

Power System Security and Reliability Standards Review: System Strength regulatory incentives framework, Technical standards for hybrid systems, and Exposure Draft of ESM Amending Rules

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From: Smart Energy Council, Western Australia

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About this submission

The Smart Energy Council (SEC) is the national industry body for the smart energy sector. Our Western Australian members include utility-scale developers and operators, original equipment manufacturers, and developers in the 1 to 10 megawatt (MW) segment.

This submission responds to the Consultation Paper and the Exposure Draft of Electricity System and Market (ESM) Amending Rules, both published 20 August 2026. We treat them as one package, since the Exposure Draft implements the Information Paper outcomes and the Consultation Paper proposes measures operating on top of them.

It also draws on a consultative meeting between SEC and Energy Policy WA (EPWA) held on 11 September 2026. References below to "the consultative meeting" are to that discussion. Where we refer to positions put by EPWA we do so on the basis of our own record, and would welcome correction if we have misunderstood.

SEC is pleased that EPWA agreed to extend the closing date to 29 September 2026, allowing a single combined response. That has produced a better submission than two partial ones, and it reduces the burden on smaller participants least able to absorb parallel processes.

SEC's 2025 submission

SEC made a submission to the June 2025 Consultation Paper on 7 August 2025, setting out seven recommendations. We are pleased that several have been reflected in the review outcomes, in particular the calibration of the technical standards we raised:

- withstand Short Circuit Ratio (SCR): the split 2.0 and 3.0 thresholds became a single Minimum Access Standard of 3 or less;
- phase angle jump: the 20 millisecond requirement is now response initiation, not full suppression within one cycle;
- negative sequence: no grid-forming (GFM) specific standard imposed; and
- damping: framed as oscillation-neutral rather than prescriptive.

Centralised system strength procurement through the Non-Co-optimised Essential System Services (NCESS) framework, which SEC supported, has also been established. We continue to support it. Where this submission questions cost allocation under that framework, that is not a qualification of our support for the mechanism.

Four recommendations were not taken up, and this submission returns to each: financial incentives for GFM deployment; streamlined Generator Performance Standard (GPS) re-registration for grid-following (GFL) to GFM conversion; flexibility in control tuning for real grid conditions; and

participation by synthetic inertia providers in rate of change of frequency (RoCoF) and system strength frameworks.

Two were adopted in part. On hybrid systems, the Measurement Point alternative provides the flexibility on the point of compliance we sought, but the characteristics of the primary generator are not addressed. On damping, an oscillation-neutral framing was adopted but with a default 100 Hz upper limit whose basis is not explained.

Defining and safeguarding minimum system strength

The designation has no rule-level definition (Recommendation 1):

Proposals 1:1 and 1:4 both operate on regions "identified in the System Strength Report as having low system strength". That concept does not appear in the Exposure Draft, which defines only System Strength Shortfall at clause 4.5D.6, with the methodology deferred to a WEM Procedure. Since this designation determines whether a mandate applies and where a facility sits in the curtailment order, it should be defined in the rules.

Governance and timing. SEC supports the FPCG and welcomes the consultation pathway at clauses 4.5C.4 to 4.5C.6. Clause 4.5C.1 is, however, the whole of the establishment provision: the FPCG "is a group comprising representatives of the Coordinator, AEMO and Western Power". There is no obligation to establish it, no date by which it must exist, no appointment process, quorum, meeting frequency or resourcing provision. Clause 4.5C.3 requires terms of reference but sets no deadline.

At the consultative meeting EPWA explained that the rules must be made before the FPCG can be formalised and industry funds applied to its work. SEC accepts that constraint, but it sharpens the timing question: the FPCG must exist before a methodology can be agreed, the methodology before shortfalls can be identified, and shortfalls before the System Strength Report can be published, which is the trigger for everything in the Consultation Paper.

Transparency (Recommendation 2):

SEC welcomes EPWA's statement at the consultative meeting that minutes and communiques should be published in a timely manner, consistent with other forecasting reference groups. We ask that this be in the rules rather than left as an intention. The Exposure Draft requires no minutes, no publication of meeting papers or of a Coordinator determination under clause 4.5C.3(b), and no response to submissions. By comparison, the PSSR Standards Working Group and the Market Advisory Committee both publish papers and detailed minutes. Transparency should not decrease as the decisions become more consequential.

Shortfall magnitude (Recommendation 3). Clause 4.5D.3(c) identifies shortfalls by Transmission Node, so a participant can establish whether its node is affected. The quantified gaps, however, are reported aggregated by Facility Technology Type and by the lowest granularity region that does not disclose Confidential Information. A participant deciding whether conversion would resolve a shortfall needs to know its size. If confidentiality prevents disclosure, the Department should explain what alternative information will support that decision.

Do no harm and existing facilities

At the consultative meeting EPWA described the principle as having two elements: the network operator's overriding obligation to maintain security and reliability, and cost causation. EPWA described the position as confirming an existing expectation, that a new facility cannot create harm to the wider network **or other connected facilities** without remedying it, rather than as a change.

SEC does not dispute that characterisation, and the documents are consistent with it. The Consultation Paper refers to do no harm four times, each time as something already in place, and the Exposure Draft does not contain the word. Two points follow.

The provisions are not identified. No clause is cited in any of the four references. Participants are told an existing safeguard is sufficient without being told what it is.

The circumstances have changed. A do no harm obligation framed when the South West Interconnected System (SWIS) had substantial synchronous generation is being asked to carry more weight now that, as the 2025 Wholesale Electricity Market Electricity Statement of Opportunities (WEM ESOO) records, system strength is projected to decline sharply in several locations. The question is not whether the principle is changing but whether, unchanged, it remains adequate.

Does it already reach other connected facilities (Recommendation 4):

EPWA told us it covers harm to other connected facilities. The Consultation Paper describes it more narrowly, as avoiding adverse impacts on the network. Information Paper Appendix B records that Collgar Renewables sought to broaden the objective to include the stable operation of existing inverter-based resources (IBRs), and that the Department responded that the review did not identify a need to extend the Network Operator's obligations. Those accounts cannot both be complete.

This matters because fault level at a node is a shared property of the location. The SCR definition excludes the contribution of all Asynchronous Generating Systems, so IBRs do not count toward the fault level other IBRs rely on. As synchronous plant retires and further inverter capacity connects, the ratio between available fault current and the capacity depending on it deteriorates for every facility already there. An incumbent approved against the conditions prevailing at connection can find those conditions moved by the actions of others, and under Proposal 1:4 is then elevated in the curtailment order as a result.

Clause A12.9A.1.3 (Recommendation 5):

Separately, SEC supports the intent of this clause, which gives a facility certainty that it will not be in breach when conditions move beyond those it was assessed against. It is a compliance protection only, and creates no obligation on any party to prevent or remedy the degradation. Two drafting points: the clause is framed in SCR terms although Review Outcome 2.3 states the requirement is framed in system impedance terms consistent with the National Electricity Rules; and it operates by reference to an agreed Withstand Short Circuit Ratio that existing facilities do not have, with no transitional mechanism for establishing one.

Curtailment, alleviation and incentives

The alleviation obligation (Recommendation 6):

The obligation to remedy a shortfall appears once, in a list of conferred functions at clause 2.2C.1(cC). There is no operative provision setting out when the Network Operator must act, against what standard, within what period, or with what consequence for inaction. By contrast, section 4.5D runs to seven clauses prescribing AEMO's identification and reporting role. The framework is precise about identifying the problem and one line long about solving it, which is why curtailment currently has no failure condition.

Valuing curtailment (Recommendation 7):

Curtailment now carries the incentive load, and the Consultation Paper acknowledges that sustained curtailment may affect investment outcomes, risk allocation and financing. Nothing

measures that effect. SEC does not ask the Department to build a valuation methodology from scratch, because the machinery exists. Clause 4.5B.4(a) already requires the Transmission System Plan to report binding Network Constraints, their estimated market costs and Energy Uplift Payments, and clause 4.5B.4(b)(ii) now requires investment options addressing shortfalls. Extending clause 4.5B.4(a) to capture constraints and curtailment applied for system strength purposes would produce a published measure of cost and connect it to the investment options already required.

Financial incentives (Recommendation 8):

SEC's lead 2025 recommendation was for targeted financial incentives or procurement mechanisms, on the basis that the SWIS lacks the value signals that have driven voluntary adoption in the National Electricity Market. The Consultation Paper rejects all financial levers. SEC accepts that a full National Electricity Market style system strength charge would be difficult in a market of this size and does not press for it, but asks the Department to reconsider the broader conclusion for two reasons. First, its own reasoning, that charges alone are often insufficient and typically require complementary arrangements, is an argument for combining instruments rather than relying on one. Second, rejecting compensation for conversion where conversion is the lowest whole-of-system cost solution selects the instrument that avoids a payment over the one that minimises system cost.

Grid-forming requirements and curtailment prioritisation

Consultation questions 1(a) and 1(b)

SEC does not oppose mandating GFM standards for new Electric Storage Resources in locations with identified or forecast shortfalls. Targeted requirements are preferable to a blanket obligation. Our support is qualified because the designation is undefined, the modelling is unpublished, and the commitment test is inconsistent with the Exposure Draft.

Commitment test (Recommendation 16):

The Consultation Paper proposes R0 GPS registration or entry into a standard access contract. New clause 3A.5.1A adopts a different test for changed Technical Requirements generally: assessment against the requirements in force at the time of assessment unless an Arrangement for Access has been executed. Executed access is the later and higher bar, and projects between the two tests are protected under one and exposed under the other.

Prioritisation (Recommendations 9 and 10):

SEC notes EPWA's assurances at the consultative meeting that existing facilities remain compliant with their registered GPS, that conversion is not required retrospectively, and that the arrangement is transitional. Three matters remain. EPWA explained that the order distinguishes facilities with the capability to convert from those without, but Proposal 1:4 item 2 is drafted without reference to capability; if capability is the test it needs defining, including how it is assessed and contested. Nothing places a term on the framework or ties it to resolution of the shortfall, so "transitional" has no end point. And item 2 places compliant Electric Storage Resources ahead of facilities in breach of the EMT model requirement at item 3, which is difficult to reconcile with the stated aim of discouraging non-compliance.

Conversion cost and re-registration (Recommendation 11):

At the consultative meeting EPWA advised that GFM conversion is generally a low-cost firmware upgrade. That proposition underpins the self-funded pathway, the fairness of elevated curtailment,

and the conclusion that compensation is unnecessary. SEC asks that the evidence base be published, disaggregated by inverter vintage and manufacturer.

Cost is only half the question. SEC's 2025 submission raised multi-year GPS registration delays and sought streamlined re-registration for GFL to GFM upgrades. That recommendation matters more now, because curtailment priority turns on whether a facility has converted. A firmware upgrade that is technically simple is not commercially simple if it reopens an approved GPS for a period measured in years, during which the facility remains unconverted and exposed to curtailment for a delay it does not control. The Consultation Paper contemplates a streamlined, low-cost assessment process for control settings changes at section 5.2; the same reasoning applies with greater force to conversion.

Industry experience indicates that the inverter operating-mode change itself may be relatively straightforward, but the end-to-end conversion is not. A facility may need to modify and re-register its GPS, undertake external power-system studies, obtain Western Power and AEMO review and approval, revise protection and control settings, secure original equipment manufacturer support, revisit warranties and repeat hold-point or commissioning tests. Indicative external costs can be around \$200,000 for a facility, before allowing for internal resources, delay, lost availability during testing or any required hardware change or oversizing. Conversion may be particularly difficult for older equipment where manufacturer support is limited or no longer available. These costs and timelines are material for operating facilities that have already passed GPS and R2-equivalent testing in GFL mode, and can also affect new projects that are already advanced in the connection workstream when a location is identified as having an SCR below 3.

Cost allocation (Recommendation 12). At the consultative meeting EPWA advised that costs would flow to causers rather than consumers. Information Paper Appendix B states, in response to both SMA and Synergy, that NCESS contract costs are recovered through network tariffs and shared with all network users. SEC asks the Department to reconcile these. If cost causation is to apply, the mechanism is not apparent in the Exposure Draft and none is proposed.

Proportionate treatment of smaller facilities

Recommendation 13:

SEC notes EPWA's receptiveness at the consultative meeting and its agreement that smaller applications should not attract the same per-application costs as large facilities. We make the case as invited.

The formal thresholds are not where the burden falls. The Technical Requirements apply above 10 MVA and the EMT obligation at 10 MVA and above, so the 1 to 10 MW segment sits below both. It is affected because connection processes and control and communications requirements designed for utility-scale plant are applied largely unchanged. Members report application processing costs in the order of \$1 million across three microgrid projects, including communications requirements disproportionate to the outcome sought. Because process cost is largely fixed, the burden per megawatt rises sharply as project size falls, and where these projects serve customers directly that cost passes through.

Proposal 4:1 contains no size threshold, so the same disproportionality will apply to the expanded control settings power if delivered through existing approaches.

This segment can often deploy GFM at low incremental cost and is frequently located in the weak and fringe parts of the network where the 2025 WEM ESOO identifies system strength declining. It is also the least represented in the record: the 11 and 18 submissions to the December 2025 and June

2025 papers came predominantly from utility-scale developers, incumbents, manufacturers and system bodies.

SEC asks for a proportionality principle in the ESM Rules, a streamlined pathway and cost arrangements for facilities below 10 MW, assessment of scalable implementation options including cloud-based inverter control, and a size threshold or express proportionality requirement in the WEM Procedure under Proposal 4:1.

Electromagnetic transient models

Consultation questions 3(a), 3(b) and 3(c)

Recommendation 14:

SEC supports the objective, and welcomes the cost reimbursement mechanism at Proposal 3:2. SEC notes EPWA's clarifications at the consultative meeting that the obligation applies at 10 MVA and above, that requests will be staggered by system strength impact, and that not all facilities will necessarily be required to produce models. Those clarifications should be in the rules: as drafted, Proposal 3:1 permits staging but does not require it, and the criteria EPWA described appear nowhere.

SEC asks for the staging and prioritisation criteria to be placed in the rules or procedure; a definition of reasonable costs covering model development, validation, physical testing and any outage required, with a dispute pathway; and a reasonable endeavours pathway for legacy facilities that cannot obtain a model because of manufacturer exit, undocumented control systems or intellectual property restrictions.

On question 3(c), SEC does not support curtailment for non-compliance absent that pathway. A facility that cannot obtain a model because its manufacturer no longer exists is not exhibiting the behaviour the framework is intended to discourage, and under Proposal 3:3 would face both a civil penalty and curtailment for a circumstance it cannot cure.

Control settings

Consultation questions 4(a), 4(b) and 4(c)

Recommendation 15:

SEC supports the distinction between registered capability and operational settings. We are less comfortable with the scope of the power relative to the detail provided: the circumstances, triggers and consultation requirements are all deferred to a WEM Procedure that has not been drafted. It should be published for consultation before the enabling rules are made.

SEC's 2025 submission also recommended that control tuning be allowed to reflect actual fault levels unless strong justification exists for worst-case testing. Review Outcome 2.2 retains the principle that compliance settings should be the operational settings and defers alternative settings to further work. The two questions are connected: a framework allowing Western Power to require settings changes should also provide a pathway for a participant to hold settings tuned to conditions at its site. We ask that both be consulted on together.

In response to question 4(c), the framework should address warranty and manufacturer support, liability where a mandated change contributes to a failure or adverse interaction, lost output, implementation and testing costs including outages, and coordination where changes are made across multiple facilities. It should also address the interaction with the curtailment order: a

mandated change taking a facility outside its Registered GPS would appear to place it at item 1, and a facility should not face elevated curtailment for complying with a direction.

On question 4(b), the scope should be confined to settings that can be changed safely within the facility's registered capability and without altering plant design, protection coordination, equipment ratings or warranty conditions. The WEM Procedure should identify the settings in scope exhaustively, distinguish control settings from protection and performance settings, and require a GPS modification where a proposed change would alter registered performance or require new modelling or testing. Protection settings that affect personnel safety, equipment integrity or network protection coordination should not be changed through an operational direction alone.

Hybrid systems

Consultation questions 2(a) and 2(b)

SEC supports clear guidance for hybrid configurations and early classification at R0. Two matters warrant attention.

The reference operating mode drives the design. Table 3:1 identifies Mode 5, low state of charge with high active power export, as the likely reference qualification case. If that mode governs, proponents choose between oversizing storage, accepting state of charge floors and reserved headroom that reduce revenue, or losing GFM classification for the integrated facility, which may not be available where GFM is mandated. SEC asks how the reference mode will be selected and whether operational constraints can substitute for physical oversizing.

The issue is especially acute for solar-charged long-duration storage. A low-state-of-charge, high-export reference case can require additional energy capacity, inverter oversizing or permanently reserved headroom that is rarely needed in normal operation but materially reduces duration, dispatch flexibility and revenue. Assessment should allow enforceable operating envelopes and energy-management controls to demonstrate compliance where they deliver the same system outcome.

GPS structuring should default to the simplest workable form. Table 3:2 Case D makes multiple Registered GPSs the default for retrofit, multi-manufacturer and independently dispatchable configurations, which describes a large share of co-location projects in Western Australia. SEC asks that a single Registered GPS supported by structured annexures be the default, with the burden of justifying additional layers resting with the assessor.

The primary generator. SEC submitted in 2025 that hybrid requirements should reflect the characteristics of the primary generator. The Measurement Point alternative delivers flexibility on the point of compliance, but this element is not addressed. We ask the Department to confirm how it is reflected.

On question 2(b), SEC is not satisfied that the Relevant Generator Modification process in Chapter 3A has been demonstrated to be sufficient for retrofit configurations. It should be supported by a proportionate and time-bound pathway that does not unnecessarily reopen settled aspects of an existing GPS, accommodates a single integrated GPS with structured annexures, and recognises the practical constraints of multi-manufacturer and independently dispatchable plant. The Department should publish worked examples covering common retrofit and long-duration storage configurations before finalising the framework.

Participation by non-synchronous providers

Recommendation 17:

SEC's 2025 recommendation that synthetic inertia providers participate in RoCoF and system strength frameworks was noted but does not appear in the Information Paper outcomes or the Exposure Draft.

Beyond confirming NCESS as the procurement mechanism, the package does not address how non-synchronous capability is specified, valued or contracted, nor how a battery providing system strength support is treated relative to a synchronous condenser delivering a comparable outcome. This connects to the case study limitations below: AEMO represents GFM voltage waveform support through an equivalent fault level contribution precisely because the SCR metric cannot express it, and assumes zero contribution to the minimum three phase fault level. If the metrics defining a shortfall cannot express what non-synchronous providers deliver, those providers will be disadvantaged in procurement regardless of policy intent.

This is also a remuneration issue. If the current shortfall metrics cannot show the contribution of a GFM battery, that limitation may flow directly into how batteries are specified, compared and paid under NCESS system strength procurement. Procurement evaluation should recognise voltage waveform support and other system-strength capabilities delivered by storage, rather than defaulting to synchronous fault-current metrics that assign those capabilities no value.

Evidence base and remaining matters

Case studies (Recommendation 18):

SEC notes the limitations properly disclosed in Appendix A: an interim, ad hoc methodology; GFM assumptions drawn from Transgrid and VicGrid applied as a static boost factor of three; a fault level contribution representing voltage waveform support rather than a physical increase; and an assumed zero contribution to the minimum three phase fault level. AEMO's conclusion is that the studies demonstrate voltage stability only, and that further assessment is required on fault current adequacy for protection systems.

That has a direct consequence given the two-limbed definition of System Strength Shortfall. A participant may convert at its own cost, satisfy the sufficient level limb, and remain within a shortfall on the effective level limb. Whether conversion resolves a participant's exposure therefore depends on which limb drives the shortfall at its node, which returns to Recommendation 3. The case studies assume conversion of 2,400 MW and 11,900 MWh across six terminals, and SEC asks that the supporting analysis be published before the mandate is settled.

Reserve Capacity Mechanism. Nothing in the package addresses how curtailment applied for system strength purposes interacts with capacity credit assignment, Reserve Capacity Obligations or availability requirements. A facility curtailed under Proposal 1:4 may face consequences under the Reserve Capacity Mechanism for a constraint imposed on it.

Sequencing. The Exposure Draft implements the Information Paper outcomes only, with no provisions on curtailment prioritisation, EMT models, control settings or hybrid systems. SEC asks the Department to confirm the timetable for a second Exposure Draft and that industry will have the opportunity to comment on that draft rule text before those rules are made.

Summary of recommendations

1. Define a low system strength region in the ESM Rules, and confirm the quantitative threshold, who sets it, and when it is published.
2. Require the terms of reference to provide for publication of meeting papers, minutes and communiques, publication of any Coordinator determination with reasons, and a published response to submissions on the methodology.
3. Require the System Strength Report to disclose the magnitude of each shortfall at the affected Transmission Node.
4. Identify the provisions that constitute the do no harm provisions, confirm whether they require a connecting proponent to remedy an adverse effect on facilities already connected at the same node, and if they do not, amend them so they do.
5. Correct clause A12.9A.1.3 so it is framed in system impedance terms, consistent with its stated rationale, and provide a mechanism for existing facilities to establish an agreed Withstand Short Circuit Ratio.
6. Give the alleviation obligation in clause 2.2C.1(cC) operative content, with a trigger, a timeframe and a standard.
7. Extend clause 4.5B.4(a) so the Transmission System Plan reports the market cost of constraints and curtailment applied for system strength purposes.
8. Reconsider targeted financial incentives, or explain why curtailment alone is expected to succeed where the Department has found charges alone insufficient elsewhere.
9. Define "capability to convert" for the curtailment prioritisation order, and place a defined end point on what EPWA describes as a transitional arrangement.
10. Reverse the ordering of items 2 and 3 in the curtailment priority, so compliant facilities are not curtailed ahead of non-compliant ones.
11. Publish the evidence base for the proposition that GFM conversion is a low-cost firmware upgrade, including the full costs of GPS modification, modelling, approvals, testing, outages, warranty changes and any hardware works, and deliver a time-bound, low-cost GPS re-registration pathway before conversion is treated as a reasonable expectation.
12. Reconcile the statement that system strength costs will flow to causers with the Information Paper's confirmation that NCESS costs are recovered through network tariffs.
13. Introduce proportionate treatment for facilities below 10 MW, so per-application costs and communications requirements scale with system impact.
14. Place the staging and prioritisation of electromagnetic transient (EMT) model requests in the rules, define reasonable costs with a dispute pathway, and provide a reasonable endeavours pathway for legacy facilities.
15. Publish the WEM Procedure governing control settings changes in draft before the enabling rules are made, and resolve the alternative settings question alongside it.
16. Align the commitment test for the GFM requirement with clause 3A.5.1A, or explain the difference.
17. Confirm how non-synchronous providers, including synthetic inertia and GFM batteries, will participate in and be valued under RoCoF, system strength and NCESS procurement frameworks.

18. Publish the analysis supporting the scale of conversion assumed in the case studies before the mandate is settled.
19. Clarify the treatment of involuntary system-strength curtailment under capacity certification, testing, availability, Reserve Capacity Obligations and associated capacity payments, so facilities are not penalised twice.
20. Establish a proportionate, time-bound Chapter 3A pathway for hybrid retrofits, supported by worked examples for multi-manufacturer, independently dispatchable and long-duration storage configurations.