

Whole System Coordination Register

May 2024



Whole System Coordination Register for 2023-24

Published May 2024

This register is published to demonstrate compliance by SSEN Transmission with the Whole System Electricity Licence condition.

It reports on compliance for the period from 1st April 2023 to 1st April 2024.

Whole electricity system outcomes arise from actions taken between two or more parties, at least one of whom holds an electricity transmission or distribution licence, that result in both:

- An investment in the transmission and distribution electricity networks representing best value for money; and
- Improving or, at a minimum, maintaining the services and benefits received by Customers of the electricity network.

Part A The behaviour requirements (summarised)

Clause 1 The licensee must coordinate and cooperate with other Electricity Distributors and transmission licensees to identify actions and processes that advance the efficient and economical operation of the Total System.

Clause 2 The licensee must consider actions proposed by Distribution System Users/Transmission System Users which seek to advance the efficient and economical operation of its network.

Clause 3 The licensee must use all reasonable endeavours to implement actions and processes identified and proposed through coordination or user suggestions

Part B that: (a) will not negatively impact its network; and (b) are in the interest of the efficient and economical operation of the Total System.

Demonstrating compliance (summarised)

This register details completed and in progress work which demonstrates compliance with the Whole System Electricity Licence Condition.

The licensee must prepare and is required to publish on its website a coordination register demonstrating the steps it has taken to comply with Part A of this condition not later than 27 May 2024. The licensee must keep up to date and is required to publish its coordination register (as updated) on its website at least once every 12 months from the date of initial publication.

Further information on the Whole Electricity System Licence Condition and its purpose can be found on Ofgem's website.

[Decision to implement the Whole Electricity System Licence Condition D17/7A for Transmission Owners and Electricity Distributors | Ofgem](#)

					Relevant coordination and cooperation activities												Actions or Processes arising			
Type	Unique ID	Licensee	Collaborating licensees and other stakeholders	Year activity added	Description of the coordination/ cooperation activity	Status	Latest stage / Update /comments (if any)	Coordination activity initiation date (mm/yyyy)	Whole system relevance of the activity	External links to reports on the activity (if available)	Description of data (who shared the data) [widely shared/restricted sharing]	External links for data (if available)	Impact of the activity on the whole system	Impact of the activity on licensee	Recommended next stage of the activity	Justification for recommendation	Action or Process description	Action or process initiation date (mm/yyyy)	Status	Reference of the activity or user suggestion which resulted in this action/ process
Coordination and cooperation activity	SSEN/034	SSEN Transmission	NGET,NGESO,University of Strathclyde, Met Office, Gilytics, Energy Line,	23/24	REVISE is primarily focused on revisiting the current methodology for assigning overhead line ratings. The calculation process uses historical environmental data captured in the 1980s that is applied uniformly across the UK disregarding local/ regional climate variations. The existing transmission network is increasingly constrained by system capacity limits exacerbated by rapidly increasing renewable integration. Improving understanding of line ratings, using latest generation high-resolution weather topographic data combined with the latest techniques for system modelling, will allow for improved targeted investment to ensure we meet demand for the connection of new renewables to the network, securing a safer and greener future.	In progress	The latest update on this work as of Feb 2024	11/2023	Provides additional capacity from existing assets to accelerate the connection of new assets, generators, services.	None	[Widely shared] Summary of UKRI application for funding.	https://smarter.energynetworks.org/projects/ukri10058535/	"REVISE offers the following: (1) Alleviating the constraint on renewable generation reduces the partial reliance on gas/diesel generation used to offset the difference. (2) Circuit rating achieved with no physical works and the associated embedded carbon involved. (3) May enable smaller renewable schemes to connect without the need to wait for further infrastructure works, helping to progress the connection queue. (4) May remove the need to upgrade/replace circuits following a connection request"	Provides additional capacity and speeds up connection times.	Delivery of the Discovery Phase projects, and recommendation for progress.	The Discovery Phase is funded.				
Related action	SSEN/034/A01	SSEN Transmission	NGET, NGESO, University of Strathclyde, Met Office, Gilytics, Energy Line,	23/24												Initiation of the Discovery Phase project and signing of the collaboration agreements	45352	New	SSEN/034	
Coordination and cooperation activity	SSEN/035	SSEN Transmission	NGESO, The Carbon Trust	23/24	"SIF Project BluePrint will develop solutions that facilitate the connection of new low-carbon energy to already-constrained areas of the GB network (such as northern Scotland in SSEN-T's network area) as quickly as possible, and to maximise energy export once connected by avoiding constraint-driven curtailment."	In progress	The latest update on this work as of Feb 2024	11/2023	"Blueprint addresses the 'Whole system planning for faster asset rollout' SIF Challenge. Discovery brings together TOs, ESO, and OWF developers to develop an improved, collaborative understanding of the key risks of developing behind constraint. This will improve whole systems cross-industry planning. It will also improve understanding of how innovative solutions can accelerate the development of the HND network and optimise the use of the existing network, and hence accelerate OWF rollout in currently constrained areas."	None	[Widely shared] UKRI Application for funding		"The project will understand how novel, collaborative approaches to data and commercial arrangements can be used to deliver the HND and mitigate the risks in its delivery, fully aligned with SIF's Innovation Challenge focus Theme 2. The project is also relevant to Theme 3, as novel, collaborative, flexible arrangements between demand and generation will be considered as a possible solution for mitigating the risks in delivering the HND. Linked to Theme 4, hydrogen generation will be considered as a possible solution."	Delivery of whole system thinking to the business.	Start delivery of the Discovery Phase project.	Project has confirmed funding from the UKRI				
Related action	SSEN/035/A01	SSEN Transmission	NGET, NGESO, The Carbon Trust,	23/24												Start of the delivery of Discovery Phase project	45352	New	SSEN/035	

Coordination and cooperation activity	SSEN/036	SSEN Transmission	NGET, Icebreaker One, Southern Gas Networks, OLWG LTD, Mapstand LTD	23/24	"REACT (Rapid Evaluation Areal Connection Tool) aims to create a geographical planning tool providing users with the ability to view electricity grid connection requests in real-time using an interactive visualisation map. Users will be able to identify the best possible locations to connect to the network, based on dynamic geospatial and network information, as well as a view of future demand and generation requests. This will streamline the connection process where limited pre-application information impacts formal applications. Optimising the location of demand and generation will increase the efficient use of existing assets and the effective roll-out of new infrastructure."	In progress	The latest update on this work as of Feb 24	11/2023	"REACT is addressing the challenges in the connection request process by providing an early dynamic view of all forecasted connection requests to highlight optimal locations and other key parameters. The main focus is the H2 use case explored in Discovery"	"https://smarter.energynetworks.org/projects/ukri10058535/" https://smarter.energynetworks.org/projects/ukri10079052/"	[Widely shared] Reports published on the ENA portal	https://smarter.energynetworks.org/projects/ukri10058535/	"REACT will deliver the following net benefits to consumers: Financial - Cost savings for users of network services Significant interest to connect hydrogen electrolysis sites to the SSEN-T Network has resulted in multi-million-pound connection offers being made to developers due to the capacity requested and limited availability on the network. These requests would require costly reinforcement of the network, which would slow down the energy transition and increase consumers bills. Offering the tool to developers before they submit requests could deliver large savings by providing alternative locations to site their project on the existing network with more capacity. REACT will also save time and resource by eliminating the need for developer pre-application calls by providing them with all the information they need prior to the application. These calls cost approximately E6.3Kpa and will increase as connection requests rise. We'll review the savings on project development, pre-application costs and Transmission Network Use of System charges throughout the Project. Environmental - Direct CO2 savings p.a against a business-as-usual counterfactual REACT will reduce the carbon emissions of building new infrastructure which would be required for the increase in connection requests. By utilising the existing network where possible, REACT will deliver direct environmental benefits. Environmental - Indirect CO2 savings p.a against a BaU counterfactual Carbon reductions will be investigated to identify the amount saved through reducing the delivery delays of hydrogen projects, while taking into consideration the ESO's and SSEN-T's North of Scotland future energy scenarios."	Improved systems planning and line of site of system needs.	Completion of Alpha Phase and submission of a Beta Application.	The project had a live demonstrator and we are now looking to move to BAU.				
Related action	SSEN/036/A01	SSEN Transmission	NGET, Icebreaker One, Southern Gas Networks, OLWG LTD, Mapstand LTD	23/24													Agreement on the Beta Application for funding with the project partners	45504	Improving	SSEN/036
Coordination and cooperation activity	SSEN/037	SSEN Transmission	National HVDC Centre, NGESO, University of Strathclyde, The Carbon Trust	23/24	"INCENTIVE will investigate and demonstrate how offshore wind farms (OWF) can provide inertia to the onshore networks. This will provide grid stability and reliability at a lower cost, and reduce the need for additional infrastructure by co-developing and co-locating inertia services with OWFs. OWFs providing inertia to the onshore network is not an incremental innovation, but a step-change in thinking that could be replicated globally. INCENTIVE will investigate OWFs with: 1. STATCOM with supercapacitor energy storage and grid forming converter. 2. Battery energy storage system (BESS) with overrated grid forming converter. 3. Synchronous condenser with flywheel. These solutions have never been trialled in conjunction with an offshore wind farm before making this a first-of-its-kind project. The Project brings together OWF developers, technology suppliers, NGESO, and Ofgem, to help build a cross-industry understanding of the INCENTIVE solutions."	In progress	The latest update on this work as of July 2023	03/2022	"The energy contained in generators at power stations and industrial facilities provides inertia as they rotate at the same frequency as the electricity grid. Inertia in the GB electricity network is falling. Without novel solutions, adding additional renewable generation capacity will become increasingly challenging and could increase the operating cost of the GB network system and consumer bills. Historically, renewable generators have not treated system inertia as their problem as it has been high. However, we are already seeing renewable generation curtailed due to low system inertia."	"https://smarter.energynetworks.org/projects/10067856/" https://smarter.energynetworks.org/projects/10037143/" https://smarter.energynetworks.org/projects/10024879/"	[Widely shared] ENA Public website		"INCENTIVE will deliver benefits over and above those achievable through existing programmes (i.e. The Stability Pathfinder). These include: (1) Introduction of design alterations to requisite or already-planned assets to provide inertia. (2) Capturing cost savings by building inertia provision alongside building OWFs. For example, sharing network, access, and planning considerations. (3) Accelerating the connection of renewable assets by proactively addressing inertia at the outset. (4) Driving down market prices by creating a liquid market for inertia services"	Benefits consumer and ancillary service providers, impact on SSEN-T is largely neutral as SSEN_T cannot take part in the ancillary services market.	Completion of the Beta Phase 1 and approval to move to Beta Phase 2.	Completion of Beta Phase 1 shows a positive outcome in terms of benefits.				

Related action	SSEN/037/A01	SSEN Transmission	National HVDC Centre, NGENSO, University of Strathclyde, The Carbon Trust	23/24													conclude Beta Phase 1 of project and disseminate knowledge	45536	Improving	SSEN/037
Coordination and cooperation activity	SSEN/038	SSEN Transmission	National HVDC Centre, NGENSO, The University of Edinburgh, The Carbon Trust, Super Grid Institute	23/24	<p>"Network-DC The UK government has set targets to increase offshore wind to 50GW by 2030. The method for connecting offshore wind farms to the grid is to connect each wind farm to an alternating current (AC) converter station with an AC circuit breaker between the converter station and the rest of the onshore AC network, to protect the electricity grid from faults on the offshore direct current (DC) network. This method results in stand-alone assets connected directly to the transmission grid, increasing the total number of required AC converter stations. As the number of wind farms increases, the number of AC converter stations increases. Without innovative solutions, the growing network of High Voltage Direct Current (HVDC) connections around GB will be less flexible and responsive, resulting in higher assets and system operating costs.</p> <p>DC circuit breakers (DC-CBs) are more than likely to be required to deliver a multi-terminal HVDC hub serving multiple offshore wind generation sites, GB transmission links, and international interconnections.</p> <p>Network-DC will investigate and demonstrate the use of DCCB, an innovative technology untested in the UK and European markets. DCCBs will allow us to bring multiple wind farms into a DC system, containing the impact of any single failure safely and securely.</p> <p>This Project brings together international partners to accelerate the readiness of DCCBs for installation into the design of the UK HVDC Network, and outline a clear pathway for the installation of the UK's first DCCB."</p>	In progress	The latest update on this work as of May 2023	09/2022	A DCCB hub will reduce the need for AC infrastructure and effectively isolate faults in offshore network components. This project will build confidence in DCCBs allowing utilisation across the network. Enables more economic connection of offshore wind to UK mainland grid.	<p>https://smarter.energynetworks.org/projects/10020383/</p> <p>https://smarter.energynetworks.org/projects/10036946/</p> <p>https://smarter.energynetworks.org/projects/10067854/</p>	[Widely shared] ENA Public website		Reduces the total amount of infrastructure.	Build expertise in design and commissioning of DC-Circuit breakers. Reduces future connection time. Simplify the operation of the network.	Progress BETA phase work with recommendations for specification of DC Breaker on UK network.	BETA phase is fully funded and is progressing.				
Related action	SSEN/038/A01	SSEN Transmission	National HVDC Centre, NGENSO, The University of Edinburgh, The Carbon Trust, Super Grid Institute	23/24													Continue to deliver the Beta phase work packages.	45231	Improving	SSEN/038
Coordination and cooperation activity	SSEN/039	SSEN Transmission	NGET, The University of Dundee	23/24	Work on the OHL Foundation uplift project to investigate improved foundation designs. Through collaboration with NGET and University of Dundee the new foundation design will improve efficiency for project timeframes as well as cost savings.	In progress	The latest update on this work as of Feb 24	11/2022	The new design will be used throughout the industry to reduce the time taken to build foundations as well as the amount of material needed for foundation builds	https://smarter.energynetworks.org/projects/niu_shet_0039/	[Widely shared] Project reports and lessons learned are shared with the University to allow them to design the new foundation. The new models and designs are shared with the partners to allow for corroboration.		This activity will have a positive impact on the whole system in allowing for more cost effective, quicker construction of the networks allowing more renewable to connect to the network quicker and for less cost. This will benefit consumers in the long term.	The impact on SHET will be positive in that it is expected that the new foundation design will allow for quicker and cheaper construction.	Project to be completed and results assessed by NGET and SHET. Further work may involve additional testing of larger structures.	Project has the potential to reduce the time taken to construct overhead line circuits as well as reduce the carbon footprint.				
Related action	SSEN/039/A01	SSEN Transmission	NGET, The University of Dundee	23/24													Coordinate further testing and introduction into BaU	45381	Improving	SSEN/039

Coordination and cooperation activity	SSEN/040	SSEN Transmission	Dundee City Council	23/24	Having regular meetings with the Climate, Economic and Planning teams in Dundee City Council to introduce SSENT and discuss the Dundee City Strategy, areas for collaboration and input from their Local Area Energy Plans (LAEP) and Local Heat and Energy Efficiency Strategies (LHEES)	In progress	The latest update on this work as of Feb 2024	08/2023	Regular quarterly meetings with Dundee City Council is creating a good relationship with the council and provides a forum to update on the progress of their LAEP and LHEES which can feed into the city strategy. It also helps to flag any issues or risks we need to be aware and explores areas of opportunity which may feed in to the strategy.	None	[Restricted Sharing] An overview of Dundee City Network Development Strategy developed by SSEN-T.	None	Effective stakeholder engagement with local authorities, SHEPD and SSENT to increase awareness of strategy and approach to create a positive working relationship	Creating positive relationships with stakeholders	Continued engagement with the next meeting taking place on 23 April 2024	Important to maintain the relationship and continue with the effective engagement that has a value to all parties.				
Related action	SSEN/040/A01	SSEN Transmission	Dundee City Council	23/24													Next meeting organised for 23 April 2024	45405	Improving	SSEN/040
Coordination and cooperation activity	SSEN/041	SSEN Transmission	SSEN Distribution, ES Catapult, Regen	23/24	"We are undertaking a study on Regional Energy System Plans (RESP) relating to our work on system planning and how strategic area plans might impact the network. We have had discussions with SSEN Distribution, ES Catapult and Regen to provided greater understanding of the current status of RESPs and local area planning."	In progress	The latest update on this work as of Feb 2024	03/2024	Strategic planning of the network such as RESPs includes considering aspects on connections, planning, charging, markets.	None	[Some restricted and some widely shared] Project still gathering knowledge based information.	None	Positive - provides greater insight into how future regional and strategic plans might be aligned.	Positive- provides greater insight into how future regional and strategic plans might be aligned.	Ongoing engagement; write up report, disseminate to appropriate areas of the business	Initial investigations have already proved inciteful and raised further questions.				
Related action	SSEN/041/A01	SSEN Transmission	SSEN Distribution, ES Catapult, Regen	23/24													Information fed to sections of business involved in strategic planning.	45383	New	SSEN/041
Coordination and cooperation activity	SSEN/042	SSEN Transmission	NGESO, SPEN, NGET, National HVDC Centre	23/24	"1) HND: The Network Planning team is extensively working with the ESO, NGET, Offshore Developers and the HVDC centre to identify an economic, efficient and deliverable solution as per of the HND offshore coordinated network. 2) HND/FUE: As part of next step to HND exercise over the 2023-24 period , we extensively worked with the ESO, NGET, SPEN and others to identify the most suitable offshore coordinated network that will help us to deliver the network to facilitate Net Zero targets by 2035. 3) tCSNP2: The Network Planning team collaboratively worked with the ESO, NGET, Developers and HVDC centre to identify economic, efficient and deliverable onshore network reinforcement options to support HND-FUE offshore coordinated network that will enable us to meet our commitments to achieve decarbonisation of Grid."	In progress	The latest update on this work as of Feb 2024	01/2023	All the activities listed above needs collaborative working with all the players from GB energy industry including but not limited to OFGEM, ESO, NGET, SPEN etc	None	[Restricted sharing]	None	These are critical activities which enable the ESO to identify economic and efficient options for development onshore and offshore to support the development of a coordinated GB network.	Deliver the most economical, efficient and deliverable network with due regard to environmental and societal considerations.	None	None				
Related action	SSEN/042/A01	SSEN Transmission	NGESO, SPEN, NGET, National HVDC Centre	23/24													GB wide publication by ESO of the Pathway to 2030 and the Beyond 2030 reports with investment recommendations for both onshore & offshore network design choices.	45371	New	SSEN/042

Coordination and cooperation activity	SSEN/043	SSEN Transmission	SHEPD, NGENSO, University of Strathclyde, NSTA/SIC/Statkraft/Offshore developers	23/24	As part of Shetland strategy, planning the future transmission network on Shetland, a close engagement with SHEPD as the distribution network owner and operator on Shetland was necessary. At the beginning of the project we reached out to SHEPD to understand their future plans in terms of GSPs and their corresponding capacities and how this can fit into the whole system solution for Shetland. This has helped assigning potential distribution customers to the closest potential GSP to help optimise the 33kV network. Then, we engaged with SHEPD to get their distribution energy profiles, those have been considered along the transmission energy profiles to assess the operation of the system throughout one typical year of operation. We have also worked closely with SHEPD on their fault ride through solution and how the future transmission strategy impacts on it. We have regular workshops with SHEPD to review the proposed network options and prepare relevant maps to show the paths that both transmission and distribution networks will take considering the planned transmission substations and customer connections offered by SHEPD.	In progress	The latest update on this work as of Mar 2024	06/2023	The whole system solution is to help optimise the required system operability assets, identify and reduce or suppress potential costs of rebuild, and assess opportunities for common use of land to build electrical assets for the whole system solution namely substations.		[Restricted sharing] Minutes of the last two meeting held with SHEPD and also a link to the distribution profiles shared. Files shared by SHEPD as part of the whole system solution.		Overall positive. However, there are some challenges related to changing projects impacting contracted customers either from SSEN Transmission or SHEPD side.	Positive. This enables us to plan an economic and efficient whole system solution in a coordinated manner.	Continue work to achieve the most from the whole system solution	Work in progress, not yet concluded.				
Related action	SSEN/043/A01	SSEN Transmission	SHEPD, NGENSO, University of Strathclyde, NSTA/SIC/Statkraft/Offshore developers	23/24													*Continue coordination with stakeholders. This feeds directly into the Needs Case for the Shetland Whole System solution for submission to Ofgem during 2024	45380	Improving	
Coordination and cooperation activity	SSEN/044	SSEN Transmission	SHEPD, NGENSO	23/24	A whole system solution to deploy a centralised flexible connections solution to provide quicker network access to renewable generation in a manner that minimises costs to the GB consumer and removes barrier to entry for small scale renewable generation	In progress	The latest update on this work as of Feb 2024	01/2024	Quicker network access to renewable generation in a manner that minimises costs to the GB consumer, removes barrier to entry for small scale renewable generation and accelerating our contribution to net zero.	None	[Restricted sharing] Connection application information including customer data, High level options being considered		This is ongoing but is expected to be positive as it will provide quicker network access to renewable generation in a manner that minimises costs to the GB consumer, removes barrier to entry for small scale renewable generation and accelerates our contribution to net zero	This is ongoing but it is expected to be positive as it will provide quicker and increased network access to renewable generation and accelerate our contribution to net zero	Define functional and nonfunctional requirements and get agreement with the ESO to deploy the scheme in line with STCP 26.1 – Active Network Management.	This will provide quicker network access to renewable generation in a manner that minimises costs to the GB consumer, removes barrier to entry for small scale renewable generation and accelerates our contribution to net zero				
Related action	SSEN/044/A01	SSEN Transmission	SHEPD, NGENSO	23/24													Define functional and non-functional requirements and get agreement with the ESO to deploy the scheme.	45565	New	SSEN/044
Coordination and cooperation activity	SSEN/045	SSEN Transmission	NGESO;SHEPD;	23/24	Work undertaken to provide methodology for setting T/D limits at GSPs. Currently Some processes already in place in England.	Complete	The latest update on this work as of Dec 2023	04/2023	Involved co-ordination across T & D in setting methodologies for dealing with setting capacity.	https://www.ssen.co.uk/our-services/tools-and-maps/eoif-form/	Data exchanged between T and D was Mvar of capacity available at selected GSP's via Appendix G. Some restricted and some widely shared	None	Positive - T + D have worked together on the dealing with limits at T/D boundary to enable more generation to connect within the scope of the work	Positive - Greater Liaison with D counterparts.	The process has already been rolled out to trial sites.	The project aimed to trial the process once the details had been agreed.				
Related action	SSEN/045/A01	SSEN Transmission	NGESO;SHEPD;	23/24													There are follow-on activities across trial sites. The process has been accepted within the company.	45275	New	SSEN/045

Coordination and cooperation activity	SSEN/046	SSEN Transmission	SHEPD;NGESO;	23/24	Work undertaken to consider how connections reform will align with requirements of a more strategically planned networks and recommend any changes as a result	In progress	The latest update on this work as of Mar 2024	02/2023	Requires input and collaboration across T/ D and T/ESO	None	No specific data exchanged other than worked examples of the connections process under TMO4 and an explanation of the TO's role in a more strategically planned network. Widely shared	None	Positive - a proposed solution will provide direction and more certainty towards developers in the queue	Positive - provides better alignment between SSEP and connections process	Seek industry endorsement and move to code modification to implement solution	This is essential if we are to realise the benefits of both strategic planning and a reformed connections process				
Related action	SSEN/046/A01	SSEN Transmission	SHEPD;NGESO;	23/24													Further co-ordination activity to assess trial status	45401	New	SSEN/046
Coordination and cooperation activity	SSEN/047	SSEN Transmission	SPEN;NGET;NGESO;	23/24	Electricity Ten Year Statement work to develop GB network models for future years, and providing technical data as required for publishing in the report.	Complete	The latest update on this work as of Mar 2024	09/2023	Working with the other TOs across GB, as well as the ESO, to develop whole GB network transmission models for current and future years.	https://www.nationalgrideso.com/research-and-publications/electricity-ten-year-statement-etyts	Data shared is network modelling data. We share our network models (PSSE) and then share modelling data for publishing as part of the ETYS. Some restricted and some widely shared	None	Coordinated work with other TOs and the ESO to develop whole GB transmission network models for all TOs and the ESO. Models are used in the system planning of the GB grid.	This results in us having updated Transmission Network master GB models for undertaking all system analysis studies. This enables the planning of the network to be undertaken at a GB level, ensuring coordination.	This is an annual process and will continue next year (ETYS 2024 has kicked off already).	This is a licence obligation to continue				
Related action	SSEN/047/A01	SSEN Transmission	SPEN;NGET;NGESO;	23/24													"Progress next ETYS cycle starting with model builds. Network modelling work feeds directly into the production of the ETYS as well as the tCSNP/NOA"	45299	Business as Usual	SSEN/047
Coordination and cooperation activity	SSEN/048	SSEN Transmission	NGESO;NGET;SPEN;	23/24	Joint Planning Committee Modelling Group. Quarterly meeting with TOs and ESO across GB to discuss network modelling activities and issues	In progress	The latest update on this work as of Mar 2024	01/2023	Work with other TOs and the ESO to resolve any issues on network modelling or discuss other modelling activities	None	This is a face to face meeting to discuss issues/ concerns regarding network modelling and this sub group reports to the overall JPC group. Restricted sharing	None	Enables TOs and ESO to review modelling assumptions or address issues with regards to network modelling with a level of consistency across parties.	Allows us to raise modelling issues and engage with other parties in GB, to ensure effective coordination of network plans.	Continue to meet as a sub group to address ongoing and new issues	This is necessary to continue improvement on the modelling of the GB network.				
Related action	SSEN/048/A01	SSEN Transmission	NGESO;NGET;SPEN;	23/24													Actions continue and any recommendations or processes that come out of it will be actioned upon as required. Outcomes relate to all system modelling work on the GB network.	44927	Business as Usual	SSEN/048

Coordination and cooperation activity	SSEN/049	SSEN Transmission	SHEPD;Scottish Enterprise;	23/24	SSEN Transmission were invited to attend a call with Scottish Enterprise to discuss the connection of data demand centres throughout our network area. With significant wind resource and pipeline of contracted Scot Wind generation, Scotland has rightly been chosen as a destination where demand is generally seen as a positive. The challenges to connection are around bay availability and space within substation, rather than network reinforcements to cater for the demand. The call was followed up with an introductory face-to-face meeting with Scottish Enterprise and one of their clients, who were looking to build out a data demand centre somewhere in Scotland. Scottish Enterprise had identified 10-15 sites around Scotland that they believed could be used for these centres, however, a grid connection did not make up part of their thinking, so most of the sites earmarked, would prove very challenging to connect to the grid. There was one site identified at Edzell Woods, which we discussed with the developer as being the most logical from a grid perspective. We explained that any Transmission connection would likely have a 6-7 year programme to build out from our substation to their site, as well as limitations on where we could physically connect their project, due to a shortage of connection bays. At this point, we introduced the possibility of their initial phase 1 50MW demand connecting via the distribution network and when their ramp up to circa 500MW was required, Transmission infrastructure would potentially be ready for them. SHEPD attended a call to discuss some of the GSP's nearby, discussing headroom left on the transformers, as well as how the physical connection would look. The conversations to date have been very valuable and have given the customer the most efficient way to connect their scheme, in the most timely manner for them. We are now awaiting a potential grid application for the data demand centre. This co-ordination between T and D could get the customer connected earlier to the system and bring 10's of Millions of pounds investment to the Scottish economy.	In progress	The latest update on this work as of Jan 2024	07/2023	SSEN Transmission and Distribution working collaboratively to find an optimal solution for the connection of new technology to the GB Network.	None	n/a	None	Positive - Earlier connection to the grid and large investment in local economy.	Positive reputation following co-ordinated approach, finding solutions on how to connect the customer earlier by involving SHEPD colleagues.	Waiting for grid connection application to formally move the project forward.	We have provided all information asked of us. The decision is now with the developer to submit an application, so we can work on issuing a connection offer with anticipated connection dates and associated costs.				
Related action	SSEN/049/A01	SSEN Transmission	SHEPD;Scottish Enterprise	23/24											Continue to engage with Scottish Enterprise, Developers and SHEPD to support future requests from similar technologies	45383	Business as usual	SSEN/049		
Coordination and cooperation activity	SSEN/050	SSEN Transmission	SHEPD	23/24	Fortnightly meetings on the Shetland Strategy which includes involvement from SHEPD on what we at Transmission are looking to progress, and what information we need from SHEPD/what impact this may have on SHEPD infrastructure and current contracted customers.	In progress	The latest update on this work as of Mar 2024	06/2023	We are taking a holistic view of the current distribution network on Shetland, and how the newly created transmission infrastructure interacts.	None	n/a	None	Positive - will provide a more holistic view	Positive - shows we are thinking out the box and shows our understanding that dealings on Shetland are very different to the mainland	Preferred outcome of the strategy to be finalised and communicated to contracted customers, Ofgem, ESO and then wider through a webinar for various stakeholders. Needs cases will need to be submitted to Ofgem on the back of this.	This is the view across the internal business of next steps/following procedures.				

Related action	SSEN/050/A01	SSEN Transmission	SHEPD	23/24													Stakeholder webinar to be held in June which will ultimately be used to support Ofgem submissions later in the year	45444	Business as usual	SSEN/050
Coordination and cooperation activity	SSEN/051	SSEN Transmission	SHEPD	23/24	The Hebrides and Orkney Whole System Uncertainty Mechanism (HOWSUM) Steering Group is comprised of both SSEN Distribution and Transmission colleagues to arrive at the optimal whole system solution accounting for future demand and generation, subsea cable asset condition, island resilience and decarbonisation	In Progress	The latest update on this work as of Mar 2024	12/2022	This group establishes working relationships between SSEN Transmission and SHEPD. This also supports consistent engagement with local councils and communities.	N/A	Knowledge sharing through emails, Microsoft Teams and face-to-face meetings		Allows for future coordination with local council, communities and developers to ensure efficient and effective solutions are put forward to benefit the islands	Positive impact with the population of the islands by building better relationships to tackle future problems, improve network security of supply and decarbonise the islands.	Continued collaboration to progress reports. HOWSUM 2024 has been submitted with costs to follow. Work towards HOWSUM 2025 submission, exploring T&D options and determining the most efficient and economic solution to be progressed.	Collaboration will be crucial to deliver the efficient and economic solutions while accounting for the or future demand and generation, subsea cable asset condition, island resilience and decarbonisation				
Related action	SSEN/051/A01	SSEN Transmission	SHEPD	23/24													Continued engagement with SHEPD to support Transmission input on the 2025 HOWSUM submission. This will include attending the steering group and Director level workshop	45383	Business as Usual	SSEN/051
Coordination and cooperation activity	SSEN/052	SSEN Transmission	SHEPD	23/24	"Using a whole system approach to support RIIO T3 submissions. 1. Dundee creation of regional development strategy which is driven by the asset life of a number of GSP locations across the Dundee area. The strategy seeks to address the drivers while considering other load, non-load and distribution requirements. 2. East Coast 132kV network- A similar approach has been taken to strategically plan that part of the transmission network recognising asset condition, customer connection and GSP interactions."	In Progress	The latest update on this work as of Mar 2024	02/2022	Both activities rely on a coordinated approach both across Transmission (load and non-load) and with SHEPD to develop a solution to future proof the network with a coordinated, economic and efficient design.	N/A	emails, Teams meetings, workshop	N/A	This has a positive impact on whole system by continuing to demonstrate our ability to coordinate internally and externally and develop a solution to future proof the network aligning with growth in generation to help meet net zero targets	Assure alignment and no-regret in development of solution	Engineering Justification Papers will be produced for both Dundee and East Coast strategies which will then be submitted with the T3 business plan	The primary driver for both EJP's will be asset health and must be accounted for in our next business plan submission ensuring that we deliver a solution which meets our future load requirements				
Related action	SSEN/052/A01	SSEN Transmission	SHEPD	23/24													submission of EJP's for RIIO T3	45383	Business as Usual	SSEN/052
Coordination and cooperation activity	SSEN/015	SSEN Transmission	NGET, National HVDC Centre	22/23	Project Aquila - Coordination activities with NGET on HVDC multi-vendor interoperability development and demonstration. Currently HVDC converters between different manufacturers cannot work with each other. This has been recognised by BEIS as a pathfinder project in July 2022. A new control model is being developed by the HVDC centre to work as an "adapter" to allow a control over converters by different manufacturers.	In progress	The latest update on this work as of Feb 2024	09/2022	Through the engagement activities from GB Interoperability Workgroup with other network licensees, SSEN Transmission, through HVDC Centre, is able to share its knowledge and experience in its approach to whole system and in return it gets feedback that it can use to make relevant changes to its design which will benefit the total system.	https://www.hvdc-centre.com/our-projects/aquila-interoperability-package/	[Restricted sharing] Models and project learning is continuously shared with NGET	None	Once multi-vendor interoperability is proven, this can be deployed to HVDC transmission projects in the future.	This would potentially reduce the number of HVDC converter stations required by connecting HVDC links to a multi-terminal switching stations.	" SSEN Transmission to continue engagement and move towards Project Assessment"	This project is important as it will enable interoperability development and benefit the delivery of the offshore transmission network by potentially reducing the connection to huge volumes of offshore wind required to meet net zero.				
Related action	SSEN/015/A01	SSEN Transmission	NGET	22/23													Coordinate with the HVDC centre on the design and simulation of a feasible controller.	Apr-23	New, Improving	SSEN/015

Coordination and cooperation activity	SSEN/016	SSEN Transmission	NGESO, SPEN, Venders/manufacturers	22/23	Coordination activities with NGESO and SPEN on system power quality issues following unusually high levels of harmonic distortion observed in the South West region. In particular, understanding the causes of the harmonic distortion and how to reduce them.	In progress	The latest update on this work as of Feb 2024	04/2022	Through the coordination activities with other network licensees as well as the system operator, a holistic approach is being taken to resolve these power quality issues which will benefit the operability of the total electricity system	None	Received harmonic data from SPEN [restricted sharing]	None	This has a positive impact as the solutions to these power quality issues will ensure the operability of the total electricity system	The knowledge sharing from these coordination activities has helped us to come up with the most efficient and economic solutions to resolve these emerging system power quality issues.	"SSEN Transmission are progressing with a project which will mitigate the impact of these system power quality issues. Coordination with NGESO [and SPT will be maintained as an affected TO]."					
Related action	SSEN/016/A01	SSEN Transmission	NGESO, SPEN, Venders/manufacturers	22/23												"Progress the project to resolve power quality issues in the south west of Scotland."	Apr-24	New	SSEN/016	
Coordination and cooperation activity	SSEN/017	SSEN Transmission	University of Strathclyde, National HVDC Centre	22/23	"Preferred Solutions to perform for Lower levels of Fault Current on AC networks (PSL-FC). To simulate a future electrical network where the fault current spike is marginal but prolonged and evaluate how present P&C products function and respond. Based upon the findings it will determine if a Protection and Control (P&C) solution can be further developed to address the potential future network issues. This project aims to investigate how effective and reliable current P&C equipment is on a future electricity network, which has even more renewable generation and power electronic equipment, via a combination of network simulation and open-loop device trials. It is also the aspiration to determine new tests and validation processes for the P&C equipment in the future transmission system environment of low fault currents. Research would also be conducted into the shape and structure of new P&C operating processes and protocols to help accommodate the transition of the network towards net-zero."	In progress	The latest update on this work as of Feb 2024	06/2022	By understanding the protection and control requirements needed for the network to operate with the increase in renewable generation sources will reduce the potential for disruption to the electrical energy supply.	https://smarter.energynetworks.org/projects/nia_shet_0033/	Data shared with University of Strathclyde and National HVDC Centre. All results of the project will be disseminated via ENA Smarter Networks portal and CIGRE P&C conferences and papers	None	Positive impact. Reducing the potential for protection and control issues to affect the electrical energy supply to the UK. This would impact both Generation, Transmission and Distribution as well as knock on effect to Gas operators	Positive impact as understanding the future protection & control needs for the network allows for better planning.	"Installation of equipment into the field to allow for comparison with the lab data"	"Evidence that the simulated lab results are confirmed by the field data will provide confidence that the technology can be applied to the future network."				
Related action	SSEN/017/A01	SSEN Transmission	University of Strathclyde, National HVDC Centre	22/23												Ensure the results of the project are moved into BaU operation	Mar-26	"New Improving"	SSEN/017	
Coordination and cooperation activity	SSEN/018	SSEN Transmission	NGESO	22/23	"TOTEM Extension (Transmission Owner Tools for EMT (Electromagnetic Transient) Modelling). Continuation of NIA_SHET_0032 TOTEM project to complete the development and associated validation of a full-scale model of the GB Transmission System in EMT PSCAD (Power System Computer Aided Design) simulation software. TOTEM is focused on the development of innovative tools and resources for power system modelling and analysis. It will produce a model that can mimic large volume power electronics and enable formulation of mitigation measures to future proof the GB network associated with the energy transition. The end product will be a valuable modelling tool which will require validation and improvement through studying actual system disturbances."	Complete	The latest update on this work as of Jul 2023	05/2022	"Deliver tools for PSCAD model manipulation for the whole GB network and analysis that will support the TOs in their use of the GB model."	https://smarter.energynetworks.org/projects/nia_shet_0035/	[Widely shared] Network models	None	Positive impact. To be able to actively model the current and future GB network. All TO's will be able to use the tools and Distribution Network Owner (DNO) will be able to see the results of the project and gain learning.	Positive impact. To be able to actively model the current and future SSEN Transmission network	"The end product will be a valuable modelling tool, however it will need to be validated and improved through studying actual system disturbances. [23/24 UPDATE] Project has completed and tool to be used in BaU. Continued dialogue with other network users on the suitability of the TOTEM tool as well as areas of improvement"	"[23/24 UPDATE] Tool to be employed in a BaU environment to prove the worth of the project"				

Related action	SSEN/018/A01	SSEN Transmission	NGESO	22/23														"Ensure the recommended next stage activity (model validation and improvement through study of actual system disturbances) is performed and the results distributed [23/24 UPDATE] The tool is to be used to investigate system disturbances"	Feb-24	"New [23/24 UPDATE] Business as Usual"	SSEN/018
Coordination and cooperation activity	SSEN/019	SSEN Transmission	SPEN, NGET	22/23	A working group has been set up between the three GB TOs to develop a master Carbon Asset (CAT) Database which contains greenhouse gas intensity factors for specific assets to allow for more accurate reporting on embodied carbon emissions.	In progress	The latest update on this work as of Nov 2022	01/2019	As a result of this work the three transmission network licensees will have a consistent methodology for calculating embodied carbon emissions in transmission projects. The CAT database will be regularly updated with any new emission factors received by the supply chain and these updates will be shared between all TOs.	None	Shared database between the three TOs	None	This ensures a consistent methodology is applied across all TOs and the regular updates will allow opportunities to share learnings. This group helps improve carbon reporting across the transmission system. It also provides a consistent database for the supply chain to use when providing transmission related embodied carbon data.	This database has provided us with the necessary data to start reporting on project level embodied carbon. The continued shared learning will ensure we stay aligned with other TO's whilst improving the accuracy of our carbon reporting.	The key next step is to determine the governance of the Cat Database i.e. where it will be stored, who will be responsible for updating etc. and consider how each TO will utilise the database.	These activities are necessary to allow a co-ordinated approach to embodied carbon emissions reporting.					
Related action	SSEN/019/A01	SSEN Transmission	SPEN, NGET	22/23														Share add-ins to the master database	Dec-22	Improving	SSEN/019
Coordination and cooperation activity	SSEN/020	SSEN Transmission	SPEN, NGET	22/23	A working group has been set up between the three GB TOs to collaborate and share knowledge on substation energy consumption. The aim of the group is to improve the accuracy of substation energy consumption data which is required to calculate part of our operational emissions.	In progress	The latest update on this work as of Nov 2022	06/2022	Through this working group, the GB TO's are applying a joint approach to methodology development by sharing knowledge on existing methods as well as discussing potential new methods which could be explored further.	None	Knowledge sharing has occurred over MS Teams meetings, no data has been shared yet.	None	This will allow for more accurate reporting on operational emissions across the transmission system and will ensure a coordinated approach is applied amongst the three TO's.	Knowledge sharing from the working groups has given us a sense of the accuracy of our current methodology and has provided us with potential alternative methods which can be further explored.	The next step is for SPEN to provide us with a detailed description of the new methodology they are currently exploring in the format of a presentation.	These activities are necessary to allow a coordinated approach to substation energy consumption emissions reporting.					
Related action	SSEN/020/A01	SSEN Transmission	SPEN, NGET	22/23														Exchange data and idea on methodologies with other stakeholders	Feb-23	Improving	SSEN/020
Coordination and cooperation activity	SSEN/021	SSEN Transmission	SPEN, NGET	22/23	A working group has been set up between the three GB TO's to collaborate and standardise project waste reporting (where possible). The aim of the group is to promote data collection consistency and to reduce administrative efforts for our supply chain partners.	In progress	The latest update on this work as of Nov 2022	10/2022	Through this working group, the GB TO's are sharing knowledge on existing reporting requirements as well as discussing potential new requirements which could be explored further.	None	Knowledge sharing has occurred over MS Teams meetings. Waste reporting templates for each TO have also been shared under restrictive access.	None	This will ensure a coordinated approach is applied amongst the three TO's.	Positive impact - improved co-ordination and standardisation.	The next step is for all TO's to collaborate on a shared file in which we can review our reporting requirements.	These activities are necessary to allow a co-ordinated approach to waste reporting.					
Related action	SSEN/021/A01	SSEN Transmission	SPEN, NGET	22/23														Review reporting requirements	Dec-22	Improving	SSEN/021
Coordination and cooperation activity	SSEN/022	SSEN Transmission	NGET, SPT, ENA, Users	22/23	Co-ordination activities to further code modifications in CUSC, STC, SQSS, Grid Code that meet the code objectives of safe and reliable system and consumer benefit etc., and overarching goal of net zero	In progress	The latest update on this work as of Dec 2022	04/2022	Enables co-ordinated whole system approach to code modifications, aligned positions, to fulfil the relevant code objectives and efficient code governance procedures	https://www.energynetworks.org/creating-tomorrows-networks/open-networks/	ENA Open Networks monthly publication of Steering Group Report - Annex of code modifications	None	Positive impact to enable fulfilment of the relevant code objectives and efficient code governance procedures	Positive enables alignment and learning from TO's and users, and assessment of code modifications against the code objectives and objectives of ENA Open Network project	Maintain activities and utilise learnings to inform SEN/023 - Energy Code Reform	Ensure learnings from current code governance and the opportunities and limitations inform advocacy position for Energy Code Reform					
Related action	SSEN/022/A01	SSEN Transmission	NGET, SPT, ENA, Users	22/23														Maintain activities and utilise learnings to inform SSEN/023 - Energy Code Reform	Mar-23	New	SSEN/022

Coordination and cooperation activity	SSEN/023	SSEN Transmission	NGET, SPT, Users, Code Administrators, SSEN Distribution, SSE Renewables, SSE Business Services	22/23	Co-ordination activities and insight sharing on BEIS and Ofgem Energy Code Reform proposals in Energy Security Bill	In progress	The latest update on this work as of Dec 2022	04/2022	Enables cross vector and cross fuel learning to ensure BEIS benefits case realised (Impact Assessment states benefit £1.6m p/a efficiency saving for industry through reforms)	None	None	None	Positive impact - seeks to take learnings from current code governance and to apply to reforms and maximise whole system opportunity of reforms	Positive impact - seeks to take learnings from current code governance and to apply to reforms and maximise whole system opportunity of reforms	Continue SSENT's Stakeholder Engagement Plan for ECR	Plan to date has brought value and insight through bi-lateral meetings				
Related action	SSEN/023/A01	SSEN Transmission	NGET, SPT, Users, Code Administrators, SSEN Distribution, SSE Renewables, SSE Business Services	22/23													Maintain activities and utilise learnings to inform SSEN/022 - Energy Code Modification management	Mar-23	New	SSEN/023
Coordination and cooperation activity	SSEN/024	SSEN Transmission	SPEN, NGET, SSEN Distribution, Users, Ofgem, NGESO, ENA, Trade bodies	22/23	Representing SSEN Transmission in market design arrangements prevalent across industry currently, ensuring whole system decarbonisation is considered when changing market arrangements.	In progress	The latest update on this work as of Dec 2022	11/2021	Our evidence based work on this area monitors and tracks the effect that changing market signals, for those connecting to our network can have on the operation of both distribution and transmission networks. A key part of this work is also considering the impact on consumers and ensure society reaches net zero efficiently at least cost.	https://www.ssen-transmission.co.uk/information-centre/energy-markets-hub/	Collaboration with industry bodies and wider stakeholders.	https://www.ssen-transmission.co.uk/information-centre/energy-markets-hub/	Our work in this area has led us to be trusted source of information that stakeholders rely on. We have responded to key government consultations such as BEIS REMA consultation and Ofgem's Call for Input.	Positive impact on SSEN Transmission in particular around enhancing our stakeholder engagement. Our engagement on market reform has ensured that our future network planning is considered by key organisation stakeholders such as BEIS and Ofgem	Continue to contribute to key consultations that consider market arrangements and ensuring their impact on transmission is accounted for.	Grid charging, access and markets play a vital part of ensuring that we can deliver our business plan efficiently. It is important for us to continue to monitor change in this area and advocate where appropriate the requirements for our business, stakeholders and wider society.				
Related action	SSEN/024/A01	SSEN Transmission	SPEN, NGET, SSEN Distribution, Users, Ofgem, NGESO, ENA, Trade bodies	22/23													Contribute to consultations and monitor their impact on the transmission system.	Mar-23	New	SSEN/024
Coordination and cooperation activity	SSEN/025	SSEN Transmission	SPEN, NGET, SSEN Distribution, Users, Ofgem, NGESO ENA, Trade bodies, NGET, SPEN, Generators	22/23	Developing the markets and fundings arrangements for the Electricity Restoration Standard directed by BEIS in 2021. Representing SSEN Transmission on industry wide work group forums and code modifications to introduce the new standard effectively.	In progress	The latest update on this work as of Dec 2022	01/2022	As part of the new standard, it is identifying new innovative ways to restoration, this includes utilising distributed restart and DG of restoration services. It is important that this is coordinated across the whole system to ensure effective data sharing and operational practices in place and the market and funding mechanisms for such services to avoid any unintended consequences	Electricity System Restoration Standard National Grid ESO	Mainly collaboration through work groups and delivery groups. The ESO shared their views and industry including SSEN Transmission provided input	Electricity System Restoration Standard National Grid ESO	Will allow more efficient, coordinated restoration of the system. Introducing new requirements that GB should be restored to 100% within 5 days and 60% within 24 hours	Positive impact as this ensures that the safety, reliability and economic operation of the transmission network is at the forefront of this work.	Work moved into Grid code modifications, continuing to monitor its progress. SMEs also providing input and support where appropriate	Important to monitor and feed into any changes that may affect the safe, reliable and economic operation of the transmission network.				
Related action	SSEN/025/A01	SSEN Transmission	SPEN, NGET, SSEN Distribution, Users, Ofgem, NGESO ENA, Trade bodies, NGET, SPEN, Generators	22/23													Monitor the modifications made to the Grid Code.	Apr-23	Improving	SSEN/025

Coordination and cooperation activity	SSEN/026	SSEN Transmission	All DNOs and TO's, NGE-SO, ENA	22/23	DSO implementation plan and interactive road map	Complete	The latest update on this work as of Dec 2022		As part of the ENA Open Network Project there was an objective to create an implementation plan and interactive roadmap for stakeholders showing the DNOs transitioning to DSOs. This was fed into and agreed by all DNOs, ESO and TO with the ENA coordinating. This looked at all functions of the DSO including system operation, markets, coordination, planning, flexibility services etc. SSEN Transmission fed into this by providing evidence on what we are doing to support the implementation of DSO and fed into the work to ensure that the appropriate data exchange and coordination practices are in place to avoid any unintended consequences.	Open Networks: developing the smart grid - Energy Networks Association	Coordination with the ESO and DSO, system operation including restoration, network planning	https://www.energynetworks.org/creating-tomorrows-networks/open-networks/	Our work in this area allowed coordination across the whole electricity system to ensure that the implementation of DSO functions were coordinated effectively and that any concerns or unintended consequences were avoided	Positive impact on stakeholder collaboration and ensuring the safe reliable and economic operation of the transmission network as the use and operation of the whole system changes	Work within the ENA has now been completed. This work is moving internally through collaborating regularly with SSEN Distribution on their progress of implementing DSO functions and services	Important to monitor and feed into any changes that may affect the safe, reliable and economic operation of the transmission network.				
Related action	SSEN/026/A01	SSEN Transmission	All DNOs and TO's, NGE-SO, ENA	22/23													Organise regular engagements with SSEN Distribution	Jun-23	New, Improving	SSEN/026
Coordination and cooperation activity	SSEN/027	SSEN Transmission	SSEN Distribution, local council, communities and developers	22/23	*Orkney Whole System Study - coordinating with SSEN Distribution and developers to determine the optimal option of connecting renewable energy generation on Orkney.	Complete	The latest update on this work as of Jan 2023	10/2022	Establishing working relationships with SSEN Distribution, local council and communities to improve infrastructure and connections on the islands surrounding Scotland. Allowing for improved security of supply and additional infrastructure in the future to help towards net zero	None	*Knowledge sharing through emails, Microsoft Teams and face-to-face meetings. Technical reports and presentations with cost data and alternative solutions shared (SSEN Transmission) [RESTRICTED SHARING]. SSEN Distribution provided indicative costs data for distributions options (SSEN Distribution) [Restricted Sharing].*	None	*Minimises social and environmental impact by building less across transmission and distribution, Enhances security of supply for consumers, Reduction in overall connection costs, Enables connection of renewable energy require to meet net zero in an efficient and economic manner Allows for future coordination with local council, communities and developers to ensure efficient and effective solutions are put forward to benefit the islands*	Positive impact - Cost savings for network licensees and developers	Recommend ongoing co-ordination with SSEN Distribution and customers to progress with the recommended whole system solution	Potential to provide costs savings to all parties involved.				
Related action	SSEN/027/A01	SSEN Transmission	SSEN Distribution, local councils, communities and developers	22/23													Progress with the recommended whole system option. This will involve SSEN Distribution applying for a new GSP at Eday.	May-23	New	SSEN/027
Coordination and cooperation activity	SSEN/028	SSEN Transmission	SSEN Distribution, local councils	22/23	*Dundee and Aberdeen City Network Development Strategies - Worked with internal (System Planning, Asset Management, etc.) and external (SSEN Distribution) stakeholders to identify the load and non-load drivers for network investment in the Eastern cities of Dundee and Aberdeen. We have also undertaken stakeholder profiling and mapping exercise, as a first step, for each of the cities to identify key stakeholders and strategies of engagement and how the feedback will inform the project design*	In progress	The latest update on this work as of Feb 2022	04/2023	A more holistic and cost-effective approach to network investment was achieved by simultaneously considering load and non-load drivers as well as the local plans for the cities, and by actively engaging the stakeholders.	None	Technical reports with identified load and non-load drivers, along with a stakeholder engagement strategy [Restricted Sharing].	None	Increased consideration of a higher number of factors influencing network investment, potentially increasing the ability to make investment decisions that will result in a reduced cost to customers and consumers	Positive impact - Cost savings for network licensees.	Recommend ongoing co-ordination with SSEN Distribution and local councils to ensure that all drivers have been successfully identified.	Potential to provide costs savings to all parties involved.				

Related action	SSEN/028/A01	SSEN Transmission	SSEN Distribution, local councils	22/23														Engage with stakeholders and provide justifications for the investments.	Dec-23	New	SSEN/028
Coordination and cooperation activity	SSEN/029	SSEN Transmission	SSEN Distribution, local councils, communities and developers	22/23	Shetland Whole System Study - Working with SSEN Distribution, developers and local authorities to develop a whole system network development plan on Shetland.	In progress	The latest update on this work as of May 2023	12/2022	Potential cost savings on infrastructure costs, minimises environmental and social impact	None	Terms of references and work plans shared with SSEN Distribution [Restricted Sharing]	None	Minimises social and environmental impact by building less across transmission and distribution, Enhances security of supply for consumers, Reduction in overall connection costs, Enables connection of renewable energy require to meet net zero in an efficient and economic manner	Positive, cost savings across transmission and distribution	Recommend continuing whole system development plans for Shetland, identifying funding mechanisms for the project/s arising from this work, and engaging with Ofgem and stakeholders	Potential to provide costs savings to all parties involved.					
Related action	SSEN/029/A01	SSEN Transmission	SSEN Distribution, local councils, communities and developers	22/23														Develop a whole system network for Shetland, identify funding mechanisms for the project/s arising from this work, engage with Ofgem and stakeholders	Dec-23	New, Improving	SSEN/029
Coordination and cooperation activity	SSEN/030	SSEN Transmission	SSEN Distribution, local councils, communities and developers	22/23	Western Isles Whole System Study - working with SSEN Distribution to produce whole system report on infrastructure recommendations for the isles of Harris and Lewis. This involves discussing with SSEN Distribution the best method to integrate the Western Isles HVDC with the local network to provide demand security and secure connection of renewable generation to the grid.	In progress	The latest update on this work as of May 2023	01/2023	Enhanced demand security for local communities, environmental benefits due to reduction in use of backup diesel generation.	None	Data shared with SSEN Distribution on potential options, current and projected demand and generation on Western Isles.	None	Reduce dependence on diesel generation. Enhanced security of supply to communities and connection of renewable generation to the grid required to meet net zero.	Positive. SSEN Transmission develops network solutions that contribute to emissions reduction	Continued stakeholder engagement, energy scenario planning, and the assessment of options to determine the most efficient and economic whole system solution.	To provide security of supply to local communities and reduction in carbon emissions from using diesel generation in an optimal manner.					
Related action	SSEN/030/A01	SSEN Transmission	SSEN Distribution, local councils, communities and developers	22/23														Align all related projects on the Western Isles to determine the optimal whole system option(s).	Sep-23	New, Improving	SSEN/030
Coordination and cooperation activity	SSEN/033	SSEN Transmission	NGESO, NGET, SPT	22/23	HND, HND FUE and tCSNP2 process. The Holistic Network Design (HND) is coordinated by the ESO and involves all three TO's in Great Britain. The HND process provided a set of recommendations to facilitate the connection of 50GW of offshore wind by 2030, taking account of four Network Design Objectives: economic and efficient, deliverable and operable, environmental impact and community impact. The HND Follow Up Exercise (FUE) is providing a follow-up recommendation for the offshore system design for the connection of further offshore wind (i.e. all ScotWind) beyond 2030, and the tCSNP2 process is providing the corresponding onshore reinforcement strategy (similar to the previous NOA process). The HND, HND FUE and tCSNP2 processes have required strong cooperation and collaboration with the ESO and other TO's (NGET and SPEN). Further, detailed network design of both the HND offshore East Coast coordinated network and HND FUE offshore coordinated network has begun (requiring strong cooperation and collaboration from offshore wind farm developers as well as NGET and the ESO).	In progress	The latest update on this work as of Mar 2024	09/2022	* The HND FUE and tCSNP2 processes will further support the Government's previously stated government targets for offshore wind and net zero; facilitating an economic, efficient, operable, and coordinated National Electricity Transmission System (NETS) (including offshore and associated onshore assets required to connect in scope projects). The detailed design activities for both the HND and HND FUE coordinated offshore systems are critical to realise the connection of significant offshore wind and minimise environmental/community impact onshore (fulfilling the aims of the HND and HND FUE processes).*	None	* Mainly collaboration through work groups and delivery groups. [Some restricted and some widely shared] [External] Published ESO reports *	*https://www.nationalgrideso.com/document/270851/download tCSNP2 publication (which covers HND FUE) is due mid-March*	*The HND FUE will identify the most efficient, economic and effective approach to connect over 50GW of offshore wind across Great Britain - minimising environmental and community impact.*	*This will ensure that SSEN and the other TO's within Great Britain can accommodate offshore wind connections in an efficient, economic and effective way.*	* HND FUE / tCSNP2 publication by ESO is expected in March 2024. Detailed network design of the offshore and onshore strategic network reinforcements - requiring strong cooperation and collaboration with NGET, the ESO, and offshore windfarm developers.*	*This work will help inform connection of offshore wind critical to delivering Net Zero.*					

Related action	SSEN/033/A01	SSEN Transmission	NGESO, NGET, SPT	22/23														HND and HND FUE Infrastructure delivery forums - leading to identification of the final preferred design for the offshore systems. Detailed network design of both the offshore and onshore system (following on from the recommendations of the HND FUE / tCSNP2 publication), developing our projects towards construction."	Jun-23	" Business as Usual"	SSEN/031
Coordination and cooperation activity	SSEN/001	SSEN Transmission	SSEN Distribution	21/22	Joint discussions with SSEN Distribution to capture their need to uprate transformer capability on sites with planned transmission network reinforcements to enable a coordinate network development as demonstrated in East Coast 132kV Upgrade (LT225)	In progress	The latest update on this work as of Dec 2021	03/2021	Ensures better coordination and better utilisation of resources resulting in overall whole electricity system benefits.	None	Business case with technical information (SSEN Transmission) [restricted sharing];	None	The impact on the whole system is positive as a coordinated approach results in efficient capacity sizing of assets and also better overall resource efficiency.	The impact on the licensee is positive as a coordinated approach results in resource efficiency.	Recommend ongoing co-ordination with SSEN Distribution for planned transmission reinforcements at GSP sites which impact SSEN Distribution.	This decision would enable better utilisation of resources and achieve more efficient outcomes.					
Related action	SSEN/001/A01	SSEN Transmission	SSEN Distribution	21/22														New Business Case template incorporating the need to explore whole system options. This will inform future working with other network licensees as a BaU activity.	Mar-21	New	SSEN/001
Coordination and cooperation activity	SSEN/002	SSEN Transmission	SSEN Distribution/NGESO	21/22	Discussions with SSEN Distribution and ESO on procedure to move customers from Dunvegan to Edinbane to resolve conflict on distribution and transmission route corridors. This was to achieve cost efficiency in the connection arrangement.	Complete	The latest update on this work as of Dec 2021	04/2021	Cost effectiveness to customers and distribution network operator		Technical Report with cost data and alternative solutions shared (SSEN Transmission) [RESTRICTED SHARING]. SSEN Distribution provided indicative costs data on distributions options (SSEN Distribution) [Restricted Sharing].	None	Positive reduction on Customer works which in turn translates to lower cost of connection.	Positive, avoided costs in Transmission infrastructure.	Consider potential GSP relocation for future embedded generators that trigger significant works at existing GSP sites.	Potential to provide costs savings for all parties involved.					
Related action	SSEN/002/A01	SSEN Transmission	SSEN Distribution/NGESO	21/22														The action is to offer SSEN Distribution a new GSP at Edinbane so that they can connect customers to the new site.	Apr-21	New	SSEN/002
Coordination and cooperation activity	SSEN/003	SSEN Transmission	SPT, NGENSO, SPD, SSEN Distribution	21/22	Under the Regional Development Program approach, completed a coordinated review of proposed transmission investment works to accommodate new battery customer connections at Abernethy and Burghmuir. This required a risk based/probabilistic approach to better understand the risk of constraints recognising the unique operating philosophy of battery system storage technology.	In progress	The latest update on this work as of Jan 2022	07/2019	Review of options across transmission and distribution networks to resolve potential transmission constraints.	No	"Power system analysis results for 132kV transmission OHL loading (SSEN Transmission) [restricted sharing] Future Generation and Demand scenarios for relevant GSPs (SSEN Distribution) [restricted sharing]	None	Positive - broad assessment of all Transmission and Distribution related options, resulting in the most cost effective outcome.	Positive as it supports timely investment decision making and customer connected in line with contracted dates.	Develop Regional Development Plan (RDP) to accommodate local growth and coordinate with asset replacement plans.	It is expected that a pro-active approach through the RDP will identify efficient solutions for customer connections in the region ahead of transmission infrastructure investment.					

Coordination and cooperation activity	SSEN/008	NGESO	SPEN, NGET, BEIS	21/22	SSEN Transmission has taken an active role in different workstreams facilitated by the Energy Network Association. The work has included the development of tools like whole system cost benefit analysis required to enable a consistent approach to whole system.	In progress	ongoing meetings		The workstreams are essential to enable a consistent approach to whole system across network licensees.	https://www.energynetworks.org/creating-tomorrows-networks/open-networks/	The workstreams are working on what is required to enable efficient data sharing between network licensees.	None	This has a positive impact in that it will ensure consistency in the whole system approach to the development and operation of the network.	SSEN Transmission will benefit from knowledge, data and information sharing with other network licensees around whole system.	SSEN Transmission will continue to be actively involved in the workstreams and facilitate implementation of processes and tools required to enable whole system working.	ENA workstreams are important as they provide a platform to develop processes and tools which will ensure a consistency in taking whole system approach and coordination activities across network licensees.				
Related action	SSEN/008/A01	NGESO	SPEN, NGET, BEIS	21/22																
Coordination and cooperation activity	SSEN/009	SSEN Transmission	SSEN Distribution	21/22	Discussions with SSEN Distribution on a whole system solution between transmission and distribution to support connection of renewable generation in Argyll	In progress	ongoing meetings	06/2021	A combined Transmission and Distribution solution will result in an efficient and economical solution that minimises costs to consumers	https://www.sse.com/news-and-views/2022/03/argyll-transmission-network-upgrade-to-support-transition-to-net-zero/	Options and costs used for cost benefit analysis (restricted sharing)	None	Positive impact on whole system as the combined transmission and distribution solution provides an efficient and economical solution	Discussions about cost recovery options for the distribution works are underway since SSEN Distribution does not have allowance for the project.	The activity will be implemented as part of the wider Argyll project. The outcome of cost recovery of distribution works will inform future working on projects of this nature.	The activity has been adopted as part of the wider Argyll project because it's the right thing to do as it results in efficient and economic whole system solution.				
Related action	SSEN/009/A01	SSEN Transmission	SSEN Distribution	21/22													A clear process of dealing with projects that support a combined transmission and distribution whole system solution addressing issues of who should deliver the distribution works, how should they be funded and ownership	Jan-21	New	SSEN/009
Coordination and cooperation activity	SSEN/010	SSEN Distribution	SSEN Distribution	21/22	Discussions with SSEN Distribution on how their Resilient as a Service project would benefit the transmission network in system restart and relieving network constraints.	In progress	The latest update on this work as of Feb 2021	01/2021	If successfully implemented and scaled up this activity can help to reduce network constraints as well as support system restart.	https://ssen-innovation.co.uk/raas/	SSEN Distribution has shared with SSEN Transmission project conceptual designs [widely shared]	None	Overall this activity will have positive impacts as it will help to relieve constraints on the network, provide support to system restart and potentially allow for connection of more renewable energy sources	If scaled up, this activity will support the overall resilience of the network	Continue to cooperate and support SSEN Distribution on this activity in terms of data sharing to ensure that cross operational impacts are properly addressed.	We are a network for net zero and will support initiatives that promote increase in connection of renewable generation to the network and enhancing network resilience.				
Related action	SSEN/010/A01	SSEN Distribution	SSEN Distribution	21/22																
Coordination and cooperation activity	SSEN/011	SSEN Transmission	SSEN Distribution	21/22	Discussions with SSEN Distribution on options to minimise network reinforcement costs for connecting Glasvaar wind farm to the network	In progress	The latest update on this work as of Mar 2021	03/2021	SSEN Distribution involvement could drastically reduce network reinforcement costs	None	SSEN Transmission has shared with SSEN Distribution the location, transmission entry capacity and costs (Restricted sharing)	None	Positive impact on whole system as a combined transmission and distribution solution will result in cost savings	Positive impact on SSEN Transmission as a combined transmission and distribution solution will result in reduced network reinforcement costs thereby supporting connection of renewable generation to the network and contributing to net zero	Discussions with the customer on the potential options and associated benefits.	The next stage will depend on the customer's decision as to which option to progress with.				
Related action	SSEN/011/A01	SSEN Transmission	SSEN Distribution	21/22																
Coordination and cooperation activity	SSEN/012	SSEN Transmission	SSEN Distribution, NGESO	21/22	Coordination activities with SSEN Distribution and ESO on the Shetland, Orkney and Western Isles transmission projects	In progress	The latest update on this work as of Mar 2021	09/2012	This is relevant to whole system because apart from connecting renewable generation from the Islands to the mainland, SSEN Transmission is working with SSEN Distribution to ensure that these projects contribute to security of supply, decarbonisation of the islands and resolving local electricity asset condition issues.	https://www.ssen-transmission.co.uk/projects/shetland/	SSEN Transmission has shared with SSEN Distribution and ESO technical reports and costs (Restricted sharing)	None	Positive impact for both transmission and distribution networks to fulfil their licence obligations and connection of renewable generation to the grid is critical to meeting net zero	Positive impact on SSEN Transmission as the coordinated approach results in an efficient and economic investment on the network.	Continue with the coordination activities between SSEN Transmission and SSEN Distribution in supporting economic development in the Scottish Islands through connection of renewable generation to the grid and improving demand security	These activities are necessary to ensure coordinated efficient and economic whole system investment decision making.				

Related action	SSEN/012/A01	SSEN Transmission	SSEN Distribution, NGESO	21/22															The action is to continue with the coordination activities in prioritising, scheduling and sequencing of activities as the projects progress into delivery.	Jul-20	Improving	SSEN/012	
Coordination and cooperation activity	SSEN/013	SSEN Transmission	SSEN Distribution, NGET, SPEN, SGN, NGESO, BEIS, Ofgem, Local Authorities	21/22	Coordination activities with SSEN Distribution, NGET, SPEN and other stakeholders in the development of our whole system strategy and annual report.	In progress	The latest update on this work as of Dec 2021	04/2021	This is relevant to whole system because by working with other network licensees and stakeholders, SSE Transmission is able to share its knowledge and experience in its approach to whole system and in return it gets feedback that it can use to make relevant changes to its approach to whole system which will benefit the total system.	The link to reports will be added when the whole system page is active	SSEN Transmission has shared presentation slides of its whole system strategy and annual report [Widely sharing]	None	Positive impact on whole system as other network licensees and stakeholders learn from SSEN Transmission on how we are embedding whole system thinking within our business with the aim of making it a BaU activity.	By interacting with stakeholders and other network licensees on our whole system strategy and annual report, we show leadership in the industry but we also get the feedback we need to improve our whole system approach to investment decision making.	The next stage is to publish the revised whole system strategy and our first whole system annual report this year.	These activities are necessary to ensure coordinated, efficient and economic whole system investment decision making.							
Related action	SSEN/013/A01	SSEN Transmission	SSEN Distribution, NGET, SPEN, SGN, NGESO, BEIS, Ofgem, Local Authorities	21/22																			
Coordination and cooperation activity	SSEN/014	SSEN Transmission	NGESO, SPEN, Venders/manufacturers	21/22	Coordination activities with NGESO and SPEN on system operability issues following a number of system disturbances in Scotland. In particular, understanding the causes of sub synchronous oscillations and how to resolve them	In progress	The latest update on this work as of Feb 2024	10/2021	Through the coordination activities with other network licensees as well as the system operator, a holistic approach is being taken to resolve these operability issues which will benefit the security of the total electricity system		Shared models and technical reports with ESO [restricted sharing]		This has positive impact as the solutions to these operability issues will ensure the security of the total electricity system	The knowledge sharing from these coordination activities has helped us to come up with the most efficient and economic solutions to resolve these emerging system operability issues.	* SSEN Transmission are continuing to work with NGESO on coordination activities on system operability issues. The System Performance team have two standing calls per week to discuss the system studies both partners are undertaking to maintain an understanding with regards to previous system operability issues.*	To maintain the security of the electricity system							
Related action	SSEN/014/A01	SSEN Transmission	NGESO SPEN	21/22															* The action is to continue with the coordination activities with NGESO on the previous system operability issues.*	Mar-24	New	SSEN/014	

We encourage stakeholders to provide their proposals on the following link which is also available on our Whole System Hub.

<https://www.ssen-transmission.co.uk/information-centre/whole-system-hub/>

Alternatively, you can contact us using the following email address

wholesystemtransmission@sse.com

