



Interconnector Ramping CBA

Working Group 10

22 03 2023



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with high standards of social
and environmental performance,
transparency and accountability.

Overview of our approach to the CBA

Our CBA framework combines various tools and datasets to capture a wide range of impacts on the ESO, GB and EU consumers, interconnectors and generators

Costs and benefits included in the CBA

| Cost or benefit | Approach | Source |
|-------------------------------------|---|--|
| Consumer impacts | Difference in wholesale spot market prices in a given market under the baseline (e.g. 100 MW/min) and alternative option multiplied by total demand | PLEXOS modelling for consumer welfare, qualitative analysis for impact of options on interconnector investment |
| Producer impacts | Difference in wholesale spot market prices in a given market under the baseline (e.g. 100 MW/min) and alternative option, minus generation costs and multiplied by total generation | PLEXOS modelling for producer welfare |
| Interconnector impacts | Difference in net revenues realised by interconnectors, taking into account direct changes in revenue from ramp constraints and indirect changes from changes in market participant views of the value of interconnector capacity | PLEXOS modelling for interconnector welfare, qualitative analysis for impact on capacity value |
| Balancing costs | Additional costs incurred by the ESO associated with repositioning, frequency control actions and other response actions | Analysis of ESO costs |
| Implementation costs | Additional costs to the ESO and industry from the set up and ongoing costs of the alternative options relative to the baseline | Estimated implementation costs from ESO and interconnectors |
| Other quantified impacts | Broader impacts from the integration of renewables (MWh/yr) and changes in emissions (MtCO ₂ /yr), with the latter measured at the social cost of carbon | PLEXOS modelling plus HMG Green Book carbon values |
| Other non-quantified impacts | A range of potential costs and benefits, including impacts on security of supply and on connecting TSO market etc. | Qualitative review and analysis |

Monetised, quantified and qualitative impacts for all options, with ranking/scoring of combined impact for each option

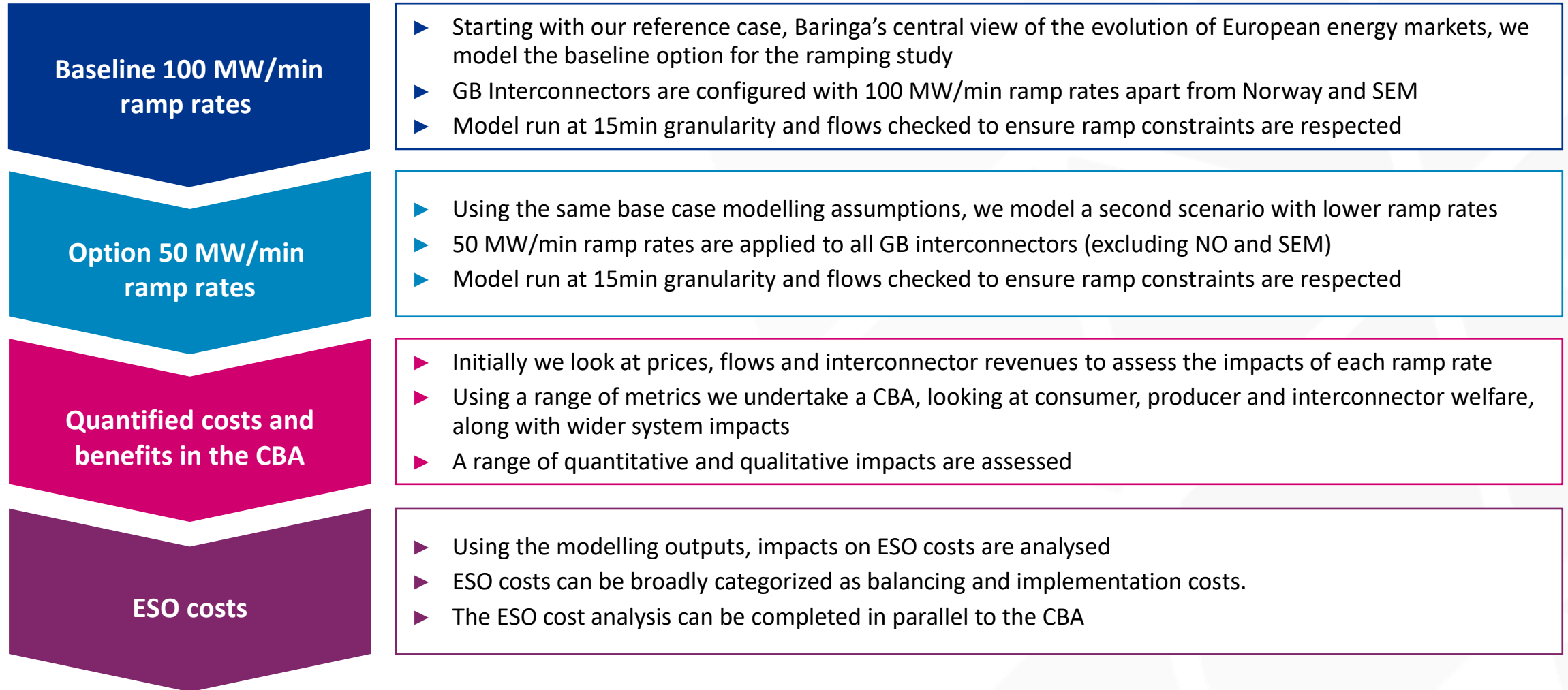
Recommended option taking into account monetised, quantified and qualitative evidence, and proposals for refining the evidence base

Switching analysis – are the qualitative impacts sufficiently material to outweigh the quantified impacts?

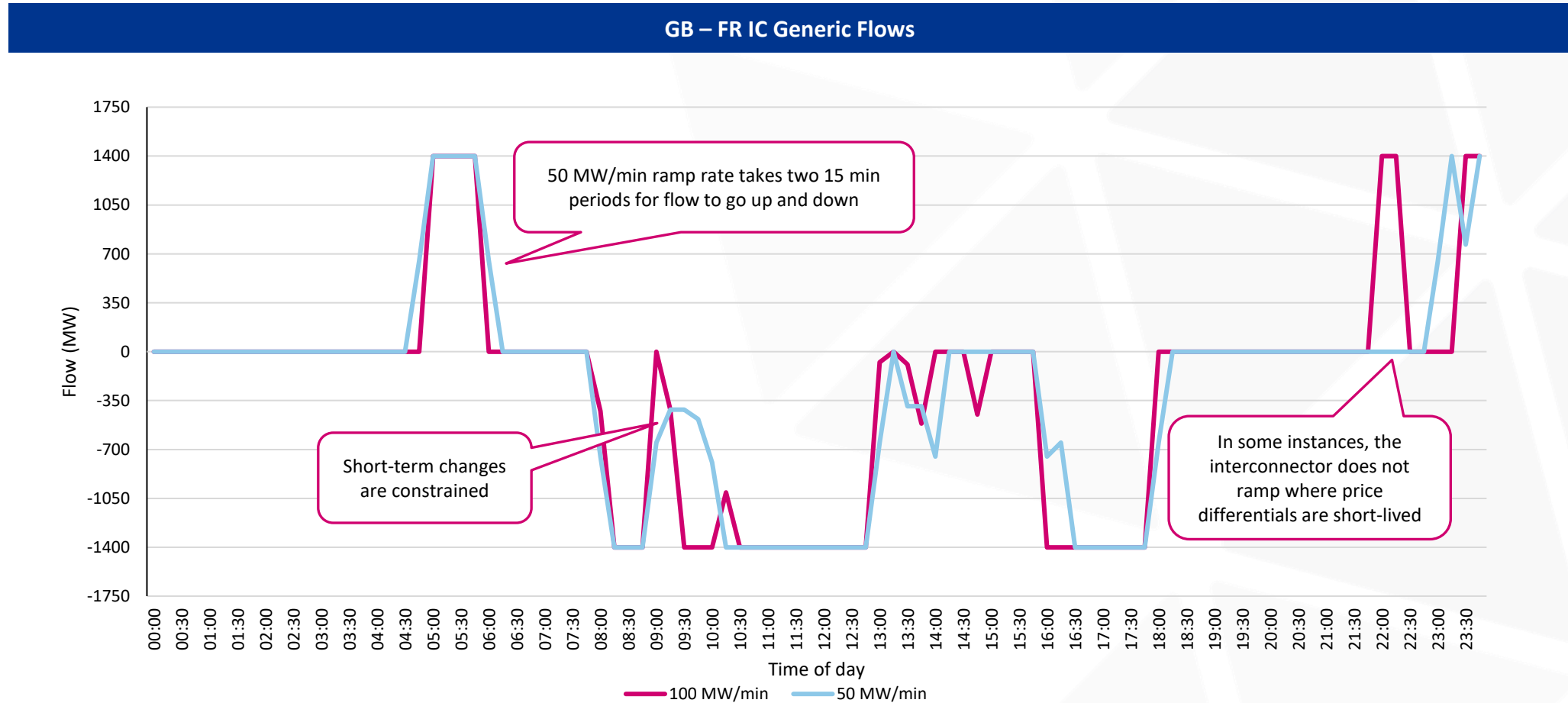
Sensitivity analysis – how sensitive is the recommended option to changes in high impact assumptions?

Modelling process

Using Baringa's reference case model, we assess the impact of lower ramp rates and take the modelling results to complete further CBA and ESO cost studies



GB – FR Generic Interconnector – impact on flows



GB – FR Generic Interconnector – 2030 results

Illustrative example of Option 2B: 100MW vs 50MW ramp rate on IC flows

Average ramp rate per 15-minute interval

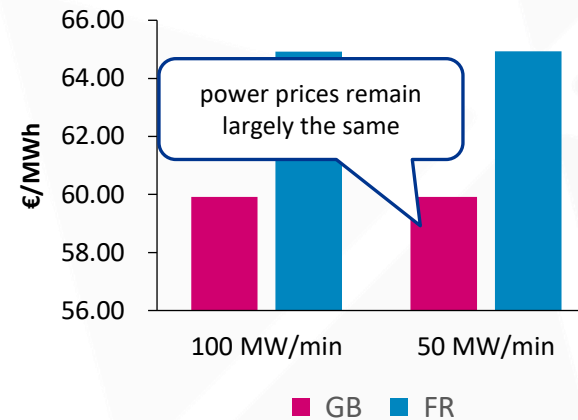
Ramp up events

| | > 1000 MW | 750-1000 MW | 500-750 MW | <=500 MW | 0 MW |
|---------------|-----------|-------------|------------|----------|-------|
| 100 MW/min | 722 | 261 | 302 | 902 | 30692 |
| 50 MW/min | 3 | 1 | 1564 | 1016 | 29907 |
| Difference | -719 | -260 | 1262 | 114 | -785 |
| Difference, % | -2.1% | -0.7% | 3.6% | 0.3% | -2.2% |

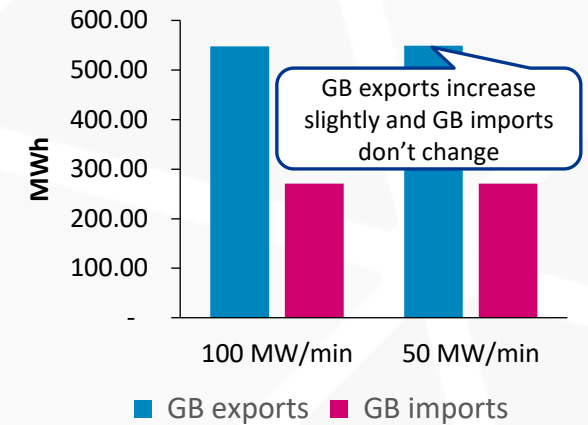
Ramp down events

| | > 1000 MW | 750-1000 MW | 500-750 MW | <=500 MW |
|---------------|-----------|-------------|------------|----------|
| 100 MW/min | 719 | 264 | 307 | 871 |
| 50 MW/min | 4 | 0 | 1559 | 986 |
| Difference | -715 | -264 | 1252 | 115 |
| Difference, % | -2.0% | -0.8% | 3.6% | 0.3% |

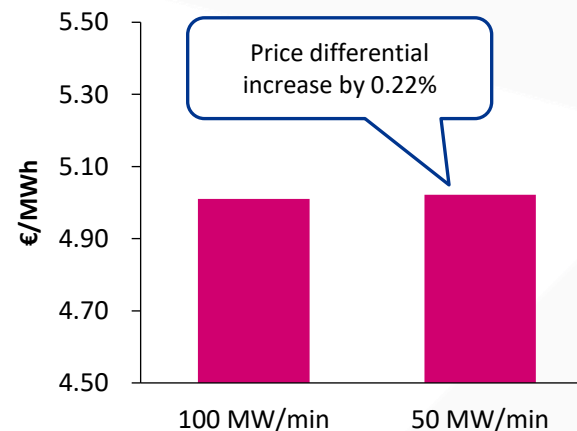
Time-weighted average power prices



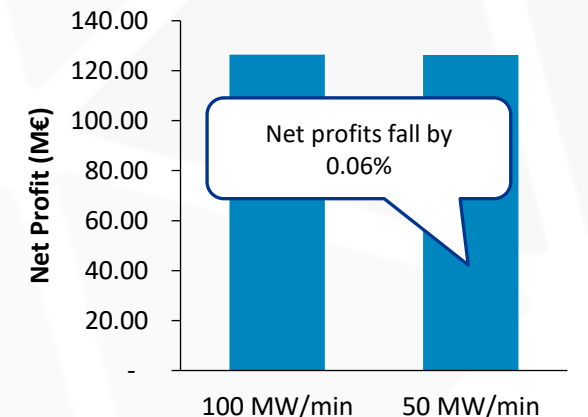
Average flows



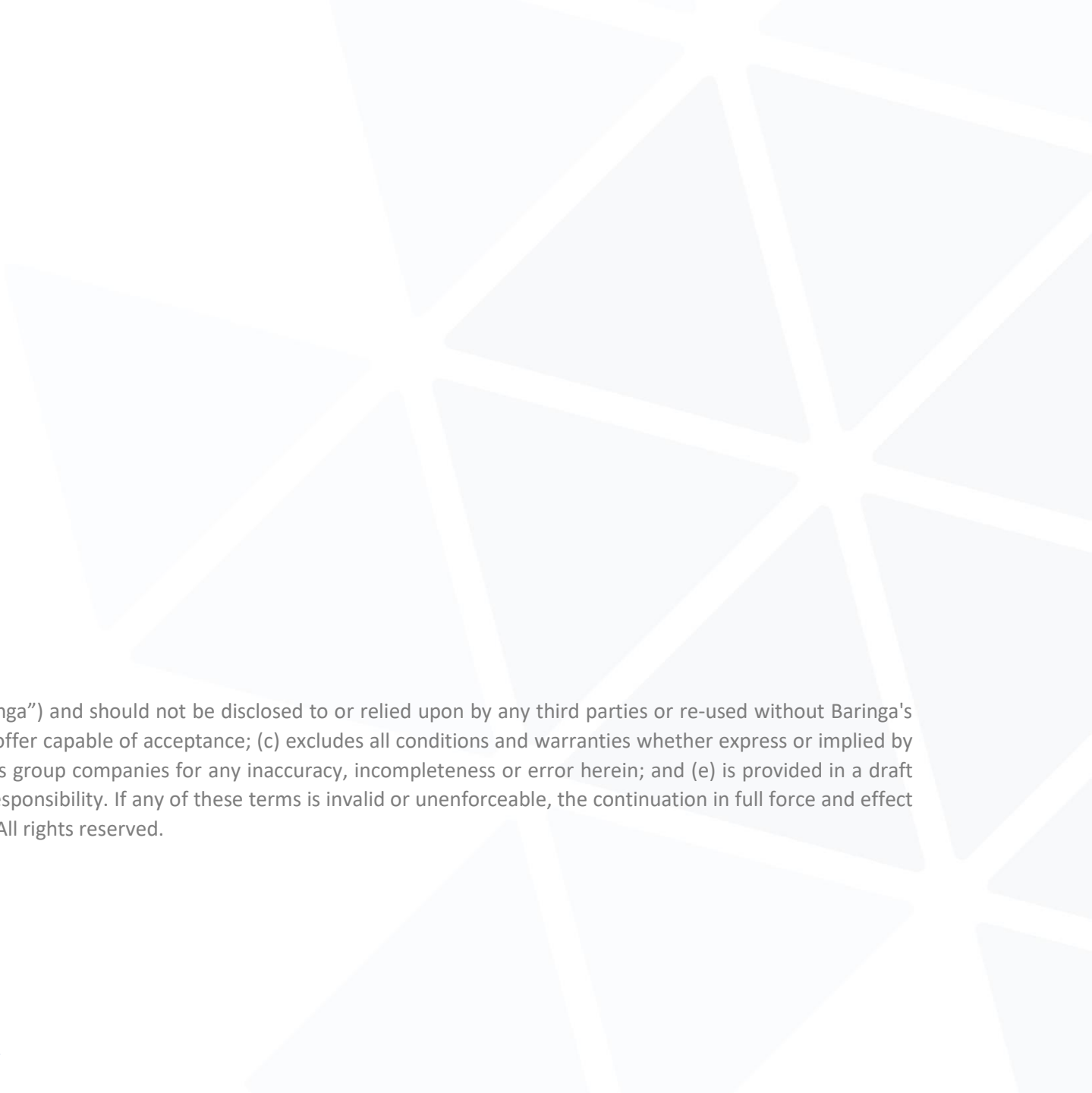
Price differential



Total revenue (net) for interconnector



Note: This is an illustrative example



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