Exceptions applied:
Personal data of which the applicant is not the data subject– The Environmental Information (Scotland) Regulations 2004 – Section 11(2)

Internal Communications – The Environmental Information (Scotland) Regulations 2004 – Section 10(4)(e)

Document 1 – FM Briefing note – FM deep dive on energy markets – 19 May 2023

From: [Redacted Section 11(2)]
First Ministers Policy & Delivery Unit
19th May 2023

Cabinet Secretary for Wellbeing Economy, Fair Work and Energy
Cabinet Secretary for Net Zero and Just Transition
Minister for Independence

[redacted Section 10(4)(e)]

The Economy Prospectus paper positions

1. The Building a New Scotland: A stronger economy with Independence paper published in October 2022 indicated an intention to regulate and design the future electricity market in Scotland either as an equal partner in a joint design authority with the UK Government, or under a different system.

2. The Economy prospectus paper sets out our aim to ensure the long-term affordability of electricity through renewable energy that provides lower cost electricity than nuclear or gas power. It also set out an aim for energy self-reliance in green electricity, of exporting increasing amounts of low carbon energy - maximising the economic opportunities this represents - and driving progress towards Net Zero by supporting wider security of supply needs and the decarbonisation ambitions of our neighbouring nations.

[redacted Section 10(4)(e)]

3. The Scottish Government Energy Strategy and Just Transition Plan was published in January 2023. It sets out the actions being taken by the Scottish Government under the current constitutional settlement to deliver a net zero energy system capable of supplying affordable, resilient and clean energy in Scotland. It also highlights key policy levers and decisions that are currently held by the UK Government and where the UK Government and regulators need to act to deliver this[1]. [redacted Section 10(4)(e)]

4. The costs of network reinforcement and support for renewable energy deployment is currently met by all GB consumers. According to BEIS, in the

[1] Draft Energy Strategy and Just Transition Plan - gov.scot (www.gov.scot)

latest figures for 2021 figures[2] there were 31.7 million domestic and non-domestic meters in GB. 28.6 million of these are in England and Wales. [redacted Section 10(4)(e)]

5. [redacted Section 10(4)(e)] the European Commission has set an interconnection target of 15% by 2030 - meaning that each Member State needs to have electricity cables that allow at least 15% of electricity it produces to be transported to neighbouring countries.

   [redacted Section 10(4)(e)]

6. The annexes to this paper reflect core aspects of current electricity market design [redacted Section 10(4)(e)
   - Annex A: The Scale of the Electricity Potential in Scotland;
   - Annex B: How electricity is traded and the grid is balanced;
   - Annex C: How the grid is built and paid for;
   - Annex D: How deployment of renewables are supported – or not;

   [redacted Section 10(4)(e)]

   [redacted Section 10(4)(e)]

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[2] Regional and local authority electricity consumption statistics - GOV.UK (www.gov.uk)

Annex A

The Scale of the Electricity Potential in Scotland

7. In 2022, Scotland exported 20.3TWh of electricity, equivalent to powering every household in Scotland for just over two years, with an estimated wholesale value of almost £4.0 billion.[3] Scotland has imported more than 1 TWh every year since 2016 to balance intermittency and maintain secure supply, but Scotland's net exports of electricity (exports minus imports) in 2021 was 18.7TWh.

8. Scotland had 13.3GW of installed renewable electricity generation capacity operational in December 2022[4]. To put this in context, peak electricity demand in Scotland is between 5-6GW.

Current capacity	Planned	Benefits
Onshore wind capacity is 8.7 GW	Consulting on aiming for an additional 8-12 GW by 2030	Ccould generate annual Gross Value Added (GVA) of £2.8 billion, and deliver around 17,000 more jobs.
Offshore wind capacity is 1.9 GW.	ScotWind leasing round - possible deployment rights of up to 27.6GW, including a potential 17.6GW of floating offshore wind.	If consented and fully deployed, Scotwind projects could deliver up to £28.3 billion of Scottish supply chain benefit across 20 projects.
At December 2022[5], 412 renewable electricity projects with capacity of 21.7 GW in the development pipeline. 4.3GW under construction, mostly offshore wind off the Moray Firth.	6.1GW are awaiting construction and 11.3GW in planning.	[Redacted Section 10(4)(e)]
1.67GW of **hydro** and 0.74GW of **pumped-storage hydro**	Around 2.8GW of projects in pipeline or consented. No route to market under the current GB approach.	These are significant potential additions to Scotlands energy mix.

9. Although there are significant differences in load factor between renewables and nuclear and gas fired power (both of which are much less intermittent), by comparison, the capacity of Torness Nuclear power station is around 1.2GW. The gas fired power station at Peterhead capacity is 1.18GW.

10. And Scotland's marine area contains 25% of Europe's offshore wind and tidal energy resource[6], where we are a leader in the development and deployment of wave and tidal energy technologies.

[3] https://scotland.shinyapps.io/sg-scottish-energy-statistics/?Section=SystemSecurity&Chart=ElecImportsExports
[4] https://scotland.shinyapps.io/sg-scottish-energy-statistics/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecCapacity
[5] https://scotland.shinyapps.io/sg-scottish-energy-statistics/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecPipeline
[6] https://www.gov.scot/publications/scotlands-marine-atlas-information-national-marine-plan/pages/49/#:~:text=Offshore%20energy%20potential%20and%20location,of%20the%20total%20UK%20resource.

Annex B

Electricity trading and grid balancing

Trading, system balancing and security of supply

11. National Grid PLC is the transmission system operator for the current GB network. National Grid manage electricity supply, buying electricity from generators – through a combination of long and short term markets and supply contracts - to respond to peaks and troughs of energy demand. It also ensures electricity supplies remain stable and secure, and that the electricity system operates within safe limits at all times. [Redacted Section 10(4)(e)]

12. National Grid also manages system constraints when there is too much electricity being generated for the electricity grid to “take”, there is limited demand in specific locations or there is congestion in the system (e.g. due to outages or maintenance and repairs). Generators who are unable to connect their electricity output to the grid receive constraints payments.

13. In 2020, constraint costs on the GB transmission network were £700 million. In 2021, this number rose to £1 billion. These constraint costs are forecast to peak in 2026 at an estimated £2.25 billion per year[7]. The costs of managing supply and constraints are spread across all GB consumers. [Redacted Section 10(4)(e)]

14. These market processes and mechanisms ensure ongoing and constant matching of supply and demand, and stable provision of electricity supplies across the GB network. [Redacted Section 10(4)(e)]

[Redacted Section 10(4)(e)]

Exporting Electricity from Scotland

15. Scotland has well established grid connections to the rest of the GB market. Around 90% of net electricity exports from Scotland are to England, the remaining 10% are to Northern Ireland. But our export capacity is limited relative to our electricity potential. The land border between Scotland and England has two onshore high voltage cable connection routes, and there is a western subsea connection between Scotland and England. The current Scotland - England boundary is limited to 6.1 GW (i.e. the grid can only accommodate 6.1GW of electricity exported from Scotland to England).

[Redacted Section 10(4)(e)]

16. Scotland has no direct export routes beyond the GB market other than the 500MW Moyle link to Northern Ireland. As there are no cable links between Scotland and the Continent, Scottish electricity is currently exported to Europe via cables from England.

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[7] https://www.nationalgrid.com/electricity-transmission/document/145986/download

17. The GB market has 8 electricity interconnectors to Europe with an overall import/export capacity of around 9GW. [Redacted Section 10(4)(e)]

18. The GB network has significantly more export capacity than it did in 2014. In 2014, GB interconnector capacity was 2GW. The GB system in 2023 with 9GW of interconnection has greater capacity to import electricity from Europe – approximately 10% of GB peak demand. [Redacted Section 10(4)(e)]

19. Plans have long been proposed for an electricity interconnector between Peterhead and Norway, the NorthConnect project[8] at around 1.4 GW. [Redacted Section 10(4)(e)]

20. [Redacted Section 10(4)(e)]The EU North Seas Energy Cooperation initiative[9] aims at facilitating deployment of offshore renewable energy and promoting interconnection around the North Sea. The UK is a party in these discussions and has committed to collaboration on development of offshore renewable energy and grid infrastructure[10]. [Redacted Section 10(4)(e)]

    [Redacted Section 10(4)(e)]

[8] https://northconnect.co.uk/

[9] https://energy.ec.europa.eu/topics/infrastructure/high-level-groups/north-seas-energy-cooperation_en

[10] https://www.gov.uk/government/news/uk-signs-agreement-on-offshore-renewable-energy-cooperation

Annex C
How the grid is planned, build and paid for

21. Energy assets are expensive, are built for long-term use and require long term planning and significant investment. In the current GB system, electricity and gas transmission and distribution network planning and reinforcement is managed through a highly regulated framework operated by the GB system regulator Ofgem. This Regulated Asset Base model is the process through which large scale electricity and gas infrastructure projects are funded and delivered to connect and transport electricity and gas around Scotland, and from Scotland to the rest of the UK and beyond.

22. It is a negotiated process between the private monopoly companies who own and operate the GB gas and electricity networks. Ofgem determines the scale and cost of network reinforcement the network companies are able to invest in, and its implications for consumer bills. The resulting plans guide the transmission and distribution electricity and gas system owners' business planning, over set time periods - called price control periods. This also determines how much of the costs of reinforcement will fall on consumers. For transmission level reinforcements, these costs are currently met by all GB consumers through their energy bills.

23. Transmission reinforcements are critical for delivering electricity to centres of demand – including the electricity that will be generated projects like ScotWind. Distribution-level reinforcements are paid for, in part, through consumer bills in the distribution network operator's area. There are two network areas in Scotland: north, owned and operated by Scottish and Southern Electricity Network (SSEN) and south, owned and operated by Scottish Power Energy Networks (SPEN).

24. The latest price control round for electricity transmission and gas covers 2021-2026. It involves significant levels of long term investment planning, a large part of it in electricity grid in Scotland. For transmission level grid, this is estimated at around £2.4 Bn for the SSEN area, and £1.375 Bn for the SPEN area. In the wider GB network, the figure is £7.1 Bn for National Grid in England and Wales.

25. In gas distribution networks, Ofgem have assessed SGNs network plans for the Scottish part of its network at around £907m. National Grid is responsible for building and running the high pressure gas transmission network in Scotland and the rest of the GB market. National Grid Gas Transmissions draft business plan for 2021-26 contains draft proposals that forecast its average annual total costs at £599m.

26. Delivery of these investment plans is wholly dependent on a stable long term regulatory environment that maintains investor confidence, and incentivises private investment in public projects with significant upfront capital costs and a long asset life.

Examples of grid reinforcement this process has delivered:

- the Western link – a £1.2Bn undersea cable between Hunterston and North Wales that strengthens electricity export capacity from Scotland by 2GW. Operational from 2017; and
- the Shetland link – a £600-650m undersea cable between the Shetland Islands and Caithness, that will transport of 600MW renewable energy. This will be the first time that Shetland has been connected to the grid on the GB mainland. Construction began in 2022.

[Redacted Section 10(4)(e)]

27. Grid reinforcement in the GB market is interconnected and interdependent. Reinforcement of grid infrastructure in one part of the network (e.g. in Scotland) can also require reinforcement across other parts of the grid network (i.e. in the north of England). [Redacted 10(4)(e)]

[Redacted Section 10(4)(e)]

Annex D

Support for deployment of renewable/low carbon technologies

28. There are mechanisms in the current GB market aimed at incentivising the build of different types of generation and to ensure sufficient capacity margins to ensure security of energy supply. In 2013, the UK Government introduced the Electricity Market Reform. The main subsidy mechanism for incentivising the build of generation projects is the Contracts for Difference (CfD) system, which replaced the previous Renewables Obligation Certificates (ROCs). It comprises contracts which guarantee a fixed price for different types of generation for 15 years. The CfD contacts are now awarded on an annual cycle following auctions between generating technologies, and within a financial envelope set by the UK Government.

    [Redacted Section 10(4)(e)]

29. [Redacted Section 10(4)(e) in England offshore wind capacity has increased from 1.5GW in 2011 to 9.5GW in 2021, [Redacted Section 10(4)(e). Onshore wind projects are now included in the CfD scheme again and in the last CfD auction round, 1.5GW of onshore wind power in Scotland won contracts. In offshore wind, two projects totalling 1.3GW off Scotland's east coast won CfDs. There is a specific CfD for remote island wind, and projects on the Shetland Islands and the Western Isles have won contracts that will help make the case for new cables to connect island communities to the grid – in particular the Western Isles. And under the current approach these cables will be paid for by all GB billpayers. A CfD has now been introduced for tidal stream projects, and 35MW of projects in Caithness and Orkney were successful in securing CfD contracts.

30. The CfD approach is also specifically designed to support new nuclear power development. The UK Government specifically targeted CfD support to encourage new nuclear build at Hinkley Point on the north Somerset coast. The CfD for Hinkley Point was not an auction, but was 'negotiated' as only one plant. The UK Government are now looking to develop a Regulated Asset Base model for nuclear. Basically this is the model discussed in Annex C above which regulates how network projects are paid for – to give the developer a reasonable rate of return over costs, paid back over a long period by consumers.

    [Redacted Section 10(4)(e)]

31. The purpose of the CfD mechanism is to support renewable technologies into maturity and deployment, including emerging technologies like offshore floating wind. [Redacted Section 10(4)(e)]

    [Redacted Section 10(4)(e)]

Transmission Charging

32. Transmission charges are the costs that generators have to pay to grid operators to connect and use the grid. Currently, generators in the North of Scotland pay the highest charges for using the electricity grid. This approach to locational transmission charging is an area where the current GB energy market and regulatory approach presents barriers to energy projects in Scotland.

33. Proponents of cost reflective charging believe it gives economic signals about where to site new generation and develop existing generation, and that it reflects the costs to the transmission network that generators cause. It can reduce costs to consumers and incentivise location of industry near centres of generation. It can be argued that both of these are economically beneficial. Opponents of locational charging maintain it reflects a generating mix predicated on generation close to centres of demand, and that it does not fit with the aim of delivering a more balanced and diverse and sustainable electricity mix on the GB network, and helping to meet the challenge of climate change through moving to a low carbon energy mix.

[Redacted Section 10(4)(e)]

Protecting consumers in remote and island areas

34. The current GB market includes two statutory schemes to ensure customers in North of Scotland do not bear unreasonable burden of costs of electricity supply in remote areas. The Hydro Benefit Replacement Scheme protects consumers from high electricity distribution costs. In 2022/23 it provided £94.97M of support, estimated by Ofgem to be worth around £60 per household[11]. The Common Tariff Obligation ensures electricity suppliers in the North of Scotland are not able to charge different prices solely on the basis of location. Both schemes protect consumers in remote rural areas or islands from the relatively high costs of supplying electricity in these areas.

35. There is also a cross-subsidy arrangement for consumers on Shetland, who would otherwise face significantly higher electricity prices than consumers on the mainland. It costs £27M a year. This, and the costs of the Hydro Benefit Replacement Scheme, are spread across all GB electricity consumers.

[Redacted Section 10(4)(e)]

[11] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128282/hydro-benefit-replacement-scheme-common-tariff-obligation-review-2022-response-to-consultation.pdf

[Redacted Section 10(4)(e)]

36. The report of the Commission[12] concluded there was a strong technical and regulatory case for Scotland and the rest of the UK to retain a single GB electricity and gas market, and to collaborate on a joint regulatory and system operators approach. It also concluded energy market regulation in Scotland should be undertaken by a Scottish energy regulatory body. [Redacted Section 10(4)(e)]

    [Redacted Section 10(4)(e)]

37. Ofgem is current GB energy regulator. It is independent of government, and operates in a statutory framework set by the UK Parliament which establishes its duties and powers. These include working to deliver a net-zero economy, ensuring fair treatment for consumers and enabling competition and innovation. Ofgem is funded by annual licence fees paid by the companies it licenses to operate in the energy market. Ofgem has grown in scope and funding since its creation in 2000 and its budget in 2021/22 was £129m.[13]

    [Redacted Section 10(4)(e)]

    International Examples of integrated markets

38. Models for combined electricity and gas markets exist in the GB market and between EU member states. These range from power exchanges which facilitate the efficient trading of electricity between countries to joint electricity markets with frictionless trade and jointly operated management committees.

39. The Nord Pool market operates as a power exchange between European countries, operating in the Nordic and Baltic regions, Germany, Poland, France, The Netherlands, Belgium, Austria, Luxembourg and the UK. It has proved successful at bringing about market integration at a large scale. The countries in NordPool have their own domestic electricity markets, regulators, and grid management and distribution and transmission network providers.

40. [Redacted Section 10(4)(e).. The Iberian Market (Portugal and Spain) has a much more integrated grid than most other countries in Europe and is managed by a joint Committee comprising representatives of both Governments. The integration of the market is reflected in the wholesale energy price difference quite often falling to zero between them. However, both countries still have separate regulators, transmission operators and retail markets . Both regulators are free to set the charges for access to the transmission grids in their respective countries, the Spanish and Portuguese Governments are responsible for meeting the costs of grid expansion and upgrade in their respective countries and the Spanish and Portuguese

[12] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/07/expert-commission-energy-regulation-main-report/documents/00455402-pdf/00455402-pdf/govscot%3Adocument/00455402.pdf

[13] https://www.ofgem.gov.uk/sites/default/files/2022-07/OFG2169%20Ofgem%20AR%26A%202022_Accountability.pdf

governments set their own support schemes to promote the generation of renewable energy.

41. In Ireland, a joint Energy market has been operating since 2007, and the market is managed by a Joint Committee. Whilst the retail markets are separate and both countries have their own regulators, a harmonised method of calculating the cost of accessing the grid is applied by both regulators to ensure transparency and fairness and there is coordination of grid expansion and upgrades between the Republic of Ireland and Northern Ireland. Again, the ROI and NI are responsible for meeting the costs of grid expansions and upgrades in their respective territories. Both countries have their own electricity retail markets with autonomy to decide how revenue support schemes for renewables are designed and implemented.

[Redacted Section 10(4)(e)]

[Redacted Section 10(4)(e)]

42. In 2018, 82.3% of all oil and gas energy in Scotland was exported[14], the bulk of it to England. The rest of the UK generates 40% of its electricity from gas[15]. Recent events in Ukraine have magnified the significant impacts of disruption of gas supplies on domestic energy markets. [Redacted Section 10(4)(e)]

[14] https://scotland.shinyapps.io/sg-scottish-energy-statistics/?Section=OilGas&Chart=OilGasExports
[15] https://www.bbc.co.uk/news/58160547

[Redacted Section 10(4)(e)]

43. [Redacted Section 10(4)(e)] As of December 2022, 412 renewable electricity projects with a capacity of 21.7 GW are in the pipeline. 4.3 GW of these are under construction[16]. [Redacted Section10(4)(e)]

[Redacted Section 10(4)(e)]

[16] https://scotland.shinyapps.io/sg-scottish-energy-statistics/?Section=RenLowCarbon&Subsection=RenElec&Chart=RenElecPipeline

Document 2 – Slide pack briefing – FM deep dive on energy markets – May 2023

[Redacted Section 10(4)(e)]