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Improving the NEM Access Standards

Package 2

The **NEXTDC** response and input to the proposed rule changes

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Ms Anna Collyer
Chair
Australian Energy Market Commission
Project Reference Code: ERC0394

Dear Ms Collyer,

NEXTDC appreciates the opportunity to respond to the Australian Energy Market Commission's (AEMC) Consultation Paper on the National Electricity Amendment (Improving the NEM access standards – Package 2) proposed rule changes.

As an ASX100-listed company and **Australia's largest locally owned and operated data centre provider**, we deliver high-performance, cloud-connected infrastructure to enterprise and government across a national footprint of world-class facilities. **NEXTDC** is dedicated to enhancing the **nation's sovereign capabilities in artificial intelligence** and **compute capability**.

Globally, AI adoption continues to accelerate at a rapid pace, and this growing demand for compute capacity is driving large-scale investment in data centre infrastructure to meet current and future market demand. **To ensure Australia remains competitive** on the global stage and builds sufficient sovereign AI capabilities, **efficient** and **streamlined** grid connections are essential to enable both industrial investment, construction, and the operation of data centres at scale.

NEXTDC acknowledges the inherent risks associated with connecting substantial loads to the network and the need for an appropriate guideline in implementing such connections. The AEMC guidelines must ensure the security of the network while supporting the growth of key national infrastructure, such as data centres. We are committed to collaborating with the AEMC, AEMO, the Network Service Providers (NSPs), and other data centre developers to mitigate these risks.

NEXTDC have engaged internal and external specialists across varying fields to formulate the following feedback on the proposed rule changes. **Our proposed next steps**, which we believe to be broadly aligned with industry, can be summarised by three key drivers below:

1. **Revised definition of a large inverter-based load**

    The current definition of large inverter-based loads risks the universal application of technical requirements to all power electronic-connected loads, regardless of size and technology. This would create an unnecessary regulatory burden on both NSPs and connecting participants alike. We call for a more nuanced approach to inverter-based load connections.

The threshold value of 5 MW is too low, and no consideration is given to the strength or characteristics of the network to which these plants are connecting. Commercially, this creates unnecessary complexity, time, and costs to develop small to medium-sized loads. Additionally, for small UPS modules, the lack of available detailed Original Equipment Manufacturer (OEM) PSCAD (Power Systems Computer-Aided Design) and PSSE (Power System Simulator for Engineering) documentation makes this task extremely challenging. Whilst we acknowledge that the changing nature of the grid is something we collectively need to work within, in our opinion, loads at this level should have minimal consequence for local grid performance.

NEXTDC proposes that the threshold for large loads be defined based on its impact on the network. This avoids unnecessary assessment and modelling of loads that will not result in system security degradation. This could also be described as a minimum SCR (Short Circuit Ratio) requirement (of the load) and/or a meaningful minimum active power/load requirement.

2. **Limitation in the application of detailed OEM PSCAD and PSSE models**

We urge the AEMC to consider a more 'fit for purpose' approach to the requirements of PSCAD and PSSE modelling. These modelling requirements were designed for material contributors to the grid, such as large generation systems. OEM suppliers for Uninterrupted Power Supply (UPS) systems, which are a customer-driven requirement in data centre power solutions, are in various stages of PSSE and/or PSCAD model development that would comply with AEMO and NSP compliance requirements. We note this potential requirement, at these very low power levels (>5MW), would be unique to Australia, which is a relatively small UPS market on a global scale, and is not the norm within the global context of data centres.

Upfront PSCAD and PSSE modelling, at the proposed cut-off levels, would be a requirement that severely limits OEM selection, with obvious downsides for enabling growth in small to medium-sized data centres across Australia. Networks in Europe and America, where data centres are well-established, are focused on improving technical requirements for these technologies (e.g., ride-through, load ramping). However, no specific modelling guidelines are being imposed by these utilities, despite their maturity.

The Australian market represents a small portion of global UPS sales, which reduces commercial incentives for specialised model development, particularly given their high cost and resource consumption. NEXTDC is concerned that this could hinder some of the world's leading manufacturers in data centre technologies from developing and launching their products in Australia due to a high regulatory burden.

NEXTDC strongly requests that the AEMC consider the need for greater industry collaboration to better understand the capabilities of these technologies and to develop appropriate modelling. We also note that projects currently in the queue to be connected should not be required to provide PSCAD and PSSE modelling, given the generally successful deployment of data centres in Australia thus far.

Over the next 3-4 years, we propose that AEMO focus on adopting generic modelling approaches and capture only the necessary elements (e.g., voltage and frequency fault ride-through). If the connecting load is large enough (above a reasonable cut-off size and/or SCR) to be considered a significant system security risk, then an alternative arrangement to supply these models could be agreed upon (i.e., prior to commissioning). This would still allow data centre owners to progress with connection agreements and achieve financial close for these projects. Importantly, it will allow Australia to capitalise on AI by building small and medium-sized data centre capacity as quickly as possible in markets (cities, elsewhere) that require it.

3. **Re-evaluation of Large Load responsibility on System Strength and the relevant charges.**

The proposed rule change treats large loads in the same manner as a Generator for System Strength Charges (SSC). Generators, however, have mitigation options to minimise SSC, such as adopting and tuning grid-forming inverters. In our opinion, system strength should be part of the network services that connected loads pay for via network charges (given reasonable load connection requirements).

There are limited options for a load to apply self-remediation options to negate SSCs. These involve installing a synchronous condenser(s) on site (not a typical customer grid capability) or additional grid-forming Battery Energy Storage Systems (BESS) or equivalent behind the meter. These options may not be practical or yield the necessary technical benefits that AEMO expects to obtain, particularly given the way SSCs are determined.

Additional constraints exist, such as those related to land and capital, as these technologies often sit outside a data centre's core business model and planning considerations. Moreover, local network conditions (suitability) are not considered when applying these SCR requirements.

If there are genuine, technically qualified concerns about the long-term system strength impacts of load connections, NEXTDC suggests that it is more efficient for NSPs to design and implement these solutions where they would be most effective. We recommend that the AEMC consider international best practice. For instance, the ERCOT grid in the US has indicated that improving ride-through performance during grid events has the potential to support the grid and has not recommended imposing any system strength penalties.

NEXTDC reiterates that the current position of the proposed rules for load connections will delay industrial investment in Australia and have a significant impact on the roadmap for compute capacity and capability, as well as Australia's **ability to construct sovereign AI capacity.**

NEXTDC appreciate the ongoing efforts of the AEMC in addressing these crucial issues and the request to continue collaboration with the market. NEXTDC look forward to contributing, where possible, to the development of robust solutions that will support Australia's infrastructure growth and technological advancement.

NEXTDC welcome the opportunity to discuss this submission further. Please contact Shayne Kumar, Head of Energy, to arrange any further discussions.

Yours sincerely,

Shayne Kumar
Head of Energy
NEXTDC

QUESTION	NEXTDC RESPONSE
Question 1: Defining large loads in the context of this rule change request	NEXTDC support AEMO's ongoing process to address system strength implications for large loads; however, we urge that the definition of 'large loads' and what constitutes an inverter-based load (IBL) be revised as a priority. The current definition risks applying technical requirements to all power electronic loads, regardless of size and technology, creating an unnecessary regulatory burden on both NSPs and increasing cost, time, and resource requirements for connecting participants. We recommend that large loads be more holistically defined in the NER, incorporating network strength and actual system impact, rather than relying on simple MW thresholds. As noted in Question 4 below, a broad classification of inverter-based loads and the need for detailed modelling requirements for projects as small as 5MW could severely restrict equipment selection and potentially delay projects, given that PSCAD and PSSE are not fit for purpose. This narrow requirement could also lock data centres into specific OEMs and isn't conducive to the way data centres are typically built. Data centre 'campuses' (i.e. blocks of buildings) are built over time as customer IT capacity (in MW) is sold. However, the full power capacity is typically contracted upfront, with the option to grow into it. Locking data centres into specific makes and models can create compliance issues down the track and potentially make future builds uneconomic, hindering Australia's opportunity to build sovereign AI capacity. **Proposed Alternative Definition** NEXTDC proposes that large loads should be defined based on their actual impact on the network, rather than an arbitrary MW threshold. This can be achieved through: • Frequency stability impact threshold: Loads large enough to impact frequency stability. • Network strength-based criteria: Loads of significant size compared to local network strength. • Contextual assessment: Consider local network conditions rather than applying blanket requirements.
Question 2: Amending the NER to address the influx of large loads	NEXTDC intends to continue developing data centres across Australia, as it has done over the past 10 years, and expects data centre electricity consumption to increase, particularly with the growing adoption of AI. It is aware of competitors with similar ambition. This investment will enable Australia to become a global leader in AI and compute hardware. While we are aware of the risk this could pose to network system security, we also emphasise the **magnitude of this opportunity and** the potential **consequences** of missing it.

	We request that the rules be considered in light of maintaining or improving speed to market, which is vital to the data centre industry. Significantly increasing the connection application period will reduce investment.
Question 4: Limiting short circuit ratio requirements for customer loads to IBR, and introducing flexibility to the access standard	NEXTDC considers the universal application of SCR requirements to all IBR plants without size thresholds to be a significant issue that creates unnecessary regulatory burden and commercial complexity. The current approach risks applying technical requirements universally to all power electronic loads regardless of size, technology, or network impact. This creates a disproportionate regulatory burden on both NSPs and connecting participants, particularly for small to medium-sized data centres that pose minimal system security risk. From a practical perspective, evaluating compliance with clause S5.3.11 requires detailed PSCAD models that are not suitable for all UPS systems and data centre types and sizes. The current definition of large inverter-based loads creates two distinct issues: first, the universal application of technical requirements to all power electronic loads, regardless of size and technology. Second is the definition of 'large,' which classifies everything above 5 MW under that category. NEXTDC proposes that the threshold for large loads should be defined based on actual impact to network security, rather than an arbitrary capacity threshold. Concerns regarding the rule are more related to the application of SSIAG (System Strength Impact Assessment Guidelines) requirements, which are linked to S5.3.11 as summarised below. 1. OEM suppliers for UPS systems are in various stages of development regarding PSCAD models that comply with AEMO requirements. 2. Imposing strict, immediate modelling requirements could significantly delay projects, risking the viability of Australia's data centre industry and our ability to compete globally in AI. 3. Requirements designed for large-scale generators are being applied to loads without considering different risk profiles and available mitigation options. **Suggestions:** • Review SSIAG guidelines, in particular the application of system strength charges for loads. • Adopt generic modelling approaches for ongoing projects, focusing on essential elements (voltage and frequency protection, ride-through performance).

	• Reserve detailed modelling requirements for loads genuinely large enough to pose system security risks. For projects that fit into this category and are already in the connection application stage, provide flexibility to supply this information before commissioning. A tiered approach has also been discussed as part of Question 1 for consideration. <u>Additional comments on the application of system strength charges for loads</u> We disagree that network customers should be responsible for providing system strength services. Both through behind-the-meter solutions (e.g. grid forming BESS or Synchronous condensers) or procuring system strength services from third-party operators. The proposed rules treat large loads identically to generators for system strength charges, even though loads have fundamentally different characteristics and limited mitigation options. Data centre operators do not have reasonably practicable options to mitigate these charges, and adding additional charges to load connections increases the complexity of these connections without effectively resolving the system strength issues. These could make data centre developments commercially challenging, particularly for projects already in connection queues. Additionally, local network conditions are not being adequately considered when applying SCR requirements, which may result in unnecessary remediation in areas with strong network connections.
Question 7: Provision of information on ride-through capability	NEXTDC agrees with the requirement for AEMO and the NSP to understand the fault ride-through performance of connecting large loads.
Question 8: Protection settings to maximise ride-through performance	NEXTDC agrees with maximising fault ride-through capability to the safe limits of the connecting equipment.
Question 9: New access standard for detection and response to instability	NEXTDC supports the broader goal of enhancing the resilience of the NEM and acknowledges the potential for certain types of loads to contribute to managing power system instability. However, we urge caution in applying detection and response requirements to all large inverter-based loads, particularly those, such as data centres, that are

	not designed or configured to detect or react to grid instability in real-time. Data centre loads are largely passive and have limited dynamic responsiveness. While technologies are evolving, the current industry standard does not include the ability for load-side systems to detect grid-wide instability events or differentiate them from local disturbances. Implementing such functionality would require new sensing, control, and protection schemes, many of which have not been fully validated and would need to be developed and integrated into highly sensitive critical infrastructure. Mandating instability detection capabilities could impose unnecessary compliance burdens on facilities that do not materially contribute to instability, and which are already designed for power quality, stability, and non-disruptive operation. NEXTDC recommends: • That any new access standard be targeted only at loads with high fault level sensitivity or system impact, rather than applied universally to all >5MW sites. • Further technical consultation should be undertaken to explore how such detection would function in practice, and what thresholds or technologies are appropriate. • A staged, optional pathway should be considered, beginning with voluntary pilots or incentives for those with advanced capabilities. We are supportive of efforts to modernise grid management, but it is critical that any new obligations reflect the specific role, limitations, and reliability expectations of data centre infrastructure. Detection and response capabilities should be viewed as an opportunity for future innovation, rather than a blanket requirement at this stage.
Question 10: Under-frequency ramp down of large loads	NEXTDC acknowledges the intention to improve system stability through load flexibility; however, we caution your response to mandatory ramp-down requirements for large loads, such as data centres. Data centres are **not** power stations and are not designed as such. While some modern power systems may provide brief reductions in grid draw through internal battery support, data centre loads are not discretionary. Data centres are critical infrastructure. Reducing load in response to frequency events would require us to activate our backup

	generators, which typically necessitates notifying our customers. We typically reserve running our backup generators for emergencies only. Backup generators are installed at data centres as an 'insurance measure' should the grid fail or become unreliable. Our backup generators are critical to NEXTDC's high reliability requirements, which our customers need. We also note that the response time for curtailment is not instantaneous due to the design of data centres for security reasons. We strongly recommend that: • Under-frequency ramp-down should be **voluntarily** implemented via existing commercially driven schemes. We welcome the AEMC's and AEMO's drive to improve system stability and encourage AEMO and the AEMC to promote their commercial demand response schemes (RERT, IRR, WDRM) to data centre owners and operators. • The rules allow operators to maintain internal redundancy and continuity of supply without penalty. NEXTDC remains open to collaborating on frameworks that enable load flexibility where appropriate, while ensuring that customer IT loads stay stable and at low risk of loss.