The Infrastructure Commission for Scotland
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10 May 2019

To whom it may concern,

Infrastructure Commission for Scotland: Initial Call for Evidence and Contributions

Scottish Renewables is the voice of Scotland's renewable energy industry, working to grow the sector and sustain its position at the forefront of the global clean energy transition. We represent around 260 organisations across the full range of renewable energy technologies in Scotland and around the world, ranging from energy suppliers, operators and manufacturers to small developers, installers and community groups, as well as companies throughout the supply chain.

The imperative to decarbonise our economy has never been clearer. The recent IPCC[1] report gives a timeline of twelve years in which to take fundamental and drastic action to manage temperature increases globally. The Scottish Government has recently adopted the recommended target from the Committee on Climate Change to achieve 'net-zero' emissions by 2045[2], globally leading targets.

To meet these targets in a way which supports wider government ambitions across inclusive economic growth, 'place making' and the Just Transition, the following actions are required:

- **Developing a clean power plan**
  While Scotland does benefit from already having an Energy Strategy in place which sets out a clear end point, the targets within it will need to be supported by an energy mix that makes use of all the renewable energy technologies and resources available to us here in Scotland as well as policy drivers designed to enable the development of that mix. Our renewable energy technologies all develop over differing timelines and several external variables can accelerate or stall their development. Onshore wind can be deployed quickly given industry has strong experience of project development and an established technology. However, it is at a market inflection point having lost route to market support from the UK Government which has in turn introduced inertia in terms of new projects and development, meaning timelines are now longer than they could be. This is compounded by a planning system that is not set up to deal with some very predictable changes required to facilitate the next era of projects such as taller turbines and a grid

[1] https://www.ipcc.ch/sr15/
[2] https://www.gov.scot/news/reaching-net-zero/

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system unable to accommodate the extent of the increase in renewable generation required by both heat and transport as they decarbonise. To date offshore wind project have taken up to 15 years to move from concept to reality. While the conditions are currently favourable there are distinct environmental considerations which we know can introduce significant delay to our development timescales here in Scotland. We know that there are steps we can take to accelerate the deployment of both onshore and offshore wind but in considering a five- and thirty-year timeframe as the Commission is, any new wind projects will sit somewhere in the middle of those two timeframes. This will require deliberate intervention through the development of a clean power plan which covers energy mix, planning enablement and assessment of network availability to meet both the energy strategy and climate change targets.

We would additionally expect a clean power plan to consider the future development of other technologies, including those expected to deploy on a merchant basis (small scale solar), renewable resources with strong community energy potential (such as small-scale hydro, tidal energy), and those best utilised for system balancing purposes (pumped hydro storage, demand side response, battery storage). It is with the consideration of the energy mix of both generation and network management technologies that policy mechanisms to support the energy system transition can be best developed.

- **Ensuring a viable jobs transition programme**
  Scotland's renewable electricity sector employs in excess of 16,000 people, generating over £5.5 billion of revenue, and has displaced more than 70 million tonnes of carbon dioxide since 2010[3] making it a vitally important industry to Scotland's economy. The renewables workforce is varied and dynamic, stretching from engineering to environmental specialist. Given the adoption of new technologies, including automation, the sector is well advanced in its approach to 'smart jobs'.

  We would expect the imperative to decarbonise our system to create additional demand for jobs within the renewable energy sector, happening broadly in tandem with some contraction across other areas of energy, particularly in fossil fuels. There is clear synergy in workforce skill sets across these energy sectors, and value to be found in collaboration and learning from incumbent energy sectors. The Preamble of the Paris Agreement highlights "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities"[4]. It is important therefore that Government and Industry come

3 https://www.scottishrenewables.com/sectors/renewables-in-numbers/

4 UNFCCC Paris Agreement 2015 Article 2 https://unfccc.int/sites/default/files/english_paris_agreement.pdf

together to secure a viable jobs transition programme supporting our decarbonisation agenda through improving cross-sector permeability and skills development.

- **Clear policy frameworks to decarbonise heat**
  With heat making up more than half of Scotland's energy demand, we need real ambition to decarbonise the sector in line with our climate change targets. There fall across three principal areas:
  1) **District heat networks:** To see this infrastructure come forward in the timescales required industry requires clarity on a package of government regulation, which must balance additional regulatory burden for industry with enabling regulations.
  2) **Rural heat (off-gas grid):** The Energy Efficient Scotland programme should be used to address the policy-gap across rural heat (biomass, electric heat pumps and solar thermal), particularly in the context of the closure of the Renewable Heat Incentive by the UK Government expected in 2021.
  3) **New Build:** Again, considering the Committee on Climate Change recommendations, gas should be phased out of new buildings by 2025 at the latest.

Scottish Renewables is working with our memberships across all of these areas to develop more detailed industry consensus on the pathway for renewable energy development across the five- and thirty-year timeframes set out by the Commission.

We set out more detail on our emerging thinking below but would welcome the opportunity to engage further with our Commission as this work progresses.

Yours Sincerely,

Claire Mack
Chief Executive
Scottish Renewables

1. The remit and in particular the Commission objectives provide an illustration of some key strategic drivers to an inclusive growth and low carbon economy:

a. What are your views on these drivers and are there any others that should be considered by the Commission

The drivers that are outlined by the Commission effectively cover the 'megatrends' facing all nations and states globally. They cover the areas defined in the Scottish Government's economic strategy and extend to capture elements of inclusive growth and the low-carbon economy. The ways these trends will play out here will be impacted by some very clear and distinctive characteristics of Scotland as a nation such as our natural resources, established industries and sectors, our current export product mix and export links, the current and future health of our people, and our very different population densities and distribution of wealth. It is against these fundamentals that we must plan and forecast the potential for economic growth of any sort.

The choices we make about what infrastructure provisions we bring forward, and where we build or provide it, will alleviate impacts or help encourage positive outcomes on some, or all of, the measures set out by the Commission.

The way Scotland's current low-carbon economy has developed however, has been different. Drivers have largely been finance/subsidy for renewable energy and environmentalism. While a renewable energy industry has grown because of those drivers with associated supply chains and infrastructure build around projects, one of the underlying determinants has been our electricity grid and the current limitations of that ageing infrastructure. We have, to date, faced an iterative process of incremental change to accommodate renewables rather than a decision point for system level change and a managed transition. The timelines highlighted recently by the IPCC and the Committee on Climate Change mean that we have now reached that point.

Another key determinant has been availability of land and the regulation of its use through our planning system. If we want a low-carbon economy to thrive we must accept that renewable energy and a huge increase in demand for electricity will be at the heart of it. Renewables has been categorised as a 'growth sector' alongside others within our enterprise system rather than something that will underpin economic growth across all sectors in the future. To that end, Scottish Renewables believes that availability of clean electricity, or other clean energy sources should be also within the list of drivers outlined by the Commission.

b. What is the impact of these (and any additional) drivers on an inclusive growth and low carbon economy?

The low carbon elements of this probably do not require explanation in that our current generation saves the equivalent of 9.4 million tonnes of carbon per year going into the atmosphere. Many sectors in Scotland have ambitious growth rates and while we know that our future growth journey and where we derive value in our economy will change, we still need to fuel economic growth without adding to carbon emissions. The critical way to do that is to increase our low-carbon electricity generation potential through the established technologies such as onshore wind, offshore wind and solar which represent the cheapest new forms of generation having already been through technology cost reduction cycles. These technologies also present an opportunity for greater demand and scale offering the potential for further cost reductions. A suite of other technologies will allow for a diverse energy mix (allowing for balance between generation profiles and grid system requirements) while also enabling communities and corporates to decarbonise through integrating renewables into new energy systems and business models.

In terms of inclusive growth there are some key characteristics of the renewable energy industry which we believe could be harnessed and worked into a strategy to drive inclusive growth.

Geographic location

Natural resources through which we generate clean power can be available anywhere (as is the case with solar resource) but most wind and tidal resources are captured in our rural areas or at the edge of our nation. As the system becomes more decentralised and energy connectivity is re-shaped these areas will be able to benefit more directly from these resources, and the benefits of these resources distributed more widely as our rural areas have the capability to become huge exporters of excess power. We have seen this in areas where constrained wind energy has been used to create hydrogen for transport as is the case in Orkney. Strategic investment in storage and grid upgrades alongside long-term planning of new electrified heat and transport networks will enable optimised use of natural resources and potentially deliver lower cost energy to consumers and industry thereby offering competitive advantages to them. Locational charges on the grid network can form a large part of the overall cost compact. Utilisation closer to source often offers the best use of our existing infrastructure, while creating local/regional assets (which could be used to underpin local economic and industrial development -in the way that we have seen a linkage between hydropower and steel production) or to bring forward the point at which our more rural areas can switch to electric road transport through the forcing an ‘outside in’ approach to charging network rollout. Local power demand coupled with newly available technologies,

such as EVs, can therefore catalyse infrastructure development underpinning local energy systems. This would be different to other technology network rollouts such as mobile connectivity and broadband where population density has defined the coverage pattern. This approach does raise questions over the future of the electricity grid and how it is funded. That is a key question which is debated within the power industry and one too that the Infrastructure Commission will no doubt consider.

Local energy systems

As laid out above, the location and abundance of our natural resources mean that we have ability to create distinct, local energy systems capable of generating and balancing electricity supply and demand through the use of multiple renewable technologies, deployment of storage and use of data to predict and respond to demand flows. This can act as driver of low-carbon outcomes such as a decarbonised transport system and decarbonised industrial growth. With the right electricity and gas transmission systems in place, markets can be opened up in areas where renewable resources can provide new sources of energy for that community or new sources of revenue where local demand is lower than supply and surplus can be sold on.

For localised use, these local energy systems can sit outwith the wholesale market and the variations in price that creates for consumers. That ability to use a consistently priced form of energy allows for much greater scope in terms of managing the cost of living. This can be used as a social security mechanism, allow for businesses to better manage their costs, or could be used as way of attracting new people and enterprises to an area which has an overall low-carbon ambition coupled with access to the cheapest, cleanest forms of energy. This could support local inclusive growth strategies in areas where other options for economic growth, local taxation and labour market opportunities are narrower.

Jobs and investment

There are a number of stages which a renewable energy project will transition through all with different associated jobs and investment opportunities. Scotland and the UK have not been at the forefront of manufacturing in the wind industry and there are very clear reasons for this. Wind projects operate over a long timeframe of 25 years. Throughout this cycle there are predictable resource requirements in terms of investment and labour. UK Government support mechanisms such as CfD auctions have created a forecastable pipeline for project delivery. Operations and maintenance are consistent and match the lifetime of the asset. They offer high skill, high wage jobs and predictable re-development points through repowering which we can use wider economic resources such as the skills delivery system and college system to feed. This predictability is highly unusual an something that will support inclusive growth programmes by reducing skills mismatch and over-skilling.

The low-carbon transition does present areas where we need further focus such as on jobs transition. Our workforce will need targeted and deliberate skills transfer programmes in the energy sector to ensure that those people working in fossil-based energy areas can access education and training to enter the low-carbon energy market. This is most clear at the moment in the offshore wind and renewable heat space. Our offshore capability built through oil and gas should be available to renewable energy. Industry and government need to work on the barriers to complete permeability between these sectors.

Another area where planning is essential not just for the technological transition but also the people transition is in heat provision in Scotland. Current advice from the CCC says that no new homes should be built with gas boilers beyond 2025. This means that we need first year school pupils and anyone after them in Scotland to consider electrical heating engineering as a career option. We will also need to plan a steady and smooth transition of people from gas to electric skillsets or enable them with dual fuel capability, monitoring demands from householders along the way to ensure that no one is left with a skillset that is technologically outdated or we inadvertently create a skills shortage for either fuel option which will lead to higher costs. Additional jobs will be created in data and data-led intelligence as our energy systems become more sophisticated with multiple energy vectors requiring management in line with storage options and resource variability.

It is essential that the Scottish Government ensures that the fiscal and regulatory environment in Scotland allows for the clean, low-carbon technologies and infrastructure that will drive/underpin this transition.

c. What are the key interactions and dependencies across these drivers?

d. What is the impact of each of them and cumulatively on Infrastructure demand and need now and for the future?

Underpinning a number of low-carbon technology rollouts is our communications and data network. High speed, ubiquitous networks are essential to creating local energy systems and decarbonised transport.

There is a fundamental interaction, one that we have been aware of and have achieved positive results on which is that between economic growth and carbon emissions. We need not only to continue this but also lead other areas of the world in their journey through our intelligence and expertise. Creating growth is essential to mitigating the impacts of some of the drivers identified such as demographic change which will have cost implication for the public purse as our society ages and our dependency ratio changes. We need to understand with the benefit of hindsight that we can share, how to achieve a new era of growth which

does not rely on fossil fuels and their associated carbon emissions. The productivity and energy intensity they have offered has driven growth to date and we need to be alive to what it will take to achieve the same outcomes in terms of living standards and industrial development in a new low-carbon energy era.

The decarbonisation agenda injects significant uncertainty into our infrastructure requirements going forward. Sector-specific decarbonisation will lead to changing infrastructure needs across the electricity network, transport network our building stock and our data & communications systems. Decarbonising these sectors will increase the interface that discreet infrastructure networks and supporting infrastructures will have with each other (for example, we are likely to see a convergence of the electricity-transport-buildings sectors). Similarly, use profiles for how we interact with these assets will change over time, driven by low-carbon alternatives, new technologies and demographic profiles. These megatrends present several challenges to delivering the ongoing maintenance and resiliency of these systems, but also to ensuring we are bringing forward infrastructure which is fit for purpose today and will meet the needs of tomorrow.

e. How to prioritise investment to deliver inclusive economic growth and low carbon objectives

Investment is best targeted to areas, sectors and projects which can unlock the widest possible set of socio-economic benefits through their delivery, driving the transition to a low-carbon economy.

Collectively, we must be cognisant of long lead in times for infrastructure developments, the benefits of temporal alignment of project pipelines to maximise supply chain capabilities and the need to leverage inward flows of capital.

Key factors determining the appropriate prioritisation of investment include:

- **Policy & Regulatory Support**
  While the capital costs of maintaining, upgrading and delivering new infrastructure requirements are significant, and investment is therefore required, policy support plays an equally important role in the delivery of infrastructure which will support inclusive growth and low-carbon objectives. Certainty over routes to market, a fair and proportionate planning system and effective regulation are also a critical dependency for renewable energy and low-carbon growth. For renewables to be supported, and drive growth in other sectors, the wider business, policy and regulation environment must work alongside the fiscal policy to enable investment.

- **Demographic & Social change factors:**
  Demographic shifts, from ageing populations through to increasing urban densities impact the infrastructures which will best enable an inclusive, low-carbon economy – and the prioritisation of investment should consider these factors. Scotland has a number of unique challenges in this regard: a smaller labour market for example drives a need to maximise productivity in the work place, capitalising on existing skills bases and national strengths to drive competitiveness. Futureproofing our investment – particularly across large CAPEX heavy and long-lead time projects – is critical in avoiding stranded assets.

- **International Competitiveness:**
  Driving strong exports will be key to achieving growth across Scotland's economy. Our ability to compete effectively internationally begins with domestic markets – so policy and fiscal levers must be used prudently to ensure markets are well-functioning and sectors can build competitive advantages. Given the nature of our service-led economy, and our existing strengths in innovation, we should be clear about what types of export sectors we are looking to deliver. We must also consider that given strong global price competition, driving competitive advantage on price alone is likely to be challenging. A more realistic market offering is one focused on expertise and quality.

- **Delivering inclusive growth and 'place making':**
  Creating vibrant, well-functioning places, relies on making the best use of community assets, ensuring effective asset maintenance and bringing forward infrastructures which meetings local requirements. Investment in renewable energy presents a new kind of asset which has a track record of becoming a cornerstone of local, inclusive, development and placemaking. Revenue opportunities that come from community and shared ownership project finance structures (already normalised within the renewable energy industry) can support local ambitions directly through financing. Renewable energy assets, particularly those that are off grid, entrench resiliency within local systems as well as creating positive externalities, such as improving health and well-being through lowering-emissions and providing clearer air, and fostering a sense of community cohesion.

2. Infrastructure has a key role in relation to an Inclusive Growth and Low Carbon Economy:

a. What are your views on Scottish Government's definition of infrastructure as provided in the Commission remit, and are there any additional elements that should be considered, or areas that could be omitted?

Scottish Renewables welcomes that the definition goes some way beyond 'traditional' thinking in this space with regards to infrastructure but given the drivers that have been identified a different set of solutions will be required because of the scale of some of the issues and impacts. Taking a broader, holistic view of the inputs (infrastructure) will allow measurement of a broader set of outcomes or outputs to understand better whether we have genuinely used our resources well and made improvements.

b. What contribution does each of the infrastructure categories identified make to achieving an inclusive growth and low carbon economy?

We believe that renewable energy is at the heart of the low-carbon and inclusive economy. It will power the changes we need in transport to deliver a low-carbon solution to what is currently 25% of Scotland's energy use and in building a renewable heat industry, decarbonising half of Scotland's emissions. The telecoms network, full rollout of broadband infrastructure and increased use of big-data will allow us to change the way we run our homes and businesses so that we can use the cheapest and lowest carbon options to power, heat and cool buildings, manufacture and deliver goods where and when they are needed. Housing demand is high, but we are creating infrastructure here that is not future ready by relying on high-carbon heat and poor energy efficiency options at build. In the same way that we are not creating digital connectivity that is fit for the needs of modern living in new builds we are not installing heating and cooling that fits with our stated ambitions of a low-carbon economy. In installing high carbon heating options, we are actively working against inclusive growth and stalling the development of a low-carbon economy

Education and skills are a key component of economic growth. In creating a stronger signal through infrastructure planning we are allowing for planning throughout the education system for the sort of economy that we are seeking to build. This will draw stable investment over the longer term, which, coupled with the right skills, will serve the projects and developments we need. A healthy workforce is part of this equation too and we are starting to see data around the negative health impacts of air pollution and emissions which mean that there is an even more compelling case for accelerating our decarbonisation plans.

Scotland has set out a clear timeframe for decarbonisation of transport at 2032, doing the same for heat will create a supporting factor in any plan to approach health and healthy citizens as a key part of our national infrastructure. Thinking of healthy citizens as part of our infrastructure also makes the case for cultural facilities which will no doubt have a wellbeing contribution. It is not something that Scottish Renewables is aware of the evidence base for but in accepting this broader view of infrastructure, we can see that would represent coherent thinking. Justice and emergency service provision are important to our investment landscape

and well establish metrics such as corruption indices and ease of doing business act as evidence of this.

In a changing climate, resilience, resource and waste management and flood prevention are all going to grow in importance. Taking mitigating actions to minimise the need for this is preferable and a clear decarbonisation path with monitored milestones is required to ensure these actions happen. Part of that mitigating action is to accelerate the energy transition and take bold action on our biggest carbon emissions issue – heat.

C. What role and impact does each of the infrastructure categories identified have on the drivers identified in the Commission remit and objectives?

The various roles and impacts of infrastructure categories change depending on how you prioritise the drivers and how you tackle them. Investments to deliver inclusive growth and a low-carbon economy will impact most if not all of the infrastructure categories listed in a positive way through either reducing consumption, reducing carbon emissions, creating a more stable economy or creating job opportunities. Similarly, the decarbonisation agenda – coupled with demographic change impacting on use-profiles for infrastructure – will increase the interface between infrastructure sectors traditionally thought of as separate. For example, we can anticipate (and at a small-scale are already seeing the emergence of) a transport-buildings-energy nexus, fuelled by the benefits in connecting electric vehicles into homes equipped with renewable power sources.

Each of the infrastructure categories listed also have an impact on place-making in that availability of them in general will create better conditions to meet the challenges presented by that driver. Some of the other drivers listed will need some specific treatments – international competitiveness for example may require investments in skills and technology to be improved and may not directly deliver to the other drivers or wider infrastructure categories. By this, if we increase competitiveness and presumably trade, we will inevitably increase carbon use through transportation and travel thus impacting our low carbon objectives.

d. What are your views on the relative importance and impact of optimising whole life asset capacity through investment in enhanced renewals and maintenance compared to investing in and developing new infrastructure?

We believe that a balance has to be optimised between investment which brings forward new infrastructure, supported by enhancing our existing assets through renewables and maintenance programmes.

In an energy context, the need for both approaches to be taken forward in tandem is clear.

The climate change mitigation targets adopted by the Scottish Government will require an significant increase in renewable energy capacity by 2045.

Investment from the public and private sector is required if we are to bring forward a volume of new renewable energy generation, support the development of new technologies and ensue that the sector's supporting infrastructure (as diverse as the electricity grid and ports and harbours) is capable of supporting that delivery.

Upgrading our feel will be equally essentially to fully capitalising on our renewable energy resources. While some renewable energy technologies, such as hydro power, can last for a century, the majority of renewable energy assets are brought forward on a 25-year basis (through a combination of technology-lifespan and the standardisation of a 25-year planning consent). Many of these sites are approaching the end of their operational lifetime. Since their initial deployment, advances in technology mean that by replacing the generating equipment on site with more advanced machinery could yield better outputs. Government enabling this repowering of assets will be critical if we are to best enable long-term, whole-life asset planning.

e. To what extent and in what way can infrastructure act as a catalyst for change in a place; be that at a community, local, strategic or national level?

See section 1.d.

f. To what extent and in what way can infrastructure act as a catalyst for: i. increased economic investment and growth? ii. improved service delivery? iii. improved community cohesion?

See above

3. e. Where do you see future convergence of need and demand having an impact across infrastructure classes?

Whilst energy is a fundamental part of national infrastructure, it relies upon an underpinning infrastructure of its own - the grid and electricity networks and as explained earlier, increasingly the communications infrastructure enabling the system change we require. For our energy system ambitions to be met, these assets must be developed toward the same objectives, yet we are currently seeing a real disjoint in how these pieces of infrastructure are developing and a lack of synergy across their roll-out. In this context planning is also a key

enabling factor and should be motivated to match any recommendations brought forward by the Commission informed by its consultation with wider stakeholders.

Heat broadens this further, with increasing electrification reinforcing the reliance between energy and grid yet also will see the need for significant new civil engineering programmes as well as embedding new technologies such as air source and ground source heat pumps. We need to see synergies develop and a deliberately coordinated approach to ensure that these separate and complex programmes work in tandem to ensure that we can meet what are incredibly challenging timeframes. We know from work in Scotland to develop communications infrastructure that laying physical pipework has some very distinct issues around access and wayleaves. Useful learning from this will need to be taken forward into any work to lay the foundations for our future neat networks. This underscores the importance of the planning system and its ability to create the right environment for development in line with the overarching objectives laid out by the Commission.