

2023/24 Imperfections

Outturn Report

30 May 2025



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Revision History		
Revision	Date	Description
R0	30/05/25	Issued to RAs
R1		
R2		

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1. Executive Summary

This report to the Commission for Regulation of Utilities (CRU) and the Northern Ireland Authority for Utility Regulator (UR), collectively known as the Regulatory Authorities (RAs), has been prepared by EirGrid and SONI, in their roles as the TSOs for Ireland and Northern Ireland respectively, concerning the 2023/24 Imperfection Costs Backcast. This report covers the period from 01/10/2023 to 30/09/2024 inclusive, referred to as Tariff Year 2023/24.

Imperfections costs are an inherent feature of the SEM design and arise due to the differences between the ex-ante market schedule and the real-time dispatch. These costs are levied on suppliers through the Imperfections Charge.

The TSOs submitted a 2023/24 Forecast to the RAs on 10 June 2023. Using the submitted forecast as a base, the TSOs then updated many inputs based on actual data for this period, to create an ex-post adjusted forecast, the “backcast”. A summary comparison of the 2023/24 forecast (Submitted and Allowed), the 2023/24 backcast, and the 2023/24 actual costs are shown in Figure 1 below.

The current resettled actual costs for the 2023/24 year are **€436m** (shown in green in Figure 1), and the total backcast cost is €465m. The 2023/24 backcast cost is €29m (7%) higher than the 2023/24 actual cost. There will always be a variance between the backcast and actuals due to limitations in modelling (including necessary simplifications/approximations in representing reality and the inherent complexity of the system being modelled), and a variance of 7% is relatively strong performance compared with recent years.

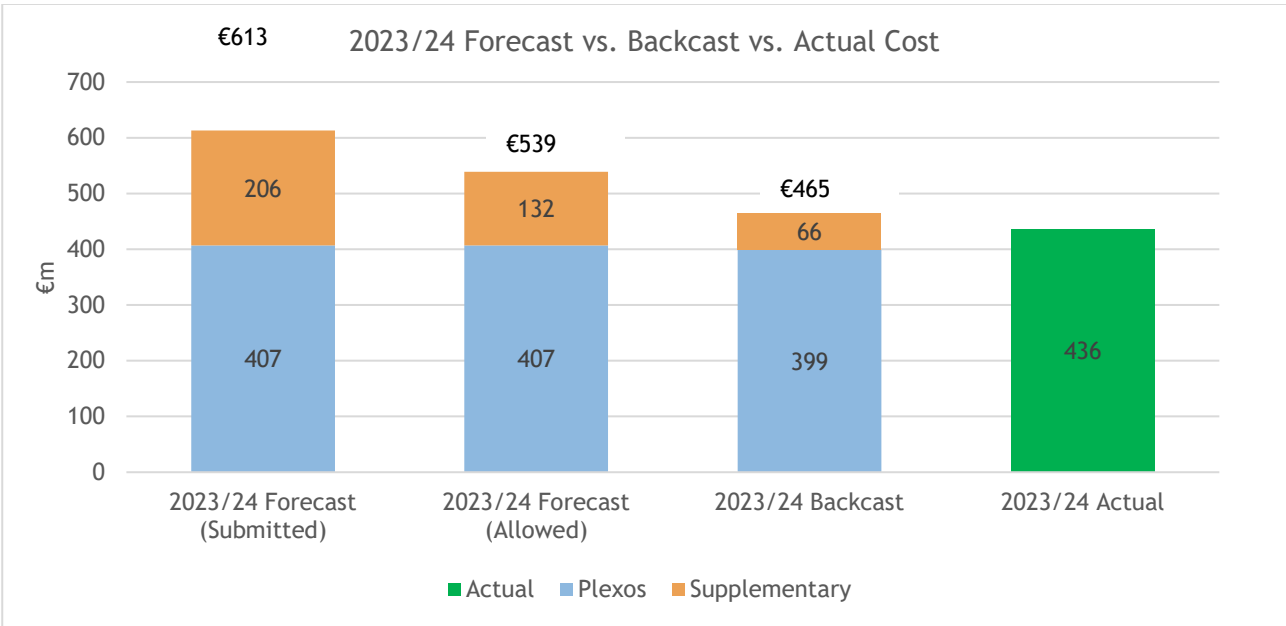


Figure 1 2023/24 Forecast vs. Backcast vs. Actual cost comparison

2. PLEXOS Comparison

The PLEXOS model component of the backcast for 2023/24 was found to be €399m. This is a decrease from the submitted PLEXOS forecast cost of €407m (i.e., as shown in Figure 2, updating the 2023/24 Forecast PLEXOS model with actual data led to a decrease of €8m).

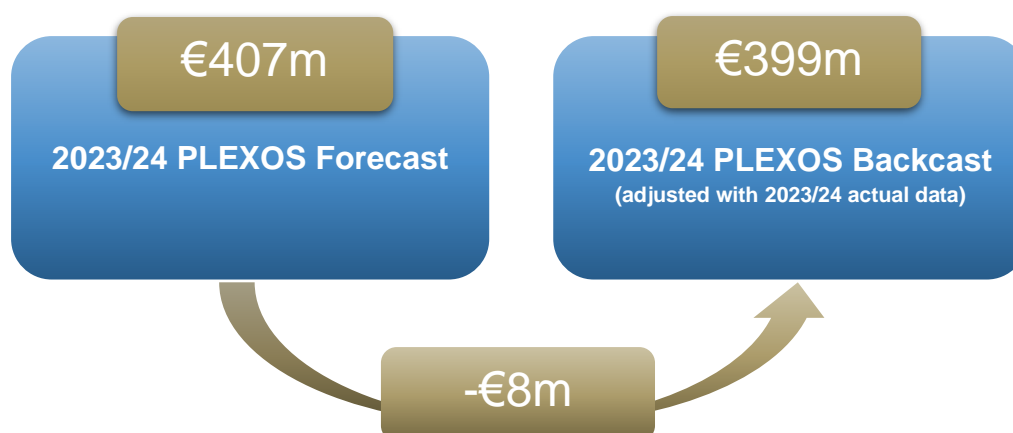


Figure 2 PLEXOS change when updated with actual 2023/24 data

Figure 3 shows the drivers which contribute to this decrease of €8m.

The outputs captured in the graph below have been determined by using the final backcast model (i.e., based on actual outturn data), and then removing each input, on its own, from that model and replacing it with the inputs used in the original 23/24 forecast. This is known as a TOOT analysis (Take One Out at a Time). This allows for a comparative approach to be taken to see the impact of an input on the same model.

The cumulative total of all the changes in Figure 3 does not add up to €-8m. This is because €399m (relative to €407m, i.e., €-8m delta) reflects the total PLEXOS imperfections backcast 'prediction' when all inputs are updated for actuals *simultaneously*. In contrast, the outputs captured below reflect the delta between the backcast based on *all inputs updated for actuals*, relative to a series of artificial scenarios where we assume no change in each input relative to the forecast input value. For that reason, they are inherently artificial projections, but they are intended to demonstrate the relative weight of each input on the overall model and in that way serve a similar analytical purpose as do coefficients of a linear regression analysis.

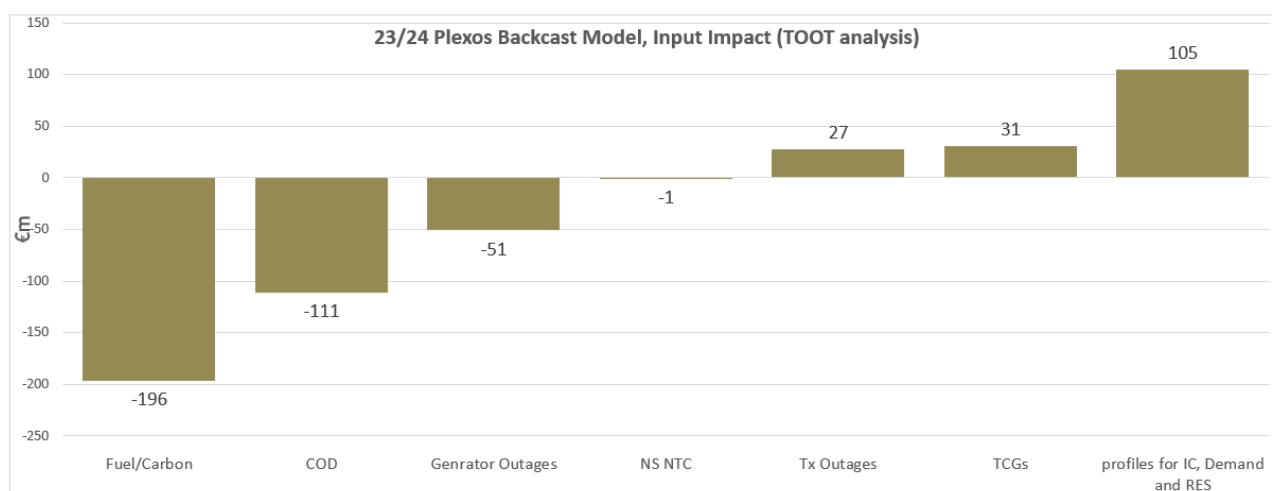


Figure 3 2023/24 Backcast PLEXOS - Input Impact

2.1. Fuel and Carbon Prices

Updating the model for actual fuel/carbon prices decreased model costs by €196m. This was due to significant decrease in all fuel types between the 2023/24 Forecast and 2023/24 Actual fuel prices. See summary of model input prices below:

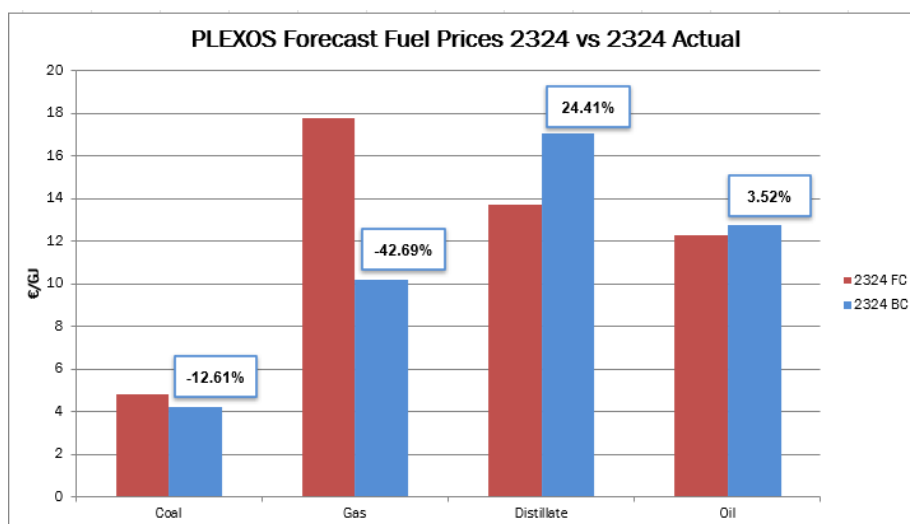


Figure 4 Fuel Prices - 2023/24 Forecast vs 2023/24 Actual

There were also decreases in carbon prices, See summary of model price changes below:

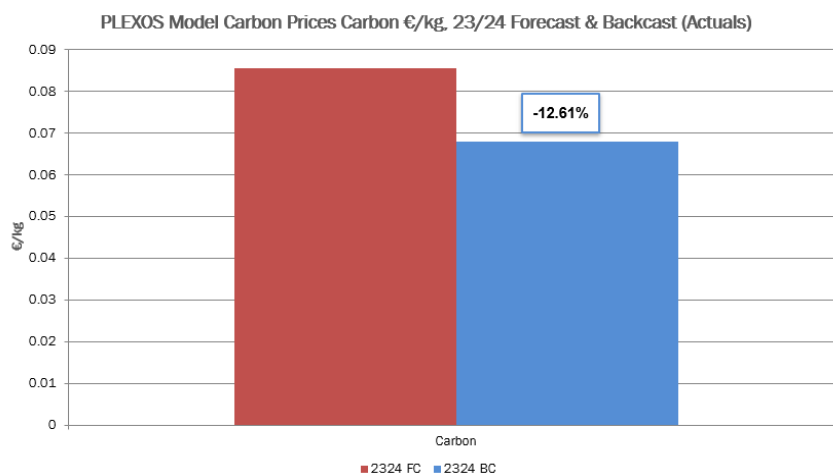


Figure 5 2023/24 Carbon Prices - 2023/24 Forecast vs 2023/24 Actual

2.2. Commercial Offer Data (COD)

Commercial offer data for each unit was updated. The updates were based on analysis of historic data including price quantity pairs, no-load and start-up costs. We removed the impact of fuel/carbon costs as these are analysed separately under the fuel/carbon category. This amounted to a decrease in model costs of ~€111m.

2.3. Generator Outages

2023/24 Forecast Generator outages and representative forced outages were updated to reflect the actual outages and forced outages that happened in 2023/24. The model shows that the actual outages in 23/24 were less costly than those assumed in the 2023/24 Forecast. This led to a decrease in the model costs of €51m.

2.4. Network Adjustments

The transmission limits of the Louth-Tandragee tie-line were updated in the 2023/24 Backcast model. In the original 23/24 FC we had flow limits set to “400 MW North to South and 300 MW South to North”. For the 23/24 Backcast, these were set to 450 MW North to South and 200 MW South to North. These updates were based on an analysis of actual flow data in the 2023/24 year representing actual dynamic stability limitations in following power across the Tie-Line in 2023/24. Updating the model with these changes resulted in a decrease in model costs of €1m.

2.5. Transmission Outages

The model was updated to reflect actual transmission outages that took place in 2023/24. The model indicates that the number of outages impacting imperfection costs was higher than anticipated in the original 2023/24 forecast. These outages increased model costs by €27m.

2.6. Transmission Constraint Groups (TCGs)/ Operational Policies

The Operational Policies in the model were updated to align with the latest policies in 2023/24 (which had not been included in the original forecast).

- Multiple new temporary TCGs for “Load Flow Control in Dublin” were included in the 2023/24 Backcast from 13/05/24 to 01/10/24. These represented new temporary TCGs introduced on the system throughout the 2023/24 Backcast period to securely manage a number of complex Transmission Outage combinations in the wider Dublin region that impacted Imperfections Costs.

These adjustments led to a net increase of €31 million in the model costs compared to the inputs from the 2023/24 Forecast model. These new TCG’s were not anticipated at the time of the 2023/24 Imperfections Forecast publication.

2.7. Demand, IC Flows & Renewable Availability

As there is a link between demand, interconnector flows and renewable availabilities, these were analysed together rather than individually. Analysing these inputs together resulted in an increase in model costs of €105m.

The availability of renewable generation sources is extremely difficult to forecast to any degree of accuracy a year in advance, as this is driven by ambient conditions. Even so, this input has significant influence on the Interconnector flows and the demand curve. For the 2023/24 Forecast, an annual historical profile of these three linked inputs was used to represent the annual variability of these variables over a full Tariff Year. When these parameters were replaced with actual outcomes it resulted in an increased cost to the DBC model.

One specific aspect that can be drawn out of this analysis is that the demand in the Backcast was higher (~3000GWh) than that of the 24/25 forecast. Although this has a positive impact on overall electricity prices it can have a negative impact on Imperfections Costs as additional out of market actions will have to be made to meet system security requirements that might otherwise have cleared in the market under higher demand conditions. It is not always definitive however that the reduction in demand has a negative impact on Imperfections as although the amount of dispatch balancing actions required will be increased the Imperfections Costs of carrying out each action will be reduced.

3. Backcast Results Compared to Actuals

This section contains a comparison of the following:

- 2023/24 Forecast Submission & RA Allowance.
- 2023/24 Backcast Model Result.
- 2023/24 Actual Outturn

3.1. 2023/24 Forecast Submission & RA Allowance

For the 2023/24 Tariff Year, the TSOs submitted an Imperfections forecast of €613m. This comprised of €407m for the PLEXOS model and €206m for the supplementary model. Following consultation, the RAs determined a total allowance of €539m for the year, deducting elements from the supplementary modelling. These values are represented by the first two bars in Figure 6 below:

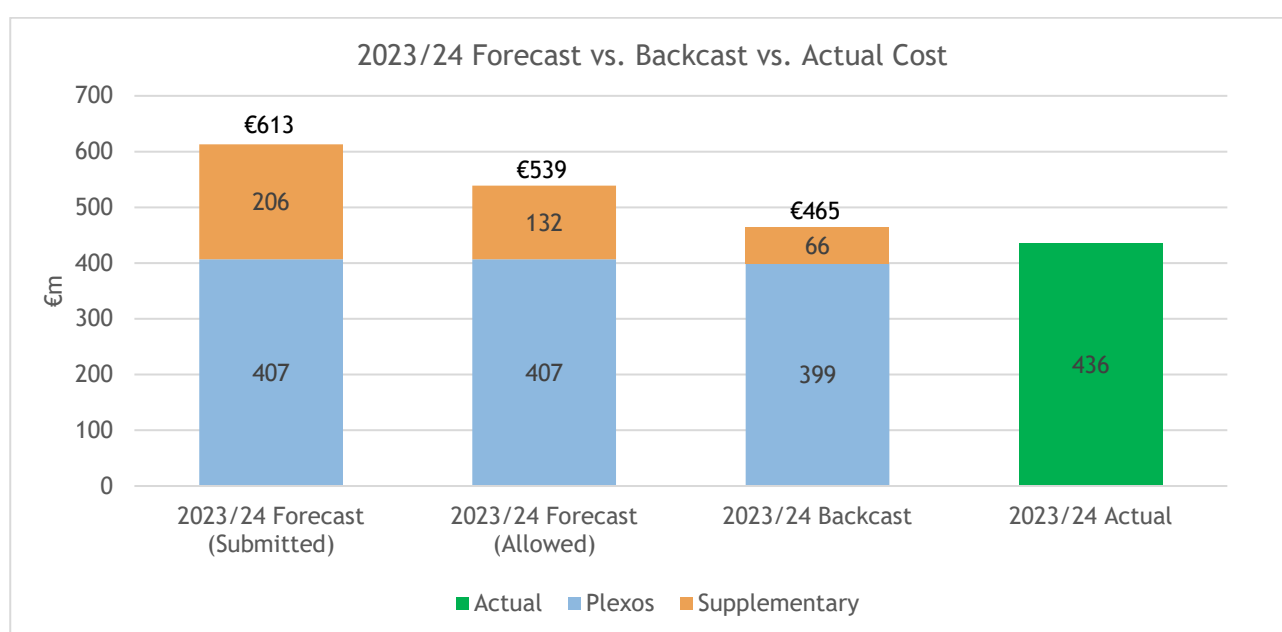


Figure 6 2023/24 Forecast vs. Backcast vs. Actual cost comparison

3.2. 2023/24 Backcast & Actual Outturn

Regarding the PLEXOS backcast Figure 6 shows that by updating the original forecast with actual data, the PLEXOS element decreased from €407m to €399m (as detailed in Section 2).

In relation to the supplementary backcast, due to the significant changes in certain inputs, predominantly wholesale fuel costs, we thought it prudent to recalculate the approved Supplementary Modelling, which was originally approved at €132m. With significant decreases in fuel prices, participant COD and therefore the imbalance price, this decreased to €66m.

The additional Premium/Discount component is heavily linked to the Imbalance Price and Participant COD so the un-foreseen reductions in these components has removed this cost of €58m from the Backcast Supplementary modelling.

Other significant differences, include the removal of DSU Energy payments forecast at €56m which subsequently was not implemented through Market Modifications in 2023/24 and Transmission Outages which were removed from the supplementary analysis and were subsequently included in the Plexos model.

The main changes in the supplementary modelling are shown in Figure 7 below:

Description	23/24 Submitted (€m)	23/24 Allowed (€m)	23/24 Backcast (€m)
PLEXOS Model	407.24	407.24	399.59
Additional PREMIUM and DISCOUNT impact	58.52	58.52	0.00
Interconnector Counter Trades	20.61	14.3	11.40
Pump Storage Running	24.79	16.93	19.60
Constrained Wind	26.37	18.56	28.37
Transmission Outages	13.00	13	0.00
DSU Energy Payments	56.00	4.73	0.00
Payment for energy imports for units in system services modes	6.70	6.7	6.70
Supplementary Model Total	205.99	132.74	66.07
TOTAL	613.23	539.98	465.66
	Actual 2023/24		436
	€m variance		29
	% variance		7%

Figure 7 2023/24 Forecast vs. Backcast vs. Actual cost comparison

The current resettled actual costs for the 2023/24 year are €436m (shown in green in Figure 6), and the total backcast cost is €465m. The 2023/24 backcast cost is €29m (7%) higher than the 2023/24 actual cost. As noted in section 2 the predictive power of the PLEXOS model was quite strong, and overall variance reflects the inherent limitations in simplifying a complex system. Overall, a 7% delta suggests the modelling approach is quite strong.