

UK researchers advise caution on 'rushing' to adopt locational marginal pricing of electricity

February 2 2023



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A new report questions whether Britain is ready to commit to a major wholesale electricity market reform based on locational marginal pricing

(LMP) where the price of electricity varies across the country.

The research by the University of Strathclyde concludes that moving to LMP could increase the risk of failing to deliver decarbonized power by 2035, a key commitment made by the U.K. Government in the 2021 Net Zero Strategy and a way of reducing dependency on imports of expensive gas.

Faced with costs of more than £1 billion per year driven by transmission network constraints, some influential stakeholders, including the Electricity System Operator (ESO) and the Energy Systems Catapult, are promoting the idea of LMP as a way of reducing electricity costs for consumers.

However, there are concerns that placing the costs of network constraints on renewable generators in congested areas of the country would increase risk to investors in new generation energy capacity and the cost of capital so much that any benefits of LMP would be lost.

Scottish Power and SSE engaged researchers at the University of Strathclyde to conduct an independent review of how LMP works in practice around the world and how it might be applied in Britain.

Professor Keith Bell, a co-author of the study, said, "Our main finding is that LMP is not, on its own, 'the right answer' for GB and a largely decarbonized power system by 2035. However, it might be part of the right answer, and our main recommendation is to carefully develop and compare different packages of reforms to better meet our needs than today's arrangements. There are very real concerns about the potential impact of reform on cost of capital at a time when we need massive investment to transition our electricity system to one with negligible carbon emissions."

Dr. Simon Gill, lead author of the report and a consultant with The Energy Landscape, said, "The potential adverse impacts of LMP, such as for investment to ensure reliable supplies of power and low emissions, can be somewhat countered through other arrangements. However, getting everything in place in time for the mid-2030s would be very challenging."

Dr. Callum MacIver, a Research Fellow at Strathclyde and co-author, added, "It's not possible to simply take an 'off the shelf' LMP implementation, as used in other markets around the world, and plug it in to Britain. The systems would cost hundreds of millions of pounds to develop and there are many details that need careful consideration, not least how LMP and associated instruments such as 'financial transmission rights' would work in a renewables-dominated system that promises to be quite unlike anywhere where LMP is used today."

The report finds there is potential for the demand side to benefit locally where LMP would give an electricity price that is very low, and through an overall lower cost of dispatching generation. However, there would be places where the price of electricity would increase.

Potential benefits

Professor Bell said some estimates of the potential benefits of LMP in Britain run to tens of billions of pounds over the decade or so after implementation so should not just be waved away. He added, "However, we find that many people are nervous about some of the assumptions used, and passing local variations in prices through to energy users—great if you live near to a wind farm—can lead to a postcode lottery that you can imagine some politicians being uncomfortable about."

The report, which will help build the [evidence base](#) on LMP and feed

into the U.K. Government's Review of Electricity Market Arrangements (REMA), finds that there is concern that the biggest potential gains for consumers from the energy transition in the next decade—reduced energy bills and better protection from geopolitical uncertainty that come from increased use of renewables—might be put at risk if poorly designed market reform leads to an investment hiatus.

Another key issue is the need for investment in transmission network capacity.

Wind farms

Texas in the U.S. is held up by proponents of LMP as an example of how it can work in a system with growing amounts of wind generation capacity.

But the researchers conclude there is no evidence that it has influenced the siting of wind farms which have depended on strategic, centrally planned development of the transmission network infrastructure leading to greater export capacity from windy areas.

They find that's likely to be equally true for Britain, regardless of what set of wholesale market arrangements are in place.

More "flexibility" such as new energy storage and greater ability to shift the use of [electricity](#) to better match the availability of wind and solar power is needed. While the report finds that LMP is one way to unlock the potential of this increased flexibility, the authors conclude that the associated risks it brings mean it should be carefully weighed against alternative reform options.

Professor Bell added, "We're still going to need more network capacity and that worries me a lot. The question remains as to whether we can we

get enough of it through planning and investment approval quickly enough."

More information: Callum MacIver et al, Exploring Market Change in the GB Electricity System : the Potential Impact of Locational Marginal Pricing—Stakeholder Insight Report, *University of Strathclyde* (2023). [DOI: 10.17868/strath.00083868](https://doi.org/10.17868/strath.00083868)

Provided by University of Strathclyde, Glasgow

Citation: UK researchers advise caution on 'rushing' to adopt locational marginal pricing of electricity (2023, February 2) retrieved 18 April 2024 from <https://techxplore.com/news/2023-02-uk-caution-marginal-pricing-electricity.html>

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