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Via online submission

HILT CRC Submission to public consultation on the Draft 2026 Integrated System Plan (ISP)

The Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) was established in November 2021 to support the decarbonisation of the Australian iron/steel, alumina, and cement/lime sectors. Since commencing operations, HILT CRC has co-developed a groundbreaking research program to develop new technologies and address non-technological barriers and enablers to heavy industry decarbonisation, in collaboration with over 70 partners from industry (including heavy industry, end users and technology providers), government, academia and non-governmental organisations (our current member list is provided in Attachment A).

Of key relevance to this submission is HILT CRC Project RP3.007 – *Unlocking investment in energy infrastructure for net-zero industrial hubs* – which aims to provide a complementary bottom-up technoeconomic approach to enhance top-down ISP modelling. By focusing on regionally specific, bottom-up scenarios in regional hubs such as the Hunter/Port Kembla, Upper Spencer Gulf, Northern Tasmania and others, the project will capture industrial dynamics that have been oversimplified in national-level modelling.

While the research project is still ongoing, preliminary insights from RP3.007 and interlinking projects include the following:

- Heavy industry dominates regional energy demand in many hubs with needs that will change significantly through the net-zero energy transition depending on how technology develops. Some scenarios offer a potential reduction in total energy demand due to increases in process efficiency.
- Industrial decarbonisation occurs through discrete, capital-intensive step changes rather than by a smooth linear growth.
- Planning for the heavy industrial sector should incentivise paths that lower total investment cost in the full system (both the process and the energy). Planning should seek to incentivise this by passing on benefits of avoided investment in both grid infrastructure and services, such as for industry technology that offers flexibility, such as by thermal storage or hybrid reactors.

- Planning for future energy demands is best obtained through scenario analysis that considers both potential changes to the process demands and the energy systems together, since the system costs are coupled. HILT is undertaking such scenario analysis.

HILT CRC is appreciative of AEMO's engagement as a project partner in RP3.007 and looks forward to more intensive engagement as the project enters the detailed modelling phase over the coming months through to completion in August 2027.

HILT CRC's feedback on the Australian Energy Market Operator's (AEMO) Draft 2026 ISP consultation is provided in response to the questions below:

Question 1: 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?

We broadly agree with the Optimal Development Path (ODP) as a foundational roadmap for the NEM's transition away from coal. The trajectory of 120 GW of renewables supported by storage and flexible gas is directionally consistent with the least-cost supply of energy. However, we contend that the ISP Scenarios, including the ODP, should be stress-tested against more granular "High Industrial Load" sensitivities.

Our research indicates that industrial decarbonisation is not linear. It involves discrete, capital-intensive step changes – such as the electrification of an alumina calciner or the commissioning of a gigawatt-scale electrolyser for green steel. These loads represent massive, localised spikes in demand that differ fundamentally from aggregated population growth.

These preliminary project insights have become clear from HILT CRC's early investigation of decarbonisation scenarios for the industrial hubs under assessment. When detailed technoeconomic modelling is completed for all the industrial hubs as part of this project, it will offer AEMO an opportunity to further refine its inputs so that the ISP scenarios are sufficiently robust to reflect more plausible range of market responses to supporting Australia's ambition to become a global clean-energy and green-materials superpower.

Question 2: Do you agree with the proposed timing and treatment of actionable projects in this draft?

HILT CRC's preliminary research supports the assessment of transmission projects serving major industrial hubs as "Actionable" in response to heavy industry's energy and decarbonisation needs. Specifically:

- **Gladstone Grid Reinforcement (QLD):** for the transition of alumina and cement assets in the region.

- **Sydney Ring North (Hunter Transmission Project (NSW)):** for the Hunter region's shift from a generation hub to a load-heavy industrial centre.
- **Project Marinus (TAS):** for the stability of Bell Bay industrial loads.

For heavy industry, the timing of infrastructure availability is a primary gate for Final Investment Decisions (FID). Industrial assets operate on 30- to 50-year lifecycles. If transmission capacity is not committed and actionable well in advance of plant retrofit windows, operators may be forced to extend the life of fossil-fuel assets. We consider that ideally the ISP should assess the "option value" of these actionable projects; valuing them not just on the electricity they transport today, but on the industrial decarbonisation investments and economic opportunities they unlock for the future.

HILT CRC has provided illustrative snapshots below of each heavy industrial hub within the remit of the ISP that is being assessed in RP3.007. In each snapshot we highlight alignment with the Draft ISP 2026 and the emerging key gaps to consider. RP3.007 is developing the capability to support detailed evaluation of heavy industry hub energy infrastructure needs which could be used in reference to future ISPs to identify actionable projects.

Gladstone (Central Queensland)

- **Industrial loads:** Alumina refineries, cement, future green hydrogen and aluminium smelting. These all constitute centres of high demand for thermal energy.
- **ISP Alignment:** The ISP identifies the "Gladstone Project" and "Facilitating Power to Central Queensland" as actionable/future projects.
- **Considerations:** The retirement of the Gladstone Coal Power Station removes significant system strength. The ISP relies on transmission from the Central QLD Renewable Energy Zone (REZ) to replace this. The ISP needs to ensure the timing of these transmission projects aligns with the industrial decarbonisation schedules.

Hunter / Port Kembla (NSW)

- **Industrial Loads:** Steel (Port Kembla), aluminium (Tomago) and ammonia. A shift from a coal generation centre to a massive load centre.
- **ISP Alignment:** The "Sydney Ring" and "Hunter-Central Coast REZ" projects are critical here.
- **Considerations:** The ISP should model in its scenarios whether the transmission grid can support projected industrial demand, including the possibility of Port Kembla Hydrogen Hub development.

Upper Spencer Gulf / Whyalla (SA)

- **Industrial Loads:** Potential green steel (magnetite processing) and hydrogen hub.
- **ISP Alignment:** South Australia is leading the transition to wind and solar power (high penetration wind/solar).
- **Considerations:** Because this area is far away from the main power centres, the grid is "weak". This is a good example of where planning for additional electrification of process heat should consider options for how to pass on the benefits to the industrial user from providing sufficient flexibility to the grid (e.g. through thermal storage or hybrid reactors) from avoided investment in both grid infrastructure and grid stabilisation that would otherwise be required to achieve a steady production rate.

Bell Bay and Northern Region (Tasmania)

- **Industrial Context:** Iron ore pelletisation, aluminium smelting, and ferro-alloys.
- **ISP Alignment:** Marinus Link is a "committed/anticipated" project in the Draft.
- **Considerations:** Tasmania relies on hydro and off-grid wind farms planned in Northern Tasmania. Drought risks are critical for industrial reliability. Marinus Link will export hydro power to the mainland, as well as providing import reliability for Tasmania (including Bell Bay) during dry years. Firming of the electricity produced from wind farms is also critical. It is also important to evaluate how to incentivise industrial users to offer flexibility to the Tasmanian grid, such as through use of thermal energy storage or hybrids.

Note: Project RP 3.007 is also evaluating heavy industrial hubs in Western Australia, such as the Pilbara. While the ISP considers only the part of the grid covered by the National Electricity Market (NEM), the supply chain for electrolysers, wind turbines and associated infrastructure is national. Hence insights from technology costs and uptake in the NEM will both be influenced by, and impact on, the viability of projects in Western Australia. Equally, this will also have relevance for AEMO's planning functions in Western Australia.

Question 3: 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?

We propose that more work be done to evaluate the benefit to the total system costs that could potentially be offered by large industrial users that offer flexibility to the grid, such as through the use of hybrid electric/fuel or thermal energy storage technologies. These should include the value of avoided infrastructure investment, as well as the value of reducing operating costs to an established grid.

AEMO's current modelling treats electricity largely in isolation from either other low-carbon energy sources or via proxies for other sectors. However, our work with industry partners highlights that heavy industries already rely on an integrated mix of electricity and fuels for heat, and this dependence in the future will likely include alternative fuels derived from biomass and waste, together with hydrogen. Future systems, with the lowest cost, are likely to include hybrids of multiple energy sources. In addition, a range of hydrogen and other technologies are under development and could become implemented during the transition. Such technologies, should they become viable, have potential to reduce significantly the demand for electricity relative to an electrification-based scenario for heavy industry. These options should therefore be considered in scenario planning. HILT can provide more details on specific technologies to reduce electricity demand to AEMO if that is of interest.

More rigorous testing of the ODP against industrial technology pathways is critical to avoid either stranded transmission assets or capacity shortfalls that can act as a barrier to industrial green growth.

Question 4: Does the ODP appropriately identify and leverage distribution investment opportunities?

Of particular interest are the recent ISP modifications to encourage the adoption of new "bottom-up" modelling approaches to incorporate these distribution planning considerations into the ISP, with the objective of planning to optimise the flexibility of consumer energy resources (CER) to smooth aggregate system demand for the benefit of all consumers.

In a similar way, HILT CRC's scenario-based, bottom-up modelling approach being undertaken in our project 3.007 is identifying significant step changes in energy demand and storage requirements for future heavy industry decarbonisation hubs. Such approaches will be able to provide additional information to the ISP in the next few years to help unlock further flexibility and optimisation opportunities to support and reinforce the backbone of the transmission grid to deliver customer and economic benefits.

HILT CRC recommends that AEMO and policymakers consider identifying and assessing the integration of heavy industry decarbonisation hub energy requirements and flexibility benefits into future ISP scenarios.

Question 5: Do the gas development projections reflect an appropriate level of investment to support the gas sector, including gas-powered generation in the NEM?

We welcome the explicit inclusion of natural gas development projections into the ISP. According to our preliminary pathways for decarbonisation of heavy industries in some specific regions, natural gas may also be utilised on the path to fully transition to 100% hydrogen-based processes (e.g. in direct reduced iron (DRI) technologies), with other heavy industry technology

options such as via carbon capture, utilisation and storage (CCUS) potentially also playing an important role.

Question 6: Do stakeholders have feedback on the Addendum to the 2025 IASR?

The 2026 ISP development process has seen a substantial increase in complexity, requiring more extensive data collection and modelling frameworks. The Addendum to the 2025 Inputs, Assumptions and Scenarios Report (IASR) was released to address issues identified in the Australian Energy Regulator's Transparency Review, ensuring that AEMO's chosen inputs are based on verifiable sources or adequate stakeholder consultation. Heavy industry stakeholders have strongly emphasised to HILT CRC that this transparency should extend to regionally specific data.

HILT CRC would welcome further discussion with AEMO regarding granular demand and flexibility profiles for heavy industrial hubs, and other regional insights, to understand how ISP processes and methodologies can evolve from the limited high-level (straight-line) assumptions currently adopted for heavy industry. This data can help refine future IASR inputs to better reflect the "lumpiness" and specific thermodynamic requirements of heavy industrial load coming online.

HILT CRC thanks the Government for the opportunity to comment on the Draft 2026 ISP.

If the Government would like to discuss any elements further, I can be contacted via ceo@hiltcrc.com.au.

Kind regards,

Jenny Selway
Chief Executive Officer,
HILT CRC

ATTACHMENT A – HILT CRC MEMBER LIST