Now in its fifth iteration, the Integrated Systems Plan (ISP) continues to provide the structure and logic for the energy transition, both its reporting foundation and its approach to risk management.

My concern with the current draft ISP is that in this fifth iteration, the transition is at an inflexion point, and that the importance of this moment is not adequately considered. Rather than acknowledge the importance of this moment, the Draft ISP takes a business as usual approach to demand, supply and future power systems, ignoring the fundamental change in the demand and supply paradigm that is occurring. While much of the necessary language exists in various parts of the Draft ISP, their fragmented nature means that the Draft ISP' won't appropriately consider the opportunities that this significant moment presents.

The arrival at this inflexion point and the acknowledgement of this monumental achievement should be the framework for the ISP initiating a discussion of what this moment means for the next stages of the transition should be the focus of the Draft ISPs deliberations, but it is not so. , Some of the achievements that should be central to the Draft ISP's deliberations, I have listed below.

1. Renewable energy generation is now supplying 50% of demand.
   This is occurring despite significant curtailment, which means that this supply ratio does not include the curtailed amount, indicating the potential ratio of renewable supply could indeed be much higher.
2. As the solar component of renewable generation is necessarily daytime generation only, logically the daytime generation ratio of renewable generation is much higher than the overall 50%. That daytime demand is now largely met by renewable generation means that it is a proven and stable supplier to the grid and importantly as curtailment occurs during the day this means that renewable generation is likely greater than demand. This must be a foundational premise of the Draft ISP, and yet it is not.
3. The daytime excess means that the remaining problem that the ISP needs to resolve is not generation over a 24-hour period, rather the remaining problem is limited largely to evening and nighttime generation. This is a limited problem rather than a whole of system problem and this should be discussed as such in the Draft ISP.
4. The critical problem of storage needs to be rethought. The large amount of curtailment needs to be discussed as an opportunity to incentivise storage, but it continues to be discussed as a stability problem in the ISP.
5. With the huge amount of storage being built in the distribution grid following the Government's rebate, there is a challenge to the prevailing logic that only the transmission grid can transport and deliver electricity. This challenge is an existential issue for the future power supply and should be considered as an opportunity to reduce capital investment. Ignoring it is likely to heighten future instability.

The ISP invests deeply in the traditional theories and possibilities of top down co-ordination of supply, but it does not consider deeply enough the opportunity for co-ordinating two-way supply, i.e. bottom up and top down. Given the impact of the Government's battery rebate on storage possibilities in the distribution grid, it is imperative that a discussion on this is included in the final ISP. The enormous impact of a distributed Hornsdale size storage being built every three days after the rebate program beginning, is changing the demand and supply assumptions that underpin the ODP's response. Such significant changes to demand and supply need to frame the discussion around what opportunities the transition is now ready to deliver in grid structure and pricing.

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Further the theory of the ISP needs to evolve to incorporate what has been achieved and what these achievements enable. This inflexion point is not addressed in the Draft ISP and must be incorporated within the final ISP for this iteration of the ISP to maintain its relevance to the transition process.

The management of electricity supply risk preoccupies the ISP, yet a deeper look into the risk profile suggests that the ISP is seeking to resolve this by securing energy storage at the top of the grid's energy flow which perpetuates the existing fossil fuel paradigm when supply and storage were inseparable concepts. Renewable energy supply necessitates that these two concepts now must be managed separately and this thinking opens new possibilities. The advent of battery storage at a viable price and scale should demand that the value and opportunity that this separation allows gains much greater focus than the ISP and the IASR give to the ODP. Critically it gives the ISP the opportunity to redesign the grid's structure relatively cheaply and efficiently, an opportunity that the business as usual approach of the Draft ISP ignores.

The supply logic for the electricity grid is unsurprisingly based on the existing fossil fuel model where storage can only exist at the beginning of the generation journey. Storage volumes, measured in coal and gas reserves and hydro dams which are large scale reserves which can be turned into electricity on demand but with the subtlety of a firehose. This logic is being perpetuated in the ISP with its focus on valuing and measuring utility scale generation and storage, opportunities for grid evolution from renewable generation are being missed by not being considered.

The supply paradigm based on renewable generation must be viewed differently as storage is functionally separate from generation and as renewable generation does not occur on demand, generation needs to be captured when it occurs by storage mechanisms such as batteries. The opportunity for distributed generation and storage to reduce infrastructure costs is considerable. Critically, with battery storage possible at all points of the grid including the distribution grid, the supply paradigm can be controlled in a more granular fashion that can vastly reduce wastage.

In both cases the ISP, much as it does now, can measure, plan and structure storage, but by utilising the second paradigm of measuring storage separately from generation it can redesign the grid so that generation sustains the required storage rather than storage sustaining generation. This is a much simpler task than trying to predict measure, plan and structure generation. This change of perspective to storage first, generation second would have significant advantages for the grid's future.

i. There would be a defined measure of need which would enable a realistic price for building the new grid. Reducing the possibility of over investment.
ii. Acknowledging storage throughout the transmission and distribution grid into the overall grid structure would allow generation to be scoped according to need, and as demand grows storage could be more simply added.
iii. Simplifying costing and pricing would allow much greater flexibility for the future grid as it would enable the myriads of generation possibilities that will be invented to be more easily costed and integrated into the grid.
iv. Enabling distribution grid storage would reduce many of the demand predictions that underpin the IASR's current assumptions, enabling existing generation to better support future growth such as Data centres.

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With the upsurge of battery installation following the Government's battery rebate, it is valid to argue that from a risk management perspective, AEMO's greatest risk is no longer supply, rather it is failing to recognise this inflexion point and not seeking to incorporate domestic storage within the grid's logic.

With the above in mind, I am pleased to give my responses to questions, 1,3, and 4 below.

1. AEMO has proposed an ODP that represents a mix of investments that help deliver a reliable, secure, and least-cost power system while also meeting government policy targets. Do stakeholders agree with AEMO's optimal development path selection in the Draft 2026 ISP? If yes, what gives you that confidence?

If not, what should be further considered, and why?

AEMO's optimal development path needs further consideration.

In its current form, the ODP is not structured to deliver a least cost power system, and this issue threatens its ability to deliver a reliable, least cost and secure power system. This is because the Draft ISP fails to consider the breadth of possibilities that the transition offers.

The ODP is written with a business as usual approach, maintaining the existing structural philosophy while sidelining the very evolution of power generation that the ODP was setup to embrace and champion. In following this business as usual approach AEMO fails to utilise the tools that it has in the ISP and the IASR to challenge its own *de facto* thinking and logic. This failure begins with not understanding the significant role that the three scenarios play in its design logic.

In the reporting and analytical structure that AEMO has constructed with the IASR informing the ISP to produce the ODP, the fundamental impact that the three scenarios have in the ODP's outcome is significant and yet rarely questioned. The three scenarios represent the range of options to be considered by the IASR, but nowhere can I see in the three scenarios where they question, what the optimal structure for a future grid might be. Rather the scenarios are structured with the *de facto* assumption that the current grid structure is optimal. This failure to question its own assumptions limits the scope of the scenarios and is a fundamental flaw in the design of the IASR, the ISP and ultimately diminishes the results of the ODP.

To avoid hard baking poor design into the future power system, the new generation and distribution paradigm that is emerging, under renewable energy supply, needs to be considered now and not in a future iteration of the ISP. Concepts like those listed below need to be brought into the core thinking of the ODP.

i. the separation of generation and storage and the possibilities this could enable
ii. the potential for distributed storage in the distribution grid to impact on
    a. demand projections
    b. supply options
    c. required capital investment in the Transmission grid
    d. reducing the likelihood of stranded assets
    e. simplifying connections for new generation opportunities
iii. generation requirements to support time of day shortages in assessing new projects

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Traditionally the grid, operated by AEMO, has had the monopoly on electricity supply, but this assumption is no longer valid. This means that AEMO has the choice to fight to maintain its monopoly by excluding these producers/consumers or incorporate them into the future grid's design. Without acknowledging the vast amount of distributed storage being built and that many consumers now have alternative supply options the ODP is not treading an optimal development path and so being able to consider the above concepts is of critical importance to a successful ODP outcome.

The outcomes from such consideration might be debatable, but if the ISP continues to focus its risk management approach primarily on solutions that maintain its monopoly position on supply, then it is likely that costs will escalate, social license will deteriorate and consequently supply instability will escalate.

The risk management approach to our future power system needs to include new thinking.

As stated above, while the ISP has identified storage as a risk, its current solution to derisk storage is to go back to the known paradigm, thereby locking in the use of fossil fuels as back up storage. In using fossil fuels to derisk the grid, the ISP is effectively undermining its own stated aims for the transition, by slowing the transition down and by requiring the grid structure to depend upon coal and gas generation.

Again, the inflexion point of the transition is upon us, and consequently it is incumbent on AEMO to ensure that a thorough debate throughout the IASR and the ISP challenges its own premises to ensure that the ODP achieves the best result possible.

3. For the Draft 2026 ISP, the tested sensitivities were on constrained delivery of the ODP, variations on the gas development projection, and the pace of coal closures. The effect of demand-side factors was also tested by assessing the impact of reduced energy efficiency measures, and no further CER coordination.

> What other sensitivities should be considered to further test the robustness of the candidate development paths, and why? What other sensitivities are relevant to testing robustness of investment decisions, why?

Furthering the discussion above, the critical sensitivity that needs to be added is what if CER surpasses expectations and in doing so changes the demand and supply equations upon which the ODP is premised.

While the impact of the government battery rebate was not known at the time of writing the draft ISP, the possibility that it may have a significant impact was not considered. In not considering even a watch and act option for any impact that it may have, a significant error in planning occurred. The uptake of the rebate and the rapid pace of battery installations has many implications on demand projections, and a continued lack of inclusion threatens the viability of any ODP conclusions.

The sensitivity testing is based on assumptions that reflect 20th century thinking and refrains from testing new and viable possibilities that the developments of the 21st century have allowed. The thinking that the current sensitivity testing doesn't challenge but needs to, is as follows:-

i. Whether the current grid structure is optimal.

ii. Distributed storage is a rounding error.
iii. Distributed generation cannot be managed except by curtailment.
iv. Significant electron generation can only occur at the headwaters of the transmission grid.
v. The basis for wholesale pricing.
vi. The basis for retail pricing.
vii. Managing the shortage and excess discussion using a more granular time of day analysis rather than a simple macro calculation.
viii. The impact of distribution level storage on maximal flow in the transmission grid.

The impact of not challenging these assumptions is likely to lead to missed transformation opportunities, over investment and higher pricing.

The community and bureaucratic anxiety that is leading to the conclusion that gas development projects are necessary needs further consideration. It is reasonable to assume that it is demand assumptions that lead to this anxiety, but it is disappointing that the calculations creating this anxiety do not now include the huge volume of distributed storage being installed in the distribution grid and the impact that this will have on both demand and supply assumptions. The direct impact of this oversight is seen in the recent RBA interest rate decision, where despite current evidence that renewables are starting to reduce electricity prices, the tone of AEMO's rhetoric and future assumptions has convinced the RBA that electricity prices will be going up.

In the scope of this submission a detailed exploration of points i-viiI is not viable, however some headlines points for consideration are

i. Whether the current grid structure is optimal.
The growth in distributed generation and storage needs to be considered in system design as it challenges the top down firehose approach upon which the grid has been built. The creativity in grid structure that distributed generation and storage all along the grid offers needs to be valued rather than denigrated both in language and in engineering options. Distribution and redundancy are a core facet of the worldwide web's success, in securing it and stabilising it. Such a philosophical approach does have merit in electricity supply and needs to be considered.
ii. Distributed storage is a rounding error.
Figure 1 in the ISP has distributed storage as a minor player in our future grid. This is not realistic in terms of what is currently being installed and the role that it can play in the future.
iii. Distributed generation cannot be managed except by curtailment.
Curtailment is constantly discussed as the best option for excess daytime generation by rooftop solar and for that matter grid scale solar. This perpetuates the myth that storage of solar generation is somehow different to gas storage. Storage is simply storage, the main difference between gas storage and battery storage lies in the philosophy of grid design.
iv. Significant electron generation can only occur at the headwaters of the transmission grid.
In the future power system paradigm, electricity generation can and does happen anywhere, and in significant volumes. Fig 1 of the ISP suggests that rooftop and grid scale solar will underpin the future power system, but the ISP only discusses grid scale

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storage of solar generation in any depth. The current ODP does not measure the opportunity of storing rooftop solar, and in not measuring it, it does not value it.

v. The basis for wholesale pricing.
Wholesale pricing is decided by demand on electron flow in the transmission grid. For this reason, the value of electron flow in the distribution grid is currently problematic for wholesale pricing to embrace, and yet it is having a significant impact upon wholesale pricing. The basic promise of generation profitability is being challenged by the abundance of rooftop solar. This needs to be acknowledged and accounted for.

vi. The basis for retail pricing.
The basic market principles of supply and demand do not apply in retail electricity pricing. High daytime prices when there is surplus supply and low nighttime when there is challenged supply is counter intuitive. Challenging the pricing structure to be more market based would smooth out many of the inconsistencies with which the power system struggles.

vii. Managing the shortage and excess discussion using a more granular time of day analysis rather than a simple macro calculation.
Rooftop solar along with grid scale solar mean that there is no daytime generation shortage. The complexity in enticing new generation into the power system is how to incentivise it, so that it can generate for need. Much of the curtailment problem is based on coal's requirement to continuously generate rather than generate as needed. Gas is clearly better at this problem, but as said earlier, gas is useful as a flexible storage option and needs to be correctly understood as such. Its value to a future power system needs to be compared to other storage options.

viii. The impact of distribution level storage on maximal flow in the transmission grid.
With the new ability to store large amounts of electrons in the distribution grid, demand on transmission should be able to be flexibly managed to reduce the moments when demand exceeds the transmission grid's ability to supply.

Pricing logic is not mentioned throughout the ISP, and the future of pricing needs deep consideration. Current electricity pricing does not follow a standard supply and demand model and given the complexities of contract pricing into the future, the cost impact of not addressing this could be significant.

AEMO needs to reconsider the assertion in the Step Change scenario that Australians do not want to participate in VPPs. The potential for change is demonstrated in the rapid uptake of distributed supply technology such as Amber electricity's offerings. This rapid uptake challenges the scenarios basic premise, indicating that rather than a reluctance to participate, it is the nature of the participation that is the issue. Pricing of distribution grid generation is fundamental to this confusion and the IASR needs to consider what would happen if DER coordination was appropriately incentivised.

4. For the first time, AEMO has assessed opportunities for investment in distribution networks across the NEM, that are consistent with the efficient development of the power system, to support operation of consumer energy resources. This recognises the key role of distribution networks in supporting the integration of consumer energy resources. See Appendix A9 for more information.

Does the ODP appropriately identify and leverage distribution investment opportunities?

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For the ODP to appropriately identify and leverage distribution investment opportunities there needs to be a deep rethink of the potential role that the distribution network can play in ensuring a stable grid. Much of what I have written in the previous sections applies here. We are at an inflexion point in the transition and this inflexion point needs to be appropriately recognised.

The discussion in Appendix 9 lacks ambition and fails to recognise the distribution grid's greatest potential advantages for the transition, promoting innovation, speed to market and increasing social license.

Below is the assumption which the IASR set up for this query. (p37 Appendix 9).

> - The 2026 ISP shows the value of VPP-only coordination to be $3.1 billion (in real June 2025 dollars). This figure is slightly lower than the equivalent 2024 ISP figure because the 2026 ISP forecasts (as outlined in the 2025 IASR) anticipated fewer consumer batteries than the 2024 ISP, and the scenario parameters assumed a lower volume of consumer VPP adoption. More information on the forecasts is in the 2025 IASR.

The commentary in the Step Change scenario is that consumers are reluctant to share their batteries with VPPs. Putting the two together describes a low impact consideration of CER and the potential impact of DER for the grid's future and this is what pervades the thinking in the ISP and the proposals in the ODP. This point of view is in stark contrast to the overwhelming public response to the Government's battery rebate scheme. The two couldn't be more different and the IASR, the ISP and ultimately the ODP need to decide which view will most colour their response. The inflexion point is here.

Missing in the discussion on the investment opportunities in the distribution grid are a few salient points. The Australian community's evident pent up demand for engagement in the power system needs to be valued, planned and accounted for, the incalculable value of social license that would follow from engaging with CER, the innovation value due to harnessing dispersed supply opportunities and the reduction in required investments and a consequent reduction in the risk of stranded assets.

The transformation that is now occurring needs to be acknowledged as fundamental to this question. If it is not, then few of the assumptions upon which the ODP is based will be validated.

The Draft ISP was written prior to the battery rebate taking effect, however the potential for battery deployment was not adequately accounted for in the IASR. Four million households with rooftop solar and only a couple of hundred thousand with batteries showed the potential for batteries to reduce demand, increase storage and reduce infrastructure build. While Appendix 9 demonstrates the potential value of investing in distribution networks, the lack of detailed analysis when there is so much information available from so many sources to quantify this, is a missed opportunity. For the transition to be a success, opportunities need to be considered and discussed before they are discounted. The potential for the distribution grid has not been properly considered.

While the current findings in Appendix 9 are a start they are at best anaemic. The possibilities that are missed include but are not limited to the distributions grids potential to heighten innovation and technology development, to increase social license and to have social impact, to maximise investment savings and minimise structural change, briefly described below.

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- Innovation in managing distributed energy is already in motion, with technology exports occurring, however the knowledge and expertise that would be developed in transforming grid design from a fossil fuel logic to a renewable logic would put Australian innovation and thinking at the forefront of the world's energy transition in more ways than simply the amount of rooftop solar. Learning to utilise this in a whole of grid concept would be truly transformative.
- Social license is broadly seen as important to the transition, but there is no real discussion of what it means. When discussed at all, it is generally expressed in an apologetic framework, as though the transition needs to constantly say sorry for happening. The language throughout needs to change to embrace the opportunity, and investing in the distribution network is key to this.
  The public's response, initially to rooftop solar incentives and now to the battery rebate reflects the public's enthusiasm for the transition and with this the potential social license that the transition can enjoy. Compare this with the public's reaction to the complex discussions of new transmission lines and offshore wind projects. These discussions are fraught and challenging and so are debated in zones where the transition does not enjoy social license. Understanding the subtle difference between utilising an enabling agenda for the transition, one that is associated with the distribution grid and an enforcing agenda for the transition, one that focusses primarily on utilising the transmission grid, upon social license is required by the ISP. Appendix 9 does not acknowledge the potential for the distribution grid to promote social license for the transition.
- The differential in implementation time between developing the distribution grid and the transmission grid is not compared. There is no achieving Net Zero by date comparison, no supply/demand comparison nor direct cost comparison.
  - The comparative ability to quickly build up renewable storage and supply while reducing demand through fully engaging with the distribution grids opportunities is not valued nor recognised in the ISP nor in the ODP.
  - The insistence that building transmission lines to fully support utility scale renewables as the logical first step to Net Zero should be challenged. At this point of inflexion, it might just be over emphasised and might be hindering the speed of the transition rather than aiding it.
  - Savings in the transition build need to be taken on as a culture within the ISP. The reduction in cost as well as the strategic and infrastructure benefits of having significant storage at a distribution grid level to assist in managing electron flow logjams in the grid is not adequately discussed from an engineering perspective, from a load perspective nor from a cost perspective.

While the transition is going through difficult and complex regulation and planning for utility scale developments, the vast amounts of storage that are now in place in the distribution grid are ready for use. The option for the ODP to lower the cost of electricity, increase social license and speed up the transition to zero carbon is to focus on these available storage options. Unfortunately, this is not adequately analysed nor considered.

To have the appropriate level of impact on investment spending, Appendix 9 should not remain as an Appendix, rather it should be brought deeply into the working philosophy of the ISP to positively challenge many of the ISP's founding assumptions.

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