A new era for DER participation in energy markets?

PJM's and ISO-NE's Order No. 2222 proposals and potential lessons learned from energy markets in the UK

Mott MacDonald has been acting in the North American T&D market for over 30 years with a particular expertise in power generation and transmission/distribution. In 2020 Mott MacDonald invested in Piclo who have developed a globally leading marketplace, Piclo Flex, that simplifies the end-to-end process for System Operators to source energy flexibility from flexibility providers.

Together, Mott MacDonald and Piclo have evaluated FERC Order 2222 drawing on Piclo's experience of market platforms and driving market liquidity, initially in the UK and now expanding to other markets. In doing so, they give important insights as to how market participants might respond to Order 2222.

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Back in September 2020, the publication of Order 2222 caused a stir with new legislation aimed at levelling the playing field for assets wanting to participate in energy, ancillary, and wholesale markets across the US. Distributed Energy Resources (DER) and DER aggregators (DERAs) in particular, were excited by the far-reaching prospects the Federal Energy Regulatory Commission's (FERC's) Order 2222 would bring. At first glance, the Order's eleven key compliance directives seemed to provide opportunities for additional revenue streams and new business models. It was heralded by FERC as an important development that would promote competition in markets, improve resilience and lower costs for consumers[1]. However delays, push-backs and clarifications have hindered the implementation of the Order. To date, these non-traditional market players have faced barriers to participation including capacity thresholds, unsuitable participation models for smaller or aggregated assets, and insufficient coordination.

Fast-forwarding to today, it appears 2022 may be a pivotal year for Order 2222. This Spring, Regional Grid Operators (RGOs) including PJM Interconnection, LLC (PJM) and independent system operator of New England,

ISO-New England, Inc. (ISO-NE), have outlined their compliance proposals. Market actors finally have a glimpse of what Order 2222 could mean for their businesses.

Already, three things have become clear from PJM's and ISO-NE's initial submissions:

1. **Change won't come quickly**: With the majority of PJM's and ISO-NE's implementation targets set in 2026, market participants shouldn't anticipate quick change. However, RGOs have an opportunity to build market trust (and ultimately participation) by engaging DERAs iteratively during market development.
2. **Market participation rules differ by RGO:** There are key variances in how RGOs will enable different technologies to participate in the markets. Lack of consistency or standardisation could lead to lower DERA participation and a less liquid market.
3. **Managing the integration of DERs will be a challenge:** To participate, DERs must apply and have their eligibility and impact understood individually and in aggregate. Increasing the number of market participants across more varied electrical grids will require new systems, processes, and technologies to successfully be implemented taking investment, time, and coordination across the industry.

Background

Energy systems across the US are radically changing in response to the greater penetration of variable renewables such as solar PV and the increasing adoption of low carbon technologies such as electric vehicles. These changes bring new challenges to electricity networks and systems to which energy markets must adapt in response. Now, more than ever, it is essential that new, distributed assets capable of providing services to the grid and driving costs down through competition can access RGO markets.

Before the emergence of Order 2222, FERC issued Order 841 requiring RGOs to enable battery and storage systems to participate in markets. Yet, with the narrow scope of the Order 841 focusing only on battery and storage systems, a swathe of barriers remained to other types of assets, DERs, and aggregators.

This limited scope changed in September 2020, with the publication of Order 2222's compliance requirements, which forms the foundation of FERC's intention to "help usher in the electric grid of the future and promote competition in electric markets by removing the barriers preventing distributed energy resources (DERs) from competing on a level playing field in the organized capacity, energy and ancillary services markets run by regional grid operators".

With this supplemental Order's publication, RGOs under FERC jurisdiction must act to enable all DERs to have access to markets on an equal footing with other participants. These markets manage electricity supply areas across nearly 2/3 of the US and vary across RGOs and include a myriad of potential opportunities that DERs and DERAs can serve while earning additional revenue. For instance, ISO-NE's compliance would open up markets including day-ahead and real-time wholesale electricity markets, Forward Capacity Market, and ancillary services such as voltage support, regulation market, black-start service, forward reserve market and real-time reserve market. Comparatively, PJM compliance would deliver access to markets including its real-time and day-ahead energy market, synchronized resource, black start service, and day-ahead scheduling reserve.

FERC has granted RGOs freedom regarding how they implement and comply with the rulings, yet requiring each RGO to individually formulate, schedule, and implement new tariffs to create new market participation models ensuring all amalgamations of DERs including DERA participation thresholds to the capacity of 100kW, can

access existing markets. Since the Order's initial publication there has been a flurry of activity to reach the stage where compliance proposals could be published.

1. Change won't come quickly

FERC originally set a date for RGO compliance proposals to be submitted by July 2021 and from the start, delays were expected; while DERs see this policy as liberating and forward moving, others feel that this policy is an over-reach and extends beyond the scope of FERC's authority. As initial reviews of the policy began, it became clear that time would be needed to identify solutions that maintain compliance while retaining local control of the distribution systems. Both PJM and ISO-NE were granted extensions for their compliance proposals through to February 2022. Equally, even for the RGOs that did not request an extension, such as NYISO and CAISO who submitted their proposals in 2021, FERC sent deficiency letters requesting clarifications. This indicates that in addition to the extensions granted, there could be a back and forth between RGOs and FERC as well as alterations to proposals.

The latest publications from PJM and ISO-NE also point toward there being a long lead time to compliance, with the majority of routes to participation becoming effective in 2026 for both[2]. The most significant complication that is driving these timelines (as cited by ISO-NE) includes setting the systems and procedures to mitigate DERs from negatively impacting the distribution system. Other complications such as software development and system integration were also cited as a concern.

Full compliance with Order 2222's provisions will undoubtedly take time, however, a 'big bang' implementation approach carries risk. International markets which have adopted an iterative-based approach prioritising early releases and pilots with market participants have built confidence and scaled participation progressively. Forgoing this critical engagement-and-feedback cycle risks that the design and implementation an RGO opts for are not fit for purpose and ultimately erodes market liquidity.

In the UK, DER participation in Distribution System Operator (DSO) flexibility markets grew as a result of the "learning by doing approach" adopted, which engaged and iterated gradual developments to improve market confidence and participation from DERs at each stage. This approach ultimately saw flexibility capacity procured in these new markets grow on Piclo Flex from 39MW in 2019, to 170MW in 2020 and 350MW in 2021 with further growth expected. This approach taken by the UK to DER participation in DSO flexibility markets could also serve as a useful outline for Order 2222's implementation, as well as providing lessons learned.

2. Market participation rules differ by RGO

The second dose of reality for DERs that PJM and ISO-NE's publications hinted at is the complications behind a truly technology-agnostic approach. The root of the complexity is that RGOs must establish DERs as a category of "market participant" by revising their tariffs. This means defining a set of participation models that address: technical considerations, distribution factors, bidding parameters, locational information, data, metering and telemetry requirements and coordination. PJM and ISO-NE have each signalled different approaches for these market participation models.

ISO-NE's proposal for DERAs sees the addition of a further two participation models to enable asset combinations of any type to participate, plus the adaptation of their existing four models. Comparatively, PJM also augmented their four participation models, which currently provide assets with access to wholesale markets, by adding one all-encompassing DER Aggregator Participation Model that accommodates the physical

and operational characteristics of aggregation and allows both homogenous and heterogeneous DER to be aggregated.

Table: Summary of ISO-NE and PJM participation models

RGO	Existing Participation Models	New Participation Models
ISO-NE	1. Generator Asset 2. Continuous Storage Facility (CSF) / Binary Storage Facility (BSF) 3. Alternative Technology Regulating Resource (ATRR) 4. Demand Response Resource (DR)	1. Distributed Energy Resource Aggregation (DRDERA) 2. Settlement Only Distributed Energy Resource Aggregation (SODERA).
PJM	1. Economic Load Response / Demand Resource 2. Energy efficiency, Energy storage resource 3. Capacity storage resource 4. Generate model	1. DER Aggregator Participation Model

From these two RGO proposals alone, it is clear that DERAs navigating participation for different asset mixes, across markets in different regions has the potential to become very complicated. Indeed, critics have already pointed out ISO-NE's models don't accommodate the most common use cases for DERs, with high barriers from metering requirements remaining[3]. Aggregators will need to navigate this complexity across and between markets to effectively participate and provide value to both DERs and the market. With each different approach requiring investment in new capabilities, understanding, necessary contracts with owners and assets, technologies and tools such as APIs, DERAs face a considerable undertaking with the potential for high costs associated. Although the process is in the early stages of development, a shared long-term vision across the board to minimise complexity and barriers to participation is key to widespread success.

In the UK, while DER access across the six DSO flexibility markets is technically possible, participation has been hindered by the complexity that stems from different DSO requirements, products, expectations, and processes. To combat this barrier to participation, industry-led standardisation efforts have focused on key pain points, such as focusing on standardising products and data requirements for DER qualification and eligibility assessments across DSOs. Whilst there is substantial variation across RGO markets, prioritising industry-led collaboration, shared learnings and standardisation efforts where possible would maximise the opportunities for DERs and reduce complexity for both DERs and Market operators - preventing the market fragmentation that initially emerged in the UK DSO flexibility markets.

3. Managing the integration of DERs will be a challenge

Thirdly, as identified by ISO-NE, one of the key challenges facing this process is the assessment of DERs eligibility and ensuring this coordinated process with distribution utilities (DU) does not become a barrier. To participate, DERs/DERAs must register with the respective RGO plus the DU. Whilst DUs are not within FERC or Order 2222's jurisdiction, they hold an important key to unlocking DER potential by being responsible for the distribution grid, including the interconnection process and Aggregation Review. The interconnection process sees the DU assess most, but not all, individual DERs connecting to the network to understand the potential impact. Comparatively, in the Aggregation Review, the DU seeks to understand collectively what service, location and assets will be dispatched and how this could impact the grid.

Consequently, the customer-facing experience DERs go through to become eligible is extremely important to not deter participation. As a result of the requirements across RGO registration and the interconnection process and aggregation review overlapping considerably, it is possible for data-sharing practices to be established to minimise complexity. DSO flexibility markets in the UK model have adopted user-friendly portals, such as Piclo Flex, that are designed in a user-centric manner to incorporate the needs of DERs and System Operators, which additionally are able to log and share data such as asset and company details with appropriate users.

Where do we go from here?

It is clear there's still a long way to go before DERs will be able to participate easily and effectively across RGO markets and provide benefits to the system through increased competition. Despite being two years since its publication, the process remains in its early days and FERC has yet to respond to PJM's and ISO-NE's submissions. Plus, with the precedence of delays already set, there'll likely be more of these as the process continues.

Yet even then, the challenges really begin here, with it being essential that RGOs build stakeholder confidence in proposals, continue collaboration, and share learnings. Approaches that have been successful in international markets such as learning-by-doing, industry-led standardisation efforts and prioritising the end to end-user experience of DERs must be adopted to optimise Order 2222's implementation from here on in.

[1] https://www.ferc.gov/media/ferc-order-no-2222-fact-sheet
[2] with the exception of one ISO-NE participation model that would be implemented in November 2022
[3] https://www.renewableenergyworld.com/solar/ferc-should-issue-a-deficiency-letter-to-new-england-iso-on-order-2222/#gref