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| Monday 10 October 2022 |

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|  | Review of Electricity Market Arrangements  |
|  | London Councils’ response to Government Consultation |

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|  | **London Councils represents London’s 32 borough councils and the City of London. It is a cross-party organisation that works on behalf of all its member authorities regardless of political persuasion.** |  |
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London Councils welcomes the consultation on the Review of Electricity Market Arrangements (REMA). We believe it is long overdue given the volatility in wholesale power prices and the disconnect between the market price of electricity and the cheapening price of renewables.

It is important that REMA helps reduce the cost-of living. We are keen to see reforms that support place-based investment in decentralised energy, storage and flexible demand. To bring this about it is important that local and regional government is involved in the consultation, and the consultation is expressed in language that local authorities are understand.

We have limited our responses to issues on which we have case studies or relevant examples. Several councils, working closely with UK Power Networks, are developing Local Area Energy Plans to plan investment into heat and decentralised power opportunities. But one general point is that the consultation appears to be focussed on adjusting the market mechanisms *as they are now,* and is locked into concepts like liquidity, flexibility, half hourly settlements, capacity markets, competition amongst generators, locational pricing, and the Review is agnostic between technologies. We understand this makes the new arrangements easier for existing market participants. But we should guard against locking out potential new business models. The review needs to be less technology agnostic and consider realistic supply and demand investments that are likely to be made between now and 2035 when the grid is decarbonised.

As presently written the Review seems to be aimed at incumbent electricity market participants and uses language and concepts that are unfamiliar to consumers and local government who we believe will be important players. The Review needs to adapt its language and engage with demand-side, decentralised heat and power and EV operators if it is to fulfil its objective of developing market arrangements are expected to endure till 2035 when the grid is fully decarbonised.

We would also advocate the Review undertaking an outreach exercise with local government, district heating / cooling and EV operators to understand the specific problems they face interacting with the electricity market, and what services they might offer in future.

## Background

London Boroughs & GLA have declared climate emergencies and are seeking to become net zero ahead of the UK target date of 2050. London boroughs have organised their efforts over seven programmes, three of these – 1) retrofitting London’s building stock, 2) increasing the use of renewable energy and 3) halving usage of petrol (through the orderly provision of EV charging infrastructure) – are impacted by proposals considered by this Review.

*Changing electricity usage in London*

The electrification of heating will be a major driver for increasing electricity consumption in London. At present, households use more than twice as much energy in the form of gas as they do electricity. Over the coming two decades, London will transition away from gas. The approach will be to take a building envelope first, then low-cost/low-carbon heating to decarbonising heating. We envisage future heat to be supplied either from electrification (e.g. heat pumps), or from innovative forms of district heat networks, often managed by local authorities. Changes introduced through REMA need to focus on the challenges of minimising the cost of heat electrification and the ensure a level playing field for investment in the major strategic alternatives energy storage, district heating, insulation and electrification.

London hosts several large net-zero embedded generators. These include four energy from waste (EfW) sites, power production from sewage treatment works (STWs) and countless household and commercial PV installations. The construction of these facilities was supported by policy instruments like the CfD, feed-in-tariffs and renewable obligation. These contracts are time limited and it is important that operators are incentivised to maintain and operate these facilities after subsidised tariff rates cease and move to market determined prices.

Local councils are facilitating the development of EV charging networks, working through EV charging operators. We are helping develop inter-operability standards across different operators. EV penetration in London currently stands at around 67,500 vehicles. London’s DNO UK Power Networks assumes this figure will rise to 750,000 vehicles by 2027/28 (the end of the RIIO-ED2 planning period). If this happens, some 37.5 TWh of battery storage will become available for flexible charging and Vehicle to Grid (V2G) services. This storage capacity is equivalent to around half a day’s London’s annual power consumption (34,000 TWh). If even a few per cent of this capacity (375 GWh) can be accessed by a system operator for balancing purposes it would make an important contribution to balancing intra-day fluctuation in demand. This is an unprecedented resource for future systems operators.

*Decentralised and digitalised energy grids*

We believe there to be very substantial scope for EVs and flexible use of heat pump/thermal stores to undertake intra-day balancing if suitably encouraged by the market design. This could be a seismic change in the way system operators manage energy use, relying on highly decentralised, embedded, small suppliers of storage and flexibility. A future digitalised electricity market will need real time monitoring of networks, localised controls of devices and AI driven local forecasting to manage localised flexible demand (e.g. from heat pumps with thermal storage) and battery storage.

In such a world many of the issues discussed in the Review document are we believe of second order importance. The most important challenge is facilitating the swift entry of decentralised and digitalised energy management. This is a different challenge to previous decades. The Review needs to foster new entrants with user friendly interfaces to assist consumer adoption, standardised products and simplified procedures so that people and offices who do not consider themselves as ‘participants in the electrical markets’ can plug-and-play their cars, heat pumps and ACs into supplying grid services. We are interested in ensuring that the Review fully consider and engage with the demand side, and EV operators to ensure they can enter the market and supply balancing and ancillary services – since they may be lower cost than traditional suppliers.

*Energy affordability: backup generation or storage?*

Fuel poverty is an important political issue in London. At present, the wholesale price per kWh of electricity is around three times that of gas, so a transition from gas to electricity could easily worsen affordability. The benefit case for heat pumps compared to gas hinges on the average seasonal coefficient of performance (COP) of heat pumps. If this COP is worse than 3, switching from gas to heat pumps will not reduce energy costs and will worsen fuel poverty, a real concern in homes where the building heating system is not optimised for use of heat pumps.

It is important that the REMA incentivises changes to the energy system that reduce the overall burden of spending on energy. This means incentivising all aspects of the energy system to work in tandem, exploiting opportunities in heat supply and storage, decentralised electricity generation, energy efficiency and V2G solutions. Least cost might mean *not* investing in new backup generation plant, and instead investing in long term power storage, and even long-term heat or cool storage.

We recognise that the REMA excludes energy efficiency from its scope. However, as the provision of heat becomes electrified it is important to ensure that measures to reduce peak heat demand by building retrofits are incentivised alongside measures to create new capacity held in reserve for winter peaks. Put simply if it is cheaper for grid operators to insulate people’s homes for free rather than build largely dormant power plant, policy needs to direct capital into retrofit. Changes from REMA need to ensure that market design encourages such investments.

## Chapter 1: Context and Objectives

**Q2: Do you agree with our objectives for electricity market reform (decarbonisation, security of supply, and cost effectiveness)?**

As well as the three objectives listed in the question, smoothing the seasonal demands for electricity demand should be an explicit supplementary objective i.e. dealing with the integration of heat demand into the electricity market through encouraging district heating, often with cogeneration systems and the necessary power network infrastructure changes this would require. We regard replacement of winter household gas by electricity (through heat pumps) as a significant potential source of pressure on electricity prices. If peak heat demand is not an explicit focus, the Review will likely recommend solutions that greatly and unnecessarily magnify the electricity capacity rather than solutions that smooth or reduce annual heat demand.

We also believe the ‘technology agnostic’ discussion overlooks the very different role that different demand sized technologies could play in flexibility, storage and decentralised supply of electricity. Specifically, the analysis needs to consider and plan the role of electric vehicles could play in supplying V2G services and be used to flexibly adjust intra-day demand, balancing and frequency services.

## Chapter 2: The case for change

**Q3: Do you agree with the future challenges of an electricity system that we have identified? Are there further challenges we should consider? Please provide evidence for additional challenges.**

In 2020, London consumed 34 TWh of electricity representing 13 per cent of the UK total. Further, domestic and non-domestic gas consumers used 61 TWh of gas. To achieve net zero targets much of this will either become electrified (heat-pumps, infrared heating) or district heating (using waste heat e.g. chilling for London Underground) over the coming two decades.

Gas consumption is highly seasonal. Across the UK, 40 per cent of final consumers’ gas use occurs in the months of January to March. In 2021, final gas consumers consumed 150,000GWh more in Jan-Mar than in Jun-Aug. This represents 50GW of power demand that will only be called upon for three months.

This point is being made since any generation built to serve incremental energy demand for heat pumps will be used for just a few months annually unless electricity market reforms *explicitly consider optimising around the seasonality of heat demand*. Meeting this demand with new renewable generation or CCGT with CCUS will greatly increase the generation base and result in a huge increase in capacity mechanism costs and exacerbate the high energy costs that Londoners already face.

One option to reduce the need for winter heating is to use Aquifer Thermal Energy Storage (ATES) to moderate the electricity demanded for winter heating (and air conditioning) in urban areas. This approach uses the ground source heat pumps to transfer heat and cool from district heating networks that are maintained at a stable year round temperature fed by the aquifer. This technology has been applied in Netherlands and Germany[[1]](#footnote-2) and inter-seasonal cooling is being developed in Islington, London. The planning and research phase finished in June this year and the project is now in construction. It has relied upon a mixture of grants from central government and the council’s own resources. Here buildings are linked to ambient temperature district heating networks. There is also an interseasonal, aquifer based cool water store to provide cooling for the data centre.

On the issue of flexibility, policies to electrify road transport over the coming decade creates a vast resource of short-term battery storage (20 million vehicles with batteries of 50 kWh represent 1 TWh of potential storage). These vehicles, with the appropriate market signals, and investment by DNOs, could supply many of the intra-day smoothing of half-hourly supply and demand and ancillary services performed by the electricity system operators. We would recommend that much more focus be given to smoothing inter-seasonal demand and facilitating the entry of V2G.

**Q7: What should we consider when constructing and assessing packages of options?**

For the reasons described above, we consider it important for the Review to focus much more on incorporation of vehicles (and their batteries) and the inter-seasonal heat market and ensuring that relatively small dispatchable power plant like EfW and STWs continue to be maintained and operated.

## Chapter 4: Cross-cutting questions

**Q12. How do you think electricity demand reduction should be rewarded in existing or future electricity markets?**

The objective of electricity demand reduction policy should be to allow technologies which can reduce peak demand to access capital cheaply, i.e. provide a predictable and bankable payment for demand reduction services they provide. At the moment, the Review anticipates the use of mechanisms like a Regulated Asset Base (RAB) mechanism for financing nuclear power stations, power transmission and distribution grids, and CfD and feed-in tariffs for large and small scale renewables. Heat networks have similar cost and risk profiles to electricity networks. They are capital intensive and are exposed to volume risks. Heat networks have precarious access to public finance limiting the rate of their roll-out. As heat zoning is introduced it is important that the expansion of the DH networks and heat supply has similar access to finance as electricity equivalents e.g. through a regulated asset base and capacity payment funding models.

RHI payments are outside the scope of this Review, but these should be available for recovery of waste heat.

## Chapter 5: A net zero wholesale market

**Q14. Do you agree that we should continue to consider a split wholesale market?**

Yes. We agree that small scale “as-available” generators should be paid at their long run average cost or the payment agreed under CfD/RO. We also see merit in removing the requirement for the generator to participate in the current wholesale market since this simply increases the revenue risk (through differences in the strike price and the price the generator achieves in the market, as well as exposure to any imbalance charges) and also any costs of operation associated with the balancing and settlement code.

Another issue is the price that should be paid for renewable generation after the end of the RO / CfD agreement period. We believe power should continue to be rewarded at a fixed price, albeit lower price than the old RO/CfD price the facility received. Such an on-going payment may perhaps be linked (but be less than) the CfD auction prices for recent rounds of the same technology.

Many customers, including councils and individuals, are interested in financing renewable-only projects through entering long-term Power Purchase Agreement off-take contract and it is important to consider how these will be enabled through any split in the wholesale market.

**Q16-18. Nodal and zonal market designs**

We think it a mistake for zonal or nodal pricing to be introduced in the “as-available” market. The price of power from off-shore wind and solar should be the same price through the UK. The transmission charge already has a locational element. As-available renewables have very low marginal costs and should not be curtailed. Priority should instead be given to investing in the transmission grids to ensure offshore sites are swiftly connected.

**Q20. Are there other approaches to developing local markets which we have not considered?**

We agree with the general principal with local distributional pricing being paid for embedded generators and reflecting the savings the DSO makes from avoided investment costs.

## Chapter 6: Mass low-carbon power

**Q34. How could deemed generation be calculated accurately, and opportunities for gaming be limited?**

We don’t understand the scenario in which a renewable generator’s production would need to be deemed. It seems a minor cost to place a meter between a generating unit and a storage unit.

**Q40 & 41: Capacity auctions for flexible plant**

We are a little unclear how and whether V2G would be able to participate in the markets being described. These and other storage solutions can provide backup for intermittent renewables generation. We would encourage consideration of how EVs can be introduced into the market. A particular issue is ensuring that DNO CAPEX funding is responsive enough to ramp up quickly if cities need increased load for EV charging, including investment in reversible current is EV batteries are used to provide flexibility.

## Chapter 8: Capacity Adequacy

**Q45. Are we considering all the credible options for reform in the capacity adequacy chapter?**

We encourage government to consider how demand-side, and specifically reduction in winter heating demand, can be incentivised and funded rather than treating growth in power demand for heat pumps as a given. This mindset will lead to mechanism that incentivise an unnecessary expansion in power generation capacity.

For example, investment in seasonal heat storage can suppress peak demand under the right policy environment. As mentioned earlier offering the regulated asset base to guarantee investors a predictable return on their investment could ease the financing challenge of heat demand reduction.

1. [Techno-economic and environmental analysis of an Aquifer Thermal Energy Storage (ATES) in Germany | Geothermal Energy | Full Text (springeropen.com)](https://geothermal-energy-journal.springeropen.com/articles/10.1186/s40517-019-0127-6)

Islington project [GreenSCIES | Green Smart Community Integrated Energy Systems](https://www.greenscies.com/) [↑](#footnote-ref-2)