

## Document 1 – TNUoS Mini Core Brief

### Transmission Network Use of System Charges (TNUoS)

<ul style="list-style-type: none"><li>• [not in scope]</li></ul>
<ul style="list-style-type: none"><li>• [not in scope]</li><li>• TNUoS reform is being actively considered within REMA as part of a package of measures which would make up a 'reformed national market' model. This is the contrasting option and counterfactual to a zonal pricing model and DESNZ are currently considering the shape of reforms.</li></ul>
[not in scope]
<b>Key contacts:</b>  [redacted]

[not in scope]

Annex A

[not in scope]

## Document 2 – Ministerial Response to Minister Stuart Letter on Second REMA Consultation, 21/03/2024

Minister for Energy, Just Transition and Fair Work  
Gillian Martin MSP



Scottish Government  
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Graham Stuart MP, Minister of State for Energy  
Security and Net Zero  
Department for Energy Security and Net Zero  
Email: Minister.Stuart@energysecurity.gov.uk

March 2024

Dear Graham,

Thank you for your letter of 12 March 2024, outlining the launch of the second REMA consultation.

REMA is a crucial step in delivering the wholesale market reform required for a net zero energy system, and towards ensuring consumers benefit fully from lower-marginal cost renewable power. We welcome the publication of the REMA consultation which provides an important opportunity for stakeholders to shape the future GB electricity market.

The Scottish Government believes that market reforms must adhere to the principles of a fair and just transition, supporting ambitions to scale-up renewable energy, including green hydrogen. A reformed wholesale market must enable a secure, flexible, net zero energy system that is not dependent on fossil fuels, and which supports statutory climate targets by enabling heat, transport and industrial decarbonisation. It is crucial that investor confidence is maintained during market reform.

We appreciate the emphasis that the consultation places on the evolution of CfDs to support necessary growth in renewables, and on improvements to the Capacity Market to drive deployment of low-carbon flexibility and storage.

Locational marginal pricing (LMP) presents a major concern for the renewables industry, although the potential impacts of this reform are significant for all market participants, and could be positive for consumers. We would welcome further discussion at an official level on how the UK Government would implement zonal pricing in a way that balances the interests of renewable generators, consumers and demand sectors.

Your letter sets out the intention to support limited new-build gas fired electricity generation capacity in the short-term, in the interests of energy security. The Scottish Government is clear in its opposition to the continued use of unabated fossil fuels to generate electricity and we urge the UK Government to prioritise the rapid deployment of clean and flexible storage as an alternative way to deliver energy security.

We understand the UK Government's assumption that gas will set the marginal price of electricity less often over time. However, the Scottish Government is concerned that support for new gas plants will distract from the need to rapidly decarbonise the electricity system and to reduce our exposure to volatile global gas prices.

As I highlighted in our meeting on 27 September 2023, it is crucial that investor confidence is not undermined during market reform. We would welcome further detail on how you plan to engage with stakeholders in Scotland, so that we may consider opportunities to collaborate. We will analyse the options assessments and technical reports published alongside the consultation and will of course provide a response in due course. I look forward to a continuation of the constructive engagement that we have had on REMA thus far.

Yours sincerely,

**Gillian Martin**

### **Document 3 – Minister for Energy and the Environment Meeting with Councillor Derek Louden, 25/01/2024**

#### **Briefing for meeting with Councillor Derek Louden, Highland Council**

<b>What</b>	A 45 minute, virtual meeting with Councillor Derek Louden of the Highland Council. The purpose of the meeting is for Mr Louden to share his views on Locational Marginal Pricing (LMP) and the benefits he believes it could bring for the Highlands and Islands.
<b>Where</b>	<a href="#">Click here to join the meeting</a>
<b>When</b>	Thursday 25 January 2024 13:30 – 14:15 (45 minute meeting)
<b>Key message(s)</b>	<ul style="list-style-type: none"> <li>• We welcome your views on LMP and have commissioned an independent study to inform our view of the costs and benefits of LMP. We will set out more detail in the Energy Strategy and Just Transition Plan by Summer 2024.</li> <li>• REMA presents an opportunity to reform the wholesale electricity market so that it serves the best interests of consumers, while delivering net zero and security of supply.</li> <li>• Market reform must enable a just transition by maintaining investor confidence, generating economic opportunities and delivering fairness for consumers and communities.</li> <li>• We are aware of the Ofgem study which suggests that LMP could have potential cost benefits for Scottish consumers. However, we are also aware of the potential impact this could have on the location and deployment of renewable generation in Scotland.</li> </ul>
<b>Who</b>	Councillor Derek Louden (SNP), Highland Council.

<b>Why</b>	Mr Louden emailed you in July 2023 highlighting research commissioned by Ofgem on the potential impacts of LMP. He believes LMP, specifically nodal pricing, could benefit the Highlands and wishes to discuss his ideas on this issue.
<b>Supporting official</b>	[redacted]
<b>Briefing contents</b>	<b>[not in scope]</b> <b>Annex B:</b> Summary Page covering REMA and LMP <b>[not in scope]</b>
<b>Media handling &amp; social media</b>	N/A

## Annex A

[not in scope]

## Annex B

### Key issue: Locational marginal pricing (LMP)

- LMP would redesign the wholesale electricity market so that prices are set based on supply and demand in a particular node or region. National Grid ESO and Ofgem believe LMP can inform investment and operational decisions to help tackle network congestion and minimise costs to consumers.
- Ofgem modelling suggests that between 2025 and 2040, at the GB level, £25bn savings could arise from greater operational and locational efficiency across the wholesale market (ie a net welfare gain), plus a wealth transfer from generators to consumers of c£25bn. However, LMP will not be in place by 2025, leaving questions about the credibility of these figures.
- The renewables industry has been keen to engage with Scottish Government officials over concerns that a move to an electricity market with LMP could increase costs for those investing in new renewable generation in Scotland. However, potential reduced costs stemming from LMP could assist with the decarbonisation and electrification of current fossil fuel based demand. More analysis and evidence is needed in this regard.

### Lines to take

- We agree that the wholesale electricity market needs reformed, particularly to allow the low marginal costs of generating electricity from renewables to flow through to consumers' bills and to ensure sustained investment in renewables at the necessary scale and pace to deliver net zero.
- We are aware of modelling, commissioned by Ofgem, which highlights potential benefits from LMP for Scottish consumers. Proposals for reform must be managed to

mitigate against market uncertainty and risk which could jeopardise the significant levels of investment needed in renewables.

- Consumer impacts - especially for those in fuel poverty and other vulnerable circumstances - should be a central concern of electricity market reform. We are calling for a joined-up approach between wholesale and retail market reform to deliver consumer fairness and innovation on the journey to net zero.
- We have commissioned an independent study to inform our view of how LMP could support our Energy Strategy and Just Transition Plan ambitions. Representatives from Highlands and Islands Enterprise (HIE) attended an Expert Advisory Panel which is helping to inform this study and our policy development. We will continue to engage with HIE on the findings of the study.

### **Summary – REMA and LMP**

- Councillor Loudon wrote to you on 10 July 2023 to highlight research commissioned by Ofgem on Locational Marginal Pricing (LMP). [redacted]
- [redacted]
- [redacted]
- We recognise the potential benefits for domestic consumers and demand users, particularly for decarbonising transport, heat and industry. However, we are aware that LMP could reduce revenues for generators that do not have the security of a CfD contract. This could impact investor confidence in the generation sector.
- The extent to which the theoretical costs and benefits come to fruition will depend on policy decisions by UKG. [redacted]
- You met with Minister of State for Energy Security and Net Zero Graham Stuart on 27 September 2023 to discuss LMP, and how wholesale and retail market reform can enable the low operating cost of renewables to flow through to consumer bills.

[redacted]

- It is unlikely that UK Government will take any significant decisions on LMP until after the next general election in 2024. This creates a lingering uncertainty for those investing in renewables across Scotland and GB.

**Annex C**

[not in scope]

**Annex D**

[not in scope]

[redacted]

- HIE responded to the last UKG consultation on REMA in October 2022. [redacted]

[not in scope]

**Annex E**

[not in scope]

**Annex F**

[not in scope]

**Annex G**

[not in scope]

## **Document 4 – Wholesale Energy Markets Core Brief 2024**

### **Wholesale Electricity Markets: Core Brief**

[not in scope]

#### **Recent briefings, submissions and correspondence**

[redacted]

[redacted]

#### **REMA Top Lines**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Any reforms should adhere to two core principles of achieving net zero and ensuring a fair and just transition. Reforms should also help to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower costs and that they consider those most vulnerable, including those in or at risk of fuel poverty.

- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. This research was published on 12 August 2024.
- We welcome the constructive engagement we have had with Ofgem, NG ESO, UK Government and industry on REMA. We look forward to continuing to work constructively with the new UK Government on electricity market reform.
- We believe the UK Government must urgently provide a public signal on the timetable and direction of travel for key reforms; this is crucial to maintaining investor confidence. We are also seeking clarity on how REMA intersects with the Government's Clean power 2030 ambition and the Strategic Spatial Energy Plan.
- Our position on electricity market reform will be covered in our Energy Strategy and Just Transition Plan and it will play a key role in achieving many of priorities set out within the Strategy.

### **Asks of UK Government**

- Provide urgent clarity on the UKG's preferred approach to electricity market reform; including whether it is continuing to keep zonal pricing under active consideration, and if so, when it intends to consult further.
- [not in scope]

### **Stakeholder Reaction**

- The renewables industry in Scotland, including Scottish Renewables, SSE and others, have been vocal in their rejection of LMP. They are concerned reduced wholesale prices and the loss of firm access rights (i.e. guaranteed access to the market regardless of capacity) would make Scotland an unattractive place to locate renewables. Some have indicated that investment and development would be taken elsewhere. They also suggest that any potential consumer and system benefit is likely to be negated by resulting increases to the cost of capital, caused by uncertainty about future prices and arrangements.
- Some stakeholders are also concerned that market reform this significant is likely to be too disruptive as we seek to increase our renewable capacity and transition to net zero. The uncertainty may cause an investment hiatus and risk Scotland, and the UK, failing to meet net zero targets.
- However, Ofgem, National Grid ESO, Octopus and other stakeholders have all been supportive of a move to LMP. They believe that LMP will drive investment and operational decisions that will help tackle network congestion and minimise costs to consumers. NG ESO and Octopus have stated that LMP is necessary to the future functioning of a net zero electricity system.
- Regardless of the direction taken on LMP, stakeholders agree that increased network build alongside strategic system planning (e.g. SSEP) is essential for UK to meet net zero targets.

[redacted]

- The new MP for Rutherglen, Michael Shanks, has been appointed Minister for Energy within DESNZ and has Energy market reform, including REMA specifically, within his portfolio.

## **BACKGROUND**

[not in scope]

[redacted]

### **Locational Marginal Pricing (LMP)**

- LMP would redesign the wholesale electricity market so that prices are set based on supply and demand in a particular node or region.
- In principle, LMP could increase costs for those investing in renewables in Scotland whilst lowering electricity costs for Scotland's consumers. Modelling undertaken for Ofgem suggests that LMP could deliver a potential saving of £50bn for GB consumers over the period 2025-2040. However, there are disputed assumptions in this work.
- The renewables industry – including SSE and Scottish Renewables – has expressed strong opposition to LMP calling for a reformed national market to be prioritised.
- Generators and investors believe that it could lead to an investment hiatus by increasing risk and capital costs, and reducing revenues. Generators and investors see twin risks, in the form of price risk and volume risk.
- However, Ofgem and National Grid Electricity System Operator believe that LMP can inform investment and operational decisions to tackle network congestion and minimise costs to consumers.
- Some modelling suggests that, given high levels of generation in Scotland, LMP could lead to Scottish consumers experiencing the lowest wholesale electricity prices in Europe, with associated benefits for the decarbonisation of industry, heat and transport.
- Whether these theoretical costs and benefits play out in practice depends on policy design choices by UKG, when LMP would be implemented, and supporting investment policy such as Contracts for Difference.
- In its Energy Security Strategy, UK Government stated its ambition to deliver wholesale electricity prices that rank among the cheapest in Europe by 2035, and that it would consult by end of 23/24 on how to rebalance the price of gas and electricity. We are still awaiting details of the UK Government's proposals to rebalance gas and electricity prices.
- [not in scope]

### **REMA Second Consultation Overview**

#### **Challenge 1: Passing through the value of a renewables-based system to consumers.**

- Retain marginal pricing across wholesale market.
- Discount radical options for decoupling gas/electricity prices such as a split market and green power pool.
- Emphasise continued development of CfD as best option for decoupling gas and electricity prices.
- Monitor the development of the corporate PPA market.

#### **Challenge 2: Investing to create a renewables-based system at pace.**



- Commit to retaining a CfD type scheme as the primary mechanism for driving investment in renewables.
- Consult further on a range of CfD options, including those which would move the scheme to payments based on potential rather than actual output (e.g. deemed CfD and capacity CfD). Also consult on reference price reform and options to restrict the percentage of capacity covered by a CfD.
- Discount a strike-price range and revenue cap and floor as options for a reformed CfD.

**Challenge 3: Transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system.**

- Retain the Capacity Market (CM) as our primary mechanism for ensuring capacity adequacy. More radical options such as strategic reserve discounted and more immediate CM reforms brought forward separately.
- Progress bespoke policy to support low carbon flexible technologies, such as long duration electricity storage, power CCUS and hydrogen to power.
- ‘Optimise’ CM through introduction of minimum procurement targets (minima) for different flexible technologies. This will create different clearing prices for different technologies within the CM auction and guarantee support for ‘minimum amounts’ of different technologies.
- Commit to supporting a limited amount of new unabated gas capacity, whilst developing “clear decarbonisation pathways for unabated gas to ensure a glide path to a fully decarbonised electricity system”.

**Challenge 4: Operating and optimising a renewables-based system, cost-effectively.**

- Consider strengthening locational market signals through either zonal pricing or a suite of alternative options under a national wholesale market.
- Discounts nodal pricing and ‘local markets’ model.
- Considers centralised dispatch alongside a reformed balancing mechanism.
- Work with NGENSO and Ofgem to develop an electricity system operability strategy for 2035.

[out of scope]

**Glossary**

CfD	Contracts for Difference. A Contract for Difference is a private law contract between a low carbon electricity generator and the Low Carbon Contracts Company (LCCC), a government-owned company. A generator party to a CFD is paid the difference between the ‘strike price’ – a price for electricity reflecting the cost of investing in a particular low carbon technology – and the ‘reference price’– a measure of the average market price for electricity in the GB market. It gives greater certainty and stability of revenues to electricity generators by reducing their exposure to volatile wholesale prices, whilst protecting consumers from paying for higher support costs when electricity prices are high.
Constraint Payments	When there are physical constraints on the network (ie the network cannot physically transfer the power from one region to another), generators are asked to reduce their output to maintain system stability and manage the flows on the network. Generators are then compensated via a constraint

	payment. The alternative is building more infrastructure at a significant cost, meaning higher bills for consumers.
Decoupling	In energy terms, when we talk about decoupling it usually refers to the decoupling of electricity prices from natural gas prices.
ESO	Electricity Systems Operator. They are responsible for day to day security system across GB. National Grid ESO carries this out this role across the whole of GB.
ESJTP	Energy Strategy Just Transition Plan. Designed to ensure the transition to Net Zero is done in a fair way for all of Scotland.
GIQ	Government Initiated Questions. These are lodged at a minister's request to promote new government initiatives/outcomes. They usually have a deadline of the following day.
LMP	Locational Marginal Pricing. The cost to buy and sell power at different locations within wholesale electricity markets. This is an option currently being considered in REMA.
Net Zero	In Scottish Government terms this is Scotland's ambitious climate change target for net zero emissions of all greenhouse gases by 2045.
NGESO	Nation Grid Electricity System's Operator. The electricity system operator for Great Britain.
Ofgem	Office of Gas and Electricity Markets. They are the UK independent energy regulator.
REMA	Review of Electricity Market Arrangements. A UK Government review of electricity market arrangements to identify reforms needed to transition to a decarbonised, cost effective and secure electricity system.
Retail Market	The retail market is where consumers buy their energy.
Scotwind	Scotwind is the first offshore wind auction of Crown Estate Scotland in the past ten years. The offshore wind leasing round included floating wind and fixed bottom wind farm projects identified in 17 areas.
Strike Price	A guaranteed price to be paid to wholesale generators of electricity. It is a critical element of UK energy policy with the aim of creating incentives for companies to invest in certain kinds of low-carbon power, like renewables and nuclear.
TNUoS	Transmission Network Use of System Charges. TNUoS charges recover the cost of installing and maintaining the transmission system in England, Wales, Scotland and Offshore.
Wholesale Market	The buying and selling of energy between energy generators and those that resell the energy. Energy generators sell energy at wholesale prices to energy suppliers. Energy suppliers such as electricity marketers, competitive power providers, and utility companies then resell this energy at higher prices to their customers.
Zonal/Nodal Pricing	This is where the transmission system is split into several pre-determined zones, or geographical regions. An option currently being considered in REMA.

[not in scope]

[redacted]

## **Document 5 – Electricity Markets ESJTP Submission – 12/12/2024**

From: [redacted]  
DECC/OESC  
12 December 2023

Minister for Energy and the Environment

### **Review of Electricity Market Arrangements – Update on forthcoming UKG consultation and proposed key messages for Energy Strategy and Just Transition Plan**

#### 1.1 Priority and Purpose

##### 1. Routine. This submission:

- a) sets out the expected direction of travel for the UK Government (UKG) consultation on the Review of Electricity Market Arrangements (REMA) and proposed next steps for responding to the consultation.
- b) proposes initial key messages for the electricity markets narrative in the forthcoming Energy Strategy and Just Transition Plan (ESJTP) for your consideration.

#### 1.2 Recommendation

##### 2. Officials recommend continuing to develop an evidence base and policy position on the options that will be set out in the UKG's REMA consultation, to inform the Scottish Government's response to that consultation [reacted].

##### 3. [redacted]

### **Context and Issues**

4. The GB wholesale electricity market sets the rules within which many of the ESJTP ambitions for renewable generation and statutory targets for decarbonising our demand sectors need to be delivered.
5. The UKG is reviewing market arrangements through REMA. The first REMA consultation was published in October 2022 and the second consultation is expected in January 2024.

6. [redacted] You then met Graham Stuart, Minister of State for Energy Security & Net Zero to discuss REMA in September 2023.
7. [redacted]
8. [redacted]
9. [redacted] further advice will follow in due course.

### **Building the evidence base on Electricity Market Reform**

10. [redacted]
11. There is a breadth of viewpoints from stakeholders (see Annex B). Renewables generators and investors have written to the UKG calling for them to take nodal and zonal pricing off the table. They warn it will increase risk and capital costs, slow down renewables deployment and increase the overall cost of the transition to consumers. The Climate Change Committee state that, to avoid an investment hiatus, an evolutionary approach to market reform is needed in the near term (2020s), with any more fundamental reforms, such as full LMP, considered for the 2030s.
12. However, demand side electricity users have communicated that they are much less certain about how LMP could affect them. There is cautious optimism – expressed in a recent Scottish Government Expert Advisory Panel on LMP – that it could help address fuel poverty and accelerate decarbonisation of demand (both household and industry) and therefore support achievement of Scotland’s statutory climate targets.
13. Furthermore, modelling commissioned by Ofgem suggests LMP could reduce Scotland’s wholesale electricity prices to among the lowest in Europe<sup>1</sup>. However, there is recognition that non-price factors such as planning, skills and supply chains, can be just as important as electricity costs in industry decisions about where to locate and invest.
14. We have commissioned an independent assessment of LMP, which aims to better understand the theoretical impacts of LMP as well as what is required to allow those benefits to materialise. It is due to conclude in February 2024. We established a short-life Expert Advisory Panel to add further rigour to the study. The Panel includes individuals from the renewables industry, retail market, flexibility and storage providers, and consumer-facing organisations.

### **Initial key messages for the ESJTP**

15. The ESJTP will bring together a coherent whole systems narrative that links our renewable ambitions closely with future energy demand and provide a clear narrative on enabling measures for the transition.
16. In developing our ESJTP position (and our response to REMA) on future market design, we will take whole systems view on what arrangements would best support Scotland to deliver a just transition to net zero in the most cost-effective way for consumers.

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<sup>1</sup> Assessment of locational wholesale pricing for Great Britain | Ofgem

17. We will draw out Scotland's pivotal role in helping the UK to deliver net zero and acknowledge the divergence in stakeholder positions. [redacted] We will also set out that more work is needed to gather evidence on the scale of the impact, including on statutory targets and the just transition.
18. Officials will continue to build the evidence base to examine the scale of impact on our ability to meet our vision for the future energy system. We suggest the following initial key messages for the ESJTP that future market arrangements should:
- 1) **Adhere to the principles of a fair and just transition** to: deliver affordable energy which isn't subject to global fuel price volatility; enable community participation and benefit; and incentivise economic benefit for Scotland through jobs and investment.
  - 2) **Enable a secure, flexible, climate friendly, net zero system which isn't dependent on fossil fuels and provides:** incentives for storage and flexibility and timely network and transmission investment. Future GB market arrangements must enable rapid decarbonisation of the electricity system.
  - 3) **Support ambitions to scale up renewable energy, including green hydrogen.** Securing volumes of low-cost finance for the energy transition requires continued support to de-risk investment, along with grandfathering for existing investments and improved wider investment conditions. Decisions on changes to UKG investment policy (including CfDs) will need to be taken alongside market reform decisions to ensure appropriate risk allocation between producers and consumers.
  - 4) **Support statutory climate targets by enabling heat, transport and industry decarbonisation in support of statutory climate targets including through CCUS,.** Reforms should support investment and decarbonisation in demand sectors thereby helping to meet our statutory climate change targets. Reforms should allow consumers to benefit from the lower marginal cost of domestic renewable production, insulating them from fossil fuel price volatility.
19. Our assessment of options for market reform will look at impacts from a Scottish-specific perspective and include different locations and circumstances such as rural, island, off-grid and vulnerability.
20. The Scottish Government will continue to call for the following actions, which were set out in the draft ESJTP:
- to ensure that reform of the wholesale market supports continued deployment of renewable generation and adequate protection to consumers;
  - to reform the wholesale market to enable consumers, communities and businesses in Scotland to share the benefits of low-cost renewable power and decarbonise demand sectors; and
  - to break the link between the price of electricity and the cost of gas.

21. [redacted]

### 1.3 Bute House & Verity House Agreement Implications

22. There are no direct Bute House or Verity House Agreement implications.

1.4 Financial and Legal Considerations

23. There are no direct financial or legal implications for the Scottish Government.

1.5 Sensitivities

[redacted]

1.6 Recommendation

[redacted]

### **Conclusions and next steps**

24. Providing you are content with the recommendation set out above, we will continue to engage with UKG on the REMA consultation. [redacted]. Officials will prepare a Scottish Government response to the REMA consultation for Ministerial approval.

25. Officials will work up an updated policy position on electricity markets for the ESJTP, based on the key messages above, and provide further advice ahead of the Cabinet process in February 2024.

1.7 Quality Assurance

26. This submission has been approved by Ragne Low, DD Onshore Electricity, Strategy and Consents and Catriona Laing, DD Domestic Climate Change.

[redacted]

Energy Strategy and Markets

Onshore Electricity, Strategy and Consents

<b>Cabinet Secretaries and Ministers Copy List</b>	<b>For Action</b>	<b>For Information Portfolio interest</b>	<b>For Information Constituency interest</b>	<b>For Information General awareness</b>
Minister for Energy and the Environment	X			
Cabinet Secretary for Wellbeing Economy, Fair Work and Energy		X		
Cabinet Secretary for Transport, Net Zero and Just Transition		X		
Minister for Small Business, Trade and Innovation		X		
Minister for Transport		X		
Minister for Zero Carbon Buildings, Active Travel and Tenants' Rights				X
Minister for Green Skills, Circular Economy and Biodiversity				

<b>Officials Copy List</b>
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DG Economy
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Michelle Quinn
Ragne Low
Catriona Laing
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**Officials Copy List**

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- Leanne Dobson
- Harry Huyton
- Kate Higgins
- [redacted]
- [redacted]
- [redacted]
- NZ Comms
- WEFWE Comms



[redacted]

[redacted]

[out of scope]

[redacted]

[out of scope]

## **Annex B: Stakeholder perspectives**

1. We are engaging widely to understand stakeholders' views on electricity market reform. For example, at both the January and December 2023 meetings of the Scottish Energy Advisory Board (SEAB), the current electricity market and electricity prices were raised as a major policy barrier for deploying heat pumps.
2. In February 2023, officials facilitated a REMA workshop jointly with UKG. The workshop provided an opportunity for Scottish stakeholders, including enterprise agencies, industry, Consumer Scotland and Community Energy Scotland to set out views.
3. In April 2023, a letter from the Just Transition Commission to Ms McAllan and Mr Gray called for "*a clear plan for working with the UK Government to ... decouple the wholesale price of electricity from the wholesale price of gas (or contingencies for long term consumer protection if this is unsuccessful)*".
4. In October 2023, Ofgem published analysis assessing the potential costs and benefits<sup>2</sup> of introducing LMP in GB between 2025 and 2040. Their analysis indicates that:
  - LMP in GB could deliver significant benefits for GB electricity consumers, the economy and carbon emissions compared to the status quo.
  - Compared to current arrangements, the net consumer benefits of locational pricing over the modelled 16-year period could range from £15bn - £51bn.
  - Net socio-economic benefits of locational pricing, over the same period, could range from £6bn to £24bn.
  - In most scenarios looked at, the average consumer would be better off compared to the status quo, but more so in the North of GB, than in the South of GB.
5. In November 2023, Scottish Futures Trust published their vision for what market reform must deliver for Scotland. It calls for sustained transmission network investment and targeted locational price and investment signals to help encourage new demand and reward flexibility (e.g. through Transmission Network Use of System (TNUoS) charging reform and regional constraint markets). It rejects LMP arguing that it would harm investor confidence, increase the cost of capital and lead to an investment hiatus.

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<sup>2</sup> The analysis used the 2021 National Grid Electricity System Operator's (ESO) Future Energy Scenarios (FES), Network Options Assessment (NOA) and Holistic Network Design (HND) data, as well as additional sources.

6. The ESO recently published its Net Zero Market Reform study conclusions, in which it states that locationally granular wholesale electricity prices are fundamental to achieving REMA's objectives. The ESO believes locational pricing can inform investment and operational decisions which would help tackle network congestion and minimise costs to consumers, ensuring market participants are not over or under compensated by inaccurate wholesale pricing; and ensure efficient use of renewables and flexible resources e.g. interconnectors and storage. Further consideration of how LMP would interact with the Strategic Spatial Energy Plan and siting decisions is needed.

## **Annex C: Building evidence**

### **Ongoing work**

1. Due to the wide range of views on the impact of LMP, we have commissioned an independent assessment via ClimateXChange. The study aims to better understand the theoretical impacts of LMP as well as what is required to allow those benefits to materialise. It is due to conclude in February 2024.
2. We established a short-life Expert Advisory Panel to add further rigour to the study. The Panel includes individuals from the renewables industry, retail market, flexibility and storage providers, and consumer-facing organisations.
3. [redacted]

### **Evidence gaps**

[redacted]

## **Document 6 – Wholesale Electricity Markets – EAP Briefing for Director, 21/11/2023**

From: [redacted]  
Energy Strategy and Markets Unit  
16 November 2023

### **Director's Briefing – Expert Advisory Panel – Wholesale electricity market reform**

#### **What is the Expert Advisory Panel?**

1. We commissioned an independent study via ClimateXChange – which is being led by ERM – to examine how proposed GB wholesale electricity market reforms could affect Scotland's ability to deliver net zero as well as what it could mean for Scotland's ability to support UK targets. The study focuses on locational marginal pricing and its alternatives.
2. To add rigour to the study and the evidence that it will present, we have established a short-life Expert Advisory Panel comprising individuals representing a wide range of interests including renewables, suppliers, flexibility/storage and consumers (see below).

#### **When is the meeting?**

- The meeting will take place via Teams on Tuesday 21 November, 14:00 – 16:00. You will provide a welcome and introduction to the meeting. Suggested lines are provided in the Annex to this briefing. Following your introduction, ERM will present its interim findings and, with support from ClimateXChange, chair a panel discussion.

### Who are the Panel members?

Name	Organisation
[Redacted]	[Redacted] Scottish Futures Trust
[Redacted]	Scottish Renewables
[Redacted]	[Redacted] Octopus Energy
[Redacted]	[Redacted] Scottish Water
[Redacted]	[Redacted] Consumer Scotland
[Redacted]	Community Energy Scotland
[Redacted]	[Redacted] OceanWinds
[Redacted]	Statera (Flexible energy generation and storage provider)
[Redacted]	Scottish Engineering
[Redacted]	South of Scotland Enterprise Agency
[Redacted]	DESNZ - Observer
Unable to attend meeting	[Redacted] UKERC [Redacted] - University of Exeter [Redacted] - The Energy Landscape
Declined invitation to join EAP	Just Transition Commission Charge UK – will input separately

### Sensitivities and stakeholder views

- Stakeholder opinion on the impacts of LMP are divided. We brought the Panel together to ensure that, in developing our policy and position on market reform, we hear from a diverse range of sectors who will be affected by any move to a market with LMP.
- The Panel will have representatives from the renewables and investor community who are strongly opposed to LMP, as well as Octopus Energy who are very much in favour of LMP. To enable us to reach a balanced view, we need to examine the full range of opportunities and threats and ensure that they are not overshadowed by the loudest voices.
- For awareness, in June 2023, 20 large energy companies and market actors – including SSE, Scottish Power Renewables, Vattenfall and Centrica – wrote to the Permanent Secretary at DESNZ calling for an incremental approach to addressing locational challenges in the wholesale market, and calling for nodal and zonal pricing to be ruled out in the next consultation.

7. The letter expressed concern that the theoretical benefits of introducing nodal or zonal pricing would be significantly outweighed by the negative impact the increased uncertainty would have on the cost of investment from increased, unpredictable price volatility within the market. Industry asked UKG to fully assess alternatives, including evolving transmission charging, CfD, Balancing Mechanism and extending ESO's regional constraints markets.

8. Conversely, there is a strong sentiment at National Grid ESO, Energy Systems Catapult and Octopus Energy that LMP could deliver a net benefit for consumers and that it is needed to tackle constraint costs and maintain system operability.

### **Purpose of the Panel – Meeting 1**

4. ERM will lead the session, presenting interim findings for 45 minutes followed by a 45 minute discussion. During the session, ERM and ClimateXChange will invite panel members to listen to and discuss the findings of the study so far.
5. The first session will explore:
  - The impacts of LMP and its alternatives on Scotland, specifically on consumers and end-users (domestic, commercial, and industrial), investment in renewables and low carbon technologies, and energy market arrangements required to support LMP.
  - The assumptions used in LMP modelling and how these will influence the scale of the impact on Scotland.
6. The second meeting – expected in December – will consider the relative scale and magnitude of threats and opportunities which LMP could bring to Scotland.
7. Both meetings will call on Panel members to share evidence as far as possible to inform the study and shape our advice to Ministers.

### **Annex: Proposed lines for your opening and welcome to the Expert Advisory Panel**

#### Electricity markets and their importance to delivering Scotland's future energy system

- I am delighted to see so many of you here – thank you for joining us to discuss the impacts and opportunities of electricity market reform in Scotland.
- As well as Panel members representing sectors such as the renewables industry, communities, demand-side industries, consumers and electricity-intensive users, we have observers from UKG's Department of Energy Security and Net Zero, and from Scottish Government policy teams.
- Through the Review of Electricity Market Arrangements (REMA), the UK Government is considering what reforms are needed to ensure the GB wholesale electricity market can deliver a decarbonised electricity system by 2035, in a way that supports affordability and security of supply.
- Electricity market reform isn't new. The last reforms took place in the early 2010s when UK Government policy began to usher in Contracts for Difference as the main support mechanism for low-carbon generations, with the Renewables Obligation scheme closing to new generation from 2017.

- Looking ahead, the arrangements taken forward in REMA may have fundamental impacts on our ability to deliver Scotland's Energy Strategy and Just Transition Plan – and the extent to which Scotland can support UK-wide targets for decarbonisation and net zero.
- REMA considers a wide range of market challenges including how the value of a renewables-based system can be passed to consumers; how to operate a renewables-based system in a cost-effective way; and how to transition to a resilient, decarbonised electricity system.
- Today's presentation and discussion will focus on one particular area of reform: strengthening locational signals in the market. ERM will explain more about this shortly.

#### What is the Scottish Government's role?

- The Scottish Government's role today is to listen to the wide-ranging expertise and perspectives on this Panel, to start developing a shared understanding and collaborative solutions.
- There will be winners and losers with market reform – that is certain. So we need to work together to find common ground and an approach that maximises opportunities and limits and manages any risks.
- We commissioned EMR to conduct this study - via ClimateXChange - to provide an independent assessment of market reform, with a focus on Locational Marginal Pricing and alternatives.
- The study is being directed by a Steering Group comprising members from ClimateXChange, the UK Energy Research Centre, Scottish Futures Trust and Scottish Government.
- This study will form a key part of evidence in Scottish Government's policy development on wholesale electricity market reform. It's critical, given the potential wide-ranging impacts, that we bring all sectors along on this journey. That's why we've set up this short-life Panel.

#### What do we want from today's session?

- Shortly you'll hear from ERM who will present the preliminary results of a desk study of recent qualitative and quantitative studies on locational marginal pricing and its alternatives. Please note that these are interim findings and do not represent the views of the Scottish Government.
- We would like you to engage with this presentation and the discussion that will follow, and tell us what these findings could mean for the sectors you represent.
  - Do you agree or disagree with the findings - and why? Can you provide evidence in support of your views? Are there gaps?
  - What is the scale of the opportunity and risks – for who and when? Which factors are most important to you?
  - Do you think LMP could attract investment and create new markets for flexible demand and industrial users?
  - Can LMP work in Scotland and GB – and under what conditions? What supporting investment policy and regulation would be needed?

#### A few considerations

- As we move into the presentation and discussion, please be open to hearing each other's interests and perspectives. How can we navigate this challenge in a collaborative way?
- This might be the first time some of you have encountered electricity markets and LMP. It is hugely complicated so please ask questions - raise your hand or post comments. The Scottish Government team can follow up with you after today if you'd like to discuss further.
- We look forward to listening to the discussion this afternoon. Thank you and I'll now hand over to the ERM team.

## **Document 7: Market Reform and Locational Pricing – Briefing for DFM, 19/09/2024**

[redacted]  
Energy Strategy and Markets Unit, DECC  
19 September 2024

### **Deputy First Minister and Cabinet Secretary for Economy and Gaelic**

### **Wholesale Electricity Market Reform and Locational Marginal Pricing**

#### **Priority and Purpose**

1. To update on wholesale electricity market reform (particularly Locational Marginal Pricing or "LMP") and current policy developments, following the Energy Strategy and Just Transition Plan (ESJTP) discussion at Cabinet on 27 August and recent media interest in the subject.

#### **Recommendation**

2. That you:
- note the contents of this briefing;
  - note the offer of a deep dive with officials on the issues presented here.

#### **Current GB Wholesale Electricity Market Arrangements**

3. Scotland is part of a single GB energy market. Current wholesale electricity market arrangements mean there is a single price of electricity across GB, with prices primarily determined by volatile global gas prices<sup>3</sup>.

4. The current market arrangements also fail to incentivise renewable generators, storage technologies and interconnectors to locate and operate in a way that is

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<sup>3</sup> The wholesale price of electricity across GB is set by the cost of the last unit required to fulfil demand. Generators are selected in price order, with renewable generators generally first and gas generation generally selected last. This means that the GB wholesale electricity market, like in Europe, is based on "short-run marginal costs" with the daily market price set at the level which ensures sufficient supply to meet demand. This means that the price is set by the most expensive plant needed that day. This is usually gas-fired power plants.

economically efficient and reflects available network capacity. This, combined with under-investment in the transmission network, has led to rising constraint costs.

5. These inefficiencies together with the fact that renewables infrequently set the wholesale price mean that Scotland’s consumers, communities and businesses (including industry) are not benefiting from the lower cost of renewable power generation in Scotland. At the same time, generators are being compensated financially for limiting or “constraining” their generation due to insufficient grid capacity. These constraints payments are primarily paid for by consumers in their bills.

6. For comparison, a variety of market structures are used across Europe. Germany, like GB, operates a single national market whilst Italy and the Nordic nations operate a zonal market where prices can vary considerably, due to varying levels of supply and demand in different zones<sup>4</sup>.

7. The incompatibility of the current GB market with a just transition to net zero lays bare the critical need for electricity market reform. This is a crucial step in achieving the ambitions set out in the forthcoming Energy Strategy and Just Transition Plan, and the recently published Green Industrial Strategy.

## **Review of Electricity Market Arrangements (REMA)**

8. The previous UK Government (UKG) initiated a review of electricity market arrangements (REMA) to consider reforms that could drive the decarbonisation of the power system in a way that supports affordability and security of supply.

9. A second consultation was held in spring this year. It addressed a range of potential reforms to pass on the low costs of renewables to consumers; support and incentivise renewable generation; maintain security of supply; and facilitate a more flexible system with improved locational and operational price signals.

10. Of these reforms, Locational Marginal Pricing (LMP) is the most radical and contested. LMP would have a range of impacts on the Scottish energy system across demand, generation, networks and consumers.

## **Locational Marginal Pricing (LMP)**

11. To build an independent evidence base, officials commissioned an evaluation of existing LMP modelling and an assessment of how it would align with Scottish Government’s ESJTP objectives. The final report<sup>5</sup> was published on 12 August 2024 and concludes that LMP could lead to significant consumer benefits and the increased siting of new demand and flexibility assets in Scotland. This includes hydrogen electrolysers which can take advantage of periods with low wholesale prices, although their deployment depends on continued growth in renewables. However, the report clearly warns that LMP poses a major risk to Scottish renewables unless appropriate support mechanisms, such as reformed Contracts for Difference, can be implemented.

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<sup>4</sup> For example, at 6pm on March 1<sup>st</sup>, the wholesale price in Norway’s northernmost zone was €51.92 per MWh, whilst in the southernmost zone it was €87.54: Data from the power system | Statnett

<sup>5</sup> GB wholesale electricity market reform: impacts and opportunities for Scotland | ClimateXChange

12. LMP would redesign the market so that prices are set based on supply and demand *in a given region*. High levels of supply relative to demand in one area would lead to lower prices in that area, reflecting the surplus of electricity. The converse is true where demand exceeds supply. Given the volume of generation relative to demand in Scotland, LMP in theory could benefit domestic and business consumers, potentially reducing wholesale electricity prices considerably.

13. Theoretically, lower wholesale prices would lead to new generation siting closer to demand (e.g. south of England), with new demand industries and flexibility assets such as grid scale batteries, siting in Scotland to take advantage of low and volatile wholesale prices. However, non-price factors such as supply chains, skills and consenting timescales can be as important as electricity prices in influencing siting decisions.

14. Nodal pricing, which would have seen the GB market split into hundreds of price 'nodes', has been ruled out by the former UKG. However zonal pricing, which would split the market into several zones, is still being considered. The extent to which changes in price across GB would materialise is dependent on policy design, the pace of network build and the speed of implementation.

15. [redacted]

16. Scottish Government's current policy on LMP stipulates that three conditions need to be in place before LMP can be considered for implementation: i) a clear path for continued renewables support in Scotland; ii) clear evidence that LMP would not come at a cost to consumers; and iii) a clear timetable for delivery.

## **Stakeholder Reaction**

17. The renewables industry in Scotland and across GB, including Scottish Renewables, SSE and Scottish Power Renewables, has been vocal in its opposition to LMP, proposing their own alternative models. Generators are concerned that reduced wholesale prices and the loss of guaranteed access to the national market regardless of capacity, would make Scotland an unattractive place to invest, potentially creating an investment hiatus and therefore risking wider UK net zero targets. They also believe that any potential consumer and system benefits will be negated by increases to the cost of capital, caused by uncertainty about future prices and market arrangements<sup>6</sup>.

18. Ofgem, National Grid ESO and Octopus Energy are the main supporters of a move to LMP. They believe that LMP will drive investment and operational decisions that help tackle network congestion and minimise costs to consumers<sup>7</sup>. National Grid ESO and Octopus Energy have stated that LMP is necessary to the future functioning of a net zero electricity system. Modelling carried out for Ofgem found that Scotland could have the

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<sup>6</sup> FTI models that a 1.3-3.4 percentage point increase to the cost of capital would eliminate any consumer benefit. AFRY modelling suggests that a 0.56 percentage point increase would eliminate net benefit.

<sup>7</sup> DESNZ commissioned modelling shows that zonal pricing could reduce the cost of running the electricity system in the region of c.£5-15bn over 2030- 2050, and that consumer benefits could be in the region of c.£25-60bn over the same period. Assuming these savings are fully passed through, this would be an average consumer benefit of £20-45pa per household over 2030-2050.



cheapest wholesale prices in Western Europe under LMP<sup>8</sup>. The renewables industry has contested the assumptions used in this modelling.

19. Octopus Energy’s CEO, Greg Jackson, has been vocal in the media over the summer, highlighting that the existing market structure provides insufficient market signals to inform siting of new generation and demand, and that consumers living close to large scale renewable developments see little benefit. Mr Jackson has called for a move to locational pricing, highlighting that it could lead to consumers in Scotland having some of the cheapest electricity in Europe.

20. A challenge moving forward is ensuring that consumer voices are appropriately represented in any debate around future market reform. [redacted]

[redacted]

### Next Steps

[redacted]

[redacted]

Energy Strategy and Markets Unit  
19 September 2024

Cabinet Secretaries and Ministers Copy List	For Action	For Information Portfolio interest	For Information Constituency interest	For Information General awareness
Deputy First Minister and Cabinet Secretary for Economy and Gaelic	X			
Cabinet Secretary for Net Zero and Energy		X		
Minister for Climate Action		X		

Officials Copy List
Permanent Secretary
DG Economy
DG Net Zero
Kersti Berge
Chris Mackie
[redacted]
[redacted]
[redacted]
[redacted]

<sup>8</sup> [assessment-locational-wholesale-electricity-market-design-options \(4\).pdf](#)

**Officials Copy List**

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Comms Net Zero and Rural Affairs

**Document 8: Ministerial Response Letter to Second REMA Consultation, 03/05/2024**

Minister for Energy, Just Transition and Fair Work  
Gillian Martin MSP



T: 0300 244 4000  
E: scottish.ministers@gov.scot

Justin Tomlinson MP, Minister of State for Energy Security and Net Zero  
Department for Energy Security and Net Zero  
Email: Minister.tomlinson@energysecurity.gov.uk

May 2024

Dear Justin,

I am pleased to share the Scottish Government’s response to the second Review of Electricity Market Arrangements consultation. We believe that the current wholesale electricity market is not fit for the delivery of our respective ambitions for net zero, nor our aims to tackle fuel poverty. This review provides us with an opportunity to take a whole systems view of our future electricity market. The Scottish Government’s response to the consultation is included as an annex to this letter.

In summary:

Reforms must find ways to keep system costs as low as possible, remove links to the volatility of fossil fuel pricing, drive innovation, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.

Reforms must also ensure that those system efficiencies are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty. Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.

Market reforms must therefore adhere to two key principles:

- **Achieving a just transition to net zero:** Decarbonising our energy system must be a central guiding principle of market reform. The continued deployment of renewables in Scotland – onshore and offshore – is crucial to GB-wide electricity system decarbonisation, and to realising the social and economic opportunities from Scotland’s abundant renewable potential. Further, the market should incentivise decarbonisation of heat, transport and energy intensive industries: this is critical for economic growth.
- **Ensuring a fair and just transition:** Reforms must consider costs to all consumers: domestic and business. This is particularly important for consumers who are most at risk of – or already in – fuel poverty. It is also critical for communities that have been relatively disadvantaged by current market arrangements, such as Scotland’s rural and island communities. Urgent reforms must be implemented to ensure that consumers are able to benefit from more affordable electricity and insulated from price volatility. Price stability and affordability are also essential for encouraging new green industry, such as renewable hydrogen production.

I look forward to the UK Government’s consideration of the responses to this consultation and to seeing further detailed proposals on the reform options discussed in the annex to this letter. I would be grateful for a continuation of the collaborative engagement between the UK and Scottish Governments that has marked the REMA process to date and welcome any further detail on how you plan to engage with stakeholders in Scotland, so that we may consider opportunities to collaborate. Finally, I would like to extend the invitation of a meeting so that we may discuss the points set out in this letter.

Yours sincerely,

**Gillian Martin**

**Annex A**

Below are the Scottish Government’s responses to the four key challenges set out in the consultation.

## **Challenge 1: Passing through the value of a renewables-based system to consumers.**

Ensuring a fair and just transition at least-cost to consumers is one of our key principles. We agree that reforms must pass through the value of a renewables-based system to all types of consumers and especially those who are most at risk of, or already in, fuel poverty. High electricity prices are a significant barrier to decarbonising industry, heat and transport, impeding progress to net zero and stifling the growth of these clean industries. Reforms should also help to attract investment in energy intensive industries.

We welcome the continued focus on reforming the Contracts for Difference (CfD) scheme and we acknowledge that this provides a long-term route to decoupling gas and electricity prices. However, relying on CfD reform as the primary way to decouple gas and electricity prices may mean that consumers, including those who are vulnerable and in fuel poverty, continue to be exposed to volatile global fossil fuel prices for longer than necessary.

Consumers cannot afford to wait. Our analysts estimate that under the current Ofgem price cap, a staggering 31% of all households in Scotland (around 790,000) are in fuel poverty. It is absolutely essential that any reforms put consumers first. We urge you to reconsider whether any more immediate reforms can be implemented to ensure that consumers are able to benefit from more affordable electricity. Additionally, clarity on the future design of the CfD scheme must be provided as soon as possible and we ask that the Scottish Government is fully involved in these discussions.

## **Challenge 2: Investing to create a renewables-based system at pace.**

Scotland has already seen a rapid growth in renewables deployment, from 6.2 GW in 2013 to 15.3 GW currently<sup>9</sup>, with a potential estimated capacity of 25.9 GW in the planning pipeline.<sup>10</sup> Scenarios underpinning analysis commissioned by the Scottish Government suggest that electricity consumption could increase by 33-45% by 2030 (compared to 2020 levels) as we decarbonise heat, transport and industry<sup>11</sup>. Making the most of our abundant renewable resources is absolutely crucial to meeting GB-wide demand for electricity and our ambitions for net zero.

Scotland's current renewables projects – and potential future projects – must therefore be fully protected during market reforms. Investors need continued certainty on the policy and regulatory context for their decisions. Renewable electricity will be the backbone of our future energy system. Supporting this vital and world-leading sector will allow us to collectively promote national energy security through increasing levels of home-grown energy supplies; meet our collective need for clean electricity as we decarbonise heat and transport; prioritise the growth of green hydrogen production via new generation capacity; and ensure that we remain an attractive place to invest in generation technology and clean energy industries.

Although we support the continued use of CfDs, reforms are needed to ensure the scheme keeps pace with market changes and renewables growth. Current arrangements incentivise generators to dispatch even when it doesn't bring 'whole system' benefit. The impact of

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<sup>9</sup> [Energy Statistics for Scotland - Q4 2023 - gov.scot \(www.gov.scot\)](https://www.gov.scot/resources/consultations-petitions/ip/energy-statistics-for-scotland-q4-2023/)

<sup>10</sup> As of the end of the end of December 2023, 517 renewable electricity generation projects

<sup>11</sup> TEC scenario - [Scottish whole energy system scenarios \(climatexchange.org.uk\)](https://www.climatechange.org.uk/scottish-whole-energy-system-scenarios/)

Transmission Network Use of System (TNUoS) charges in CfD prices also needs to be addressed. Projects in Scotland face higher charges which affect the competitiveness of their bids in CfD auctions, leading to higher strike prices and consumer costs.

Given the importance of CfDs to future investment decisions, it is crucial that reform happens at pace and that proposed changes are communicated to industry at the earliest possible opportunity. We appreciate that reform of the CfD scheme is, in part, contingent on overall market reforms – especially those set out under Challenge 4 – however, investors require stable, long-term policy frameworks alongside clarity on grandfathering arrangements.

According to Energy UK, there is a significant shortfall of capacity following the under-delivery of AR5 in 2023, which means the next two rounds (AR6 and AR7) must deliver around 21GW of new capacity to reach UK Government offshore wind targets. Given that Scottish offshore wind projects will be responsible for delivering a majority of these targets, we must ensure that we maximise our offshore wind pipeline. Given the crucial role of offshore wind in delivering net zero, future Allocation Round budgets must be increased, subject to information and insight on the pipeline to deliver greater capacity.

Whichever reforms are taken forward, they must continue to enhance the economic, environmental and social benefits from renewable energy. To this end, reforms must align with the Sustainable Industry Rewards (SIC) scheme.

### **Challenge 3: Transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system.**

With the right reform, the Capacity Market (CM) can continue to meet the security of supply challenge in GB. However, we strongly believe that the CM's future role should be in supporting low-carbon flexibility technologies. The Scottish Government is clear in its opposition to the continued use of unabated fossil fuels to generate electricity and we wish to see a rapid end to this. While abated natural gas still has a role to play, this should only be to provide system flexibility in a largely renewables-based system. Therefore, we remain concerned about plans to support new unabated gas capacity.

While we acknowledge the intention for these new plants to play a limited role, the focus should be on accelerating the roll out of low-carbon storage and flexibility technologies which can fulfil the role of unabated gas in our system. Technologies such as long duration electricity storage (LDES), power CCUS and hydrogen to power (H2P) are crucial to supporting decarbonisation and security of supply. Proposals for bespoke, technology-specific support are welcome but need to come forward quickly.

Pumped hydro storage (PHS) already plays a critical role in supporting security of supply and flexibility. There are currently 1.5 GW of PHS projects awaiting construction in Scotland. A recent report from Scottish Renewables<sup>12</sup> indicates that six PHS projects currently in development in Scotland could, if constructed, add 4.9 GW to the UK's PHS capacity. The combined investment in these projects is expected to be around £6-8bn. It is also expected that they could provide significant economic benefits, £4.2-5.8bn in GVA and

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<sup>12</sup> [Report: The Economic Impact of Pumped Storage Hydro \(scottishrenewables.com\)](https://scottishrenewables.com)

create between 10,700 and 14,800 jobs in the UK at the peak of development and construction.

We welcome the UK Government's recent consultation on LDES, which offers the much-needed cap and floor mechanism support for technologies such as PHS. It is vital that this is designed effectively and delivered promptly and efficiently.

We are still waiting for the UK Government to make a final decision on awarding the Acorn T&S project, and to publish the selection criteria for the Track 2 emitter projects. This slow rate of progress has hampered the development of CCUS in Scotland, and does not support the guiding principles set out in the UK Government's CCUS Vision. Accelerating the delivery of CCUS clusters would reduce the requirement for new unabated gas capacity.

We are in agreement with your (minded to) position that a business model to support H2P is required alongside LDES support. This approach should be taken forward as part of a wider drive for greater coordination across system boundaries such as hydrogen production, to optimise the system as a whole.

We are concerned that introducing minimum procurement targets (minima) in the CM could prevent unabated gas from competing with low-carbon alternatives such as battery energy storage systems. This risks locking in support for unabated gas while limiting the scope of technologies like batteries to replace it.

The consultation sets out an expectation that by 2035, up to 55GW of short-duration flexibility and between 30 and 50GW of long-duration flexibility will be required. We challenge the UK Government to ensure that this flexibility is delivered in line with its target for a net zero system by 2035.

#### **Challenge 4: Operating and optimising a renewables-based system, cost-effectively.**

The ESO is predicting up to £3 billion per year in constraint costs by the late 2020s<sup>13</sup>. Ensuring the right locational and operational signals are sent through the wholesale market is crucial to delivering a net zero system and ensuring consumers, communities and businesses in Scotland benefit from this transition. The Scottish Government has commissioned an independent assessment of the impacts of wholesale electricity market reform for Scotland. This study focuses on locational marginal pricing (LMP). We would be pleased to discuss the findings of this report with your officials, in due course.

The evolution of whole electricity system planning through frameworks such as the Strategic Spatial Energy Plan and Centralised Strategic Network Plan, will be vital to ensuring our future system remains operable at the lowest cost to consumers. As these frameworks are developed, we ask that you continue to involve the Scottish Government to ensure an effective cross-GB energy plan is created. However, as the consultation notes, strategic system planning will not be sufficient on its own and enhanced locational and operational signals are required.

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<sup>13</sup> National Grid ESO (2022) Modelled Constraint Costs NOA 2021/22 Refresh- August 2022  
<https://www.nationalgrideso.com/document/266576/download>

The introduction of LMP to deliver these signals could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers. We note that nodal pricing has been removed as an option, leaving two overarching options: (i) zonal pricing; and (ii) a suite of changes to existing arrangements under a national pricing model. However, the consultation states that any suite of alternative options is unlikely to provide the operational signals that LMP can provide, such as optimising interconnector flows and generation and flexibility dispatch.

Meanwhile, we must consider the potential for operational efficiencies, reduced costs for consumers and opportunities for decarbonisation and growth in novel sectors such as hydrogen production – alongside the continued deployment of renewables.

Given the range of policy design choices which exist in relation to zonal pricing, we would have welcomed more clarity regarding the UK Government’s preferred approach and how these interact with other key decisions such as CfD and TNUoS reform. We need urgent clarity on the direction of travel for locational price signals, both in a zonal and national market. Consequently, and on balance, the following conditions are needed to be able to fully consider the costs and benefits of zonal pricing:

- There must be a clear plan for continued support for renewables to maintain investor confidence and protect Scottish generation. CfDs offer one route to breaking the link between the cost of gas and electricity prices, while providing revenue certainty to investors, but as above, we urge the UK Government to fully explore others.
- Any zonal pricing policy design proposed by the UK Government, and all accompanying analysis, must demonstrate with a high degree of confidence that zonal pricing will not cost consumers more than the savings which could be gained from incremental reforms such as Local Constraints Markets and TNUoS reform. Reform must not be to the detriment of those in, or at risk of fuel poverty, and it should actively seek to support the eradication of fuel poverty.
- Any decision on zonal pricing must be accompanied by a clear and well-evidenced timetable for delivery. Consumers in Scotland would stand to benefit more from locational pricing the earlier it is introduced ahead of planned network reinforcement by 2035 and onwards. And investors must be provided with certainty on how the policy and regulatory landscape will evolve over time.

**Document 9: All Energy REMA Panel Session – Director Briefing, 16/05/2024**

**All-Energy REMA Panel, 16 May, 11:00-12:30**

<b>Who?</b>	<ul style="list-style-type: none"> <li>• Simon Dawes, Head of Future Renewable Investment, UK Department for Energy Security and Net Zero (DESNZ)</li> <li>• Madelaine Brooks, Energy Markets and Regulation Lead, Octopus Energy</li> <li>• Simon Gill, Consultant, The Energy Landscape</li> <li>• Keith Patterson, Partner &amp; Co-Head Renewables, Brodies LLP Solicitors</li> <li>• Angus MacRae, Head of Electricity Strategy, SSE</li> </ul>
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	<ul style="list-style-type: none"> <li>Maxine Frerk, Associate, Sustainability First</li> </ul>
<b>What?</b>	REMA panel discussion at All-Energy Conference 2024.
<b>Agenda and Discussion Topics</b>	<p>11:00 – 11:10: Allowing for people getting seated; housekeeping / fire alarms; Kersti remarks/introduction to REMA session.</p> <p>11:10 - 11:40: Panel members have 5 minutes each (<u>maximum</u>) to give their opening remarks</p> <p>11:40 – 12:00: Questions from Chair</p> <p>12:00 – 12:20: Questions from audience using Slido</p> <p>12:20 – 12:30: Chair’s remarks and close</p>
<b>Why?</b>	To engage with stakeholders and facilitate further discussion on REMA and its potential impacts. The second consultation closed on 07 May and this discussion therefore provides an opportunity to hear from key stakeholders on the reforms still under consideration and some of the analysis set out by UKG.
<b>Where?</b>	SEC, Glasgow. Hall 1.
<b>When?</b> <i>Date</i> <i>Time</i>	Thursday 16 May 2024. 11am – 12:30pm.
<b>Who will accompany from the Directorate?</b>	[redacted]
<b>Sensitivities</b>	[redacted]
<b>Briefing Contents</b>	<p>Annex A – Chair’s opening remarks.</p> <p>Annex B – Panellists opening remarks.</p> <p>Annex C – Chair’s questions.</p> <p>Annex D – REMA top lines.</p> <p>Annex E – Second consultation overview.</p>

## Annex A

### Chair’s Opening Remarks (10 minutes) (11:00 – 11:10)

- Welcome everyone to this panel session on the Review of Electricity Market Arrangements (REMA, for short). It’s wonderful to see so many people here.
- Many of you will have been at the All-Energy REMA session last year. A lot has (and hasn’t) changed since then. One thing is for sure, lessons have been learned about the huge level of interest in REMA and we have a bigger space in which to have this discussion!
- Before we get going, I’m going to take a moment to run through the usual announcements.



- No fire alarm drills are planned but should an alarm sound please all make your way to the nearest emergency exit and follow the instructions from members of the SEC team.
- I'd also ask at this stage that people ensure their phones are on silent and please do start sending in some questions via Slido.
- You can access Slido using the All-Energy app or via [www.sli.do](http://www.sli.do) and then insert the code #AllEnergy24. From there you should select the room we are in (which is Hall 1) from a list containing all the conference theatres.
- On to the topic for this session. The Review of Electricity Market Arrangements (REMA) is the largest programme of reforms to the electricity market in a generation. It aims to ensure a decarbonised GB power system is delivered by 2035. This entails consideration of all facets of the energy market and system, and requires us to engage with questions such as
  - how best can we continue supporting the deployment of renewables;
  - how can we ensure all consumers – particularly those in fuel poverty and other vulnerable circumstances – benefit from the lower cost of renewables;
  - how can we ensure security of supply as we decarbonise the system; and
  - how the market can send the correct locational and operational signals.
- It is important that we get this right. An electricity market and accompanying policies which are fit for purpose are critical to delivering our net zero ambitions and wider social and economic goals, including a just transition.
- We are fortunate to be joined by a diverse group of experts who are well-placed to share their views on how we can do this. We will hear from each speaker and then discuss a range of questions, including from the audience.
- We have 90 minutes in total and will hear from:
  - Simon Dawes, Head of Future Renewable Investment, DESNZ
  - Madelaine Brooks, Energy Markets and Regulation Lead, Octopus Energy
  - Simon Gill, Consultant, The Energy Landscape
  - Keith Patterson, Partner & Co-Head Renewables, Brodies LLP Solicitors
  - Angus MacRae, Head of Electricity Strategy, SSE
  - Maxine Frerk, Associate, Sustainability First
- Once we have heard from our panellists and I have used my Chair's privilege to ask them some questions, we will open the floor to the audience for Q&A. Please also take the opportunity to consider the audience poll which can also be accessed through Slido.
  - This poll will hopefully draw out your views on one of the central tensions within REMA; whether reducing de-risking investment in renewables or improving them way generation and demand respond to system needs is most important to reducing overall system costs.
- And now, I am happy to pass on to Simon Dawes to begin the opening remarks of our panellists.

**Panellists' Opening Remarks**

**Panellists have shared the broad messages that they will set out in their opening remarks. Each panellist has a maximum of five minutes to set out their position. Simon Dawes has 7-8 minutes to provide a more detailed overview of the second REMA consultation.**

**Simon Dawes, Head of Future Renewable Investment, UK Department for Energy Security and Net Zero (DESNZ)**

- Overview of second consultation content and outline of next steps to be taken by UKG.

**Simon Gill, Consultant, The Energy Landscape**

- The tension inherent between investability and operational signals.
- We need to think beyond electricity markets: whole electricity system; whole energy system; whole economy; whole society.
- The impact on market design of moving to a strategically planned system.
- REMA is still a conceptual debate: how do we navigate from now to REMA's conclusion with implementation of practical, fully designed solutions and do all that via a general election.
- Understanding the risk and uncertainty landscape of a net zero electricity system: what does it look like and who should hold it?

**Madelaine Brooks, Energy Markets and Regulation Lead, Octopus Energy**

- The power system is transforming not evolving, so we need transformational change to ensure the system runs most efficiently.
- Zonal pricing is fundamental to ensure the effective balancing of demand with renewable supply and any investment support must be built around this new wholesale market.

**Keith Patterson, Partner & Co-Head Renewables, Brodies LLP Solicitors**

- The importance of stability and predictability in the regulatory framework in maintaining investor confidence, especially given capital in the renewables sector is global.
- Three aspects to this in the context of REMA – reform of market structure, reform of financial incentives and protection of existing investments.
- Better to identify specific issues and address them one-by-one. In the UK we have a long tradition of innovation through regulatory evolution, not revolution.
- Financial incentives – CfD reform. CfD has been highly successful – variation not replacement is the best strategy.
- Protection of existing investments – even if it relates to prior investments, it is key to attracting new investment for the signal it sends.

**Angus MacRae, Head of Electricity Strategy, SSE**

- REMA has so far delivered good stuff – maintained a low-risk environment for investing in low carbon and secure energy via continued use of Contracts for Difference and Capacity Market.

- However (main theme) – we need to clarify that renewed commitment to an integrated national market is needed to really deliver for GB. A dangerous understatement of the benefits of renewable investment remains a threat to the delivery of key decarbonisation aims ahead of 2035.
- We hope for a sensible next stage focussing on building on REMA phase 1 maintaining the objective of minimising market risk for variable renewable energy assets, transferring attention from continued debate over LMP to practical, deliverable actions to contain the cost of the congestion that is an inevitable part of an optimised low carbon electricity system.

**Maxine Frerk, Associate, Sustainability First**

- What do REMA reforms mean for end consumers and how do we perceive fairness in the energy market?
- Discussion of comparisons with market-wide half-hourly settlement as the counterfactual.

**Annex C**

**Chair Questions to Panellists (11:40 – 12:00)**

**We reached out to panellists and asked them for two questions that they would like you to pose to the panel. Taking account of our own views of the key issues in REMA, we propose that you pose the following questions.**

Question	Who's happy to pick the question up?
<p>The key issue for many stakeholders in REMA has been locational marginal pricing, and zonal wholesale pricing has been retained as an option in the second consultation.</p> <ul style="list-style-type: none"> <li>• What do panellists think are the key issues, problems and opportunities related to the potential implementation of zonal pricing.</li> </ul>	All
<p>Passing through the value of a renewables-based system to consumers is the first of the four REMA challenges. Will retaining marginal pricing alongside a reformed CfD scheme achieve this?</p> <ul style="list-style-type: none"> <li>- How do you think the CfD needs to change in the context of a renewables dominated system?</li> <li>- Are there more immediate options that we are missing to ensure the low generating cost of renewables is passed through to consumers?</li> </ul>	Angus Keith Maxine Maddie
<p>The second consultation proposes to retain the Capacity Market as the primary mechanism for ensuring capacity adequacy. Is this the correct route to ensuring long-term security of supply?</p> <ul style="list-style-type: none"> <li>• What is Government's rationale for maintain the Capacity Market as the primary mechanism for supporting security of supply and flexibility? (<b>Simon D specifically</b>)</li> <li>• How does it need to be reformed so it can support low-carbon flexibility (including batteries, long duration storage, power CCUS and hydrogen) deployment?</li> </ul>	Maddie Simon G Simon D
<p>How do recent developments in whole energy system planning, such as the Strategic Spatial Energy Plan (SSEP) and the Centralised Strategic Network Plan (CSNP) impact upon the reforms set out in the second REMA consultation?</p>	Angus Maxine Simon G

### **Open to questions from the audience (12:00 – 12:20)**

Questions submitted via All-Energy app, Slido or asked using microphone.

### **Chair's remarks and close (12:20 – 12:30)**

- Thank you so much to our panellists for sharing their expertise and honest opinions. And thank you to the audience for such challenging questions and constructive engagement.
- I will end with two final questions for the panel:
  - Hopefully our audience members have had the opportunity to answer the following question through a poll on Slido:  
*Under Challenge 2, the REMA consultation articulated that two objectives would be key to reducing overall system costs: de-risking investment in renewables and improving assets' operational responsiveness to system*

*needs. Which of these do you think is most important to delivering lowest overall system costs, whilst achieving a net zero system and maintaining security of supply?*

- The results from the audience were as follows (**here you just need to ask the technician to “put up the poll please”**). I’d now like to ask each panellist to give a rapid-fire response to the same question.
- Finally, and very briefly, what would panellists like to see next from UK Government in the REMA process?

### **Supplementary Questions**

- Can a package of alternative options alongside a national market achieve the same locational and operational efficiencies as zonal pricing potentially could?
- What one thing have you learned from the price crisis of the past two and a half years, that has influenced your thinking on electricity market design and how to deliver good outcomes for consumers?
- Have we moved far enough and fast enough since the last REMA consultation? Has the second consultation done enough to refine options?
- How should DESNZ consider options compatibility and how important will ensuring compatibility of reforms be in the next stages of REMA?

### **Annex D**

#### **REMA Top Lines**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- REMA provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers. We are clear that any reforms must adhere to our two core principles of achieving net zero and ensuring a fair and just transition.
- Reforms must find ways to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we have commissioned independent research to inform our position on Locational Marginal Pricing. The study has benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. We expect this research to be published in the coming months.

- We welcome the constructive engagement we have had with Ofgem, NG ESO, UK Government and industry on REMA, and look forward to the next phases of REMA including publication of the UK Government consultation response this summer and policy development thereafter.
- Our position on electricity market reform, including Locational Marginal Pricing, will be covered in our Energy Strategy and Just Transition Plan, to be published by summer 2024.

## Annex E

### Second Consultation Overview

#### **Challenge 1: Passing through the value of a renewables-based system to consumers.**

- Retain marginal pricing across wholesale market.
- Discount radical options for decoupling gas/electricity prices such as a split market and green power pool.
- Emphasise continued development of CfD as best option for decoupling gas and electricity prices.
- Monitor the development of the corporate PPA market.

#### **Challenge 2: Investing to create a renewables-based system at pace.**

- Commit to retaining a CfD type scheme as the primary mechanism for driving investment in renewables.
- Consult further on a range of CfD options, including those which would move the scheme to payments based on potential rather than actual output (e.g. deemed CfD and capacity CfD). Also consult on reference price reform and options to restrict the percentage of capacity covered by a CfD.
- Discount a strike-price range and revenue cap and floor as options for a reformed CfD.

#### **Challenge 3: Transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system.**

- Retain the Capacity Market (CM) as our primary mechanism for ensuring capacity adequacy. More radical options such as strategic reserve discounted and more immediate CM reforms brought forward separately.
- Progress bespoke policy to support low carbon flexible technologies, such as long duration electricity storage, power CCUS and hydrogen to power.
- ‘Optimise’ CM through introduction of minimum procurement targets (minima) for different flexible technologies. This will create different clearing prices for different technologies within the CM auction and guarantee support for ‘minimum amounts’ of different technologies.
- Commit to supporting a limited amount of new unabated gas capacity, whilst developing “clear decarbonisation pathways for unabated gas to ensure a glide path to a fully decarbonised electricity system”.

#### **Challenge 4: Operating and optimising a renewables-based system, cost-effectively.**

- Consider strengthening locational market signals through either zonal pricing or a suite of alternative options under a national wholesale market.

- Discount nodal pricing and ‘local markets’ model.
- Consider centralised dispatch alongside a reformed balancing mechanism.
- Work with NGENSO and Ofgem to develop an electricity system operability strategy for 2035.

## **Document 10: REMA Submission – Ministerial Response to Second Consultation, 02 May 2024**

Onshore Electricity Strategy and Consents  
02 May 2024

**Cabinet Secretary for Wellbeing Economy, Net Zero and Energy  
Minister for Energy, Just Transition and Fair Work**

### **Ministerial response to UK Government’s second REMA consultation**

#### **Priority and Purpose**

1. Urgent.
2. To seek clearance on a draft response letter (Annex A) to the UK Government’s second consultation on the Review of Electricity Market Arrangements (REMA).

#### **Recommendation**

3. Recommends that you:
  - Note the sensitivities set out in this submission.
 [redacted]

#### **Context and Issues**

4. This advice sets out our proposed response to the UK Government REMA programme second consultation. Previous advice was provided on 12 March 2024.
5. [redacted]
6. Officials have considered the options set out in the consultation alongside available evidence and stakeholder opinions. The proposed response is an important part of our ongoing engagement with the UK Government and the sector on market reform. We expect the UK Government to analyse responses and publish a summary over the summer and then begin work on policy development up to summer 2025.
7. The consultation set out potential reforms in response to four key challenges. Some of the key proposals are as follows:
  - Removing more radical reform options such a green power pool and splitting the market, which were aimed at decoupling gas and electricity prices; instead proposing

to retain marginal pricing and reform the CfD to achieve this decoupling in the long term.

- Retaining but reforming the CfD as the primary support mechanism to support renewables.
  - Retaining the Capacity Market as the primary way of ensuring security of supply. UKG has indicated they will be introducing minimum procurement targets for different technologies with different roles.
  - [not in scope]
  - Removing nodal pricing as an option, with zonal pricing and an evolutionary package of reforms to a national market the remaining options to improve locational and operational signals. Central-dispatch and self-dispatch also remain as options.
8. Throughout the months preceding the consultation and through this consultation phase, officials have carried out extensive engagement with stakeholders including with DESNZ, Scottish Renewables, Ofgem, National Grid ESO and industry. Representatives of the renewables industry actively oppose LMP but more nuanced views have been provided by Octopus Energy, the Scottish Fuel Poverty Advisory Board and South of Scotland Enterprise Agency, among others.
9. The proposed response (Annex A) presents a balanced view of the proposals, with a call for further evidence to fully assess costs and benefits. The draft response reiterates our ambitions for a just transition to a net zero energy system and follows the principles-based approach set out in previous advice.

### **Options Considered and Advice**

[redacted]

### **Contribution to the Government's Three Missions**

10. REMA is likely to have an impact on all three of the Government's missions.

### **Delivery**

11. The GB electricity market and GB energy security are wholly reserved policy areas. The Scottish Government will continue to seek to influence UK Government policy as it impacts upon Scotland.

### **Verity House Agreement Implications**

12. Officials will engage with COSLA on reform proposals as the UK Government seeks input on policy design in the next phase of the REMA process.

### **Financial Considerations**

13. N/A

### **Legal Considerations**



14. The electricity market is reserved and implementation of any reforms is the sole decision of UK Government.

### **New Deal for Business Implications**

15. As the UKG begins selecting market reform options and initiating policy design, officials will provide further advice on impacts.

### **Sensitivities**

16. Stakeholders disagree on the possible impacts of zonal pricing (a variant of LMP). This is a highly sensitive issue for the renewables industry, especially in Scotland. They have expressed strong opposition to LMP believing it will damage investment by increasing risk, and therefore the cost of capital, and reducing revenues. Their view is that a lower regional wholesale electricity price will make Scotland an unattractive place to invest, with cost of capital increases making projects unviable.

17. However, Ofgem and National Grid ESO believe that LMP will drive investment and operational decisions that will help tackle network congestion and minimise costs to consumers. NG ESO has stated that LMP is necessary to the future functioning of a net zero electricity system. It has indicated publicly that it supports the introduction of LMP alongside long-term strategic system planning.

18. The Scottish Fuel Poverty Panel, Just Transition Commission and Consumer Scotland have told officials that market reform is an important issue for consumer pricing considerations, especially for those in fuel poverty and other vulnerable circumstances.

19. The draft response (Annex A) acknowledges the differing stakeholder views and calls for the UK Government to provide more evidence and detail on the proposed market reform options so that we can fully assess the costs and benefits.

### **Quality Assurance**

20. This submission has been cleared by Ragne Low, Deputy Director Onshore Electricity, Strategy and Consents.

### **Conclusion and next steps**

21. Next steps are:

- Ministers agree to send the response (Annex A), noting that this is officials' recommended approach.
- Officials will continue to develop the evidence base on market reform and maintain ongoing stakeholder engagement.

[redacted]

Directorate for Energy and Climate Change; Onshore Electricity, Strategy and Consents

[redacted]

Cabinet Secretaries and Ministers Copy List	For Action	For Information Portfolio interest	For Information Constituency interest	For Information General awareness
Cabinet Secretary for Wellbeing Economy, Net Zero and Energy	X			
Minister for Energy, Just Transition and Fair Work	X			

Officials Copy List
Callum McCaig
DG Net Zero
Kersti Berge
Michelle Quinn
Ragne Low
Susie Townend
Lisa MacDonald
[redacted]
[redacted]
[redacted]
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## Document 11: All Energy REMA Session – Panellist Overview, 16 May 2024

### All Energy 2024 – Review of Electricity Market Arrangements (REMA)

Time, date and venue

1100-1230, Thursday 16 May, Hall 1  
(Conference Programme)

Chair and confirmed panellists

<b>Chair:</b> Kersti Berge, Scottish Government	Kersti.Berge@gov.scot Supported by [redacted]
1. Simon Dawes, Head of Future Renewable Investment, UK Department for Energy Security and Net Zero (DESNZ)	[redacted]
2. Madelaine Brooks, Energy Markets and Regulation Lead, Octopus Energy	[redacted]
3. Simon Gill, Consultant, The Energy Landscape	[redacted]
4. Keith Patterson, Partner & Co-Head Renewables, Brodies LLP Solicitors	[redacted]
5. Angus MacRae, Head of Electricity Strategy, SSE	[redacted]
6. Maxine Frerk, Associate, Sustainability First	[redacted]

### Agenda

11:00 – 11:10: Kersti introduction and housekeeping

11:10 - 11:40: Panel members have 5 minutes each (maximum) to give their opening remarks

11:40 – 12:00: Questions from Chair to panellists

12:00 – 12:20: Questions from audience using Slido

12:20 – 12:30: Chair’s remarks and close

21. Opening gambits and key points to make when introducing the session, including who the panellists are.

**Kersti has approximately 5 minutes for the introduction and welcome.**

- Welcome everyone to this panel session on the Review of Electricity Market Arrangements (REMA, for short). It’s wonderful to see so many people here.
- Many of you will have been at the All-Energy REMA session last year. A lot has (and hasn’t) changed since then. One thing is for sure, lessons have been learned about

the huge level of interest in REMA and we have a bigger space in which to have this discussion!

- Before we get going, I'm going to take a moment to run through the usual announcements.
- No fire alarm drills are planned but should an alarm sound please all make your way to the nearest emergency exit and follow the instructions from members of the SEC team.
- I'd also ask at this stage that people ensure their phones are on silent and please do start sending in some questions via Slido.
- You can access Slido using the All-Energy app or via [www.sli.do](http://www.sli.do) and then insert the code #AllEnergy24. From there you should select the room we are in (which is Hall 1) from a list containing all the conference theatres.

### **Brief introduction to REMA and the session**

- On to the topic for this session. The Review of Electricity Market Arrangements (REMA) is the largest programme of reforms to the electricity market in a generation. It aims to ensure a decarbonised GB power system is delivered by 2035. This entails consideration of all facets of the energy market and system, and requires us to engage with questions such as
  - how best can we continue supporting the deployment of renewables;
  - how can we ensure all consumers – particularly those in fuel poverty and other vulnerable circumstances – benefit from the lower cost of renewables;
  - how can we ensure security of supply as we decarbonise the system; and
  - how the market can send the correct locational and operational signals.
- It is important that we get this right. An electricity market and accompanying policies which are fit for purpose are critical to delivering our net zero ambitions and wider social and economic goals, including a just transition.
- We are fortunate to be joined by a diverse group of experts who are well-placed to share their views on how we can do this. We will hear from each speaker and then discuss a range of questions, including from the audience. We have 90 minutes in total and will hear from:
  1. **Simon D:** scene setting – overview of second consultation (7-8 minutes)
  2. **Simon G:** Impacts of whole system planning and need to think beyond markets (5 minutes)
  3. **Maddie:** Need for transformational reforms to match transformational changes. (5 minutes)
  4. **Angus:** Call for commitment to national market and renewable support. (5 minutes)
  5. **Keith:** Need for stability in reg framework and evolutionary reform. (5 minutes)
  6. **Maxine:** Consumer perspective on reforms and perceptions of fairness. (5 minutes)
  7. The audience via Q&A. (Around 20 minutes)

### **22. Audience questions**

- We will be using [Slido](https://www.sli.do) for audience questions. The audience should access Slido using our app or via ([www.sli.do](http://www.sli.do)) and then to insert the code #AllEnergy24. From there they should select the room they are in (Hall 1) from a list containing all the conference theatres (Slido is very simple and intuitive to use, they shouldn't have any issues connecting).

23. Some questions that Kersti might pose to the panel

Note that Simon is happy to offer the department's view on any of the questions.

**Questions to the whole panel (20 minutes)**

- Passing through the value of a renewables-based system to consumers is the first of the four REMA challenges. Will retaining marginal pricing alongside a reformed CfD scheme achieve this?
  - How do you think the CfD needs to change in the context of a renewables dominated system?
  - Are there more immediate options that we are missing to ensure the low generating cost of renewables is passed through to consumers?
- The key issue for many stakeholders in REMA has been locational marginal pricing, and zonal wholesale pricing has been retained as an option in the second consultation.
  - Is it possible to introduce zonal pricing and achieve the purported operational and consumer benefits, whilst maintaining investment and deployment of renewables?
  - Can a package of alternative options alongside a national market achieve the same locational and operational efficiencies as zonal pricing potentially could?
- The second consultation proposes to retain the Capacity Market as the primary mechanism for ensuring capacity adequacy. Is this the correct route to ensuring long-term security of supply?
  - How does it need to be reformed so it can support low-carbon flexibility (including batteries, long duration storage, power CCUS and hydrogen) deployment?
- How do recent developments in whole energy system planning, such as the Strategic Spatial Energy Plan (SSEP) and the Centralised Strategic Network Plan (CSNP) impact upon the reforms set out in the second REMA consultation?

**Open to Questions from audience (20mins)**

**End with reflection on polls and pose final questions to panel:**

- I will end with two final questions for the panel:
  - Hopefully our audience members have had the opportunity to answer the following question through a poll on Slido:  
*Under Challenge 2, the REMA consultation articulated that two objectives would be key to reducing overall system costs: de-risking investment in renewables and improving assets' operational responsiveness to system needs. Which of these do you think is most important to delivering lowest overall system costs, whilst achieving a net zero system and maintaining security of supply?*
  - The results from the audience were as follows (**here you just need to ask the technician to "put up the poll please"**). I'd now like to ask each panellist to give a rapid-fire response to the same question.

- Finally, and very briefly, what would panellists like to see next from UK Government in the REMA process?

Question	Who's happy to pick the question up?
<p>The key issue for many stakeholders in REMA has been locational marginal pricing, and zonal wholesale pricing has been retained as an option in the second consultation.</p> <ul style="list-style-type: none"> <li>• What do panellists think are the key issues, problems and opportunities related to the potential implementation of zonal pricing.</li> </ul>	<b>All</b>
<p>Passing through the value of a renewables-based system to consumers is the first of the four REMA challenges. Will retaining marginal pricing alongside a reformed CfD scheme achieve this?</p> <ul style="list-style-type: none"> <li>- How do you think the CfD needs to change in the context of a renewables dominated system?</li> <li>- Are there more immediate options that we are missing to ensure the low generating cost of renewables is passed through to consumers?</li> </ul>	Angus Keith Maxine Maddie
<p>The second consultation proposes to retain the Capacity Market as the primary mechanism for ensuring capacity adequacy. Is this the correct route to ensuring long-term security of supply?</p> <ul style="list-style-type: none"> <li>• What is Government's rationale for maintain the Capacity Market as the primary mechanism for supporting security of supply and flexibility? (<b>Simon D specifically</b>)</li> <li>• How does it need to be reformed so it can support low-carbon flexibility (including batteries, long duration storage, power CCUS and hydrogen) deployment?</li> </ul>	Maddie Simon G Simon D
<p>How do recent developments in whole energy system planning, such as the Strategic Spatial Energy Plan (SSEP) and the Centralised Strategic Network Plan (CSNP) impact upon the reforms set out in the second REMA consultation?</p>	Angus Maxine Simon G

## Logistics

### Use of slides.

### On the day

The following is from the Chair's information you received.

Upon arrival at the venue, please come to the Speakers' Room (**Boisdale 2 in the Loch Suite**) to meet with us and to collect your **gift and speaker ribbon**. And do make use of the room as your home-from-home/office-from-office!

Please get to your designated room 10 minutes (note we agreed with Keith everyone will get there 20 minutes prior at 13:40) before your session is due to begin – your AV technician and one of our temporary team members will be there to help you

Upon arrival an iPad will be available for you. It should be used to moderate Slido, meaning you'll be able to approve or decline questions as they arrive (we will set it up in advance, so you won't have to worry about anything!).

Once the session starts

- Make the usual form of emergency exit announcements (e.g., no fire alarm drills are planned, should an alarm sound please all make your way to the nearest emergency exit and follow the instructions from members of the SEC team)
- Ask people to put their phones on silent
- Connecting to Slido: at the start of your session please ask the audience to access Slido using our app or via ([www.sli.do](http://www.sli.do)) and then to insert the code **#AllEnergy23**, from there they should select the room they are in (e.g Carron, Forth, Gala, etc) from a list containing all the conference theatres (Slido is very simple and intuitive to use, they shouldn't have any issues connecting)
- Please do not read out long biographical details on speakers, it eats into speaking time. all that we have had from them are easily accessed via the show App
- Ensure strict time keeping during your session
- Q&A: A microphone is available for those who want to ask questions in the traditional way, but please encourage them to use Slido

## **POST-SHOW**

Naturally we thrive on feedback. [redacted] would be particularly eager to hear from you at [redacted]

Help

We're here to help you in any way we can – both [redacted] and [redacted] will be at the show:

1. Conference Executive: [redacted]
2. Conference Manager: [redacted]
3. Project Director: [redacted] is on divert to this number too)

## **Document 12: Gillian Martin and Minister Stuart REMA Meeting – Official Minute, 27/09/2024**

### **DRAFT FOR MINISTERIAL APPROVAL**

**Meeting with Rt Hon Graham Stuart MP, Minister of State for Energy Security and Net Zero**

**Wednesday 27 September 2023, 10:30 – 11:00**  
**MS Teams**

### **Attendees**

Gillian Martin MSP  
Graham Stuart MP

[redacted], SG  
[redacted], SG  
[redacted], DESNZ

## **Matters discussed**

### **REMA consultation**

1. UK Government Official [redacted] provided an overview of the forthcoming REMA consultation setting out that it will explore how to introduce locational investment and operational signals in the wholesale market. This includes splitting the market into nodal or zonal pricing and presenting alternatives such as CfD reform, network charging reform and retaining a national market.

[redacted]

[not in scope]

[redacted]

### **Document 13: [redacted]**

[redacted]

### **Document 14: [redacted]**

[redacted]

## **Document 15: Wholesale Electricity Markets and LMP – Short SpAds Briefing, 12/07/2024**

### **Electricity Market Reform Briefing**

#### **Current GB Wholesale Market Arrangements**

1. Scotland is part of a single GB energy market. Current GB wholesale electricity market arrangements mean there is a single price of electricity across GB, with prices primarily determined by volatile global gas prices<sup>14</sup>. The current market prevents Scotland's

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<sup>14</sup> The wholesale price of electricity across GB is set by the cost of the last unit required to fulfil electricity demand. Generators are selected in price order, with renewable generators generally being used first and gas generation generally selected last. This means that the GB wholesale electricity market, like in Europe, is based on "short-run marginal costs". The daily market price is set at the level that ensures there will be sufficient supply to meet demand. This means that the price is set by the most expensive plant needed that day. This is usually gas-fired power plants.



consumers, communities and businesses from benefiting from the lower marginal cost of renewable power generation in Scotland.

2. [redacted]

### **Review of Electricity Market Arrangements (REMA)**

3. REMA is the previous UKG's programme which was considering reforms to the current GB market. Its aims were to drive the decarbonisation of the power system by 2035, in a way that supports affordability and security of supply. The first REMA consultation was held in 2022 and a second consultation, with a narrower package of reforms, was held in spring of this year. The then Minister for Climate Action, Ms Martin, provided a response on 03 May.
4. The second consultation addressed a range of potential reforms within the wholesale market, exploring how it can ensure the low costs of renewables are passed through to consumers; how best to support and incentivise renewable generation; how to ensure security of supply is maintained; and how to create a more flexible system with improved locational and operational market signals. The most significant and controversial of the potential reforms set out in REMA is Locational Marginal Pricing (LMP).

### **Locational Marginal Pricing (LMP)**

5. LMP would redesign the market so that prices are set based on supply and demand in a given region. High levels of supply relative to demand in one area will then lead to lower prices in that area, reflecting the surplus of electricity. The converse is true where demand exceeds supply. Given the volume of generation relative to demand in Scotland, LMP in theory could benefit domestic and business consumers, potentially reducing prices considerably.
6. Theoretically, lower wholesale prices would lead to new generation siting closer to demand (e.g. south of England), with new demand industries and flexibility possibly siting in Scotland to take advantage of low and volatile wholesale prices. However, non-price factors such as supply chains, skills and consenting timescales can be as important as electricity prices in influencing siting decisions.
7. Nodal pricing, which would have seen the GB market split into potentially hundreds of price 'nodes' has been ruled out by DESNZ but zonal pricing, which would split the market into several zones, is still being considered. The extent to which any changes in price across GB would materialise is dependent on policy design, the pace of network build and the speed of implementation. [redacted]
8. To build an independent evidence base on the issue, officials commissioned through CXC an independent critique of existing modelling and an assessment of how LMP would align to our energy system objectives. The report concludes that LMP could lead to significant consumer benefits and the increased siting of new demand and flexibility (e.g. electrolysers and energy storage) in Scotland. However, it also notes that LMP poses a major risk to Scottish renewables unless appropriate support mechanisms can be implemented concurrently.

### **Stakeholder Reaction**

9. The renewables industry in Scotland, including Scottish Renewables, SSE and others, have been vocal in their rejection of LMP. They are concerned reduced wholesale prices and the loss of firm access rights (i.e. guaranteed access to the market regardless of capacity) would make Scotland an unattractive place to locate renewables. Some have indicated that investment and development would be taken elsewhere. They also suggest that any potential consumer and system benefit is likely to be negated by resulting increases to the cost of capital, caused by uncertainty about future prices and arrangements.
10. Some stakeholders are also concerned that market reform this significant is likely to be too disruptive as we seek to increase our renewable capacity and transition to net zero. The uncertainty may cause an investment hiatus and risk Scotland, and the UK, failing to meet net zero targets.
11. However, Ofgem, National Grid ESO, Octopus and other stakeholders have all been supportive of a move to LMP. They believe that LMP will drive investment and operational decisions that will help tackle network congestion and minimise costs to consumers. NG ESO and Octopus have stated that LMP is necessary to the future functioning of a net zero electricity system.
12. Regardless of the direction taken on LMP, stakeholders agree that increased network build alongside strategic system planning (e.g. SSEP) is essential for UK to meet net zero targets.

### **Post-Election Future for Market Reform and REMA**

13. Following the second consultation, the then UK Government was expected to begin more detailed policy development from summer onwards, with decisions from 2025 onwards. [redacted]
14. The new MP for Rutherglen, Michael Shanks, has been appointed Minister for Energy within DESNZ and has Energy market reform, including REMA specifically, within his portfolio.

### **Next Steps**

15. [redacted]
16. Officials will continue to engage extensively with UKG, Ofgem, NG ESO and industry stakeholders.
17. Officials aim to publish the CXC study in August ahead of the ESJTP as part of a developing evidence base and are also advertising, through CXC, a 6-month opportunity for a research fellow to work with SG in exploring how affordability, fairness and equity can be unlocked through electricity market reform.
18. We would be happy to follow up on any points above in a more in-depth discussion if helpful.

[redacted]  
Energy Strategy and Markets Unit  
12 July 2024

### **Document 16: Redacted, 10(4)(d)**

**Document 17: Briefing for DD Level REMA Meeting with DESNZ, 29/08/2024**

**REMA meeting with DESNZ officials, 29 August, 15:00-16.00**

<b>Who?</b>	<ul style="list-style-type: none"> <li>• Rob Hewitt – Deputy Director for Strategy and Cross Cutting Policy</li> <li>• [redacted]</li> <li>• [redacted]</li> </ul>
<b>What?</b>	<p>Introductory DD level meeting to discuss the Review of Electricity Market Arrangements (REMA) and for DESNZ DD to update you of its direction under the new UK Government.</p> <p>REMA was initiated by the previous UKG in 2022 to consider reforms to the current GB wholesale electricity market. Its aims were to drive the decarbonisation of the power system by 2035, in a way that supports affordability and security of supply</p>
<b>Likely discussion Topics and Potential Questions</b>	<ul style="list-style-type: none"> <li>• Introductions</li> <li>• Strategic direction for REMA</li> <li>• SG position on REMA reforms</li> </ul>
<b>Why?</b>	This is an introductory meeting to allow you to meet Rob Hewitt, DESNZ’s DD responsible for REMA [redacted]
<b>Where?</b>	Virtual via Teams
<b>When?</b> <i>Date</i> <i>Time</i>	Thursday 29 August 15.00 – 16.00
<b>Who will accompany from the Directorate?</b>	[redacted] [redacted]
<b>Sensitivities</b>	[redacted]
<b>Briefing Contents</b>	Annex A: Top Lines and potential questions, pg. 2 Annex B: Background info on REMA, Markets and LMP, pg. 3 Annex C: Second Consultation Overview, pg. 6

**Annex A**

**Top Lines for this meeting**

- We appreciate the close engagement that Scottish Government has had with the UK Government at Ministerial and official level on REMA, and we are positive about this engagement continuing in the future.
- We continue to believe that wholesale market reform is crucial for meeting the Scottish Government’s ambitions of achieving net zero and ensuring a fair and just transition, as well as delivering UKG’s Clean Power Mission by 2030.
- Scotland’s First Minister has set out his priorities for government and wholesale electricity market reform is particularly important to the First Minister’s priorities of eradicating child poverty; growing the economy; and tackling the climate emergency.
- [redacted]
- An imminent public signalling on the new UK Government’s plans for zonal pricing – and wider market reforms including transmission charging reform – would provide much-needed certainty for investors and help to maintain investor confidence. A clear signal of how these reforms relate to the Clean Power 2030 and SSEP processes would also provide further industry clarity.
- We stand ready to engage with the UK Government on the next steps for REMA, including detailed policy development and any further stakeholder engagement.

### **Potential Questions**

[redacted]

**Annex B**

### **Background information**

#### **Review of Electricity Market Arrangements (REMA)**

[redacted]

#### **Scottish Government response to REMA consultation**

- An overview of the most recent REMA consultation is available in Annex C. Our response set out the Scottish Government’s overarching priorities for market reform, as well as views on specific proposals for CfD reform, the capacity market and support for low-carbon flexibility.
- It also set out a balanced position on locational marginal pricing (LMP) with three conditions that we believe need to be in place before LMP could be considered for implementation: i) a clear path for continued renewables support in Scotland; ii) clear evidence that LMP would not come at a cost to consumers; and iii) a clear timetable for delivery.
- To inform this consultation response and the position in our forthcoming Energy Strategy and Just Transition Plan, we commissioned independent research through

ClimateXChange on Locational Marginal Pricing. This research was published on 12 August 2024 and has been shared with DESNZ officials.

## **REMA Top Lines**

- REMA provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Reforms must find ways to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- Our position on electricity market reform, including Locational Marginal Pricing, will be covered in our Energy Strategy and Just Transition Plan, to be published in late summer 2024.

[not in scope]

## **Locational Marginal Pricing (LMP)**

- LMP is an option set out in the previous UK Government's REMA consultation.
- There is broad acceptance that the current GB wholesale electricity market is not fit for purpose, with insufficient locational and operational signals contributing to high constraint costs and a system which is becoming increasingly complex – and expensive – for the Electricity System Operator (ESO) to balance. These costs are passed directly to consumers through their bills.
- LMP would redesign the wholesale electricity market so that prices are set based on supply and demand in a particular node or zone. This could have the following system-wide impacts:
  - In theory, areas where the supply is higher than demand – such as Scotland – could see electricity prices fall. Areas with higher demand – such as the south of England – could see prices rise.
  - Conversely, LMP could increase costs for those investing in renewables in Scotland. The renewables industry – including SSE and Scottish Renewables – has expressed strong opposition to LMP calling for a reformed national market to be prioritised.
  - Generators and investors believe that LMP could lead to an investment hiatus by increasing risk and capital costs, reducing revenues and ultimately damaging progress towards net zero.

- The introduction of LMP could help tackle network congestion and minimise costs to consumers. Ofgem and National Grid ESO believe that LMP can inform investment and operational decisions to support these efficiencies.

## Annex C

### **Second REMA Consultation (2024): Summary of reform options**

#### **Challenge 1: Passing through the value of a renewables-based system to consumers.**

- Retain marginal pricing across wholesale market.
- Discount radical options for decoupling gas/electricity prices such as a split market and green power pool.
- Emphasise continued development of CfD as best option for decoupling gas and electricity prices.
- Monitor the development of the corporate PPA market.

#### **Challenge 2: Investing to create a renewables-based system at pace.**

- Commit to retaining a CfD type scheme as the primary mechanism for driving investment in renewables.
- Consult further on a range of CfD options, including those which would move the scheme to payments based on potential rather than actual output (e.g. deemed CfD and capacity CfD). Also consult on reference price reform and options to restrict the percentage of capacity covered by a CfD.
- Discount a strike-price range and revenue cap and floor as options for a reformed CfD.

#### **Challenge 3: Transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system.**

- Retain the Capacity Market (CM) as our primary mechanism for ensuring capacity adequacy. More radical options such as strategic reserve discounted and more immediate CM reforms brought forward separately.
- Progress bespoke policy to support low carbon flexible technologies, such as long duration electricity storage, power CCUS and hydrogen to power.
- ‘Optimise’ CM through introduction of minimum procurement targets (minima) for different flexible technologies. This will create different clearing prices for different technologies within the CM auction and guarantee support for ‘minimum amounts’ of different technologies.
- Commit to supporting a limited amount of new unabated gas capacity, whilst developing “clear decarbonisation pathways for unabated gas to ensure a glide path to a fully decarbonised electricity system”.

#### **Challenge 4: Operating and optimising a renewables-based system, cost-effectively.**

- Consider strengthening locational market signals through either zonal pricing or a suite of alternative options under a national wholesale market.
- Discount nodal pricing and ‘local markets’ model.
- Consider centralised dispatch alongside a reformed balancing mechanism.

- Work with NGENSO and Ofgem to develop an electricity system operability strategy for 2035.

## **Document 18: Submission on UK Government Announcement on REMA and Energy Security, 12/03/2024**

[redacted]  
Onshore Electricity Policy, Strategy and Consents/DECC  
12 March 2024

Cabinet Secretary for Wellbeing Economy, Net Zero and Energy  
Minister for Energy, Just Transition and Fair Work

### **Response to UK Government Announcements on Electricity Market Reform and Energy Security**

#### **Priority and Purpose**

Routine.

To inform you of today's UKG announcements in relation to the UKG's Review of Electricity Market Arrangements (REMA) and energy security.

#### **Recommendation**

Recommends that you:

- Note the announcements made by the Secretary of State (SoS).
- Note that officials will provide further detailed advice on REMA proposals ahead of the Cabinet process for the ESJTP.

#### **Context and Issues**

[out of scope]

2) [out of scope]

3) The UKG also outlined that wider reform of the wholesale electricity market could reduce overall system costs by £35 billion from 2030 to 2050.

- 4) The second REMA consultation focuses on addressing four key challenges:
- passing through the value of a renewables-based system to consumers;
  - investing to create a renewables-based system at pace;
  - transitioning away from an unabated gas-based system to a flexible, resilient, decarbonised electricity system;
  - operating and optimising a renewables-based system, cost-effectively.

- 5) The Scottish Government has had constructive engagement with DESNZ as the REMA consultation was developed. [redacted] and will continue to work closely with UKG to surface Scottish interests and to inform ongoing policy development.
- 6) [out of scope] It will be important for UKG to explain the effect that continued use of gas-fired electricity generation will have on wholesale electricity prices.
- 7) [out of scope]
- 8) The REMA consultation proposes further consideration of the zonal form of Locational Marginal Pricing (LMP)<sup>15</sup>, which it proposes should be compared against the option of more incremental reforms including network charging reform, reviewing transmission network access arrangements, and more strategic energy spatial planning. These reforms could be introduced while retaining a single national price.

### **Options Considered and Advice**

- 9) Officials will assess UKG's proposals and provide further detailed advice on REMA and a proposed Scottish Government response in due course.
- 10)[redacted]

### **Contribution to the Government's Three Missions**

- 11)This submission relates to the Government's equality and opportunity missions, as key aims of REMA are to support energy affordability and reduce the impact volatile global gas costs have on electricity prices.

### **Delivery**

- 12)The GB electricity market and GB energy security are wholly reserved policy areas. The Scottish Government will continue to seek to influence UK Government policy as it impacts upon Scotland.

### **Bute House Agreement Implications**

- 13)[redacted]

### **Verity House Agreement Implications**

- 14)The Verity House Agreement includes a just transition to net zero as a shared priority, as well as a commitment to consult and collaborate as early as possible in all policy areas where Local Government has a key interest. Officials will engage with COSLA on REMA during the consultation period.

### **Financial and Legal Considerations**

- 15)N/A

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<sup>15</sup> [redacted]



## New Deal for Business Implications

16) Impacts relating to REMA proposals will be set out in future advice from officials.

## Sensitivities and Stakeholder Reactions

17)[redacted]

## Quality Assurance

18) This Submission has been approved by Ragne Low, Deputy Director for Onshore Electricity, Strategy and Consents.

## Conclusions and next steps

19) Note the announcements made today by the UKG on REMA and new gas power plants. Officials will provide further detailed advice on REMA proposals in due course.

**[redacted]**

Onshore Electricity Policy, Strategy and Consents/DECC

12 March 2024

## Annex A

[redacted]

Cabinet Secretaries and Ministers Copy List	For Action	For Information Portfolio interest	For Information Constituency interest	For Information General awareness
Cabinet Secretary for Wellbeing Economy, Net Zero and Energy	X			
Minister for Energy, Just Transition and Fair Work		X		
Minister for Agriculture and Connectivity				X
Minister for Zero Carbon Buildings, Active Travel and Tenants' Rights				X

<b>Officials Copy List</b>
Roy Brannen
Kersti Berge
Michelle Quinn
Ragne Low
Lisa McDonald
Susie Townend
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
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[redacted]
[redacted]
[redacted]
[redacted]
Callum McCaig
Leanne Dobson
Gavin Corbett

**Document 19: Submission on CXC locational Marginal Pricing Study, 08/08/2024**

From: [redacted]  
Onshore Electricity, Strategy and Consents Division  
Directorate for Energy and Climate Change  
08 August 2024

**Acting Cabinet Secretary for Net Zero and Energy**

**Electricity Market Reform – notification of publication of CXC report, update on emerging UK Government direction and next steps.**

## Priority and Purpose

22. **Priority:** Urgent – a response is requested by COP Monday 12 August, or as soon as practicable, to ensure publication can proceed imminently.

### 23. Purpose:

- To notify you of the upcoming publication of the Climate X Change study “*GB wholesale electricity market reform: impacts and opportunities for Scotland*”.
- [redacted]
- To update you on next steps to build our evidence base on electricity market reform.

## Recommendation

24. Recommends that you:

- Note the CXC plans for publication.
- Note the sensitivities in relation to this publication.
- [redacted]
- Note the next steps for strengthening our evidence base.

## Context and Issues

25. Officials commissioned an independent study via ClimateXChange (CXC) to assess the possible impact of Locational Marginal Pricing (LMP) and alternatives in the context of the Scottish Government’s ESJTP ambitions. The report was overseen by an Expert Advisory Panel which included representatives of the renewables industry, consumer groups, flexibility providers, electricity suppliers, and academics. The report will be published by CXC in August following feedback from this submission.

26. The full set of assumptions for the study along with copies of the short and long form of the reports are attached in copy. This research forms part of the ongoing evidence base for the important issue of electricity market reform.

## Findings

27. **CXC’s report suggests that LMP could deliver benefits to electricity consumers and flexibility in Scotland, incentivising optimal siting of generation and demand, reducing wholesale prices and network build costs, and improving dispatch signals.**

- The study found that LMP could provide Scottish consumers with some of the lowest wholesale prices in Europe, due to the existing high capacity of renewable generation in Scotland. However, also that the extent of the benefits are based on the pace at which LMP is implemented. This impact of LMP is reduced the later it is implemented as the network build out continues out to 2035, reducing transmission constraints. As such, introduction prior to 2035 would see the greatest benefits for prices in Scotland, with prices across GB becoming more level after this time.

- The study found that LMP has the potential to encourage the location and operation of assets in Scotland that would provide flexibility to the electricity system. This would help reduce network congestion as part of a strategic planning process.

**28. If designed and implemented efficiently, LMP could reduce the system cost associated with decarbonisation. If market reforms to protect renewable investment in Scotland are brought forward alongside LMP, the potential benefits for Scottish electricity consumers are sufficient to explore further.**

- Lower wholesale prices could reduce the cost of electrifying demand, attracting new industry and green hydrogen production to Scotland. However, sectors such as heat and transport face high upfront costs and other non-price factors such as government policy, planning and skills are also key to wider decarbonisation.
- On its own, LMP would create new risks for renewable generators and increase the cost of capital of new developments. Without support, the renewables pipeline in Scotland could be disrupted, impacting UK power system decarbonisation goals.

29. The report suggests the importance of continued work with UKG to develop a long-term strategic plan for future network, renewables, and flexibility deployment, such as the Strategic Spatial Energy Plan (SSEP), as well as fully exploring the impacts of reforming Contracts for Difference (CfDs) to insulate renewables against risk.

**Proposed next steps**

30. The findings from the report alongside wider evidence and stakeholder engagement were considered in the development of the SG response to the second REMA consultation and [redacted]

31. [redacted] Nonetheless, the evidence base in this report provides a valuable foundation on which to build out our understanding, engagement with stakeholders and policy on this matter. Officials propose to stay fully engaged with the emerging position from new UK Government and potential for focus on shorter term market reform options.

32. We will continue to further develop the evidence base on this complex and critical area of energy policy, and its role in achieving our ESJTP ambitions by commissioning a Post-Doctoral Research Fellow through CXC. This work will investigate “how electricity market reform can unlock affordability, fairness and equity in a just transition to net zero” and support input into evolving UKG market reform policy.

**Contribution to the Government’s Four Priorities**

33. Electricity market reform is a critical area of policy that supports growing our economy, tackling the climate emergency, addressing child poverty (through its

interaction with fuel poverty) and improving public services. The CXC report and follow up research fellow will form part of the developing evidence base to support policy development against these four priorities.

### **Risks to Delivery**

34. [out of scope]

### **Verity House Agreement Implications**

35. There are no new requirements for local authorities.

### **Financial Considerations**

36. There are no costs associated with publication of the CXC report. The Research Fellow will be funded through the Scottish Government's existing contract with CXC. No additional funding is required.

### **Legal Considerations**

37. This work relates to electricity markets which are reserved to the UKG. Due consideration will be given to actions that the Scottish Government can take within devolved competence.

### **New Deal for Business Implications**

38. Extensive engagement has taken place with businesses during the course of the study. The completed report will be shared with key stakeholders such as the Scottish Energy Advisory Board. We will continue to engage with industry as this works develops including representatives of the Expert Advisory Panel.

### **Sensitivities**

39. [redacted]

### **Quality Assurance**

40. This submission has been approved by Catriona Laing, Joint Deputy Director for Domestic Climate Change.

### **Conclusion and next steps**

41. Electricity market reform is a fundamental consideration in Scotland's journey towards a net zero energy system. Officials will continue to work with UKG and industry on potential market reform options and interventions which could contribute towards our ambitions. This includes CfD reforms, the SSEP and transmission charging reform.

42. Timely publication of this study will allow stakeholders to engage with the findings, helping to inform their thinking on electricity market reform and demonstrate transparency of evidence.

43. [redacted]

44. [out of scope]

[redacted]

Onshore Electricity, Strategy and Consents Division  
 Directorate for Energy and Climate Change

## Annex A

### Confirmed Reactive Lines

“The findings from this Climate X Change report will enable Ministers to better understand any impacts that introducing LMP could create for Scotland and form a crucial addition to our evidence base.

“The Scottish Government is committed to working closely with the UK Government as it develops a package of market reforms to ensure it delivers real benefits for Scotland’s economy and supports our ongoing efforts for a just transition to net zero and future investment in renewables, flexibility and networks.”

#### ***Follow up re renewables concerns:***

The Scottish Government is aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers. We have heard the concerns of the renewables industry in Scotland in relation to potential impacts of LMP and will, of course, take these into account alongside feedback from a range of other stakeholders.

Cabinet Secretaries and Ministers Copy List	For Action	For Information Portfolio interest	For Information Constituency interest	For Information General awareness
Cabinet Secretary for Net Zero and Energy	X			
Minister for Climate Action		X		
Deputy First Minister and Cabinet Secretary for Economy and Gaelic		X		

<b>Cabinet Secretaries and Ministers Copy List</b>	<b>For Action</b>	<b>For Information Portfolio interest</b>	<b>For Information Constituency interest</b>	<b>For Information General awareness</b>

<b>Officials Copy List</b>
DG Net Zero DG Economy Kersti Berge Colin Cook Chris Mackie Suresh Kumar Ragne Low [redacted] Sue Kearns Susie Townend Catriona Laing Philip Raines [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] Leanne Dobson David Hutchison

**Document 20: Briefing for Cabinet Secretary NZE Meeting with Octopus Energy, 02 October 2024 – Meeting Postponed**

<b>What</b>	You are meeting Greg Jackson, CEO and Rachel Fletcher, Director for Regulation and Economics at Octopus Energy, to discuss the company's views on locational pricing.
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<b>Where</b>	Virtual Join conversation (microsoft.com)
<b>When</b>	Wednesday 9 October 2024 14.00 – 14.30
<b>Key message(s)</b>	[redacted]
<b>Who</b>	Greg Jackson, CEO at Octopus Energy Rachel Fletcher, Director for Regulation and Economics
<b>Why</b>	An opportunity to engage with a key stakeholder in the GB electricity market and discuss the company's support for zonal pricing.
<b>Sensitivities</b>	[redacted]
<b>Supporting officials</b>	[redacted] [redacted]
<b>Briefing contents</b>	Annex A: Agenda and Biographies Annex B: Top Lines and Background Annex C: Key Questions for Octopus Energy Annex D: Recent Media Coverage

## Annex A

### Agenda

- 14:00 – 14:05: Welcome and introductions
- 14:05 – 14:10: Presentation of key issues from Octopus Energy
- 14:10 – 14:25: Discussion on zonal pricing
- 14:25 – 14:30: AOB and close

[redacted]

## Annex B

### Top Lines

- The current GB wholesale electricity market is not fit for purpose to deliver a net zero electricity system, nor our aims to tackle fuel poverty.



- Market reforms provide an opportunity to reduce costs for consumers, particularly the most vulnerable. This includes those in, or at risk of, fuel poverty.
- We continue to call on the UK Government to decouple the cost of gas from the price of electricity paid by consumers to support long-term energy affordability.
- This must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are continuing our engagement with the UK Government, Ofgem and the Electricity System Operator, to ensure that future reforms find ways to keep system costs as low as possible, drive innovation, and remove barriers to decarbonising and growing our clean heat, transport and industry sectors.
- An imminent public signal from the UK Government on its plans for market reform (including zonal pricing, transmission charging and Contracts for Difference) would provide much-needed certainty for market participants. Clarity on how REMA aligns with Clean Power 2030 and the Strategic Spatial Energy Plan is also needed.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- We commissioned independent research to inform our position on locational pricing: this research was published on 12 August 2024. We are very grateful for Rachel Fletcher's participation in the expert panel for this study.
- The Scottish Government's position on electricity market reform will be covered in our Energy Strategy and Just Transition Plan.

## **Background**

[redacted]

### **The need for electricity market reform**

- The current GB electricity market is incompatible with a just transition to net zero. There is a critical need for electricity market reform to achieve the ambitions that will be set out in the forthcoming Energy Strategy and Just Transition Plan, and the recently published Green Industrial Strategy.
- Current wholesale electricity market arrangements mean there is a single price of electricity across GB, with prices primarily determined by volatile global gas prices and not renewables prices. This means that Scotland's consumers, communities and businesses (including industry) are not benefiting from the lower cost of renewable power generation in Scotland. High gas prices in recent years have led to high electricity prices for consumers in Scotland. In 2021, gas set the price of electricity 97% of the

time, and the average between 2015 - 2021 was 83%<sup>16</sup>. Change is needed to help consumers fully benefit from the lower costs of renewable electricity.

- The current market arrangements also fail to incentivise renewable generators, storage technologies and interconnectors to locate and operate in a way that is economically efficient and reflects available network capacity. This, combined with under-investment in the transmission network, has led to rising constraint costs. Constraints are primarily paid for by consumers in their bills. The ESO predicts up to £3 billion per year in constraint costs by the late 2020s.
- For comparison, a variety of market structures are used across Europe. Germany, like GB, operates a single national market whilst Italy and the Nordic nations operate a zonal market where prices can vary considerably, due to varying levels of supply and demand in different zones<sup>17</sup>.

### Impact of zonal pricing on Scotland and GB

- Zonal pricing would redesign the market so that prices are set based on supply and demand in a given region. High levels of supply relative to demand in one area would lead to lower prices in that area, reflecting the surplus of electricity. The converse is true where demand exceeds supply. Given the level of generation relative to demand in Scotland, zonal pricing could in theory benefit household and business consumers, potentially significantly<sup>18</sup>.
- A recent ClimateXChange report concludes that locational pricing could lead to significant consumer benefits and new demand and flexibility assets choosing to site in Scotland. This includes hydrogen electrolysers which can take advantage of periods with low wholesale prices - although their deployment depends on continued growth in renewables. The report clearly warns that locational pricing poses a major risk to Scottish renewables unless appropriate support mechanisms, such as reformed Contracts for Difference, can be implemented.
- Ofgem, National Grid ESO and Octopus Energy have been supportive of a move to locational pricing, believing it necessary for the future functioning of a net zero electricity system. They believe it can help tackle network congestion and help keep system costs down for consumers.
- Octopus Energy was named USwitch's Supplier of the Year in 2024, 2023, 2021, 2020 and 2018 and has been a Which? recommended provider for seven years running. Octopus Energy claims to be one of Europe's leading investors in renewable generation. The company offers smart tariffs for consumers to sell solar power, charge batteries and run heat pumps.

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<sup>16</sup> The role of natural gas in setting electricity prices in Europe - ScienceDirect, Zakeri et. Al, 2023

<sup>17</sup> For example, at 6pm on March 1<sup>st</sup>, the wholesale price in Norway's northernmost zone was €51.92 per MWh, whilst in the southernmost zone it was €87.54: Data from the power system | Statnett

<sup>18</sup> DESNZ commissioned modelling shows that zonal pricing could reduce the cost of running the electricity system in the region of c.£5-15bn over 2030- 2050, and that consumer benefits could be in the region of c.£25-60bn over the same period. Assuming these savings are fully passed through, this would be an average consumer benefit of £20-45pa per household over 2030-2050.

- The renewables industry in Scotland and across GB has been vocal in its opposition to locational pricing. Generators worry that reduced wholesale prices and the loss of guaranteed access to the national market regardless of capacity, would make Scotland an unattractive place to invest, potentially creating an investment hiatus and therefore risking wider UK net zero targets.
- The industry believes that any potential consumer and system benefits will be negated by increases to the cost of capital, caused by uncertainty about future prices and market arrangements<sup>19</sup>.

## Annex C

[redacted]

## Annex D

### Recent Media Coverage

- Jackson has been very openly supportive of locational pricing in the media, calling for a shift towards setting energy prices at a local rather than national level.
- For example, in an interview with Energy News Live in July 2024, Jackson suggests that Scotland could have periods of free electricity if market reforms are implemented. He states “What we need is a real reform of markets so that...when it’s windy in Scotland, we don’t pay the wind farms to turn off.”
- Others in the renewable industry have been vocally against zonal pricing. In an interview with Energy Live News on 10 September 2024, Keith Anderson, CEO of ScottishPower, expressed concerns that zonal pricing could “lead to uncertainty and disrupt progress towards the UK’s 2030 decarbonisation goals”. Instead, Anderson believes the focus should be on accelerating investment.
- Claire Mack of Scottish Renewables has expressed similar concerns and was noted as saying in an interview with ReNEWS in March 2024, that while she is happy that nodal pricing has been ruled out, zonal pricing poses a ‘threat to investment and our ability to deliver cheaper bills for consumers’.

### Document 21: Energy Consumers Roundtable – Ministerial Chair’s Brief, 12/09/2024

[Not in scope]

### Wholesale Markets

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<sup>19</sup> FTI models that a 1.3-3.4 percentage point increase to the cost of capital would eliminate any consumer benefit. AFRY modelling suggests that a 0.56 percentage point increase would eliminate net benefit.

- We also need to consider retail market reform in conjunction with wholesale market reform, and the proposals forming the Review of Electricity Market Arrangements (REMA).
- This includes understanding how a social tariff mechanism – along with efforts to rebalance gas and electricity prices – would interact with proposed wholesale market reforms.

[Not in scope]



**[Not in scope]**

**Background on Agenda Item 3 – Market Reform**

[not in scope]

Review of Electricity Market Arrangements (REMA)

- The Review of Electricity Market Arrangements (REMA) was initiated by the previous UK Government to consider reforms to the current GB wholesale market. Its aims were to drive the decarbonisation of the power system by 2035, in a way that supports affordability and security of supply.
- The second REMA consultation was published on 12 March 2024, with then Minister for Climate Action, Ms Martin, providing a response on 03 May 2024.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- We continue to engage with UK Government, Ofgem, National Grid ESO and Industry to understand the potential impacts of any reforms. We are pressing UK Government to provide a clear timetable for decisions on key reforms. We are also seeking clarity on how REMA intersects with the Government’s Clean power 2030 ambition and the Strategic Spatial Energy Plan.

[not in scope]

[not in scope]

[not in scope]

[Not in scope]

**ANNEX D**

[not in scope]

**ANNEX E**

[not in scope]

**ANNEX F**

## **Document 22: Factual Briefing – SG Asks to UK Government on Energy Issues**

[not in scope]

- The Scottish Government has asked UKG to provide clarity to stakeholders and investors on its preferred approach to wholesale electricity market reform, including whether it is continuing to keep zonal pricing under active consideration, and if so, when it intends to consult further.

## **Document 23: Cabinet Secretary NZE Visit to Invinity Energy System, Motherwell – Briefing Pack, 07/08/2024**

[not in scope]

[redacted]

[not in scope]

[redacted]

**Annex A**

[not in scope]

**Annex B**

[not in scope]

## Annex C

[Not in scope]

## Annex D

[not in scope]

## Annex E

[not in scope]

### **Review of Electricity Market Arrangements (REMA) – Top Lines**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Any reforms should adhere to two core principles of achieving net zero and ensuring a fair and just transition. Reforms should also help to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study has benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. We expect this research to be published in the coming months.

### **REMA – Background**

- The second REMA consultation closed on 07 May 2024 and you provided a response on 03 May 2024.
- [not in scope]
- [not in scope]
- [not in scope]

**Annex F**

[not in scope]

**Annex G**

[not in scope]

**Annex H**

[not in scope]

## **Document 24: [Redacted]**

[redacted]

[not in scope]

[redacted]

[not in scope]

[redacted]

**5 April 2024**

## **Document 25: Minute of Meeting between FM and Scottish Renewables, 07/08/2024**

**DRAFT FOR MINISTERIAL APPROVAL**

### **Minute of meeting with Scottish Renewables 07 Aug 2024, 09.30-10:15 Bute House**

In attendance:

First Minister

Colin McAllister, Special Advisor

Kersti Berge, Director of Energy and Climate Change

[redacted]

Claire Mack, Chief Executive, Scottish Renewables

Jack Norquoy, Interim Director of Communications, Scottish Renewables

### **Discussion points**

[not in scope]



CR stated that SR were of the firm belief that zonal pricing/locational marginal pricing in its current form is a threat to the industry.

FM noted these views and the importance of considering the issue in the round to ensure that consumer interests are not ignored in the reform of the electricity market, citing the high levels of fuel poverty, the cost-of-living crisis and energy costs as important factors that cant be ignored. SR highlighted the need for them to develop a more nuanced position to electricity market reform, noting the issues raised by FM but their key point is that they don't believe that LMP would feed through the benefits stated.

[not in scope]

Meeting closed

[reacted]

[redacted] .07 Aug 2024

## **Document 26: Redacted, 10(4)(d)**

## **Document 27: DECC Energy FMQ, 02/09/2024**

[not in scope]

**14 July:** (STV News) Market reforms could give Scots cheapest energy in Europe, says Octopus boss.

[not in scope]

## **WHOLESALE ELECTRICITY MARKET REFORM AND LOCATIONAL MARGINAL PRICING**

### **The current GB wholesale electricity market is not fit for purpose to deliver a net zero electricity system.**

- Reforms being explored by the UK Government provide an opportunity to reduce costs for consumers – particularly the most vulnerable citizens and those in or at risk of fuel poverty.
- We continue to call on UK Government to decouple the cost of gas from the price of electricity paid by consumers to support long-term energy affordability.
- Any reforms must balance the need to protect investment in renewables, flexibility and networks, to maximise the economic opportunities of the net zero transition.

- We are aware that the introduction of locational marginal pricing could have significant impacts for all market participants.
- That is why we commissioned independent research – published last month – and continue to engage widely with the renewables industry, energy suppliers and consumer organisations.
- An imminent public signal from the UK Government on plans in relation to zonal pricing, Contracts for Difference reforms and transmission charging reform would provide much-needed certainty for investors.
- We stand ready to continue our constructive engagement with the UK Government to ensure that any future reforms find ways to keep system costs as low as possible, drive innovation, and remove barriers to decarbonising and growing our clean heat, transport and industry sectors.

[not in scope]

## **Document 28: DECC Energy FMQ, 09/09/2024**

[not in scope]

### **WHOLESALE ELECTRICITY MARKET REFORM AND LOCATIONAL MARGINAL PRICING**

#### **The current GB wholesale electricity market is not fit for purpose to deliver a net zero electricity system.**

- We continue to call on the UK Government to decouple the cost of gas from the price of electricity paid by consumers to support long-term affordability.
- Reforms must be used to provide an opportunity to reduce costs for consumers – particularly those who are most vulnerable.
- An imminent public signal from the UK Government on plans in relation to zonal pricing, Contracts for Difference reforms and transmission charging reform would provide much-needed certainty for investors.
- We stand ready to continue our constructive engagement with the UK Government to ensure that any future reforms find ways to keep system costs as low as possible, drive innovation, and remove barriers to decarbonising and growing our clean heat, transport and industry sectors.

[not in scope]

**Document 29: DECC Energy FMQ, 07/10/2024**

[not in scope]

**7 Oct:** The Guardian reports that energy industry trade groups have written to Ed Miliband warning against locational energy pricing proposals.

[not in scope]

[not in scope]

**MARKET REFORM AND LOCATIONAL MARGINAL PRICING**

**The current GB wholesale electricity market is not fit for purpose to deliver a net zero electricity system.**

- We continue to engage with stakeholders and consider their views alongside input from a range of other stakeholders.
- An imminent public signal from the UK Government on plans in relation to zonal pricing, would provide much-needed certainty for investors.
- These reforms must be used to provide an opportunity to reduce costs for consumers – particularly those who are most vulnerable.
- The UK Government should decouple the cost of gas from the price of electricity paid by consumers to support long-term energy affordability.
- We will continue engagement with the UK Government to ensure that any future reforms find ways to keep system costs as low as possible.
- We also want reforms to drive innovation, and remove barriers to decarbonising and growing our clean heat, transport and industry sectors.

[not in scope]

**Document 30: Cabinet Secretary NZE – ARUP Roundtable Briefing, 11/09/2024**

[not in scope]

**ANNEX A**

[not in scope]

**ANNEX B**

[not in scope]

**ANNEX C**

[not in scope]

**ANNEX D**

## **Q&A**

[not in scope]

## **Markets and REMA**

**Q: What is the Scottish Government's position on locational marginal pricing?**

**A:**

- We are clear that LMP should only be introduced if the UK Government can set out a clear plan to ensure continued support for renewable deployment. LMP has the potential to reduce costs for Scottish consumers and improve the efficiency of the electricity system, but this must not come at the cost of investment in Scottish renewables.
- We are cognisant of the potential impacts LMP could have on Scottish renewable generators, domestic consumers, industrial consumers and others. Consequently, we commissioned research through ClimateXChange to explore the potential impacts LMP could have in Scotland and expand our evidence base on this issue.
- We will continue our constructive engagement with UK Government on the Review of Electricity Market Arrangements (REMA) and any other market reforms to ensure that Scotland's interests are accounted for.

[not in scope]

**ANNEX E**

[not in scope]

**ANNEX F**

[not in scope]

**ANNEX G**

[not in scope]

**Annex H**

[not in scope]

[not in scope]

**REMA**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Any reforms should adhere to two core principles of achieving net zero and ensuring a fair and just transition. Reforms should also help to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. This research was published on 12 August 2024
- Officials continue to engage extensively with UK Government, Ofgem, National Grid ESO and industry stakeholders in relation to REMA and LMP. We have called on UKG to provide a public signal on their direction of travel on wholesale market reform as soon as possible. This is vital to maintain investor confidence.

[not in scope]

**ANNEX J**

[not in scope]

**ANNEX K**

[not in scope]

**ANNEX L**

[not in scope]

**ANNEX M**

[not in scope]

- We will continue to make the case to the UK Government on the need to decouple the cost of gas from the cost of electricity so that consumers can benefit from the lower costs of renewable electricity<sup>20</sup>
- Reforms need to consider costs to all consumers: domestic and business. This is particularly important for consumers who are most at risk of – or already in – fuel poverty. It is also critical for communities that have been relatively disadvantaged by current market arrangements, such as Scotland’s rural and island communities. Reforms should ensure that consumers are able to benefit from more affordable electricity and insulated from price volatility. Price stability and affordability are essential for encouraging new green industry, such as renewable hydrogen production.

**ANNEX N**

[not in scope]

**Document 31: Redacted, 10(4)(d)**

**Document 32: Redacted, 10(4)(d)**

**Document 33: FM Briefing for Meeting with Scottish Renewables, 07/08/2024**

[not in scope]

**ANNEX A**

[not in scope]

**ANNEX B**

[not in scope]

**ANNEX C**

[not in scope]

[not in scope]

**AGENDA ITEM 2: FUTURE ENERGY MARKETS**

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<sup>20</sup> Change is needed to help consumers fully benefit from the lower costs of renewable electricity and to protect them from future price spikes. In 2021 gas set the price of electricity 97% of the time, and the average between 2015-2021 was 83% - source: <https://www.sciencedirect.com/science/article/pii/S23524847>

## **Review of Electricity Market Arrangements (REMA) and Locational Pricing**

[redacted]

### **Top Lines**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Any reforms should adhere to two core principles of achieving net zero and ensuring a fair and just transition. Reforms should also help to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study has benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. We expect this research to be published in the coming months.
- We welcome the constructive engagement we have had with Ofgem, NG ESO, UK Government and industry on REMA. We look forward to continuing to work constructively with the new UK Government on electricity market reform.

### **REMA Background**

- REMA was initiated by the previous UKG's programme to consider reforms to the current GB market. Its aims were to drive the decarbonisation of the power system by 2035, in a way that supports affordability and security of supply.
- The first REMA consultation in 2022 presented a broad set of reform options to deliver: investment in mass low carbon power; greater low carbon flexibility; system operability and security of supply; and a net zero wholesale market.

- Scottish Government responded to the first REMA consultation in October 2022.
- UKG published a summary of consultation responses in March 2023. Respondents were broadly supportive of incremental changes but opinions were divided on transformative changes such as the role of locational marginal pricing (LMP).
- The second REMA consultation was published on 12 March 2024 after originally being planned for autumn 2023. As Minister for Climate Action, Ms Martin, provided a response on 03 May 2024

### Locational Marginal Pricing (LMP) Background

- LMP would redesign the wholesale electricity market so that prices are set based on supply and demand in a particular node or region.
- In principle, LMP could increase costs for those investing in renewables in Scotland whilst lowering electricity costs for Scotland’s consumers. Modelling undertaken for Ofgem suggests that LMP could deliver a potential saving of £50bn for GB consumers over the period 2025-2040. However, there are disputed assumptions in this work.

- [redacted]

- [not in scope]

### **ANNEX D**

- [not in scope]

[redacted]

[not in scope]

- [redacted]
- [not in scope]

### **Document 34: Redacted, 10(4)(d)**

### **Document 35: Deputy Director Briefing on CP2030 and SSEP, 11/09/2024**

[Not in scope]  
[Redacted] in support.

- [not in scope]
- [redacted]



- **When will you be able to send a clear public signal to stakeholders on REMA direction of travel?**
- [not in scope]

## **Document 36: Minister for Climate Action Meeting with OnPath Energy, 03/10/2024**

- [not in scope]

### **Annex A**

#### **Agenda – Topics for discussion and speaking points**

[not in scope]

- 3. Investment in Scotland is critical to hitting climate targets and delivering green jobs. Uncertainty from UKGov around market reforms with locational pricing and how TNUoS charging is determined is delaying billions in investment and will prevent many projects from ever being built. How can we tackle these issues together?**

#### Review of Electricity Market Arrangements (REMA) and Locational Pricing

- We believe the UK Government must urgently provide a public signal on the timetable and direction of travel for key reforms; this is crucial to maintaining investor confidence. We are also seeking clarity on how REMA intersects with the Government's Clean power 2030 ambition and the Strategic Spatial Energy Plan.
- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Reforms must ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower costs and that they consider those most vulnerable, including those in, or at risk of, fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study benefited from wide engagement across

industry, including Scottish Renewables who joined our expert panel. This research was published on 12 August 2024.

- We welcome the constructive engagement we have had with Ofgem, NG ESO, UK Government and industry on REMA. We look forward to continuing to work constructively with the new UK Government on electricity market reform.

[not in scope]

#### **Annex B**

[not in scope]

#### **Annex C**

[not in scope]

#### **Annex D**

[not in scope]

### **Document 37: Scottish Renewables Onshore Wind Conference – Ministerial Briefing, 04/09/2024**

[not in scope]

#### **Annex A**

[not in scope]

#### **ANNEX B**

[not in scope]

#### **ANNEX C**

[not in scope]

#### **ANNEX D**

[not in scope]

- TNUoS reform is being actively considered within REMA as part of a package of measures which would make up a 'reformed national market' model. This is the

contrasting option and counterfactual to a zonal pricing model and DESNZ are currently considering the shape of reforms.

[not in scope]

## **ANNEX E**

[not in scope]

### **Document 38: Redacted, 10(4)(d)**

### **Document 39 - Briefing - Cabinet Secretary for NZE meeting with Quebec Minister of International Relations - 8 October 2024**

[Not in scope]

[redacted]

[not in scope]

**Annex A**

[not in scope]

**Annex B**

[not in scope]

**Annex C**

[not in scope]

- **Review of Electricity Market Arrangements (REMA) – *if raised*:** We believe the UK Government must urgently provide a public signal on the timetable and direction of travel for key reforms; this is crucial to maintaining investor confidence. We look forward to continuing to work constructively with the new UK Government on this.

[not in scope]

[not in scope]

### **Review of Electricity Market Arrangements (REMA)**

- We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.
- Electricity market reform provides us with an opportunity to take a whole systems view of our future electricity market and consider how it can be reformed to support further renewable deployment, ensure security of supply and reduce costs for consumers.
- Any reforms should adhere to two core principles of achieving net zero and ensuring a fair and just transition. Reforms should also help to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms must also ensure that system efficiencies and the low generating costs of renewables are passed through to consumers in the form of lower costs and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on Locational Marginal Pricing. The study benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. This research was published on 12 August 2024.
- We welcome the constructive engagement we have had with Ofgem, NG ESO, UK Government and industry on REMA.
- We believe the UK Government must urgently provide a public signal on the timetable and direction of travel for key reforms; this is crucial to maintaining investor confidence. We are also seeking clarity on how REMA intersects with the Government's Clean power 2030 ambition and the Strategic Spatial Energy Plan.
- Our position on electricity market reform will be covered in our Energy Strategy and Just Transition Plan and it will play a key role in achieving many of priorities set out within the Strategy.

[not in scope]

[not in scope]

[not in scope]

## **Document 40: INTRODUCTORY PORTFOLIO BRIEFING – NET ZERO AND ENERGY PORTFOLIO – JULY 2024**

[not in scope]

### ELECTRICITY MARKET REFORM (“REVIEW OF ELECTRICITY MARKET ARRANGEMENTS”)

#### TOP LINES

We believe that the current wholesale electricity market is not fit for the delivery of our net zero ambitions, nor our aims to tackle fuel poverty.

- Market reform provides an opportunity to consider how the future market can support further renewable deployment, ensure security of supply and reduce costs for consumers.
- We are clear that any reforms must adhere to two core principles: achieving net zero and ensuring a fair and just transition.
- Reforms must find ways to reduce system costs, break the link to volatile fossil fuel prices, and remove barriers to decarbonisation and growth of our clean heat, transport and industry sectors.
- Reforms should find ways to pass through the lower generating costs of renewables to consumers in the form of lower bills and that they consider those most vulnerable, including those in or at risk of fuel poverty.
- Crucially, this must be balanced with the vital need to ensure that levels of investment in renewables, flexibility and networks are protected and enhanced, so we maximise the economic opportunities afforded by the net zero energy transition.
- We are aware that the introduction of zonal pricing could have significant impacts for all market participants, from renewable generators and hydrogen producers to suppliers and consumers.
- That is why we commissioned independent research to inform our position on zonal pricing. The study benefited from wide engagement across industry, including Scottish Renewables who joined our expert panel. We expect this research to be published in coming weeks and will notify Ministers ahead of publication.
- Our position on electricity market reform, including on zonal pricing, will be set out in our Energy Strategy and Just Transition Plan.

## **Document 41: BANS Net Zero Paper: Price Comparison Analysis 28 March 2024**

## Purpose

The purpose of this paper is to:

- Provide a comparative analysis of wholesale electricity prices across UK and EU, including an exploration of potential underlying driving factors.
- Provide an analysis of residential electricity prices in selected EU (and UK) Capital Cities

## Key Findings

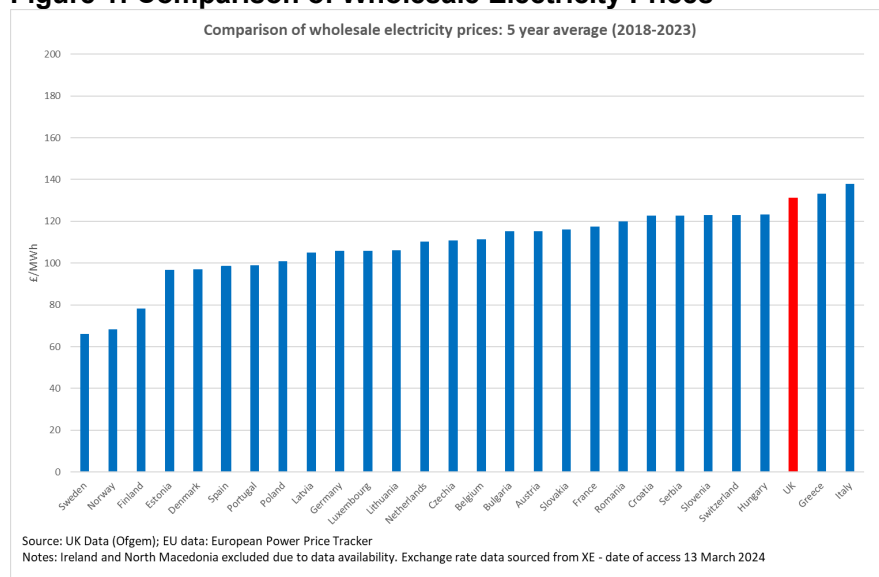
- Wholesale electricity prices over the last 5 years have generally been higher in the UK, when compared with a number of EU comparative countries.
- Electricity prices depend on a number of factors, including the type of generation, the extent to which capital costs are still being paid off, the level of integration of markets, and the extent of subsidies provided.
- In the UK, gas is typically the “marginal fuel”, which means that gas generation costs effectively sets the wholesale price for electricity.
- Recent research has found that in the UK alone, in 2021 gas cleared the market 97% of the time, and the average between 2015-2021 was 83%.

## Wholesale Electricity Prices

Wholesale energy prices are the biggest single element in energy bills, and the most volatile<sup>21</sup>. Taken together, with other elements of the wholesale cost allowance<sup>22</sup>, they make up 51% of the Q1 2024 cap (in the UK). Lower wholesale prices mean this will fall to 45% of the Q2 2024 cap<sup>23</sup>. Changes in wholesale prices therefore largely dictate whether household bills go up or down.

The chart below provides a comparison of average wholesale electricity prices per unit of energy (MWh) over the past 5 years (2018-2023). As can be seen, wholesale electricity prices over the past 5 years, have generally been higher in the UK than in the majority of other European countries.

**Figure 1: Comparison of Wholesale Electricity Prices**



**Annex A** of this note provides further detail on how wholesale prices have changed over time, for a subset of selected countries<sup>24</sup>.

<sup>21</sup> CBP-9714.pdf (parliament.uk)

<sup>22</sup> Mainly consisting of Contracts for Difference, the Capacity Market, and losses for electricity and backwardation costs for gas and electricity

<sup>23</sup> Ofgem, Energy price cap levels 1 April to 30 June 2024. Final levelised cap rates model (Annex 9) Energy price cap (default tariff) levels | Ofgem

<sup>24</sup> Please note, a subset of countries have been selected to provide this information. This is for presentational purposes only.

Wholesale electricity prices are determined by a large number of factors, which are specific to each electricity market. These factors can largely be split into the following groups<sup>25, 26</sup>:

- *Demand side factors*: including the level of economic activity, weather conditions, and energy efficiency measures.
- *Supply side factors*: these include the availability of generation capacity, fuel prices, and the cost of CO2 emissions.

### *Electricity Prices and Renewable Energy*

In GB, electricity is priced nationally. This means that the market price for electricity is the same across GB. The market price is determined by the intersection between supply and demand. The price reflects;

- The cost of producing one kWh of power from the most expensive source needed to be employed to balance the system – either from a domestic installation or from external imports
- The price that the consumer is willing to pay for the kWh required to satisfy demand.

This is known as a marginal price structure<sup>27</sup>. Under this structure, electricity prices are therefore set by the variable cost of the marginal plant, i.e. the most expensive plant that is required to serve demand.

In the UK, gas is typically the “marginal fuel<sup>28</sup>”, which means that gas generation costs effectively set the wholesale price for electricity<sup>29,30</sup>. To illustrate the importance that natural gas has on setting electricity prices<sup>31</sup>, recent research<sup>32</sup> has shown that the energy transition (towards increasing the share of renewable energy sources) has made natural gas the main electricity price setter in Europe, with gas determining electricity prices for more than 80% of the hours in 2021 in several countries such as Belgium, the UK, Greece, Italy, and the Netherlands<sup>33,34</sup>. Drilling down into the data, the research found that in the UK alone, in 2021 gas cleared the market 97% of the time, and the average between 2015-2021 was 83%<sup>35</sup>.

Europe – and the UK’s – electricity markets are hence highly exposed to issues related to the cost and supply of gas, to price volatility, and to the economic risks of currency exchange<sup>36</sup>.

### *Recent trends in wholesale prices*

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<sup>25</sup> The role of state funding can also be important – for example, in France lower prices because the major capital cost of nuclear had been funded through state support France strikes deal with EDF over power price curbs (ft.com)

<sup>26</sup> In addition to the factors above, the pricing model (for example, national or nodal pricing) used by individual countries, can also have an impact on the wholesale electricity price. Countries generally use three main pricing models to calculate the wholesale electricity price: National, Zonal, or Nodal Pricing. Each option has a different way of deriving its pricing regions. At present, Great Britain<sup>26</sup> has a single “national price”. Other countries, such as Italy, Sweden, Norway, and Denmark use a “zonal pricing” system – where the transmission system is split into several pre-determined zones, or geographical regions. At the most granular end of the spectrum, some countries (including the USA, Singapore, and New Zealand) use “nodal pricing” system, where the national network is divided into many multiple nodes, each with their own unique wholesale electricity price. How is electricity priced? | ESO (nationalgrideso.com)

<sup>27</sup> Under this system, as more low-cost renewable technologies (such as wind and solar PV) are growing in the power supply mix, more expensive generation plants – such as fossil fuels – are being pushed outside the supply mix (a phenomenon known as the “merit order” effect) <https://www.sciencedirect.com/science/article/pii/S2352484723013057>

<sup>28</sup> The fuel used for peak load generation which responds to short term changes in demand.

<sup>29</sup> Natural gas and coal are among the leading sources of electricity generation in the EU, accounting for more than one-third of the output in 2022. Electricity rates are therefore highly dependent on the price of these commodities. Electricity price Europe 2024 monthly | Statista

<sup>30</sup> Researchers have estimated that gas set electricity prices 84% of the time in 2019 UCL news, Electricity prices dictated by gas producers who provide less than half of UK electricity | UCL News - UCL – University College London (6 September 2022)

<sup>32</sup> <https://www.sciencedirect.com/science/article/pii/S2352484723013057>

<sup>33</sup> As gas is the typically the marginal fuel in many EU countries (as well as the UK), it is likely that this may, partially explain recent trends in wholesale prices. Additional factors are also likely to be in play, for example, the relative supply mix of an individual country, as well as potential differences in power plant efficiencies.

<sup>34</sup> <https://www.sciencedirect.com/science/article/pii/S2352484723013057>

<sup>35</sup> <https://www.sciencedirect.com/science/article/pii/S2352484723013057>

<sup>36</sup> <https://www.sciencedirect.com/science/article/pii/S2352484723013057>

Wholesale energy prices have increased dramatically from mid-2021, both at the global, and UK level<sup>37</sup>. Gas led the price rise during the recent energy crisis, but electricity prices have followed as gas is typically the marginal fuel (as described above).

Natural gas prices in Europe increased continuously throughout 2021, and the first half of 2022, as reserves reached low levels in the region. Uncertainties over the future Russian gas supply following the invasion of Ukraine were one of the main factors driving up gas prices in 2022<sup>38</sup>.

While the energy supply shortage was felt across Europe, the impact on each country's electricity price varied. Over the period January 2020- January 2024, Italy recorded the highest figure in the region (surpassing 540 Euros per megawatt-hour in August 2022). Italy is the EU's leading electricity net importer<sup>39</sup>. Meanwhile, Sweden – where hydropower and nuclear energy account for a large share of the country's electricity generation – saw a less pronounced growth in prices over the same period<sup>40</sup>.

Policy response to the recent energy crisis can also have a bearing on wholesale prices. For example, in response to the energy crisis, Spain and Portugal<sup>41</sup> introduced a new policy which was designed to decouple gas from the wholesale electricity price. This involved paying gas generators a subsidy for their electricity. The subsidy was intended to have the effect of lowering the price that gas generators bid to supply electricity in the power market and thus lead to lower market clearing prices (which all other generators receive)<sup>42</sup>. The subsidy was funded in large part by a contribution imposed on Iberian consumers. Originally introduced as a temporary measure, the policy has recently been extended until the end of 2024<sup>43</sup>.

Analysis suggest that the policy to decouple gas from electricity prices in the Iberian market has resulted in a modest net benefit for consumers<sup>44</sup>. However, it also resulted in more gas being burned and subsidy leakage through interconnector flows. For this policy to be applied elsewhere, the analysis suggested three conditions need to hold: little interconnection to neighbouring countries, an unconstrained gas market, and only limited forward hedging. This limits the applicability of such an intervention for the UK.

More recently, across the EU, wholesale electricity prices have decreased, after soaring in 2021 and 2022<sup>45</sup>. In Europe, the third quarter of 2023 was marked by a continuation of positive market fundamentals that supported lower wholesale electricity prices<sup>46</sup>. The **European Power Benchmark**<sup>47</sup> averaged 85 €/MWh in Q3 2023– 74% lower than in the third quarter of the previous year.

## Comparison of Residential Electricity Prices in Selected EU Capital Cities

The Household Energy Price Index (HEPI) tracks monthly energy prices across Europe. The price survey includes every EU Member State, in addition to selected members of the European

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<sup>37</sup> CBP-9714.pdf (parliament.uk)

<sup>38</sup> Electricity price Europe 2024 monthly | Statista

<sup>39</sup> Electricity price Europe 2024 monthly | Statista

<sup>40</sup> Electricity price Europe 2024 monthly | Statista

<sup>41</sup> As with power markets across Europe, the Iberian market operates on the principle of marginal pricing, whereby the price of the most expensive unit of generation needed to meet demand sets the price for the whole market.

<sup>42</sup> The Iberian electricity market intervention does not work for Europe | CEPR

<sup>43</sup> Spanish Government agrees with European Commission to extend Iberian derogation until end of year | The Corner

<sup>44</sup> The Iberian electricity market intervention does not work for Europe | CEPR

<sup>45</sup> The spike in European [electricity prices](#) was one aspect of a [global energy crisis](#), and the result of a myriad of factors, including increased demand in the "post-pandemic" economic recovery, a rise in natural gas and coal prices, and a decline in renewable power generation due to low wind speeds and drought. Electricity price Europe 2024 monthly | Statista

<sup>46</sup> Market analysis - European Commission (europa.eu)

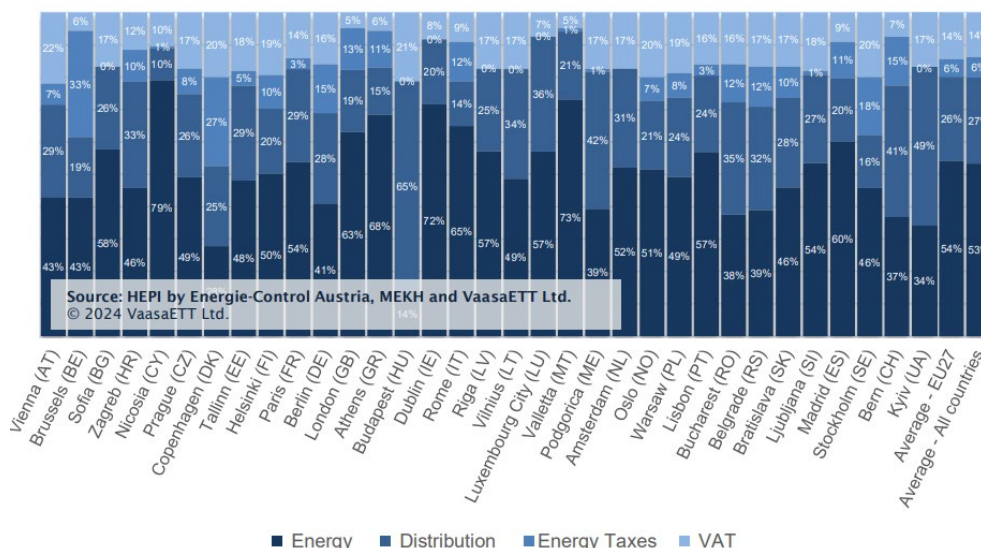
<sup>47</sup> European Power Benchmark (EPB9) is a replacement of the former Platt's PEP index discontinued at the end of 2016, computed as weighted average of nine representative European markets' (Belgium, Czechia, France, Italy, Germany, Netherlands, Spain, the United Kingdom and the Nord Pool system price) day-ahead contracts.



Energy Community (Montenegro, Norway, Serbia, and Ukraine), plus Great Britain and Switzerland.

The chart below<sup>48</sup> shows the breakdown of the electricity price in the 33 analysed capitals, into energy, distribution, energy taxes<sup>49</sup>, and VAT (as of January 2024). The survey results show that, on average, energy represents 54% of the end-user price of the electricity bill, followed by distribution (26%), energy taxes (6%), and VAT (14%) for the EU capitals<sup>50</sup>.

**Figure 2: Residential Electricity Breakdown**



Data source<sup>51</sup>: Household Energy Price Index by e-Control, MEKH and VaasaETT, ©2024 VaasaETT [HEPI \(energypriceindex.com\)](https://energypriceindex.com)

The cost of energy in London currently represents 63% of the end-user electricity price, which is higher than the EU27 Average of 54%.

Energy taxes make up an estimated 13% of the end-user electricity price in London, compared to an EU27 Average of 6%.

In Amsterdam (starting from January 2020), a typical consumer pays zero energy tax due to the increased amount of tax credit, which exceeds the indicated energy tax amount. Instead, consumers receive a refund on the exceeding tax credit amount. The aim of this refund is to encourage consumers towards electrification and switching away from gas heating and appliances<sup>52</sup>. In a similar vein, in Luxembourg<sup>53</sup>, the typical customer pays negative energy taxes as a result of the compensation mechanism which is currently in force. This mechanism is intended to offset the increase in the energy component and stabilise prices to 2022 levels.

**OCEA: Energy Economics, 28 March 2024**

<sup>48</sup> Please note, the proportions which appear in the graph are rounded, and therefore may not add up to 100%. Additionally, for Amsterdam (NL), the typical household considered in the HEPI research receives a tax refund on their energy tax. When considering this, the end-consumer's bill breakdown is as follows: energy component 71%, distribution 41%, energy taxes - 29%, and VAT 17%. For Luxembourg City (LU), the typical household considered in HEPI research receives a tax refund on their energy tax. When considering this, the end consumer's bill breakdown is as follows: energy component 90%, distribution 56%, energy taxes -53%, and VAT 7%.

<sup>49</sup> Energy taxes component is the sum of all the taxes, fees, and levies.

<sup>50</sup> Social tariffs and other targeted price discounts or support measures are not taken under consideration in the analysis.

<sup>51</sup> Link to specific bulletin: Household Energy Price Index - 2023 (squarespace.com)

<sup>52</sup> Household Energy Price Index - 2023 (squarespace.com)

<sup>53</sup> Regulation ILR/E22/58 of 28 December 2022 laying down... - Legilux (public.lu)