

Cost-Benefit Analysis on Imbalance Settlement Period duration in GB

What is the problem under consideration? Why is Ofgem intervention necessary?

The Guideline on Electricity Balancing (the EBGL Regulation) puts an obligation on all European Union member states to harmonise their Imbalance Settlement Periods (ISPs) to 15 minutes by December 2020. However, it also allows the relevant regulatory authorities of a synchronous area to grant an exemption from the requirement after performing a cost-benefit analysis in cooperation with the Agency concerning the harmonisation of the imbalance settlement period within and between synchronous areas. Since GB is its own synchronous area, it is Ofgem that has the power to grant such an exemption.

The original Cost Benefit Analysis (CBA) that was used to support the chosen ISP of 15 minutes in the EBGL Regulation was published in 2016. This CBA was carried out by Frontier Economics (on behalf of ENTSO-E). The CBA suggests that a move to a 15-minute ISP would have a strongly negative net welfare effect for GB under all scenarios. Due to the fact that the 2016 CBA predicted a highly significant economic detriment to GB consumers if we move to a 15-minute ISP, we believe that it is appropriate for us to consider whether to grant an exemption to this obligation. In this CBA, we assess whether the assumptions and data that fed in to that result are still valid and up-to-date and if there is a case to grant an exemption to this obligation.

What are the policy options that have been considered, including any alternatives to regulation?

There are two options:

- a) Implement a 15-minute ISP; and
- b) maintaining a 30-minute ISP.

Under option a, GB would transition to a 15-minute ISP. Further consideration would be needed on whether there is sufficient time for arrangements to be in place to move to a 15-minute ISP by 18 December 2020.

Under option b, where we choose to grant an exemption, GB would remain with a 30-minute ISP, and we would be required by the EBGL Regulation to perform a CBA at least every three years. Therefore, this exemption would be revisited as part of this 3-year review process.

The preferred option is to grant an exemption to the obligation to harmonise to a 15-minute ISP and maintain the status quo of a 30-minute ISP. Maintaining the status quo has no monetised impacts associated with it, as no changes to existing systems will be required resulting in no benefits or costs. It is the preferred option because implementing the alternative option – harmonising to a 15-minute ISP – would have a significant negative impact on GB consumers.

Preferred option - Monetised Impacts (£m)

Net Benefit to GB Consumer	0
Wider Benefits/Costs for Society	0
<p>How was the Net Benefit monetised (NPV or other)?</p> <p>The CBA completed by Frontier Economics used market data from the 2015 calendar year as the inputs for their modelling. In this CBA, we reassess Frontier Economics results, use their results as the starting point for our analysis and update the inputs with market data from 2018 calendar year.</p> <p>As they are presented as the net present value from when the analysis was performed, we recalculate the NPV using 2015 as the base year. The results from our reassessment are adjusted for inflation, with a discount rate of 4% and presented in 2018 financial year prices covering the net present value for the period 2020 to 2030.</p>	

Preferred option - Hard to Monetised Impacts

Describe any hard to monetised impacts

The preferred option is to grant an exemption to the obligation to harmonise to a 15-minute ISP and maintain the status quo of a 30-minute ISP. We believe that maintaining the status quo has no hard to monetise impacts associated with it and that all impacts have been captured in the quantifiable analysis within this Impact assessment.

Key Assumptions/sensitivities/risks

In this analysis, we make the following assumptions:

- We assume that the costs that were presented in the 2016 CBA report are still representative, aside from a relatively minor adjustment stemming from stakeholder feedback and to account for inflation.
- We assume that Frontier Economics prediction of the rate of growth in electricity demand for 2020-2030 is reasonable¹ and we derive a scaling factor from their results to adjust the demand in 2018.
- We assume that an increase in intraday market liquidity would lead to the same reduction in the bid-offer price spread that Frontier Economics calculated in their report.
- We assume the potential reduction in the average wholesale price (in €/MWh) is the same as the reduction calculated by Frontier Economics.
- We assume that a 31% increase in the volumes traded on the intraday market will have a proportional increase in the potential benefit that Frontier Economics calculated for increased intraday liquidity.
- By using scaling factors to adjust Frontier Economics results, we assume the same 4% discount rate as they did.²

¹ We compared the difference in demand predictions from ENTSO-E's 2016 and 2018 Ten Year Network Development Plans. In their low demand scenarios, there is a 3% increase in demand between the two studies. In their high demand scenarios there is a 1% increase in demand.

² The ENTSO-E methodology for Frontier's CBA states that they use the same discount rate as the TYNDP i.e. 4%. We believe that the way in which we have reassessed Frontier's results, implicitly takes account of the discount rate. In addition, the 2018 TYNDP uses the same discount rate, therefore, we have not made further changes.

Summary table for all options

Summary of options	Main effects on Consumer outcomes	Benefits	Costs	Key considerations (Risks, assumptions, distributional impacts etc.)
30 minutes ISP	Consumers will not have to pay extra to comply with an obligation that delivers limited benefits.	€0	€0	No risks. Additional cost benefit analyses are required every 3 years after granting the exemption. Therefore, there is a natural review process for the appropriateness of the exemption.
Move to 15-minute ISP	Consumers will incur significant costs in order for GB to move to a 15-minute ISP	€136.5m to €237.9m	€852.9 to €1,953.0m	A move to a 15-minute ISP would be permanent and GB would not be able to move back to a 30-minute ISP.

1. The Costs and benefits of GB moving to a 15-minute ISP

Section summary

This section outlines the how we've performed our reassessment of Frontier Economics modelling of the costs and benefits for moving to 15-minute ISP. We find that the costs have not significantly increased, and that overall the benefits of moving have remained similar as well.

Costs of changing ISP

Reassessment of Frontier Economics 2016 European study on ISP duration

- 1.1. The costs that Frontier Economics presented were a result of an industry survey on the costs associated with a change to the ISP. From GB there were 17 responses to the survey, specifically addressing a change from a 30-minute ISP to a 15-minute ISP.
- 1.2. Of all countries that were surveyed, GB provided the second greatest number of responses to the survey. The costs therefore required very little scaling and were consider by the consultants to be representative for GB. This high response rate was attributed to the fact that multiple separate responses were made by a single company, i.e. one response for each of several different business activities (retail, trading, generation, etc.).
- 1.3. Given the number of respondents that were able to provide quantitative estimates of costs, Frontier Economics did not need to conduct any (in their words) stylised analysis to get a value for the costs. All that they needed to do was, scale up the estimated costs where necessary in order for them to be representative of the whole country and account for market participants that did not respond to the survey.
- 1.4. The top 5 cost drivers were (largest to smallest):
 - Metering and notification systems (distribution network) - €1295m
 - Scheduling and settlement - €183m
 - Billing systems – €144m
 - BRP forecasting, and trading and scheduling – €62m
 - Trading Platforms – €46m
- 1.5. In order to check that these costs are still representative of industry costs, we engaged with stakeholders via the Joint European Stakeholder Group and invited them to inform us if their costs had changed since Frontier Economics performed their survey.

- 1.6. The majority of stakeholders responded saying that the costs that they estimated for the 2016 study would be very similar today. One stakeholder has said that their cost estimates had increased by 33% leading to an increase of £13.7m over the period 2020 – 2030. The majority of stakeholders also agreed that there has not been enough change to warrant a complete reassessment of industry costs and that our approach of using the 2016 cost estimates would be a reasonable assumption.
- 1.7. The main cost driver stems from changes to metering and notification systems (7 times larger than the next category), where smart meters would need to be changed to store data from 15-minute periods. Smart meter role out has progressed since 2016, and there is still no requirement for smart meter's to be able to accommodate 15-minute settlement data. Moving to a 15-min ISP would likely incur additional costs from a redesign and replacement of existing meters. Therefore, it is likely that the estimated costs for metering are conservative and could be even greater than those modelled by Frontier.
- 1.8. In conclusion, we believe that the drivers behind the costs have not materially changed since Frontier's 2016 analysis. Our reassessment of the cost estimates are set out in the table below:

	2015	2018
Profiling costs	- € 786.0m	- € 853.6m
Unadjusted costs	- € 1816.2m	- € 1953.7m

Benefits of changing ISP

Summary

- 1.9. In our assessment of Frontier Economics' modelling, we have found that there have only been relatively minor changes to the benefits that could stem from moving to 15-minute settlement. The results can be seen in the table below:

Potential Benefit	Low Case (2018)	High Case (2018)
A shift of balancing energy to intraday energy (€m)	€ 50,125,584	€ 150,376,753
Lower reserve capacity cost	0	0
Greater intraday competition from cross border BSPs	0	0
Greater entry by BSPs to the intraday market (€m)	€ 1,192,356	€ 2,384,712
Increase in liquidity (€m)	€ 85,148,528	€ 85,148,528
Total (in €m)	€ 136,466,468	€ 237,909,993

- 1.10. We observe that there is a roughly €1m increase in benefits in the low case and roughly a €40m reduction in benefits in the high case.

Results from Frontier Economics' 2016 European study on ISP duration

- 1.11. In order to model the benefits associated with a shorter and harmonised ISP across EU member states, Frontier Economics produced stylised analysis to model the impact on a number of categories of potential benefits. Frontier Economics concluded that there is three areas where there could be potential benefits for GB if we harmonise our ISP to 15 minutes. They are:

- Balancing energy shifting to intraday energy (€73m – €219.1m)
- Greater entry by BSPs to the intraday market (€1.2m – €2.4m); and
- An increase in liquidity (€61m).

- 1.12. Given that there have only been relatively small changes to the costs of changing ISP, we have focussed our reassessment on the benefits that were the most substantial in the 2016 CBA.

Reassessment of the benefit associated with a shift of balancing energy to intraday energy

- 1.13. In order to model the potential benefit from a shift of balancing energy to intraday energy, Frontier Economics assumes that the net welfare effect is equal to the product of the estimated delta in price times the volume effect as follows:

$$\text{Net welfare effect} = (30\text{min Vol}_{BE} - 15\text{min Vol}_{BE}) \times (MPBE - MPID) \times Y\%$$

30min Vol_{BE} = Average volume of balancing energy needed for a 30-minute ISP

15min Vol_{BE} = Average volume of balancing energy needed for a 15-minute ISP

MPBE = Balancing energy market price

MPID = Intraday energy market price

Y% = 25% or 75%. In the low case, the net welfare effect is equal to 25%. In the high case it is equal to 75%.

- 1.14. Given that this is the most substantial benefit from Frontier Economics CBA, we sought to recreate their analysis as much as possible. Using the above method, we have recalculated the benefits with updated data from the 2018 calendar year.
- 1.15. Frontier Economics report provides the estimated volume shift for 2015, but doesn't provide how they estimated volume shift for the years 2020-2030. By rearranging the formula above, we calculated the relationship between Frontier's volume shift for 2015 and the high/low benefits for the years 2020-2030. The result is a scaling factor of 3.73. We assume that it is still appropriate to use this scaling factor to model the volume shift in the years 2020-2030 and use it to scale up the volume shift for 2018.
- 1.16. We then re-estimated the average balancing to intraday price premiums³ (£/MWh) by:
- Calculating the difference between either the upwards or downwards balancing price and the intraday price in the same period depending on whether the system as a whole is short or long in every hour of a year; and then by
 - Deriving the resulting average premium for upwards or downwards balancing actions over the whole year.
- 1.17. The results in the table below show how the potential shift in balancing energy volumes to intraday energy volumes has reduced since 2015 to 2018. Our recalculation of price premiums show that they have also reduced since 2015.

³ Price premiums are the differences between the MPBE and the MPID for each settlement period in the year. MPBE is taken from the system buy/sell price and MPID is taken from the UKPX RPD Base.

Combined this leads to a reduction in potential benefits in both the high and low cases. Data from the 2018 year shows that the potential benefit ranges from between €50.1m to €150.4m.

	2015	2018
Consumer Surplus (High)	€ 219.1m	€ 150.4m
Consumer Surplus (Low)	€ 73m	€ 50.1m
Upward price premium	28.62 €/MWh	19.67 €/MWh
Downward price premium	17.09 €/MWh	12.20 €/MWh
30 to 15 min ISP Volume effect	1,711,187 MWh	1,685,158 MWh

Greater entry by BSPs to the intraday market (in €m)

- 1.18. In Frontier's analysis, they estimate the potential reduction in the average wholesale price (in €/MWh) associated with increased entry. They then estimate the corresponding increase in consumer surplus by multiplying this price reduction by local electricity demand.
- 1.19. This benefit was significantly smaller than the other modelled benefits (£1.2 – £2.4m). Given the scale of this potential benefit, we have limited our reassessment reviewing how GB electricity demand has changed since 2015. Between 2015 and 2018, electricity demand reduced by 7%. Since we are not assuming any change to the potential reduction in the average wholesale price, we have reduced this benefit associated with greater entry of BSPs to the intraday market by 7%, and then adjusted to account for inflation. The result is that the benefit remains at between €1.2m and €2.4m.
- 1.20. For this benefit to materially change the outcome of the CBA, either electricity demand, or the average wholesale price would have to be more than 200 times greater than they currently are now. Given that neither of these scenarios are likely to occur, we believe that this reassessment is sufficient to provide a reasonable estimate of a potential benefit.

Assessment of the benefit associated with an increase in liquidity

- 1.21. Frontier Economics modelling suggests that there could be a €61m welfare benefit associated with increased liquidity in the GB intraday market. Their assumption was that a reduction in ISP and an introduction of shorter duration traded products on the intra-day market might affect liquidity. Frontier modelled how much of an increase in intraday traded volumes would occur following a move to a 15-minute ISP. They also assume that 5% of the intraday bid-ask spread (BAS) is associated changes in liquidity, and that with increased traded volumes, this spread would decrease, leading to a benefit for GB.

$$\text{Net welfare effect} = \text{Intraday BAS} \times \text{Intraday Traded Volumes}$$

- 1.22. Frontier does not provide the data that they used in this assessment. Therefore in order to update this figure, we looked at the volumes of products traded on the intraday market in 2015, and compared that to the figures available in 2018.

Between 2015 and 2018 we observed that there has been a 31% growth in traded volumes. Given the relationship between the intraday traded volumes and the net welfare effect, we then scaled up the benefit associated with liquidity by 31%, leading to a benefit of €79.7m.

- 1.23. For this benefit to materially change the outcome of the CBA, either the intraday traded volumes, or the bid-ask spread would need to increase by at least 800%, to change the outcome of the CBA. We do not believe that it's likely that either of these scenarios occur within the next 10 years and we therefore believe that this reassessment is sufficient to provide a reasonable estimate of this potential benefit.

2. Conclusion and next steps

Summary of results

- 2.1. The results of our analysis are summarised in the table below. They show that under all scenarios, the costs of moving to a 15-minute ISP has increased in the years since Frontier Economics' CBA from 2016.

Scenario	2015 net welfare	2018 net welfare
Profiling and high benefits	€ -503.6m	€ -615m
Profiling and low benefits	€ -650.8m	€ -716.4m
Unadjusted costs and high benefits	€ -1,533.8m	€ -1,715.1m
Unadjusted costs and low benefits	€ -1,681.0m	€ -1,816.6m

- 2.2. The results of the 2016 CBA had a benefit to cost ratio of between 0.07 and 0.33. Our reassessment of the CBA has produced results that have a benefit to cost ratio of between 0.07 and 0.28. Therefore, harmonising to a 15-minute ISP is slightly less favourable now than it was when Frontier Economics produced their report on behalf of ENTSO-E.
- 2.3. Given the scale of the negative welfare effects, our preferred option is to grant an exemption to the obligation to harmonise to a 15-minute ISP and maintain the status quo of a 30-minute ISP. Maintaining the status quo has no monetised impacts associated with it, as it means that there does not need to be changes to existing settlement and metering systems.
- 2.4. Implementing the alternative option (harmonising to a 15-minute ISP) would incur significant costs and relatively little benefits to GB. In 2016 Frontier Economics estimated that the net welfare of moving to 15-minute ISP in GB would be € -503.6m to € -1,681.0m.⁴ In our reassessment of their analysis, we estimate that the net welfare for GB would be € -615m to € -1,816.6m.⁵
- 2.5. Therefore, we believe that compared to the option of moving to a 15-minute ISP, granting an exemption is the most pragmatic option at this stage. We note that after granting this exemption, there will be an obligation for Ofgem to reassess the merits of this exemption every 3 years. In the next CBA performed by Ofgem on this issue, we will endeavour to perform a full reassessment of the possible costs and benefits from moving to a 15-minute ISP.

⁴ These figures are the unaltered values from Frontier's report.

⁵ These figures are presented in 2018 values, where appropriate taking account of inflation and using 2018 GBP to € exchange rates from the following resources:

https://ec.europa.eu/eurostat/statistics-explained/index.php/Inflation_in_the_euro_area#Euro_area_annual_inflation_rate_and_its_main_components
https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-gbp.en.html

- 2.6. While our current CBA suggests a heavily negative impact of GB moving to a 15-minute settlement period, it is important that industry ensures that any new system can cope with both 15-minute and 30-minute imbalance settlement period when there is a low cost of doing so. This should contribute to lower costs of a possible change if at any point in time, the periodic CBA suggests a high benefit to GB of moving to a 15-minute ISP.