Amp X welcomes the opportunity to respond to Ofgem's Call for Input on The Future of Distributed Flexibility. Amp X was established to deliver a disruptive grid edge digital energy platform that allows all forms of distributed generation and load to make a dynamic contribution in the relevant energy markets, whether as an individual unit or as an aggregated group of assets, providing flexibility, resilience and system stability at the lowest possible price.

The need for, and potential benefits of, greater flexibility in the wholesale, ancillary services and retail markets has been widely and regularly referenced in numerous publications, but progress has been painfully slow with numerous barriers to entry. We strongly support Ofgem in addressing the essential questions of how to expand and accelerate participation in distributed flexibility.

Questions:

1. What do you think distributed flexibility could contribute to the energy system?

The energy transition macro trends of decarbonisation, decentralisation, digitalisation and democratisation bring about a number of key challenges to the secure operation of the grid.

As more dynamic loads such as electric vehicle charging and electric heating increase, and generation becomes more decentralised, variable and less dispatchable, the dynamics of the grid as a whole become substantially more complex, leading to a significantly more stressed network infrastructure whose resilience is being threatened.

The large spinning reserves found in fossil-fuel power stations, which were historically relied upon to provide system stability, are being replaced by intermittent, non-dispatchable renewable generators, alongside large dynamic loads (e.g. EV chargers). The resulting lack of synchronous inertia leads to frequency instability that threatens grid resilience.

Crucially, the sustained increase in DERs and CERs at the grid edge are resulting in unforeseen power flows for which the grid wasn't designed, leading to significant congestion and voltage instabilities, which are an increasingly difficult challenge for distribution network operators to manage.

Failure to address these issues in the short term will result in either increased curtailment of output from (largely renewable) DERs and other renewables, whose output would be replaced by the output from (largely fossil fuel) dispatchable generation. This would create additional cost and have a negative impact on the carbon intensity of the energy mix. In the longer term this could necessitate expensive grid reinforcement, which will add further costs onto consumer bills.

Distributed flexibility will help manage the challenge and cost of the massive increase in connected assets and network activity in the place where the problems are arising – at the grid edge – by providing greater visibility and control of CERs and DERs and enabling cheaper, non-wire alternatives to grid reinforcement.

By shifting and shaping load, for example in response to price signals or explicit call for flexibility from network operators, we can more closely match patterns of electricity consumption to match patterns of productions – maximising the use of renewable energy and reducing the need to curtail clean, sustainable generation. By enabling consumers to respond to calls from network operators for flexibility at times of high grid constraints, then we can reduce the risk of blackout and brown-outs. By optimising energy consumption and network usage, we can optimise the amount of new grid reinforcements and upgrades, managing the costs of the net zero energy transition which are ultimately borne by consumers.

The Smart Systems and Flexibility Plan published by BEIS and Ofgem estimates that a more flexible energy system could save the UK £17-40bn across the electricity system, to 2050. The Carbon Trust and Imperial College London estimated that demand-side flexibility could save around £5bn per annum by 2050. In the Call for Input, Ofgem cites potential savings of £3.2-4.7bn per annum by 2030 from flexibility – reducing the costs of investment in generation assets, reserve services and network reinforcement. These all point to a significant potential contribution to the energy system from enabling greater flexibility.

2. Will a focus on CER flexibility also help enable other forms of flexibility, especially distributed flexibility?

It is vitally important to focus on consumers as a key enabler of the Net Zero Transition. A recent study by EY identified a risk to climate ambitions from stalling consumer confidence as a result of consumers' disappointment with their personal experiences with the energy market and concerns that energy will become less affordable. This sentiment appeared particularly prevalent in markets where the transition is more advanced, such as the UK and Japan. The study identified a gap between intention and action: consumers still believe that decarbonisation is the right thing to do, but making the necessary changes to their own activities is regarded as too difficult, too expensive or just confusing. Here at Amp X, we found that our consumer-centric approach enabled consumers to save between 25-33% on their electricity bills and our technology received a confidence rating of 8.5/10 in a post-trial survey, with 20/29 users saying they would like to continue using the technology because of the convenience it offered, even if there were no financial savings.

Policy documents and consultations increasingly treat "flexibility" and "battery storage" as synonymous, largely overlooking the huge potential contribution from consumer demand-side flexibility. It has been estimated that in Europe there are 200GW of flexible, behind-the-meter assets, 20GW of which would be readily monetisable for flexibility services, but only 1.5GW is actually being used. However, the BEIS/Ofgem Smart Systems and Flexibility Plan envisages a situation in 2030 where consumer flexibility will be normalised and providing up to 13GW of flexibility (in combination with intraday storage) to the GB system. The Plan paints a picture where actions by consumers to shift demand patterns are as essential as investing in new generation or network assets.

However, this is the slowest ship at whose speed the convoy of distributed flexibility is moving.

If we take the examples of Code Modifications P415 and P444 (allowing wholesale market access for aggregated flexible assets) – it is looking as though it will take until November 2024 for the required settlement system changes. This needs to be accelerated – National Grid ESO demonstrated "the art of the possible" in managing to introduce the Winter Demand Flexibility Service in a matter of months, showing its commitment to demand side flexibility and a willingness accept end-consumers as a provider of services.

We therefore support Ofgem's focus on CER to enable other forms of flexibility to enter the market.

3. Is there a 'case for change' and a need for a common vision for distributed flexibility?

Yes, there is a case for change. Ofgem has articulated it well in the CfI. It has also been well articulated at various points over the last decade by, inter alia, DECC, BEIS, the National Infrastructure Commission, National Grid ESO, the Committee on Climate Change, Carbon Trust, Imperial College, and the Energy Systems Catapult.

We agree that a common vision is needed for distributed flexibility – starting with identifying blockers and a strategy for reducing/removing them such as the lack of coordination between

transmission and distribution, divergent and over-complex technical and onboarding requirements, over-complex metering requirements for CERs, and a lack of standardised procurement.

More than a shared end-vision at this stage, we would welcome a near-term road-map for identification and removal of blockers to market participation by CERs.

4. What is your vision for how to accelerate the delivery of accessible, coordinated and trusted markets for distributed flexibility?

The successful integration of large scale DERs and millions of CERs into the electric network and their participation into wholesale markets and distribution network services requires the careful coordination between the transmission system operator and the distribution network operators.

A robust and reliable system architecture that accounts for market design and operational structures (including controls) needs to be developed in order to execute the coordination of DERs in an effective way. However, in the rush to an end-vision we might overlook some immediate issues which need addressing, and so we would advocate for a staged progression towards any final goal.

We are currently in the situation of trying to retrofit demand-side flexibility solutions into market frameworks and structures which weren't originally designed to accommodate them. This is not a situation we want to repeat, but this is a risk given the number of concurrent consultations, reviews, initiatives and market redesigns of discrete elements and sections of the market which are currently in progress. Developing a user-friendly route-to-market for CERs will very likely require a review of the electricity retail market (because retailers are currently the main interface with markets for consumers, and participation by domestic users in National Grid ESO's Winter Demand Flexibility Services was via their retailer).

A future review of the electricity retail market was mentioned in the consultation document for the Review of Electricity Market Arrangements (REMA), but no timescale has been set out. If the REMA review of wholesale markets progresses too far without taking account of potential interactions with a redesigned retail market (including data and money flows) and newly-designed DSO flexibility markets, then we may end up back in the situation of trying to retrofit a sub-optimal solution for CER/DER market participation.

For this reason, we would like to see an organisation – possibly the FSO – given responsibility for identifying and facilitating potential market interactions as part of a "whole system" coordination role. As an example, a (non-exhaustive) list of requirements for the participation of DERs and CERs in wholesale and flexibility markets which should be accommodated by any future digital infrastructure might include:

- Presumed access to all markets for distributed energy assets (whether individually or aggregated);
- Standardised rules, products, processes and contracts;
- Stackability across markets and products wherever possible;
- Transparent primacy rules, covering markets and products;
- Common API(s)
- It should have the flexibility to be supportive of (or at least, not to preclude) innovative business models such as transactive energy or peer-to-peer trading.

5. Will certainty of an end vision help accelerate enabling work and make it cohesive?

It is unlikely at this stage that there will be industry-wide agreement for any one of the archetypes described in the CfI. Therefore, our preference would be for certainty of direction of travel, with a

clear timeline, and a stage-gate process, i.e. if we accept that the thin, medium and thick archetypes described in the CfI are a progression, then progress from thin to medium to thick could be subject to consultation at the appropriate stage, when the incremental costs and benefits of each stage could be more clearly assessed. This would also mean that enabling works for subsequent stages could be incorporated into the preceding stage without necessarily committing the project to progress to the next stage, and would enable adjustments to be made to any end-vision and to the design of any ultimate common digital infrastructure to accommodate changes as a result of REMA, or any other initiatives running concurrently.

6. When should a common digital energy infrastructure be in place? And therefore, when should development begin?

Work could and should begin on the "thin" archetype as soon as possible. As part of this, as described above, a staged progression through the "medium" and "thick" archetypes could be developed. This process could follow the model adopted for the EU target-model for implicit auctions – which initially saw a "light-touch" coordination of national markets, followed by a development of regional markets, leading ultimately to the integration of regional markets into the common target model.

7. What should a common digital energy infrastructure look like, and why? Please consider the archetypes or develop your own proposition.

As set out above, designing an end-stage common digital infrastructure now would be premature, and developing a first-stage model which addresses the existing barriers to market entry for distributed flexibility assets should be the priority.

8. What is your view on the desirability and feasibility of the archetypes or your own alternative proposition?

As described above, we would favour a project design which followed a stage-gate process so that initial market coordination was developed via the "thin" archetype, building in the necessary enablers for progression to a more coordinated "medium" archetype subject to satisfactory cost-benefit analyses and favourable industry consultation. These stages should build towards an end-model incorporating "thick" market-wide, whole-system coordination but if, for example, it is felt that the "medium archetype" has successfully removed the barriers to entry and enables sufficient coordination of products, markets and providers then the decision may be taken to conclude the project there.

Any design needs to build in the adaptability to integrate market design changes as a result of REMA, and review of retail markets or any other initiatives.

9. Should a common digital energy infrastructure be new-build, or should it build-out from existing infrastructure?

We would like to see the stage-gate process as described previously highlight the benefits, features and outputs expected from each stage. If any existing platforms can be shown to deliver these without significant de-scoping of the project then a build out would be acceptable.

However, we are currently in the situation where seeking to retrofit solutions onto platforms which were already sub-optimal has led to significant barriers to entry, not least as a result of the complexity of platforms which were designed for a radically different (and smaller) set of market players attempting to accommodate a large number of new entrants.

A “target model” approach as described above, would accommodate flexibility to allow for changes to market design and structure, and would also allow for integration (or adoption) of existing platforms that meet any/all criteria agreed by industry as part of the stage-gate progression process.

10.What are the important areas for consideration when designing institutional delivery models for a common digital energy infrastructure?

Key areas to consider are: timely deliverability, transparency, inclusivity, flexibility to accommodate changes in policy and innovative market models, and broad cross-industry support.

As mentioned previously, it is more important to agree on the characteristics and features which would be delivered by each progressive stage than to set out to design the ultimate end-product now. The governance of this design and delivery process needs to be actively overseen by Ofgem.

We agree that the FSO would seem a likely fit for any market-wide facilitator role, but this was not necessarily envisaged in the original institutional design for the FSO so it would need to be adequately funded to take on any additional roles and responsibilities, and be held to account for their timely delivery.

As previously stated, any common digital infrastructure should be flexible enough to accommodate, or at least not to preclude, innovative business models and services such as transactivity, peer-to-peer trading etc.

11.What are the important areas for consideration when designing financial delivery models for a common digital energy infrastructure?

We believe Ofgem has correctly identified the key issues to consider for the financing of such a project.