

SONI Forward Work Plan

2023 – 24

Appendix 5 SONI Performance Measures

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Key Performance Indicators

Overview of Key Performance Indicators in 2023/24 Plan

There are four SONI TSO Outcomes in relation to each role across the Forward Work Plan, being Decarbonisation, Grid Security, System Wide Costs and Stakeholder Satisfaction. We have categorised each performance measure against these four outcomes and provided a brief description below.

Decarbonisation

The decarbonisation of the electricity system is of great importance to customers and a vital component of the energy transition. The KPIs which fall within this SONI outcome are as follows:



SNSP (%): To increase the maximum level of System Non-Synchronous Penetration (SNSP) that SONI will allow on the system at any point in time,

Renewable Dispatch Down (%): To keep the average level of curtailment and constraint in Northern Ireland below a certain level.

Grid Security

A secure and reliable electricity network that is fit for the future of the electricity systems needs is critical to customers and market participants. The KPI which falls within this SONI outcome is as follows:



System Frequency: To ensure that SONI manages the system frequency within Grid Code requirements.

System-Wide Costs

Ensuring customers get value for money and benefit from cost efficiency should be paramount. However, the costs for customers should be viewed holistically. The KPI which falls within this SONI outcome is as follows:



Imperfections (£): SONI intends to use the Plexos Backcast model in order to calculate savings made in relation to key projects and will be developing this performance measure over the period

SONI Service Quality

Whilst delivering on decarbonisation, grid security and cost, SONI will also need to meet the expectations of its stakeholders. Creating a transparent information sharing environment accompanied by the timely completion of our tasks will create positive and efficient working relationships between the parties acting in the market. The KPIs which contribute to this SONI outcome are as follows:



Timely Delivery of Publications: All Publications and materials are published according to the timelines set throughout the Forward Work Plan, with dependencies detailed as, and when, appropriate

Quality & Quantity of Feedback: Where appropriate, feedback will be reviewed in both qualitative and quantitative terms and then used to inform SONI on our performance for each relevant area as detailed throughout the Forward Work Plan

Approach to Performance Measures

The deliverables set out in our Forward Work Plan 2023 – 2024 are ambitious. This requires a culture of innovation and flexibility within SONI and for us to engage in partnerships, in order to be successful.

SONI believes that the targets should be flexible to adapt to the increasing pace of change in the energy industry. We have made a number of assumptions in the development of the targets such as demand, renewable connections, and policy changes from the Department for the Economy, etc. We therefore feel that it is prudent to periodically re-calibrate the targets to ensure that we are appropriately delivering on what's right for customers.

SONI has used a baseline figure where possible, which is taken from our 2019 historical data, and this is our performance comparator as detailed within the Utility Regulator's Guidance document on the Evaluative Performance Framework¹.

We note that as part of the implementation of the new SONI Governance Arrangements that the new SONI board may wish to consider the range and targets of KPIs. Therefore, no new KPIs have been included in this forward work plan. As discussed under Role 2, SONI is developing measurements in relation to stakeholder engagement. These will be considered by the new SONI Board once established.

We have excluded two KPIs that were included in previous reports. We have explained the rationale for this at the end of this Appendix.

¹ [epf-guidance.pdf \(ureg.gov.uk\)](https://www.ureg.gov.uk/epf-guidance.pdf)

Historical Background and Upcoming Targets

Decarbonisation

SNSP (%)

Purpose of the metric

System Non-Synchronous Penetration (SNSP) is an important enabler for increasing the level of renewable sources of electricity generation on the power system. System Non-Synchronous Penetration is a real-time measure of the percentage of generation that comes from non-synchronous sources, such as wind and HVDC interconnector imports, relative to the system demand. New tools and processes are required by SONI to allow increases in the SNSP metric; therefore, this is determined to be a good measure for progress to enable decarbonisation of the electricity system to achieve net zero carbon emissions by 2050.

Approach to measurement

SNSP is a system security metric that has been established from the results of the DS3 programme. These studies initially identified 50% as the maximum permissible level. Due to works undertaken by SONI under the DS3 programme the SNSP level was reassessed, and the limit was raised over the years as per the table above.

In order to achieve the levels of SNSP that are required to achieve the 2030 targets, we will need to significantly evolve how we operate the power system. In the past we operated a power system based on conventional generation that could be sent an instruction (a dispatch instruction) to generate at a particular output, with no variability and with each generating unit synchronised with each other. Our future system will be at times utilising fully variable and non synchronised renewable sources of power.

The SNSP level is published on our website on a weekly basis in the Operational Constraints update document²

Historical Figures

The actual permanent SNSP limit over the last several years is as follows:

² These documents can be accessed through the following link; [General Publications \(sem-o.com\)](https://www.sem-o.com)

Table 1 SNSP Historical Figures

Year	SNSP Limit
2013	50%
2014	50%
2015	55% Trial from Oct
2016	55% Perm from Mar 60% Trial from Nov
2017	60% Perm from Mar 65% Trial from Nov
2018	65% Perm from Apr
2019	65%
2020	65%
2021	70% Trial from Jan 70% Perm from Apr 75% Trial from Apr
2022	75% Perm from Apr

SNSP (System Non-Synchronous Penetration) is the sum of non-synchronous generation (such as wind, solar and HVDC imports) as a percentage of total demand and exports.

When the SNSP limit is raised, a trial period takes place before it becomes permanent. During the trial period, the system is operated at this increased SNSP limit except in times of extreme system events or during system testing.

Target for year

In 2022 we successfully concluded our trial of operation with an increase in the SNSP limit from 70% to 75% and this increased limit became operational policy on 31st March 2022. In 2022, we operated above 70% SNSP for 359 hours, approximately 10 hours of which were at the 75% limit.

Further increases in SNSP are planned in coming years as set out in our Shaping our Electricity Future Version 1.1³

Description	Start Date	End Date
Increase SNSP limit from 75% to 80%. - Complete studies for operation at 80% SNSP. - Conduct operational trial with SNSP limit of 80%. - Post-trial review and implementation of 80% SNSP operational policy.	Q4 2023	2024
Increase SNSP limit from 80% to 85%. - Complete studies for operation at 85% SNSP. - Conduct operational trial with SNSP limit of 85%. - Post-trial review and implementation of 85% SNSP operational policy.	2025	2026
Monitor SNSP as an operational metric targeting system operation at SNSP up to 90%.	-	2028
Monitor SNSP as an operational metric targeting system operation at SNSP up to 95%.	-	2030

Figure 1 SOEF Plan for SNSP Increases

³ [Shaping Our Electricity Future Roadmap: Version 1.1 \(soni.ltd.uk\)](#) Page 134

Renewable Dispatch Down (%)

Purpose of the metric

The aim of this metric is to minimise the dispatch down⁴ of renewable generation. Dispatch-down of renewable energy refers to the amount of renewable energy that is available but cannot be used by the system. This is because of broad power system limitations, known as curtailments, or local network limitations, known as constraints.

In Northern Ireland, renewable energy is predominantly sourced from wind, although solar energy has grown in size and significance in recent years. Other sources include hydroelectricity, biomass, biogas and waste.

Renewable generation receives priority dispatch within the scheduling and dispatch algorithms in the Castlereagh House Control Centre. However, there will be times when it is not possible to accommodate all priority dispatch generation while maintaining the safe, secure operation of the power system. Security-based limits have to be imposed due to both local network and system-wide security issues. Local network issues may arise due to lack of grid infrastructure to accommodate the renewable generation or due to transmission outages required to facilitate the delivery of new infrastructure.

Approach to measurement

Renewable Dispatch Down (%) is calculated on a Monthly basis and published one month in arrears. Annual figures are available one month following the end of the year.

All controllable wind and solar farms are issued with detailed constraint and curtailment reports each month.

The reports include clear categorisation between constraint and curtailment and clear reasons for why a curtailment or constraint was applied called a 'reason code'. All wind and solar farms also have access to dispatch instructions and wind and solar farm data with each dispatch instruction time-stamped with the instruction time.

A detailed wind and solar aggregate constraint and curtailment report is also published online every month to coincide with the individual wind and solar farm reports. This report is accompanied by a separate user guide, which contains a detailed description of the methodology, worked examples and a Frequently Asked Questions (FAQs) section. Both the aggregate report and the user guide can be found at: <http://www.soni.ltd.uk/how-the-grid-works/renewables/>

Historical Figures

Table 2 Renewable Dispatch Down Historical Figures

	2018	2019	2020	2021	2022
Wind	9.4%	10.7%	14.8%	7.8%	9.4%
Solar	0.0%	0.0%	0.0%	0.0%	4.6%

In 2022, the total wind energy generated in Ireland and Northern Ireland was 13,676 GWh, while 1,280 GWh of wind energy was dispatched down. This represents 8.5% of the total available wind energy in 2022.

⁴ For more information please see [Annual Renewable Constraint and Curtailment Report 2022](#)

In Northern Ireland, the dispatch-down energy from wind resources was 291 GWh. This is equivalent to 9.4% of the total available wind energy. The dispatch-down energy from solar resources however was 6 GWh which represented 4.6% of the total available solar energy.

When all renewable sources of electricity are taken into account, the dispatch down level of all renewables on the island in 2022 was 8.4%.

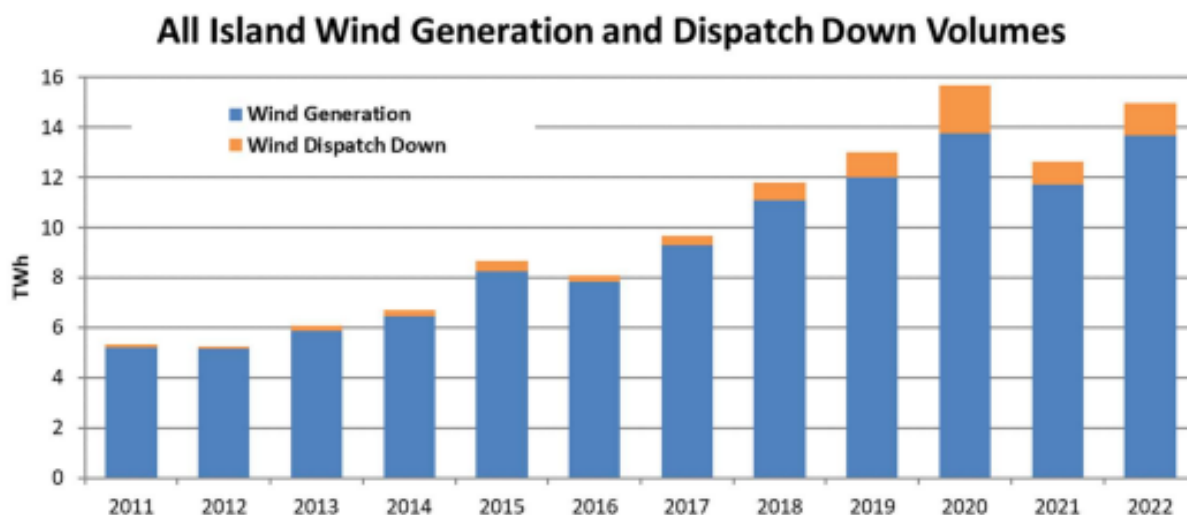


Figure 2 All Island Annual Wind Generation and Dispatch Down Volumes

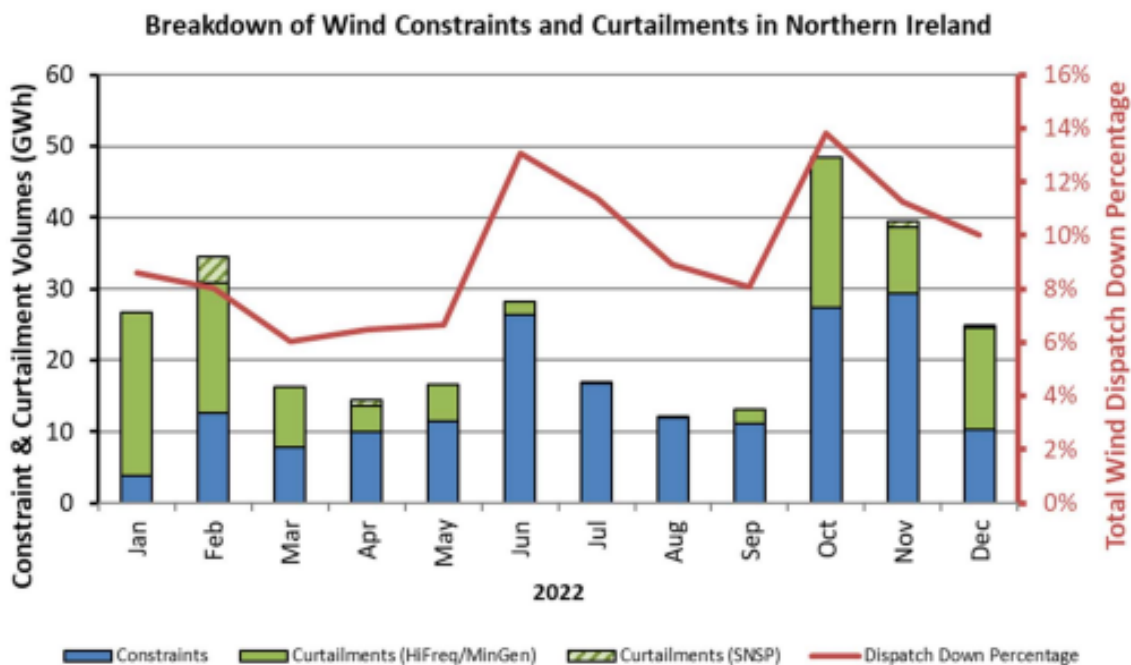


Figure 3 Monthly breakdown of wind dispatch-down categories in NI in 2022

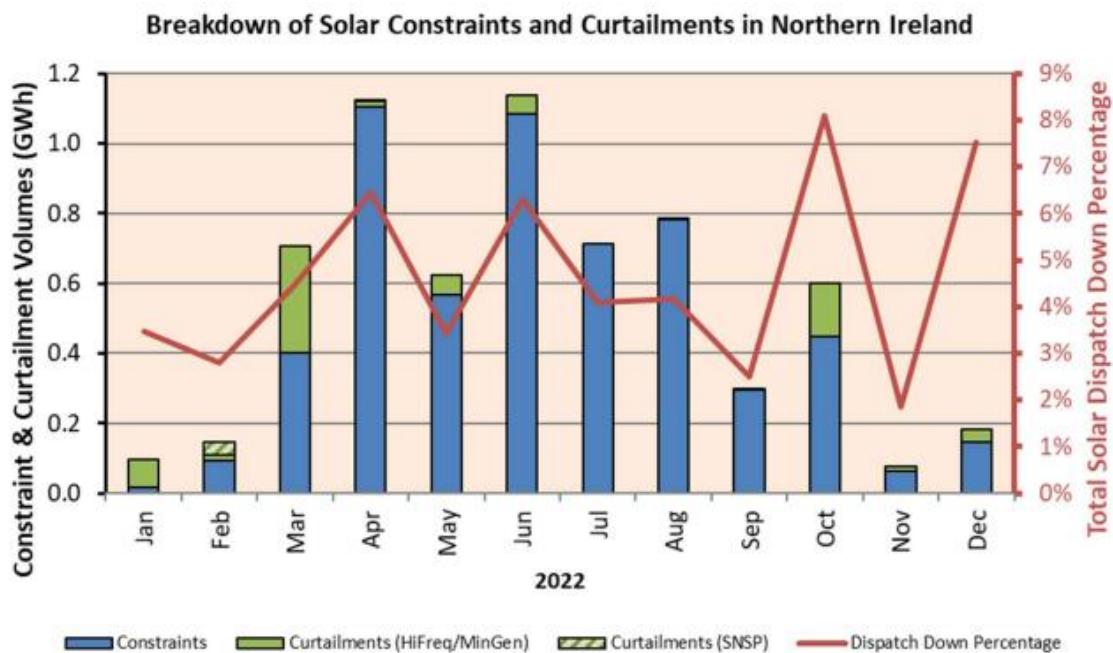


Figure 4 Monthly breakdown of solar dispatch-down categories in NI in 2022

In general, wind constraints are trending upwards in Northern Ireland due to the amount of wind on the Northern Ireland system relative to its size. At times there is no option but to constrain wind (and solar) if all the online conventional units are at minimum generation, while also managing the potential loss of the tie-line. The loss of the tie-line is flagged as a Northern Ireland constraint as opposed to curtailment, as it does not affect wind in Ireland, i.e., it's a local Northern Ireland issue. A dedicated constraint group was implemented as a change to the wind dispatch tool in Northern Ireland in December 2019 that enabled the TSO to select all wind and solar farms as a single constraint group. Prior to establishing this group dispatch down for the loss of tie-line may have been labelled as curtailment on some occasions.

From a Northern Ireland perspective, there will always be occasions throughout the year when outages required to maintain the network can increase constraints.

In 2022 there were no significant outages beyond what would be expected each year.

Target for year

The fundamental issues that give rise to curtailment are being addressed through SONI's Delivering a Secure Sustainable Electricity System (DS3) programme⁵ and are now being considered in our follow-on Shaping Our Electricity Future programme⁶.

In 2022, SONI has carried out a trial to increase SNSP to 75% which will allow more renewables onto the all-island power system. This trial completed in April 2022 and the power system is now operating at 75% SNSP.

SONI also applied the minimum requirement of 8 units in 2022, and in 2023 we have commenced a trial on the reduction of the Minimum Number of Units constraint from 8 to 7 on the all-island power system.

⁵ [DS3 Programme \(soni.ltd.uk\)](https://www.soni.ltd.uk/DS3-Programme)

⁶ [Shaping Our Electricity Future Roadmap: Version 1.1 \(soni.ltd.uk\)](https://www.soni.ltd.uk/Shaping-Our-Electricity-Future-Roadmap-Version-1.1)

SONI expects to see the impact of these operational changes through dispatch down reporting in 2023.

Our target for Renewable Dispatch Down for 2023/24 remains at 10% for wind generation, however, as highlighted above there are a number of factors at play and this target is very challenging.

Grid Security

System Frequency (%)

Purpose of the metric

The Grid Code requires that the frequency is kept within the normal operating limits of 50 Hz \pm 0.2. This is to protect equipment and ensure a quality supply of electricity to end users.

Assessing the percentage of time that SONI operates within this window is considered a good measure of the performance against the Grid Code requirement. Certain events outside of the control of SONI, such as generator tripping, will result in the frequency falling outside of these normal operating limits. Management of frequency will also become more challenging due to increasing levels of non-synchronous generation on the system. It should also be noted that there needs to be a balance in relation to this metric as to not create a perverse incentive i.e. to maintain the frequency within the target range 100% of the time would require SONI to hold additional dynamic operating reserve at an additional cost to consumers.

The target percentage of time that the frequency should be in this window is outlined below. SONI believes that this strikes the best balance to ensure quality of supply, but which minimise costs.

Approach to measurement

The percentage of time that the frequency is within the range of 50 Hz \pm 0.2 Hz will be assessed at the start of each year for the previous year. The information will be made available as detailed in the Annual All Island Transmission System Performance Report⁷.

Historical Figures

The actual performance over the past 5 years is detailed below:

Table 3 System Frequency (%) Historical Figures

2018	2019	2020	2021	2022
99.65%	99.66%	99.67%	98.63%	98.52%

Frequency control will become increasingly challenging with the rapid decarbonisation of the electricity system, which will result in fewer conventional sources of frequency control and stability.

The nominal frequency of the all-island transmission system is 50 Hz and is normally controlled within the range of 49.95 Hz and 50.05 Hz. A frequency event is defined as when the frequency drops below 49.8Hz. A chargeable frequency event is when the frequency drops below 49.7Hz.

Figure 3 below provides the historic frequency excursions over the period 2013 – 2022.

⁷ 2022 Report, page 19, Section 4.1 - [All-Island Transmission System Performance Report 2022](#)

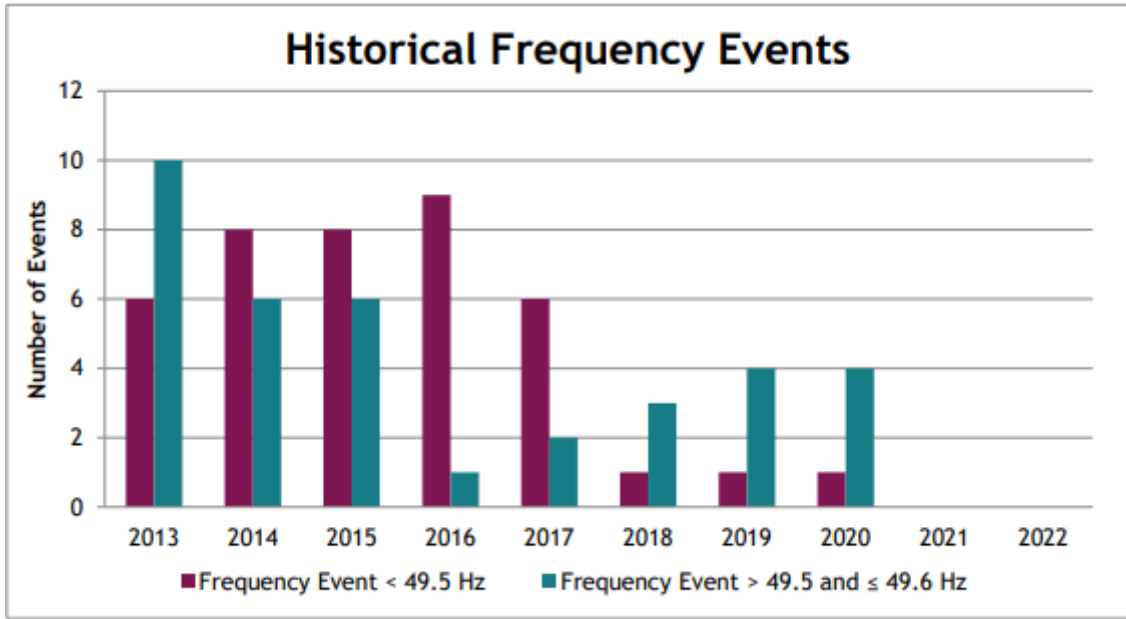


Figure 5 Historical Frequency Excursions 2013 – 2022

Target per Year

Our current target for 2023/24 will be operating within the detailed parameters indicated above for 98% of the time.

System-Wide Costs

Imperfections Cost

Imperfections costs are levied through an all-island tariff; therefore modelling is performed on an all-island basis. This performance measure assesses our work to minimise constraints costs (which arise due to the difference between the ex-ante market schedule and the real-time dispatch). These costs are passed onto the end electricity consumer.

SONI intends to use the Plexos based backcast model, considering it to be the best model to use, when estimating the annual imperfections costs associated with constraints, as the backcast contains actual data, rather than using the forecast model which contains assumptions forecast more than six months before the beginning of the tariff year.

Some of these assumptions, such as fuel, are very volatile and have a significant impact on the imperfections costs associated with constraints. No method of estimating the annual imperfections costs associated with constraints is perfect but it is SONI's opinion that using the Plexos based backcast model to determine these costs is as robust as possible, as we are using actual inputs rather than assumptions.

SONI produces 4 Quarterly Imperfections Cost Reports which are published on the SEM-O website (TSO Responsibilities), which will provide clear evidence of the imperfections reductions actions, progress on the plan and the future improvements that SONI will make to remove or reduce the cost of each constraint in the next period. In addition, for the first time in 2023, the TSOs published a Mid-Year Imperfections⁸ report.

TSO actions regarding the list of transmission constraint groups, gave rise to imperfections cost savings of €10.2m in the 2021/22 tariff year. As such, three Transmission Constraint Groups were changed / removed that provide all-island benefit:

- **Error! Reference source not found.** - this was removed part way through the previous reporting period, and this is the first full year of implementation.
- **Error! Reference source not found.**
- Reducing conventional requirement from all reserve categories

The removal/easing of these three TCGs was facilitated by the following system services: operating reserve contracts with batteries and Demand Side Units (DSUs) and Steady State Reactive Power (SSRP) contracts. SONI has used the 2021/22 Imperfections Backcast model to evaluate the cost savings associated with removing current TCGs. It should be noted that some TCGs are interdependent/interrelated as a result of which simple aggregation of the individual savings may not be appropriate in certain instances. We will be using the Plexos backcast model to assess the equivalent savings for 2022/23, which contains actual data, as opposed to the forecast model. Therefore, given the rationale provided above, it is not possible at present to provide targets for future years.

⁸ [Imperfections Mid-Year Report 2022/23](#)

SONI Service Quality

Timely Delivery of Publications

Purpose of the Metric

Feedback received during the assessment period of the 2021 – 2022 Forward Work Plan indicated some stakeholders were not clear on whether dates could change, and this would still be considered as an indication that SONI have performed well and met expectations. This section is to provide clarity around the timeframes detailed throughout the Forward Work Plan whereby the associated performance measure is the timely delivery of material or relevant publication dates.

Approach

Where SONI has provided a date or range of dates for the publication of documents/reports or availability of materials for use, we may measure our performance, alongside other KPIs, as the “timely delivery” of the described deliverable.

In this instance, SONI would highlight that these dates are not subject to change except where explicitly advised (e.g. due to external dependencies). The expectation is that these dates will be met as they are subject to a specific Licence obligation, or they align with the dates determined during our business planning process for the period.

Should a date deviate from the original planned date, SONI will notify stakeholders through our planned December 2024 publication of our Annual Performance Report 2023 – 2024. We will also detail any rationale as to why this deviation may have taken place, any external dependencies that may have resulted in this change and the mitigating actions SONI may take over the period.

Targets

SONI considers that we meet expectations in terms of delivering the date stated throughout the plan in terms of publications. Should this deviate, as above we will consider this through all perspectives to include whether there is an external dependency that has resulted in any deviation from the planned date.

Quality and Quantity of Feedback

Purpose of the Metric

Stakeholder views and the qualitative assessment is an area which was raised by stakeholders, the UR and the independent panel during the assessment period and in the final determination of the 2021 – 2022 Forward Work Plan grade.

Approach

Over the 2022-23 period, SONI has been progressing a deliverable FWP23-12 Stakeholder Needs Assessment.

Given the different knowledge levels, engagement requirements and engagement needs in a wide-ranging stakeholder landscape, identifying a single key performance indicator is very challenging not necessarily useful or accurate in its assessment of outcomes. Rather, best practice in stakeholder engagement recommends the use of evaluation frameworks, mixing qualitative and quantitative methods to establish the most accurate picture possible.

This project has been the first step in SONI moving forward in developing a method of assessing our performance in engagement with our key stakeholders.

Due to SONI's extensive stakeholder landscape, this project is currently in development., As such, we are unable to provide historic trends or future based objectives until we have concluded this programme in full.

This project has provided us with vital insights into a range of areas including the views of stakeholders on the areas SONI should prioritise, their experience of engaging with us to date, and their future engagement needs.

The findings of the Stakeholder Needs Assessment will be used to develop the Stakeholder Management Strategy⁹ and accompanying evaluation framework.

At present, our approach to stakeholder feedback is detailed further in Appendix 6: Stakeholder Engagement.

⁹ Please refer to Appendix 2, FWP24-02: Stakeholder Management Strategy

Previous KPI's

RES-E

SONI notes that RES-E is a key feature of the Northern Ireland Energy Strategy and the more recent Climate Change Act. It is clear that the delivery of RES-E requires actions to be progressed by many players in the energy industry,

SONI has an important role in this and many of the projects detailed in this forward workplan will contribute to the achievement of the RES-E targets.

However, SONI considers that it is not appropriate that this is used as a specific KPI to assess SONI's performance as there are many factors that are outside SONI's control that can impact this metric. We have therefore excluded this metric from our forward work plan.

Transmission Network Pre-Construction Project (TNPP) Submissions

In the Forward Work Plan 2022-2023, SONI introduced a new performance measure for our activities associated with Role 3 – System Planning, the TNPP Submissions.

SONI considered an appropriate metric for our performance in this area to be the timeliness of UR approvals regarding a TNPP submission. This would have considered the quality of the submission made to the UR, as standard UR approval times are within 4 months of approval, whereas SONI would have expected a high-quality submission would have not required as much time to review and challenge and therefore we would expect these to be approved in less than 4 months therefore exceeding expectations.

Due to feedback received from Stakeholders, deeming this to have too many dependencies and not wholly within SONI's control, we are no longer considering this metric.