

# SONI Annual Performance Report

**2022 – 23**

## **Appendix 5 SONI Performance Measures**

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## Overview of Key Performance Indicators in 2022/23 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 overview below. Commentary around each KPI is included in the following sections.



### 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:



Performance Indicator	Description	2022/23 Target	2022/23 Actual
RES-E (%)	To increase the percentage of electricity from renewable sources in Northern Ireland.	-	-
SNSP (%)	To increase the maximum level of Synchronous Non-Synchronous Penetration (SNSP) that SONI will allow on the system at any one point in time	75%	75% 
Renewable Dispatch Down (%)	To keep the average level of curtailment and constraint in Northern Ireland below a certain level.	10%	9.4% 

Figure 1 Decarbonisation KPIs



## 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:


Performance Indicator	Description	2022/23 Target	2022/23 Actual
System Frequency (%)	To ensure that SONI manages the system frequency within Grid Code requirements which states that target frequency is that Frequency determined by the TSO, in its reasonable opinion, as the desired operating Frequency of the Total System. This will normally be 50.00Hz plus or minus 0.05Hz, except in exceptional circumstances as determined by the TSO, in its reasonable opinion when this may be 49.90 or 50.10Hz.	98%	98.6% 
Transmission Network Pre-Construction Project (TNPP) Submissions Approval Time	Timeliness of UR Approvals regarding a TNPP submission	-	-

Figure 2 Grid Security KPIs



### 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:

Performance Indicator	Description	2022/23 Target	2022/23 Actual
Imperfection Cost Savings (€)	This performance measure is to minimise constraints costs.	-	€10.2m ✓

Figure 3 System-Wide Costs KPIs



## 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:

Performance Indicator	Description
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

*Figure 4 SONI Service Quality KPIs*

## Decarbonisation

### RES-E

#### Purpose of the Metric

The aim of this performance measure is to maximise penetration of electricity generated by RES sources in line with policy. The NI Climate Change Act aims to achieve 80% renewable electricity by 2030 and net zero carbon emissions by 2050.

Many parties across Northern Ireland impact this metric. SONI's influence on the metric include:

- Dispatching renewable generations
- Increasing SNSP to allow for more dispatch.
- Developing grid and connections
- Increasing market for non-carbon providers of system services

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. Given the above impact on other metrics associated with this performance measure (i.e. SNSP, renewable dispatch down) and the metric itself is not wholly within SONI's control, in that it is affected by the level of demand, renewable connections, wind availability etc. SONI considered this may not be an appropriate performance measure as SONI is one of a number of contributors to the overall government targets. However, as some stakeholders consider the perspective that this metric presents, it was included in the Forward Work Plan 2022/23.

We referenced the Shaping Our Electricity Future Roadmap Version 1.1<sup>1</sup> in the 2022-23 FWP document in relation to RES-E. This document was published in July 2023 and included a forecast of RES-E out to 2030. This is repeated below for ease of reference.

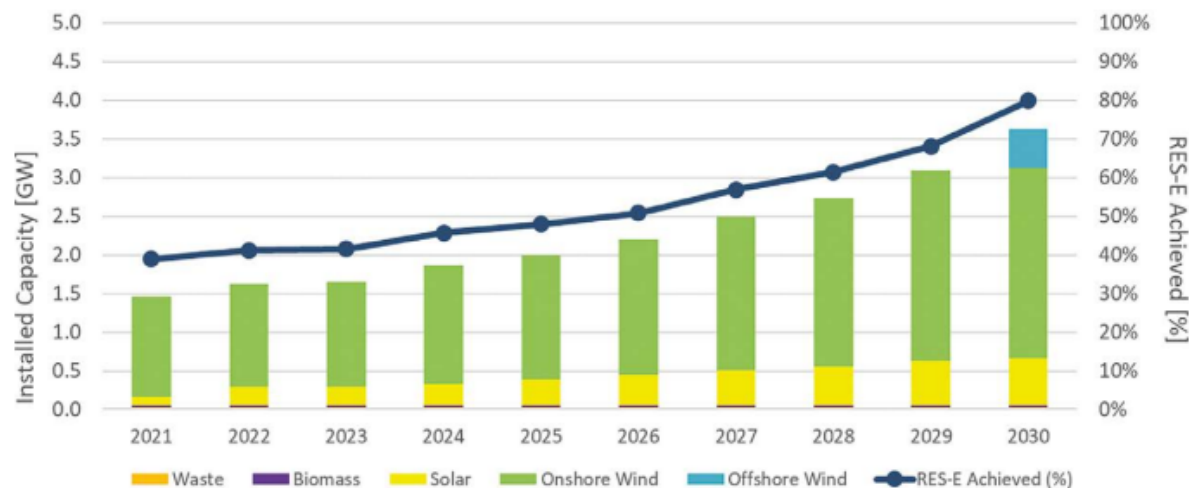


Figure 5 Projection for renewable generation growth and RES-E% levels in Northern Ireland

<sup>1</sup> [Shaping Our Electricity Future Roadmap Version 1.1, Page 110, Section 6.7.2](#)

## 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, processes and system services, as demonstrated in the Operational Roadmap<sup>2</sup>, 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**

The DS3 programme was established to increase this system security metric beyond the maximum permissible level previously identified, 50%. 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 below.

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 document<sup>3</sup>

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<sup>2</sup> [Operational Policy Roadmap 2023 to 2030](#)

<sup>3</sup> These documents can be accessed through the following link; [General Publications \(sem-o.com\)](#)

## Historical Figures

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

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. SONI delivered on the target of 75% for 2022/23.



## Renewable Dispatch Down

### Purpose of the metric

The aim of this metric is to minimise the dispatch down<sup>4</sup> 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.

### 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.

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%.

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

### All Island Wind Generation and Dispatch Down Volumes

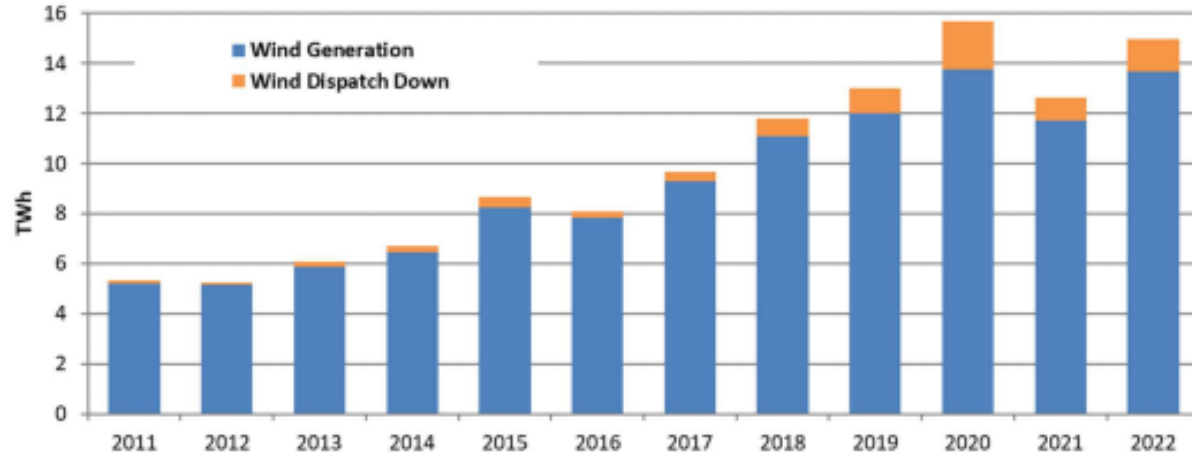


Figure 6 All Island Annual Wind Generation and Dispatch Down Volumes

### Breakdown of Wind Constraints and Curtailments in Northern Ireland

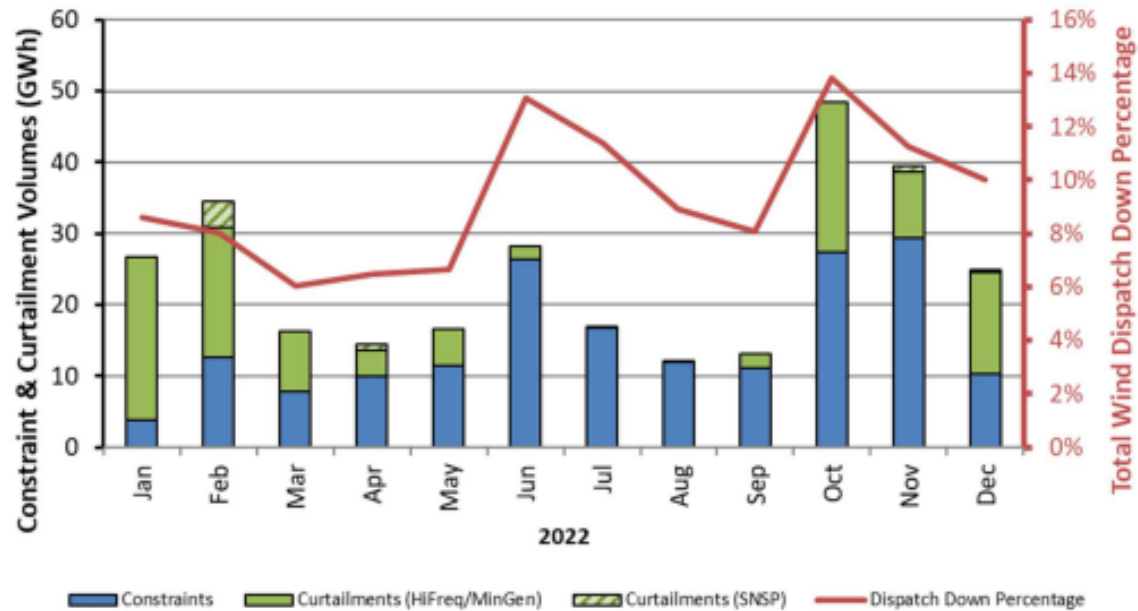


Figure 7 Monthly breakdown of wind dispatch-down categories in NI in 2022

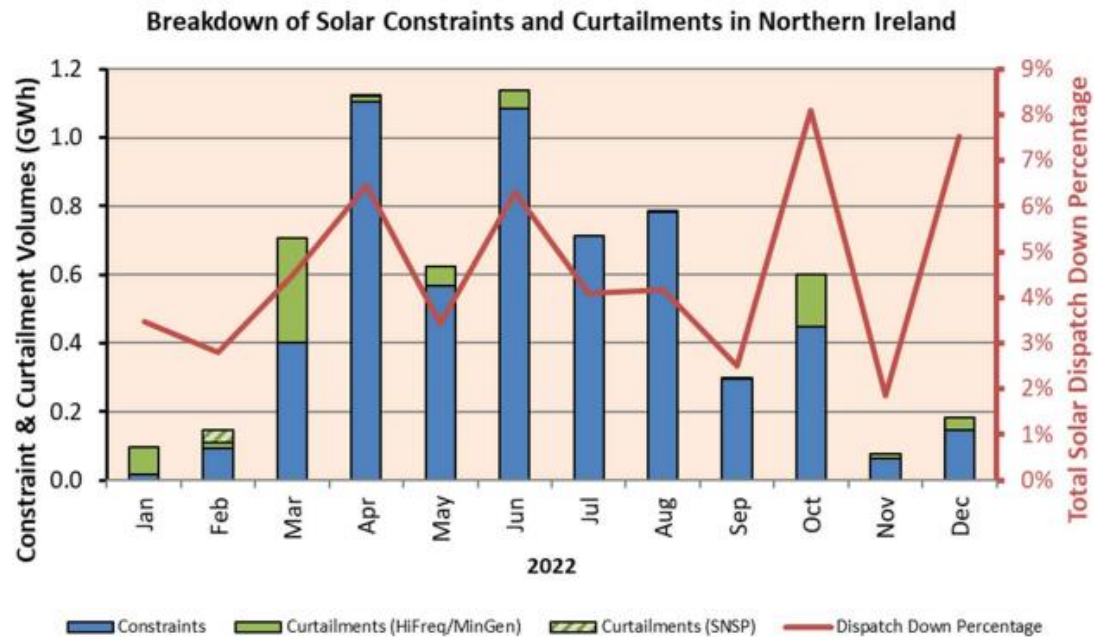


Figure 8 Monthly breakdown of solar dispatch-down categories in NI in 2022

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

Our target for Renewable Dispatch Down for 2022/23 was 10% for wind generation, however, as highlighted above there are a number of factors at play and this target is very challenging.

The latest published figures available for Renewable Dispatch Down for calendar year 2022, is 9.4%.

The figure for 2023 will be available in SONI's Annual Renewable Constraint and Curtailment Report 2023, which will be published in April 2024.

## 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 is available as detailed in the Annual All Island Transmission System Performance Report<sup>5</sup>.

#### 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 10 below provides the historic frequency excursions over the period 2013 – 2022.

<sup>5</sup> 2022 Report, page 19, Section 4.1 - [All-Island Transmission System Performance Report 2022](#)

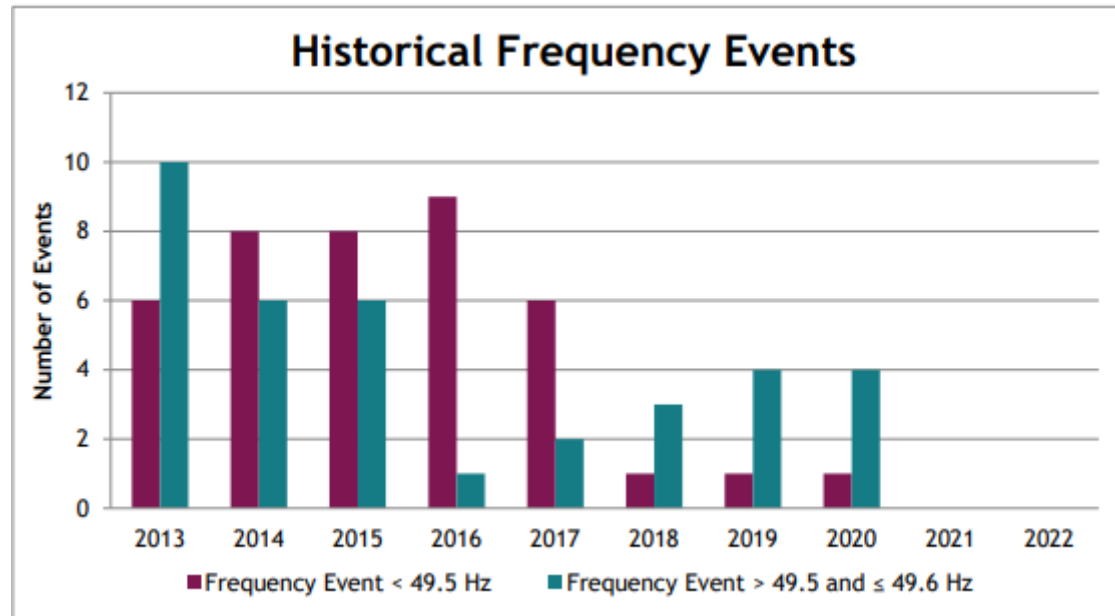


Figure 9 Historical Frequency Excursions 2013 – 2022

### Target for Year

Our current target for 2022/23 was operating within the detailed parameters indicated above for 98% of the time. Our System Frequency percentage for this period was 98.52%

### 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.

## System-Wide Costs

### Imperfections Costs

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 imperfection's costs associated with constraints. No method of estimating the annual imperfections costs associated with constraints is perfect however, 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 Imperfections<sup>6</sup> 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:

- Removing Ireland Negative Reserve - this was removed part way through the previous reporting period, and this is the first full year of implementation.
- Dynamic Primary Reserve Requirement Reduction.
- 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.

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<sup>6</sup> [Imperfections Mid-Year Report 2022/23](#)

## SONI Service Quality

### Timely Delivery of Publications









Across the four SONI roles, **19** project milestones were detailed to have the performance measured by Timely Delivery.












**17** of these **19** milestones were completed. 2 were partially completed within the year.

Out of the **17** completed:

- **12** were delivered on time (in the month specified or earlier)
- **3** were delayed, however they were delivered within the Quarter (3 months of the specified delivery date),
  - **1** was a **SONI-related delay**.
  - **2** for reasons **outside of SONI's control**
- **2** were delayed and they were delivered outside of the Quarter (3+ months of the specified delivery date)
  - **1** for reasons **outside of SONI's control**
  - **1** was postponed to secure an **improved outcome for consumers**.

Table 4 Timely Delivery Projects

PROJECT ID	PROJECT NAME	MILESTONE	FWP DUE DATE	DELIVERY	DELAY CATEGORY	STATUS
FWP23-04	Operational Roadmap To 2030	Delivery of Publication	Dec-22	On Time	-	
FWP23-05	TSO Demand Side Strategy	Delivery of Publication	Dec-22	-	To secure an <b>Improved outcome for consumers</b>	
FWP018	SOEF	Advisory council	Jan-23	On Time	-	
FWP018	SOEF	SOEF V1.1 Publication	Feb-23	Outside Quarter	To secure an <b>Improved outcome for consumers</b>	
FWO018	SOEF	Advisory council	May-23	On Time	-	
FWP019	Annual Innovation Report	Publication	Apr-23	On Time	-	
FWP23-15	SONI Mid Year Performance Review	Publication of short report	Apr-23	On Time	-	
FWP021	Balancing Market Principles Statement	Version 7 publication	Jun-23	On Time	-	

PROJECT ID	PROJECT NAME	MILESTONE	FWP DUE DATE	DELIVERY	DELAY CATEGORY	STATUS
FWP23-16	Grid Code Studies	Providing outcome of the studies considering minimum generation parameters for Grid Code to Grid Code Review Panel and UR	Apr-23	Within Quarter	SONI-related delay	
FWO018	SOEF	Advisory council	Sep-23	On Time	-	
FWP022	SONI Forward Work Plan 2023/24	Publication FY24 FWP	Sep-23	On Time	-	
FWP23-22	Security of Supply Publications	Publications - GCS & Winter Outlook	Sep-23	-	Outside of SONI's control	
FWP23-24	SONI Publications	Publications over the period to include the All-Island Transmission System Performance Report and the Annual Renewable Energy Curtailment and Constraint Report	Throughout	On Time	-	
FWP23-26	Delivery Plan for NI Infrastructure Projects	Development of a delivery plan for all NI Infrastructure Projects and communicate externally	Sep-23	On Time	-	
FWP23-25	Castlereagh - Rosebank	Timely issue of functional specification.	Nov-22	On Time	-	
FWP001	Commercial Arrangements for Low Carbon Inertia	Consultation and submission of a TSO Recommendations paper on the Technical Requirements and Procurement Approach for SEMC decision	Oct-22	Within Quarter	Outside of SONI's control	
FWP001	Commercial Arrangements for Low Carbon Inertia	Consultation and submission of a TSO Recommendations paper on the Contractual Arrangements	Mar-23	Outside Quarter	Outside of SONI's control	
FWP001	Commercial Arrangements for Low Carbon Inertia	Commencement of the procurement process	Apr-23	Within Quarter	Outside of SONI's control	
FWP23-31	Annual Tariff Process	Commence work under Condition 30 of the TSO Licence, preparation to publish a Charging Statement each year, to be approved by the UR.	Sep-23	On Time	-	



## Quality and Quantity of Feedback

In 2022/2023, SONI undertook a comprehensive Stakeholder Needs Assessment. This assessment was undertaken by an independently commissioned research company and involved a mixture of qualitative and quantitative research methods. The Assessment has provided crucial insights and research that will form the basis of a new Stakeholder Management Strategy and Evaluation Framework.

As part of the initial research, initial thematic benchmarking was undertaken in relation to stakeholder satisfaction and favourability. The results are summarised below.

However, the financial resource requirements to undertake this exercise on an annual basis would not be consistent with our determination to deliver our obligations at the best value for money possible for the consumer. As such, the Evaluation Framework will set a more resource proportionate, consistent, and meaningful approach for assessing stakeholder satisfaction across our organisation. It is important to note, therefore, that the metrics detailed below are likely to be different to those used to assess future SONI stakeholder satisfaction.

<b>Satisfaction Metric</b> Showing %	<b>Stakeholders</b>
<b>Very satisfied</b>	36%
<b>Somewhat satisfied</b>	50%
<b>Somewhat dissatisfied</b>	14%
<b>Very dissatisfied</b>	0%

*Figure 10 Satisfaction Metric*

In addition, as part of the Stakeholder Needs Assessment, the general poll was taken with a representative sample of the general public.

Key Demographics Showing %	Total	Urban	Non-Urban	21-34	35-54	55-64	65+
<b>Net favourable</b> Very and somewhat favourably	65%	66%	65%	73%	83%	52%	53%
<b>Very favourably</b>	31%	44%	21%	73%	17%	26%	19%
<b>Very unfavourably</b>	-	-	-	-	-	-	-
<b>Net unfavourable</b> Very or somewhat unfavourably	23%	34%	15%	27%	9%	25%	30%

● 10+ points higher than total      ● 10+ points lower than total

*\*Only asked to those who knew SONI operates the Northern Ireland electricity grid (n=29).*

Figure 11 Poll Results

Amongst those members of the public who could correctly identify SONI as the Transmission System Operator, SONI had a new favourability score of 65%.