The over-arching document is very impressive and sets a good roadmap for the transition, however, by changing emphasis on some of the elements of the Optimal Development Path (ODP) there would be significant benefits to the speed of transition, security of the NEM and improved social license.

The risks that the Draft ISP identifies are present but appear to remain unaddressed within the document. It is to these risks that I believe the answers to Questions 1-4 are in the negative and to which I propose further considerations.

The general approach of my submission is that the document points to the path for positive answers to the questions asked, but that to achieve its desired ambition of delivering a reliable, affordable, and secure transition, the ISP needs to deepen its consideration of certain aspects of the transition. The key aspect is the changing role of the NEM and the grid, and how it might operate most efficiently in the post fossil fuel world.

Given that I see a broader approach as key to each of the questions asked, please bear with a few general points prior to answering the questions.

I would like to start my response by quoting the document

Under the section "Risk that CER are not adequately integrated into grid operations", the Draft ISP mentions the positive impact that Virtual Power Plants (VPP) or co-ordinated CER, can have and the importance of co-ordinating distributed energy resources. The Draft ISP discusses, in section 5 "Actionable and other network investments" but fails to discuss VPP's in any detail or sense of co-ordination. In Figure 19 "Storage installed capacity and energy storage capacity" we are shown the importance that both passive storage and VPP's have to our future energy plan, but this is quickly glossed over in the ensuing discussion as the Draft ISP proceeds to discuss its standard view on the importance of medium and deeper storage.

The opportunity and possibilities that VPPs present to the transition are significant, but from the Draft ISP, it appears that to seize this opportunity a further consideration is required. This consideration is on the changing role of AEMO and the NEM, and the changing nature of energy producers, energy production and energy transmission.

The document's focus is on the challenges facing the Transmission grid, rather than the opportunity that lies in the Distribution grid. In a renewable energy future the two grid structures can have different, yet still integrated, roles, which is a strength to be explored, rather than a weakness to be managed. Fully realising the potential of this duality is a key part of the transition being cost-effective, secure and trusted (social license). The power in renewables will be realised by empowering the distribution grid to deliver local electrons to consumers. The less electrons need to travel, the better the transition.

Up until now, the two grids have been part of an integrated whole, sequential in their roles. However, the nature of distributed energy production has changed this and we are seeing this now in the impact of rooftop solar on pricing, grid stability and the potential that distributed production offers for the future.

Martin Kamener

The discussion in the ISP should explore the differing roles and responsibilities of a two grid logic. The draft ISP's singular focus on the transmission grid belies the importance of locally produced electrons to the transition. In ignoring the value of locally produced electrons, the Draft ISP risks over investment and the social license opportunity that exists.

In this context, the emerging value of the new energy producer, sometimes called the prosumer, for their dual role in the new energy paradigm is not recognised sufficiently in the detail of the Draft ISP and until it does, this prosumer will continue to frustrate the managers of the grid instead of being recognised for the opportunity that they present, and that the transformation demands.

The case for a greater emphasis, on the distribution grid, is made by the Draft ISP itself, but the case is not explored. Yet if we read the Draft ISP from this viewpoint, it is possible to see the beginning of this discussion is occurring. It is vital that it is developed and crystallised.

There are cultural, historical, philosophical, and technical reasons that make this transition of thinking difficult and yet resolving this is vital for the transition to a clean energy future. Below I discuss some of the challenges to the drafters of the ISP:

1. The drafters and negotiators behind the ISP traditionally have focussed on managing large scale energy producers and the transmission grid. In the draft ISP it is written and predicted that this consideration needs to evolve to consider small producers, but this is not a natural relationship for AEMO and the NEM. As stated in the Draft ISP. for the transition to be successful AEMO needs to deeply consider its relationship with, as well as the role of, smaller energy producers. For the ODP to successfully tread the narrow path of the transition, the ISP needs to look to its own aspirations and challenge its statutory bodies to tease out some of the newer paths that the ODP enables and indeed demands. The opportunity to empower the distribution grid would require a fundamental rethink of the role of AEMO and the NEM. It is conceivable that a new body needs to be formed for this to occur.
2. The opportunity proffered by the Distribution Grid lies in fully exploiting Rooftop solar and Storage. Fully exploiting this possibility could open unutilised areas for local production of energy and could reduce some of the investment and development challenges that the transition faces.
3. Rooftop solar and small storage sit behind the meter, so it is possible that in its consideration of managing these producers, they are deemed to be outside of AEMO's charter, however their considerable impact is acknowledged in the Draft ISP and in the ODP, and so their impact on the NEM needs to be managed within the document.

    > On p63 of the Draft ISP we read "The capacity of these coordinated CER storages is forecast to rise from today's 0.2 GW to 3.7 GW in 2029-30, and then 37 GW in 2049-50 – by then making up 65% of the NEM's energy storage capacity".

    The absence of planning for a concept that might be 65% of the total system storage needs to be reassessed and speaks to the focus on the transmission grid in the document rather than the distribution grid.

4. A further reason that there is not a strong focus on the facility that "rooftop solar + storage" will bring, might be that
    a. rooftop solar alone is causing problems to the transition. By flooding the distribution grid during daylight hours, rooftop solar alone is reducing daytime wholesale electricity prices to negative dollars while simultaneously reducing system stability.
    b. similarly storage appears to be a solution that requires technology developments to achieve efficient VPP operation and integration.

    However, if we combine rooftop solar and storage as a singular concept rather than as two separate ones, we not only solve the above problems, but also lean significantly into the ODP.

    In combining rooftop solar + storage into a single analytic concept, the benefit for the grid operation is by absorbing surplus daytime production and thereby stopping it from flooding, while being able to shift this surplus into the evening. The combined advantage of this concept is significant and undervalued in the document whose commentary on the benefits of storage are for when the wind doesn't blow and the sun doesn't shine, and yet the positive impact of rooftop solar + storage occurs also when the wind DOES blow, and the sun DOES shine. The dual benefit that rooftop solar + storage delivers does not receive due consideration in the document and leads not only to undervaluing its potential impact, but critically, the potential of rooftop solar production is confusingly viewed as a negative to be managed (transmission grid view), rather than a positive to be leveraged (distribution grid view).

5. The Draft ISP repetitively refers to the importance of developing VPP technology but does not explore the steps required for this to occur. Planning for this is vital and needs to be a key part of the ODP.
    a. Correctly incentivising the development of VPP technology without large volumes of available battery storage will be very difficult and wasteful.
    b. With the creativity of Australia's IT developers, once there is the availability of surplus storage, they will build this technology efficiently and quickly.
    c. The development of this technology will be a major breakthrough in the transition and a commodity of value throughout the world.

    So broadly speaking the stepped path for the development of VPP's is not discussed in detail in the Draft ISP. A simple outline might be
    d. Step 1 wide scale building of distributed storage capacity to create a surplus at the distribution Grid level.
    e. Step 2 encouraging developers to utilise this surplus in their implementation of VPPs

Below I answer the questions asked by the submission.

1. Does the proposed optimal development path help to deliver reliable, secure and affordable electricity through the NEM, and reduce Australia's greenhouse gas emissions? If yes, what gives you that confidence? If not, what should be considered further, and why?

The current focus on the Transmission grid over the Distribution Grid in the ODP gives me little confidence in the current path. If this singular focus was to be broadened into the dual-path to reflect the importance of large- and small-scale producers that are inferred in the Draft ISP, but not explored, then the ODP would be much stronger and more likely to deliver reliable, secure and affordable electricity through the NEM.

2. Does the proposed timing and treatment of actionable projects support a reliable, secure and affordable NEM? If yes, what gives you that confidence? If not, what should be considered further, and why?

The lack of focus on the potential of the Distribution grid and its immediately available small-scale storage options gives me little confidence in the timing and treatment of actionable projects.

Currently we have 3.5 million homes with solar panels and less than a million with household batteries. The writers of the Draft ISP have much better command on these figures, than I, but if for the sake of simplicity, if we imagined that all current rooftop solar installations had a standard Tesla battery

> 2.5 million X 13.5 KWh (a standard Tesla powerwall), there is the immediate potential to store 27GWh domestically in the 1-4 hour storage zone without planning approval or without costs to NEM infrastructure. If we are to include the predicted growth in rooftop solar over the ISP period, then this number increases further.

Small scale storage technology is available and cost-effective. It is viewed as vital to the ODP and yet when looking at the Draft ISP's projections, the impact of small-scale storage is viewed to be a future option rather than a current option. This could change quickly with a simple Feed In Tariff incentive, the full power of this can be exploited immediately. This would engage the community in the transition and build social license.

3. Does the Draft 2024 ISP accurately reflect consumers' risk preferences? If yes, how so? If not, how else could consumers' risk preferences be included and what risks do you think are important to consider?

The Draft ISP constantly discusses the risk to the transition, stabilised by gas. The actual risk to the transition is to not consider the opportunity that small scale producers give to power the distribution grid. The lack of emphasis will delay the potential development of VPPs. The draft document discusses their importance but does not discuss their path. Without fully embracing VPPs the NEM will continue to view rooftop solar as a negative force to be managed rather than a positive force to be managed. The implied risk here is immense.

Consumers, investing in renewable production, will give the transition social license if they are acknowledged and engaged. They will also produce the cheapest energy as is acknowledged in the Draft ISP. Success here is key to aligning the transition with consumers risk preferences.

4. Do you have advice about how social licence can be further considered in the ISP, or advice on how to quantify the potential impact of social licence through social licence sensitivity analysis?

To best consider social license, one needs to consider the opportunity that distributed energy production gives to small, medium, and large producers. Succeeding to involve the community in the transition is an important way to gain social license as opposed to demanding conformity to solve the problem for everyone.

A central solution always has winners and losers, thereby creating space for negativity, whereas a broad solution allows many more to be involved in creating the solution and less space for negativity. In enabling owners of houses, warehouses, rural properties, sporting facilities, community properties and councils to exploit their roof spaces involves the whole community in the transition and so the transition becomes part of a positive community discussion of possibilities, rather than a negative discussion of risk. The growth of rooftop solar is a great example of how positive this can be. Incentivising rooftop + storage would accelerate this vital part of the transition which would allow the operators of the NEM to further explore the best mechanism to develop VPP's and to integrate them into the grid which is the ultimate goal.