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Sun Metals Corporation Pty Ltd ABN 97 074 241 982

1 Zinc Avenue, Stuart Townsville, Queensland 4811 Australia

PMB 10 Townsville MC, Queensland, 48101

Telephone:+ 61 7 4726 6609

Facsimile:+ 61 7 4726 6300

Email: [admin@sunmetals.com.au](mailto:admin@sunmetals.com.au)

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Anne Collyer  
Chair  
AEMC  
GPO BOX 2603  
SYDNEY  
NSW  
2001

Dear Anne,

**RE: ERC0280 – DRAFT Determination “Integrating Energy Storage Systems into the NEM”.**

Sun Metals Corporation Pty Ltd (“SMC”) is an actively engaged party in the wholesale energy market as a mechanism to manage one of its major input costs – electricity. SMC’s primary purpose is value adding through the refining of commodities into saleable materials to domestic and export markets.

It is a major employer in the North Queensland region and is of material significance to GRP of North Queensland, and a valued contributor to national GDP. SMC uses global, leading zinc processing technology, developed by its parent company, and applied in only two refineries in the world.

SMC is the second largest single site electricity load in the Queensland system and has recently invested heavily in behind the meter renewable generation, co-located with its refinery in Townsville. SMC is committed to ongoing investment in its core business for its own benefit, and the benefit of the communities within which it operates. Part of SMC’s success is a mature focus on environmental and social issues which it delivers through economic resilience, and a well published commitment to fully offset the carbon emissions from its refining operations by 2040.

SMC is very supportive of the critical and difficult role of the AEMC and AEMO in the transition of the electricity system. SMC has been an active participant in the NEM and is conscious of the need for the ongoing evolution of the Rules to facilitate appropriate participation consistent with the National Energy Objectives (“NEO”) and wider policy objectives.

**Consumers and electricity service providers**

Hybrid systems that are primarily loads, supported by generation or storage, are end-users and should be considered as consumers for the purposes of the NEO. Many large and medium sized end-users, like SMC, install generation on-site to manage electricity costs and reduce greenhouse gas emissions. Sometimes batteries are added to assist on the management of the market price and load profiles.

Even though load causes power to flow in the opposite direction to generation, loads and generators are not two sides of the same coin. The reason that there are so few scheduled loads in the NEM (other than batteries) is that loads are not primarily service providers to the electricity system, but end-users of electricity. The same is true when a customer connection point adds a generating facility or an energy storage facility. Consumers may occasionally provide services to the NEM, but provision of services is not core business. By contrast, connections that are solely energy storage systems or generation and storage (dc coupled or not) are clearly service providers for the purpose of the NEO and should be treated as such. Considering this understanding of consumers, SMC consider the proposed Rule is not consistent with the NEO in all the proposed changes. SMC makes the following key observations about specific proposed changes.

### **Facilitation of consumer energy choices**

SMC is supportive of the proposal to consider, for the market operation, the net input or output of power at the connection point for a hybrid system. SMC is also supportive of the proposals in the draft determination to assess dispatch compliance at the connection point but believes the proposed Rules do not go far enough to differentiate between market service providers and consumers.

The Rule change should also facilitate the use of generation behind a connection point to meet the consumers' needs (i.e., for hybrid systems where there is only one 'scheduled resource'), where this does not interfere with the ability to operate the power system securely.

The proposed Rule change envisages a generator and load behind the same connection point can be subject to "unit level" constraints. The basic principle for implementing these "unit level" constraints should be economic efficiency within the NEO allowing consumers to consume their own generated energy unconstrained if it does not provide a market service and does not adversely impact the security of grid.

Specifically, the Rule changes should correct the current unintended consequence of current constraint equations turning down behind the meter connections of a semi-schedule generator when they are still a net load and not putting energy into the grid. For instance, in 2019-20, there was significant congestion (593 hours of constrained operation on the Central Queensland (CQ) – South Queensland (SQ) network) largely during planned outages that reduced the transfer capacity. During this time SMCs site was still a net load to the NEM with none of its generation flowing into the Powerlink network, but SMCs generation was still turned down and SMC was forced to buy energy from the grid.

For a consumer this is a suboptimal economic outcome when it has invested in technology to optimise its delivered energy cost by managing its NEM price exposure. The economic costs to the large-scale consumer investing in the behind the meter energy is a doubling of its electricity cost; once via sunk depreciation capital costs on its own site and once by buying electricity it didn't want.

This problem has arisen because traditionally scheduled and semi-scheduled generation has been treated as a market service for the purpose of the transmission constraint equations. The generation has all been allocated to one side of the constraint equation and loads on the other side across a bulk transmission area. This treatment distorts the true impact of semi-scheduled generation that does not supply the market because it is consumed behind the meter prior to the point of connection.

There is a technical solution whereby SMC could guarantee zero export. Even if this were implemented, the current application of the Rules would not accommodate it. This highlights an example of the growing divergence of the regulatory configuration from the technical solutions available to pursue the NEO.

The emerging market participants with large industrial load with behind the meter semi-scheduled generation to support its on-site energy consumption – a Hybrid Customer with an Integrated Resource System (HC) should be encouraged if the HC facilitates more economically efficient electricity supply. The HC should not be disadvantaged by the conventional treatment of the generation used on its site. The current Rule change proposal should ensure the constraint equation treatment of the generation that is not provided as a service to the market is not constrained when it purely supplies the load to which it is connected.

In addition, the proposed rule imposes a requirement for registration as a scheduled unit on a battery of five MW or more, which is inconsistent with treatment of similarly sized generators. In its recent draft decision on registration the AEMC saw no reason to apply a lower threshold than 30 MW for generators, yet in this Rule they propose a 5 MW threshold.

These aspects of the proposed Rules are detrimental to the long-term interests of consumers, as they limit the ability of industrial scale consumers to manage their loads cost-effectively and flexibly.

#### **Technical requirements applied to hybrid systems**

While it might be expedient to lump all forms of hybrid and storage systems together under the same classification of Integrated Resource Provider (IRP), and Integrated Resource System (IRS), this creates confusion in the drafting. This is particularly evident in the generator technical standards which have been extended to IRS, which leads to unworkable standards for loads within hybrid systems. Load within IRS need to be explicitly excluded from requirements of the generator performance standards.

#### **Transitional arrangements**

The proposed Rules require Registered Participants who are Customers and Generators, behind the same connection point, to be reregistered as IRPs. The Rules seem to be intended to target grid-scale batteries, but also captures loads that are Registered Participants which also have generation behind the connection point. SMC query whether this is intentional?

The transitional arrangements currently state that the changes are not intended to change connection agreements, but the connection agreements contain performance standards. The transitional arrangements need to clarify that existing Registered Participants' performance standards are not changed by this rule.

Set out in the table below is SMC's response to the Draft Determination. In addition to specific comments on the drafting of the Rules, SMC also make general comments regarding to the intent of this draft Rule change and its applicability to a subset of the IRP and IRS. "Hybrid Customers with Integrated Resource Systems" (HC) who are not providers (IRP) to the market are consumers from their connection point.

Draft Determination Proposed Change	SMC Response
<p><b>New Registration Participant Category</b></p> <p>The AEMC is proposing the creation of a new participant category – Integrated Resource Provider (IRP), with supporting categories for Integrated Resource System (IRS) comprising one or more Integrated Resource Unit’s (IRU).</p> <p>The definition proposed by the AEMC appears to be sufficiently broad to cover a range of hybrid and storage systems.</p> <p>There are two types of systems that are classified as integrated resource systems:</p> <p>The first contains one or more integrated resource units and possibly generating units. Example is a battery or a dc coupled hybrid solar-battery inverter system. Other connected plant could be a load. So, this category could include, for example a load, battery and solar farm.</p> <p>The second contains a load (other than an auxiliary load) and one or more generating units. It would include an industrial load with generation onsite, or a pumped storage system with separate pumps and generators.</p>	<p>The proposed new participant category needs to clearly separate out the treatment of facilities which are designed to provide resources and services to the wider system from consumers / loads that integrate behind the meter generation as part of their strategy to achieve the NEO. This Hybrid Customer with Integrated Resource System (HC) needs to be treated as a consumer / load except to the extent it provides services back into the system.</p> <p>The current nomenclature for this new proposed category is somewhat confusing. There is a risk that this will cause misinterpretation or inadvertent extension of the requirements beyond IRU’s or in some cases beyond generating units. There is a tendency in the Rules drafting to use the term integrated resource system in place of one or more integrated resource units.</p> <p>Loads, which form part of an IRS, might also be captured inadvertently by Rules intended for IRUs and generating units in an IRS.</p> <p>In addition, there is potential for confusion, or at least awkwardness, over the use of the term integrated resource unit (singular) for multiple generating units (eg. dc, coupled solar/battery hybrid) and calling multiple generating units (e.g., a solar farm) a generating unit in an IRP.</p> <p>The SMC load is not an electricity resource unit for the NEM. It follows that it, or a system like it, should not be construed as a service provider in this nomenclature.</p> <p>The SMC connection point is a hybrid customer whose purpose is to use its facilities and the NEM to meet the energy requirements of its value adding manufacturing.</p> <p>It would seem unlikely that AEMC were intending to have every system with a generator and load that is a Registered Participant be treated as a resource provider. This would have the effect of prioritising the convenience of regulatory/operator imperatives over the purpose of the energy system implied by the NEO.</p>

	<p>The AEMC should consider a new category called a Hybrid Customer (HC) where the site is primarily a load site for consumer purposes and the generation or storage is primarily for efficient energy costs management for the load.</p>
<p><b>Performance standards</b></p> <p>An IRP would have a single performance standard apply to its facility; however, this performance standard would reflect the technical and performance capabilities of each unit behind the connection point.</p> <p>To support the operation of this clause, the draft rule would amend Schedule 5.2 of chapter 5. Schedule 5.2 sets out the conditions for connection of Generators. Under the draft rule, the schedule would be extended to IRP's in respect of their integrated resource systems, integrated resource units, generating systems and generating units.</p> <p>Changes to the schedule in the draft rule include extending the technical requirements in S5.2.5 in order to apply to an integrated resource unit across its full range of operation, and in both consumption and production modes. The proposed changes are intended to recognise that the requirements applicable to an integrated resource unit in consumption mode will need to mirror (rather than replicate) the requirements applicable when in generating mode.</p>	<p>SMC's view is that this suggestion does not adequately consider the practical implications for a load. In particular, where that load is not a battery and has co-located generation.</p> <p>The use of the term 'integrated resource system' in various parts of 5.2.5A extends the requirements of various aspects of rule 5.3, and Schedule 5.2 beyond generating systems and integrated resource units. An integrated resource system can include scheduled or non-scheduled loads, as well as IRU's and generating systems.</p> <p>It is unclear whether this is intentional. Consideration of this aspect of the rule change requires scrutiny of each instance of the term <i>integrated resource system</i> in chapter 5 to validate its appropriateness.</p> <p>It appears that the simple addition of <i>integrated resource system</i> into various generator performance standards is not appropriate in the context of an IRS that is fundamentally a load with its own generating system.</p> <p>It is unreasonable to extend the generator performance standards to scheduled and non-scheduled loads that are part of a hybrid system. For example, it would be unreasonable to expect a load to provide voltage control (s5.2.5.13) or maintain its active power when the voltage drops to 0.9 pu (<i>continuous uninterrupted operation</i> and s5.2.5.4) or when the frequency is reduced (<i>continuous uninterrupted operation</i> and s5.2.5.3). The frequency stability of the power system relies on load relief (reduction) when the frequency drops.</p> <p>Not all generator performance standards are applicable to loads, for example in the overvoltage requirements for S5.2.5.4 requiring operation at 1.15 pu for 20 minutes. Many loads are voltage</p>

sensitive and may not even tolerate 1.1 pu or 0.9 pu continuously.

For a hybrid system, the inclusion of integrated resource system in the reactive power generator performance standards (S5.2.5.1). It suggests that regardless of whether the generating units in a hybrid system are operating, for the automatic access standard, the system should be capable of reactive power in the range 0.395 x rated active power of the integrated resource system.

Considering operation of the IRS when the generation is offline, this may conflict with existing requirements of a customer performance standard, which typically requires a reactive power 0.95 lagging to 1.0 (AAS for connection point voltages in the range 50 kV to 250 kV).

Nevertheless, there is some merit in considering the net impact of reactive power at the connection point, and what is required by the power system.

Care should be taken in implementing the current regulatory framework for performance standards not to encourage gold plating (at cost to participants, and ultimately to consumers) by insisting that participants meet automatic access standards, regardless of whether there is any benefit to the operation of the power system to do so.

An extension of the requirements to IRUs alone, seems to increase the performance requirements for storage systems compared with current requirements.

SMC strongly suggests that the AEMC takes careful consideration of the implications of each change to the generator performance standards for IRS and IRU, especially through the lens of hybrid customer.

The AEMC intends for hybrids to rewrite their performance standards as a single set of standards at the connection point, but it is very difficult to assess the impact of the new drafting on the performance standards. New requirements have been added, intentionally or inadvertently, and

	<p>because of the nomenclature, is it not clear that it doesn't capture loads that are part of an IRP.</p> <p>These changes could greatly complicate any change of registration to IRP. AEMC should consider specific requirements for the consumer / load market participant who has generation behind the system for its own needs – Hybrid Customer – reflecting the difference in the role of this participant with the role of an Integrated Service Provider servicing the NEM.</p>
<p><b>Unit level Constraints</b>  Constraints to apply to each generating unit or integrated resource unit within a hybrid system, where scheduling requirements apply, at the unit level.</p>	<p>The application of constraints to resource units within a facility that provides services is understandable.</p> <p>A Hybrid Customer is primarily focused on providing energy to the load via its own generation and the NEM. It is inappropriate for the constraint equations to be assessing the semi-scheduled generation in the Hybrid Customer in isolation from the load that it is servicing behind the meter. The constraint equations should consider the actual generation at the connection point being the net of the connected load and generation.</p> <p>In order to provide certainty to industry, AEMO is should write a procedure on how it would apply unit or connection point constraints to generating units, scheduled loads or IRUs in an IRP. There should be specific requirements on AEMO to acknowledge a Hybrid Customer that has generation that is focused primarily on meeting the associated / integrated load.</p> <p>SMC support the development of guidelines in the Rules about how AEMO is to approach this to ensure that every constraint does not simply become a unit constraint and behind-the-meter use of resources is respected unless it is injecting energy into the NEM in a manner that compromises the security of the system.</p> <p>Making every constraint a unit level constraint seems inconsistent with the intent of this Rule change and the NEO.</p> <p>SMC would support a more dynamic / granular system that supports the efficient and cost-effective supply to consumers over simplistic provisions that do not differentiate consumers from service providers to the system. The existing AEMC</p>

	<p>suggestion has the appearance of prioritising operator convenience over appropriate consumer driven objectives.</p> <p>Of some relevance are thermal constraints that depend on the flow on a cutset which should be considered as connection point constraints. This is achieved by considering the net flows from the Hybrid Customers connection point. There are other types of constraint, including voltage stability that are dependent on the flow on a cutset and should similarly be treated as Hybrid Customers connection point level constraints.</p> <p>AEMO must be able to justify any future position on constraint through the objective application of a transparent procedure and be subject to a decision review process to ensure that decisions are made in accordance with the intent of the Rules and the long-term interests of the consumers, per the NEO.</p> <p>Use of plant behind the meter to allow an IRP to meet the generator performance standards should be facilitated as part of this process. For example, a battery could be used to support a solar inverter-based generating system’s capability to meet the requirements of continuous uninterrupted operation under S5.2.5.4. The requirement of the battery to be dispatched should not prevent the use of this plant to provide active power to support the generating unit within the same connection point.</p>
<p><b>Compliance with Dispatch in Aggregate</b></p> <p>For an IRP with more than one scheduled resource, a new clause 4.9.2A would allow compliance with dispatch instructions in aggregate, except where AEMO has specified that unit level compliance is required.</p> <p>AEMO could specify in a dispatch instruction that a scheduled resource must operate with unit level compliance.</p> <p>AEMO would make a power system operating procedure specifying permitted forms of aggregate compliance by scheduled resources in hybrid integrated resource systems and arrangements for AEMO to specify when unit level compliance is required.</p>	<p>We note that the term “scheduled resource” is somewhat misleading as it includes semi-scheduled generation. SMC suggests that “dispatchable resource” is a more appropriate term.</p> <p>SMC supports this initiative but would like to see it broadened to work for the case of a Hybrid Customer with a single scheduled resource and a load. As the AEMC notes, many large industrial loads are building generation, as part of the energy transition to renewables. It would be in the interest of consumers to facilitate integration of appropriate self-supply and load through this mechanism, whether the hybrid system has one scheduled resource or many.</p> <p>The draft Rule could be improved by clarifying under what circumstances, and pursuing which principles,</p>



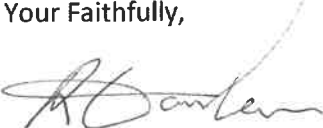
	<p>AEMO might invoke this process. Importantly, any specific instruction should be tested and validated prior to activation.</p> <p>If the load was of importance to a network constraint, it could also be forecast on a five-minute basis (similar to solar and wind). If the load were also forecast the compliance of the generator could be checked against the net output at the connection point less forecast load.</p> <p>We note that forecasting a load does not imply that the load is scheduled.</p> <p>As written, SMC would need to classify its load as scheduled and register as an IRP for this to apply. Currently there is only one “scheduled resource” behind the SMC connection point. The clause could apply if SMC builds a BESS (and is the registered participant).</p> <p>SMC believe this rule would be enhanced if it accommodated a single scheduled resource which enabled Hybrid Customers to supply its load at any level, except where dispatch compliance is required.</p>
<p><b>Transitional arrangements for Integrated Resource Systems (IRS)</b></p> <p>The draft Rule would require a Registered Participant who, immediately before the commencement of the Rule, is registered as:</p> <ul style="list-style-type: none"> <li>- a Generator in relation to an integrated resource system and</li> <li>- a Customer in relation to the same integrated resource system</li> </ul> <p>to apply to AEMO within 6 months of commencement of the Rule to change its registration category to Integrated Resource Provider. The draft Rule also suggests that an IRP would have a single set of performance standards.</p>	<p>The draft Rule proposes that hybrid systems and storage systems change their registration to IRP. SMC believes there should be a separate classification or at least a sub-class within the registration class for the Hybrid Customer which is a consumer that integrates load and generation behind its meter and is not a service provider to the NEM.</p> <p>SMC wish to acknowledge that this is different from the current arrangements where there is a Customer Performance Standard (CPS) and a Generator Performance Standards (GPS) for hybrid systems. It appears that the performance standards for IRPs differ from the existing standards for CPS and GPS which are captured in an existing registration.</p> <p>SMC is of the view that the changes resulting from this Rule change should <b>not</b> add or increase performance requirements for existing plant. There needs to be greater clarity in transitional arrangement in respect of this, to the extent that there is no question that the changes do no more</p>

	<p>than translate the existing performance standards into a new form, not additional requirements.</p> <p>SMC also note that any change to performance standards, even if limited to combining them into a single document, leads to additional and potentially material, costs for Participants. Participants required to make these changes should not be required to pay fees to Network Service Providers for any changes to performance standards, and connection agreements (in which the performance standards are recorded). This has particular relevance in the case of GPS and CPS which form part of existing registration and therefore are likely to change on transition to IRP.</p> <p>Put simply, there needs to be clear and inarguable statements in the Rules which specifically address:</p> <ol style="list-style-type: none"> <li>1. That there will no costs or charges from AEMO or from NSP's.</li> <li>2. Batteries are required to meet primary frequency response requirements when generating but not when charging.</li> </ol> <p>This may be affected in the Rule by including a statement that the requirements on Integrated Resource Systems in schedule 5.2 do not apply to loads in an Integrated Resource System.</p> <p>SMC has reservations about the benefit or advantage gained from this aspect of the Rule change. SMC cannot identify any benefit to participants with a similar profile to it.</p>
<p><b>Dispatch Bid</b>  Clause 3.8.6(g2) - A Scheduled Integrated Resource Provider's dispatch bid must specify the energy available for energy constrained scheduled integrated resource units for the trading intervals in the trading day.</p>	<p>This change is consistent with the treatment of energy constrained scheduled generating units.</p> <p>The dispatch bids for the generation in a Hybrid Customer need to be treated as a semi-scheduled generator and the dispatch volume should be the net position at the hybrid connection point.</p>
<p><b>Recovery of non-energy costs</b></p> <ul style="list-style-type: none"> <li>• uses two new data streams in non-energy cost recovery – adjusted sent out energy (ASOE) and adjusted consumed energy (ACE).</li> </ul> <p>Non-energy cost recovery would be based on a participant's gross energy flows, i.e., gross consumed energy (ACE) or exported energy (ASOE) during relevant intervals, rather than the category a participant is registered in.</p>	<p>SMC is supportive of this change and believe it can be enhanced by AEMC providing an impact analysis for various NEM participant types.</p> <p>In its Overview and Q&amp;A from August 2021, AEMC says (slide 15) that for an operator of a hybrid system registered as an IRP, with load and generation behind the connection point, the assessment would be on net output from the connection point.</p>

	The clarification suggests that if a hybrid has a net load at some times, and a net generation at others, it would be charged on the net load or generation in each trading interval (including net load and generation within each trading interval, not netted over the trading interval).
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SMC appreciates the opportunity to contribute to the consultation and Rule change process.

Your Faithfully,



Kathy Danaher  
Director, Sun Metals Corporation

