



Lessons Learnt: Project Execution

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Lessons Learnt Report 01

Project Details

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The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

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Alice Springs Future Grid is led by the Intyalheme Centre for Future Energy, on behalf of Desert Knowledge Australia (DKA). Intyalheme is proudly supported by the Northern Territory Government.

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Contents

Lessons Learnt: Project Execution	1
Lessons Learnt Report 01.....	1
Acknowledgement of funding.....	1
Executive summary	3
Purpose of this report	3
Background	4
Project objectives.....	4
Project outputs	5
Project Partners	6
Consortium Members	6
Project Leads.....	6
Knowledge Sharing	6
Partner Organisations	6
Project Execution Workshop.....	7
Sub-projects	8
Sub-project 1: Modelling	8
Sub-project 2: Microgrid	8
Sub-project 3: Community Solutions Details	8
Sub-project 4: Tariff Reform	8
Sub-project 5: Future Grid Deployments.....	8
Gaps identified and lessons learnt.....	9
External knowledge sharing opportunities.....	10
Further information	10





Executive summary

The [Alice Springs Future Grid](https://www.alicespringsfuturegrid.com.au)¹ project is led by the Intyalheme Centre for Future Energy and involves multiple organisations from across the Northern Territory and Australia. Energy experts are working together to identify and remove barriers to further renewable energy penetration, through a number of interdependent sub-projects.

System modelling, household battery pilot studies, the development of new tariff options, an investigation into the viability of wind as a complementary renewable resource to solar, and microgrid trials are all part of Alice Springs Future Grid. The project will culminate in the production of a Roadmap to 2030 report, explaining how the Alice Springs power system can be configured to support an increasing proportion of renewable energy.

The community is playing a growing role in the energy system, and Future Grid will investigate how distributed energy resources - such as household batteries and rooftop solar and existing infrastructure - can work together to create a clean, reliable and affordable energy supply.

Lessons Learnt reports are designed to share learnings from either one or more sub-projects, or the whole project, in the period up to publication date. This report is the first for Future Grid and focuses on the project execution learnings observed.

This Lessons Learnt Report has been authored by CSIRO, the Knowledge Sharing Partner for the Alice Springs Future Grid project. Editorial assistance was provided by the Intyalheme Centre for Future Energy.

Purpose of this report

This Lessons Learnt report is the first public document to outline the Alice Springs Future Grid project as a whole; with an emphasis on the early phase of project execution. With Partners from all over the Northern Territory and Australia, Future Grid relies on strong relationships and deep discussions that are typically best held in person. The COVID-19 pandemic brought entirely unforeseen challenges into the project, most notably that such face-to-face interactions would now be limited. This document seeks to share the experience of launching a project of this magnitude at such a time in history, in the hope that other similar projects will benefit from the path forged by the Future Grid team.

¹ www.alicespringsfuturegrid.com.au



Background

The Intyalheme Centre for Future Energy (Intyalheme) is a flagship project of Desert Knowledge Australia (DKA), created to assist the Northern Territory (NT) in achieving its target of 50% renewables by 2030. In setting up Intyalheme, it was recognised by the Northern Territory Government that no single energy industry participant could reach the target alone.



a flagship project of



In November 2018, Alice Springs hosted an ARENA A-Lab attended by 50 energy experts from across Australia and the NT. A-Lab outcomes were refined into the ambitious and transformational Alice Springs Future Grid project, designed to bring stakeholders together from across Australia to model and deploy a range of solutions for increased renewable energy penetration into the Alice Springs grid.

The Alice Springs Future Grid project (Future Grid) aims to increase the variable renewable energy (VRE) fraction in the local electricity system with a view to meeting the NT's 50% by 2030 renewable energy target in Alice Springs. The project will:

- Focus on the Alice Springs grid and the development of an implementation plan known as the Alice Springs Roadmap to 2030, to increase VRE fraction;
- Provide sector support to promote collaboration and future-thinking amongst a collaborative network of key industry stakeholders to support investment in renewable energy, with lessons transferable to other parts of the NT and beyond; and
- Deliver five sub-projects which interact to create a reliable and renewable future grid.

Project objectives

The Future Grid project has three key objectives:

1. To bring together diverse energy system stakeholders into a partnership that addresses current and future system challenges in Alice Springs;
2. To deliver a suite of prototypes that underpin increased penetration of Distributed Energy Resources (DER) including solar energy and battery storage, on the grid and reduce the reliance on gas-fired generation;
3. To design a technical, regulatory economic and social pathway for Alice Springs to reach the Northern Territory's renewable energy target of 50% by 2030, whilst sharing lessons learnt with the rest of the NT and Australia where relevant.





Project outputs

Deliverables across the five sub-projects that comprise the Alice Springs Future Grid project include, but are not limited to:

- A reduced thermal generation model for Alice Springs;
- Community engagement activities, including for the purposes of educating consumers about the complexity and idiosyncrasies of the Alice Springs grid, and encouraging participation in a proposed Virtual Power Plant (VPP);
- The development and implementation of a robust social science methodology and community engagement approach, with lessons that may be transferrable to other sectors;
- Developing a suite of tariff options, including rebates and payments for system services that incentivise solar PV and battery ownership;
- The procurement and installation of up to 50 residential battery systems in critical areas of the low voltage network;
- Procurement and installation of Large-Scale Battery System (LSBS) as part of a commercial microgrid design;
- Knowledge sharing reports that capture lessons learnt; and
- A final “Alice Springs Roadmap to 2030” report outlining the pathway to reach the 50% by 2030 renewable energy target on the isolated Alice Springs grid.

Within the sub-project trials, specific outputs include:

- A commercial microgrid which includes Large-Scale Battery Storage;
- An aggregated residential battery trial (VPP);
- A new combined generation and load solar forecast platform;
- A renewed investigation into the viability of wind resources, owing to reduced turbine costs and improved efficiencies; and
- Dynamic export trials at a commercial solar farm and at a local commercial and industrial location with an existing solar system (such as a school or public building).





Project Partners

The term “Project Partners” is used to describe all organisations involved in Alice Springs Future Grid. However, there are varying levels of involvement, as outlined below:

Consortium Members

The organisations represented through the logos below are Consortium Members, which are the founding organisations of the Alice Springs Future Grid project. Desert Knowledge Australia (DKA) also incorporates the Desert Knowledge Research Institute (DKRI) through which ARENA funding was provided. These organisations provide strategic input and advice to the project. Their understanding of local network conditions and the interventions required to achieve the 50% by 2030 renewable energy target make it vital these entities have a mechanism through which to influence the direction of Future Grid. The primary mechanism is the Future Grid Steering Committee, led by an independent Chair from DKRI and comprising a representative from each Consortium Member. Some of the Consortium Member organisations are also leading the delivery of sub-projects, as described below.



Project Leads

Consortium Member Ekistica is leading sub-project 1 (and initially sub-project 2 – until a commercial microgrid site owner is confirmed) while Power and Water Corporation leads sub-project 5. In addition to the Consortium Member organisations, the Arid Lands Environment Centre (ALEC) and Jacana Energy are leading sub-projects 3 and 4, respectively.



Knowledge Sharing

CSIRO is the Knowledge Sharing Partner for the Alice Springs Future Grid project, as well as having involvement across many other areas of Future Grid as a Project Partner more broadly. CSIRO’s input was instrumental in the development of the Future Grid project.



Partner Organisations

In addition to the Funders, Consortium Members, Project Leads and the Knowledge Sharing Partner; a number of organisations are involved in the Future Grid project through sub-contracting arrangements. Some of these organisations share valuable local knowledge; for example, Alice Springs Town Council and Charles Darwin University. Organisations such as Proa Analytics, Epuron, RMIT and WattWatchers share their technical expertise, and Horizon Power is contributing knowledge and experience generated through previous DER-focused projects.



Project Execution Workshop

The Alice Springs Future Grid Project Execution Workshop was held in Alice Springs, on the August 25 and 26, 2020. The location was the Business and Innovation Centre at the Desert Knowledge Precinct, where the Intyalheme Centre for Future Energy is based.

Attendance from interstate Partners was not possible due to very strict Northern Territory border controls, and emerging COVID-19 hotspots elsewhere. The team needed to be flexible in its approach; considering how to include those whose attendance could only be conducted online, with minimal disruption to the advantageous dynamics of a face-to-face event. Over the two days, about 20 people attended the workshop in person (about half from Darwin) with a further 10 attending via video conferencing facilities.

The workshop focused on the logistics of the project and the sub-projects that make up the work to be undertaken. Participants worked to identify gaps and risks, and plot the next steps in the sub-projects they were most strongly associated with.



Figure 1 Participants at the Alice Springs Future Grid Project Execution Workshop, held in Alice Springs in August 2020

Whilst the sub-projects were fixed, this workshop was designed to:

- Refine and find consensus on outstanding sub-project detail for all sub-projects including critical paths for each sub-project;
- Identify gaps and emerging risks;
- Develop a framework for the Roadmap to 2030 report;
- Confirm Project Partner roles and discuss preferred methods of engagement; and
- Work collaboratively across multiple organisations.



Sub-projects

Along with the whole-of-project activities such as Knowledge Sharing, and a targeted stream called ‘Sector Support’, the five sub-projects are focused work packages which interact in a holistic manner, to enable an increasing fraction of renewable energy to be absorbed into the Alice Springs grid.

Sub-project 1: Modelling

As the amount of renewable energy in the Alice Springs grid increases, interventions are required to reduce thermal generation (e.g. gas and diesel), while maintaining the stability of the electricity system. Modelling is a crucial step before significant changes are enacted, to optimise outcomes and avoid system failures. This sub-project on system modelling, led by Ekistica, is investigating technical challenges, as well as accounting for financial and consumer behaviour – factors rarely included in technical models.

Sub-project 2: Microgrid

Privately operated, renewable energy microgrids may play an important role in future grids. A key feature of a microgrid is the ability to operate independently from the main grid and to potentially ‘island’ for periods of time. Grid-connected microgrids based on renewable energy are not common in regulated networks. This sub-project is conducting feasibility studies at potential sites for a commercial microgrid in Alice Springs, with multiple tenants and customers. The team seeks to identify and overcome technical and regulatory barriers through a microgrid trial, and understand liabilities for supply during periods of disconnection from the network.

Sub-project 3: Community Solutions Details

The consistent enthusiasm of Alice Springs residents for rooftop solar is accelerating the need to provide extra support to the electricity network, through the installation of household batteries. As well as storing energy for later use, batteries can provide other services crucial to power system operation. When multiple batteries are linked through a Virtual Power Plant (VPP), such services can be bundled up (aggregated) and directed by the system controller. A VPP - planned to be the first in the Northern Territory – is being created in Alice Springs. Customer engagement will underpin the success of this sub-project, which is led by the Arid Lands Environment Centre (ALEC).

Sub-project 4: Tariff Reform

The Tariff Reform sub-project is led by Jacana Energy. While Northern Territory Government policy determines the tariffs that Jacana can provide, the testing and development of new tariffs remains important. Tariffs can be a useful tool in changing energy usage patterns and to incentivise the uptake of technologies, including batteries and solar. The tariff reform sub-project will explore options for time-of-use electricity tariffs and a monthly VPP participation credit. Tariff trials will help the team learn how customers respond to different price signals and the effect of their altered behaviour on the power system.

Sub-project 5: Future Grid Deployments

This multi-faceted sub-project will culminate in the delivery of a ‘Roadmap towards 2030’ report for Alice Springs. This will identify the optimal pathways and timelines for achieving the Northern Territory’s target of 50% renewable energy by 2030, on the Alice Springs grid. Various technical investigations will be delivered under this sub-project, led by the Power and Water Corporation. Activities include enhanced forecasting of solar and load, a dynamic export trial for sites that are



typically limited in the amount of solar power they can export, and the exploration of new dynamic operational procedures. The aim is to provide more options for System Control to minimise the amount of thermal generation (i.e. gas and diesel) required.

For more details on the sub-projects please visit the [sub-projects page](#) on the Alice Springs Future Grid website.

Gaps identified and lessons learnt

The Project Execution Workshop allowed the Future Grid team and individuals from Project Partner organisations to recognise the following areas for learning:

- COVID-19 is placing a higher degree of pressure on event management. During the Project Execution Workshop it was found by the Intyalheme team that the role of “online manager” was essential to the smooth integration of online participants. Tasks within this role might include admissions to the online meeting, playout of presentations, email updates to provide context around in-person conversations and notifications of forthcoming sessions.
- With potential for COVID-19 to impact the extent to which in-person workshops can be held into the future, further collaboration tools could be explored with a view to streamlining some processes and content capture.
- The importance of paying due consideration to how to involve the community in a project that is complex and multifaceted, and technology is at the core. A briefing document or “energy for dummies” type of publication could help with terminology alignment and ease of communication.
- While the workshop was heavily focused on technical outcomes, there was an overarching acknowledgement of the importance of community engagement during the Future Grid project. The team were also asked to cast their imaginations further than the 2022 end-date of the project, to identify what more the community would have to do in order to reach the 50% by 2030 renewable energy target. It was identified that strong community buy-in would be essential if the town’s energy system were to be run without thermal generation at specific times; a key milestone on the path to 2030.
- Consideration should be paid on how to measure real, meaningful change for the Alice Springs community and help it reach the NT renewable energy target of 50% by 2030.
- How to strike a balance between the ability to deliver community-level impact whilst also conducting valuable science and research that will hopefully yield insights that can assist others (e.g. government, industry, community, etc.) well into the future.
- How best to showcase the benefits of renewable energy to remote/regional communities and provide a real-world illustration of how new and emerging energy technologies can deliver positive change at multiple levels (from individual consumers, all the way through to the entire community).



Figure 2 The Project Execution Workshop involved almost 20 people in person, and a further 10 online

External knowledge sharing opportunities

The points below outline potential areas for knowledge sharing into the project, from organisations which have carried out relevant work.

- Historical lessons learnt and knowledge sharing by CSIRO to the project. Projects such as the [CSIRO Low-Voltage Feeder Taxonomy Study](#) – with a focus on Low-Voltage modelling learnings and methodologies, DNSP data challenges and how to model a Low-Voltage network in DlgSILENT PowerFactory. Align data gathering format to allow models and data be digestible in the Low-Voltage Feeder Taxonomy clustering and modelling.
- Share learnings from the [Virtual Power Station 2 project \(VPS2\)](#).
- Building on the Horizon Carnarvon DER trials – similar trials, but upscaled.

Further information

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www.alicespringsfuturegrid.com.au

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