



It's all about location

Will changing the way we price electricity deliver for consumers?

Introduction

As the statutory advocate for consumers in the energy sector, Citizens Advice is considering how reforms to electricity markets can help to deliver an affordable and sustainable energy system that works for consumers. In February, we published the first in a series of discussion papers examining these reforms in detail.¹ It examined the potential drawbacks of moving to a split-market model, and set out possible alternative pathways to ensure electricity prices become more stable and affordable.

Another major reform being considered is called locational pricing. This concerns whether to move to a system where the *wholesale* price of electricity varies between locations. Under today's arrangements, there is a single wholesale market that covers the whole of Great Britain (GB), and participants (generators, storage providers, suppliers and large consumers) face the same wholesale price signal wherever they are. Some are worried that under this model, the future energy system could end up being built and operated in a way that actually drives up the cost of energy for consumers.

But moving to locational pricing could have a number of unintended consequences if it affects the willingness of developers to invest in new infrastructure. There is also an open question about the extent to which consumers could be exposed to any new price variations. Concerns have been raised about the implications this could have in terms of producing unfair outcomes for households.

This discussion paper outlines some of our emerging views on the case for implementing locational pricing, and the risks that would need to be addressed if it is implemented. We have also sought to set out alternative recommendations if it is decided that locational pricing fails to deliver sufficient value. It is deliberately provocative in places and we welcome feedback on the findings via the following email address: euan.graham@citizensadvice.org.uk. Setting out these concerns will enable them to be better addressed as proposals are developed.

In researching this discussion paper, we have spoken to a number of engaged stakeholders, as well as conducting our own desk-based research. We thank all participants for their time.

Executive summary

Locational pricing would represent a big change to the way electricity is priced in Great Britain (GB). In simple terms, there is currently a single wholesale market that stretches across the whole of GB. Locational pricing would seek to change this by splitting the market into multiple regions (either several zones, or hundreds of nodes). This could help ensure that the GB power system is built and operated in a way that keeps costs down for consumers.

There is strong evidence that it can bring cost savings through how the power system is operated, but fierce debate over the unintended consequences it could have. Namely, how it would impact the appetite for investment in the colossal amount of infrastructure needed for net zero, and whether it would result in detrimental outcomes for consumers in certain parts of GB.

Reviewing how consumers have been exposed to locational prices in other countries, it is clear that a great deal of options exist to protect against distributional impacts for domestic consumers. Moreover, it is our view that there could still be a case for locational pricing even if domestic consumers were entirely shielded from it. More work is urgently needed to understand how locational pricing could affect the retail market, which should not be left as an afterthought.

However, there are undeniably concerns around how it may impact investment in generation that would have to be addressed. If these cannot be adequately met, then it may not be in consumers' interest to proceed with locational pricing. If it is decided that locational pricing risks being too disruptive, there needs to be a clear alternative to ensure the grid can operate at value for consumers. This is currently missing from the debate.

Lastly, the debate on locational pricing should not distract from the successful delivery needed across a wide range of existing programs. This includes reinforcing the transmission network, planning reform, the move to marketwide half hourly settlement and the smart metering programme.

Findings

1

A range of options exist for shielding consumers from locational price signals, so this is not a reason to avoid locational pricing. There will likely be a need to address the distributional impacts of locational pricing.

2

Whether or not risks to timely investment in generation can be addressed will determine whether it is worthwhile to consumers to implement locational pricing.

3

Problems with how the grid is operated are too big to ignore - and other options to manage constraints are underdeveloped. Detailed proposals are needed in future consultations so they can be better scrutinised.

4

The impact on the retail market needs more scrutiny. Retail reform must specifically consider what provisions should be made if locational pricing were implemented.

5

This debate should not distract from urgent programs of reform that are already underway. Network buildout, planning reform and the smart meter rollout will all be vital to deliver a flexible and low cost power system.

Pricing in today's wholesale market

The wholesale electricity market is where suppliers, storage providers, generators and large consumers buy and sell their electricity. In reality, this isn't one single thing, but a collection of different markets. For example, suppliers will look to manage their risk by buying some of their electricity in advance via forward markets. As well as this, a lot of power is bought and sold in day-ahead markets.

A simplified explanation of how these markets work is that all generators sell their power into the same wholesale markets no matter where they are in GB. For a lot of generation, the price they receive at any moment reflects the price of the most expensive generator that was needed to match supply and demand at that time.

Generators dispatch themselves without any consideration of constraints in the network. A constraint occurs when generation in a particular area exceeds the amount of power that the network can safely transport. If this happens, the System Operator takes action to ensure that supply and demand still match, through things such as the Balancing Mechanism.

Where generation can't be transported, the System Operator must direct it to turn down, often at a cost, and a new more expensive action is taken. Consumers ultimately pay for this action.



Case for change

The power system needs to operate more efficiently to keep costs down

Over the last decade, renewables growth has exploded. This has successfully driven coal off the system, and more recently-built renewables have been able to reduce consumer bills as gas prices rose to record levels.² But the build out of the electricity network has not kept pace.³ More and more often, parts of the network are becoming constrained. A constraint happens when generation in a particular area exceeds the amount of power that the network can safely transport.

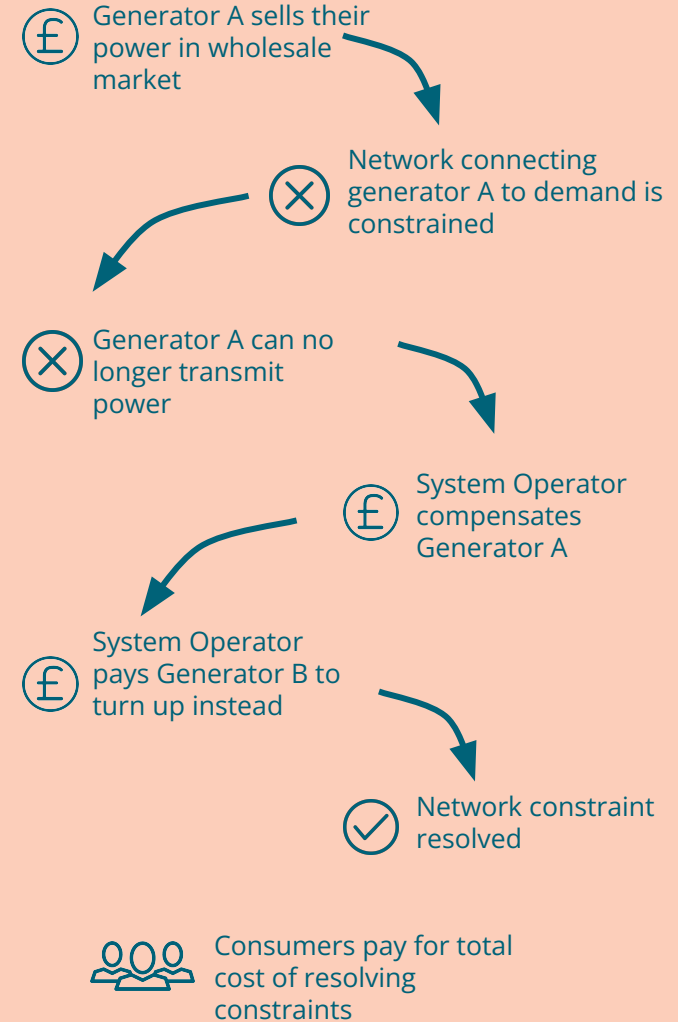
An obvious solution is to build more network. Plans already laid out by the Electricity System Operator (ESO) involve an eightfold increase in network build out.⁴ But another problem is that today's wholesale market operates without considering potential network constraints.

Generators and interconnectors dispatch themselves without considering the limits of the network, and the System Operator may have to later pay some of them to turn off if the network is constrained. It then needs to pay a new generator to turn on to meet supply.

These constraints are becoming increasingly costly for consumers. Constraint payments have risen from £300mn in 2009 to £1.1bn in 2022, and are projected to reach £3bn by 2035.⁵ These are paid for via a levy on consumers' bills.

A potential benefit of moving to locational pricing is that it would ensure potential constraints on the network are considered as the System Operator dispatches generation and other assets in the wholesale market. By considering this from the beginning, this means that you avoid the need for costly payments later down the line arising from constraints. It would also mean that gas may only set the price in certain regions, keeping down costs in other regions.

What does a constraint mean for consumers?



Case for change



We haven't unlocked the full potential of flexibility

As new technologies become more widespread, consumers will be able to play more of an active role in how and when they use electricity. Scenarios show that this sort of flexibility will be crucial for meeting our net zero targets.⁶ It will also reduce the cost of doing so, with studies estimating that it can deliver up to £4.7bn/year in benefits by 2030.⁷

The question is: are electricity markets able to harness this flexibility? Under a national pricing model, people on flexible tariffs would receive the same price signals across the entirety of GB. This means some consumers could end up being incentivised to be flexible in a way that worsens, rather than improves constraints in their area.

Advocates of locational pricing say that it would ensure people are rewarded for using energy in a way that benefits the overall system. Some also argue that stronger price signals may be needed to reward people more for being flexible.

Generation and demand may be able to locate differently

A lot of factors affect where generation gets built. Often planning rules, supply chains, and resource potential mean that developers do not have a lot of freedom as to where they site.⁸

However, one factor that they do not have to consider under today's regime is how often the network will be able to transport their power due to their location, and whether they will be paid a different price for it compared to elsewhere. Locational pricing would change this.

Advocates of locational pricing suggest that despite other siting factors, you could still see a modest shift in where generation, storage, and potential new kinds of industrial demand choose to locate.

It is worth noting that this is a particularly contested benefit of locational pricing, with many stakeholders emphasising the limited potential to affect siting decisions.

What is locational pricing?

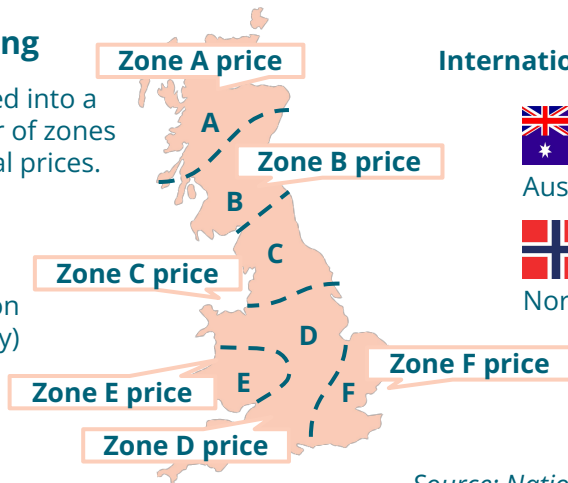
Locational pricing would seek to address these challenges by moving away from a single national wholesale market. There are two main kinds of locational pricing, called **nodal** and **zonal** pricing. Under zonal pricing, you could expect GB to split into around 7 zones. Under nodal pricing, it would likely be closer to 700 nodes. The markets at each node or zone would each clear simultaneously with consideration of the available transmission network, generation and storage capacity available within each region.

Zonal pricing

System divided into a small number of zones with individual prices.

Key:

Boundaries
(for illustration purposes only)



International examples:



Source: National Grid ESO (2022)⁹

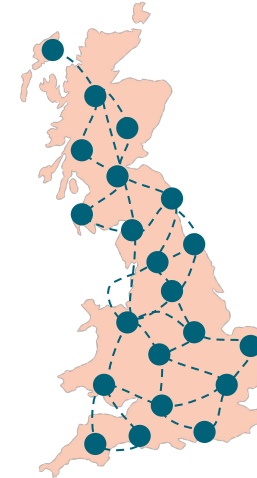
Zonal pricing is currently implemented in the EU, with some countries being split into multiple zones. The market clears in each zone, with considerations of potential congestion between each of the zones. There can still be a need to re-dispatch generators if there are constraints within zones.

Nodal pricing

System divided into many 'nodes' with individual prices.

Key:

● GB price nodes
(for illustration purposes only)



International examples:



Source: National Grid ESO (2022)⁹

Nodal pricing would be accompanied by a big change to the way market participants are paid. Under today's arrangements, generators have something called 'firm access rights'. This means that they are guaranteed the ability to sell their power into the grid whenever they choose to. If they cannot sell their power for whatever reason, they receive compensation.

Under nodal pricing, an algorithm would determine what assets are used and which are not at any given time. The algorithm is designed to optimise according to the needs of the grid at that moment. There would not be the same mechanism to compensate generators if they are not dispatched. This is called centralised dispatch.

How do energy bills vary between regions today?

What's in a bill?

Electricity bills are made up of a number of different parts. Some of these parts vary depending on where you are in Great Britain (GB), while others are the same across the country.

The largest part of a consumer's bill is made up of **wholesale costs**. These represent the cost of purchasing the electricity that has been supplied to you. When suppliers purchase electricity from generators in the wholesale market, they will be doing this at a single national price. However, when it feeds into energy bills, the cost for consumers can vary between regions, depending on how much electricity is lost through the wires as it's transported to different regions of GB.

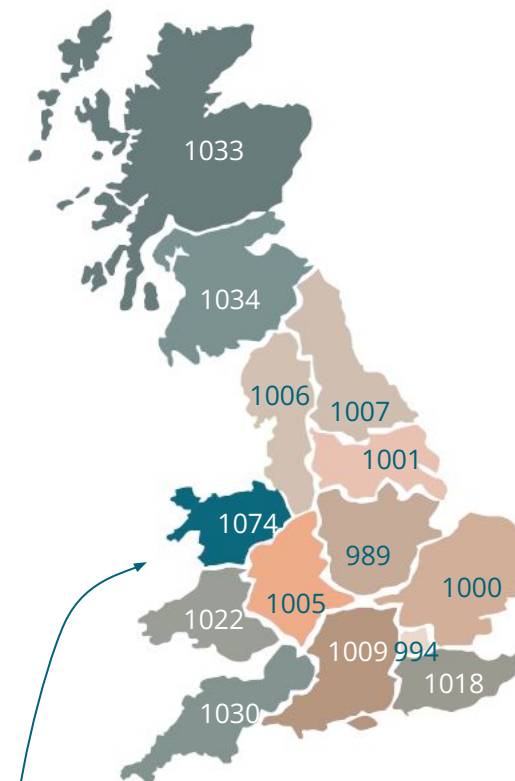
Another major factor is **network costs**. These correspond to the cost of building and maintaining the Transmission (big wires) and Distribution (smaller wires) networks. Distribution network costs vary most from region to region in GB.

Network costs are typically lower in regions with higher overall demand, as the costs are often shared over a greater number of households in these regions.

The rest of a consumer's bill corresponds to a variety of fixed costs and social and environmental levies. These are spread across all domestic consumers, and do not vary significantly between regions.

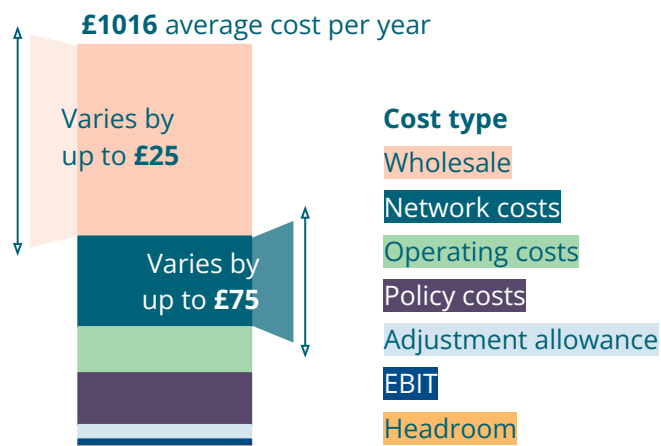
As a result of these factors, a typical household electricity bill can vary by just close to £90 depending on where in GB the household is located.¹⁰ The typical electricity bill in GB is £1016.

Average household energy bill by region (£)¹¹



Electricity in North Wales and Mersey costs nearly £90 more than in the East Midlands

How much do different parts of a bill vary?



How would wholesale prices vary under locational pricing?

When imagining how wholesale prices could vary between different regions under locational pricing, it is useful to think of three different ways. These different variations could drive different types of responses from consumers.

Different shape of profile

On any given day, different regions could see peaks in wholesale prices occurring at different times.

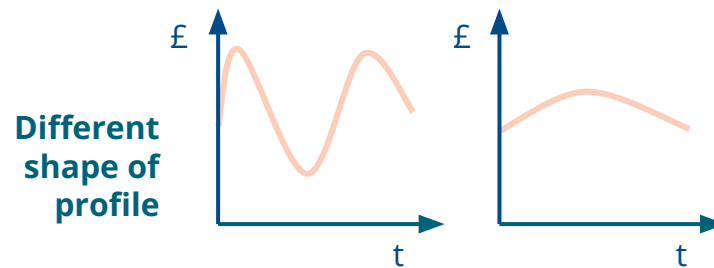
Different average cost

When looking at costs over longer time periods, regions could see differences in their average wholesale costs.

Different levels of volatility

As well as peaks happening at different times in different regions, there would also likely be differences in volatility between regions. This would mean that the gap between high and low prices could be much larger in some regions than in others.

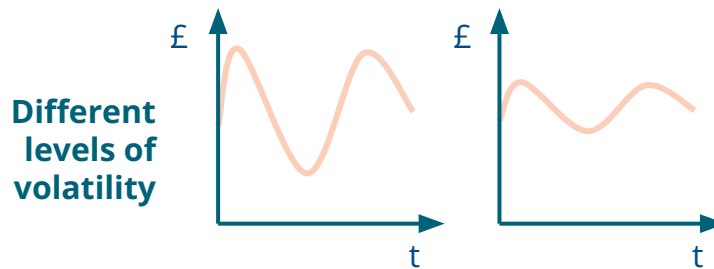
Difference between regions



Different average cost

£X,000 per year

£Y,000 per year



Envisaged responses

Operating differently

Change in location, invest in energy efficiency

Operating differently, invest in flexible technology

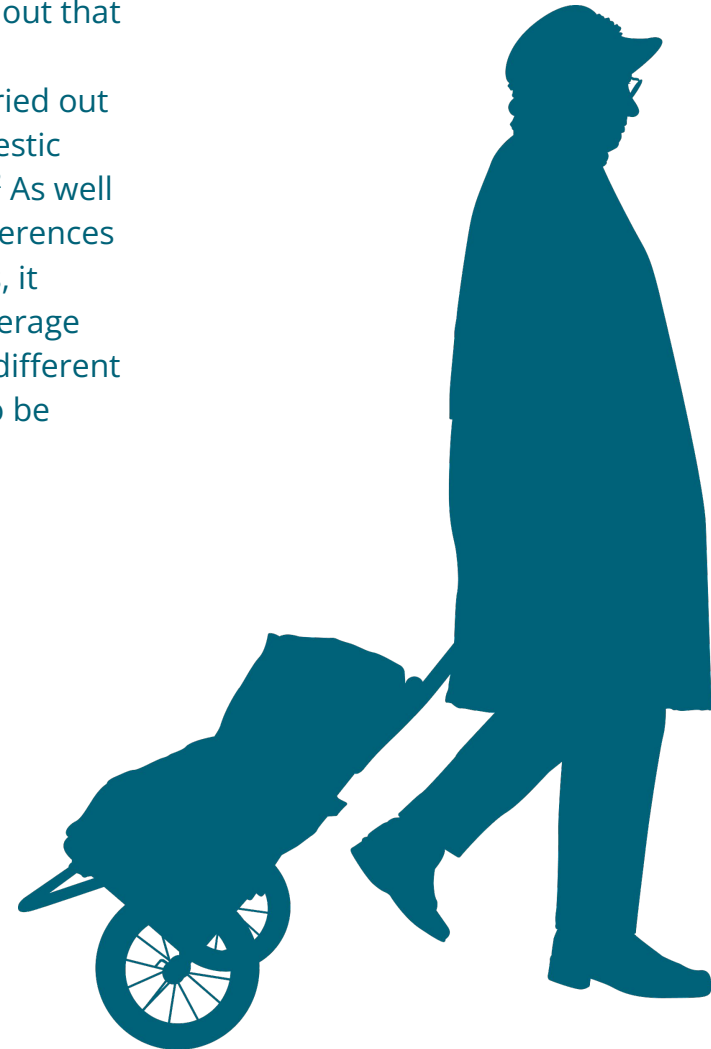
Options for shielding consumers

Domestic consumers aren't fully exposed to the volatility of wholesale electricity prices. In today's market, it is down to suppliers to manage volatility in the wholesale price on behalf of their consumers. Customers can then choose between a range of different tariffs. However, due to the possibility for large fluctuations between regions, Government would need to consider how best to protect consumers if it implemented locational pricing.

In other places that have locational pricing, there is a very wide variety of ways in which consumers are exposed to price signals. As a general rule, almost all jurisdictions draw a distinction between larger industrial users and households.

Due to the amount of different implementation choices, we have drawn together a set of options to better assess the tradeoffs of different approaches.

This is much more than a technical question. Ultimately, a preferred option will depend on what is deemed to be fair. In our previous work, we have set out that a detailed distributional impact assessment would need to be carried out before considering exposing domestic households to locational pricing.¹² As well as examining the potential for differences in average prices between regions, it should also seek to model how average costs may vary within regions for different users depending on their ability to be flexible.



Options for shielding consumers

Option	Detail	Effect	Example
Average nationally	Consumers settled on a weighted average national price	No difference in average cost, shape of profiles or the volatility of price signals between regions	Italy (zonal)
Adjust for regional variations	Adjust for differences in average annual bills between regions but preserve different time of use profiles	Maintains differences in shape of profile and volatility of signal between regions. Eliminates difference in average cost between regions	Not currently implemented
Average across larger areas	Consumers settled on a regional basis that averages across multiple nodes or zones	Reduces volatility of price signal, reduces difference in the average cost between regions	California, New York
Minimal intervention	Up to retailers to offer a range of tariffs for people to choose from (eg flat tariff, load management, dynamic ToU, fixed ToU)	Uncertain	Denmark (zonal), New Zealand

Options for shielding consumers

Option	Detail	Effect	Example
Opt-in	Consumers can choose to be settled on a locational basis if they want to, otherwise settled on a national or regional basis	Guarantees access to a less volatile wholesale price for consumers who don't opt in - although this could still be a higher overall cost	Ontario, PJM (North America)
Shield by type of user	Expose some users (eg industrial) to more granular locational price signals while other consumers are settled on a national or regional basis	Accounts for that fact that different types of consumers may be able to respond in different ways	Most jurisdictions
Phased exposure to more granular signals	Shield some types of flexible resources at first before considering more granular exposure to locational price signals	Could allow for greater uptake of smart and flexible technologies before domestic consumers are exposed to locational signals	New York

Assessment of options for shielding consumers

Adjusting for regional variations should be possible but must be fleshed out

Without a measure to account for the potential for differences in average costs between regions, we do not see it as fair to expose consumers to locational pricing. It is neither feasible nor desired for households to change their location in response to a locational price signal. As a result, large differences in average cost between regions would simply resemble a postcode lottery.

It should be possible to do this through adjusted Distribution Use of System (DUoS) charging, either through the unit rate or the standing charge. One drawback is that this wouldn't be able to account for circumstances where a consumer's demand profile causes them to receive higher bills than the average consumer in their region. This could happen if they use more energy at peak times than other consumers. As a result, it wouldn't be a perfect mitigation measure.

From an implementation standpoint, there would also be a need to understand whether or not adjustments would likely be negative in some regions. Legislation currently prevents a number of fixed costs from falling below zero, and may need to be adjusted. There would also need to be arrangements in place to ensure that charges can retrospectively account for differences between past forecasts and reality.

Shielding by type of user makes sense

While domestic consumers likely need some form of shielding from locational price signals, industrial users could be more able to manage prices. New industries in particular could locate closer to generation, bringing potential systemwide value as well as economic benefits to specific regions such as the North of Scotland. Existing industries may be able to hedge against changes in prices, adapt processes, or purchase storage and generation technology. However, detailed research is needed to understand the potential ability of different industrial consumers to respond to price signals.

Hard to see value of an opt-in approach

Unless you adjust for regional variations in the average cost, it is hard to see the value of an opt-in approach. This is due to the fact that the 'winners' in certain regions could opt-in and receive far lower prices without actually changing their behaviour. Conversely, this would leave those who don't opt-in facing higher bills.

Quantitative analysis is crucial to identify best approach

Ultimately, the extent to which shielding measures are needed will be informed by analysis which models the distributional impacts of locational pricing. If the overall value provided by exposing consumers to these price signals is low, then there is a strong case for averaging nationally, as it minimises distributional impacts. Alternatively, if there is significant savings generated by it, it could be justified to expose consumers to some extent whilst ensuring protections are in place for those in vulnerable circumstances.

Wider risks to consumers of implementing locational pricing

The previous section of this paper has considered how to protect consumers if government chose to implement locational pricing. But while its operational benefits are clear, there are a number of potential risks that would have to be addressed.

Value for consumers is linked to how it impacts generators

There are a number of ways to shield consumers from locational price signals. But a large part of potential savings to consumers would stem from how it could affect the operation and build out of the rest of the power system.

If locational pricing were to increase financing costs for new infrastructure, this could in turn affect the ability of GB to deliver low-cost renewable electricity to consumers.

Exposing demand to locational prices would drastically change the retail market

Introducing a reform like locational pricing would create new opportunities for suppliers and other actors to manage the differences between high and low wholesale prices on behalf of their customers. If done well, this could boost uptake of new technologies and bring down costs for consumers.

However, there are also a series of risks that come with this that must be better understood before deciding on whether to move to locational pricing. Selecting a wholesale reform option and then building protections in afterwards could bake in unfair outcomes for certain consumers.



Risks on the demand side that could impact consumers

Risk	Detail	Implication
Variations in average cost between regions could create a postcode lottery	Depending on how large the variations are in price between regions, consumers could receive windfall gains depending on their location, while others see higher prices	<ul style="list-style-type: none">● Sensitivity modelling needed to understand size of cost variations between regions● Either settle consumers nationally or account for variations in average cost
Inclusivity of new products and services could exacerbate distributional impacts	Products that are able to effectively manage price volatility may not be suitable or available to everyone, resulting in higher costs for some.	<ul style="list-style-type: none">● Engagement, advice and financing needed to ensure more people can benefit from flexibility● Products and services must be inclusive by design
Regulation may not keep pace with increased retail market complexity	Greater wholesale volatility could lead to innovative products and services from suppliers. Without careful regulation, new products may cause detriment to consumers	<ul style="list-style-type: none">● Retail reform must directly consider potential impacts of locational pricing● Consumers must have ability to compare tariffs on a consistent basis
Reduced market liquidity could drive up bills for consumers	Without new instruments, suppliers could be more restricted in how they buy energy, which would be likely to drive up costs for consumers	<ul style="list-style-type: none">● Lessons need to be learnt from hedging instruments in other jurisdictions
Complex hedging strategies for suppliers could affect health of suppliers if poorly executed	LMP creates new risks for suppliers to manage, if they get this wrong and aren't well-capitalised then this could result in increased costs for consumers	<ul style="list-style-type: none">● Balance of risk must be considered to ensure financial health of suppliers whilst encouraging innovation that is in the interests of consumers

Risks on the supply side that could impact consumers

Risk	Detail	Implication
Limited ability to re-site results in higher costs for new generation	If generation is unable to resite, then locational prices may simply result in higher overall costs, which would be passed back through to consumers	● Feasibility of near term net zero targets could be affected if costs increase significantly
Lengthy implementation time chills investment in lower-cost generation	A lack of clarity over how new arrangements could impact existing generation could affect the appetite for investment in generation.	● Clear transitional arrangements would be needed
Uncertainty over long-term price forecasts could increase financing costs for new infrastructure	While locational pricing sends a signal about the value of investing in a location, this can rapidly change depending on generation, storage and network buildout.	● Mechanisms such as CfD would still be needed to stabilise expected revenues and ● Hedging instruments needed to account for risk of price changes
Potential for gaming by generators and storage providers	For example, in some instances individual generators will have significant ability to influence prices at a node. This can give rise to price manipulation.	● Enhanced market monitoring and enforcement needed to reduce potential for gaming

Assessment of risks of locational pricing

Effect on investment represents material risk to the value of locational pricing

The precise impact that locational pricing could have on investment will be heavily dependent on the outcomes of other reforms that could accompany it, including changes to the CfD mechanism. However, doing so could mean that overall the reforms provide limited value to consumers. If locational pricing is implemented, it will have to ensure that it manages to balance the gains in operational efficiency against any impact on investment appetite.

Evidence from other markets shows that liquidity concerns can be addressed

System operators in other parts of the world that have locational pricing have found new ways to make sure that there is sufficient liquidity in the wholesale market.¹³

These include setting up trading hubs to allow suppliers to trade between nodes, and financial hedging instruments to allow suppliers and generators to more easily manage risk. There is no question that drivers of poor liquidity should be addressed as they drive up costs for consumers. Efforts to address this could be better focused on factors such as the choice of reference price in CfD contracts.

Whether locational pricing is implemented or not, ensuring inclusivity of flexible products is a significant priority

With the move to marketwide half-hourly settlement, it can be expected that there will be more widespread availability of smart and flexible products in coming years. Regardless of whether or not locational pricing is implemented, it is vital that these are designed to be as inclusive as possible. Targeted support will also be needed in order to overcome financial barriers to adopting new flexible technologies.

Retail reform needs to examine the potential risks of locational pricing

Due to the significant impact that locational pricing could have on the retail market, any reform to the retail market should specifically consider how locational pricing might change the landscape for suppliers and consumers.

More research is needed to unpick some of the potential risks posed by the interaction between wholesale and retail markets, and at the moment it risks being left until the last minute.

Alternatives to locational pricing

It could be the case that potential risks outweigh the benefits of implementing locational pricing. However, the problems it is looking to solve are too important to ignore. More work is needed to flesh out possible alternatives.

For efficient siting decisions

While locational pricing may deliver a more accurate reflection of the value of energy in different locations, other options may be better suited to influencing investment decisions.

More stable long term signals may be able to be delivered through reform to existing network charges, such as the Transmission Network Use of System (TNUoS) charge. While these may be less cost-reflective than signals delivered through LMP, they could be made to be more predictable. This could lead to a greater level of re-siting, which could mean more value for consumers. Key to unlocking this will be reforms to the planning process which currently heavily restricts where generation can locate.

For efficient operation of the system

It is less clear what other viable alternatives are for ensuring the grid operates more efficiently in future. Measures are already underway to improve transparency in the balancing mechanism, and develop new tools for constraint management.

It is possible that new markets for constraint management could be expanded and help to deliver more efficient operation of the grid. This would be attractive in some ways as it could be more easily phased in and adjusted over time. Generators could also choose to not participate, which would help to avoid concerns over increased investment risk. However, a key question will be whether these alternative approaches are able to deliver significant value for consumers. It could be that the cost of paying generators and storage units through constraint management markets eats into savings from avoiding the constraints.

In any case, proposals must first be fleshed out in more detail. Without more information, their benefits cannot be scrutinised in the same way as nodal or zonal pricing.

Another part of the puzzle will be reforms to the CfD mechanism and planning rules, to encourage renewables to more easily locate with demand, and to incentivise them to operate more efficiently.

For unlocking value of demand flexibility

The delivery of programs that are already underway, such as the smart meter rollout or the move to marketwide half hourly settlement, will boost the value of domestic flexibility. However, to ensure that flexibility is helping to manage constraints as efficiently possible, there may be a need for creation of new more local markets - such as those which operate at the distribution level.

Conclusions

Locational pricing is a complicated reform option that has occupied a great deal of debate about the future of the UK wholesale market. Ultimately, what is uncontroversial is that the problems it is looking to solve must be addressed in order to ensure net zero targets are met at good value to consumers. Ensuring the system can operate as efficiently as possible, and that we make the most the potential for flexibility are key considerations. There is evidence that locational pricing could be an option to achieve this.

Our research has highlighted that a great deal of options exist for shielding consumers from locational price signals. In our view, this means that concerns over the possibility of a postcode lottery are not a reason to avoid implementing locational pricing. Rather, appropriate protection measures should be taken, based on an assessment of the scale of price variations between regions, and the overall value that could come from exposing consumers to new signals in the first place.

However, in any world where flexibility is better rewarded, it is paramount for new smart and flexible products to be inclusive and affordable. Without this, there is a risk that some consumers will be unable to benefit from being flexible. Targeted support will be needed to ensure this. What is clear is that the overall value to consumers will be set by whether or not potential risks to investment in generation, storage and network capacity can be overcome. REMA is taking place ahead of a crucial window in which there will need to be an unprecedented level of investment in our power system. The successful delivery of REMA reforms will be key for ensuring long term affordability of electricity bills. If locational pricing negatively affects this, it may not be able to deliver value for consumers overall. One aspect that has not been covered in detail in this discussion paper is whether there is sufficient political and institutional bandwidth to deliver locational pricing. It is a fundamental reform that would require significant time and resource to get right.

There is already a great deal of difficult work being laid at the feet of the Future System Operator - it could be that locational pricing restricts its capacity to deliver on other crucial aspects of a net zero energy system.

We would also like to see a greater focus on how locational pricing could affect the retail market, and what this may in turn mean for consumers. If this is left as an afterthought, there is the potential for unforeseen risks to result in adverse outcomes for consumers, particularly those in vulnerable circumstances.

Alongside further work to understand potential risks of locational pricing in more detail, forthcoming consultations on REMA should develop an alternative set of measures for efficiently operating a future electricity system. This way, the value and potential drawbacks of these measures can be properly scrutinised in the same way.

References and bibliography

1. Citizens Advice (2023), [Splitting Opinion](#)
2. Onward (2022), [Renewed Importance: How investing in renewables cuts energy bills](#)
3. Ofgem (2022), [Locational Pricing Assessment](#)
4. Ibid
5. National Grid ESO (2022), [Modelled Constraint Costs, NOA 2021/22 Refresh – August 2022](#)
6. National Grid ESO (2023), [Bridging the Gap to net zero](#)
7. Poyry, Imperial College London (2017), [Roadmap for Flexibility Services to 2030, A report to the Committee on Climate Change](#)
8. Regen (2022), [Regen's REMA Consultation Response October 2022](#)
9. National Grid ESO (2022), [Net Zero Market Reform: Phase 3 assessment and conclusions](#)
10. Ofgem (2023), [Default tariff cap level: 1 April 2023 to 30 June 2023](#), values have been adjusted to reflect more up-to-date average household consumption. Values used reflect costs for single metering arrangement, other payment method.
11. Ibid, map from Smarter Business (2019)
12. Citizens Advice (2021) [Rough trade? Balancing the winners and losers in energy policy](#)
13. Anselm Eicke, Tim Schittekatte (2022), [Fighting the wrong battle? A critical assessment of arguments against nodal electricity prices in the European debate](#)

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