NexSys (Next Generation Energy Systems)

Submission to Public Consultation on the Department of the Environment, Climate and Communications Statement of Strategy 2025- 2028

April 2025

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Introduction

NexSys (Next Generation Energy Systems) is an all-island, multidisciplinary energy research programme. Through this programme of research, 50 leading academics across 9 institutions are working in partnership with industry to tackle the challenges of energy system decarbonisation, developing evidence-based pathways for a net zero energy system.

NexSys is committed to engaging with national policy processes in order to provide evidence based research and policy insights in support of our net zero ambitions. The research programme will seek to actively engage with the Department as a key policy making organisation in this space; proactively identifying research needs and providing research outputs which are relevant to the Department's strategic goals.

This submission is intended to provide feedback on the Department's proposed Statement of Strategy 2025-2028 and to identify areas for further engagement with NexSys.

Feedback on Existing Strategic Goals Under the Statement of Strategy

The Previous Statement of Strategy (2024-2025) identified 6 strategic goals:

1. Be a recognised leader in climate action
2. Transform our energy system for a secure and affordable net zero emissions future
3. Restore, protect and enhance our natural environment
4. Deliver world class connectivity and communications
5. Deliver improved cyber security defence and resilience across Government and Society
6. Develop our people, culture, and organisation

Given the expected change in functions, this submission assumes that the objectives contained in Goals 4 and 5 will no longer be under the auspices of the Department, and the remaining Strategic Goals will be reformulated to address the challenges of the next three years with particular focus on the State's response to the triple planetary crises of climate change, biodiversity loss, and pollution, for which the future Department of Climate, Environment and Energy will have key responsibilities.

NexSys believes that in order to deliver on the strategic objectives and actions identified under Strategic Goals 1, 2 and 3 of the previous Statement of Strategy the reformulated Goals should reflect the strong relationship between effective climate action and research and innovation. Researchers across Irish institutions have the ability to address the kinds of wicked problems that lie at the heart of these crises.

General recommendations for the revised Statement of Strategy:

- NexSys would welcome a specific commitment to developing the necessary fundamental research and expertise in Ireland to allow us to meet our climate action and net zero ambitions.
    - In particular, continued funding for energy research will be needed in order to meet *Strategic Goal 2: "Transform our energy system for a secure and affordable net zero emissions future"*.
    - Support for a dedicated **national energy research centre** will be central to this.
- The Department should seek to proactively include energy researchers in relevant working groups to ensure the strongest evidence base for policy.
- The revised Statement of Strategy will ideally include quantifiable metrics to reflect progress on strategic objectives and actions taken during its lifetime.

Strategic Opportunities for the Department 2025-2028

NexSys research has identified strategic opportunities which fall under the Department's existing Objectives and which have the potential to support the achievement of key subsidiary Actions, in the following areas:

Strategic Objective 2.2: Increased energy efficiency in the residential, public and commercial sectors

Action: Continued engagement with the Sustainable Energy Authority of Ireland (SEAI) and the Department's communications teams, and the SEAI Behavioural Science team to encourage long-term behaviour change in relation to energy efficiency

- There is an opportunity to support the development of markets and schemes to incentivise demand side customers to provide flexibility to the electrical system, through, for example, vehicle-to-grid technologies.

Action: Continue our implementation of the Offshore Wind Energy Programme to deliver 5 GW offshore wind by 2030

- It may be possible to accelerate the development of offshore wind and the co-development of routes to market through increased interconnection or power to gas.

Action: Ensure an appropriate planning and development framework is in place for energy grid development, onshore and offshore wind energy and solar PV energy

- Ireland, given the fact that it is an island system, also has an opportunity to lead the way in the planning and operation of 100% renewable power systems, building on past successes which now allow operation at levels of up to 75% .
- An opportunity exists to support the development of schemes to incentivise greater use of long duration storage in the system.

Strategic Risks for the Department 2025-2028

NexSys research has also identified strategic risks that will remain relevant over the lifetime of the next Statement of Strategy which could impact the Department's ability to meet its strategic objectives in the following areas:

Strategic Objective 2.1: Transform Ireland's electricity sector to a high-renewable, low-carbon system to reduce greenhouse gas emissions on a pathway to net zero emissions by 2050

Action: Continue our implementation of the Offshore Wind Energy Programme to deliver 5 GW offshore wind by 2030

- Ambitious offshore wind targets require a clear pipeline and an efficient planning process. It is likely that a target of 5GW by 2030 will be missed, but it may be possible at this point to deliver 3GW by the early 2030s. A strong plan to ramp up rollout of offshore projects will aid in achieving the next 2GW and beyond.

Action: Ensure an appropriate planning and development framework is in place for energy grid development, onshore and offshore wind energy and solar PV energy

- Natural variability of wind and solar generation implies extended periods of excess renewables (leading to curtailment) as well as extended periods of low renewable generation. Proposed cost-effective strategies will require multiple actors working together in a well-coordinated way.
- Electrification of the energy system requires significant investment in grid infrastructure and related measures. Delays in the planning system prevent the development of the electricity network in a timely fashion.

Strategic Objective 2.4: Secure, affordable and reliable supplies of sustainable energy to support our economy and society on the pathway to net zero emissions

- A deteriorating geopolitical situation may continue to threaten the security of energy supplies. A strong focus on the development of indigenous renewable energy sources will mitigate this.
- Better coordination and information sharing on risks, potentials, and opportunities with neighbouring countries and regions in a periodic and structured manner involving different stakeholders and experts will help in identifying optimal response to unforeseen events.

NexSys Capacity to Support the Department's Strategic Goals

NexSys is a multidisciplinary team of researchers developing evidence-based pathways for a net zero energy system across 5 research strands: Energy Systems, Offshore Wind, Transport, Cities & Communities, and Water.

These research areas have strong relevance to the Department's Strategic Goals, and there exists within the NexSys programme ongoing research which can support the achievement of the associated objectives and actions. The programme, through roadmapping and associated modelling activities, can assist with monitoring the progress of strategic objectives and actions.

As an international and multidisciplinary team, NexSys can also act as a nodal platform to facilitate dialogue with researchers across the EU and internationally in identifying both best practice and strategic risks for energy systems.

Full details of the work packages being undertaken in the NexSys programme are available here. Ongoing NexSys research has specific relevance to the Department's following strategic objectives and actions:

Strategic Objective 1.1: Put Ireland on a pathway to becoming a leader in tackling climate breakdown

Action: Implement Ireland's Long-term Climate Strategy, setting out pathways to climate neutrality no later than 2050

- The research objectives of the NexSys programme align with achieving climate neutrality for the energy system by 2050. The NexSys Roadmap is an annual iterative process which will integrate the programme's research to provide overall pathways towards decarbonisation, and discuss the impact of electrical systems on Ireland's decarbonisation goals.

Strategic Objective 1.3: Ensure the transition to climate neutrality and resilience is just and fair, including capitalising on the new economic opportunities that it will bring

- NexSys work package ES7 will deliver an empirical assessment of how a Just Transition impacts disadvantaged groups and how it can be financed.
- NexSys researchers contribute to UCD's Just Transition Research Group, which will use integrated and interdisciplinary research approaches and develop a national and international research network to increase knowledge and understanding to achieve a Just Transition to a low-carbon future

Strategic Objective 1.4: Continue to take climate adaptation measures to ensure that people are protected from the effects of climate change in Ireland that are already locked in

- NexSys work package WA1 will develop models which support adapting wastewater infrastructure to future climate risks and demographic contexts

Strategic Objective 1.5: Proactively leverage expertise, evidence, research and innovation to underpin the timely development and implementation of climate policy

- The NexSys programme will proactively seek to furnish research output and expertise to the Department.

Action: Implement Research and Innovation Strategy

- NexSys researchers will engage with the Department in the development of the *Research and Innovation Strategy to 2030*.

Action: Enhance our capacity for timely and relevant analysis and modelling to inform policy development

- NexSys will seek to provide the Department with timely and relevant analysis and modelling where requested.

Strategic Objective 2.1: Transform Ireland's electricity sector to a high-renewable, low-carbon system to reduce greenhouse gas emissions on a pathway to net zero emissions by 2050

Action: Deliver the Accelerating Renewable Electricity Programme to reach 50% renewable electricity by 2025 and 80% by 2030

- NexSys work package ES3 will explore the impact of increased renewable generation on the dynamics of the power system

Action: Continue our implementation of the Offshore Wind Energy Programme to deliver 5 GW offshore wind by 2030

- NexSys work package OW1 will develop reliable forecasts, downtime detection and classification for offshore wind to forecast short-term wind power more accurately.
- NexSys work package OW2 will develop models to estimate the lifetime of offshore wind turbines.
- NexSys work package OW3 will develop data-driven systems to measure and monitor wind turbine performance
- NexSys work package OW4 will create a model for control systems for floating wind turbines

Action: Develop and embed the Offshore Renewable Energy Future Framework to develop new renewable electricity generation and consumption after 2030

- NexSys work package OW5 will develop a model to integrate offshore wind into the national grid and analyse the public acceptance of offshore wind farms
- NexSys work package ES6 will investigate the feasibility of hydrogen as an energy source to deliver net zero, including the production of green hydrogen via excess offshore wind.

Strategic Objective 2.2: Increased energy efficiency in the residential, public and commercial sectors

Action: Continue to accelerate and drive delivery in relation to retrofitting, district heat and decarbonisation of the building stock through the work programme of the Heat and Built Environment Taskforce

- NexSys work package CC1 will deliver innovative solutions across different scales of the urban energy landscape including at scales of the neighbourhood, collectives of large municipal buildings, new and retrofit housing and data centres

Strategic Objective 2.3: Coherent heat policy and supporting legislation in place providing certainty to investors and stakeholders

- NexSys work package CC2 will deliver an algorithm and tool to identify energy that can be reused from different consumer groups.

Strategic Objective 2.4: Secure, affordable and reliable supplies of sustainable energy to support our economy and society on the pathway to net zero emissions

Action: Continue to reduce electricity loss of load closer to 8 hour standard and improve medium term outlook

- NexSys work package ES2 will provide solutions and metrics for load balancing on the power system

Action: Implement revised Energy Poverty Action Plan

- NexSys work package CC4 will address transport & residential energy deprivation by identifying at-risk groups and developing case studies.

Contributors

NexSys contributors to the preparation of this submission include (in alphabetical order):

- Prof. Damian Flynn
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NexSys welcomes further engagement with the Department on this submission and related matters.