

LCPDelta

Zonal Pricing in Great Britain

Differences in regional wholesale electricity prices – A deep dive

Report for sse

JUNE 2025

Introduction

This report is an expansion of our previous analysis completed for SSE on wholesale electricity prices under zonal pricing, taking a deep dive into the impact on consumers of moving to zonal pricing

- The UK Government's Review of Electricity Market Arrangements (REMA) programme, which started in July 2022, is considering a range of reforms to the GB system to ensure the market is fit for purpose for the future.
- One of the key reforms being considered is whether to move the GB market to zonal pricing or make improvements to our current national pricing market (Reformed National Market).
- Moving to zonal pricing is complex and a seismic change to the current market which will have large implications for the present and future of the GB electricity system. As such there needs to be a clear benefits case for moving zonal pricing that shows a positive system and consumer impact.
- When publishing their decision on moving to zonal pricing or a reformed national market, DESNZ should publish an Impact Assessment (IA) outlining the economic impacts of both options compared to the status quo (the current market). This will be the main economic evidence the government use to support the decision.
- Understanding the impacts of moving to zonal pricing requires detailed modelling and analysis. LCP Delta has already undertaken two such studies assessing the economic impacts of zonal pricing – the first for DESNZ published in March 2024 alongside the second REMA consultation and an updated version for SSE, published in October 2024 which factored in NESO's updated network plans.
- The October 2024 report for SSE only assessed the system impacts of moving to zonal pricing given this is the key metric used by DESNZ in their Impact Assessments. In February, we published the impacts on wholesale electricity prices across GB and this report takes a deeper dive into that analysis by breaking down the system impacts in a different way to understand the distributed impacts on consumers.

Our reports on the impacts of zonal pricing



DESNZ Report: March 2024

LCP Delta along with Grant Thornton were commissioned by DESNZ to independently assess the impacts of moving the market to zonal pricing. This analysis was completed in 2023 and published alongside the 2nd REMA consultation in March 2024.

SSE Report: October 2024



LCP Delta were commissioned by SSE to update the analysis completed for DESNZ factoring in NESO's updated network plans, published in Spring 2024 and changes to strategic infrastructure planning to reflect offshore wind seabed leasing. This focused on the overall system benefits.

This Report: June 2025



This report expands on the previous SSE report taking a deep dive into the impacts of wholesale electricity prices (initial results published in February). It uses the same analysis as the October report but breaks down the results in a different way with a focus on consumers.

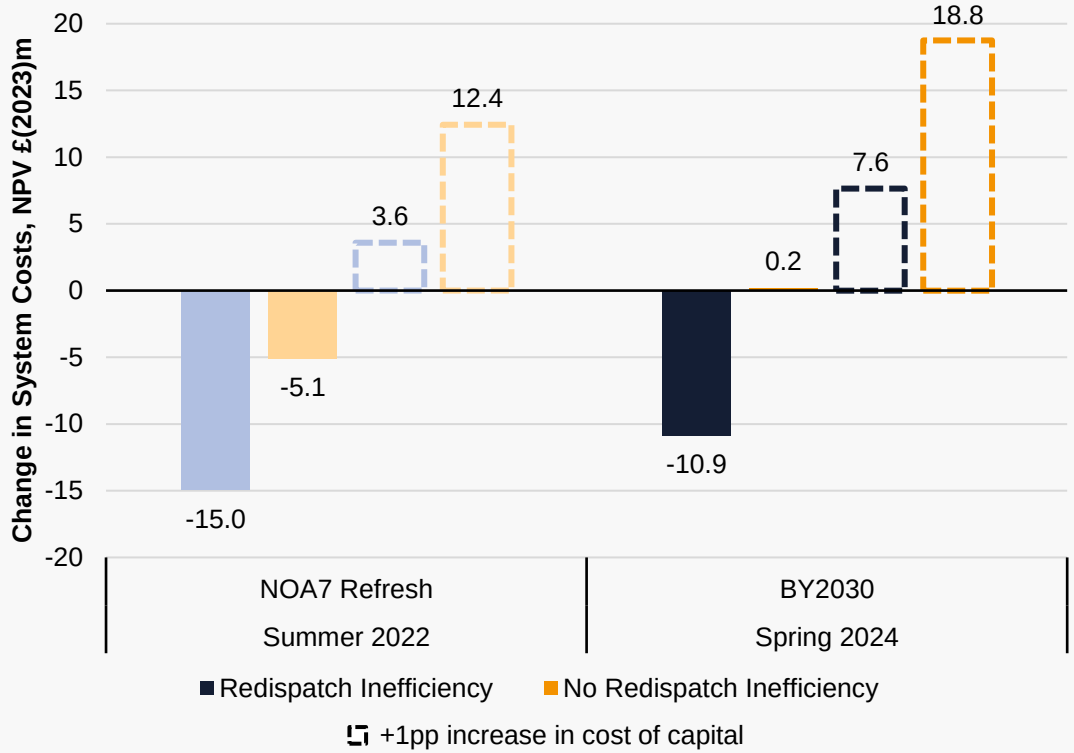
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Recap of Previous Analysis

Our previous analysis showed that increased network capacity and the ability to connect more offshore wind in Scotland under the 'Beyond 2030' plans from Spring 2024 significantly reduce the benefits of moving to zonal pricing

- LCP Delta's previous analysis for DESNZ (published March 2024) assessed the impacts of zonal pricing under now outdated network plans (the 'NOA7 refresh', from summer 2022) and had limited consideration of strategic infrastructure planning, such as offshore wind seabed leasing.
- Including the 'Beyond 2030' network plans from Spring 2024, along with fixing offshore wind locations based on seabed leasing, leads to a **significant reduction in the modelled system benefits of moving to zonal pricing to £0-11bn.** This is compared to the £5-15bn under the 'NOA7 Refresh' plans from Summer 2022.
- **The modelled system benefits of moving to zonal pricing are eliminated if interconnector redispatch reforms can be delivered to allow interconnectors to fully redispatch their capacity.** This is shown in the "No Redispatch Inefficiency" scenario in the report, where interconnectors can fully redispatch their flows under the current national pricing arrangement.
- **When considering the potential impact on investments, zonal pricing becomes a £8-19bn cost to the system** if a 1pp uniform increase in the cost of capital for all technologies (except nuclear) is assumed.
- **Increased network capacity reduces the system benefits of moving to zonal pricing.** Any plans to upgrade the network further is likely to reduce the system benefits further.
- The analysis in this report builds on the analysis in the Beyond 2030 scenarios to understand how the £0-11bn system impact breaks down across consumers and producers as well as by zone.

Change in modelled system costs from moving to zonal pricing under Summer 2022 grid plans and 'Beyond 2030' network plans



- **Redispatch Inefficiency** – Interconnectors are not able to be redispatched in the national market to deal with constraints, their flows are fixed at the day ahead stage.
- **No redispatch inefficiency** – Interconnectors can be fully redispatched in the national market to deal with constraints and essentially participate in locational balancing.

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Executive Summary



While there is a reduction in constraint costs under zonal pricing, wholesale prices increase under zonal pricing for 98% of demand in 2035

- Under zonal pricing, average wholesale prices vary across the country. Zones with high levels of renewable generation will tend to have lower prices and zones with higher demand will tend to have higher prices.
- Wholesale prices in 2035 would be higher under zonal pricing for most of the country compared to national pricing. Prices do decrease in Northern Scotland, but this only accounts for 2.3% of total demand in GB. This means wholesale prices increase under zonal pricing for 97.7% of demand in GB.
- The reason for increases is due to constraint costs transferring into the wholesale price. In a national market, the last plant on the system dispatches in the Balancing Mechanism as part of NESO's redispatch to deal with constraints. In a zonal market that plant moves into the wholesale market – lifting the wholesale electricity price.



The actual end consumer impact from zonal pricing is dependent on the allocation of 'congestion rents' and extent of grandfathering, plus investment

- Congestion rents are the primary driver of overall consumer benefits, but there remains an allocation question for policymakers as to how much of these are used for legacy arrangement costs (grandfathering) and therefore how much that leaves to be allocated to consumers. How the remainder is allocated to consumers geographically also needs to be decided.
- Higher investment costs arising from any increases in cost of capital would likely be passed through to consumers through higher CfD strike prices and Capacity Market clearing prices.
- Before these 3 key uncertainties, direct consumer costs (wholesale costs, constraint costs, policy costs) increase under zonal pricing. The congestion rents switches this to an overall benefit but this could be offset by the costs of legacy arrangements and higher investment costs. This makes the overall impact on consumers uncertain.



However, moving to zonal pricing would increase exposure to gas price shocks for the majority of the country in 2035

- Currently, gas sets the wholesale price over 95% of the time. Under a national market, our modelling shows the investment in clean power will decrease this to 20% by 2035.
- Under a zonal market, the number of periods where the wholesale price is set by gas actually increases for the majority of demand, with at least one zone being set by gas 27% of the time. This is due to the same driver of higher wholesale electricity prices under zonal - with gas plant moving from the Balancing Mechanism under national pricing into the wholesale market.
- This leaves consumers in most zones more exposed to gas price shocks than in a national market. Modelling shows that the already significant differences in wholesale price between a zonal and a national market could more than double in zones across England and Wales under a gas price shock similar to 2022.

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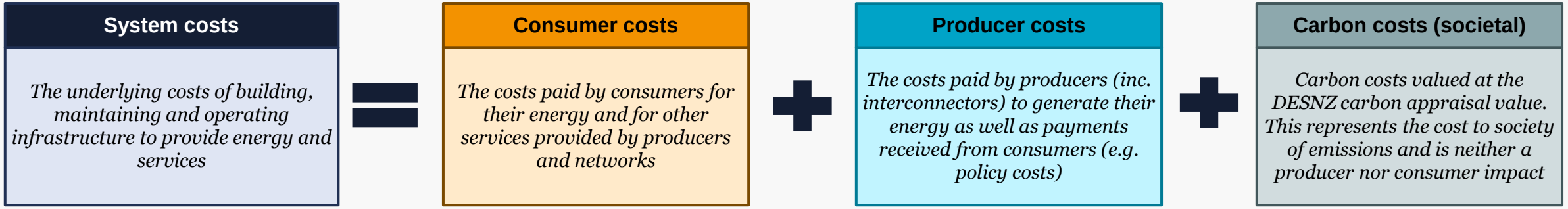
Impact of zonal pricing: System and consumer costs



System and consumer costs – What's the difference?

System cost impacts are the primary measure used in any government impact assessment on a potential policy with impacts on consumer and producer costs assessed as a secondary distributional impact

- Assessing the impacts of moving to zonal pricing requires modelling to understand the change in system costs of moving from a *national pricing counterfactual* to a *zonal pricing factual*. This approach aligns with Government value for money (VfM) guidance as set out in the 'Green Book'.
- As per government guidance and previous Impact Assessments (such as the Electricity Market Reform (EMR) Impact Assessment), system impacts are the primary measure used by government to assess the overall benefits of a policy or system change.
- This is then supported by assessing the redistributive impact on consumers and producers (consumer and producer costs). Consumer costs are all the costs that are then passed on to consumer bills. While an important impact to consider, consumer costs should not be used in isolation without considering the producer costs, as it only represents the impact on one part of the system so is not a reflection of the total system cost.
- The total system cost impact is the sum of the impact of consumers plus the impact on producers and the societal impact of carbon emissions as shown in the graphic below. System costs can also be broken down in an alternative way to show impacts on different types of cost (generation cost, capital costs, etc.). This is how system cost impacts have been presented in our previous analysis.
- Our analysis on the impacts of zonal pricing for government included impacts on both the system costs and consumer/producer costs but our updated analysis for SSE (including the Beyond 2030 network assumptions) published in October only assessed the system impacts given that is the primary measure used by government on overall impacts. In this report, we look at redistributive impact on consumers and producers in addition to the impact on the system as a whole.



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Consumer costs – Breaking it down

Many of the costs to consumers will change under zonal pricing, not just wholesale prices

Wholesale prices are only one part of the overall electricity bill for consumers. A move to zonal pricing would also impact other parts of the consumer cost. The table below outlines how the elements of the consumer cost are likely to be impacted under zonal pricing:

Consumer Cost	Overall direction of change under zonal compared to national	Comment
Wholesale Costs		Some zones will see wholesale prices decrease under wholesale but for the majority of zones across the country, wholesale prices will increase. This is due to cost of constraints now being factored into the wholesale price rather than in constraint costs. As a result, the total wholesale cost across all consumers will increase under zonal pricing, despite falls in prices in some areas.
Constraints Costs		With constraint costs now being factored into wholesale costs, constraint costs will decrease significantly under zonal. Some constraint costs may remain for constraints within zone, but these are likely to be small as key constraints should lead to splits across zones. Removal of constraint costs and moving these to wholesale also means that assets are no longer paid to turn-down generation.
Congestion Rent		Under zonal pricing, the system operator will collect congestion rents through buying power in a cheaper zone and selling in a more expensive zone. Generally, it is assumed this benefit is passed through to consumers through reduced network charges. However, there remains an allocation question as to how much of these will be used to fund the cost of legacy arrangements, as well how this is shared geographically to counter differences in wholesale prices.
Policy Support costs		Policy costs cover costs from renewable support schemes, such as the CfD, and Capacity Market. Wholesale prices are a key driver of CfD Policy costs (which will make up the bulk of policy costs in the long term), as this will change the CfD top-up that is required. Assets located in zones with lower wholesale prices (such as Northern Scotland) will see policy support payments increase while assets in zones with higher prices will see policy support payments decrease. With a lot of wind capacity likely to be located in Northern Scotland, this makes the overall impact of zonal pricing on policy costs uncertain as policy costs for these plants increase, whereas policy costs for plants in the south of the country will decrease. Indeed, there may be a question about whether these policy costs are continued to be recovered across all GB consumers or by zone.
Legacy arrangement costs (Grandfathering)		A move to zonal pricing introduces a new and greater market risk for legacy assets and investments made during the transition. DESNZ has provided an indication that it will provide financial protections for at least a proportion of these assets, but the overall nature and extent of this support is still uncertain. This will be an additional cost that will need to be paid for by consumers in some form, likely from reducing congestion rents. The extent of these protections is likely to have a wider impact on investor confidence, for example, lower protection could result in a larger impact on the cost of capital for future investments.
Investment costs (Cost of Capital)		Changes in the cost of capital for building new assets are likely to be passed through to consumers in some form. A higher cost of capital, as a result of moving to zonal pricing, could lead to increases in CfD strike prices or Capacity Market clearing prices which would increase costs for consumers. The scale of the investment impact will be driven by the level of market volatility, liquidity, legacy arrangements and other transitional risks, including to upcoming CfD auctions, amongst other factors.

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System costs – Key uncertainties for consumer end prices

There are still several key decisions to be taken by DESNZ that leave the overall impact on consumers uncertain at this stage.

Congestion Rents

Previous analysis, including our report for DESNZ, has assumed that the congestion rent is fully passed through as a benefit to consumers, but DESNZ will need to make a policy decision on how to allocate these. There are other possible uses for congestion rents such as being used to pay for funding legacy arrangements costs, the operation of the market, or other system costs.

Legacy Arrangements

DESNZ has indicated that some legacy assets negatively impacted by a move to zonal pricing could receive some form of legacy arrangement support (grandfathering) but have not confirmed the detail on the extent of this support. There are key questions for DESNZ to consider on the dimensions of any legacy arrangement support package including which assets would be supported, the cut off for support (e.g.: up to AR7, up to AR8 or all assets up to the implementation of zonal) and how long they will be supported for (duration of support contract, fixed period or full economic life of asset). Decisions on these will affect the total cost of legacy arrangements and therefore the impact these have on total consumer costs.

Investment impacts

The inherent complexity and uncertainty around the introduction of zonal pricing could mean that investors see GB power investments as riskier leading them to require a higher WACC (weighted average cost of capital). This will likely flow through as an impact on consumers in various ways such as through increased CfD strike prices or Capacity Market clearing prices. The extent of legacy arrangements and other government measures will directly impact the cost of capital change from moving to zonal pricing. As shown in our previous study, only a small increase in the cost of capital can wipe out the modelled system benefits of zonal pricing, with further increases resulting in zonal pricing becoming a net system cost.

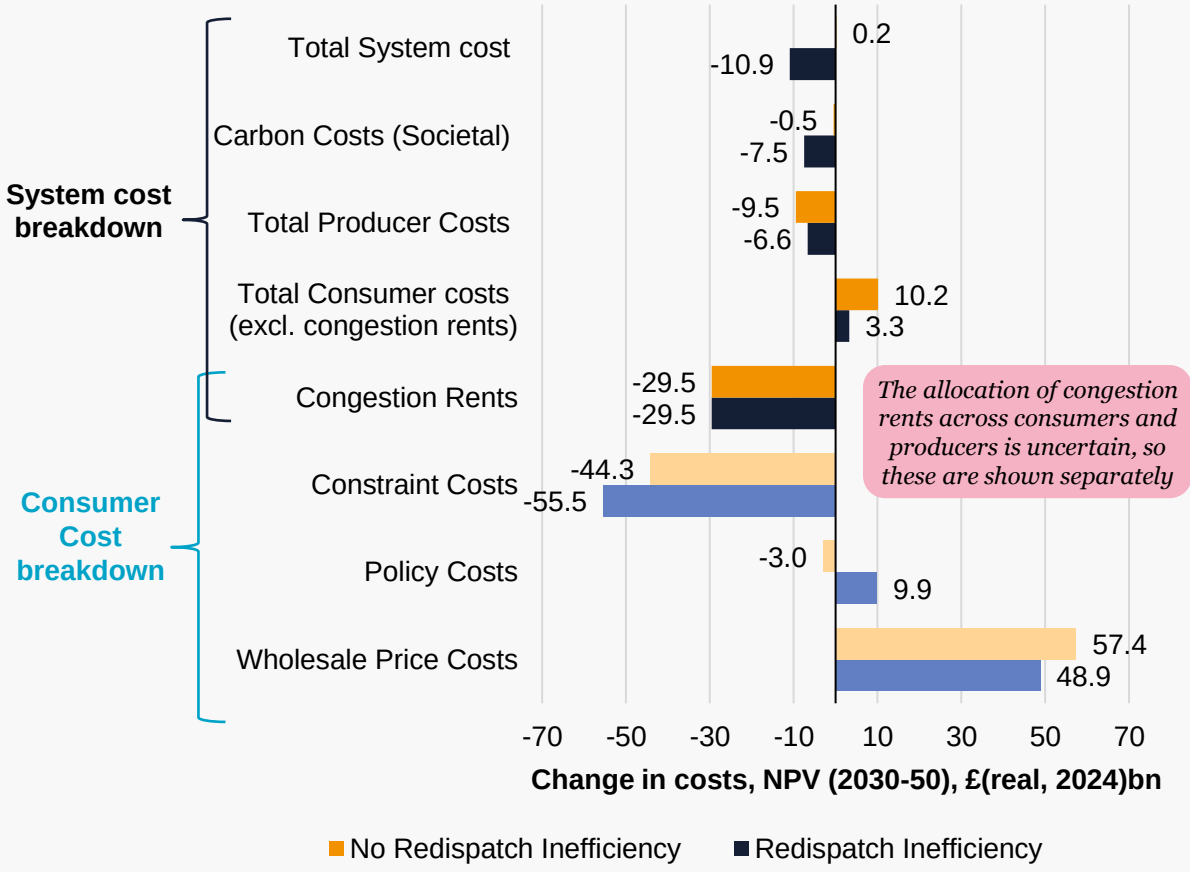
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System costs – Impacts of moving to zonal pricing

Total system benefits of moving to zonal range from £0-11bn

- Without any impact assumed on cost of capital, moving to zonal pricing decreases electricity system costs by £10.9bn in the 'Redispatch inefficiency' scenario and increases system costs by £0.2bn in the 'No Redispatch Inefficiency' scenario.
- Under both scenarios, there is a transfer from producers to consumers with the producer costs increasing by £20-23bn and the consumer costs decreasing by £19-26bn.
- The social cost of carbon makes up the remainder of the system impact with a decrease of £0.5-7.5bn when moving to zonal pricing. This is driven by changes in emissions. The impact is higher in the Redispatch inefficiency scenario as the change in interconnector flows when moving to zonal enables more gas generation to be replaced.
- The consumer costs can be broken down as follows:
  - **Wholesale price** costs increase by £49-57bn as prices increase in the highest demand zones compared to the national market. This is mainly due to constraint costs effectively moving into wholesale prices.
  - **Constraint costs** decrease by £44-56bn as the cost of constraints are factored into wholesale prices under zonal pricing.
  - **Policy costs** range from a £3bn decrease to a £10bn increase largely due to increased CfD top up payments in zones with lower wholesale prices.
  - **Congestion rents** are represented as being separate from other consumer costs to show that the allocation of these costs has a large impact on the overall consumer benefit. These congestion rents represent £30bn in costs so will be the key driver of any consumer benefit. Congestion rents will likely be used for the cost of legacy arrangements so the extent of these grandfathering arrangements will be vital in determining the overall impact on consumers.
  - The impacts shown here do not include the impact of investment costs which will increase both the system and consumer costs.

Overall system cost change of moving to zonal pricing in no redispatch inefficiency and redispatch inefficiency scenario broken down by consumer and producer impacts



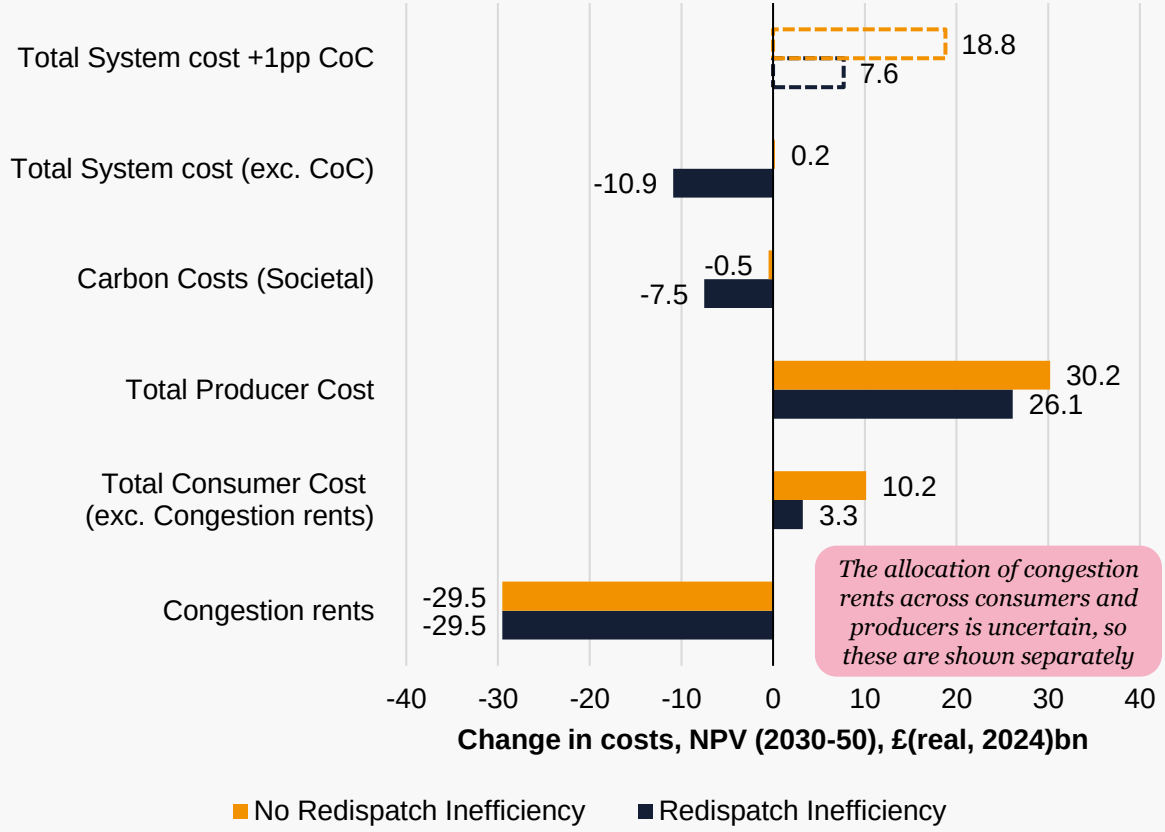
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System costs – Investment impacts

Increases in cost of capital wipe out the system benefits of moving to zonal pricing

- The cost of capital is the expected return required by investors to undertake investments. The higher the uncertainty around future cash flows, the higher the risk for an investor, and therefore the higher the cost of capital.
- The inherent complexity and uncertainty around the introduction and design of a zonal pricing market, alongside an inherent and enduring level of uncertainty, could mean that investors see GB power investments as riskier leading them to require a higher WACC (weighted average cost of capital).
- Our previous analysis tested a range of impacts and showed that only a small increase of 0.6pp in the cost of capital in the Redispatch Inefficiency scenario wipes out the system benefits of moving to zonal pricing. Here we have tested the impact of a potential 1pp increase in cost of capital across the two scenarios.
- When considering the potential impact on investments**,** a 1pp uniform increase in the cost of capital for all technologies (except Nuclear) **makes introducing zonal pricing a net £8-19bn cost to the system.**
- The immediate impact of a higher cost of capital is on producers as this raises the costs of developing new projects.. However, this increase in costs is likely to be passed through to consumers through increased CfD clearing prices and Capacity Market clearing prices. This means the investment impact could also lead to increase in consumer costs as well as system costs

Overall system cost change of moving to zonal pricing including Cost of Capital Impact



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2035 deep dive: Wholesale prices and consumer impact

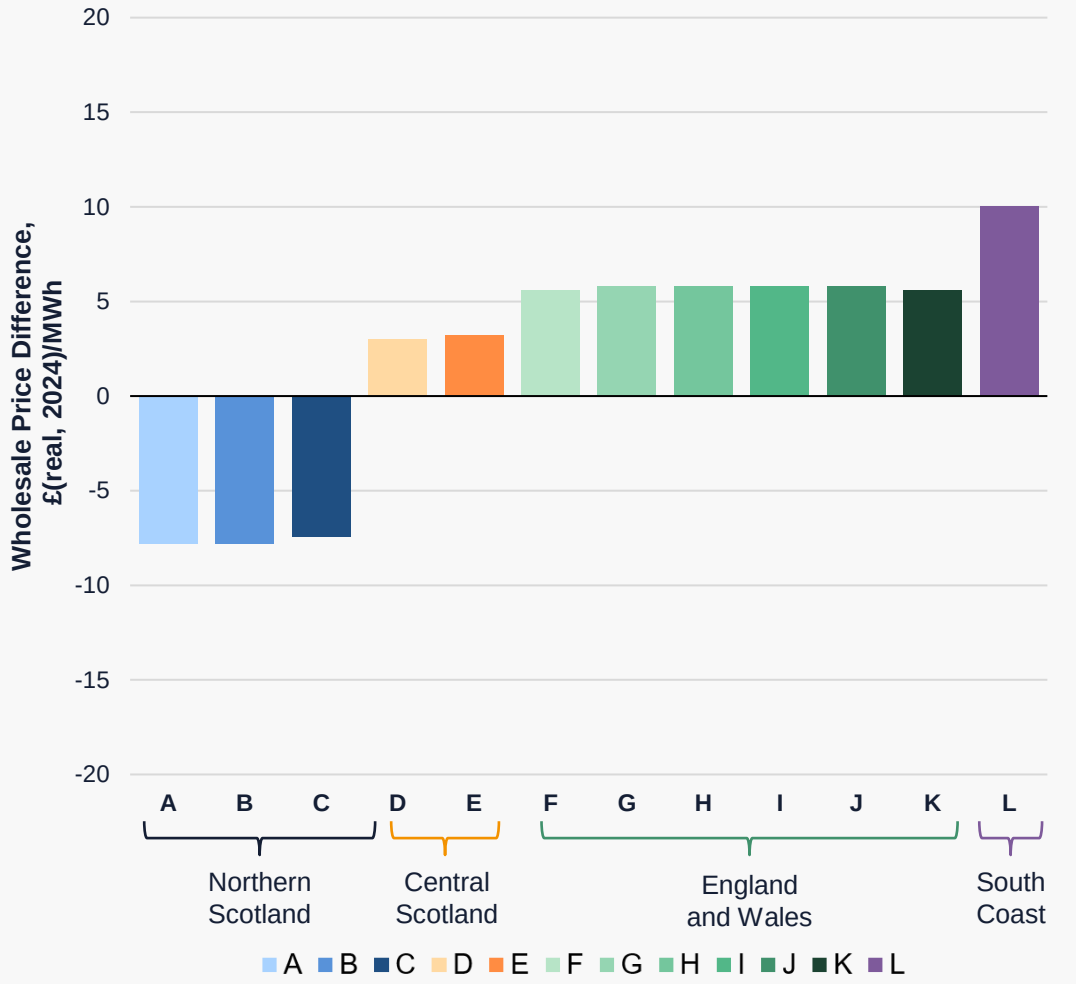


Wholesale prices in 2035 – Recap

Under zonal pricing, wholesale prices will be higher across most of the country

- Under zonal pricing, average wholesale prices vary across the country. Zones with high levels of renewable generation will tend to have lower prices and zones with higher demand will tend to have higher prices.
- Wholesale prices in 2035 would be higher under zonal pricing for most of the country compared to national pricing. This is a result of constraints being factored into the wholesale price in the zonal market whereas in the national market, this is dealt with through redispatch in the Balancing Mechanism (BM) – outlined in more detail on page 22.
- The chart opposite shows the difference in price in each zone under zonal pricing compared to the national pricing counterfactual for the 'Redispatch Inefficiency' scenario. The 12 zones modelled can be grouped into four key areas:
  - **Northern Scotland** (zones A, B and C) where zonal prices are on average £8/MWh lower compared to the national price due to high renewable penetration and relatively low demand.
  - **Central Scotland** (zones D and E) where prices are on average £3/MWh higher. Although this area also has high levels of renewables, constraints in between Northern and Central Scotland mean the price does increase slightly compared to national pricing.
  - **England and Wales** (zones F to K) where prices are £6/MWh higher under zonal pricing. This reflects thermal assets, such as unabated gas, regularly setting the price in these zones.
  - **The South Coast** (zone L) where prices are £10/MWh higher under zonal pricing. This zone is often constrained meaning thermal assets, such as unabated gas, regularly set the price in this zone.

Price difference between zonal and national wholesale prices in 2035



Based on DESNZ scenario

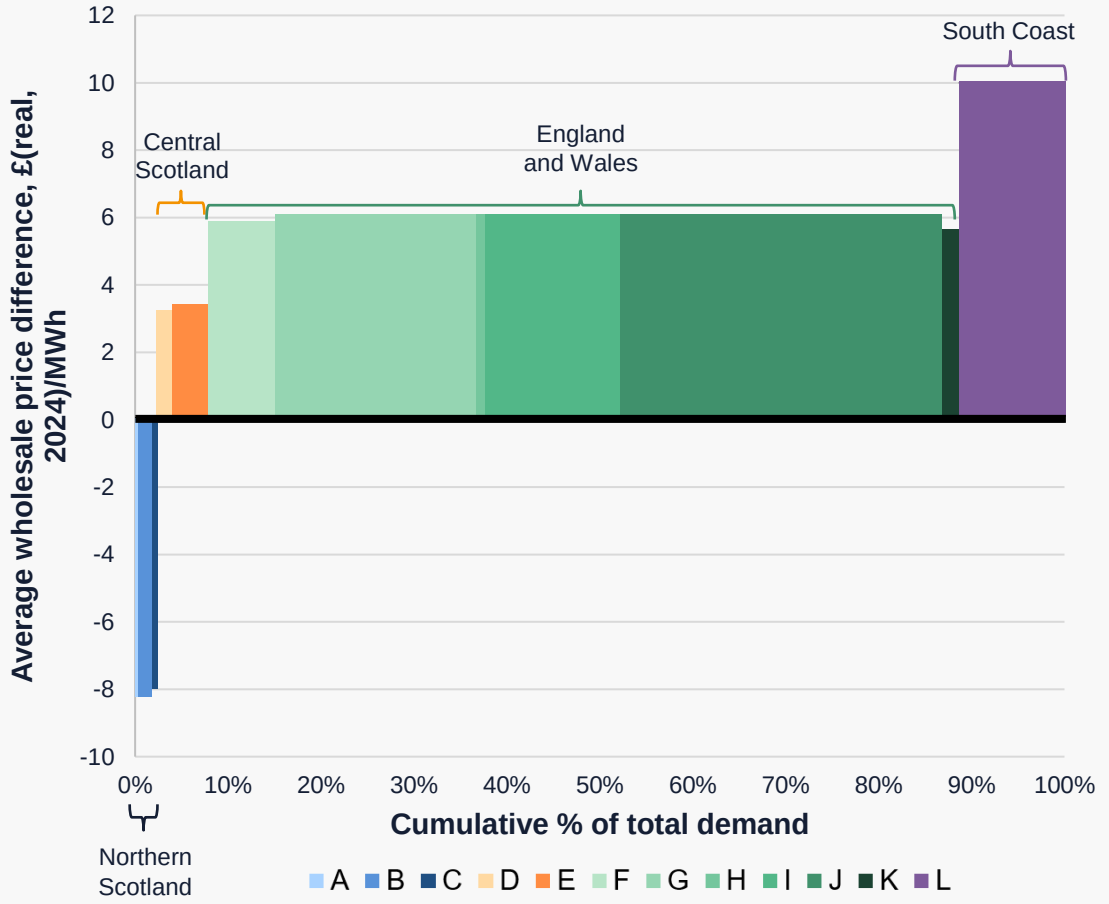
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Wholesale prices in 2035 – Demand weighted

More than 97% of consumers see wholesale prices rise when moving to zonal pricing

- **Wholesale prices increase under zonal pricing for 97.7% of demand.** Although we do see prices decrease in Northern Scottish zones, these zones only account for 2.3% of total demand.
- The chart opposite shows the change in wholesale prices across each zone weighted by the level of demand in each zone. This highlights how wholesale prices increase for nearly all consumers across the country. This shows:
  - 2.3% of demand sees prices decrease by £8/MWh (Northern Scotland)
  - 5.7% of demand sees prices increase by £3/MWh (Southern Scotland)
  - 80.6% of demand sees prices increase by £6/MWh (England and Wales)
  - 11.4% of demand sees prices increase by £10/MWh (South Coast)
- The South Coast shows the largest increase in wholesale prices from a move to zonal pricing. The proportion of total demand within this zone is much larger than the total demand in Northern Scotland, meaning that **5 times more consumers would face wholesale price increases of £10/MWh than would see savings of £8/MWh** under a move to zonal pricing.

Price difference between zonal and national wholesale prices, weighted by demand



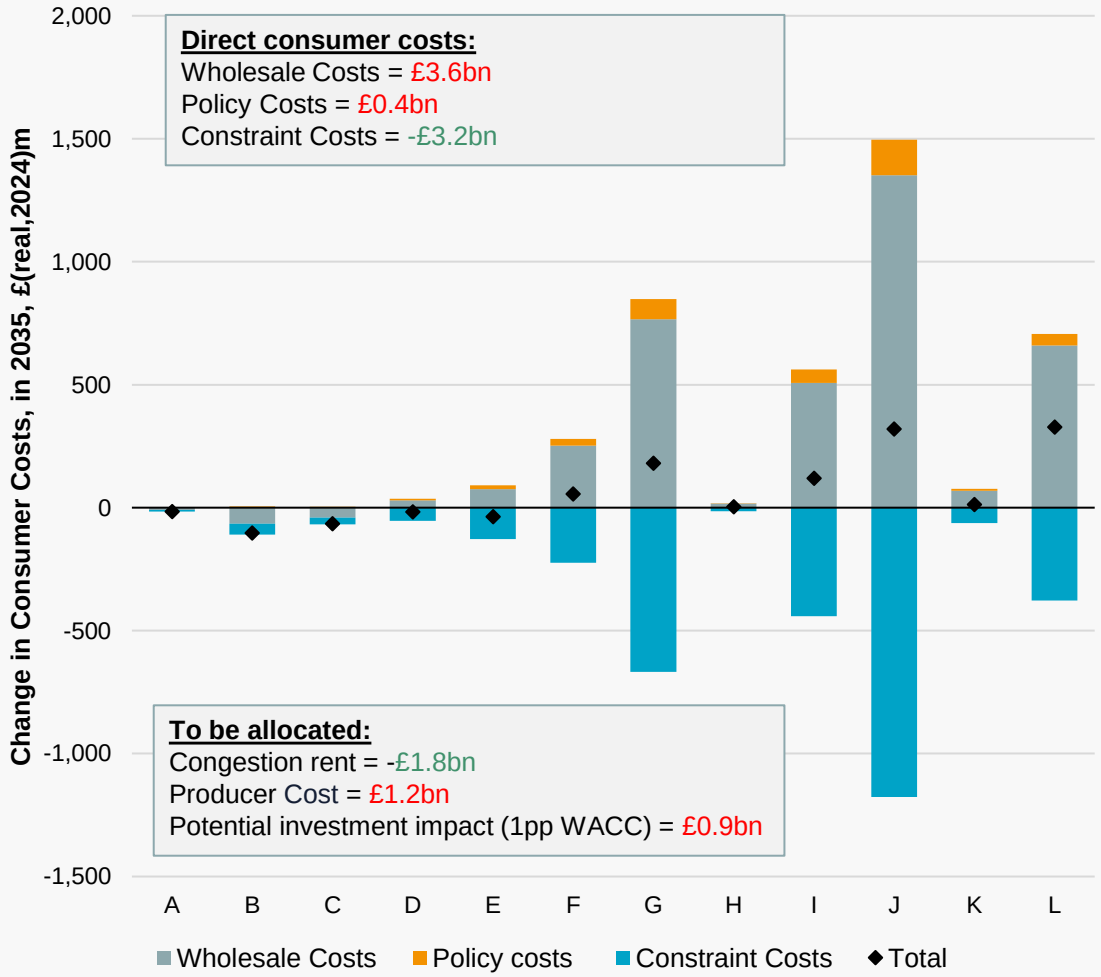
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Consumer costs in 2035 – Breaking it down

The impact on consumers in each zone also depends on the key uncertainties on allocation of congestion rents and extent of grandfathering and investment impacts

- The change in wholesale prices under zonal pricing, mean the wholesale cost element of consumers costs increase for consumers in all zones except Northern Scotland.
- Alongside wholesale costs, constraint costs and policy costs are more easily distributed per zone with costs split across zones based on demand in each zone. This means that the direct consumer costs show a slight decrease in Scottish zones and an increase in all zones in England and Wales – **with a total direct cost to consumers of £0.8bn**.
- However, policymakers would need to determine how they would allocate the congestion rent that would arise – £1.8bn under DESNZ's scenario in 2035.
- A first consideration for this congestion rent would likely be to cover any legacy arrangements to protect existing investment. This will cover at least a proportion of the £1.2bn increase in producer costs under zonal. The remaining congestion rent could also be used to mitigate regional differences that arise from wholesale electricity prices under a zonal market. The DESNZ Secretary of State has in effect committed to this redistribution at the end of April, if the government was to adopt zonal pricing.
- This means the overall impact on a zonal basis would depend on whether consumers see an overall benefit from moving to zonal pricing. As shown on the next slide, this is highly dependent on how much of the congestion rent is needed for legacy arrangement costs (offsetting part of-producer losses) as well as any impact on investment.
- **Overall, there is a net system benefit in 2035 of £160m**, but if there is a 1pp increase to the cost of capital for low carbon generation **this becomes a £730m cost**.
- In the 'Redispatchy efficiency' scenario where interconnectors can be redispatched, this net system benefit in 2035 falls to £70m benefit, and a becomes a £840m cost with a 1pp cost of capital impact for low carbon generation.

Overall consumer cost change in 2035 of moving to zonal pricing in the 'Redispatch Inefficiency' scenario, split by zone

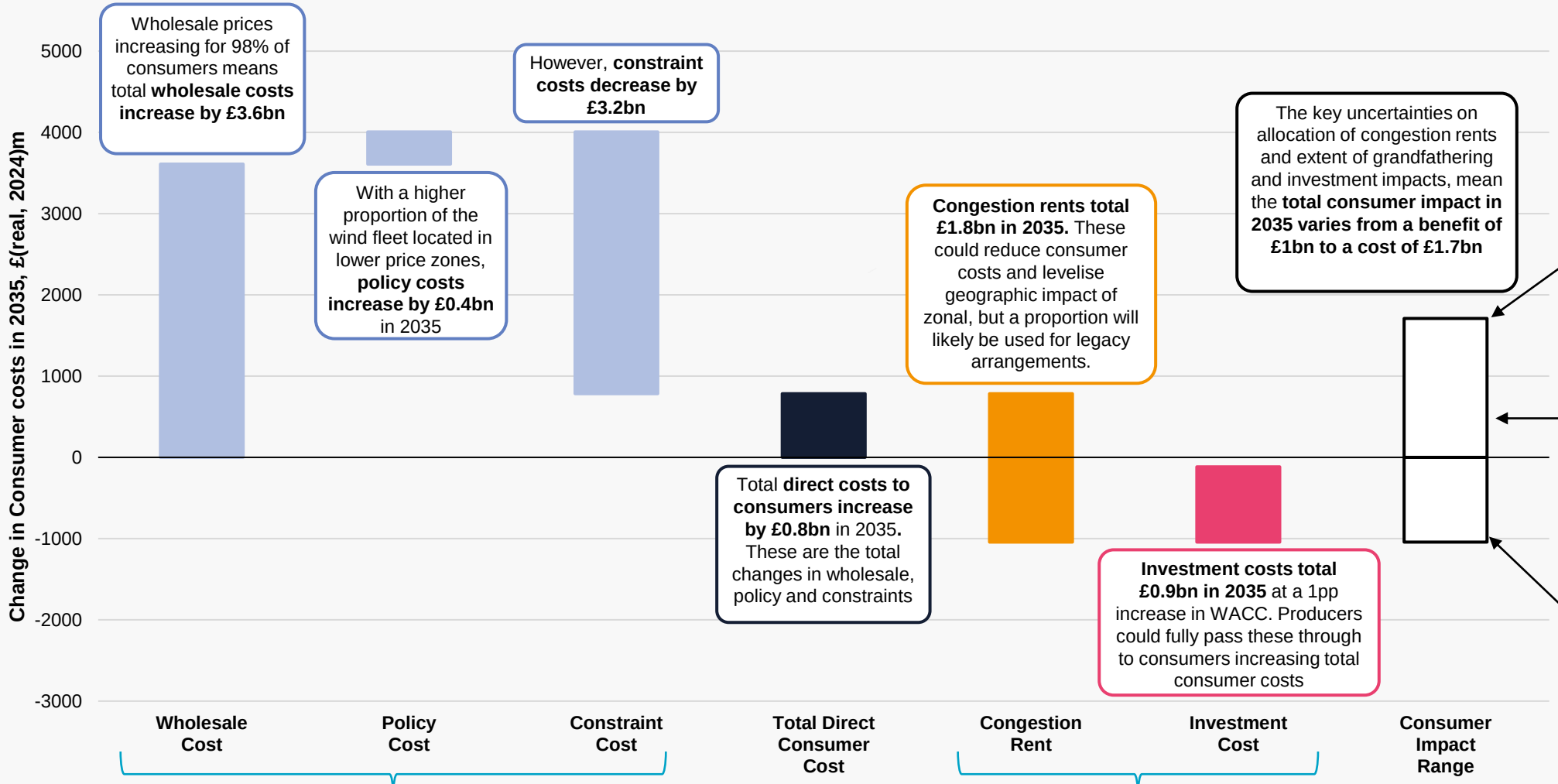


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Consumer costs in 2035 – What will be the actual impact?

The key uncertainties on allocation of congestion rents and extent of grandfathering and investment impacts make the overall impact on consumers uncertain

Waterfall chart showing overall consumer cost change in 2035 of moving to zonal pricing in the 'Redispatch Inefficiency' scenario



Consumer costs increase by £1.7bn if no congestion rents are allocated to consumers (i.e.: they are fully needed to fund legacy arrangements) and investment costs increase is fully passed through to consumers

Costs are most likely to fall somewhere within this range as a proportion of congestion rents (with rest used for grandfathering) are passed to consumers and there is some investment impact

Consumer costs reduce by £1bn if congestion rents are fully passed to consumers (i.e.: none used for grandfathering) and there is no investment impact – although the two are linked, as less legacy arrangements will lead to higher risk for future investors

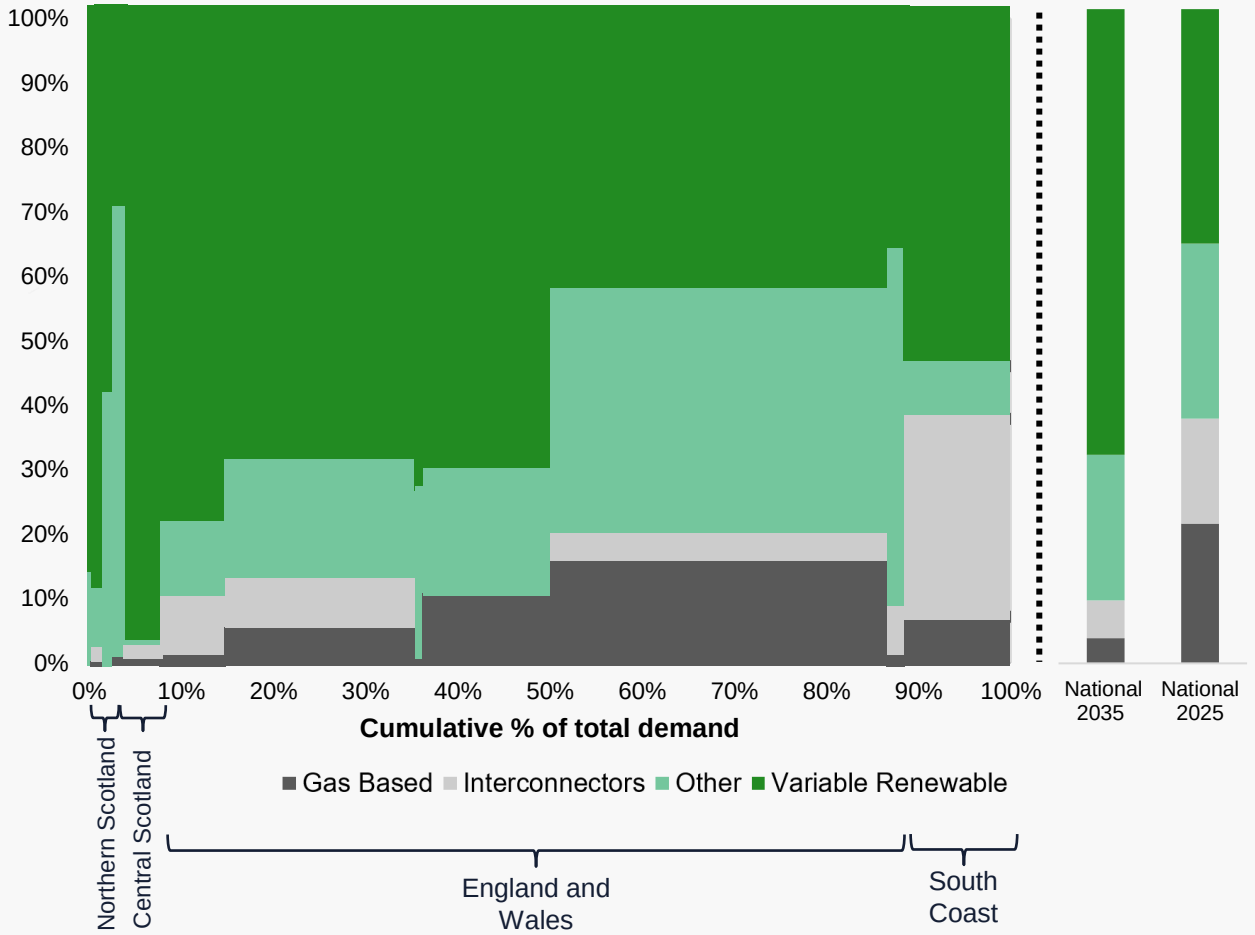
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Wholesale prices in 2035 – Increased gas price exposure

Zonal pricing increases the periods when gas is setting the price on the system for the majority of demand, and leaves some zones heavily impacted by interconnectors

- As the system decarbonises, exposure to gas price shocks is reduced. Currently gas sets the price in the majority of hours, but this reduces significantly by 2035 as low carbon generation sets the price on a more regular basis.
- A shift to zonal pricing is likely to increase the wholesale market's exposure to gas price shocks. Under national pricing, gas sets the wholesale electricity price in 20% of periods whereas under zonal pricing, **gas sets the price in at least one zone during 27% of periods – an increase of more than a third.**
- This shift is driven by a higher percentage of gas-based generation within individual zones compared to the national average as shown in the graph opposite. Zones I (Midlands) and J (London/South Wales), for example, both rely heavily on gas, and together account for over 50% of national demand – meaning the majority of consumers would be more frequently exposed to gas-driven prices.
- Interconnectors also set the price on a more regular basis under a zonal market increasing the wholesale market's exposure to changes in connected markets (e.g.: the issues seen in the French Nuclear fleet in 2022). Under national pricing, interconnectors set the wholesale electricity price in 36% of periods whereas under zonal pricing, interconnectors set the price in at least one zone during 53% of periods.

% of generation in wholesale market by technology in each zone (demand weighted) compared to national under the 'Redispatch inefficiency' scenario in 2035



*Gas based includes both unabated gas and Gas CCS
** Interconnectors in the above graph represents import into the zone only, it does not include exports.
***'Other' includes storage, renewables and other low carbon generation (e.g.: Nuclear)
Note that the chart shows the split of generation in each zone with the thickness representing the % of total national demand in that zone.

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2035 deep dive: Gas price sensitivity

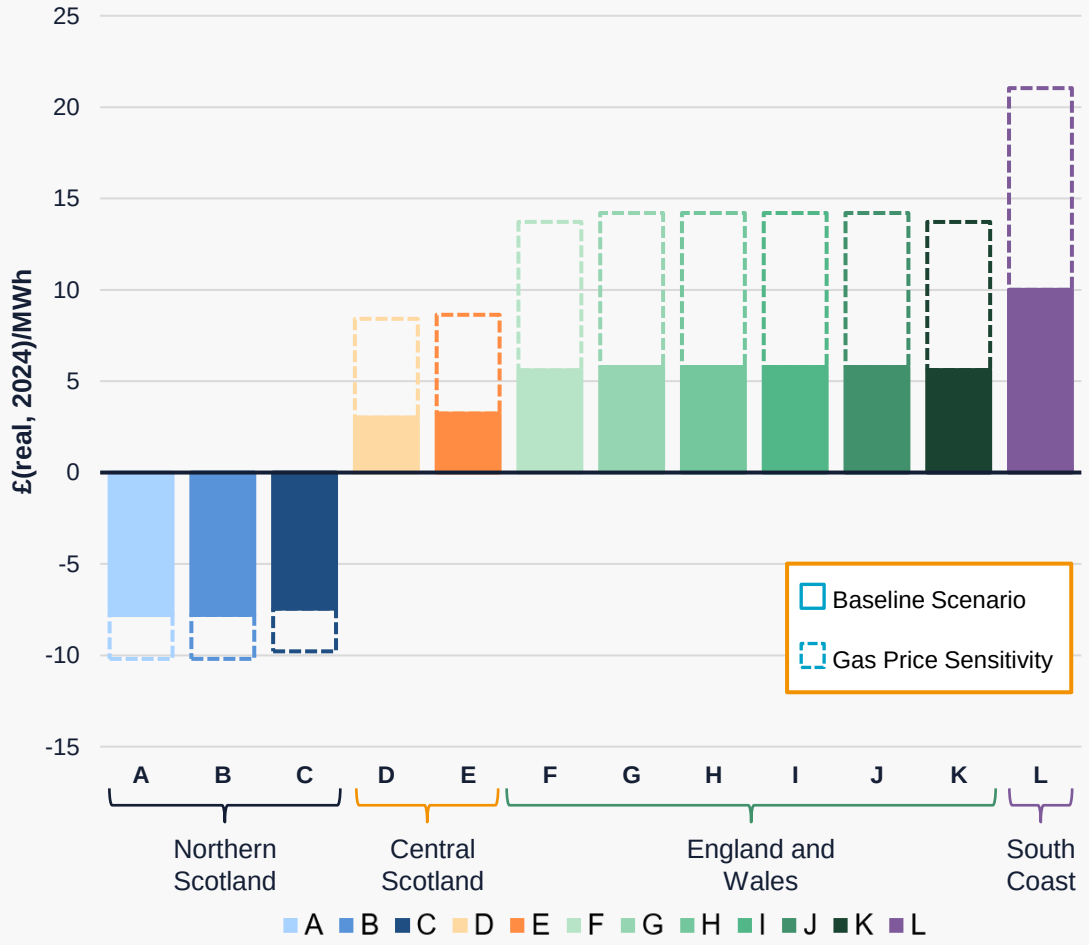


Wholesale prices in 2035 – Gas price sensitivity

Most consumers in GB will be more exposed to gas price shocks under zonal pricing

- While a gas price shock will have a lower impact as the system decarbonises compared to the recent energy crisis, gas will continue to be a price setter in the GB power market to some extent (whether through unabated gas, gas CCS, hydrogen or interconnectors). This means the future system will still be exposed to gas price risk under both national and zonal pricing.
- To test the impact that a gas price shock would have under zonal pricing compared to national pricing, we have run a gas price sensitivity where gas prices increase to the levels seen during the 2022 energy crisis (£2.73/therm) in 2035 under both national and zonal pricing.
- This shows that **the already significant differences in wholesale price between a zonal and a national market could more than double in zones across England and Wales.** Across the 4 key areas we see:
  - The difference in national and zonal wholesale prices in Northern Scotland decreases from £8/MWh with baseline gas prices to £10/MWh under the gas price sensitivity as gas linked assets rarely set the price in these zones.
  - In Central Scotland, the difference between national and zonal wholesale prices increases from £3/MWh with baseline gas prices to £7.50/MWh under the gas price sensitivity
  - Across England and Wales, the difference between national and zonal wholesale prices more than doubles from £6/MWh with baseline gas prices to £13/MWh under the gas price sensitivity
  - In the South Coast, the difference between national and zonal wholesale prices more than doubles from £10/MWh with baseline gas prices to £21/MWh under the gas price sensitivity.

Price difference between zonal and national wholesale prices in 2035 with high gas price sensitivity



Based on DESNZ scenario

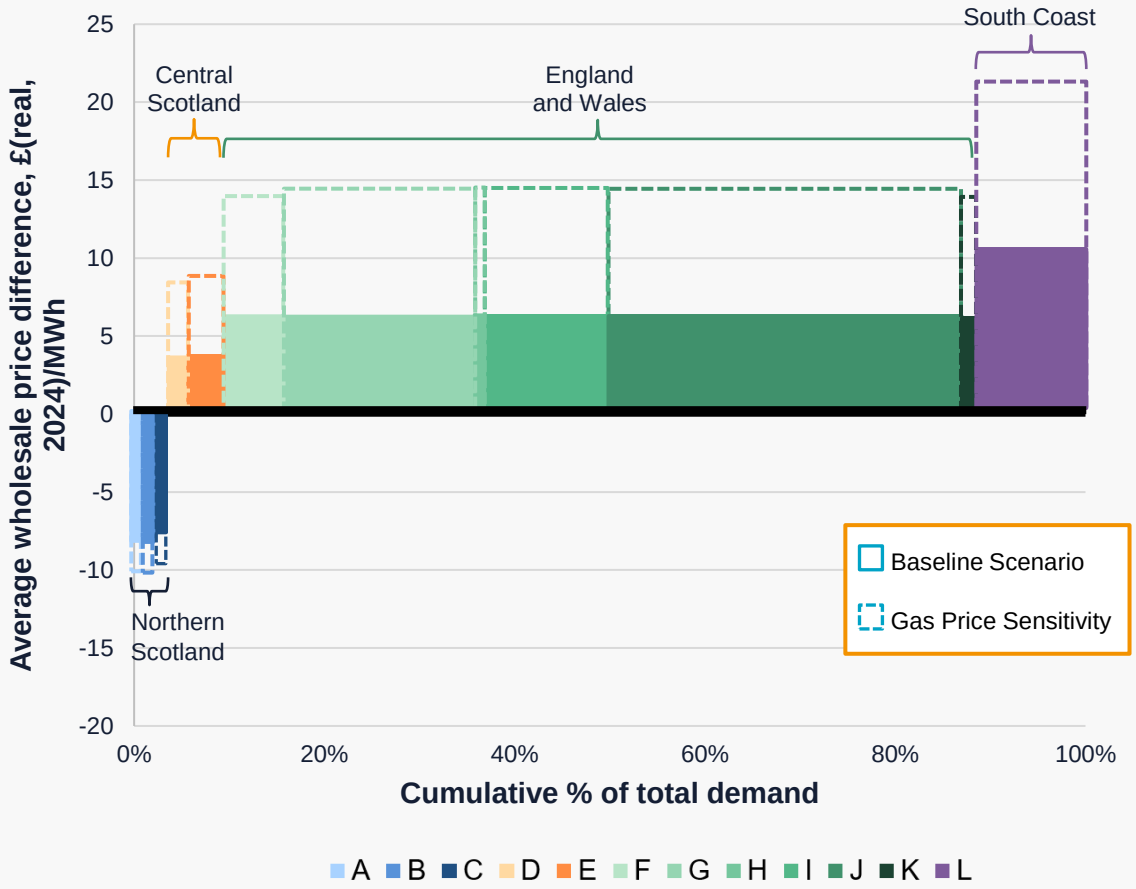
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Wholesale prices in 2035 – Gas price sensitivity, demand weighted

98% of consumers are more exposed to gas price shocks under zonal pricing

- Taking the proportion of demand within each zone, **97.7% of demand see substantial increases in their wholesale costs as a result of increased gas price exposure.**
- The chart opposite shows the change in wholesale prices across each zone weighted by the level of demand in each zone under the gas price sensitivity. **This shows that for 97.7% of demand in GB, wholesale prices double under a gas price shock sensitivity.**
  - 2.3% of demand sees prices decrease by £10/MWh (Northern Scotland), down from £8/MWh in the baseline scenario. The decrease is larger under the gas price sensitivity as Northern Scotland is less exposed to gas prices.
  - 5.7% of demand sees prices increase by £7.5/MWh (Southern Scotland), up from £3/MWh in the baseline scenario
  - 80.6% of demand sees prices increase by £13/MWh (England and Wales), up from £6/MWh in the baseline scenario
  - 11.4% of demand sees prices increase by £21/MWh (South Coast), up from £10/MWh in the baseline scenario

Price difference between zonal and national wholesale prices in 2035 with high gas price sensitivity (2022 levels)



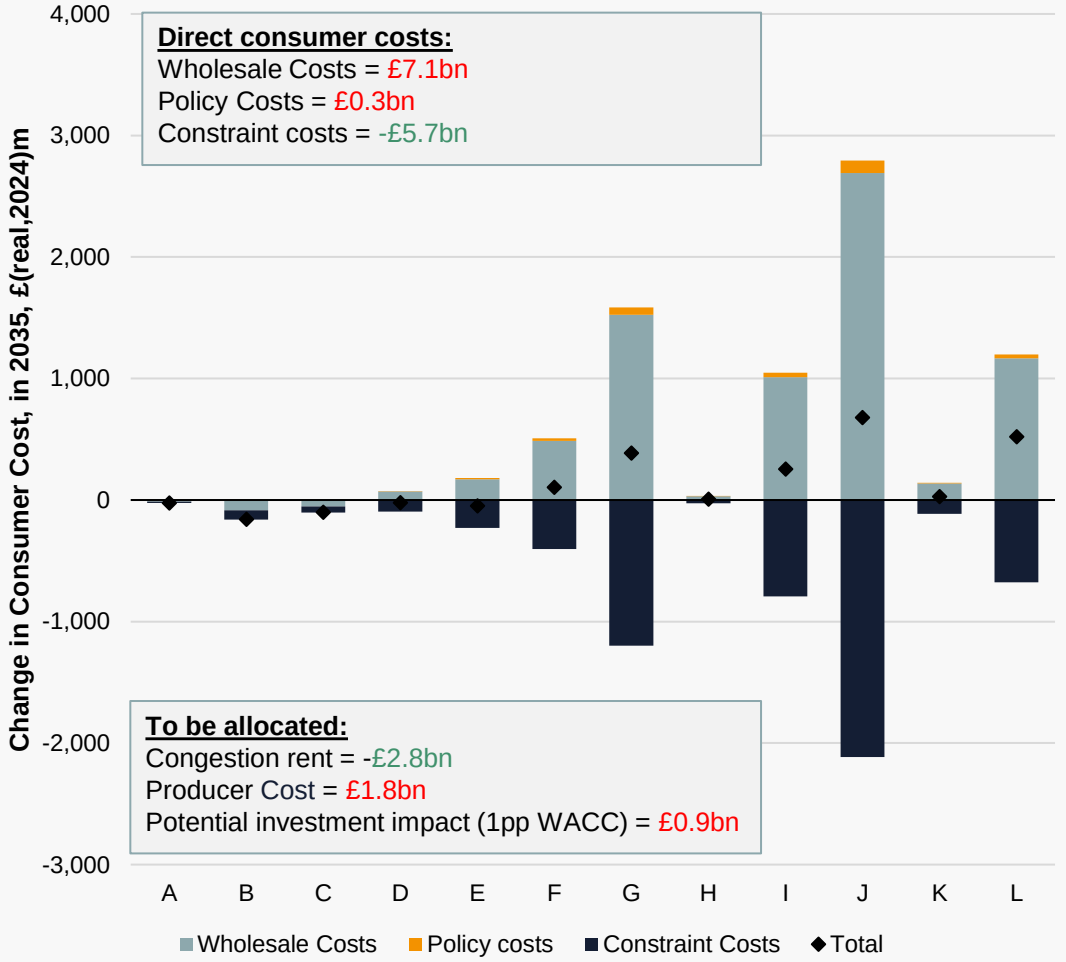
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Consumer costs in 2035 – Gas price sensitivity

The key uncertainties on allocation of congestion rents and extent of grandfathering and investment impacts make the overall impact on consumers uncertain

- Wholesale prices are only one part of the overall electricity bill for consumers. A change in the gas prices will also impact other elements of direct consumer costs as well:
  - Constraint costs in the national market also increase as gas is paid more to turn-up, however the impact is lower than the increase in wholesale costs from a move to zonal. This is due to the higher gas price increasing infra-marginal rents by a greater amount for other generators.
  - The change in wholesale price under the gas price sensitivity changes the policy costs. The change in policy costs under zonal will be higher for plants in Northern Scotland (due to lower wholesale price) but lower in the rest of the country compared to the baseline scenario.
  - Similar to the main scenario, this means that the direct consumer costs show a slight decrease in Scottish Zones and an increase in all zones in England and Wales. **However, total direct costs to consumers are higher at £1.6bn** (up from £0.8bn in the baseline scenario).
- The higher wholesale prices increase the congestion rents under the gas price sensitivity as the price disparity between zones is higher compared to the baseline scenario. This increases to £2.8bn in 2035 under the gas price sensitivity compared to £1.8bn in the normal gas price run.
- Costs to producers also increase to £1.8bn with a proportion of this likely passed back to consumers through legacy arrangement costs. Investment costs at 1pp WACC remain unchanged at £0.9bn as gas price does not affect these.
- Once again, this means the overall impact on a zonal basis would depend on whether consumers see an overall benefit from moving to zonal pricing. This is highly dependent on how much of the congestion rent is needed for legacy arrangement costs (offsetting part of producer losses) as well as any impact on investment.

Overall consumer cost change in 2035 of moving to zonal pricing in the 'Redispatch Inefficiency' scenario under gas price sensitivity



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Annex 1: Further Insights

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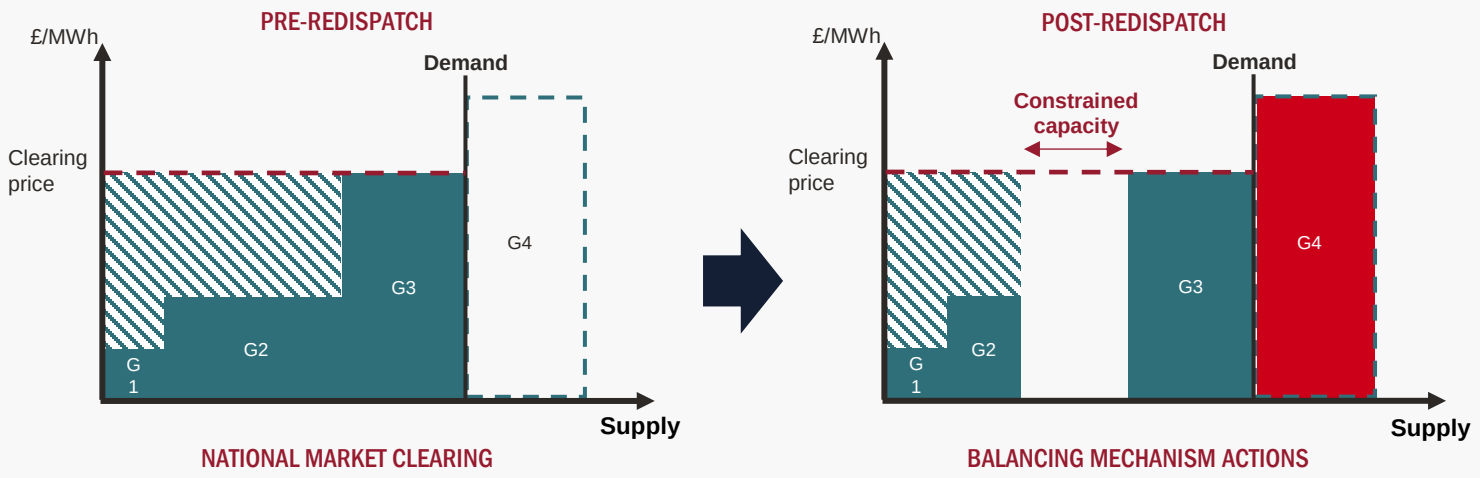
What's driving the increase in wholesale prices in zonal?

In a national market, the last plant on the system dispatches in the Balancing Mechanism. In a zonal market that plant moves into the wholesale market – lifting the wholesale electricity price

In a national market, higher cost actions to balance supply and demand (like turning on gas) are paid for separately in the Balancing Mechanism and doesn't affect the wholesale price. In a zonal market, those same actions are no longer separate and instead raise the wholesale price for everyone in that zone.

Stylised illustration

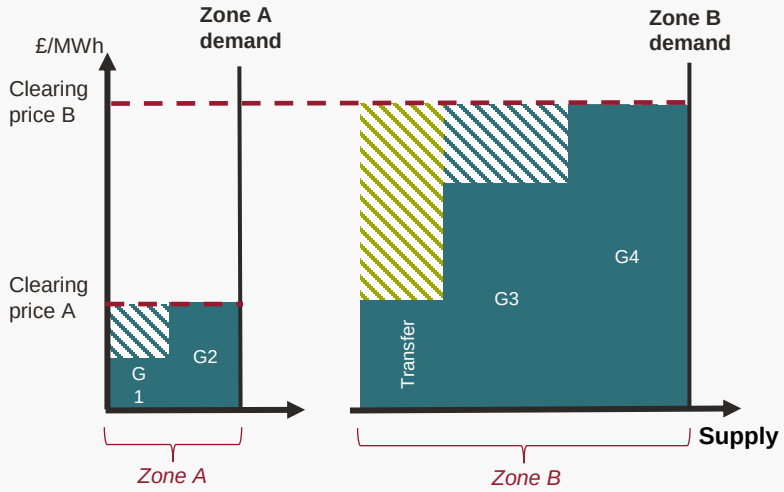
NATIONAL MARKET



- In the national market, a single clearing price is set that balances national supply and demand.
- It does not consider transmission constraints on the system at this stage – these are considered closer to delivery in the Balancing Mechanism (BM) (right).

- Actions are taken in the BM to balance supply and demand by adjusting the cleared market (left) for network constraints. In this example:
  - G2 is *constrained off*, due to insufficient network capacity; therefore
  - G4 must be *constrained on* to replace G2 and ensure demand is met.
- This "redispatch" action leads to an incremental cost to the system that consumers pay for via constraint payments.
- In a national market, there is no change to the wholesale market clearing price as a result.

ZONAL MARKET



- In the zonal market, the same physical dispatch is achieved as the post-redispatch outcome in the national market.
- However, while the cost of redispatch is avoided, the cost of G4 sets the clearing price in zone B, increasing the wholesale cost for all consumers in zone B compared to a national market.
- If G4 is a gas (or gas linked) plant, this means that zone B, which covers a larger share of demand, is more exposed to gas the gas price and any associated volatility or price shocks.

Key: Inframarginal rent earned on output; Payment to constrained on generator; Congestion rent

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Impact of transitional costs and implementation timeline

The potential for earlier benefits of a Reformed National Market is not reflected in modelled scenarios

The evidence is clear that the estimated benefits of zonal pricing decline with network build, which is also true for aspects of the RNM…

Range of GB studies commissioned by…	*Industry*	*Ofgem*	*DESNZ / SSE*	*Octopus*
System benefits *Transmission build assumption*	**Afry (£bn 2021 *2023), 2028-50)**	**FTI / ESC (£bn 2024, 2025-40)**	**LCP Delta (£bn 2023, 2030-50)**	**FTI (£bn 2024, 2030-50)**
NOA7	N/A	15.3	N/A	N/A
NOA7 (HND)	4.2	7.1	5-15	N/A
Beyond 2030	3.3	N/A	0-11	25.5

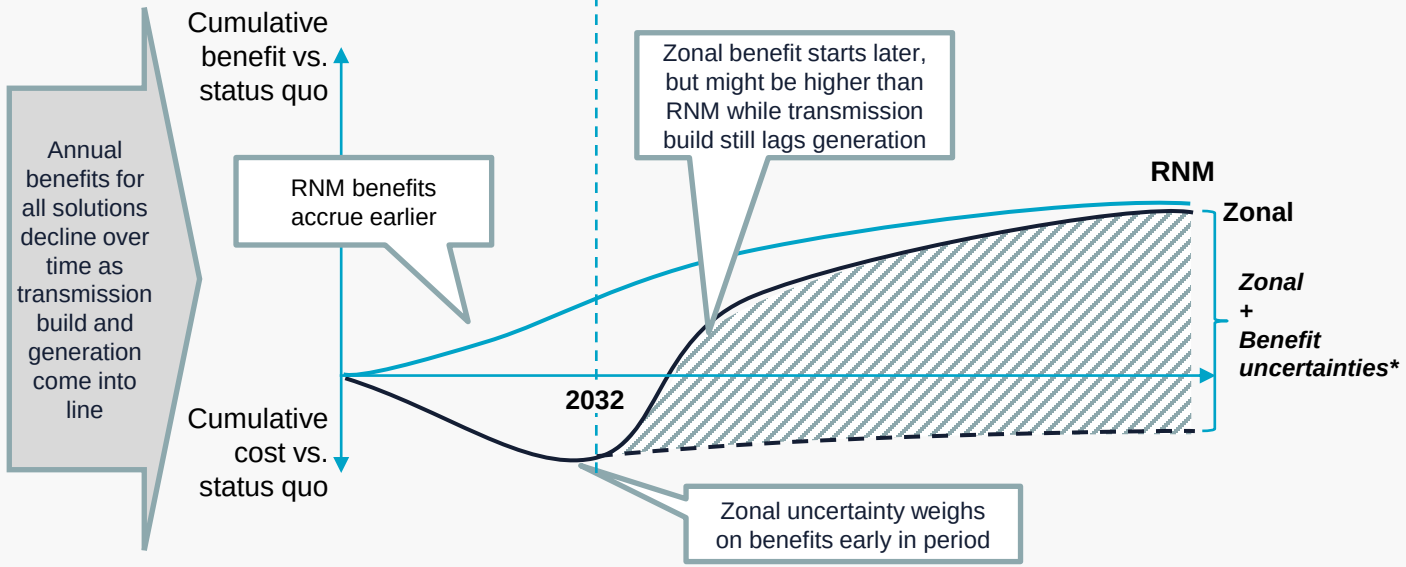
Increasing network build ↓

Current plans

- All else equal, the benefits of zonal pricing decrease significantly if we meet our planned transmission build and when you consider the potential impact on investment costs. FTI's most recent analysis for Octopus shows increased benefits despite increased network build, however, FTI also made changes to the background scenario (compared to the previous work), increasing overall congestion, making the figures less comparable.
- As a result, the potential to capture benefits due to reform to locational signals in a zonal or Reformed National Market (RNM) are focused on the period before the network is built out, catching up with the level of generation.

…while zonal pricing may deliver more operational efficiency, a RNM sees benefits accrue earlier without the impact of uncertainty pending implementation that zonal pricing introduces

Illustrative benefits profiles



- The RNM could lead to benefits relative to current arrangements from as early as 2027, compared to 2032 at the earliest for a zonal market.
- Whether it is worth waiting to implement a zonal market depends on 1) the extent to which a zonal market improves locational efficiency over RNM; 2) the extent of transitional uncertainty while a zonal pricing market developed; 3) the pace at which the transmission network is built out; and 4) the extent of the initial and enduring Cost of Capital impacts.

*Uncertainties include impact on investment (eg cost of capital increases), liquidity and transitional costs

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Annex 2: Modelling Approach and Assumptions

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LCP Delta's Locational Dispatch Model

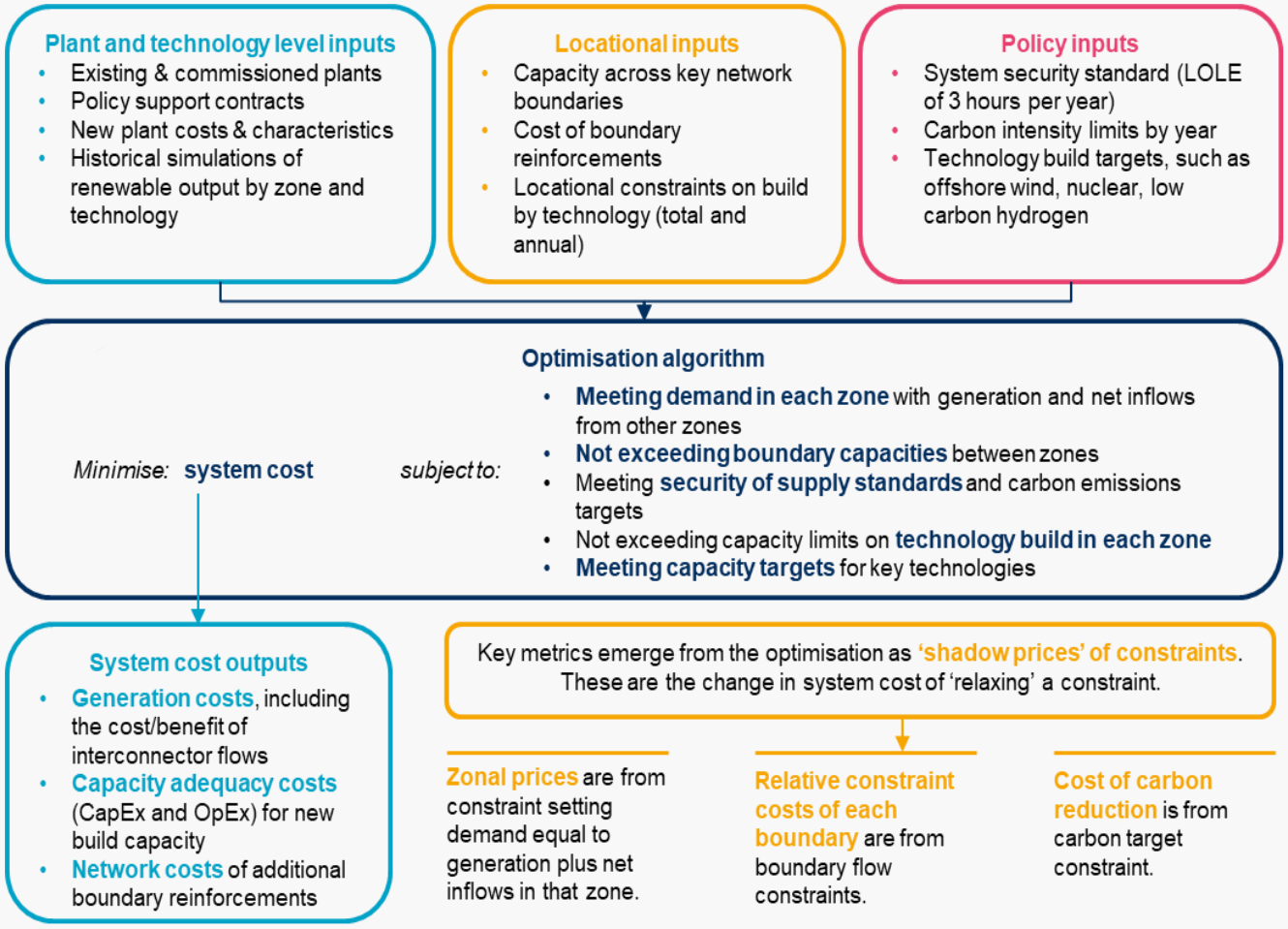
Our Locational Dispatch Model allows for detailed modelling of network constraints

LCP Delta's Locational Dispatch Model (LDM) is a stochastic optimisation-based model designed to simulate the GB power sector with locational pricing. It has been developed specifically to model network constraints and understand the benefits of changing locational signals. The model works by simulating generation and demand every hour on a long-term basis.

There are two main functions to the model:

- **Market dispatch:** Simulating the supply and demand in each hour by zone, based on market fundamentals. This determines the operation of each plant on the system, and the wholesale market price(s).
- **Capacity relocation:** Re-allocating new plant to a different zone, based on market incentives and subject to zonal capacity restrictions (these can vary by technology). These incentives include wholesale prices (zonal or national), TNUoS (transmission network use of system) charges, policy support levels and generation availability (e.g. wind and solar available output vary by zone).

LCP Delta's Locational Dispatch Model Diagram



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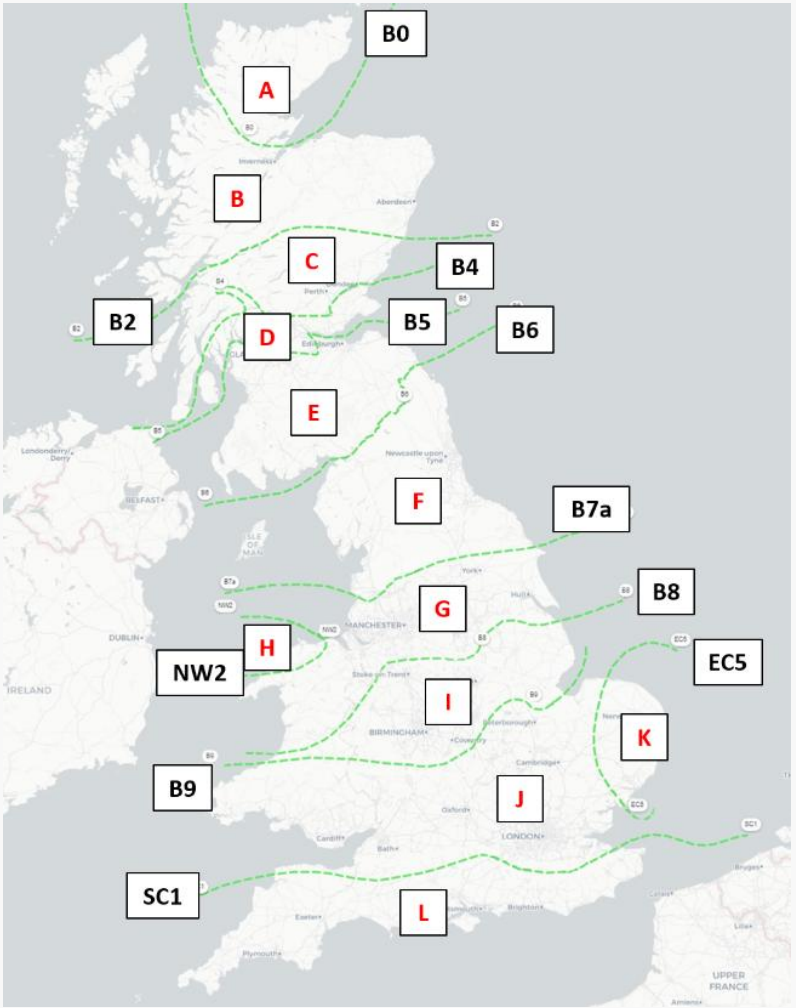
Modelling approach and assumptions

The modelling uses the same methodology and assumptions as LCP Delta's study for DESNZ

- The modelling approach used in this report (and our previous report for SSE in October 2024) aims to replicate the approach and assumptions used in the analysis for DESNZ as closely as possible. The analysis utilises LCP Delta's Locational Dispatch Model (LDM) to compare a zonal pricing factual scenario with a national pricing counterfactual scenario across the period 2030-2050
- The country is split into 12 zones which capture the key transmission network boundaries as shown in the map opposite. Network boundary capacity is taken from the NESO's 'Beyond 2030' report.
- Market assumptions (Demand, Capacity and Commodity Prices) use published versions of DESNZ data where available. Where data is not published, LCP Delta have either used our own internal assumptions or interpreted from available DESNZ data. More detail on approach and assumptions used in the modelling can be found in the Annex.
- There is significant uncertainty around how interconnectors in the current national market are redispatched to deal with constraints and whether this could be changed under reforms to the national market. Given this uncertainty and in line with LCP Delta's previous report for DESNZ each locational pricing factual is compared against two national pricing counterfactuals where interconnector redispatch is varied. These scenarios are:

National Pricing scenario	Description
Redispatch inefficiency	In this scenario, interconnectors are not able to be redispatched in the national market to deal with constraints. Under the national market their flows are fixed at the day ahead stage, leading to less efficient dispatch under the national market than under the zonal market.
No redispatch inefficiency	In this scenario, interconnectors can be fully redispatched to deal with constraints and essentially participate in locational balancing. Flows are redispatched based on the prices in the connected market in any given hour.

Locational Pricing Zones



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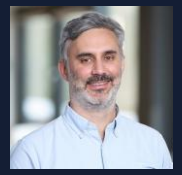
Key input assumptions

The analysis replicates the assumptions used in LCP Delta's study with DESNZ as closely as possible

- Key assumptions used in the modelling are as close as possible to the Government's own Net Zero Higher Demand scenario used in the previous DESNZ study. This ensures consistency between this analysis and the previous analysis LCP Delta completed for DESNZ. The below table outlines the key assumptions used in this study:

Assumption	Source	Description
Capacity Mix	DESNZ Net Zero scenario	Based on the DESNZ Net Zero Higher demand scenario. DESNZ do not publish the full capacity mix for this scenario in detail, so LCP Delta have made assumptions based on available data. Locations of assets are assumed to the same under both national and zonal pricing.
Demand	DESNZ Net Zero scenario	
Commodity Prices	DESNZ publications	Gas and carbon prices are based off DESNZ published fossil fuel prices.
Zones	Previous LCP report for DESNZ	The country is split into 12 zones which capture the key transmission network boundaries in line with the zones used in LCP Delta's report for DESNZ.
Network build-out	NESO Beyond 2030	Uses the boundary capacities published by NESO in the 'Beyond 2030' report.
Capacity Siting Restrictions	Previous DESNZ report/Seabed leasing	Capacity siting is modelled using the model's capacity relocation algorithm. Restrictions are placed on where certain technologies can be sited. This is primarily taken from the assumptions provided by DESNZ for the original zonal pricing report. The only exception is offshore wind where some offshore wind is fixed based on completed seabed leasing rounds as outlined in the October 2024 report.
Demand Siting	FES	Demand splits are taken from FES in line with the previous DESNZ report. We assume no change in the siting of demand capacity between a national and zonal market.
Redispatch under national	Previous LCP report for DESNZ	We assume that participants in the BM bid up to the cost of the marginal provider – essentially resulting in the same outcome as a pay as clear market.
Zonal implementation date	Previous LCP report for DESNZ	Zonal pricing is assumed to be introduced in 2030 in line with previous DESNZ report
CfD reference price under zonal	DESNZ REMA update	In line with announcements in the Autumn REMA update we assume all CfD plants, both new and existing, are provided with a zonal reference price.
CfD strike prices	Auction Round 6	For modelling purposes, we assume that CfD strike prices for new investments (AR7 onwards) are the same as they were in AR6 in both the national and zonal market scenarios. Strike prices could differ from this under both zonal and national for various reasons.

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