

Cabinet Secretary for Wellbeing Economy, Fair Work and Energy

Briefing for committee inquiry on Scotland's energy infrastructure

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| What | Invitation to give evidence to the Net Zero, Energy and Transport Committee's inquiry on Scotland's electricity infrastructure |
| Where | <i>Scottish Parliament, Committee Room 2</i> |
| When | <i>09 May 2023 from 09:50 – 11:05.</i> |
| Key Message(s) | <ul style="list-style-type: none">• We must seize the huge opportunity that the energy transition presents and deliver maximum benefits to Scotland's people, communities, and economy from our vast renewable energy resources.• It is clear that significant investment is needed in networks to ensure clean, cheap renewable electricity can flow to where it is needed.• Electricity Transmission infrastructure in particular requires huge levels of investment to ensure the grid does not become a barrier to net zero. |
| Who | <i>Edward Mountain MSP, is convener of the Net Zero Energy and Transport Committee</i> <i>Full list is provided in Annex B</i> |
| Why | The purpose of the inquiry is to scrutinise what electricity infrastructure will be needed to realise the ambitions set out in the Scottish Government's Draft Energy Strategy and Just Transition Plan. |
| Supporting official | Ragne Low, Deputy Director, Onshore Electricity Policy, Strategy and Consents [Redacted] [Redacted], Head of Onshore Electricity Policy, [Redacted] |
| Briefing contents | Annex A: Meeting Agenda and Notes Annex B: Attendees Annex C: Summary Page / Top Brief Annex D: Speaking Note Annex E: Summary of oral evidence provided at Committee Annex F: Background on Renewables Annex G: Background on Hydrogen Annex H: Background on ESJTP Annex I: Background on electricity networks Annex J: Background on REMA [Redacted] Annex L: Clerk's Paper Ahead of Committee |

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| Media Handling | <i>Comms team have been notified of session</i> |
| Social Media | <i>Not required</i> |
| Greeting Party and specific meeting point on arrival (if event is at a non SE Building) | <i>Officials will arrive at parliament for 9:30am ready to answer any questions you might have.</i> |

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Annex A

Agenda & Background Notes

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| Opening Address (3 min) followed by questions | 09:50 – 11:05 |
| No Formal Agenda provided – paper from clerks at annex L | |

Background

The Net Zero, Energy and Transport Committee launched its inquiry titled “Scotland’s Electricity Infrastructure: inhibitor or enabler of our energy ambitions” in March 2023.

The purpose of the inquiry is to: scrutinise what electricity infrastructure will be needed to realise the ambitions set out in the Scottish Government's draft Energy Strategy and Just Transition Plan, and what will be needed to deliver that infrastructure. It is intended to be a short "snapshot" inquiry leading to a report to the Scottish Government as it finalises its new Energy Strategy

To date the Committee has taken oral evidence from a small group of industry stakeholders and separately heard from representatives in the Office of Gas and Electricity Markets (Ofgem) – the GB energy markets regulator.

A wider call for evidence, which closed on the 18 April, has sought views from all stakeholders on a number of targeted areas of interest, which includes:

- Electricity network readiness
- Electricity system security and resilience
- Wind Energy
- Hydrogen
- UK Regulation and policy

A summary of the oral evidence provided, in addition to the committee reports, is provided in Annex E.

The Committee has invited you to address this inquiry and is particularly interested to explore the following themes:

- the suitability of the different electricity technologies that the Scottish Government wants to play a role in future energy supply (onshore/offshore wind, marine, solar, hydro)
- the relationship between technologies (e.g. intermittent renewables, pumped hydro, battery technologies, hydrogen etc.)
- these technologies’ compatibility with the current and planned electricity network
- the regulatory regime within which they operate
- whether the current planning system is geared to support and enable development of the infrastructure we will need within the right timeframes to reach net zero

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Annex B

Attendee List and Biographies

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|  | <p>Edward Mountain (Conservative) MSP for Highlands and Islands regions 2016 – present</p> <p>Edward Mountain is a Member of the Scottish Parliament for Highlands and Islands Region (Scottish Conservative). He is one of the seven regional MSPs for the Highlands and Islands Region having been re-elected on 6 May 2021 and is also the Convenor of the Net Zero, Energy and Transport Committee. Edward's area of interests includes health care provision in the Highlands, improving infrastructure, and renewing the Highland school estate. Edward also supports a strong local economy and is passionate about agriculture and fisheries.</p> |
|  | <p>Fiona Hyslop (SNP) MSP for Linlithgow (constituency) 2011 – present</p> <p>Fiona Hyslop is the Member of Scottish Parliament (MSP) for the Linlithgow Constituency. Fiona has served as the MSP for the Linlithgow constituency since 2011, having represented the Lothians Region from 1999 to 2011. Fiona is one of the longest serving members in the history of the Scottish Government having served from 2007 until standing down as Cabinet Secretary for Economy, Fair Work and Culture in May 2021</p> |
|  | <p>Jackie Dunbar (SNP) MSP for Aberdeen Donside (Constituency) 2021 – present</p> <p>Jackie Dunbar is a Scottish National Party (SNP) politician. She has served as the Member of the Scottish Parliament (MSP) for Aberdeen Donside since May 2021. Jackie was born in Peterhead and educated in Elgin. She was elected to the Northfield (later Northfield/Mastrick North) ward of Aberdeen City Council in 2007, and held some senior posts on the council. She has remained a councillor since first taking up the post. In 2021, Jackie was elected as a MSP for Aberdeen Donside, following her predecessor Mark McDonald's decision to not seek re-election.</p> |
| | <p>Liam Kerr (Conservative) MSP for North East Scotland (Region) 2016 – present</p> <p>Liam Kerr is a Scottish Conservative and Unionist MSP elected to the Scottish Parliament on the North East list in May 2016 to represent the people of the North East Region. Liam served as Shadow Justice Secretary from 2017 to 2021 and as Deputy</p> |

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|  | <p>Leader of the Scottish Conservative & Unionist Party in 2019. Following his successful re-election in 2021 Liam was appointed Shadow Cabinet Secretary for Net Zero, Energy & Transport. In addition to his Shadow Cabinet Secretary role, Liam has tackled a wide variety of issues both local and national and is dedicated to working for and speaking out on behalf of everyone in the North East.</p> |
|  | <p>Monica Lennon (Labour) MSP for Central Scotland (Region) 2016 – present</p> <p>Monica Lennon is a Scottish Labour and Scottish Co-op Party Member of the Scottish Parliament for Central Scotland region. Monica delivered the world-leading Period Products (Free Provision) (Scotland) Act, working with trade unions and with campaigners and activists in communities all over Scotland and beyond. Monica studied Environmental planning at the University of Strathclyde. Before becoming an MSP, Monica worked as a town planner in public and private roles for over a decade, and was a local councillor in Hamilton, South Lanarkshire.</p> |
|  | <p>Ash Regan (SNP) MSP for Edinburgh Eastern (Constituency) 2016 – present</p> <p>Ash Regan is a Scottish National Party (SNP) politician. She has served as the Member of the Scottish Parliament (MSP) for Edinburgh Eastern since 2016. In June 2018 Ash was promoted to the position of Minister for Community Safety. Ash studied International Relations at Keele University in Staffordshire and a master's degree in Development Management. Before becoming an MSP Ash was involved in Women for Independence in 2014 and served on the national committee. She has also worked at the think tank Common Weal as head of Campaigns and Advocacy.</p> |
|  | <p>Mark Ruskell (Green) MSP for Mid Scotland and Fife (Region) 2016 – present</p> <p>Mark Ruskell is the Scottish Greens MSP for Mid Scotland and Fife. Mark was first elected in 2003, then again in 2016 and 2021. Mark has served as a local councillor in Stirling and has worked in the renewables sector. He lives near Doune with his young family.</p> |

Core Brief

Renewables Top Lines (further detail in Annex F)

- We need to rapidly accelerate our deployment of renewables in order to support decarbonisation of the GB grid by 2035, and to support decarbonisation of other sectors in line with our 2030 and 2045 climate targets.

Onshore wind

- Onshore wind is a cheap and reliable source of electricity generation and will play a key role in our transition to net zero and in meeting the UK Government's 2035 electricity decarbonisation target.
- In December 2022 we set out our final Onshore Wind Policy Statement which introduced a new ambition for a minimum installed capacity of 20GW of onshore wind by 2030.
- To ensure this ambition can be delivered and with maximum benefit to people in Scotland we have established an onshore wind strategic leadership group charged with developing a sector deal.

Offshore Wind

- Scotland's natural resources, along with our established expertise in oil and gas, excellent port structure and strong innovation hub, make Scotland one of the best places in the world to develop offshore wind and its supply chain.
- ScotWind reflects very significant market ambition for offshore wind in Scottish waters - almost 28GW across 20 projects, and has delivered over £750m in revenues to the public purse in initial lease option awards with several billion pounds more in rental revenues when projects are operational.

Long Duration Energy Storage (Hydro/pump hydro/batteries)

- Scotland has a proud history of hydro power and has 1.67GW operational, which accounts for almost 88% of total UK hydro power capacity.
- There are currently 1.5 GW of pumped hydro storage projects awaiting construction in Scotland that could deliver vital flexibility for the grid and balance out the intermittent nature of renewables.
- However, the lack of a dedicated support mechanism means these projects do not have sufficient certainty to proceed. We have repeatedly called on the UK Government to support the development of pumped hydro storage.

Solar

- Solar has an important role to play in Scotland's transition to net zero and we are currently consulting on a solar vision in the draft Energy Strategy and Just Transition Plan.

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- We are also asking stakeholders whether we should look to set a deployment ambition for solar and will review feedback from stakeholders and through the consultation.

Marine

- Tidal energy is highly predictable and can complement intermittent sources of energy, smoothing the overall power supply from renewables, Scotland's early lead in the technology provides an opportunity to build on our marine heritage and secure a substantial share of the emerging global market for marine energy.
- As part of our draft ESJTP we are currently consulting on whether a deployment ambition should be set for marine energy and if so what an appropriate ambition would be. We will publish a final marine vision as part of the final ESJTP.
- The ringfencing of support for tidal stream in the Contracts for Difference allocation rounds represents an overdue but welcome step in the journey towards the commercialisation of tidal stream energy. To fully unlock its potential, the sector needs certainty about the support that will be available in future allocation rounds.

UK Government Action needed

- Many areas of energy policy are reserved to the UK Government. This means that in order to meet net zero ambitions, not just in Scotland but in the UK overall, we need the UK Government to take action in a number of areas.
- In particular action is needed on energy consents reform, unlocking investment in the electricity network, electricity market reform, energy affordability and support for carbon capture and storage.

UKG investment in the North Sea Transition

- The Scottish Government is investing directly in the just transition for the North East, with the £500m Just Transition Fund (which we repeatedly call on UK Government to match) and £75m Energy Transition Funding.
- This is **direct** investment in the future of the North East, from the Scottish Government, not hypothetical leveraging over an extended period.
- The UK Government's own Green Jobs Task Force recommended they set out how they will match support available through the EU's Just Transition Fund, something that to date they have completely failed to do.
- Indeed, the UK Government has refused to even match our £500m Just Transition Fund, despite the £300bn that has flowed to the Treasury from North Sea oil since the 1970s.
- The Scottish Government is targeting investment where it will make the most impact, and is also ensuring support is provided to projects quickly – genuinely supporting a just transition for the North East.

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Hydrogen (further detail in Annex G)

- Scotland is creating a hydrogen economy that will provide economic benefit and a renewable and low carbon source of energy to help meet our net zero ambitions.
- Hydrogen has a role to play across Scotland, in our islands and rural places, communities, cities and industrial clusters.
- Our Hydrogen Action Plan sets out the strategic approach and actions required to support the development of the hydrogen economy in Scotland over the course of this Parliament.
- The Action Plan sets out Scottish Government's ambition of at least 5GW of installed renewable and low carbon hydrogen capacity by 2030 and 25GW by 2045.
- It also confirmed that both renewable (green) and low-carbon (blue) hydrogen will play an increasingly important role in our energy transition to net zero in 2045, with the need to see as much renewable hydrogen in the energy system as quickly as possible and to support the establishment of low-carbon hydrogen production at scale in the 2020s linked to carbon capture and storage.

Draft Energy Strategy and Just Transition Plan (further detail in Annex H)

- The draft ESJTP sets out our vision for Scotland's net zero energy system, one that delivers affordable, resilient, and clean energy supplies for Scotland's households, communities, and businesses
- We must seize the huge opportunity that the energy transition presents and deliver maximum benefits to Scotland's people, communities, and economy from our vast renewable energy resources.

Network Investment (further detail in Annex I)

- Several reports have been published recently which make clear that failure to deliver significant network investment could derail progress to net zero.
- This includes Chris Skidmore's Net Zero Review, Tim Pick's report on Accelerating Offshore Wind and on 28 April the Business, Energy and Industrial Strategy Committee Report on Decarbonisation of the Power Sector.
- Tim Pick said: *"If you take just one message from this report, it should be the urgent need to upgrade our national grid for a world of high renewables penetration, and widespread electrification of homes and businesses."*
- While there has been progress in this space, such as Ofgem's decision to accelerate some strategic transmission investments and work to include ScotWind in the network planning process, it is clear that far more needs done.
- We agree with Chris Skidmore's call for a net zero duty for Ofgem.
- This is not an area where Scottish Government has powers to act. That is why we are continuing to call for urgent reform to grid connection queue management and transmission charging, all of which could lead to transformational change in much quicker time.

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Consenting Reform

- We are aware that a regular feature of industry feedback is the consenting process.
- We are engaging extensively at Ministerial and official level, to request further legislative powers to be granted to create an efficient consenting system in Scotland. We had requested for regulatory powers in the current UK Energy Bill though this has not progressed and we are urgently exploring alternatives with UK Government.
- We are seeking powers that would enable us to regulate and amend: 1. statutory timescales for several aspects of the consents process; 2. requirements and procedures for public inquiries; and, 3. timescales for judicial procedure. If we had full powers, we could make changes to these three elements, which would accelerate decisions.
- The trigger for a mandatory Public Inquiry is an objection from the planning authority. This could be addressed under point 2 if we can update requirements and procedures for inquiries.
- In the absence of a legislative vehicle to amend the Electricity Act to provide these regulatory powers to Scotland, a significant barrier remains to enable the pace required for the delivery of vital grid connections.
- In recent years the Energy Consents Unit has also made a number of efficiencies and improvements within the current regime which have already achieved reductions in the time taken for a decision to be made, it is recognised these timescales require further improvement and we are continuing to work closely with stakeholders to improve timescales further

Electricity System Security and Resilience

- Security of electricity supply is a reserved matter and is delivered by the National Grid as Electricity System Operator (ESO) across the whole of Great Britain under regulation from Ofgem.
- The ESO has confirmed that Scotland's demand can be met even in the event of earlier than expected closure of existing nuclear facilities.
- As we transition to a net zero energy system, increased renewables, storage and flexibility technologies such as pump storage, hydro and batteries and increased interconnection will provide the services we need to ensure a secure and resilient electricity system.
- However, the lack of a dedicated support mechanism means these projects providing flexibility services, such as pump storage do not have sufficient certainty to proceed. We have repeatedly called on the UK Government to support the development of pumped hydro storage.

Electricity Market Reform (Further detail in Annex J)

- The Scottish Government has repeatedly called on the UK Government to introduce short-term solutions to decouple the market price of renewable and low carbon electricity from the cost of gas.

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- We are deeply concerned by the proposal to move to a locational pricing system and the lack of consideration this work has given to the role that generation based in Scotland will play in meeting net zero (both in Scotland and the rest of GB).
- It is vital that we deliver net zero at lowest cost to the consumer, but it is not clear how undermining developer confidence for taking forward projects in the best locations in terms of renewable resource will achieve that.
- In a net zero world, it is counterproductive in the extreme to care more about where generation is situated than what type of generation it is.

Calls for a public energy company

- A national public energy company that is involved in major energy generation would only be possible in an independent Scotland where we had full powers over the energy market and full access to borrowing.
- Full powers in relation to energy generation and borrowing would enable Scotland to consider large scale national public sector involvement or ownership in key energy technologies.
- Current market volatility and the ongoing reserved nature of powers on energy regulation and the energy market mean that now is not the right time for a retail-based public energy company.
- That is why we have set up our national agency Heat and Energy Efficiency Scotland, which will act as a stepping stone to the dedicated body, to be established by 2025.
- We remain supportive of the future potential for a public energy company in Scotland and, through the Agency, will support others with an interest in exploring options to take this forward new models for energy provision.

[Redacted]

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Annex D

Speaking Note - Opening remarks (3 min)

[Redacted]

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Annex E

Summary of oral evidence

Context

The Committee took evidence from a representative from the following stakeholders on the 21 March:

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|--------------------------------|-------------------------|
| Scottish Power Energy Networks | SSEN Transmission |
| Scottish Renewables | University of Edinburgh |
| Arup | Solar Energy UK |
| Community Energy Scotland | ORE Catapult |

A short summary of key areas of the discussion is presented below.

Intermittent electricity supply

- The group discussed intermittent electricity supply and the options for replacing Nuclear with other non-intermittent generation. The consensus is that storage in the form of pumped hydro, batteries and hydrogen can provide the solution by providing interminable energy.
- Scottish Renewables (SR) called for a cap and floor mechanism to be applied to Pumped Hydro to enable finance stabilisation in 2021. Scottish Renewables also noted that the UK Government does not intend to make a decision on this until 2024 and that the timescales are problematic.
- Solar Energy UK highlighted that batteries have a particular role alongside solar and would like to see a target for solar deployment of 4-5GW deployed by 2030. SPEN noted that utility scale battery storage can be a grid scale solution provided sited correctly.

The role of Hydrogen

- The consensus is that Hydrogen could be a future solution, although storage and transportation solutions are required.
- It was noted that the ESJTP does not stipulate a preference for Green or Blue Hydrogen. This was highlighted as currently the technology for production of Green Hydrogen is not available at scale meaning this would need to be met by Blue Hydrogen.
- However as Blue Hydrogen production requires methane the associated CCS or CCUS projects would be required in conjunction to remove emissions.

Grid Infrastructure delivery

- The main theme from the discussion was the barriers to progressing the required electricity network infrastructure development. The enormous scale of the network projects required was recognised with the view that Regulatory changes

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are required to allow Electricity System Operator (ESO) and the Future System Operator (FSO) to be more agile.

- Extended timescales for securing planning and consenting were flagged as causing unnecessary delays. A number of suggestions were made addressing the timescales for example; having a more structured process with defined timescales, standardizing the format of planning applications and providing a decision framework.
- Concern was also raised around Local Authority Planning having adequate resource to cope with scale of projects required to meet net zero targets. The general view is that systemic changes and a Central Network Plan are required, as cables will land in England so require planning across several jurisdictions.

[Redacted]

Background on Renewables

[Redacted]

Onshore Wind

Facts and Figures

As of December 2022, Scotland has 8,991 MW (almost 9 GW) of onshore wind capacity.

There is currently 11,685 MW (11.7 GW) in the pipeline, consisting of:

- 6,110 MW (6.1 GW) in Planning
- 4,217 MW (4.2 GW) Awaiting Construction
- 1,358 MW (almost 1.4 GW) Under Construction

Onshore Wind Strategic Leadership Group

- Our Onshore Wind Policy Statement (December 2022) set out the need for a strategic partnership between industry, government and communities to deliver our ambition, whilst maximising the benefits to people in Scotland.
- To enable the delivery of the 20GW deployment ambition the Onshore Wind Strategic Leadership Group (OWSLG) was established in February 2023.
- The OWSLG is tasked with bringing together existing workstreams, tackling barriers to the deployment of onshore wind and developing a Scottish Onshore Wind Sector Deal.
- This Sector Deal will seek to capture the needs and ambitions of SG and the onshore wind industry in relation to delivering a minimum installed capacity ambition of 20 GW of onshore wind in Scotland by 2030
- The Sector Deal will define the key practical commitments from all relevant stakeholders to help deliver the ambitions defined in the OWPS, which itself defines the contribution of onshore wind to help meet the ambitions of Scotland's Energy Strategy and Just Transition Plan.
- Key from a Scottish Government perspective will be ensuring that people in Scotland benefit from the further deployment of onshore wind.

[Redacted]

Offshore Wind

Facts and Figures

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As of December 2022, Scotland has 2,086 MW (almost 2.1 GW) of seabed offshore wind and 80 MW of floating offshore wind capacity, for total offshore wind capacity of 2,166 MW (almost 2.2 GW).

There is currently 8,117 MW (8.1 GW) of offshore wind (seabed and floating) in the pipeline, consisting of:

- 4,200 MW (4.2 GW) in Planning
- 1,100 MW (1.1 GW) Awaiting Construction
- 2,817 MW (2.8 GW) Under Construction

Additional Background

- ScotWind reflects very significant market ambition for offshore wind in Scottish waters – almost 28GW across 20 projects, and the INTOG leasing round could add a further 5.5GW of capacity.
- This means that subject to planning and consenting decisions and finding a route to market, we have a current reported potential pipeline (subject to change) of over 38 GW of offshore wind projects.
- When projects which are awaiting construction, under construction or already operational are added to this the total potential capacity reaches over 40GW – the equivalent to produce enough electricity annually to power every home in Scotland for 17 years, or every home in the UK for over a year and a half.
- Our Offshore Wind Policy Statement (2020) set out the Scottish Government's ambition for 8-11 GW of offshore wind in Scotland by 2030. We recognise that this now needs to be reviewed in light of the market ambition expressed in response to the ScotWind leasing round. We are using the draft Energy Strategy and Just Transition Plan (ESJTP) to consult on increasing this ambition. We are also consulting on setting an ambition for 2045.

Solar

Key Facts and Figures

As of December 2022, Scotland has 505 MW of solar PV capacity.

There is currently 1,059 MW (1.1 GW) in the pipeline, consisting of:

- 447 MW in Planning
- 565 MW Awaiting Construction
- 47 MW Under Construction

Additional Background

- Solar power is an established renewable technology in Scotland. It spans two main technologies; solar thermal (primarily used to heat water) and solar PV (used to generate electricity). Both forms of solar are traditionally roof mounted, with options for ground mounted solar for larger arrays and unsuitable roof

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constructions. Floating solar PV arrays are a less common but newer form of installation, relevant for offshore and coastal situations.

- Solar can work well as a secondary technology in conjunction with a primary zero emissions heating system, such as heat pumps, to increase operational effectiveness in certain scenarios.
- Industry have been consistent in calling for a deployment ambition for solar in the same line as onshore wind and other technologies.
- We are currently consulting through the ESJTP and taking forward research to understand the whole systems interactions and impacts on the electricity distribution network of high volumes deployment of domestic and commercial solar.
- This will inform the development of the final solar vision which will be published in the final ESJTP.
- Solar deployment is supported through a number of UK and SG schemes which support solar deployment at commercial scale (such as through the UK government's contracts for difference auction), smaller scale (the UK government's Smart export guarantee) and through committee projects (The Scottish Governments Community and Renewable Energy Scheme)

Hydro

Key Facts and Figures

As of December 2022, Scotland has 1,335 MW (1.3 GW) of large hydro and 332 MW of small hydro capacity.

There is currently 23 MW of small hydro in the pipeline, consisting of:

- 1 MW in Planning
- 16 MW Awaiting Construction
- 7 MW Under Construction

Energy Storage

Key facts and figures

As of June 2022 Scotland has 864MW of electricity storage in operation. This is made up of 740MW of pumped storage hydro and a further 124MW of battery storage

There are over 9000 MW of electricity storage under development this includes;

- 90MW of battery storage under construction
- 2079 MW of batteries awaiting construction
- 1450 MW of pumped storage hydro awaiting construction
- 3328 MW of batteries that have applied for consent
- 2100 MW of pumped hydro storage that has applied for consent

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Additional Background

Long Duration Storage

- A clear case has been made that, if the energy sector is to maximise environmental, economic and social benefits, renewable energy will need to be linked to energy storage.
- Energy storage technologies can counteract intermittency associated with certain energy supplies, can ensure excess power is not lost at times of high production, can provide energy on demand off-grid in a variety of ways.

[Redacted]

Pumped Storage Hydro

- Pumped hydro is the only tried and tested long duration storage technology capable of both storing vast amounts of excess energy and discharging at full capacity for long periods of time.
- It contributes the majority of storage on the power system today and there are opportunities to deploy additional capacity onto the GB system – several projects have been identified in Scotland, including the expansion of Drax's Cruachan Power Station.

Marine

Key Facts and Figures

As of December 2022 there are 22 MW of marine energy capacity.

There is currently 317 MW in the pipeline, consisting of:

- 220MW in planning
- 97 MW awaiting construction

Additional Background

- In November 2021 the UK Government announced a ringfenced budget of £20 million p.a. for tidal stream energy projects in the fourth allocation round (AR4) of the Contracts for Difference (CfD) scheme. This followed a period in which there had been no viable route to market for wave and tidal energy in the UK, following the decision by the UK Government in 2016 to remove the ringfence for these emerging marine technologies.
- Projects in Scotland secured the vast majority of support awarded to tidal stream energy in AR4, with Simec Atlantis Energy's MeyGen project in the Pentland Firth receiving support for an additional 28MW of capacity, and Orbital Marine Power for a further 7 MW of capacity in Orkney.
- While the ring-fencing of £20 million per year to support tidal energy in in AR4 was welcome, it fell short of the £70 million per year called for by some in the

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industry as being required to kick start the sector and begin to unlock its full potential.

- The fifth allocation round for the CfD (AR5) includes a £10 million per annum ringfenced budget for wave and tidal energy. Trade bodies for the marine energy industry, while welcoming the continuation of the ringfence for the sector, have raised concerns about the impact of the reduction in the budget for marine energy.

Hydrogen

Background

- Hydrogen will be a key part of the net zero journey. Complementary alongside electricity, hydrogen will play a role in industrial decarbonization and transport.
- There are different types of hydrogen production, the most commonly discussed are:
 - Green hydrogen which is produced via electrolysis of water using renewable electricity and is zero carbon.
 - Blue hydrogen which is produced via reforming natural gas or biogas in conjunction with carbon capture with high capture rates and is very low-carbon.
- The development of a domestic hydrogen sector and hydrogen production for export, supported by a strong supply chain, will play an important role in supporting a just transition to net zero by 2045 and presents significant long-term economic opportunities.
- In the Action Plan, we refresh our commitment to providing the supportive policy and regulatory environment required to enable Scotland to take a pioneering role in a growing global industry and to support our vision for Scotland to become a leading hydrogen nation in the production of reliable, competitive, sustainable hydrogen
- Scotland's vast offshore wind resources, skilled technicians, and engineers, highly specialised technical companies and an experienced offshore workforce will be able to assist in bringing forward large scale renewable hydrogen production.

Emerging Energy Technology Fund

- The Scottish Government has committed £100 million in renewable hydrogen funding for 2022-26 through the Emerging Energy Technologies Fund (EETF).
- This capital fund will help projects become operational/produce renewable hydrogen by 2025/26 to kick start the hydrogen economy in Scotland.
- In June 2022, we launched the first tranche of the EETF hydrogen investment programme via the £10 million Hydrogen Innovation Scheme with a focus on innovation in renewable hydrogen production, storage and distribution technology.
- The remaining second tranche of the EETF hydrogen investment programme – the Green Hydrogen Fund - is expected to launch in 2023. This flagship fund will focus on supporting rapid renewable hydrogen production from Scotland's abundant renewable energy resources, seeking to give Scotland first-mover advantage.
- This will support hydrogen production for domestic use in Scotland and establish Scotland's place in Europe for the production and export of renewable hydrogen.

Energy Strategy and Just Transition Plan

We are taking action to transform and expand Scotland's energy generation sector. Scotland's rich renewables endowment means we can not only generate enough cheap green electricity to power Scotland's economy, but also export electricity to our neighbours, supporting jobs here in Scotland and the decarbonisation ambitions of our partners.

- The draft ESJTP sets out a route map of ambitions, milestones and actions to deliver this vision and will guide decision making and policy support out to 2030.
 - **Energy Supply:** We are scaling up renewable energy and taking action to transform and expand Scotland's energy generation sector. By 2030, domestic production of renewable electricity and renewable hydrogen will have increased significantly.
 - **Offshore Wind:** We have set an ambition for 8-11 GW capacity by 2030 and are consulting on setting a further offshore deployment ambition.
 - **Onshore Wind:** We will take action to deliver up to an additional 12 GW of installed onshore wind by 2030 (for a total of 20GW), as set out in our Onshore Wind Policy Statement, published in December 2022..
 - **Tidal and wave:** We have set out a draft vision for Marine and are seeking views including options for setting a deployment ambition as part of the consultation.
 - **Solar:** We have set out a draft vision for Solar and are seeking views on this, and options for setting a solar deployment ambition, as part of the consultation.
 - **Hydro:** Hydro power, and in particular pumped hydro storage, has the potential to play a significantly greater role in the energy transition. We urge the UK Government to provide appropriate market mechanisms for hydro power to ensure the full potential of this sector is realised.
 - **Hydrogen:** We wish to see as much renewable hydrogen in our energy system as quickly as possible. We are taking forward the actions set out in our Hydrogen Action Plan, including a renewable and low-carbon hydrogen production ambition of 5 GW by 2030 and 25 GW by 2045 and have set out plans to rapidly grow Scotland's hydrogen economy.
 - **Nuclear:** We do not support the building of new nuclear power stations in Scotland under current technologies. The Scottish Government's position is clear: significant growth in renewables, energy storage, hydrogen and carbon capture provides the best pathway to a net zero energy system.
- The draft Energy Strategy and Just Transition Plan was published on 10 January 2023 for consultation. On 3 March the consultation period was extended from 4 April 2023 to 9 May 2023, following publication of independent, in-depth analysis of Scotland's energy requirements (Project Ninian).

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- The final Energy Strategy and Just Transition Plan will be published once we have conducted a thorough review of the consultation responses and engaged with the full range of stakeholders. This is Scotland's first outline Just Transition Plan and details our response to the energy recommendations of the Just Transition Commission.

Networks

General Background

- Scotland is physically and economically integrated with Great Britain for both electricity and gas supply and demand (Northern Ireland is not part of the GB network and is instead part of a single network with the Republic of Ireland).
- Transportation of electricity and gas from where it is imported or generated is undertaken by a number of companies that operate as regional monopolies.
- These regional monopolies are heavily regulated by the independent energy regulator Ofgem in order to ensure that consumers are protected. This includes heavy scrutiny on requests for funding to take forward network investment projects. The cost of such projects is large for example one key project processing a new subsea transmission link from Scotland to Wales (Western HVDC link) cost in the region of £2 billion.
- Network costs make up around 12% of the average dual fuel bill.
- Powers relating to the regulation and operation and electricity and gas network companies are fully reserved to the UK Government. This includes legislation, industry standards and licences. The Scottish Government has no powers at all in this area.
- There are two types of network across GB – Transmission and Distribution.
 - Transmission networks act like motorways taking energy from where it is produced/ imported to where it can be used. In Scotland, large amounts of power generated in the country (or in its seas) is transported south to England and Wales.
 - Distribution networks are more like A and B roads taking energy from the transmission system and transporting it to homes and businesses. In recent years the operation of the distribution grid has changed as domestic and business customers play a more active role in the energy market (by generating and/or storing their own electricity).
- The electricity system operator (ESO) is responsible for balancing supply and demand 24 hours per day, 365 days per year.
- The ESO also plays a significant role in planning the future development of the electricity network and provides recommendations on which projects should proceed with investment based on deep analysis of the relative costs and benefits for consumer.
- The UK Government through its Energy Bill is amending legislation to create a Future System Operator (FSO) which will legally separate the ESO from the National Grid group and this will also increase the scope of advice that the system operator provides to Government.

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Electricity Transmission Investment

Background

- An unprecedented amount of electricity network reinforcements will be required to be delivered before 2030. This is a huge challenge which must be tackled immediately if Scotland, and the UK, is to stay on target for net zero and meet the higher demand linked to the growing deployment of electric vehicles and electric heating.
- One of the key barriers to increased network investment is the time it can take Ofgem to make a decision on whether projects can proceed. This matters because without this approval the companies cannot provide certainty to manufacturers who provide key components.
- The ESO's Network Options Assessment (NOA) is the tool used to provide recommendations to Ofgem and Transmission Owners on which electricity transmission reinforcement projects should receive investment during the coming year.
- NGEN's recent NOA (Jan 22) has signalled the need to invest over £7bn in Scotland's transmission infrastructure if we are to keep on the pathway to net zero. In July 2022 this was updated to include National Grid's Holistic Network Design (HND) for offshore wind. This document sets out the network requirements to facilitate the connection of up to 23GW of wind (including 10.7 GW of ScotWind), helping to deliver the UK Government's ambition for 50GW connected offshore wind by 2030.
- The HND provides a recommended design (both on and offshore) for a 2030 electricity network in GB. It enables investment and delivery of infrastructure, including locations in North and South Wales, the Scottish Islands and West Coast, the East Coast of Scotland and Aberdeenshire, Lancashire, North-East England, and Yorkshire & Humber, opening the door for more jobs and economic growth in these regions.
- A follow up exercise to the HND (HND FUE) will provide the connection options for the remaining 16GW of ScotWind generation when it is published (due to be in July).
- Scottish Government is working with SSEN, SPEN and NGEN through a Major Network Projects Group to develop a clear understanding of the scale and timing of new transmission investments needed, which will help us plan and resource accordingly.
- Recently, Ofgem published its decision on the Accelerating Strategic Onshore Transmission Investment (ASTI) Framework in December 2022. The objective of this work was to provide greater certainty to a number of key projects that need to be taken forward quickly to ensure continued progress to net zero and release constraints (where power can't be transported because there is no space on the cables.)
- The outcome of this work will provide the following benefits for 26 transmission projects (worth £19.8bn):
 - **Earlier certainty of project funding approvals:** The need for an initial and final needs case has been removed. This will provide early certainty of

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project funding before the detailed project design is known and planning permission secured. Ofgem estimate that this could reduce the time to deliver projects by one year.

- **Exemption from onshore competition:** Ofgem has concluded that all but two projects under the ASTI framework will be exempt from competition when it is introduced. This exemption allows for a programmatic delivery of the projects required to deliver the Government's 2030 ambitions.
- **Protecting consumers from excessive risk:** Ofgem is proposing to impose robust consumer protection measures in the form of a new Output Delivery Incentive (ODI) that rewards/penalises the TOs for delivery against target delivery dates.

Local Electricity Network Investment (Distribution Networks)

Background

- RIIO-ED2 is the price control for the electricity distribution network, where network companies take power from the transmission network and deliver it at safe, lower voltages to homes and businesses. The price control runs for five years from 2023-2028.
- The price control works by setting out how much money (recovered from customers) the network companies can spend, and on what they can spend it. It also sets out the key performance indicators companies are expected to meet in areas such as safety, customer support, environment etc. Failure to do so can lead to penalties from the regulator.
- In its Final Determinations, Ofgem cut the upfront allowances requested by SPEN and SSEN by £400 million and is relying heavily on 'Uncertainty Mechanisms' to give DNO's flexibility to request additional investment should demand materialise.
- Ofgem has made this decision to avoid placing unnecessary costs on consumers in the event demand does not increase, while ensuring there is a mechanism available for DNO's if it does. Neither SPEN or SSEN challenged Ofgem's Final Determination decision at the Competition and Markets Authority.

[Redacted]

Network Charges: Transmission Network Use of System Charges (TNUoS)

Background

- Transmission Network Use of Systems Charges (TNUoS) is a cost recovery tool used by ESO to recover the allowed revenue for the Transmission Owners across GB (National Grid, SPEN and SSEN).
- Simply speaking these are the charges that pay for investment in and the use of the electricity transmission system. All companies pay these charges but how much you pay depends on a number of different factors.

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- Revenue is recovered from generation and demand customers across GB. (Around £800m is recovered from generators and £2.7bn from demand customers).

Issues with existing charging regime

- Generation that connects to the transmission network in Scotland will face higher charges through TNUoS due to the distance from the bulk of GB demand.
- The Scottish Government has repeatedly called for change and we believe that an abundance of comprehensive evidence has been provided over the years by various stakeholders that clearly set out the flaws and risks associated with the current TNUoS charging system.
- In response to Ofgem's recent call for evidence, the Scottish Government has questioned whether the existing methodology is aligned with net zero and has called for a full review of TNUoS that includes the locational element of the charges.

Ofgem TNUoS charges review

- Ofgem published a call for evidence on TNUoS in October 2021 recognising that stakeholders were concerned with the TNUoS methodology and its outputs.
- Due to increased energy costs this work was deprioritised in November 2022 allowing Ofgem to deploy their resources on areas most likely to protect consumers over the winter. In April 2023, Ofgem committed to restarting the TNUoS taskforce and have set up a separate wider assessment of transmission charging in the context of electricity market reform.

Grid Consenting regime in Scotland

- Transmission and distribution of electricity is a reserved matter, but under section 37 of the UK Electricity Act 1989, functions relating to consenting for certain overhead electricity lines, are executive devolved to the Scottish Government. (Land use planning itself is devolved).
- The current lack of full legislative competence for designing the consenting regime means that the Scottish Government cannot modernise the process for accepting, processing and determining applications for consent.
- As it stands, the Electricity Act provides that a planning authority must be consulted when an application is made under Section 37. If the planning authority objects to the application within the statutory timeframe or a time frame agreed in accordance with legislation, and that objection is not withdrawn or cannot be acceded to, then the Scottish Ministers must cause a public inquiry. This is a provision that cannot be considered for reform in Scotland.
- We are engaging extensively to request further legislative powers to be granted to create an efficient consenting system in Scotland. We had requested for regulatory powers in the current UK Energy Bill though this has not progressed and we are urgently exploring alternatives with UK Government.

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- In the absence of a legislative vehicle to amend the Electricity Act to provide these regulatory powers to Scotland, a significant barrier remains to enable the required pace for the delivery for grid connections for offshore and onshore wind and the network reinforcements to protect our energy supply and deliver net zero targets.

Review of Electricity Market Arrangements - REMA

- The Review of Electricity Market Arrangements (REMA) project is being led by the UK Government Department for Energy Security and Net Zero (DESNZ). It seeks to consider the wholesale electricity market in the round to understand what reforms might be required in the mid to long term.
- REMA seeks views on a wide range of options to address the combined challenges of responding to higher global energy costs, the need to further boost energy security and move the UK to a cleaner energy system.
- An initial consultation was held last year and DESNZ published a summary of consultation responses in March 2023. A more limited 'minded to' consultation with impact assessments will be published likely autumn 2023.
- One of the reform options, which has been backed by both Ofgem and National Grid, is to move the GB wholesale electricity market to a Location Marginal Pricing (LMP) model.
- With LMP, electricity prices would be determined at individual nodes or within specific zones on the network and reflect the balance of supply and demand in that area.
- There are two broad options under consideration:
 - Nodal pricing will set different market prices at different nodes on the network. This can vary from a few hundred to a few thousand, with this typically influenced by network size and the level of congestion.
 - Zonal pricing splits the electricity network into defined zones with boundaries usually drawn to reflect where major transmission network constraints occur. Each zone operates like the current national market, with a single price that does not reflect network constraint costs within the zone.

[Redacted]

Note from the Clerk

[5805 \(parliament.scot\)](#) – pasted from PDF due to formatting issues

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Net Zero, Energy and Transport Committee

16th Meeting, 2023 (Session 6)

Tuesday 9 May 2023

Scotland's electricity infrastructure: inhibitor or enabler of our energy ambitions?

Note by the clerk

1. In February, the Committee decided to conduct an inquiry into "Scotland's electricity infrastructure: inhibitor or enabler of our energy ambitions?"
[Read more about the inquiry on the Scottish Parliament website.](#)
2. This inquiry will scrutinise what electricity infrastructure will be needed to realise the ambitions set out in the Scottish Government's recently released [Draft Energy Strategy and Just Transition Plan](#), and what will be needed to deliver that infrastructure.
3. This is a short "snapshot" inquiry leading to a report with recommendations for the Scottish Government as it finalises its new Strategy. It will also help inform the Committee's future scrutiny of specific aspects of energy and climate policy and practice. Issues the Committee is likely to consider during the inquiry include—
 - the suitability of the different electricity technologies that the Scottish Government wants to play a role in future energy supply (onshore/offshore wind, marine, solar, hydro);
 - the relationship between technologies (e.g. intermittent renewables, pumped hydro, battery technologies, hydrogen etc.);
 - these technologies' compatibility with the current and planned electricity network;
 - the regulatory regime within which they operate; and
 - whether the current planning system is geared to support and enable development of the infrastructure we will need within the right timeframes to reach net zero.
4. The inquiry is about electricity infrastructure in a broad sense, incorporating supply, transmission, distribution and storage. Substantial investment and changes in all these asset types will be needed for Scotland to meet its ambition to achieve [net zero greenhouse gas emissions by 2045](#).

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5. Planning for future electricity infrastructure in Scotland requires simultaneous consideration of the forms of supply, the relationships between supply and storage assets, and the readiness of the electricity transmission and distribution networks for change. While the Scottish Government has significant control over the supply sources sited in Scotland, largely through devolved planning powers, the governance of electricity networks is a reserved matter.
6. The [inquiry homepage](#) sets out 13 key questions the Committee posed in its targeted call for views to stakeholders.
7. In response, the Committee has received the following submissions of written evidence—
 - [Arup](#)
 - [David Garvie](#)
 - [EDF Renewables](#)
 - [Energy Saving Trust](#)
 - [North Ayrshire Council](#)
 - [Nuclear Industry Association](#)
 - [Ofgem](#)
 - [Professor R A Williams, FREng FTSE, FRSE, Heriot-Watt University](#)
 - [RWE](#)
 - [Scottish Renewables](#)
 - [ScottishPower Renewables](#)
 - [Scottish Trades Union Congress \(STUC\)](#)
 - [Scottish and Southern Electricity Networks \(SSEN\) Transmission and SSEN Distribution](#)
 - [SGN](#)
 - [SSE Renewables](#)
 - [Statkraft](#)
 - [West of Orkney wind farm](#)
8. On 21 March, the Committee held its first evidence session, hearing from a panel of industry stakeholders and experts. [Read the Official Report - 21 March 2023](#)
9. On 28 March, the Committee held an evidence session with officials from [Ofgem](#), the energy industry's statutory regulator. [Read the Official Report - 28 March 2023](#)
10. On 18 April, the Committee held an online engagement event with small and medium-sized enterprises (SMEs) working on innovation in renewable energy systems.
11. On 24 April, the Committee undertook a fact-finding visit to ScottishPower Energy Networks' control room and Whitelee onshore wind farm.
12. On 27 April, the Committee held an evidence session with Andrew Bowie MP, Parliamentary Under Secretary of State (Minister for Nuclear and Networks) for the UK Government. The session provided an opportunity to explore the intersection of devolved and reserved responsibilities in relation to Scotland's future electricity infrastructure. [Read the Official Report - 27 April 2023](#)
13. On 9 May the Committee will take closing evidence from the Scottish Government. As part of this session, the Committee will discuss the Scottish Government's vision for future electricity infrastructure as set out in its Draft Energy Strategy. The Committee will also pursue a range of themes arising from

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its inquiry work. The Committee will hear from Neil Gray, Cabinet Secretary for Wellbeing Economy, Fair Work and Energy, and supporting officials as listed in the agenda.

14. Following the conclusion of evidence taking, the Committee expects to report in early summer. The Scottish Government must then reply to the report.