The research and innovation needs. Based on lengthy discussion with industry partners, the following research questions have been developed. These questions are the basis for the coming projects within SWC.

Social, economic and planning aspects of wind power

The successful large-scale deployment of wind power in Sweden depends not only on technological progress and system integration but also on the social, economic, and institutional frameworks that enable a just, inclusive, and resilient energy transition. This research theme focuses on understanding and shaping the social and economic dimensions of technological change in wind power—from local community acceptance to new business and revenue models. The objective is to ensure that wind energy development strengthens societal trust, regional growth, and Sweden's long-term competitiveness in a sustainable way.

Below the research questions within Social, economic and planning aspects of wind power is described.

Governance and participation

Strong governance structures and participatory approaches are essential for ensuring public legitimacy and effective decision-making in the deployment of wind power. Research in this area seeks to understand how collaborative planning and transparent governance can improve social acceptance and institutional stability.

- How can new governance models enhance social acceptance and long-term legitimacy of wind energy projects?
- What roles can municipalities, regional actors, and citizens play in co-owning, co-managing, or co-financing wind power developments?
- How can transparent and participatory processes be institutionalized in planning and permitting frameworks?

Regional economic development, value creation, and business models

Wind power can generate substantial regional benefits if supported by strategic economic planning and innovative business models. Research focuses on how local and regional economies can capture value, promote entrepreneurship, and develop resilient supply chains tied to the wind energy sector.

- How do local and regional economies, including employment, skills development, and supply chains, affect wind power deployment?
- What mechanisms and policy tools ensure fair distribution of economic benefits and compensation to affected communities?
- How can new business models for wind power promote the deployment of wind power, e.g., through diversified value proposition and capture?
- How can regional and national policies stimulate entrepreneurship and innovation around the wind energy sector?

Support actors and institutional embedding

Successful wind power deployment depends on a network of support actors that bridge government, industry, and society. Research aims to identify which organizations can serve as facilitators or intermediaries and how they can become enduring elements in Sweden's socio-technical system.

- Which support actors (e.g., intermediaries, associations, local facilitators) are essential for successful deployment of wind power in Sweden?
- How can these actors become established and legitimate functions in the sociotechnical system?

- What types of organizational structures and long-term funding mechanisms can sustain these roles?
- How can collaboration between government, industry, academia, and civil society be structured to accelerate wind power deployment?

Economic and policy instruments

- Economic and policy tools play a central role in shaping incentives, managing risk, and guiding long-term investments in wind energy. Research in this area examines how market designs and fiscal frameworks can integrate social and environmental objectives alongside economic performance.
- How can market design, auction models, and regulatory frameworks account for social value creation and long-term sustainability?
- What are the macroeconomic and fiscal effects of large-scale wind deployment under different policy scenarios?
- How can integrated cost–benefit and risk assessments include social, environmental, and system-level factors in investment decisions?

Wind power planning

Experiences with setting the course too late in terms of the actual feasibility of wind power projects hurt wind power development both economically and commercially, and with regard to timelines.

- How can planning and permitting for wind energy (and the relevant grid expansion) be effectively tiered between governance levels and marine/ geographical scales?
- Which solutions do other countries that qualify as forerunners pursue to benefit from a more scaled and binding planning approach?

Co-existence with Defence force

Conflicting interest and restrictions due to military use, such as radar, can be mitigated by further research. Solutions to these questions will enhance the defence capabilities of Sweden.

- How can future energy system with a large share of wind energy contribute to energy resilience? How will large offshore wind farms impact radar systems?
- How can wind energy infrastructures provide possibilities for military sensors?

Wind energy siting

Wind power siting is a crucial research theme in Sweden, focusing on identifying optimal locations for wind farms while balancing environmental, social, and economic factors. This theme connects to the state-of-the-art by integrating advanced modelling techniques with measurements including remote sensing technologies to optimize wind farm performance.

Below the research questions within Wind energy siting is described.

Characterization of flow conditions

The wind flow reaching wind parks is subjected to the complex processes in the atmosphere in interaction with the surface. Changes in the diurnal cycle as well as the given terrain and vegetation, shape the wind with particular features that affect the park performance. The offshore conditions in the Baltic Sea have particular conditions compared to e.g. the North Sea.

- How is the prediction of the incoming flow to yield energy extraction as well as the dynamic loads on the wind turbines best achieved?
- How important is it to correctly predict events such as low-level jets or shallow boundary layers (offshore) and what methodology is applicable in research and industrial applications?

- What accuracy is needed to characterize wind in complex and forested terrains?
- How is prediction of degradation and failure best modelled?

Modelling wind, as an energy resource, in space and time

Modelling of the wind is carried out by employing computational methods to solve flow equations. Models include the representation of conditions of the atmosphere and the ground to assess how these affect the wind motion within a region and during a period of time. With larger rotors and larger farms, new modelling challenges needs to be addressed, e.g., rotor's interaction with the top of the boundary layer, blockage and gravity waves.

- How can the ability to accurately predict characteristics of the wind such as velocity, direction, turbulence, temperature, etc. on all relevant scales be improved?
- How do we best assess the ability to optimize the location and design of wind turbines and farms as well as to anticipate their performance from short to long periods of time and with it, securing the energy supply?
- There is a large gap between industrial and state-of-the-art modelling tools used in academy, how can we better validate when and how engineering tools are applicable?
- Can novel methods such as Lattice Boltzmann replace Navier-Stokes solvers and thereby increase industrial ability to use high fidelity modelling in daily workflow?

Wakes and farm-to-farm interaction

This effort focuses on how the disturbed airflow behind turbines and farms affects the performance of downstream turbines and farms. This includes studying the interaction between wakes, turbulence, and arrangement of turbines within a farm using e.g. large-eddy simulations.

- To what extent can research enhances the efficiency and performance of wind farms by minimizing wake-induced energy losses and mechanical stress on turbine
- Do wake and wake-wake interaction effects depend on near-wake and blade flow details? Can novel farm control techniques improve farm efficiency?
- What methodology fulfil future needs for wake simulations considering larger rotors in larger wind farms?
- How can farm to farm interaction be performed with best practice considering the spatial scale of the problem and corresponding balance between numerical accuracy and size of areas considered?

Wind power in typical Swedish conditions, i.e., forest and Baltic conditions

These environments present unique challenges for energy resource assessment such as complex wind patterns, turbulence, low-level jets and interaction with waves and ocean currents. Can today's high-fidelity models, to a large extent developed by SWC partners, that partly can predict these events to a very large numerical cost, be represented with simplified engineering models?

- To what accuracy can these hight fidelity models be developed and validated?
- Turbines located in complex terrain does to a larger extent experience difference between pre-assessment an actual loads and degradation, how can industrial practice, and their models, be modified to overcome this problem?
- Can machine learning approaches be used to identify why extreme or fatigue loads, resulting in degradation or failures, are overlooked by today's practice?

Icing effect on production, revenue and lifetime

Icing can significantly reduce energy output, increase maintenance costs, and lead to premature equipment failure. This research aims to mitigate these effects, ensuring reliable and efficient wind power generation in cold climates.

- How can the entire modelling chain; from meteorological conditions, resulting in different types of ice structures, ice accretion modelling on the blades, to load and power estimations be achieved and improved?

Remote sensing

SODAR and LIDAR are key instruments for wind resource assessment and are often used in research. As turbine models become larger, the need to rely on remote sensing for wind measurements increases. Furthermore, to facilitate participation of wind farms in grid balancing services, independent wind measurements for operation is desired.

- How can the weak points of remote sensing (turbulence accuracy, sensitivity to complex terrain and general data availability) be improved?
- How can remote sensing contribute to independent site measurements used for wind farm operation?
- Can the industrial measurement standards be reformulated to take full advantage of the possibilities that remote sensing offers?
- How can remote sensing best be used for specifically Swedish conditions (such as measurements of icing risk, strong annual cycles and in the Baltic Sea and over forested terrain)?

Environment and material

Biodiversity solutions

Biodiversity is a prerequisite for all life on Earth. With loss of biodiversity, the planet loses vital and irreplaceable ecosystem services that both people and society depend on to function. It is vital for food production, fresh air, clean water and the society will be more resilient towards global changes, heath threats and catastrophes.

- What can be assessed as ´best available science´ to effectively and affordably unfold the mitigation hierarchy to favour biodiversity, i.e. through macro-siting (impact avoidance), micro-siting (impact reduction), turbine operation (curtailments, camera systems), and compensation as a last resort?

Sustainable and low-carbon value chains

Transitioning to sustainable and low-carbon practices is critical to minimize environmental impacts and strengthen circularity in wind power. Research explores institutional, technological, and policy pathways for achieving low-carbon supply chains and end-of-life management for turbines.

- What institutional frameworks and business models are needed to implement sustainable and low-carbon practices across the wind power sector—from design to end-of-life?
- How can policy incentives and procurement strategies drive the adoption of sustainable technologies and practices in the wind energy industry?

Development and demonstration of recycling methods for wind turbine components

Research on recycling and reuse methods for wind turbine materials, manufacturing waste, and components has mainly focused on the blades since already more than 90% of the turbine is recycled today. Research on End-of-Life solutions for wind turbine blades are demonstrating innovative ways of reusing decommissioned blades.

- How can the recycling techniques for composite blades, both mechanical and thermal treatments be further developed, to reduce waste and lower the environmental impacts even more?
- How can one or several sustainable value chain(s) for wind turbine blades be established, regardless of the material used or of the process used (repurposing/recycling/incineration/ cement coprocessing).
- How can metals from decommissioned wind turbines be repurposed?
- What are the economic benefits of recycling of turbine blades?

Life cycle assessments

Life cycle assessments (LCAs) of wind power provide a comprehensive evaluation of sustainability impacts across all stages—from raw material extraction and manufacturing to operation and end-of-life recycling—and allows for the integration and assessment of all kinds of environmental and societal impacts simultaneously, thereby addressing trade-offs among different types of impacts as well as impacts occurring in different life cycle stages. This broad assessment approach can identify critical hotspots across the life cycle of wind power plants, thus informing important decisions regarding design and materials selection that can minimize overall negative impacts.

- What are the potential environmental gains from different design and material use decisions for future wind power turbines, as well as various sourcing strategies of the required materials? How do these change based on onshore and offshore wind power plants?
- How can LCAs be designed to be parameterized and thereby made scalable to different sizes and types of construction?
- What are the potential societal implications in terms of impacts on people and their local communities as well as the society at large along the supply chain from future design and material use decisions? Further, what are the trade-offs between the environmental and societal implications at these points of decision? How do these change based on onshore and offshore wind power plants?
- How do the overall sustainability impacts from large scale wind power plants compare to the corresponding sustainability impacts from other technologies for electricity generation in the future? How do these change based on onshore and offshore wind power plants?
- What are the potential opportunities and risks from a sustainability perspective from increasing circularity in the wind power sector? How do these change based on onshore and offshore wind power plants?

Operation and maintenance

Regardless of which future scenario for the Swedish energy system will take place, there are more than 5000 wind turbines in Sweden today with an estimated asset value of many billions SEK. Increasing revenue is key, both from an asset management point of view, but also to ensure future growth. This can be done by decreasing operational costs and/or increase income, for instance from ancillary services. Extending the lifetime of turbines can help reduce the CO2 emission per produced kWh electricity, since most of the CO2 emissions from wind turbines are associated with its erection and decommissioning. The operation and maintenance question is in many aspects: For a given asset, what is the operational cost for producing electricity at a certain instant in a certain mode of operation (full production, curtailed etc), and how can it be reduced? This is closely connected to the question: What is the remaining useful life of the asset and its components? Most of these aspects are currently studied throughout the international research community. This includes predictive maintenance strategies, methods to estimate remaining useful life of components (especially blades, main bearings, and gearboxes), condition monitoring. Novel control strategies can be developed to take full advantage of these findings. Due to the vast amount of operational data collected, wind energy research was in the forefront in the development of data-driven methods that are now getting widespread attention. The overarching issue is how to estimate the remaining useful life of a component or system, how to mitigate faults and failures, and how to control the turbine to take full advantage of the asset.

Below the research questions within Operation and maintenance is described.

Lifetime assessment

The overarching issue is how to estimate the remaining useful life of a component or system, how to mitigate faults and failures, and how to control the turbine to take full advantage of the asset.

- How can a digital twin be built based on reasonable available turbine data (SCADA, CMS, more) to accurately describe the turbine status (including RUL of components) and guide the owner in operation and maintenance decisions? What are the critical additional data and information needed to reach this goal?

Lifetime extension

Lifetime extension (LTE) means a technical assessment for continued operation of the turbine (possibly with minor repairs) over a given time horizon.

- What data is needed to do conduct LTE (already available or from additional instrumentation)?
- How shall the turbine be operated in an LTE scenario?

Impact of wind turbine control on operation

- Wind turbines can play a much bigger role in the energy system, especially considering that wind turbines can, from a technical point of view, offer an enormous potential in instantaneous adapting production to the demands of the grid, at different timescales.
- How can costs and income for wind turbines providing ancillary services (e.g. lost production, reduced loads) be quantified?
- How can model-predictive control be used to improve operation (reducing harmful loads without sacrificing production).

Digitalisation

Although digitalization in theory offers a huge potential in improving O&M practice, several practical obstacles stop a widespread use. This topic connects to ongoing work in IEA-TCP 43.

- How can operation and maintenance data be made available to increase O&M knowledge?
- How can data tools efficiently re-sort and organize data from several sources and formats?
- How can alarm codes from different turbines be systemized?

Modelling and synthetic data

It needs to be determined when different kinds of models are needed and the pros and cons with each. Synthetic data can be a valuable tool for many research projects and also increase the possibility to compare results.

- When and where are detailed physical models needed to predict degradation and failure?
- Which are the best-suited stochastic models and parameters for performing adequate and accurate systems reliability assessments?
- How can these models be used to estimate RUL of turbine and components in a practical setting?
- How can wind turbine internal load time-series be recreated from SCADA data?
- How can synthetic wind data be created to be used for operation modelling?

Remote turbine inspections

O&M costs are largely driven by site visits. Remote turbine inspections topic covers a range of use cases involving asset inspection assisted in real time by remote specialists such as safety walks, fire alarms, etc. The industry needs a cost-effective approach for real-time collaboration between site and off-site teams. Technologies such as augmented reality may help to perform O&M with minimal risks and costs.

- How can remote turbine inspections be developed?

Blade reliability and maintenance

Enhanced methods are being developed for in-field repair of composite structures using carbon fibre based integrated de-icing technologies.

- How can the repair reliability and predictability for blades be improved, using i.e. fibre lay-up, anisotropy, or contact resistance?
- Can integrated heaters provide de-icing capabilities but also allow precise temperature control during repair curing, ensuring robust repairs under the harsh, cold conditions typical of the Nordic climate?
- How can structural health monitoring be used to detect early signs of damage and extend blade service life?
- Which novel composite materials can be used to extend blade lifetime?

Integration in the power system

Wind turbines play a significant role in the process of generation technology shift in the electricity system, where the direction is towards energy systems heavily based on renewable power, both in Sweden and many parts of the world. There will be a paradigm change when wind power becomes a dominating power production source in Sweden and then, wind power has to significantly increase its role to support different types of system services. The variability and uncertainty associated with wind are two of the main challenges that the electricity system is facing now and in the future. The reduction of existing dispatchable power generation and the increase and re-location of weather dependent generation calls for an increasing amount of flexibility resources that could handle power shortage, grid capacity shortage and other grid-related issues. The lead time and the cost to upgrade or expand the Swedish grid is long and high, therefore it is prudent to better utilise the existing grid so that more wind power can be installed. How this can be done should be further developed. Wind farms will need to contribute to the ancillary services markets that are developing in Sweden, such as reactive power and frequency control. In order to increase the grid properties of a wind farm as well as giving a complementary income for the owner, wind turbines can be coupled with different solutions of storage. This could for example be with batteries, methanol or hydrogen.

Below the research questions within Operation and maintenance is described.

Wind power and hybrid farms contribution to the Swedish power system

For the general power system, it is important to have a system which is flexible, both in the second-to-second balancing, to manage longer periods with high demand and low wind, as well as systems which mitigates the challenges with large changes from day to day. The research includes both technical challenges as well as market structures which promotes an efficient use of available resources as well as promotion of the right investments.

- How can the location of wind power reduce grid congestion and facilitate voltage control?
- How can wind power be placed to reduce public acceptance challenges and how does it compare to siting based on reduction of grid congestion and facilitating voltage control?
- How can different types of VRE (onshore wind with high and low specific power, offshore wind and solar PV) be combined to reduce variability and improve grid resilience?
- Which technologies and strategies are key complements to wind power to assure reliability and cost-efficiency?
- Is there an extra value, from system point of view, to combine wind power farms with storage, either as batteries, or hydrogen storage?
- Should wind turbines be available for ancillary services at nearly no wind?
- How can new loads for flexible electricity consumption be designed to make sure wind power is fully utilised?
- How can more cost-efficient investment decision be made when building hybrid farms?

Wind turbines and farms contribution to keeping the power system reliable and stable

Wind turbines and farms can contribute to ancillary services already today, but new ways of supporting the grid can be developed.

- How can wind power further contribute to the existing system services?
- How can wind turbines contribute to new services such as black start capability, island operation, reactive power support (dynamic, regulation and bulk) and power oscillation damping?
- How should the market for ancillary services be designed for an optimal use of wind power?
- How should one choose the rated wind speed and capacity of a wind farm?
- When and how should wind downregulate and deliver power system margins?

Use the existing grid to a larger extent

The flows on the lines will change much more in the future, with wind and solar power all over the system. This means a high value of grid control (e.g. FACTS of different kinds), but also on-line systems for estimation of available transmission capacities in the system between different areas. It is important for wind power investors to understand the connection between the grid capacity and what is reasonable to connect in a certain point. The question is both technical, contractual and a market design issue.

- How much flexibility in the production from wind and solar farms can be expected and provided in order to utilise the grid in the optimised way?
- How can hosting capacity in the grid increase, without building new power lines?
- How can flexible contracts be written?
- How should the availability of transmission and distribution system capacities be calculated/measured?

Dissemination of results

The centre will hold an internal conference each year where employees from all industry partners are welcome. This will be an opportunity for the participating industry to learn about all the different projects. The conference will make it possible for more people from each organisation to hear about the research.

To facilitate that the research results can be easier assimilated by the industry, SWC will work quite extensively with dissemination in the form of thematic webinars, expert meetings, facilitation of master theses ideas from industry and summarising results from the projects in an approachable way. Both thematic webinars and expert meetings will further the discussions between researchers and industry.

The centre will also help researchers to reach out to society in a way that is easy to understand. SWC will also write short reports regarding the research in the centre as well as produce movies about some of the research issues that will be presented on the centre's website.

SWC will facilitate personnel mobility there the ambition is that persons with key competence can move from academia to industry, and vice versa.

Follow-up on work and measuring of impacts

At each programme council meeting the status in the ongoing projects will be presented. The executive team will discuss the progress in each project quarterly with the project leader. This way potential problems can be discovered early and not cause delays in the research.

The executive team will continually follow-up on the centre's overall goals and KPIs to ensure that the centre will meet its goals. The projects will report their contribution to these in each year's annual report.

Timetable

Table 1 The main activities for SWC are listed here.

	2026		2027				2028				2029				2030				2031			
Activity	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1st call opens	X																					
1st project workshop is held	X																					
1st call closes		X																				
Centre agreement signed		X																				
SWC starts 2027-01-01			X																			
Programme council meetings			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
The first projects will start				X																		
internal conferences																						
The 2nd internal conference in 2024					X				X				X				X				X	
80% of the Centre budget will be allocated										X												
The first Licentiate thesis will be presented														X								

The timetable for SWC is seen in Table 1. Since SWC is already in operation, the plan is that during autumn 2026 some activities can already be started, in order to ensure a prompt start of the competence centre. One example is that the centre agreement will be signed before at the end of 2026. During autumn 2026, the first project call can be held so that early in 2027, the first programme council meeting can be held to make project recommendations. This makes it possible for the first projects to start in quarter 2 in 2027.

Annual internal conferences will be hosted for all members in the centre, starting in September 2027. By the end of 2028 at least 80% of the centre budget will be allocated. The first Licentiate thesis/midterm seminar is planned for Q4 2029.

Datum
2026-02-13

The structure of the competence centre

Organisation

Chalmers University of Technology/ Uppsala University will be hosting the Swedish Wind Centre. An overview of the organisation can be found in Figure 1. All organisational structures are presented below.

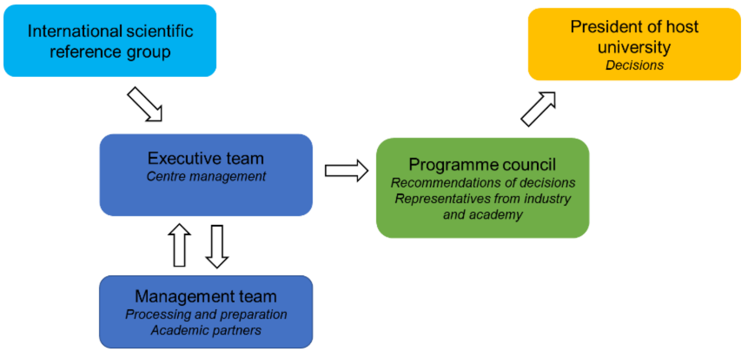

Figure 1 Organisational structure of Swedish Wind Centre

Executive team

The centre will be led by the executive team that consist of two directors and an industry disseminator. The directors are Stefan Ivanell from Uppsala University and Sara Fogelström from Chalmers. Åsa Elmqvist from Energiforsk is acting as industry disseminator. These three are today the members of the already existing executive team of SWC.

The executive team has extensive experience with competence centre leadership since Stefan was director for STandUp for Wind in 2014-2022, Sara was the coordinator for SWPTC between 2010 and 2020 as well as director in 2021-2022, and Åsa Elmqvist was leading Vindforsk between 2018-2022. Together Stefan, Sara and Åsa have led the Swedish Wind Centre in its current constellation since 2023. They have all the necessary skills and experience to operate the Swedish Wind Centre as a competence centre.

The executive team will organise the work within the centre, such as project calls, events, dissemination of results.

Management team

The management team consists of representation from all academic partners and research fields together with the executive team. The management group will prepare and process action points and decisions made by the programme council. The group will be led by the directors of the centre and handle recurring issues such as following up on activities, budget, communication, organisation of annual meetings, seminars.

The management group will apply an active management and gather once a month for regular meetings. In addition, working meetings on specific tasks and deliverables will take place continuously. The directors will by their active leadership methods further stimulate positive group dynamics within the management group to achieve best possible creativity, as well as stimulate a better coordination and cooperation of wind energy related research in Sweden.

Swedish Wind Centre already have an active management team today that is ready to continue their work in a competence centre.

Programme council

A programme council will be assembled with representatives from both academia and industry, and to cover all areas of expertise. The directors are co-opted to the programme council. The chairperson of the programme council should be a representative from the industry partners within the centre. The programme council is responsible for the long-term strategic issues of the centre and to assure that the centre follows the program description. The programme council will make recommendations for new projects and for the budget of the centre. The recommendations will be based on an approval process for project applications. The hosting university's president will make the final decisions regarding approval of projects.

SWC has a steering committee today that will be reformed to the programme council.

International scientific reference group

To benchmark the research within Swedish Wind Centre and to get input from outside partners, an international scientific reference group will be created. The group will consist of key academic partners within all research themes. This will also further increase the possibilities for international collaboration.

Complements existing competence centres and contributes to new networks

Among the existing competence centres, there is no centre regarding wind power. Almost all other power sources are represented by a centre today. This, together with the important role wind power will play in the future Swedish power system, speaks for the need of a competence centre within wind power.

Swedish Wind Centre has reached out to the Swedish Electricty Storage and Balacing Centre, Swedish Centre for Sustainable hydropower and Solar Electricity Research Centre and discussed possible cooperation. For all centres, there is an overlap in research questions that would benefit by projects covered by more than one centre. The cooperation can be done by having joint projects, where each centre finances a project, but there is direct cooperation between the PhD students/post docs in the projects. Other possibilities include having researchers from other centres as co-supervisors in projects, as well as apply for common projects in external calls.

Participation of stakeholders

The Centre consists of industry partners such as energy companies, renewable energy developers, owners of renewable energy farms, wind turbine manufacturers and regions. For this reason, SWC covers the whole value chain of wind power which also matches the spread of research questions that the centre has identified. The industry partners vary in size which will give them different opportunities to participate in projects.

Project applications

The project plan covers more research areas than the centre budget can cover. Therefore, the projects approved will be a selection from the research themes. The selection is made by the programme council through internal calls. This ensures a transparent process for projects within the centre.

To ensure that the research matches the industry needs, the call process will start with the industry partners highlighting the research topics that they would like to see projects in. Then, the researchers will formulate a project idea as one-pager. These will be presented at a project workshop where the industry partners can give feedback. The approved project ideas will then be developed into full project applications. The project applications will be scientifically evaluated by the academic partners and the result will be sent to the industry partners, who then can confirm participation in projects. The scientific evaluation will focus on Research novelty & impact, Feasibility of project and Constellation.

The final project applications will be evaluated by the programme council by looking at scientific evaluation, industry evaluation, diversity and relevance for the centre. The industry partners evaluate the projects for how well they match the need from the industry and rank the proposals accordingly. Diversity will be evaluated by an external expert within the field. All participants in the programme council will evaluate the project on how well they match the aim and scope of the centre. All criteria are then discussed and weighed together to reach recommendations for project approvals.

Scientific evaluation

- Research novelty & impact
  - What new knowledge will the project bring?
  - Novelty /originality of proposed research
- Feasibility of project
  - Are the project plan and budget credible and correlating with the project goals and expected results?
- Constellation
  - Access to the appropriate competence needed for the activities to be performed within the project.
  - Participation of relevant stakeholders.

Industry evaluation

- How well does the project match the need from the industry?

Diversity

- How well has the applicant considered equity and diversity aspects when setting the project team and roles?
- How well has the gender dimension [1]been taken into account when formulating the project's scope, content, goals and expected effects?

Relevance

- How well does the project match the aim and scope of the centre?

In addition to the internal calls, the directors will coordinate and stimulate applications (both national and international) outside the centre budget to scale up activities.

International collaboration for the centre

Following on the description in the background, the EAWE, EERA JP Wind, and IEA are important international arenas for existing activities as well as ongoing EU projects and associated networks. By gathering national activities within the wind field by the creation of SWC, an even stronger national coordination on the international arena can be achieved. By being able to represent national activities in many specialization fields at the international level, an increase in possibilities

[1] See Gender equality and diversity section.

to connect the thematic key persons, one will stimulate larger international engagements. The already well-established international collaborations will therefore benefit from a larger critical mass within SWC.

As a first step, fulfilling the result objectives and ambition, the directors will organize a workshop, during the second year, focusing on international collaboration and future possibilities to map ongoing activities and future possibilities and create a strategic plan on internationalization.

Gender equality and diversity

Gender equality and diversity are two very important factors for research and innovation. It has been shown that diversity enhances innovation and creativity as well as contributes to an increase in research output and with bigger impact through citations. Universities and institutes within energy research have been quite good at employing people from different cultural and geographical backgrounds, but when it comes to gender equality in academia in technology it is severely lacking. However, it can be noted that renewable energy and wind energy is seen as positive factors in attracting female students to technical education. SWC will contribute to making wind energy visible at Swedish universities, thus, offering a potential to reduce gender discrepancy in the technical student population.

Including the gender dimension in research is one of six key priorities of the European Research Area[2]. Therefore, this will be implemented in all research projects at the Swedish Wind Centre. Gender dimension in research means that gender is part of the research design and systematically checked for throughout the research process without necessarily being the main focus of analysis. The gender dimension in research will be implemented by that all project proposals will need to answer questions regarding this, for example:

- Have you considered how assessment of gender can affect what you want to investigate, what questions you ask and how to answer them?
- Are there other dimensions that can be considered in relation to sex/gender, such as age, ethnicity, educational level, income, occupation, geographical location or technical competence?
- Does the proposal explain how the sex/gender dimension will be handled?
- Have you considered whether the results of the research can have different effects on women and men, boys or girls? Can the research contribute to the advancement of gender equality?
- Does the underrepresentation of women in the energy sector, in terms of both production and decision-making, have any impact on the transition to more sustainable energy systems?

The project proposal should also motivate how the gender dimension is being handled. The list of questions evaluating the gender dimension will be developed further during the start of the centre.

The centre will organise a workshop in the start of the centre for all potential project leaders to teach them about how to implement the gender dimension in future project applications.

Swedish Wind Centre will strive for that gender equality in executive team, management team and programme council will reach a 60/40% distribution between men/women. The centre will encourage the academic partners to have a gender equal hiring and the centre will strive towards a 60/40% distribution between men/women & nonbinary in total.

[2] https://ec.europa.eu/info/research-and-innovation/strategy/era_en

Stakeholders

In Table 2 the preliminary representatives of the centre is presented. All areas of expertise are represented in the centre.

Table 2

Name of organisation and involved persons	Gender (M/F)	Position	Role in the centre
Fugen, Sónia Liléo	F		PC member
OX2, Eva Podgrajsek	F		PC member
Rabbalshede Kraft, Marie Magnusson	F		Member
RES, Pernilla Montgomery	F		Member
Skellefteå Kraft, Peter Jacobsson	M		PC member
SR Energy, Sarah Nilsson	F		PC member
Statkraft, Fredrik Stighall	M		PC member
Svenska kraftnät, Leif Petterson	M		PC member
VasaVind, Erik Holmgren	M		
Vattenfall, Björn Bolund	M		PC member
Västra Götalandsregionen, Fredrik Dolff	M		PC member
Region Gotland, XX			PC member
Energiforsk, Åsa Elmqvist	F		Executive team
Uppsala University, Stefan Ivanell	M	Prof. in Wind energy	Director, PI Wind energy siting
Uppsala University, Anders Goude	M		Management team, PI Wind energy siting
Chalmers, Sara Fogelström	F		Director, PI Integration
Chalmers, Håkan Johansson	M		Management team, PI Operation&Maintenance
KTH, Nicholas Honeth	M		Management team, PI Integration
LTU, Patrik Fernberg	M		Management team, PI Environment&Material
LU, Johan Revstedt	M		Management team, PI Wind energy siting
RISE, Anders Wickström	M		Management team,
SLU, Per-Anders Hansson	M		Management team, PI Environment&Material
SMHI, Jelena Bojarova	F		Management team, PI Wind energy siting
CIT, Alann Andre	M		Management team, PI Environment&Material

Academic stakeholders of SWC

The academic stakeholders of SWC are shortly presented below. More about their expertise in wind power can be found in Areas of expertise. Attached you will find CVs from the listed academic participants in.

Chalmers conducts research and education in technology and natural sciences at a high international level. The university has 3100 employees and 10,000 students, and offers education in engineering, science, shipping and architecture. With scientific excellence as a basis, Chalmers promotes knowledge and technical solutions for a sustainable world.

KTH has since its founding in 1827 grown to become one of Europe’s leading technical and engineering universities. KTH is Sweden’s largest technical research and learning institution.

LTU is Scandinavia's northernmost university of technology. The research at LTU is conducted in close collaboration with leading industries and international universities. LTU have 1770 employees and 17200 students.

LU was founded in 1666 and is regularly ranked among the world's top 100 universities. The university has 44 000 students and 8 000 co-workers organized in nine faculties, where the Faculty of Engineering, LTH, is the largest.

RISE is a national wide research institute. Most relevant for the centre is our work with applied research within renewable energy, wind power, energy systems, material development, corrosion protection. RISE has 2800 employees working as researchers, engineers and laboratory- or test bed technicians.

SLU focus on the interaction between humans, animals and ecosystems and the responsible use of natural resources, thereby contributing to sustainable societal development and good living conditions on our planet. SLU has about 3,000 employees, 5,000 students and doctoral students.

SMHI is a government agency with the task of being an expert body in meteorology, hydrology, oceanography and climatology. Thus, SMHI manages and develops information about weather, water and climate to society, business and the general public.

UU is the oldest university in Sweden, founded in 1477. UU will pursue top-quality research and education and interact constructively with society, to in different ways contribute to a better world. UU has over 50,000 students, more than 7,000 employees and a turnover of around SEK 7 billion.

Industry stakeholders in SWC

Short presentations of each industry partner. Will be written then the commitments have been made clear.

Financial plan

Short description of the budget when it is finalised.