

# Northern Territory Government Response to the Alice Springs Roadmap to 2030

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## 1. Overview

The Alice Springs Electricity System is the Territory's second largest after the Darwin-Katherine Electricity System, and plays a significant role in the lives of the 26,500 residents of Alice Springs and surrounding communities.

The Northern Territory Government's principal objectives for the Alice Springs Electricity System are for it to supply electricity securely, reliably, affordably and sustainably. A key element of the sustainability of the Alice Springs electricity system is achieving the Territory Government's target of 50 per cent renewable energy by 2030

In this context, the Alice Springs Future Grid (ASFG) Project was a \$12.5 million collaborative effort launched in 2020, to identify and overcome barriers to the further deployment of renewable energy in the Alice Springs Electricity System and provide insights to the sector that could be applied to other Territory and Australian electricity systems.

The ASFG Project was led by Desert Knowledge Australia's Intyalheme Centre for Future Energy, in partnership with a consortium of member organisations and project partners. Funding was provided by the Territory Government through Intyalheme; from the Australian Renewable Energy Agency through the Advancing Renewables Program; from the then Australian Government Department of Industry, Science, Energy and Resources through the Regional and Remote Communities Reliability Fund – Microgrid Program; and through in-kind contributions from member organisations and project partners.

The ASFG Project culminated in the publication of the Alice Springs Roadmap to 2030 (the Roadmap) in March 2024 which brings together insights from the broader ASFG Project and global best practice to explore transition pathways of the Alice Springs Electricity System to 50 per cent renewable energy by 2030.

Without seeking to 'predict' the future, the Roadmap explored four plausible technical scenarios for the transition of the Alice Springs Electricity System to 50 per cent renewable energy by 2030, with either large-scale solar or rooftop solar dominating the transformation; and system security maintained with either a small amount of thermal gas-fired generation on at all times or without gas-fired generation for periods of time. The four scenarios do not represent options to be selected from, but rather extremes demonstrating there are multiple plausible pathways to achieve the renewable energy target.

The Alice Springs Roadmap to 2030 concludes that the reality in 2030 is most likely to be somewhere in between the scenarios and that the renewables transformation will require significant upfront capital investment with the benefits accruing to the community over time.

Depending on the scenario, the Roadmap indicates that achieving the transition to 50 per cent renewable energy in Alice Springs by 2030 will require capital investment of \$156 million to \$216 million, in a mix of technologies such as small-scale solar (32–82 megawatts (MW)), large-scale solar (25–50MW), small-scale batteries (3–41MW), large-scale batteries (15–25MW). Savings in fuel costs are estimated at between \$53 million and \$63 million.

The estimated investment costs in the Roadmap are described as order of magnitude approximations, expressly for the purpose of comparison, and have not been derived from detailed designs and associated costings. Similarly, savings estimates do not include direct consumer savings; those benefits associated with potential carbon pricing mechanisms; or savings from the more efficient operation of, and lower requirements for maintenance and extended economic lives, of existing gas-fired generators due to fewer running hours and more optimal machine loading.

To narrow the optimal pathway and investment requirements for the Alice Springs Electricity System within the range of scenarios examined in the Roadmap, the Territory Government has commissioned the Northern Territory Electricity and System Market Operator (NTESMO), to develop a Regulated Electricity System Investment Plan (RESIP) for Alice Springs (and Darwin-Katherine and Tennant Creek) to outline in detail the new generation and transmission mix that balances cost-effectiveness, system security and reliability requirements while meeting the renewable energy target. The RESIP is scheduled to be delivered in Q4 2024.

Preparation to procure the optimal investments to be established in the RESIP is already underway, with Territory Generation undertaking a market sounding between March and May 2024 for renewable energy generation and long duration storage for Alice Springs (in addition to Darwin-Katherine and Tennant Creek). The market sounding will be used to determine the suitability of proposed solutions to be deployed in Alice Springs.

The Roadmap identified that priority focus needed to be given to secure the Alice Springs system, including through emergency Consumer Energy Resources (CER) management, battery energy storage systems, protection system analysis and redesign, accelerating new bulk load connections and essential system services plant such as synchronous condensers. Noting that the Territory Government's corporations and agencies contributed to the ASFG Project as member organisations, project partners and observers, the Territory Government has already commenced actions to the address Alice Springs Roadmap to 2030 recommendations.

- Power and Water is in the process of deploying emergency CER management capabilities in Alice Springs under its Power Partnerships Program. Power and Water currently has 850 kilowatts of controllable CER, with customers being compensated when it is necessary to turn off their solar systems to support the security of the electricity system.
- Power and Water published new Basic Micro and Negotiated Embedded Generation Specifications in 2023 that are fully compliant with the relevant Australian Standard (AS 4777.2.2020). In addition, Power and Water will implement a solar compliance program under its Future Networks CER Integration plans approved by the Australian Energy Regulator over the period 2024 to 2029.
- Power and Water has developed a Business Case, informed by the ASFG Project, and won approval from the Australian Energy Regulator for investment in enabling systems for greater CER integration including core infrastructure for dynamic management of CER necessary to maximise solar PV hosting capacity, as well as to inform future investment decisions to expand that capacity.
- Territory Generation, in consultation with Power and Water, is conducting power system modelling to understand the technical specifications of the assets required to address the shortfall in essential system services and enable further renewables uptake. In line with the Alice Springs Roadmap to 2030, Territory Generation has included budget for battery energy storage systems and synchronous condensers in its Statement of Corporate Intent, and is finalising the individual investment business cases.

Detailed responses to each of the specific Alice Springs Roadmap to 2030 recommendations are outlined below in section 2.

## 2. Detailed response to recommendations

Notwithstanding the different scenarios to 50 per cent renewables it identifies, the Alice Springs Roadmap recommends a common and broadly sequential phased transition of the Alice Springs Electricity System:

1. **Secure the system** – Address current and nearer-term operational challenges in a manner that lays an enduring foundation for a power system increasingly based on renewable energy.

2. **Advanced planning and operation** – Develop and operationalise new capabilities, systems, and tools to operate a more sophisticated, digitised, and dynamic system.
3. **Accelerate renewables deployment** – Commission new large-scale renewable generation and enable the system to run for periods with zero gas generation.

To position the Territory to move through these recommended phases of transition, the Roadmap identifies four priority actions.

1. **Formal Roadmap to 2030 responses developed** – Relevant Northern Territory and Alice Springs stakeholder organisations review the Roadmap to 2030 report and related materials as the basis for developing formal responses to its content, the proposed three phases of transition and the priority actions outlined.
2. **Establish cross-organisational transition process and Integrated System Plan** – Informed by the organisational reviews and formal responses to the Roadmap to 2030, establish a cross organisational working group of key stakeholder organisations to develop an agreed integrated, collaborative plan for Alice Springs.
3. **Quantify and secure transition funding** – Informed by the detailed scoping, technical design and budgeting processes outlined above, evaluate the quantum and potential sources of the additional funding required to give effect to the agreed scope of work.
4. **Commence Phase 1 with urgency** – Given the issues currently emerging in the Alice Springs power system with the continued growth of distributed solar photovoltaic (PV) and resulting system risks from falling minimum demand, the execution of Phase 1 must be advanced with urgency.

The Territory Government has reviewed the Alice Springs Roadmap to 2030, its recommended phases of transition and priority actions, and prepared the following detailed responses for the information of stakeholders.

## Priority action 1 – Formal Roadmap to 2030 responses developed

Relevant Northern Territory and Alice Springs stakeholder organisations review the Roadmap to 2030 report and related materials as the basis for developing formal responses to its content, the proposed three phases of transition and the priority actions outlined.

The Northern Territory Government plays a direct role in the provision of electricity supply in Alice Springs and connected communities through its government owned corporations, including the network provider (Power and Water Corporation), generator (Territory Generation) and retailer (Jacana Energy).

Power and Water and Territory Generation were Steering Committee and Consortium members of the ASFG Project, and Jacana Energy was a Project Partner and led a Household Batteries and Tariff Trial sub-project. The Department of Industry, Tourism and Trade through the Office of Sustainable Energy was also an observer on the Steering Committee. Through their direct involvement in the three-year ASFG Project, each of Territory Government corporations and agencies have assimilated knowledge from the project in their planning and operations.

In January 2024, the Territory Government announced significant electricity market reforms applying to the Alice Springs Electricity System (in addition to the Darwin-Katherine and Tennant Creek electricity systems). Key elements of the Government's reforms and interim arrangements align with the Roadmap's recommended priority actions and transition phases:

1. **Secure the system** – Aligns with the interim gap analysis and investments in essential system services in Alice Springs being undertaken by Territory Generation in consultation with Power and Water (see response to recommendation 4)
2. **Advanced planning and operation** – Aligns with the delivery of the Regulated Electricity System Investment Plan (RESIP) currently being developed by the Northern Territory Electricity System and Market Operator (NTESMO) (see response to recommendations 2 and 3)
3. **Accelerate renewables deployment** – Aligns with the mandated delivery by Territory Generation as the sole supplier of new generation and energy storage technology to be identified in the RESIP (see response to recommendations 2 and 3).

Consistent with the knowledge sharing objective of the ASFG Project, the Territory Government is implementing these phases of the transformation across the Territory's other major electricity systems in Darwin-Katherine and Tennant Creek; for which similar challenges are presented by the renewable energy transformation.

## Priority action 2 – Establish cross-organisational transition process and Integrated System Plan

Informed by the organisational reviews and formal responses to the Roadmap to 2030, establish a cross-organisational working group of key stakeholder organisations to develop an agreed integrated, collaborative plan for Alice Springs including:

- Power system transition strategy and scope of work;
- Detailed technical designs, budget and execution plan;
- Customer and community engagement plan;
- Cross-organisational governance model;
- Mapping of the enabling regulatory framework updates; and,
- Mutually-agreed accountabilities for all collaborating organisations.

While this process will consider the entire transition to 2030, in recognition of the emerging issues currently faced by the Alice Springs power system, it will give the most detailed and urgent consideration to the foundational Phase 1: Secure the System.

## Priority action 3 – Quantify and secure transition funding

Informed by the detailed scoping, technical design and budgeting processes outlined above, evaluate the quantum and potential sources of the additional funding required to give effect to the agreed scope of work as follows:

- Total additional funding required to complete all three transition phases and including integrated coordination across all collaborating organisations; and,
- Funding required by each of the collaborating organisations to enable fulfilment of their requirements and agreed accountabilities per transition phase.

In January 2024, the Territory Government announced electricity market reforms for the Territory's major electricity systems, including for Alice Springs. The reforms will see a new Territory Electricity Market (TEM) established with new arrangements for wholesale electricity supply in the Alice Springs Electricity System.

The TEM reforms comprehensively address the Roadmap priority actions 2 and 3.

The TEM reforms are designed to create a centralised approach within the Alice Springs Electricity System for determining and procuring generation and essential systems services resources at lowest cost while ensuring system security and reliability requirements are not compromised.

Central to the new market design for Alice Springs (and Tennant Creek) will be what is termed as 'sole supplier' arrangement as follows.

- NTESMO will periodically develop the RESIP, which will determine the investments required to meet the needs of the electricity system and the Government's renewable energy policy. The RESIP will be approved and mandated by the Minister for Renewables and Energy.
- Territory Generation will be established as the sole supplier to develop and own, or contract with the private sector to deliver the assets required to satisfy the RESIP through a competitive procurement process, aimed at maximising value for money and Territory.
- Territory Generation, under the regulatory oversight of the Utilities Commission, will be required to develop and publish a standard wholesale product offering for electricity retailers including the terms and a forward view of pricing.
- NTESMO will utilise Territory Generation's generators to securely supply electricity at lowest cost and provide information to participants to facilitate the settlement of contracts.
- Any existing legacy contracts between Territory Generation and private sector generators will not be impacted by the new sole supplier arrangement and will continue pursuant to current contractual obligations between the parties

The sole supplier arrangement provides the most effective way for meeting the Territory Government's vision for improved renewable energy integration in the Alice Springs Electricity System that ensures a secure, reliable, affordable and sustainable energy future.

Preparation for the required investments is already underway, with Territory Generation undertaking a market sounding between March and May 2024 for renewable energy generation and long duration storage for the Alice Springs Electricity System (in addition to Darwin-Katherine and Tennant Creek

systems). The market sounding will be used to determine the suitability of proposed solutions to be deployed in Alice Springs.

The Territory Government has established an Industry Reference Group to gather a range of industry perspectives and feedback on the implementation of the new TEM arrangements, including in Alice Springs.

The Industry Reference Group includes representatives from Power and Water, Territory Generation, Jacana Energy, private sector generators and retailers operating in the Territory's regulated electricity systems, large customers, prospective major participants, union representatives from the Community and Public Sector Union and Electrical Trades Union and the Utilities Commission (observer).

The Industry Reference Group and broader consultation provides for the Territory Government to receive stakeholder advice, informing near term and future planning and investment in the Alice Springs Electricity System.

NTESMO is already well progressed in developing the inaugural RESIP for the Alice Springs Electricity System, which will outline the requirements for achieving a new generation and transmission mix that balances cost-effectiveness, system security and reliability requirements while meeting the renewable energy target.

The RESIP will build on the previous related works conducted in the Territory, including the Alice Springs Roadmap to 2030 and the Utilities Commission's Northern Territory Electricity Outlook Report, to consider technology, capacity, and location of investments, along with the essential network enhancements needed to support the ongoing development of the Alice Springs Electricity System. A 10-year whole-of-system investment plan will be prepared, to apply from July 2025, for the NT's regulated electricity systems. This includes consideration of power system security including essential system services, the 50 per cent renewable energy target and a new form of reliability standard.

Achieving the 50 per cent renewable energy target by 2030 will require a significant level of capital investment in the Alice Springs Electricity System in the near term; offset by operational savings that accrue over time. The final release of the RESIP will provide NT Government and stakeholders with a much clearer understanding of what is required to maintain a quality, safe, reliable, and secure regulated electricity supply for Northern Territorians whilst achieving the 50 per cent renewable energy target. It will also provide clarity of future electricity system costs and the roadmap toward decarbonising the Northern Territory regulated electrical systems over the longer-term. The RESIP is scheduled to be delivered in Q4 2024.

Consultation with stakeholders is being undertaken throughout the preparation of the RESIP, including on the framework and approach, scenarios, inputs and assumptions and on the draft RESIP investment plan. Through this process, interested stakeholders will have a say in the future development of the Alice Springs Electricity System.

Funding for required investments by Territory Generation will be included in its annual Statement of Corporate Intent (SCI), which represents the agreement between Territory Generation and its shareholder, the Territory Government. Network investments required by Power and Water will be funded through existing regulatory processes under the Northern Territory National Electricity Rules.

The Territory's renewables transformation is taking place in the context of a broader national transformation and the Territory Government is working with the Australian Government to agree funding and support mechanisms for the transformation of the Alice Springs Electricity System, in particular through the Australian Government's Rewiring the Nation and Capacity Investment Scheme initiatives.



The energy transition of the kind required to meet the 50 per cent renewable energy target will require careful consultation with the community to understand its level of acceptance for significant new infrastructure. Cultural heritage, visual amenity, noise pollution, environmental and habitat damage, land devaluation and numerous other factors are critical considerations in the efficient and timely delivery of projects. Consultation on individual projects mandated in the RESIP Investment Plan will be subject to detailed community consultation.

## Priority action 4 – Commence Phase 1 with urgency

Given the physics-based issues currently emerging in the Alice Springs power system with the continued growth of distributed photovoltaic (DPV) and resulting system risks from falling minimum demand, the execution of Phase 1 must be advanced with urgency. While some refinements may be made in the detailed technical design phase, this is expected to include:

- Deployment of Emergency DPV Management capabilities across all new and a wide range of existing DPV systems, supported by a proactive program of community engagement;
- A program to achieve a significant uplift in compliance of grid-connected inverters with AS/NZS 4777.2.2020 (Region A) requirements;
- Procurement and deployment of large-scale Grid-forming Battery Energy Storage Systems;
- Analysis of the existing protection systems, including design and deployment of necessary upgrades;
- Evaluation of system requirements, technology options and procurement pathways for additional Essential System Services (ESS) plant;
- Exploration of opportunities for the accelerated connection of new bulk loads which have potential to slow the impact of declining system demand; and,
- In parallel with the Phase 1 actions, identify relevant regulatory or policy barriers and engage with key stakeholders to develop proposed treatments.

Like most power systems in Australia, the Alice Springs Electricity System is experiencing significant uptake in behind-the-meter consumer energy resources (CER), particularly distributed solar PV. At present these systems are largely uncontrolled and manifest as a reduction and/or significant variability in demand to be supplied by dispatchable generating systems.

The Alice Springs Roadmap to 2030 recommends the first phase of the transition, broadly occurring over the three years of 2024 – 2026, establishes the foundation for the journey to 50 per cent renewable energy power by addressing supply and demand balance and stability, frequency and protection issues. This may include through emergency CER management, battery energy storage systems, protection system analysis and redesign, the acceleration of new bulk load connections and essential system services plant.

Power and Water and Territory Generation, have already commenced this work.

- Power and Water is in the process of deploying emergency CER management capabilities in Alice Springs under its Power Partnerships Program. Power and Water currently has 850 kilowatts of

controllable CER, with customers being compensated when it is necessary to turn off their solar systems to support the security of the electricity system.

- Power and Water published new Basic Micro and Negotiated Embedded Generation Specifications in 2023 that are fully compliant with AS 4777.2.2020. In addition, Power and Water will implement a solar compliance program under its Future Networks CER Integration plans approved by the Australian Energy Regulator in the next regulatory control period (2024–29).
- Power and Water has developed a Business Case, informed by the ASFG Project, and won approval from the Australian Energy Regulator for investment in enabling systems for greater CER integration including core infrastructure for dynamic management of CER necessary to maximise solar PV hosting capacity, as well as to inform future investment decisions to expand that capacity.

A range of supporting activities are planned to realise the benefits of the proposed CER integration and management investment including:

- development and improvement of the non-public CER register database
- development and testing of the capabilities and outcomes when applying dynamic operating envelopes to electricity vehicle (EV) loads to shift EV charging.
- Territory Generation, in consultation with Power and Water, is conducting power system modelling to understand the technical specifications of the assets required to address the shortfall in essential system services and enable further renewables uptake. In line with the Alice Springs Roadmap to 2030, Territory Generation has included budget for battery energy storage system and synchronous condenser investment in its SCI, and is finalising the individual investment business cases.

The Territory Government is committed to achieving the 50 per cent renewable energy target by 2030 and has already made significant progress including for the Alice Springs Electricity System. In shaping its whole-system approach, the Territory Government will continue to actively engage with industry stakeholders and community members while staying informed of advancements in clean energy technology. This commitment will ensure a sustainable future for all Territorians with emphasis on electricity security, reliability and affordability.