Onshore Electricity, Strategic Coordination and Energy Consents Division
Scottish Government
5 Atlantic Quay
Glasgow
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09 May 2023

To whom it may concern,

Consultation Response: Energy Strategy & Just Transition Plan

Scottish Renewables is the voice of Scotland's renewable energy industry. Our vision is for Scotland leading the world in renewable energy. We work to grow Scotland's renewable energy sector and sustain its position at the forefront of the global clean energy industry. We represent over 330 organisations that deliver investment, jobs, social benefits and reduce the carbon emissions which cause climate change.

Our members work across all renewable energy technologies, in Scotland, the UK, Europe and around the world. In representing them, we aim to lead and inform the debate on how the growth of renewable energy can help sustainably heat and power Scotland's homes and businesses.

Scottish Renewables welcomes the opportunity to provide our view on the proposed amendments outlined in this consultation.

Scottish Renewables would be keen to engage further with this agenda and would be happy to discuss our response in more detail.

Yours sincerely,

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CONSULTATION QUESTIONS

Chapter 1 – Introduction and Vision

1. What are your views on the vision set out for 2030 and 2045? Are there any changes you think should be made?

Overarching views
Scottish Renewables welcomes the vision for 2030 and 2045 within the draft Energy Strategy and Just Transition Plan. We support the Scottish Government's ambitious plans for the development of onshore and offshore wind, pumped hydro storage, other storage technologies such as Liquid Air Energy Storage and hydrogen, the decarbonisation of heat and transport and, crucially, the rapid expansion of networks infrastructure to accommodate this.

However, many barriers still stand in the way of realising Scotland's renewable energy and net-zero ambitions. While we welcome the vision provided by the Energy Strategy and Just Transition Plan, time is rapidly running out to 2030 and we need strong focus on delivery from government and regulators to unlock the low-carbon energy system of the future. These barriers include, but are not limited to:

- Planning and consenting timescales for onshore and offshore projects
- Anticipatory investment ahead of demand in electricity network infrastructure from a Networks perspective
- Increasing global competition threatening the UK's investment climate for renewable energy

Scottish Renewables recommends that:

- A schedule of milestones and a plan of supporting actions for achieving the ambitions set out in this consultation is included in the final strategy.
- Firm, costed and ambitious commitments are put forward by the Scottish Government, demonstrating how it will support Scottish oil and gas supply chain companies and ports in adapting their goods, services and infrastructure to renewables.
- We would also seek firmer commitments and more detail on how the regulatory bodies (Marine Scotland, National Grid) will address the current barriers to offshore wind deployment. If developers are to deliver the ScotWind programme, they require certainty on when they will achieve grid connections and greater clarity on the consenting requirements they need to fulfil imminently.

- The Scottish Government provides clarity on the form of hydrogen production that they are targeting. A firm commitment to transitioning directly to green hydrogen (without the interim step of blue hydrogen) would be a further powerful, unequivocal signal for investors and a stimulus to green hydrogen market creation. Pursuing blue hydrogen, which will inevitably be phased out, diverts focus and resource away from the more viable solution of green hydrogen, and dilutes Scotland's early-mover advantage in developing green hydrogen models, products and services.

Specific comments

SR supports the overarching vision set out for 2045 set out on page 17 and the aims it seeks to achieve. However, we highlight the start of the second sentence "*This will deliver maximum benefit for Scotland…*" is likely to prove problematic from a policy-making perspective.

Under the current wording, what constitutes maximum benefit will likely be interpreted very differently by different stakeholders. The current wording risks undermining progress as processes such as consenting will become mired in contentious arguments over whether the maximum benefit has been achieved. Wording that is so open to interpretation will also make it extremely difficult to evidence and evaluate progress against this aim.

We recommend that the wording is amended to "*We will maximise benefit for Scotland…*" Using the amended wording, a key principle can be set that projects or initiatives that fall under this aim would be expected to provide evidence that they had maximised the benefits to Scotland. If a challenging party disputed that benefit had been maximised, they would be expected to present evidence to support their challenge. Such an approach would shift decision-making from being based on interpretation to being based on an evaluation of the evidence presented. This approach also has the benefit of being practical to evaluate, enabling the tracking of progress. We further recommend that this change in wording is reflected across the remainder of the strategy.

There is also a lack of clarity on the specific benefits the vision refers to. It can be assumed that these are the benefits outlined on page 23 but as these refer to 2030 and the vision to 2045, it is not clear that this is the case and clarification is required.

Under the vision for 2030 on page 23, there is also a lack of clarity. The aims set out under *climate and environment* and *economy, business and workers* can all be quantified, and progress measured using clearly identifiable data such as the volume of renewable generation capacity, GVA to the economy, job numbers, biodiversity surveys and so on. The

aims set out under *communities and regions* are far more ambiguous and it is unclear how these would be evidenced and evaluated.

It can be assumed that the 2GW of community and locally owned renewables by 2030 included in the timeline on page 21 and the bullet points on pages 24 and 25 relating to communities and regions are intended to clarify what is meant by the *communities and regions* section of the 2030 vision but further clarification is needed on whether this is the case.

There is also no explanation of how any of this chapter relates to the outcomes set out in Annex F.

Chapter 2 – Preparing for a Just Energy Transition

Overarching comments
The shaded box at the top of page 27 contains what can be interpreted as part of the vision for 2030 but the wording is different from the vision for 2030 shown on page 23. If the text on page 27 is part of the vision for 2030, then the wording should be consistent with the vision on page 23.

At present, it is not clear from the consultation exactly what the vision is and where in the document the entirety of the vision can be found. If stakeholders are expected to work with 'the vision' there the strategy must contain a clearly identifiable, definitive version and a clear explanation of what this means in practice. The outcomes set out in Annex F go some way to providing this explanation, but it is not clearly linked to the vision and is not mentioned in the text until page 28.

2. What more can be done to deliver benefits from the transition to net zero for households and businesses across Scotland?

It will not be possible to deliver benefits from the transition to net zero for households and businesses without renewable energy projects actually being built. While Scotland has a significant volume of onshore and offshore projects in development, renewable energy is a global and highly competitive industry.

The significant volume of projects under development in Scotland is a result of Scotland being viewed as a desirable location to invest by both developers and financiers. But in a dynamic global marketplace, there must be no complacency with regards to these projects

being built. Consenting and reaching a final investment decision are both key milestones on the road from in development to fully operational, and barriers to either of these can derail project delivery. It is essential that the Scottish Government is keenly focused on ensuring Scotland's consenting regimes and policy environment make this a smooth journey.

Lack of clarity and guidance on Environmental Impact Assessments and Habitat Regulations Assessments are major barriers to the timely and efficient consenting of projects, as is the lack of capacity in the consenting processes. Attention also needs to be given to the need for greater certainty in the policy environment, particularly around the need for clear timelines for leasing rounds.

It is essential that a focus on the benefits the transition to net zero will bring does not result in a lack of focus on the actions needed to bring forward the project that will deliver these benefits. Key actions include:

- Project pipeline and scale being recognised as key to deliver supply chain confidence and attract sustainable investment – ultimately, it is not possible to deliver benefits to households and businesses without projects being built.
- Scotland's workforce being ready to reap the benefits of net zero by embedding the energy transition at the heart of the Scottish education system.
- Ensuring a supportive policy environment for supply chain innovation in areas Scotland can 'win', such as in developing technologies like hydrogen and floating offshore wind.
- Scotland being viewed as an attractive place to invest in a globally competitive low-carbon investment climate by ensuring projects here are not competitively disadvantaged by barriers to delivery, such as consenting timescales and transmission charges.

3. How can we ensure our approach to supporting community energy is inclusive and that the benefits flow to communities across Scotland?

Benefits are already flowing to communities across Scotland from community ownership and shared ownership of renewable energy generation, as well as from community benefit funds. The Onshore Wind Sector Deal currently being negotiated between the Scottish Government and industry also include a specific focus on maximising benefits to communities, with work on this area being led by Community Energy Scotland. It is essential that a flexible approach to community benefit is maintained, and communities are meaningfully involved in deciding how funds should be deployed.

The Scottish Government has set a target of 2GW of community and locally owned renewable energy generation by 2030. An estimated 908MW was operational at the end of December 2022, with much of the remaining ~1GW expected to come from community shared ownership of onshore wind.

Opportunities for shared ownership of onshore wind are often directed at the communities in the immediate vicinity of wind farm developments. These developments and opportunities are often clustered in areas best suited to development in terms of renewable energy resource, grid connection, site availability, etc. This means that communities in the most suitable areas can receive numerous opportunities, whereas communities in the least suitable areas could miss out.

Opportunities have, however, been spread more widely by developers, including opportunities for communities in some of the least suitable areas, including peripherally disadvantaged and deprived rural areas. For example, development in NW Sutherland is severely constrained by multiple environmental protections, wild land issues, etc. as well as a general lack of physical infrastructure including grid; but the communities in NW Sutherland are now set to benefit from shared ownership in several onshore and offshore wind farms, all located outside NW Sutherland.

The community bodies who take forward community development, including shared ownership, are inclusive by nature, i.e., not-for-profit, open membership and equal opportunity organisations; but they often lack the awareness, the confidence, or the capacity to embrace shared ownership opportunities.

Increasing community capacity, spreading benefits, and other necessary guidance is already included in The Scottish Government's *Good Practice Principles for Shared Ownership of Onshore Renewable Energy Developments* (principles for offshore community benefit and shared ownership are currently being developed). Good practice principles are very helpful for developers, communities, and other stakeholders alike. Reference to the good practice principles for onshore shared ownership should be included in Annex H in this consultation and future publications.

The Scottish Government's Community and Renewable Energy Scheme (CARES) provides a one-stop-shop for communities to access support and expert advice on community shared ownership. CARES support includes community awareness raising, confidence building, and capacity building measures, as well as grants to pay for expert advice, etc. We expect demand for CARES support will increase through to 2030, and additional resources will be required.

Access to specialist and affordable loan funds will also be required increasingly through to 2030. This may require early gap funding and market making support from the Scottish National Investment Bank (SNIB), and, possibly, the development of more innovative financial products.

The Scottish Government's approach to supporting community shared ownership in renewable energy development is appropriate, particularly through CARES, SNIB, and the good practice principles; but more resources will be required to meet expected increased demand through to 2030.

4. What barriers, if any, do you/your organisation experience in accessing finance to deliver net zero compatible investments?

Investment climate in a global context

There is broad consensus on the steps industry and government must take to reduce our reliance on expensive imported gas, decarbonise and transition to a homegrown energy system that is cheaper, cleaner and more secure. The recent energy crisis only underlines the case for an urgent transition to a renewables-dominated energy system. Delivering the increased renewables ambition for 2030 of the British Energy Security Strategy (BESS), particularly on wind power and transmission grids, will play a major part in securing this – cutting the gas used in the GB electricity system by over 75%.

For the electricity system, there is no trade-off between our climate ambitions and consumer costs or maintaining security of supply. Accelerating the energy transition is no longer just a green imperative, but it is central to securing reliable and affordable energy supply. However, competition for that clean energy investment is increasing – it is now an international battle of ambition. Maintaining our position as a leading destination for investors in clean energy, when other regions are racing to catch up, is a key challenge for UK energy policy.

How we respond will not only determine whether the current energy crisis is repeated in the future, but also in realising the long-term benefits of the clean energy transition in communities across the country. The UK is in a comparatively weaker position following the USA's Inflation Reduction Act and EU response, as well as the Electricity Generators Levy, and wider economic challenges. The REMA debate and support for Local Marginal Pricing is also contributing to investor uncertainty – especially in Scotland where it would introduce unprecedented uncertainty to the investment case for offshore wind projects.

The Scottish Government should therefore work with the UK Government and Ofgem to ensure to that keeping the cost of capital as low as possible is prioritised. A recent report

from Strathclyde University showed LMP alone would add £90bn to the cost of achieving net zero. Keeping the cost of energy as low as possible is a key just transition objective.

Keeping investment competitive

In general, the overarching focus for both the Scottish and UK Governments in response to growing competition for low-carbon capital should be: how can we make the UK and Scotland the easiest place in the world to invest in and build clean energy infrastructure?

Actions for the Scottish Government:

- Stimulate investment in Scotland by making it the fastest place in Europe to develop low carbon projects, building on NPF4 by resourcing and further streamlining planning and consenting systems for onshore and offshore projects.
- Embed net zero at the heart of the education system as part of a national skills strategy to ensure Scotland has the human resources to deliver the green revolution.
- Focus on areas Scotland can 'win' on supply chains, with agile and targeted policy, e.g. capitalising on Scotland's floating opportunity by incentivising supply chain innovation.
- Combine Scotland's world leading climate ambitions with a national net zero delivery plan, with critical path dependencies sector-by-sector to see it through.
- Make Scotland an attractive place for innovators and skilled people to live, do business and invest, by demonstrating Scotland is open for business – incentivising inward investment, reducing regulatory barriers and assessing tax options for innovators to attract them to Scotland.

Actions for UK Government:

- Take a strategic, long-term approach to investment in the UK's critical infrastructure and recognise the importance of the cost of capital in meeting the UK's future energy needs at the lowest cost to the public.
- Learn the lessons from success in offshore wind by creating stable, investable frameworks and markets for new renewables and technologies like low carbon thermal generation and pumped storage hydro.
- Tackle the barriers to project deployment in Scotland, such as TNUoS, and bottlenecks which act as a drag on growth, slow down infrastructure delivery and add unnecessary years to the time it takes to build a new wind farm or grid connection.

Policy framework: Hydrogen
In Scotland and the UK in general, it is important that we have policy and regulatory mechanisms for companies to draw in capital for long term infrastructure in Scotland. For hydrogen in particular, as the economy develops through the various stages (e.g. growth phase & steady state phase), there needs to be consistency.

To ensure investor confidence right from the beginning, a consistent investment environment and smooth transition from the growth phase to the steady state phase is vital to reduce and uncertainties that may exist regarding the future role of hydrogen. This can be achieved by developing robust policy frameworks that support and incentivise the long term strategic being of a hydrogen economy.

5. What barriers, if any, can you foresee that would prevent you/your business/organisation from making the changes set out in this Strategy?

Electricity grid issues
The electricity Transmission and Distribution Networks operated in Scotland by SSE Networks (SSEN) and ScottishPower Energy Networks (SPEN) play a critical role in the transition to a low carbon future; connecting renewable energy and transporting it to demand areas across GB to support home grown energy security needs and reach our net zero targets. Significant and accelerated investment in grid will be critical to enable the Scottish Government's 2030 renewable energy targets and unlock the wider economic ambitions of the Energy Strategy and Just Transition Plan.

However, we remain concerned about the risk of delay to critical 2030 grid investment delivery, both from a regulatory and Government policy perspective, particularly through the planning and consenting process.

We recognise that networks are a reserved policy area. However, we would welcome support and alignment from the Scottish Government on addressing current uncertainties to enable socio economic ambitions and meet energy targets. For more information on networks related issues, please revert to views shared in SSEN and SPEN responses to this consultation.

Supply chains

One of the biggest challenges currently being faced by SSEN and SPEN is their ability to provide long-term certainty to the supply chain in a globally constrained market. Ambitious targets for decarbonisation have been set worldwide resulting in demand for High Voltage Direct Current (HVDC) technology tripling from 2022 to 2030, outstripping supply every year to 2030. Being able to shore up our supply chain is imperative for making sure we stay on track for delivering Government decarbonisation targets, as well as supporting growth in British industry and jobs by providing signals for inward investment, boosting our homegrown resilience, and reducing the need for relying on imports and overseas manufacturers.

With increased ambitions, and a reliance on overseas manufacturing, the Scottish Government should consider investing in domestic supply chain. This would lessen the risk element in procuring assets, and easier to access from a developer perspective. The Scottish Government should also consider the development of skills within Scotland. This would allow an easier transition to domestic supply chain, and investment into people and community of Scotland.

Consenting

Planning remains a key barrier to achieving the 2030 ambition. However, we believe that National Planning Framework 4 (NPF4) adopted by the Scottish Government earlier this year represents a significant and positive step forward in tackling this barrier. It's a clear statement that tackling climate change should be at the heart of our planning system and the recognition that the deployment of renewable energy infrastructure has a key role to play in this should now help to unlock further onshore wind development in Scotland.

However, it's important that we now see NPF4 fully reflected within our planning system whether that be in decisions taken by planning authorities, and the Scottish Ministers, the assessment of applications for renewable energy projects by statutory bodies, or within emerging Local Development Plans which will require to be prepared by local planning authorities following the introduction of the new development planning regulations later this year and which should take into account NPF4's policies and ambition.

For offshore wind, overcoming the environmental barriers to consenting will be key to accelerating deployment of offshore wind and meeting targets. It is vital that Scottish and UK Government work together to deliver a robust and coherent package of reforms to the HRA process through the current UK Energy Bill which speeds up consenting while continuing to deliver on environmental obligations. In particular, it is important that a package of strategic

environmental compensation measures to mitigate the impact of offshore wind is urgently agreed and implemented.

Solar energy

The biggest barriers to rapid solar deployment in Scotland are a lack of deployment ambition (addressed elsewhere in this consultation), skills shortage, and the inaccessibility of affordable and quick connections to the grid.

6. Where do you see the greatest market and supply chain opportunities from the energy transition, both domestically and on an international scale, and how can the Scottish Government best support these?

Scottish Renewables' full answer to this question can be found in our *Supporting Scotland's Renewable Energy Supply Chain* document[1]. In summary:

Despite the exceptional work which is already underway by many dedicated and ambitious suppliers, Scotland does not yet have the capacity to fully deliver our upcoming projects or to grasp the expanding export opportunities presented by clean energy across the globe.

To develop the renewable energy supply chain in Scotland across all technologies, maximise the economic benefits of our sustainability pipeline and ensure a just transition for suppliers, Scottish Renewables recommends that the Scottish Government:

- Establishes a Low-Carbon Industrial Strategy that includes a Supply Chain Plan to drive forward renewables-led investment and a just transition for Scottish clean energy suppliers and manufacturers.
- Supports the immediate growth of Scottish renewable energy suppliers by working with near-term net-zero projects to assist in the success of local supply chain companies
- Enhances the role that Scottish ports play in building a low-carbon economy through a net-zero ports and infrastructure programme
- Achieves growth for small and medium low-carbon suppliers by introducing a supply chain SME support mechanism
- Enhances export opportunities for Scottish suppliers by promoting and supporting companies moving into international markets

[1] https://www.scottishrenewables.com/news/1065-renewables-industry-campaigns-for-supply-chain-growth

7. What more can be done to support the development of sustainable, high quality and local jobs opportunities across the breadth of Scotland as part of the energy transition?

- Stimulate investment in Scotland by making it the fastest place in Europe to develop low carbon projects by resourcing and further streamlining planning and consenting systems.
- Embed net zero at the heart of the education system as part of a national skills strategy to ensure Scotland has the human resources to deliver the green revolution.
- Capitalise on Scotland's floating opportunity by incentivising supply chain innovation.
- Combine Scotland's world leading climate ambitions with a national net zero delivery plan, with critical path dependencies sector-by-sector to see it through.
- Make Scotland an attractive place for innovators and skilled people to live, do business and invest, by demonstrating Scotland is open for business – incentivising inward investment, reducing regulatory barriers and individual tax incentives.
- Enable the development of a Circular Economy for the Wind Industry, economic analysis produced by BVG associated has identified that the GVA associated with developing Scotland's capacity to remanufacture could be £8.9bn from the European market from 2025-2035. Additionally, this would create up to 20,000 FTE roles.

8. What further advice or support is required to help individuals of all ages and, in particular, individuals who are currently under-represented in the industry enter into or progress in green energy jobs?

The transition to a renewables dominated energy system offers huge employment and career opportunities to the people of Scotland and the sector is committed to diversity and inclusion.

We re-iterate our call for a national strategic approach to skills development to ensure the matching of the renewable energy industry's requirements to education provision. This strategic approach should support and promote multiple pathways into employment rather than favouring university level qualifications as industry will also need a high volume of vocational skills.

Chapter 3 – Energy supply - Scaling up renewable energy

9. Should the Scottish Government set an increased ambition for offshore wind deployment in Scotland by 2030? If so, what level should the ambition be set at? Please explain your views.

10.Should the Scottish Government set an ambition for offshore wind deployment in Scotland by 2045? If so, what level should the ambition be set at? Please explain your views.

Yes, the Scottish Government should set an increased ambition for offshore wind deployment in Scotland by 2030 and by 2045.

Scottish Renewables further recommends that the Scottish Government set an ambition for 2035 to support the continued success of offshore deployment and provide a stepping-stone between the ambitions for 2030 and 2045. We also recommend that the Scottish Government set a specific floating wind ambition in response to the UK Government's ambition, to encourage and facilitate the growth of this technology.

We have intentionally not recommended GW figures for each of the ambition milestones as the key parameters to what can be achieved by 2030, 2035 and 2045 are consenting timelines, the CfD process and the scale of future leasing rounds; all of which are undergoing change.

The announcement of the INTOG leasing round, the CfD Allocation Round 5 parameters plus changes to future rounds, the update to Marine Scotland's Consenting and Licensing Guidance and proposed National Marine Plan 2 and updated Sectoral Marine Plan for Offshore Wind Energy, both due to be consulted upon over the course of 2023 and 2024, all impact on the scale of ambition the Scottish Government should set.

Establishing the level of ambition that should be set for each milestone is also not enough. There must also be a strategy for how each of these ambitions will be achieved and this should be reflected in consenting timelines and the scale of future leasing rounds.

Scottish Renewables recommends that the Scottish Government works in collaboration with the offshore wind industry to develop an overarching offshore wind deployment 'roadmap' to 2045. This roadmap should establish interim ambitions that ensure the pace of deployment is sustained until net zero is met. We further recommend that the Scottish offshore wind consenting process and the scale of future leasing rounds are shaped to ensure the delivery of the roadmap and ambitions.

11. Should the Scottish Government set an ambition for marine energy and, if so, what would be an appropriate ambition? Please explain your views.

Yes, Scottish Renewables strongly supports the Scottish Government setting an ambition for marine energy. Any ambition should be matched with a clear pathway for delivery supported by an enabling policy and regulatory environment. The strategy, and marine energy pathway, should make a clear distinction between the devolved powers that the Scottish Government can take, and the interventions that are required by the UK Government.

Tidal Stream Energy (TSE) and wave energy face similar but distinct challenges and are at different stages of maturity. As such we believe that two deployment pathways should be set out in the final Energy Strategy and Just Transition Plan – one for TSE and one for wave energy.

SR would welcome further consultation and consideration of an appropriate MRE ambition for 2045. This long-term view will provide guidance to key bodies including the Crown Estate Scotland, transmission, and distribution network operators, as well as providing certainty to investors.

The Resolution Foundation in its Economy 2030 report notes that technologies like tidal "*are not only likely to generate relatively high national economic returns, but also have the potential to contribute to regionally balanced growth.*"[2] Investment in wave and tidal technologies in less innovation-intense regions generate strong returns, imperative for a just net zero transition.

The below ambitions should inform and be included as part of the Scottish Government's deployment pathway for TSE and wave energy.

TSE ambitions
We strongly support the Scottish Government setting ambitions of:

- Working with the UK Government to deliver tidal stream capacity of 200MW by 2030; and 700MW by 2035.
- Investing in Scottish project development to maintain Scotland's global lead.
- Investing in the Scottish supply chain to create export opportunities.
- Increase R&D spend in Scotland on TSE.

[2] Resolution Foundation (2022) The Economy 2030 Inquiry, available online.

The draft marine vision is right to highlight significant industrial opportunity, and the unique role that TSE can provide in its predictability. Committing to the above ambitions will position Scotland to maintain its first mover-advantage, attract companies, investment, and green jobs across Scotland.

The TSE ringfence in CfD Allocation Round 4 (AR4) will deliver significant benefit to Scotland with three projects delivering over 35MW of TSE capacity. It is crucial to delivery of the above ambitions that the ringfence is maintained, and the sector has clarity and consistency to support its growth. Ideally, the ringfence should be returned to £20m for future rounds or increased to support the sector scaling up.

The Policy and Innovation Group from the University of Edinburgh recently estimated that TSE could provide between £5bn and £17bn GVA to the UK economy by 2050[3]. The aim of the Scottish Government should be to seize as much of this potential as possible, and to embed supply chains in and across Scotland, building on the success and very high Scottish content of world-leading developers like Nova Innovation and Orbital.

Scottish-based companies including Proteus Marine Renewables and Nova Innovation are already exporting goods and services to the global TSE market, with a strong potential to scale up these exports in coming years. This approach seeks to emulate the success of the Danish wind energy sector, which built a strong domestic market and supply chain through investment in projects in Denmark in the 1980s and used this as the foundation to export technology and services to the world. By 2003, 90% of Danish wind turbine production was exported, and Danish wind sector exports in 2019 amounted to €9 billion.

The Draft Just Transition and Energy Strategy aims to position Scotland as an international leader within the net zero transition to create and provide high-quality jobs with economic benefit. The UK and Scotland has an opportunity to create over 4,000 jobs in tidal stream alone by 2030 with over 50% of the economic benefit expected to be generated in coastal areas.

TSE is on a clear cost-reduction trajectory, following the trajectories demonstrated by wind and solar energy. TSE is projected to reach £78/MWh by 2035 and 1GW of deployment, and below £50MWh by 2050 and 10GW of deployment. This means that by 2035 TSE could be cheaper than new nuclear, and that support for TSE will be consistent with the Scottish Government's aim to deliver affordable energy whilst supporting economic growth.

[3] ORE Catapult (2022) *Cost reduction pathway of tidal stream energy in the UK and France*. Available online.

Wave energy ambitions

We recommend that Scotland sets the following wave energy ambitions:

- 1MW to be deployed by 2027. Work with UK Government to secure 200MW wave energy capacity by 2035.
- Delivery of a co-location wave and wind pilot by 2030.
- Maintain support for WES.

We support the Scottish Government's ambition to deploy 4 x 250 kW in EMEC wave machines by 2027. This is an important target that provides clarity of direction to the sector. It should be noted that Horizon Europe is aiming to secure a 2MW (minimum) wave energy array, with €40M funding available to support two such projects. To maintain Scotland's global lead, it is critical that Scotland secures at least one of these projects. As with the ambitions set for TSE, wave energy will benefit from a clear pathway with points for review and re-evaluation to ensure the Scottish Government and industry remain on track to deliver.

Scotland's 2027 target is supported by EuropeWave – an EU-funded pre-commercial procurement programme akin to those run by Wave Energy Scotland. Three wave energy developers will be selected for the final phase (phase 3) of the EuropeWave programme. This will see three different prototype wave energy converter systems deployed in the Spring of 2025 for a 12-month demonstration and operational testing programme; among them may feature Mocean Energy, who are Scotland based and developing a 250 kW WEC. Two systems will be deployed at the BiMEP test site in Spain, and one system deployed at EMEC's Billia Croo test site. The deployment of an initial array should support the route to realising 200MW of wave energy deployed in Scotland by 2035. Depending on developments in the industry this could be scaled up and should be kept under review if the industry is able to respond to a greater ambition.

The deployment of an initial array should support the route to realising 200MW of wave energy deployed in Scotland by 2035. Depending on developments in the industry this could be scaled up and should be kept under review if the industry is able to respond to a greater ambition.

Diversity and innovative deployment of renewable technologies will be key in optimising how the energy system is utilised. Waves provide a more consistent generation profile than wind and can be harnessed 3-8 hours after the energy is initially harnessed by wind farms. Co-locating offshore wind and wave energy converters allows technologies to share assets and

can reduce costs by 14%. The UK Government is currently undertaking its Review of Electricity Market Arrangements consultation, which may lead to a more efficient use of existing infrastructure having greater value than in existing arrangements.

Committing to a pilot project as a step toward commercialisation will position Scotland to be a world-leader in innovative offshore renewable deployment.

Finally, grant (R&D) support has been - and will continue to be - crucial in enabling further step-change technology cost reductions, with significant impact on overall learning investment to reach competitive LCOE. A 2021 paper by Kerr et al. suggests that a 10% step-change cost reduction can reduce overall learning investment by approximately a third on the road to achieving target LCOE.

12.What should be the priority actions for the Scottish Government and its agencies to build on the achievements to date of Scotland's wave and tidal energy sector?

To realise the above ambitions set out in Question 11 the Scottish Renewables recommends the Scottish Government take the following actions to provide clarity to industry and investors, make Scotland the most attractive country in the world to invest in marine renewable energy, and critically make it easier to get technology in the water.

Provide clarity to industry and investors

- **Action 1: The Scottish Government should set out two distinct deployment pathways as part of any finalised strategy.**

As noted, wave energy and tidal stream are distinct technologies and should have separate deployment pathways in the finalised strategy. This will allow for Scottish Government actions, and engagement with the UK Government and other bodies, to be focused accordingly.

These two deployment pathways can be included in a Marine Energy Action Plan, which could be developed as a distinct piece of work from the ESJTP and marine vision.

- **Action 2: Demonstrate intent by setting achievable and impactful MRE deployment ambitions.**

In question 11 we set out what we think these ambitions should be. These ambitions should be supported by a clear pathway for delivery.

- **Action 3: Engage with the UK Government on its non-price criteria consultation and the future of the CfD.**

The current CfD mechanism awards contracts based on the lowest Levelised Cost of Energy (LCOE). This has been successful in increasing renewable capacity from 7% of the UK's electricity supply in 2010, to over 40% today. However, a great deal of the cost-reduction achieved was because of other countries supporting indigenous renewable sectors and supply chains. These countries are now benefiting from thriving export markets.

In the 1980s Denmark invested heavily in wind, delivering projects with high levels of local content, and developing its domestic market. In the process it gained first mover advantage and in exports alone its wind sector generates over £7bn annually for the Danish economy. In 2012, 88% of Denmark's exports were associated with wind turbines and components.[4] By contrast the UK's wind sector, Europe's largest generator of wind energy, exports less than £0.5bn annually and is a net importer of wind technology, principally from Denmark.[5]

Both tidal stream and wave energy will be cheaper than new nuclear at 1GW of deployment.[6] However, these technologies are not going to be the cheapest to deploy in the short term.

Research by the University of Edinburgh through Project EVOLVE has found that deployment of just under 13GW of marine energy will reduce annual dispatch cost from £13.54bn to £12.51bn. This is a saving of £1.03bn annually for UK and Scottish households. This cost reduction comes from a higher dispatch of renewable energy – by up to 27 TWh (+6%), and thus a lower requirement for expensive peaking generation – by as much as 24 TWh (-16%) when wave and tidal generation are part of the electricity mix, compared with a scenario without marine energy generation.[7]

The UK Government's non-price criteria consultation provides an opportunity to include considerations around supply chain development, local jobs being created and supported, and in delivering a diverse renewable energy generation portfolio, key to energy security. As the CfD will likely be the primary mechanism for renewable deployment for the foreseeable future, it is key that the Scottish Government engages, and that the benefit of MRE is accurately factored into future considerations.

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[4] Deloitte (2012) *Study of the macroeconomic impact of Wind Energy in Denmark*
[5] State of Green (2021) *The economic benefits of wind energy*. Available online.
[6] Catapult (2018) Ibid.
[7] Supergen (2023) *What are the UK power system benefits from deployments of wave and tidal stream generation?* Available online.

- **Action 4: Drive this work forward through the Scottish Marine Energy Industry Working Group**

This industry working group has been a key driver in identifying barriers and proposing solutions to increasing MRE deployment. Internationally Scotland and the UK is at risk of being left behind as countries seek to establish first-mover advantage in emerging technologies. The United States' Inflation Reduction Act is already pulling investment and supply chains from the UK[8] and is making over $1.7bn available to marine projects.[9]

SR believes the next iteration of the SMEIG should be ministerial-led, and support Scotland taking a strategic approach to MRE deployment and in responding to changes and challenges internationally. It could also have a role in monitoring industry progress on the TSE and wave energy deployment pathways, and horizon scan for any challenges in delivery.

Make Scotland the most attractive country to invest in marine renewable energy.

- **Action 5: Increase innovation, research and development support for MRE.**

Innovation and demonstration projects will be crucial in developing the MRE industry. Innovation funding is crucial to expected reductions in the strike price. However, limited innovation support or demonstration programmes are available for MRE in the UK, and ongoing uncertainty around UK participation in the Horizon programme is damaging.

Almost all recent MRE funding in the UK has come from the EU, except for Wave Energy Scotland (WES) and the Saltire Fund. While the Scottish Government should be commended for this support, we as a sector believe the Government could go further. Over a 3-year period the European Commission allocated over €160m to the sector. In comparison the sector has received £30m from the Scottish Government over the past six years.

As the sector moves from projects in the single digits towards economies of scale, business as usual for innovation funding will no longer be sufficient. This issue could be compounded by the as-yet-undetermined future of European funding in the UK, which may no longer be accessible to Scottish projects in the near future. Specific funding must therefore be made available to maintain Scotland's global lead and to achieve the expected reduction in LCOE.

[8] The Times (2023) *Biden's green subsidies could lure gigafactory away from Dundee.* Available online.
[9] US Government (2023) *Building a Clean Energy Economy: A guidebook to the inflation reduction act's investments in clean energy and climate action.* Available online.

Innovation funding is required at both the Scottish and UK levels, and we encourage the Scottish Government to consider how best to provide its own support while encouraging the UK Government to do the same. Funding through Innovate UK would greatly support the sector and depending on the availability of European funding, might be a critical lifeline. The Scottish Government can lobby UK Government for such funding, and the Enterprise Agencies can support Scottish companies in accessing it.

Research by the University of Edinburgh has revealed that between 2017-2022 wave energy received £39m funding (with WES accounting for £35m of that total) and TSE only £15m. This lack of investment puts Scotland's global lead in tidal energy at risk and should be addressed within the Scottish Government's Just Transition Strategy.[10]

Research by the University of Edinburgh has revealed that between 2017-2022 wave energy received £39m funding (with WES accounting for £35m of that total) and TSE only £15m. This is significantly less than other renewable and emerging technologies and should be addressed within the Scottish Government's Just Transition Strategy.[11]

- **Action 6: Introduce a support mechanism for direct to customer and off-grid markets**

Marine renewables are strongly positioned to support the decarbonisation of offshore activity. This is being demonstrated by Mocean's Renewables for Subsea Power (RSP) project. The £2million demonstrator project, called Renewables for Subsea Power (RSP), has connected Mocean's Blue X wave energy converter with a Halo underwater battery developed by Aberdeen intelligent energy management specialists Verlume.

The two technologies have been deployed in March 2023 will provide low carbon power and communication to infrastructure including Baker Hughes' subsea controls equipment and a resident underwater autonomous vehicle provided by Transmark Subsea.

The project aims to show how green technologies can be combined to provide reliable low carbon power and communications to subsea equipment, offering a cost-effective alternative to umbilical cables, which are carbon intensive with long lead times to procure and install.

Alternative markets also apply to tidal power, which could potentially be used as a reliable source of supply for hydrogen production, or to decarbonise industry. For example, Nova Innovation's Oran na Mara project in the Sound of Islay has the potential to provide predictable,

[10] Supergen (2023) *What is the Optimal Balance of Development and Deployment Policy Support Mechanisms for Wave and Tidal Power?*
[11] Supergen (2023) *What is the Optimal Balance of Development and Deployment Policy Support Mechanisms for Wave and Tidal Power?*

renewable power to Scotland's whisky islands of Islay and Jura, offering a net zero solution to one of Scotland's most important industrial sectors.

The Scottish Government should explore ways to support projects that have developed beyond the pilot project stage but have a different application to that addressed by the UK Government's CfD mechanism.

- **Action 7: Ensure infrastructure is prepared for renewable deployment.**

SR recommends that the Scottish Government should support the national port and harbours infrastructure as well as targeted manufacturing, supply chain and skills development to ensure that Scottish companies winning CFD projects can achieve 70% Scottish content in their project supply chains. This will also enable both increased GVA and jobs to Scottish organisations from both domestic and export sales.

Make it easier to get technology in the water.

- **Action 8: reduce the consent timescales to enable MRE deployment at pace.**

The Scottish Government should streamline regulation and enable synergies between marine and other developments. We recommend reducing consenting review approval times to three months, as is being pursued for offshore wind in the UK. This is in line with current proposals by the European Commission across Europe and will strengthen the project pipeline and ensure that Scotland remains at the forefront of new project development.

MRE projects can be deployed within well under 3 years. However, due to current consenting constraints and the structure the primary mechanism for supporting renewable projects, the CfD, development of a new, greenfield site takes upwards of 7 years – and potentially much longer. New site development is crucial to the future growth of the industry and the achievement of the goals set out above, but the extremely long timescales involved are a strong disincentive to investment. The fact that very few new sites are under development in Scotland is testament to the fact that the existing regime needs to change, and development timescales need to be accelerated.

The Scottish Government could explore aligning offshore consents with onshore consents, which only require a Section 36 consent for projects over 50MW, offshore projects require a consent for projects over 1MW. A proportionate approach to consenting is also required, where relatively small-scale marine energy developments can be assessed more quickly than multi-GW offshore wind farms. In addition, designating key areas as strategically important for energy security could enable rapid and streamlined consents. It should be acknowledged that

no negative impact on marine mammals has been recorded at key Scottish sites including EMEC, MeyGen and the Shetland Tidal Array.

- **Action 9: work with the sector to reduce the costs and liabilities associated with deploying MRE technologies.**

The Scottish Government should work with Westminster to revisit current arrangements around decommissioning bonds. Currently large projects are typically asked to set aside millions of pounds for decommissioning, provided up-front and held in real cash terms. In contrast, large offshore wind projects only require a paper bond which states there is enough cash for decommissioning, and the value of this bond can build up in value during the life of the project (mid-life accrual). An equivalent product is not available from the bond market for tidal stream energy. This is a market failure, caused in part by a line in the Decommissioning Act, that allows the UK Government's Secretary of State to call in the bond even in the absence of an event that would require the bond to be called upon. This can be quickly addressed through an amendment which allows novel and innovative generation projects to have a bond called in only if the bond is required and following appropriate events. This will remove a significant barrier for tidal stream and wave energy projects. The Scottish Government should join industry in advocating for this change, and in supporting mid-life accrual of decommissioning securities for marine energy projects.

Equally the industry faces significant headwinds around insurance which increases the cost of deployment. The first deployments of tidal stream or wave energy projects invariably come with higher risks and therefore higher financing costs. Offshore wind has proven that financing costs can be dramatically reduced over a very short space of time. Currently insurance costs are a significant and costly barrier to marine renewable deployment. In the absence of competitive commercial insurance options, the Scottish Government should explore the proposal being developed by Renewable Risk Advisers, to introduce an 'Insurance and Warranty' Fund. This is an insurance service for early pilot farms designed to balance the interests and incentives of public authorities, ocean energy developers, and investors. As well as directly reducing the costs of the first deployments, the Fund will generate data to 'crowd in' commercial insurers, and ultimately put itself out of business.[12] As part of deploying renewable technology at pace the Government should consider support for this proposal and similar financial measures to de-risk early project development.

- **Action 10: Continue to provide cornerstone debt finance for MRE projects and invest in Scottish marine energy companies.**

[12] OceanSET (2021) *Design Options for an Insurance and Warranty Fund*. Available online.

We recommend that the Scottish National Investment Bank continues to provide cornerstone debt finance to early-stage MRE projects to leverage additional private sector finances. This will help to reduce the cost of capital and make early, but commercially fundable projects more attractive to inward investors. These projects should be focused on maintaining Scotland's global lead by deploying capacity in the water and consolidating and expanding Scotland's world-leading MRE companies and supply chain.

13. Do you agree the Scottish Government should set an ambition for solar deployment in Scotland? If so, what form should the ambition take, and what level should it be set at? Please explain your views.

Yes, we agree that the Scottish Government should set an ambition for solar deployment in Scotland, supported by a clear strategy which is designed and delivered in partnership with industry. The ambition should be a minimum of 4GW with a stretch ambition of 6GW of solar PV by 2030. The 6GW stretch ambition would consist of 3.5GW of ground-mounted commercial solar farms, 1.5GW of domestic rooftop panels and 1GW of commercial rooftop panels. A minimum ambition of 4GW would put Scotland in line with the deployment trajectories of other European economies, while an ambition of 6GW would put Scotland at the top of the league table for European solar generation, and ahead of the rest of the UK.

The rationale behind these figures is set out in detail in Solar Energy Scotland's *Scotland's fair share: Solar's role in achieving net zero in Scotland* report[13].

Ambition in the solar industry around the world is escalating sharply. Governments are setting enormous deployment targets – for example, Germany recently announced plans under which it could install 200GW of solar energy by 2035.

While 4-6GW is a challenging ambition, it is nonetheless deliverable. The sector saw record growth in 2021 and 2022, and the pace of installations shows no signs of slowing. January 2023 saw 1,672 MCS accredited installations in Scotland. MCS estimates that 15% of households in Stirling and 10% of households in Aberdeenshire have MCS accredited small scale renewables installed. MCS installations in Midlothian alone increased 1.3% in January 2023.

An ambitious deployment ambition for solar energy in Scotland will help the wider transition to net zero by further incentivising investment in the electricity grid, which is desperately

[13] https://solarenergyuk.org/resource/scotlands-fair-share-solars-role-in-achieving-net-zero-in-scotland/

needed and will benefit communities across Scotland. Setting a national deployment ambition for solar would provide the distribution network operators (DNOs) and planning authorities with the clarity of policy direction required to make decisions about infrastructure and investment – in urban and rural areas alike. These network upgrades and expansions will be essential if we are to reduce long term costs and improve our energy security. A defined ambition would send a clear signal to investors and decisions makers that Scotland is ready to use every tool at its disposal to meet its carbon reduction commitments and avoid climate disaster.

In addition to directing investment in infrastructure, an ambition of 4-6GW in Scotland could support nearly 9,000 jobs by 2030. These jobs are not just installers and developers; a wide variety of roles from site planners and manufacturers to construction and trade roles, to communications and finance specialists will be created by a healthy solar industry. For more information, please see our briefing “Solar Skills Scotland: The job creation potential of Scottish solar.”

A national solar ambition is essential to direct the development of solar energy in Scotland. It signals to industry, district network operators, and planning decision makers that solar is an essential part of Scotland’s energy transition and opens the door for solar to deliver stable green jobs in a variety of sectors.

Whilst the Scottish Government’s ambitions ‘for a strong role for solar thermal, as well as domestic and commercial solar PV,’ is welcomed, government must establish its plans for the different solar energy technologies which are needed to meet any ambition for solar deployment. This should include clear plans for ground-mounted solar deployment, which is highly reliable, inexpensive to assemble in comparison to other technologies and provides affordable energy. Consideration must also be given for the level of ‘behind the meter’ deployment on homes, public building and business, and what role industry can play in building these local distributed energy schemes.

We welcome the consideration in the draft solar vision for ensuring that Scotland has the necessary skills to deploy and maintain solar energy projects, and also commitment to assess interactions between large solar projects and the grid. Any target will also require government action to ensure a robust and sustainable solar energy supply chain and a supportive planning process.

14.In line with the growth ambitions set out in this Strategy, how can all the renewable energy sectors above maximise the economic and social benefits flowing to local communities?

As discussed in Chapter 2, we believe that a development plan is required, with clear policy and regulatory framework set out. The Scottish Government should consider focus on value rather than cost of securing domestic supply chains.

Solar energy

Unlike all other power sources, solar energy has the unique ability to reduce the electricity bills of households, reduce individuals' household demands on the grid, and therefore to reduce the 'peakiness' of that demand at a national level – helping to reduce the pressures on the national electricity network at peak times.

The average cost per kilowatt of solar in Scotland (for MCS accredited installations) has remained relatively steady since 2019, rising far slower than the cost of electricity. According to MCS, the average cost per kilowatt in 2019 (the first-year reliable data has been available) was £1,274; in 2022 it was £1,629, a 28% increase. Electricity price inflation in the same period was 49%, decreasing the payback time for solar installations drastically. These figures indicate the potential of, and desire for, solar in Scotland – a sector that is ready to grow in line with other parts of the UK, which saw record deployment in 2022. Because solar is a uniquely versatile, cheap, and accessible renewable technology, it can benefit offer benefits at a community and individual level.

Peer-to-peer local energy trading (P2P) could maximise the benefits that solar can offer to communities. P2P is, at its core, the buying and selling of energy between multiple parties in a community, increasing consumer choice and improving local resilience, and allowing members of a local community to receive energy directly from a local project they are hosting.

15.Our ambition for at least 5GW of hydrogen production by 2030 and 25GW by 2045 in Scotland demonstrates the potential for this market. Given the rapid evolution of this sector, what steps should be taken to maximise delivery of this ambition?

The following barriers need to be addressed to ensure that Scotland can achieve its targets by 2030 and 2045:

Production & Demand Locations:
Hydrogen production and demand locations will not always align and will not always be in close proximity to hydrogen storage facilities. Scotland, for example, provides significant opportunity for electrolytic hydrogen production given the significant renewables penetration. We anticipate that the majority of electrolytic electrons appropriate (i.e. constrained) for low-carbon hydrogen production are likely to be located in Scotland. Given the current lack of obvious large-scale storage solutions, a hydrogen transmission system connecting areas of production with demand centres and storage facilities will help maximise renewable investment, and support electricity network infrastructure easing congestion between Scotland and England.

Specific consideration needs to be given to how to transport hydrogen from Scotland, where there is significant wind resource, to England as a large demand centre. This should unlock the potential for large volumes of hydrogen production, optimise the use of wind energy by reducing curtailment and encourage the development of export markets.

Ambition and Policy Clarity
As it stands, policy intervention is needed to incentivise investments which are not delivered through market signals alone. Given the reliance on policy to stimulate investment (e.g. CfDs, Capacity Market, et. al.), a clear policy commitment and ambition is needed to drive investor confidence. Whilst we appreciate that targets have been published, a clear strategic direction and timetable as well as well-defined policy is essential.

Planning and consenting
Hydrogen is a new technology which needs consenting through existing planning regimes, creating first-of-a-kind challenges and potentially delaying the ability to deploy these technologies. The Scottish Government must ensure support is in place that reflects the importance of hydrogen infrastructure as nationally significant developments and supports planning decision makers to expedite project planning submissions.

16.What further government action is needed to drive the pace of renewable hydrogen development in Scotland?

As above, we foresee sizable planning and consenting bottlenecks occurring in hydrogen projects across the UK, especially in the devolved administration of Scotland. It is therefore critical for Scotland to help streamline this process wherever possible, without sacrificing the necessary due diligence practices to help enable Scottish projects to benefit from the UK Government current suite of initiatives such as the Net Zero Hydrogen Fund.

The Scottish Government should work closely with the UK Government to collaborate on this process and ensure that the ambition of the wider UK administration is aligned with their own. Affording a greater weight to the importance of net zero and the climate emergency in planning and consenting workstreams will help to expedite wide-scale decarbonisation of the UK energy system and provide hydrogen projects with a platform to fast-track decision making.

SR will not be responding to Questions 17 – 18

17.Do you think there are any actions required from Scottish Government to support or steer the appropriate development of bioenergy?

18.What are the key areas for consideration that the Scottish Government should take into account in the development of a Bioenergy Action Plan?

19.How can we identify and sustainably secure the materials required to build the necessary infrastructure to deliver the energy strategy?

Key Requests:

- Fund research on processes and methods to separate and recycle critical minerals which currently lack suitable recovery options (e.g. rare earth elements from direct drive magnets)
- Invest in the necessary infrastructure to support recycling and refurbishment of materials and assets from energy infrastructure decommissioning (e.g. port infrastructure to support dismantling of oil rigs, an electric arc furnace to recycle steel from decommissioned wind farms)
- Incentivise circular economy approaches in energy infrastructure development through bid criteria in renewable energy auctions (e.g. as per Dutch example) and/or national planning framework requirements (e.g. materials passports)

- Support and promote a national resource exchange mechanism for infrastructure developers to advertise construction materials or assets for re-use
- Remove regulatory barriers to the re-use of waste products as construction materials
- Close the data gap in understanding Scottish material consumption by defining standardised product reporting criteria for materials suppliers and manufacturers, ideally in a joined-up approach with UK/EU authorities (e.g. material content of products, % recycled content, % imported content)

Government developments

On the macro level, important government interventions will be necessary to secure the materials required to build the necessary infrastructure. Geopolitical tensions, combined with the supply chain disruption endured during the Covid 19 pandemic have led to new, large legislative interventions which aim to secure the necessary raw materials to drive the green industrial revolution. Two important examples should be highlighted here: the US Inflation Reduction Act (IRA) (2022) and the proposed EU Critical Raw Materials Act (CRMA). These legislative examples represent appropriate mechanisms for future resource security. The European example highlights the role that circularity can play in achieving these aims and is likely to represent a more rational approach for the Scottish and wider British market. Both examples, in addition to being advantageous for resource security, also represent avenues for new industrial and technological development locally.

Reduction through life extension

From a carbon perspective, the optimum way to secure the materials required to build renewables infrastructure is to reduce the quantity of raw materials required to fulfil the nation's energy demands. The simplest way to achieve this is to support the life extension of assets which are already operational. By creating support mechanisms to enable owner/operators to safely extend the life of their assets we can reduce the sum total of material consumption for the industry.

Due to the risk of component obsolescence, to enable increased life extension, it would be prudent to develop Scotland's capacity to refurbish and remanufacture major and minor Wind Turbine Generator (WTG) components, as aligned to the Coalition for Wind Industry Circularity (CWIC) proposal that SSER, Renewable Parts and the University of Strathclyde are advocating for.

This programme will serve the dual purpose of reducing the need to landfill mechanical and electrical components and ensure that all materials are kept at a high value further reducing the need for additional virgin materials. The hydro industry is a great example of building assets to last, with Scottish hydro power stations that have generated electricity for over 70 years.

Critical Minerals

The overall proportion of critical minerals which make up energy assets are minimal, but the potential impact of their consumption deserves its own special consideration.

The majority of critical minerals are sourced from countries with a high risk of conflict, corruption, and political instability. The recent invasion of Ukraine by Russia, which accounts for 5-6% of the world's nickel supply and 17% of high-purity nickel production, has increased the cost of nickel. Broadly speaking the issues are characterised by a lack of supply chain diversity, the top three nations that produce lithium, cobalt, and rare earth elements control three quarters of global output. Democratic Republic of the Congo (DRC) and China were responsible for 70% and 60% of global production of cobalt and rare earth elements respectively in 2019, and China has a 35% share in refining and processing nickel, 50-70% for lithium, and cobalt, and 90% for rare earth elements. This creates delays in the deployment of low carbon technologies, as well as increased costs associated with delivery. Due to the lack of diversity, there may be instances where the supply chain is forced to rely on unsustainable sources for these commodities potentially leading to environmental degradation and human rights abuses, as well as reputational damage for the sector.

Developing a UK-based circular economy involving designing for re-use and recycling of existing critical minerals present in a number of UK industries and in landfill would serve to reduce consumption and mitigate the risks.

The Critical Minerals Association has developed a blueprint for Responsible Sourcing of Critical Minerals, which was launched in July 2021 and outlines how the UK can lead on the responsible mining and sourcing of critical minerals. The government could incentivise standardisation of reporting and work with industry and academia to develop appropriate standards for measuring recovery, reuse, and recycling as part of a circular economy. A just transition should form part of this, to protect countries that currently rely on mining for their economy. The UK could regulate imports of critical minerals to ensure that they are sourced from companies that meet established environmental and governance standards and to

prevent the use of minerals from sources that may contribute to environmental degradation or human rights abuses.

Point of Origin/Transparency

It is important to understand the full supply network involved in the production of all products. This is true for all products as most are now created using a global supply network, having limited understanding of the suppliers involved creates additional risks and hinders the ability to act. Having traceability to Point of Origin is crucial to truly understanding the risks involved in the activities and will unlock the potential to mitigate effectively. Having access to detailed and robust data on the products and assets needed, through digital solutions such as materials passports or systems such as Ecovadis or Sedex allows for a standardised approach to which all companies can be held accountable.

From a developer point of view this enables more informed decisions on the security and sustainability of the supply network. Utilising current legislation, such as the UK Modern Slavery Act 2015, and calling for more robust and aligned legislation globally helps to support the development of more transparent supply chains by actively requiring companies to report publicly on their existing efforts and future development strategy to risk mitigation.

Achieving true end to end transparency of the global complex supply chains needed to support the renewables industry is not easy and cannot be achieved by a single developer asking for the information, this can only be achieved by global alignment supported by all developers, appropriate global legislation and the digital networks to enable the sharing of verified data at all levels of the supply chain. Utilising strong supplier relationships can support a more transparent view of the products and assets being procured.

Incentivisation

Currently, the policy mechanisms pertinent to material supply chains do not incentivise businesses to optimise their material consumption. While some emerging policies will target reductions in waste to landfill through taxation, there are no policy mechanisms to reward businesses who develop robust policies who are actively reducing their consumption, support local suppliers or develop data led practices to assess for supply chain risks. As other support mechanisms such as CfD or the seabed auction process have placed an emphasis on reducing cost wherever possible, examples of best practice in this space can be considered an unnecessary additional expense, even when increased initial investment might result in cost savings in the long term. This means that progression on these elements

is challenging to justify and happens in-spite of, rather than being driven by the policy environment.

Recently, the importance of circularity and corporate social responsibility are being given greater prominence in addition to cost mechanisms through policy mechanisms in other markets. Examples of this include the upcoming Ijmuiden Ver auction which is expected to attribute up to 20% of the scoring for Circularity and Corporate Social Responsibility, and one of the sites attributed a further 45% to ecological innovations. Additional example. Conversely, in the most recent ScotWind Leasing Round, completed in 2021, none of the scoring criteria was dedicated to sustainability metrics.

Finally, by embedding sustainability criteria within these mechanisms, we can ensure that sustainable and secure supply chains are not penalised against cost incentives for delivery, resulting in an approach which is beneficial in the long term, create skilled job opportunities and delivering value for the Scottish economy.

Solar energy

The Solar industry recognises that part of a just transition to net zero means sustainable development and responsible production across the supply chain, from manufacturing to end of life.

Last year Solar Energy UK, in partnership with Solar Power Europe, launched the Solar Stewardship Initiative, which seeks to support and enhance responsible development of the solar supply chain. Following the publication of an industry-wide code last year, the initiative began pilot audits of key manufacturing centres in China, which should be concluded in 2023.

The solar industry is also turning its attention to what happens at the end of a PV panel's life. Solar PV panels are made of silicon, glass, and metal, much of which can be recycled. Additionally, many solar panels can be "repowered" to extend the lifetime of the overall panel.

Solar panels are usually operational for between 25-40 years, meaning that the UK has yet to reach a mass of solar panels ready for recycling that would support a UK based recycling business; however, many of our members are investigating how solar panels could be recycled in the UK, reducing the carbon footprint of solar further and ensuring good labour and disposal practices.

We would be happy to discuss the Solar Stewardship Initiative and solar recycling with Scottish Government further.

SR will not be responding to Questions 20 – 26 but make the following overarching comments:

Scottish Renewables recognise that oil and gas activity can help smooth the pipeline for energy sector workers as Scotland moves towards a huge volume of offshore renewables work around the end of decade. We also recognise that supply chain flight and competition for skills, people and talent will step up globally, it is therefore essential we look at the overall attractiveness of Scotland as a place to live and work. This includes ensuring that there is a visible and viable pipeline of work for those in the energy sector to enable a properly managed just transition.

North Sea Oil and Gas

20.Should a rigorous Climate Compatibility Checkpoint (CCC) test be used as part of the process to determine whether or not to allow new oil and gas production?

21.If you do think a CCC test should be applied to new production, should that test be applied both to exploration and to fields already consented but not yet in production, as proposed in the strategy?

22.If you do not think a CCC test should be applied to new production, is this because your view is that:

- Further production should be allowed without any restrictions from a CCC test;
- No further production should be allowed [please set out why];
- Other reasons [please provide views].

23.If there is to be a rigorous CCC test, what criteria would you use within such a test? In particular [but please also write in any further proposed criteria or wider considerations]

- In the context of understanding the impact of oil and gas production in the Scottish North Sea specifically on the global goals of the Paris Agreement, should a CCC test reflect –
  a) the emissions impact from the production side of oil and gas activity only;
  b) the emissions impact associated with both the production and consumption aspects of oil and gas activity (i.e. also cover the global emissions associated with the use of oil and gas, even if the fossil fuel is produced in the Scottish North Sea but exported so that use occurs in another country) – as proposed in the Strategy;
  c) some other position [please describe].
- Should a CCC test take account of energy security of the rest of the UK or European partners as well as Scotland? If so, what factors would you include in the assessment, for example should this include the cost of alternative energy supplies?

- Should a CCC test assess the proposed project's innovation and decarbonisation plans to encourage a reduction in emissions from the extraction and production of oil and gas?
- In carrying out a CCC test , should oil be assessed separately to gas?

24.As part of decisions on any new production, do you think that an assessment should be made on whether a project demonstrates clear economic and social benefit to Scotland? If so, how should economic and social benefit be determined?

25.Should there be a presumption against new exploration for oil and gas?

26.If you do think there should be a presumption against new exploration, are there any exceptional circumstances under which you consider that exploration could be permitted?

Chapter 4 Energy demand

Heat in Buildings

27.What further government action is needed to drive energy efficiency and zero emissions heat deployment across Scotland?

Heat networks

We welcome the Scottish Government's continued commitment to heat networks as a key technology for decarbonising heat. Heat is responsible for around 18% of the UK's annual carbon emissions. It is critical that action is taken now to give the UK a realistic chance of reaching its net zero targets. With the UK targeting 600,000 heat pump installations annually from 2028, and the Scottish Government (SG) aiming for 1 million households to have zero emission heating systems by 2030, we need to, collectively and inclusively, turn this ambition into action.

The scale of this challenge cannot be underestimated and will not be solved with a single form of technology. In 2020, 85% of UK households used gas for heating, and those that are in off gas grid areas are more likely to be living in fuel poverty. The challenge of decarbonising heat and alleviating the pressures felt by those living in vulnerable situations must go hand in hand.

As the Scottish Government develops a new regulatory regime for heat networks we would welcome as much alignment as possible with the regulatory framework which is being developed by the UK Government for Heat Networks in England. The Scottish Government's

financial mechanisms for Heat Networks which are currently being designed should ensure that private sector partners play an active role in the development, investment and delivery of heat networks. In particular, mechanisms to facilitate public sector connections to networks developed and financed by private sector entities should be advanced. Plans to publish an updated target for renewable heat should be designed with industry partners with a clear roadmap set out for how this is achieved.

Solar energy

The Scottish Government should ensure that its energy performance standards for all homes and buildings recognise the carbon benefit of exported solar power from onsite generation and include solar PV in its "notional house," recognising that solar is a crucial technology for consumers to utilise to drive the Scottish clean heat transition.

Solar panels can help directly reduce consumer bills, especially when paired with highly efficient electric heating systems like heat pumps. Solar Energy UK analysis found that for a typical home, installing a solar PV system could reduce energy bills by at least £400, and this can be expected to increase significantly as consumer bills increase. A pilot project run by Stirling Council found that installing storage batteries to complement existing solar panels on tenant homes resulted in tenant homes being over 90% self-sufficient in the summer months, and provided tenants the ability to buy cheaper, off peak electricity in winter. Solar PV as part of energy efficiency or low carbon heating installations will allow homes to be made fit for the future whilst lowering fuel bills now – a truly no regrets option.

Electricity is more expensive per unit than gas, meaning electric heating is much more expensive to run than gas heating; 43% of households who use electricity as their main heating type were in fuel poverty in 2019, before the energy price cap rose and the average fuel bill increased by 50%. A fundamental way to mitigate this is by maximising the uptake of onsite energy generation, such as through solar systems. When accompanied by energy efficiency improvements, many heat pumps and modern electric heating systems can be cheaper to run than older systems. However, cost savings are not guaranteed. Factors such as type of fuel the heat pump is replacing, energy tariffs, the system design, type of heat pump, and location all influence how much heat pumps cost to run.

Energy efficiency requirements in Scotland are based on Standard Assessment Procedure, or SAP methodology. SAP, or a simplified version of SAP called rdSAP is used to produce energy performance certificates (EPCs), which assign a numerical value to the efficiency of a building. Metrics within SAP are determined by the so called "notional house," which is in

essence a benchmark building with the same geometry as the building being examined, but which follows an “elemental recipe.” Current SAP methodology (SAP 10) favours solar PV in its score assignation and should continue to do so.

Presently, New Build Heating Standard Regulations despite being SAP based, do not recognise the value of onsite/exported generation, and do not require solar PV to be installed alongside heat pumps. As written, the regulations remove any benefit in the energy performance calculations for new homes from exported solar energy produced by rooftop solar panels. This is out of line with not just the rest of the UK, but many other national building regulations across the EU, which recognise the value of onsite solar power as part of the net energy position of the building. The effect is unfairly prejudicial to the uptake of solar and associated smart energy technologies and could make homes with electric heat and vehicles unduly expensive for consumers.

Including solar PV in the “notional house” would ensure developers include solar PV and energy storage in new build homes that have electric vehicle charging points or electric heating systems, not only making homes fit for the future, but reducing consumer costs as well. Research from Solar Energy UK found that in a typical heat pump-heated Scottish home, the installation of a solar system would mean heating bills would be reduced by £961 per year, saving 34.1 tonnes of carbon across the system’s lifetime. For a typical gas-heated Scottish home, installing a solar heat system could reduce energy bills by £313 annually. Typically, this would mean a saving of 75.42 tonnes of carbon over the systems lifespan. Greater savings could be expected for new build homes, as they are built to be more energy efficient and installation costs are lower as scaffolding is already present.

Onsite heat technologies generate power at a lower cost than grid electricity and reduce the need for investment in the broader energy system. Homeowners must be supported to take charge of their bills and reduce their carbon emissions by installing solar energy systems. This would help deliver a high volume of cost-effective and decarbonised homes as quickly as possible.

SR will not be responding to Questions 28 – 39

Energy for transport

28.What changes to the energy system, if any, will be required to decarbonise transport?

29.If further investment in the energy system is required to make the changes needed to support decarbonising the transport system in Scotland, how should this be paid for?

30.What can the Scottish Government do to increase the sustainable domestic production and use of low carbon fuels across all modes of transport?

31.What changes, if any, do you think should be made to the current regulations and processes to help make it easier for organisations to install charging Infrastructure and hydrogen/low carbon fuel refuelling infrastructure?

32.What action can the Scottish Government take to ensure that the transition to a net zero transport system supports those least able to pay?

33.What role, if any, is there for communities and community energy in contributing to the delivery of the transport transition to net zero and, what action can the Scottish Government take to support this activity?

34.Electric vehicle batteries typically still have around 80% of their capacity when they need replacing and can be used for other applications, for example they can be used as a clean alternative to diesel generators. What, if anything, could be done to increase the reuse of these batteries in the energy system?

Energy for agriculture

35.What are the key actions you would like to see the Scottish Government take in the next 5 years to support the agricultural sector to decarbonise energy use?

Energy for Industry

36.What are the key actions you would like to see the Scottish Government take in the next 5 years to support the development of CCUS in Scotland?

37.How can the Scottish Government and industry best work together to remove emissions from industry in Scotland?

38.What are the opportunities and challenges to CCUS deployment in Scotland?

39.Given Scotland’s key CCUS resources, Scotland has the potential to work towards being at the centre of a European hub for the importation and storage of CO2 from Europe. What are your views on this?

Chapter 5: Creating the conditions for a net zero energy system

40.What additional action could the Scottish Government or UK Government take to support security of supply in a net zero energy system?

A decarbonised power system is the central requirement for achieving our net zero ambitions. Access to reliable, resilient, and plentiful decarbonised electricity – at an affordable price to consumers – is key to a thriving, energy secure economy.

It is estimated that £350bn in capital investment will be required to deliver the volume of low carbon generation to decarbonise the electricity system and extend clean electricity across the economy. Ensuring that the UK energy sector remains an attractive place to invest will be a critical decarbonisation challenge.

Regulatory framework and network growth
Regulatory frameworks need to be much more agile than current processes allow, prioritising the accelerated delivery of a net zero grid which will form the backbone of our future energy security and decarbonisation ambitions. Without urgent investment in the grid (both transmission and distribution) it will be impossible to realise renewable energy and wider decarbonisation targets.

To put the required level of network growth into context, the transmission network in the north of Scotland needs to double in size by the middle of this decade, triple by 2030, and increase by five to six times by 2050 to support UK net zero targets. A significant proportion of this will be connected at a distribution level and the need for a whole system approach to infrastructure investment and deployment will be crucial.

It is imperative that governments support the development of technologies which can deliver sustainable security of supply to the electricity sector in Scotland and ensure that Scottish generators and flexibility providers can access revenue streams to support investments.

There are several technologies that can transform our electricity system, including energy storage, smart grid technologies, and technologies to deliver sustainable security of supply. The integration of intermittent renewable energy generation into our electricity system can be achieved using flexibility and storage technology deployed at two levels – site level and grid level.

Site level flexibility and storage technology enables individual renewable energy projects to become dispatchable[14]. The technology needed to achieve this can vary and is site specific but can include batteries or electrolysers producing green hydrogen.

Grid level flexibility and storage technology enables the balancing of the grid over periods of four hours to ten days. The BEIS (Business, Energy, and Industrial Strategy) 2021 Smart Systems and Flexibility Plan[15] proposes that 30GW of flexible capacity will be required by 2030 to meet current net zero pathways and suggests that some £10 billion per annum may be saved by 2050 by the introduction of flexible technologies. Our members are currently developing these technologies, including both short and long-duration energy storage. It is expected that pumped storage hydro and green hydrogen will deliver a sizable percentage of the required flexibility capacity and Scotland is well placed to deliver both. Policy should also be designed to accommodate new technologies such as Liquid Air Energy Storage.

There is a need to ensure that Scottish Government and UK Government funding and interventions support world leading activity in Scottish based companies.

To ensure security of supply and operability – the UK Government urgently need to address the matter of regional security of supply. Our decarbonised system will need enhanced 'black start' provision, and to unlock investment in critical ancillary services. This is especially true of pumped storage hydro, where the plans and potential for huge new investments in Scotland will depend on the UK Government delivering a clear route to market. The Scottish Government must also collaborate with UK Government on actions to support investment in new pumped storage hydro capacity.

The key issue is that current Electricity Market Arrangements do not provide an effective market mechanism to bring forward the needed flexibility and storage technologies. Larger infrastructure projects such as pumped storage hydro also require price stabilisation mechanisms to unlock private sector investment in them. This can be achieved through a Cap and Floor system, which is technology neutral and would support the development of a range of medium- and long-term flexibility technologies. The UK Government put out a Call for Evidence on such a mechanism in September 2021 but is not expected to have the mechanism finalised until 2024.

We welcome that the Department for Energy Security and Net Zero is examining the need for improvements to the Capacity Market (CM), ensuring security of supply is maintained while

[14] "dispatchable": energy generation that can be available on demand.

[15] Transitioning to a net zero energy system: smart systems and flexibility plan 2021 - GOV.UK (www.gov.uk)

achieving decarbonisation at least cost. By 2035 electricity production must be achieved without fossil fuel generation and vast amounts of new low-carbon flexibility resources will have to replace flexible fossil plant.

We recognise that a recent consultation included proposals to align the CM with net zero, largely by enabling access for potential abated fossil fuel generation. However, we consider that the proposed design has the effect of restricting large scale, long duration energy storage (LLES) pumped storage hydro projects from participating.

Our pumped storage hydro members are currently developing over 7GW of projects in the UK that, alongside other low carbon storage technologies, can make a major contribution to providing flexibility needed to enable an affordable, secure net zero energy system[16]. The de facto exclusion of these pumped storage hydro projects from the CM means that the policy aim of a technology-neutral capacity market is not being realised.

Our responses to the individual sections of the Capacity Market 2023 consultation are summarised below.

Aligning the CM with Net Zero – we agreed that the CM should seek to enable the transition to net zero. We welcomed the questions in the consultation that aimed to understand how unbated gas Capacity Market Units (CMUs) plan to decarbonise. This evidence should inform decisions around the timings of introducing a new emissions limit and how the Government may either reactively and/or pre-emptively procure replacement capacity as high carbon capacity exits or retrofits.

We consider that this must also include the security of supply and decarbonisation benefits that can be delivered by pumped storage hydro. While the consultation highlighted that a separate mechanism e.g., Cap and Floor, will be developed to enable LLES development, the form and timescale of such a mechanism is still uncertain and therefore investment in LLES will be chilled until an investable mechanism is introduced.

The proposals in the CM to exclude projects with long construction periods, and to make CM revenues available for unabated fossil fuel technologies until at least 2034 serve to create market barriers which exclude pumped storage hydro projects from the CM. Even if a LLES Cap and Floor mechanism is introduced, pumped storage hydro will still be at a disadvantage

[16] In our response to BEIS' 2021 call for evidence on facilitating the deployment of large-scale and long-duration electricity storage we set out in detail the system benefits Pumped Storage Hydro project can deliver.

to other competing technologies with access to the CM (such as interconnectors, batteries, hydrogen, etc).

Additional improvements to the CM - we agreed with the proposals in this area to improve the efficiency of the CM process and reduce the administrative burden. Whilst it is concerning that such a process does not already exist, we supported the phased introduction of independent verification of Fossil Fuel Emissions Declarations to ensure security of supply requirements are met in the 2023 auction.

Scottish Renewables fully supports the need for a review of the electricity market arrangements, as the current arrangements were never designed nor intended to deliver net zero.

Scottish Renewables submitted a response to BEIS' opening consultation in the Review of Electricity Market Arrangements (REMA), which sets out our views on the REMA in detail.

REMA seeks to identify market reforms that will enable the transition to a decarbonised power sector by 2035 and net zero by mid-century. In our response we make the overarching argument that REMA must meet two key objectives:

- Scale up low carbon technologies to meet net zero goals.
- Scale up flexible technologies to support renewables.

For this to be achieved, REMA must deliver long- and short-term price signals to mobilise the required investment in both renewable and flexible assets whilst maintaining security of supply and providing best value to consumers. These signals must safeguard the investor confidence that is critical to ensuring the transition clean energy continues at the pace required.

SR strongly advocates for the evolution of existing arrangements rather than the introduction of radical new ones. Existing arrangements are well understood, and the administrative and financial infrastructure needed for them to operate are already in place.

The introduction of radically new arrangements will require the investment of a significant amount of time and capacity from government, regulators and industry to design and implement. Given the pace at which changes must be made to achieve net zero, the time and capacity investment needed to implement radical change is incompatible with achieving net zero.

Scottish Government should act now and send a strong ambitious signal to the market that Scotland welcomes all renewable energy, at all scales, in the drive to meet its ambitious climate goals whilst keeping household costs down. This includes setting deployment ambitions for mature technologies, such as solar, and working with regulators and operators to modernise the rules and regulations that govern the electricity grid.

Solar and battery storage are indisputably proven technologies available and cost-effective today that are essential components to achieving Scotland's net zero target. Scotland, like the rest of the country will not achieve its targets unless changes are made to the regulatory frameworks that are currently blocking deployment and unnecessarily increasing costs and development risk.

The main issue with the electricity network is due to outdated regulations suited to a different operating premise that were not designed for and therefore are not able to deliver net zero.

The UK grid was designed and built over the last 100 years for one-way flows from large central power stations to consumers. The grid has been operated, and regulation established, that makes grid operators liable for voltage and frequency at the customer's point of connection to be within a pre-set range. Vastly simplified, electricity regulators valued energy reliability over affordability and sustainability in the "energy trilemma." When grid operators controlled all supplies, this was not an issue. Per this system, regulations on network charging were designed for large one-way flows in a centrally controlled network, and do not reward local projects that offset long-distance imports and improve local resilience. In contrast, the internet operates reliably on a decentralised model.

Over the last 20 years, the price of renewable generation and battery storage has fallen faster and by more than government imagined. Today it is economic to self-generate and self-store energy locally. Technological change has been significantly faster than the pace at which government policy and regulation has evolved, because policymakers and grid designers did not envisage a large quantity of small generators being connected close to demand. Unlike network operators in other countries, UK operators have not yet had the resources to consider how local generation and storage can be an opportunity.

Urgent action and investment are needed to modernise the electricity grid; however, current policy does not allow investment ahead of need. UK Government, through the regulator OFGEM, requires evidence for investments in network upgrades that can only be calculated once the technical need is already evident. Network operator upgrade lead times are 5-10 years - on this basis regulation slows the adoption of renewable generation and harms the economy by always being late in approving upgrades. As Scottish and Southern Electricity

Networks Transmission wrote in their submission to the Scottish Parliament's Net Zero Committee

"Sensible and evidenced low regrets anticipatory investment for Distribution would also be helpful to achieve required network enhancement within tight timescales and at the same time reduce costs to consumers, and impact to communities over the long term. Strategic investment in critical infrastructure can significantly help to reduce the UK's carbon consumption and cost to consumers, by lowering the need to constrain off generation in the north of Scotland and turn up gas generators in the south of England.

At a distribution level, strategic investment can avoid costly disruption of repeated upgrades in step with gradual increase in demand, or of retrofitting the network after demand has emerged.

Regulatory frameworks need to be much more agile than current processes allow, prioritising the accelerated delivery of a net zero grid which will form the backbone of our future energy security and decarbonisation ambitions. Without urgent investment in the grid (both transmission and distribution) it will be impossible to realise renewable energy and wider decarbonisation targets."

Prohibiting investment ahead of need jeopardises net zero targets not only by restricting the ability of renewable generation and storage to connect to the grid, but also through slowing the development of demand side infrastructure, significantly decelerating the decarbonisation of heat and transport. The shift to electric vehicles and heat pumps will significantly increase electricity consumption, but tens of thousands of local transformers and cables cannot be upgraded fast enough to satisfy the upcoming demand. In some neighbourhoods, the grid operator may require multi-year lead times for new heat pump or EV charger connections.

Regulatory reform is needed, and the electricity networks need to be modernised. Where devolved powers are insufficient to expedite changes in electricity regulations, they can be used to oblige grid operators to expedite new connections. Private consultants could be empowered to undertake grid studies on behalf of the network operators to overcome severe resourcing constraints. Scottish Government could investigate giving communities the right to transfer network assets into CIC ownership so that those assets could be managed through an IDO – effectively allowing local communities to form their own "private wire" supplies and "self-supply" under current national regulations. In all cases, the network operators need better regulatory incentives to cooperate quickly and efficiently with developer grid connection requests, and to implement upgrades at commercial rather than monopolist timescales.

The current electricity infrastructure system will not enable us to reach net zero. Applications to connect to the grid are expensive and connection dates are increasingly offered in the 2030s. The difficulty obtaining timeous and affordable grid connections could pose a threat to achieving Scottish Government ambitions, if action is not taken to modernise the rules and regulations that govern the electricity grid and facilitate the infrastructure needed for a decarbonised energy system. We have the mature technologies we need to reach net zero, and solar in particular can be deployed at pace, reducing the energy costs and carbon footprints of consumers, businesses, and communities.

41.What other actions should the Scottish Government (or others) undertake to ensure our energy system is resilient to the impacts of climate change?

The National Planning Framework 4 (NPF4) provides high-level policy principles on climate adaptation however further guidance is required around the implementation of these principles within Local Development Plans to ensure that development proposals for energy infrastructure are not held up.

The Scottish Government should constructively engage with developers and local authorities to provide clear guidance and a consistent framework for how climate risk assessments should be undertaken on development proposals and how the adequacy of climate adaptation and resilience measures would be assessed. The Scottish Government should also engage with the UK Government and regulators on the harmonisation of climate adaptation reporting requirements to avoid unnecessary duplication.

Scottish Renewables believes it is critical that climate resilience and future adaptation is considered and prioritised during the development of policy and legislation by Government and our regulator, Ofgem.

We are concerned that some of the energy policy currently in development could lead to the security of the UK's critical national electricity infrastructure being put at risk if climate resilience is not a factor in its development (such as competition in networks and uncertainty on future roles and responsibilities of the FSO (Future System Operator)).

The UK Government has committed to decarbonise electricity supply by 2035, in line with the Climate Change Committee's advice.

While some work is underway to address this issue, Scottish Renewables fully supports the statement in the Climate Change Committee's report[17] published on March 09 which states *"A reliable, secure and decarbonised power system by 2035 is possible – but not at this pace of delivery….the Government has not yet provided a coherent strategy to achieve its goal nor provided essential details on how it will encourage the necessary investment and infrastructure to be deployed over the next 12 years."*

We believe that the Climate Change Committee's report illustrates what a reliable, resilient, decarbonised electricity supply system could look like in 2035, and the steps required to achieve it.

Chapter 6: Route map to 2045

42.Are there any changes you would make to the approach set out in this route map?

No response

43.What, if any, additional action could be taken to deliver the vision and ensure Scotland captures maximum social, economic and environmental benefits from the transition?

Circular Economy
Enable the development of a Circular Economy for the Wind Industry, economic analysis produced by BVG associated has identified that the GVA associated with developing Scotland's capacity to remanufacture could be £8.9BN from the European market from 2025-2035. Additionally, this would create 20,000 FTE's. SSE Renewables is a co-creator of CWIC, the Coalition for Wind Industry Circularity, an organisation focused on, unlocking this potential through cooperation, funding and the sharing of IP. We are calling on the Scottish Government to adopt this into their sector deal and support the embedding of it across developers and manufacturers, through policy mechanisms.

[17] https://www.theccc.org.uk/publication/delivering-a-reliable-decarbonised-power-system

SR will not be responding to Questions 44 – 47

Impact assessment questions

44.Could any of the proposals set out in this strategy unfairly discriminate against any person in Scotland who shares a protected characteristic? These include: age, disability, sex, gender reassignment, pregnancy and maternity, race, sexual orientation, religion or belief.

45.Could any of the proposals set out in this strategy have an adverse impact on children's rights and wellbeing?

46.Is there any further action that we, or other organisations (please specify), can take to protect those on lower incomes or at risk of fuel poverty from any negative cost impact as a result of the net zero transition?

47.Is there further action we can take to ensure the strategy best supports the development of more opportunities for young people?

Just Transition energy outcomes

48.What are your views on the approach we have set out to monitor and evaluate the Strategy and Plan?

Risk management – Just Transition Plans should include a detailed and credible assessment of key risks to strategic delivery as well as actions to mitigate these risks. One key risk to the delivery of the energy transition, for example, is workforce capacity. A step change is needed if Scotland is to have the skills required to build a low carbon energy sector, both in terms of supply and demand, and to enjoy the associated benefits.

Road maps – road maps are a critical tool in the development of credible Just Transition Plans. These should be detailed and thorough, mapping interdependencies between actions and outcomes, and providing a critical path analysis that includes a realistic assessment of institutional capacity and other key constraints.

49.What are your views on the draft Just Transition outcomes for the Energy Strategy and Just Transition Plan?

No response

50.Do you have any views on appropriate indicators and relevant data sources to measure progress towards, and success of, these outcomes?

No response