

2021/22 Imperfections

Outturn Report

16 June 2023



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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 2021/22 Imperfection Costs Backcast. This report covers the period from 01/10/2021 to 30/09/2022 inclusive, referred to as Tariff Year 2021/22.

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 2021/22 Forecast to the RAs on 30 June 2020. 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 2021/22 forecast (Submitted and Allowed), the 2021/22 backcast, and the 2021/22 actual costs are shown in Figure 1 below.

The current resettled actual costs for the 2021/22 year are €523m (shown in green in Figure 1), and the total backcast cost is €574.91m. The 2021/22 backcast cost is €51.91m (10%) higher than the 2021/22 actual cost. This variance is likely due to limitations in modelling such as simplifications/ approximations in representing reality and inherent complexity of the system being modelled. These limitations are likely to have been exacerbated by the high fuel prices.

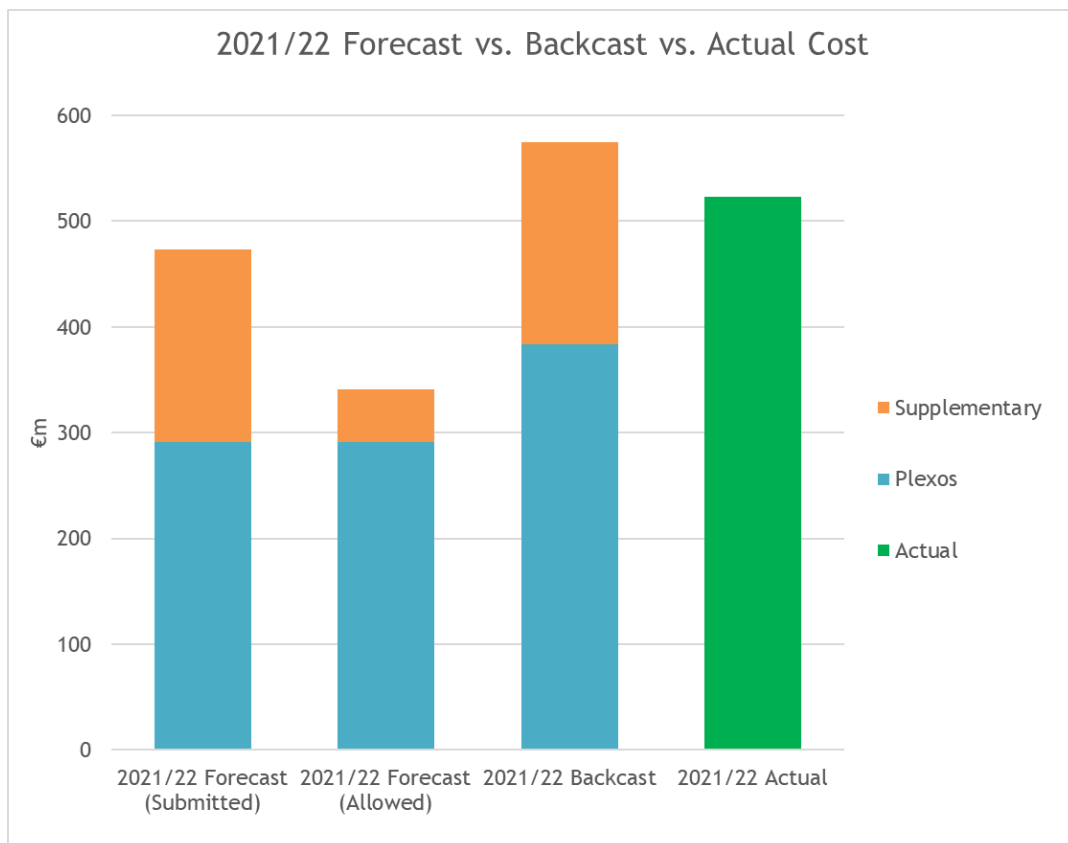


Figure 1 2021/22 Forecast vs. Backcast vs. Actual cost comparison

2. PLEXOS Comparison

The PLEXOS model component of the backcast for 2021/22 was found to be €383.88m. This is an increase from the submitted PLEXOS forecast cost of €291.40m. As shown in Figure 2, updating the 2021/22 Forecast PLEXOS model with actual data led to an increase of €92.48m.

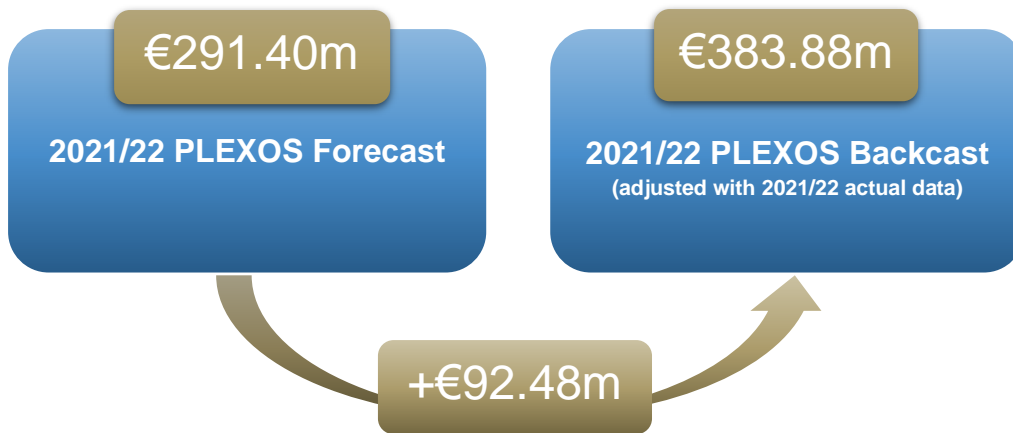


Figure 2 PLEXOS change when updated with actual 2021/22 data

Figure 2 shows the drivers which contribute to this increase of €92.48m.

The costs within the graph 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 21/22 forecast. 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 €92.48m. The reason being is €92.48m is the result of making all the changes together, at the same time, in the same model, while the values in Figure 3, are the result of making a change to particular inputs, one at a time, with all other inputs remaining constant.

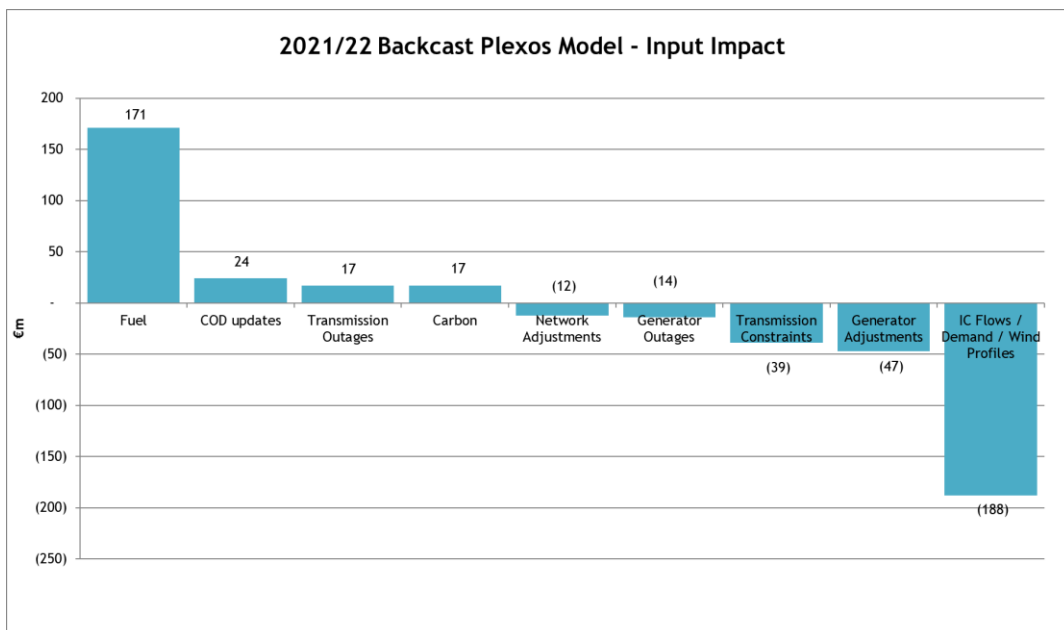


Figure 3 2021/22 Backcast PLEXOS - Input Impact

2.1. Fuel and Carbon Prices

Updating the model for actual fuel/carbon prices increased model costs by €171m. This was due to significant increases in all fuel types between the 2021/22 Forecast and the backcast. See summary of model input prices below:

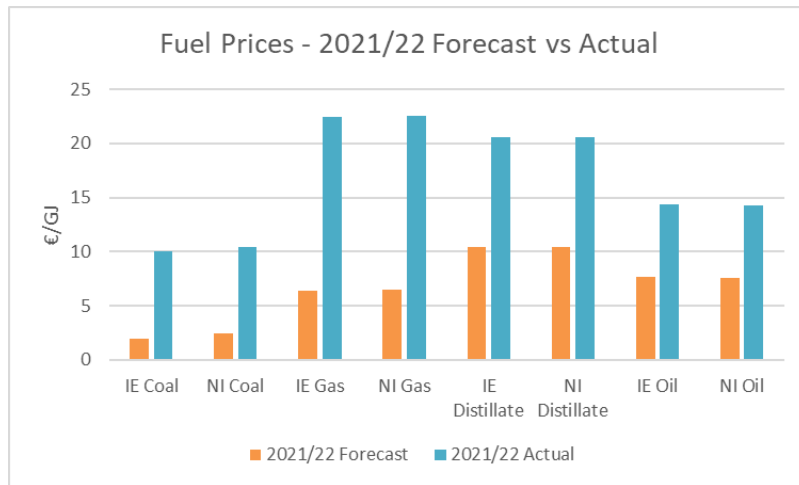


Figure 4 Fuel Prices - 2021/22 Forecast vs Actual

There were also significant increases in carbon prices, which increased model costs by €17m. See summary of model price changes below:

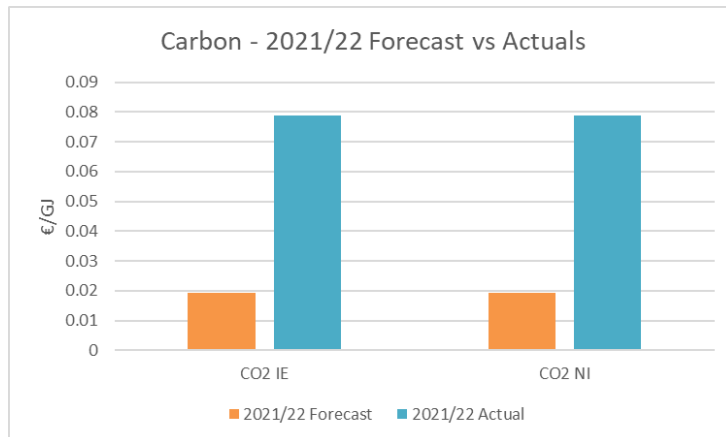


Figure 5 2021/22 Carbon Prices - Forecast vs Actual

2.2. Commercial Offer Data (COD)

Commercial offer data for each unit was updated. This amounted to an increase in model costs of €24m. The updates were based on analysis of historic data including incremental cost of generation, no-load costs and start-up costs. We removed the impact of fuel/carbon costs as these are analysed separately under the fuel/carbon category. Combined with fuel/carbon, these allow PLEXOS to replicate the commercial bids of generators. For gas generators, we assume that that Gas Transportation Costs (GTC) for gas units have been incorporated in their bids.

2.3. Transmission Outages

The model was updated to reflect the actual transmission outages that took place in 2021/22. The model indicates that the number of outages impacting imperfection costs was higher than anticipated in the original 2021/22 forecast. These outages increased model costs by €17m.

2.4. Network Adjustments

The transmission limits of the Louth-Tandragee tie-line were updated in the 2021/22 Backcast model. These updates were based on actual flow data in the 2021/22 year. The changes in the model resulted in an increase in flow capability from North to South, the direction where the tie-line would typically be constrained. Other changes in this category included line upgrades, TLAfs, etc. Updating the model with these changes resulted in a decrease in model costs of €12m.

2.5. Generator Outages

Generator outages were updated to reflect the actual outages that happened in 2021/22. There were less outages impacting imperfections costs than anticipated in the 2021/22 Forecast, partly due to the impact of tight system margins. This led to a decrease in the model costs of €14m.

2.6. Operational Policies

The Operational Policies in the model were updated to align with the latest policies in 2021/22 (which had not been included in the original forecast). These resulted in a net decrease of €39m in the model costs relative to the 2021/22 Forecast model inputs. Some of the main changes from forecast to backcast included:

- Additional battery capacity allowed for a reduction in the dynamic primary operating reserve requirement to the floor of 75MW in IE in particular,
- The additional batteries allowed for all non-dynamic reserve to be met without requirements on conventional units
- Minimum conventional set requirement was due to reduce to 7 sets in the 2021/22 Forecast, but this was not implemented in the 2021/22 year
- Inertia was forecast to reduce to 20,000MWs during the 2021/22 year, but remained at 23,000MWs.

2.7. Generator Adjustments

For Technical Offer Data (TOD), some units changed their minimum stable generation levels, and others increased their 'min off' times. Also, the available capacity of certain units was updated to reflect their actual availability levels though the year. These resulted in a net decrease of €47m in the model costs relative to the 2021/22 Forecast model inputs.

2.8. Demand, IC Flows & Wind Availability

There is a strong link between demand, interconnector flows and wind availabilities, so these were analysed together rather than individually. Changing one or two of the inputs at a the time breaks the intrinsic link between them, and results in other generators compensating in unrealistic ways. Analysing these inputs together resulted in a decrease in model costs of €188m.

This is a significant decrease and there were likely two factors contributing to this decrease. Firstly, using actual interconnector flows of that year created a better match to all the actual events in that year (such as forced and scheduled generator outages). Secondly, using actual 2021/22 Moyle flows, better represented the actual limitations on Moyle flows. Having the better alignment with these two factors, decreased imperfections costs.

3. Backcast Results Compared to Actuals

This section contains a comparison of the following for the Tariff Year 2021/22:

- The 2021/22 Forecast Submission & RA Allowance,
- The 2021/22 Backcast & Actual Outturn.

3.1. 2021/22 Forecast Submission & RA Allowance

For the 2021/22 Tariff Year, the TSOs submitted an Imperfections forecast of €473.09m. This comprised of €291.40m for the PLEXOS model and €181.69m for the supplementary model. Following consultation, the RAs determined a total allowance of €341.01m for the year, deducting elements from the supplementary modelling, mainly by the removal of any costs associated with the clean energy package. These values are represented by the first two bars in Figure 6 below:

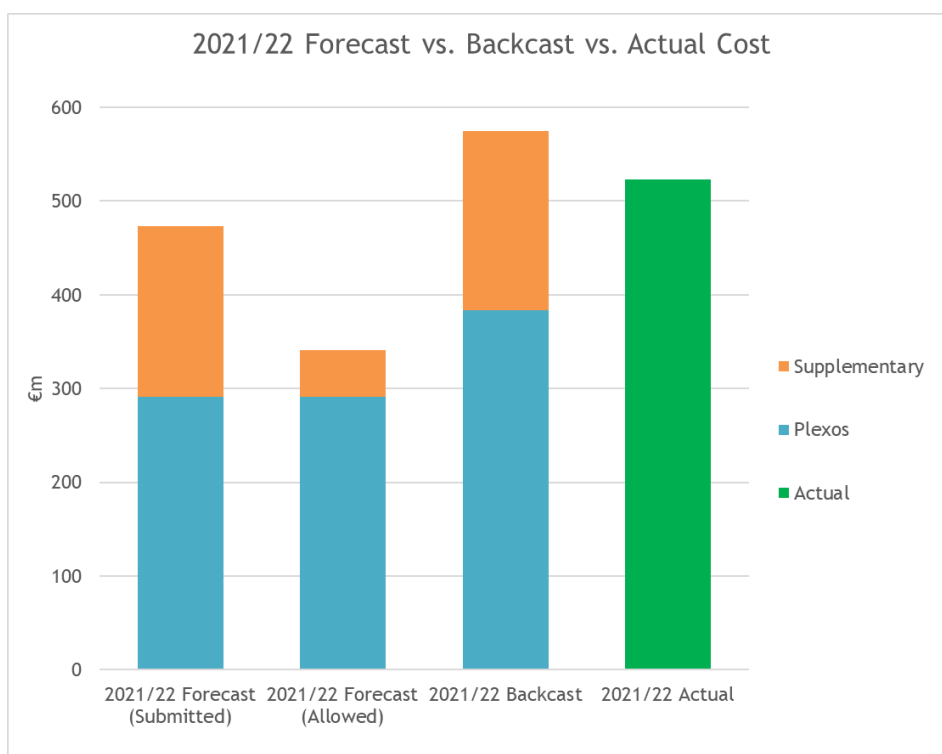


Figure 6 2021/22 Forecast vs. Backcast vs. Actual cost comparison

3.2. 2021/22 Backcast & Actual Outturn

PLEXOS backcast: Figure 7 shows that by updating the original forecast with actual data, the PLEXOS element increased from €291.40m to €383.88m. These changes are detailed in Section 2.

Supplementary backcast: Due to the significant changes in certain inputs, predominantly fuel, it was prudent to recalculate the approved Supplementary Modelling, which was originally approved at €49.61m. With significant increases to in fuel prices and therefore the imbalance price, this increased to €191.03m. This increase yielded a large increase in CPREMIUMs and CDISCOUNTs that would have been applied during the year, as well as the increase in actual costs seen for pump storage running, constraining wind, and countertrades.

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

Description	21/22 Forecast Submitted (€m)	21/22 Forecast Approved (€m)	21/22 Backcast Final (€m)
PLEXOS Model	291.40	291.40	383.88
Additional PREMIUM and DISCOUNT impact	23.21	23.21	103.19
Pump Storage	15.58	8.00	29.26
Block Loading	0.09	0.09	0.00
Capacity Testing & Performance Monitoring	2.00	2.00	0.00
Secondary Fuel Testing	0.59	0.59	0.00
Constrained Renewables	5.72	5.72	32.59
CEP	124.50	0.00	0.00
Interconnector Counter Trades	10.00	10.00	25.99
Supplementary Modelling Total	181.69	49.61	191.03
TOTAL	473.09	341.01	574.91
	Actual 2021/22		523.00
	€m Variance		51.91
	% Variance		10%

Figure 7 2021/22 Forecast vs. Backcast vs. Actual cost comparison

The current resettled actual costs for the 2021/22 year are €523m (shown in green in Figure 6), and the total backcast cost is €574.91m. The 2021/22 backcast cost is €51.91m (10%) higher than the 2021/22 actual cost. This variance is likely due to limitations in modelling such as simplifications/ approximations in representing reality and inherent complexity of the system being modelled. These limitations are likely to have been exacerbated by high fuel prices.