

RECHARGING THE TERRITORY

A report by Tom Quinn, Springmount Advisory

How the Northern Territory can
create thousands of jobs, lower
the cost of living, and embrace
the renewables revolution

JOBS | SKILLS | LOWER BILLS



ACKNOWLEDGEMENTS

Thank you to Alan Langworthy, former Chair of the Roadmap to Renewables, Jonathan Kneebone and Karrina Nolan from the First Nations Clean Energy Network, Julie Fraser from the Australian Services Union, Caitlin Perry from NTCOSS, Dr Ruwani Peiris of Aboriginal Medical Services Alliance NT, Ned Bible and Clare Horsfall from Jesuit Social Services, Mark Burgess from Energy Skills Australia and many more who provided their time and expertise.

Published by the Environment Centre NT Inc.
3/98 Woods Street, Darwin, NT 0800.
Authorised by K. Howey.

First Published February 2024

Recharging the Territory. Jobs, Skills, Lower Bills should be attributed to Tom Quinn, Springmount Advisory.

This document is available for download from www.ecnt.org.au.

The Environment Centre NT acknowledges that we work on Aboriginal land. We pay our respects to Elders past, present and emerging.

CONTENTS



FOREWORD	3
INTRODUCTION	4
STREAM 1	10
PRIORITISE THE PORT OF DARWIN	
STREAM 2	15
ENERGY AND SKILLS FOR THE FUTURE	
STREAM 3	24
BETTER HOMES UPGRADE PROGRAM	
CONCLUSION	29



FOREWORD

The Environment Centre of the NT is delighted to partner with Tom Quinn on this bold new report, which puts renewable energy at the centre of a sustainable growth strategy for the Northern Territory's economy. The need has never been more urgent.

While the impacts of global heating are being felt across the world, the forecasts for northern Australia are particularly dire. Within a generation, Darwin could become uninhabitable due to climate change. At the same time, the Territory's economy is faltering, and saddled with increasing debt. In addition, everyday Territorians have been impacted by sharp increases in the cost of living.

To address these problems, we need innovative and brave solutions. New economies must be forged, founded on principles of climate justice that focus on the historical and social genesis of climate change, examine its unevenly distributed impacts, and attempt to engage solutions that support those who have been traditionally marginalised and most affected.

Instead, the Federal and Northern Territory Governments' \$1.5 billion program to convert the Middle Arm peninsula into a major gas and petrochemical export hub will entrench our dependence on fossil fuels and risk the air, climate and harbour upon which the Territory lifestyle depends.

We can do so much better

This report shows that redeploying the Federal Government's \$1.5 billion dollar commitment into a Recharging the Territory Package would deliver more high-quality jobs for locals, directly tackle the NT's cost-of-living crisis and provide the foundations for a strong and diverse new economic base.

We can invest in energy and skills to fix the NT's unstable electricity system and provide energy security for households. We can provide energy upgrades for every low income and public housing dwelling in the NT, which will give families economic relief in a cost-of-living crisis. Finally, we can expedite strategic industrial land development at East Arm or returning the Port of Darwin to public ownership.

This report reflects an economic vision that recognises and plays to the Territory's strengths and capacities, reduces emissions, builds the skills of local people, cares for people and country, and makes the Territory more prepared to meet the challenges of the future.

We have a choice to transform the lives of Territorians. It's time to recharge the Territory.

Kirsty Howey
Executive Director
Environment Centre NT

INTRODUCTION

The Federal Government's \$1.5 billion dollar program to convert the Middle Arm peninsula into a major gas and petrochemical export hub will transfer public money into the hands of offshore gas companies with little benefit for Territorians, or for a competitive, clean economy future.

The program will fund wharves to export fossil gas, methanol and petroleum, the dredging of Darwin harbour and the Elizabeth River, and the clearing of woodlands and mangroves on Middle Arm. The project will result in the government subsidising infrastructure for gas companies already banking record profits.

Funding this development will come at a significant cost to residents. The Institute for Energy Economics and Financial Analysis has found that the "business model underlying the plan is not viable"¹ and that the precinct relies on "unrealistic policy and financial assumptions."²

Meanwhile, doctors have warned in an open letter to the Prime Minister that the project poses "unacceptable health risks to local communities"³ and

that the associated fracking of the Beetaloo Basin presents "risks to children and communities living in the region from exposure to heavy metals, carcinogens, and other toxic chemicals."⁴

There is a better way

This report shows that redeploying the Federal Government's \$1.5 billion dollar commitment into a **Recharging the Territory Package** would deliver more high-quality jobs for locals, directly tackle the NT's cost-of-living crisis, and provide the foundation for a strong and diverse new industry sector. It would see federal investment in three new streams that play to the Northern Territory's natural strengths and existing skills base.

Recharging the Territory will create high-quality jobs for locals, and provide the energy security and workforce skills that industry requires to invest and grow. Additionally, it will cut the cost of living for Territorians, secure the supply of clean, low cost energy and enable completed solar farms to connect to the grid, and underpin investment in solar, remote microgrids and home construction.

RECHARGING THE TERRITORY

INVESTMENT STREAMS



STREAM 1

Expedite strategic industrial land development at East Arm or return the Port of Darwin to public ownership to make East Arm a genuine sustainable industry hub.

Investment required: \$495 million



STREAM 2

Invest to fix the NT's unstable electricity system and provide energy security for industry and households, establishing a four-campus Northern Australia Renewable Energy Training Centre of Excellence, and rolling out microgrids in remote regions.

Investment required: \$417.8 million



STREAM 3

Establish a better homes upgrade program for every low income and public housing dwelling in the Northern Territory, double the number of households with solar, and expand the Remote Housing Investment Package.

Investment required: \$587.2 million

THE CHOICE

There is a clear choice, which speaks to our priorities as a nation.

The Australian Government can keep its commitment to invest \$1.5 billion in the Northern Territory in a way that can benefit all Territorians and create good quality jobs that help decarbonise and reduce energy costs; or it can spend the money to subsidise the expansion of the fossil oil and gas sector, dredge the harbour and open up exploitation of the Beetaloo Basin which will result in a substantial increase in Australia's emissions.

Spending \$1.5 billion of taxpayer funds could deliver either of these two futures. The financial price for both options is the same, but the outcomes and benefits for the Territory are vastly different.

The choice should be easy.

\$1.5 BILLION ON THE RECHARGING THE TERRITORY PACKAGE

- Expedite strategic industrial land development at East Arm or use the funds to renationalise the Port of Darwin and establish East Arm as a sustainable industry hub (\$495m)
- Fund a 150MW/600MWh Darwin big battery and new microgrid investment across the NT (\$378m)
- Establish a four-campus Northern Australia Renewable Energy Training Centre of Excellence (\$25m)
- Provide \$15m for TAFE and university course subsidisation
- Double the number of homes with solar (\$116m)
- Deliver climate-safe upgrades for every low-income household in the Territory (\$225m)
- Install solar, insulation, and air conditioning for every public housing property (\$127m)
- Provide a \$120m top-up of the Remote Housing Investment Package
- Slash the cost of living and provide energy security and the work skills that industry requires to establish in the NT

OR

\$1.5 BILLION ON THE MIDDLE ARM GAS HUB

- Fund the dredging of Darwin Harbour
- Fund export wharves for LNG, methanol, ethylene, ammonia, petroleum and hydrogen

THOUSANDS OF JOBS FOR TERRITORIANS

Investing in the Recharging the Territory package will create thousands of good quality jobs for locals.

The Recharging the Territory package modelled in this report would generate 7,622 jobs across the Northern Territory. These would primarily be jobs for local tradies, electricians, and educators. Training for the next generation of workers will ensure we have future-ready skills right here in the Territory, reducing dependency on an interstate workforce.

In contrast, the Middle Arm gas precinct is likely to be dependent on FIFO workers brought in from interstate for the construction phase of the project.

The dependence on FIFO workers was highlighted in the Strategic Assessment Workforce Development analysis of Middle Arm conducted by the Chamber of Commerce in the NT, which found that “the domestic NT labour market is unlikely to supply all the capacities that will be needed to build the enabling infrastructure” and that the project would “need to rely on external recruitment of migrant and Fly-in Fly-Out (FIFO) Labour” for at least the short term.⁵

Short-term construction jobs don’t last either. Locals have learned this the hard way, as when INPEX sacked 1,400 construction workers right before Christmas in 2014⁶.

Modelling released by Infrastructure Australia under a Freedom of Information request has also shown that total expected job creation at the Middle Arm industrial hub is much lower than is being promoted by the NT Government. The analysis forecasts that the Middle Arm industrial hub will create only 1600 direct jobs, and 2131 indirect jobs (2840 total) by 2026 and 3009 direct jobs and 2602 indirect (5611 total) by 2036.

Redirecting funding into a Recharging the Territory package will be better for jobs and better for locals, while still unlocking a genuine sustainable development precinct clustered around the Port of Darwin’s East Arm wharves and rail terminal.

Recharging the Territory: Job creation by project

Port of Darwin renationalisation	*
Renewable Energy Training Centre of Excellence	116
Energy skills package	70
Darwin Big Battery	98
Regional Microgrids Program	128
Territory Solar program	818
Climate Smart Housing Upgrade Program	4,494
Public housing cost of living upgrades	819
Remote Housing Investment Package top up funding	1,081
Total jobs	7,622



“The jobs we need are for real locals. We saw with INPEX how industrial development can make jobs for people who never lived here before and will never stay once the busywork is done. I want NT Government to focus on jobs that meet the needs of people who already live here and want to stay.”

Palmerston resident feedback on the Middle Arm precinct, NT Chamber of Commerce report, p 41.⁷

STREAM 1:

PRIORITISE THE PORT OF DARWIN

Industrial expansion and public ownership of critical infrastructure

The Port of Darwin can be established as the central precinct for sustainable industry in Darwin either via investing in expedited development of the strategic industrial land holdings in East Arm or via a return to public ownership for an investment of \$495 million. Investing in the Port of Darwin will improve national security and relations with key allies as well as support ongoing improvements in relations with China. Public ownership will help unlock new investment into the East Arm precinct, create the economy of scale needed for industry and capitalise on existing rail and road infrastructure.

The Port of Darwin is superior for industry development

The Port of Darwin at East Arm is already the natural hub for industry. Centrally located between Darwin and Palmerston, East Arm features established infrastructure which is completely lacking at Middle Arm. This includes direct rail access to the wharf via the Berrimah Freight Terminal, and Truck Central for truck-based freight that is suitable for a wide range of port users.

The East Arm precinct has benefited from significant government investment over the years, including the brand new \$515 million dollar ship lift facility,⁸ and features a well-developed precinct plan designed with significant holdings of strategic industrial land earmarked for future development.

The Northern Territory's Land Development Corporation holds two strategically-located precincts adjacent to the Port of Darwin at East Arm. The Marine Industry Park and the Darwin Business Park⁹ that have a combined area of 300 hectares of industrial land clustered around the port and are optimal for the future expansion of industry and manufacturing in Darwin.

Expediting Land Development Corporation's existing plans, and building a publicly owned common user sustainable industrial precinct will concentrate future industrial development in East Arm and give the NT the best chance of developing a strong and viable industrial future.

Critical minerals producers, such as Core Lithium, have already established export operations at the port due to the existing bulk minerals ship loading capacity¹⁰ and common user facilities.

Concentrating industrial development on the site will enable greater economies of scale, industrial proximity, and the opportunity to capitalise on shared infrastructure to make local industry competitive. This is where investment should occur to build a sustainable industrial precinct that will underpin the economic future for the Territory.

Publicly owned common user manufacturing infrastructure

Investing \$495 million to expedite the development of the Land Development Corporation's strategic industrial land and marine industry park lots and establish a dedicated, publicly owned common user manufacturing and industrial zone will firmly establish East Arm as the NT's sustainable industrial centre and capitalise on its extensive existing infrastructure and location advantages.

Common User Manufacturing facilities are large scale, government-owned pieces of industrial infrastructure where the state invests in cutting edge industrial technologies and the private sector bids for access. Infrastructure in this mould, like the Australian Marine Complex in WA, have a demonstrated track record of generating good jobs, helping SMEs reach scale and creating new industrial capabilities.

Middle Arm is a poor location for sustainable industry

Middle Arm in contrast offers none of the advantages that exist at the Port of Darwin in East Arm. The Middle Arm site is isolated from the main population centres in Palmerston and Darwin, the shipping channel to the proposed wharves requires significant and ongoing dredging, and there is no rail access to the port area, no bulk material loading facilities, nor are there the closely located support services that exist at East Arm currently.

Spending \$1.5 billion on Middle Arm will prove a slippery slope that will likely cascade into ongoing demands for more significant government expenditure to make up for the precinct's underdeveloped infrastructure and inherently less competitive location.

Due to the small population and size of Darwin, duplicating infrastructure across two locations will spread the Northern Territory's finite workforce and resources thinly, and ultimately undermine the competitiveness of port services. Concentrating development in a single location is a wiser choice for establishing a competitive industrial sector.

AN INFRASTRUCTURE ADVANTAGE

	Port of Darwin East Arm	Middle Arm Precinct
Rail mounted bulk minerals ship loader	✓	✗
Heavy lift capabilities	✓	✗
Berrimah Rail Freight Terminal & Truck Central (15)	✓	✗
Existing hardstand and common user facilities	✓	✗
Darwin Ship Lift	✓	✗
Proximity to Darwin and Palmerston	✓	✗

Renationalising the Port of Darwin

An alternative to expediting development at East Arm and establishing a publicly-owned common user manufacturing infrastructure precinct is to bring the Port of Darwin back into public ownership.

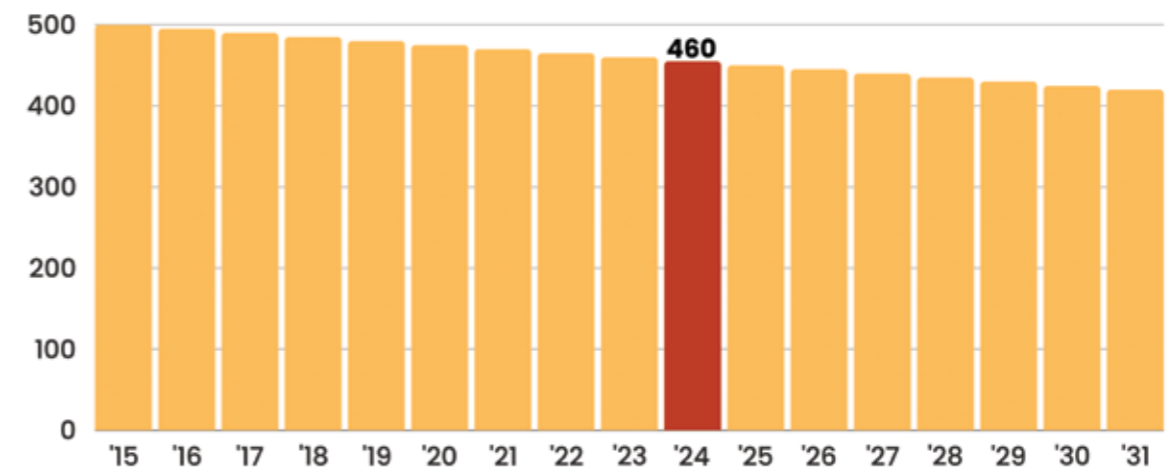
In 2015, in a highly controversial move by the Northern Territory Government¹², the Port of Darwin was leased to the foreign owned Landbridge Group for \$506 million. The 99-year lease has generated ongoing concerns due to its being Australia's most important port and naval base in the north, and a critical export facility.

Buying out the remaining portion of the lease with a generous compensation payment and renationalising the Port of Darwin will return Australia's most strategic northern port to public ownership and help resolve the ongoing controversy about the arrangement.

Returning the port to public ownership is calculated to cost \$495 million based on the remaining lease value and compensation. The 99-year lease signed with Landbridge equates to an average value of \$5.1 million per year. Using an annual depreciation rate, the remaining effective value of the lease is calculated at \$460 million in 2024. This is assuming that Landbridge has met all the commercial obligations under the lease. The Northern Territory has previously had to terminate a separate lease and reclaim land from Landbridge in 2021 due to a failure to meet the lease conditions.

Additionally, as part of maintaining good relations with our trading partners, an additional compensation payment of \$35 million has also been modelled into the renationalisation costing. This would return the Port of Darwin to government ownership and help pave the way for the East Arm precinct of the port to become a competitive and diverse industrial precinct for Darwin.

PORT OF DARWIN EFFECTIVE LEASE VALUE
[\$M]



Investing in Middle Arm doesn't stack up

Research by the Institute for Energy Economics and Financial Analysis has found that the Middle Arm industrial precinct proposal relies on "market assumptions [that] are overly optimistic; infrastructure needs are substantial, requiring policy and finance decisions that will place stress on federal and local budgets; and the plan is misaligned with global efforts to curtail greenhouse gas (GHG) emissions."¹³

Furthermore, the "common user" facilities proposed for the Middle Arm precinct, unlike in East Arm, are not 'common' in the usual sense of the word. The five export wharves outlined in the 'balanced' development scenario by the NT Government are designed for LNG, methanol, ethylene, ammonia and "clean petroleum", and hydrogen¹⁴ exports - wharves exclusively designed for fossil fuel exports are not 'common user infrastructure' in any general understanding of the term.

In contrast, the wharves at the Port of Darwin's East Arm precinct are already genuinely 'common user' and cater to all industries including general cargo, containers, motor vehicles, livestock, bulk ore and bulk liquids.¹⁵

Splitting the NT's port resources between the two sites will create a diseconomy of scale and hamper the economic efficiency of industrial development. Investment in the Port of Darwin and the East Arm Sustainable Development Precinct must be prioritised in order to establish a competitive future for industry in the Territory.



***"The plan is also based on unrealistic policy and financial assumptions."*¹⁶**

Institute for Energy Economics and Financial Analysis (2023)

STREAM 2: ENERGY AND SKILLS FOR THE FUTURE

Big batteries, energy security and a skilled energy workforce

Investing \$417.8 million of the Middle Arm funding into a comprehensive Energy and Skills investment package will set up the Northern Territory for the future. The package would fund the establishment of a four-campus \$25 million **Northern Australia Renewable Energy Training Centre of Excellence** to train the next generation of energy workers, along with a \$15 million **Energy Skills Fund** to reduce study costs. The primary investment would fund the construction of a **150 MW / 600 MWh big battery** that will stabilise the grid, providing the energy security that industry requires to invest and expand, as well as investing an additional \$50 million into the Regional Microgrids Program to deploy solar and storage solutions in remote communities.

A stable energy system is foundational for industry. By constructing a modern-sized Big Battery within the Darwin-Katherine Interconnected System (DKIS) alongside a \$50 million expansion of the Regional Australia Microgrid Pilots Program¹⁷, the Northern Territory can fix systemic issues in the electricity system and allow more low-cost renewable energy to connect.

Large-scale storage is the key that will unlock low-cost, clean power supply in the Northern Territory and rectify ongoing grid stability issues and underperforming reserves from the Blacktip gas field. In particular, a genuine Big Battery will allow completed large-scale solar projects around the Darwin region to finally connect to the grid as well as pave the way for more households to install solar and cut energy bills.

Investing in a new generation of skilled energy workers and modernising the increasingly fragile electricity system will attract new businesses to the Northern Territory and enable the expansion of low cost renewable energy projects that industry needs to grow.

Ensuring there are skilled workers able to support the transition is essential, especially as the Northern Territory is already experiencing shortages in most electrical professions.

Establishing a four-campus Northern Australia Renewable Energy Centre of Excellence at Charles Darwin University coupled with a \$15 million Energy Skills and Training package will help position the Territory as the leading provider of specialised energy training in the region and support the transition to a clean future. This will equip local workers with the qualifications needed to deliver renewable energy projects large and small, and address critical skills shortages in this area.

ENERGY AND SKILLS	COST (\$)	OUTCOME	JOBS
Darwin Big Battery	327.8M	Energy security, grid stabilisation and allow more solar farms in the NT	98
Four campus Northern Australia Renewable Energy Training Centre	25M	Renewable Energy Training and Skills Centres of Excellence in Darwin (\$15m), Katherine (\$2m), Alice Springs (\$7m) and Tennant Creek (\$1m)	116
Energy Skills Package	15M	Skills and training for Territory workers	70
Regional Microgrids Program	50M	More microgrids, lower remote area energy costs	128
COST SUBTOTAL	417.8M	JOBS SUBTOTAL	411

Grid instability and unconnected solar farms

"The most pressing challenge is the security of the network on low demand ("minimum demand") days. This occurs on sunny and mild days when household solar is largely meeting the low energy demands of customers."¹⁸ - Power and Water

The growth of solar rooftop systems and farms in the Territory coupled with a failure to invest in large-scale storage to balance energy supply and demand pressure is creating system risks to the three electricity grids in the Northern Territory, especially in the DKIS. These issues are further compounded by faltering gas generation due to ongoing production issues in the Blacktip offshore gas field.¹⁹

In the DKIS, minimum demand levels during the daytime are now approaching Power and Water's minimum threshold of 60 MW, below which thermal generation assets struggle to provide sufficient inertia to keep the grid stable²⁰ and prevent system collapse. The drop in midday demand can be observed in changes to minimum demand profiles between 2017 and 2020 (see chart).

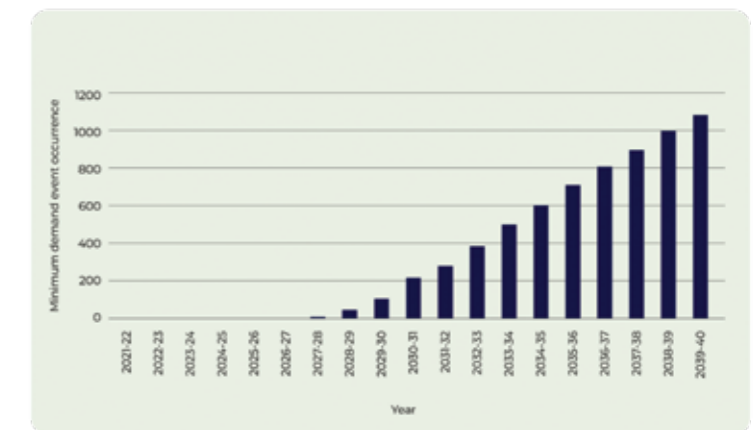
Gas and diesel based generators can't assist with low demand nor provide sufficient frequency control and other grid services required at these low levels of demand. A failure to address this issue will result in escalating 'minimum demand events' that threaten the electricity network.

COMPARISON OF DEMAND PROFILE ON MINIMUM DEMAND DAY IN 2017 AND 2020 IN DARWIN-KATHERINE [MW]

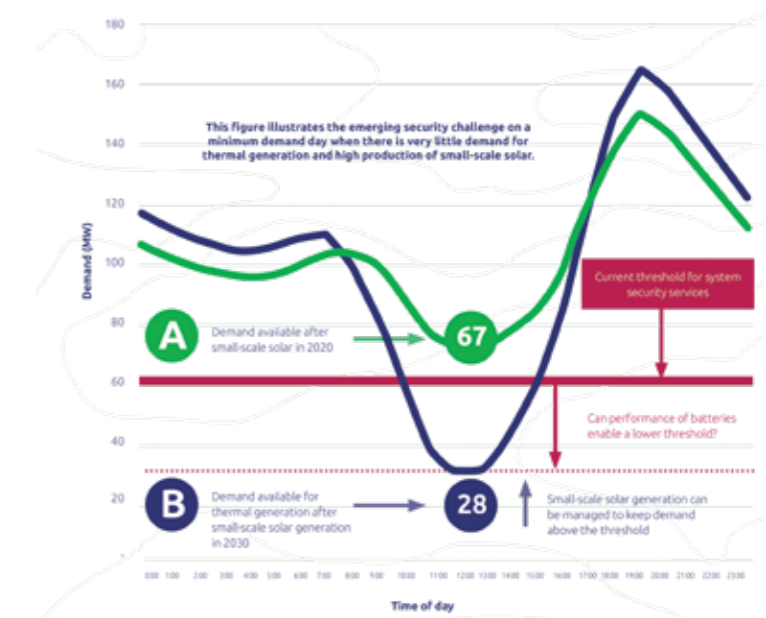


Source: Transmission and Distribution Annual Planning Report 2020, Power and Water²¹

FORECAST MINIMUM DEMAND 'EVENTS' ON DARWIN-KATHERINE BY YEAR



https://www.powerwater.com.au/_data/assets/pdf_file/0031/153967/20221229_DA_TDPAR-Report_2022_Accessibility-AW.pdf



Source: Darwin Katherine Electricity System Plan, Power Water P34
https://territoryrenewableenergy.nt.gov.au/_data/assets/pdf_file/0011/1056782/darwin-katherine-electricity-system-plan-web.pdf

A Big Battery for Darwin

What the Northern Territory requires is significant investment in large-scale storage or 'big batteries' to stabilise the grid and unlock renewable generation.

The Darwin Katherine Electricity System Plan by Power and Water shows that storage is the solution that can enable a much lower minimum demand threshold for system security services.

While one 'big' battery, the 35 MW/35 MWh Darwin-Katherine Battery Energy Storage System (DK BESS) currently being installed at the Channel Island Power Station, is a good start that will reduce emissions by 58,000 tonnes annually and deliver cost savings of about \$9.8 million per year,²² it is far too small to make a difference.

The system is a tiny system in contrast to modern battery storage projects in Australia (see table) and lacks the capacity required to fix the systemic issues plaguing the DKIS.

Big batteries are measured by both MW and MWh. MW (Megawatt) is a measure of battery capacity or its maximum rate of energy flow. Similar to how the size of a pipe determines the maximum volume of water that can leave or enter a tank. MWh (Megawatt-hour) is a measure of the storage capacity of the battery. This indicates the maximum quantity of energy the battery can store when fully charged (similar to the capacity of a water tank).

Australia's Big Battery comparison table

BATTERY PROJECT	DK BESS	HORNSDALE [SA BIG BATTERY]	CANBERRA BIG BATTERY	VICTORIA BIG BATTERY	COLLIE WA	WARATAH NSW
Capacity	35 MW	150 MW	250 MW	300 MW	500 MW	850 MW
Storage	35 MWh	194 MWh	500 MWh	450 MWh	2000 MWh	1680 MWh
Scale		5.5 x more storage	14 x more storage	13 x more storage	57 x more storage	48 x more storage

Look West for storage solutions

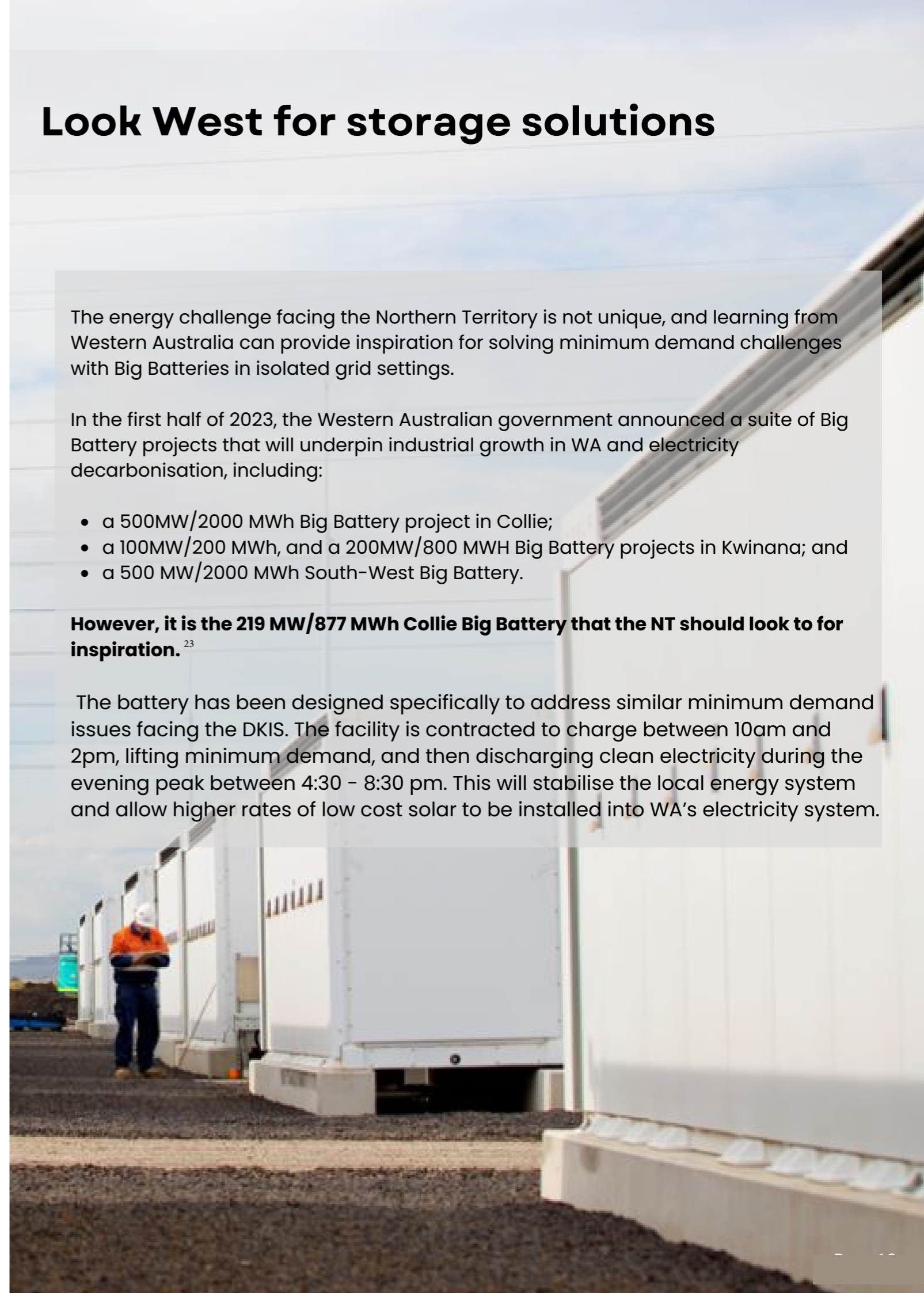
The energy challenge facing the Northern Territory is not unique, and learning from Western Australia can provide inspiration for solving minimum demand challenges with Big Batteries in isolated grid settings.

In the first half of 2023, the Western Australian government announced a suite of Big Battery projects that will underpin industrial growth in WA and electricity decarbonisation, including:

- a 500MW/2000 MWh Big Battery project in Collie;
- a 100MW/200 MWh, and a 200MW/800 MWh Big Battery projects in Kwinana; and
- a 500 MW/2000 MWh South-West Big Battery.

However, it is the 219 MW/877 MWh Collie Big Battery that the NT should look to for inspiration.²³

The battery has been designed specifically to address similar minimum demand issues facing the DKIS. The facility is contracted to charge between 10am and 2pm, lifting minimum demand, and then discharging clean electricity during the evening peak between 4:30 - 8:30 pm. This will stabilise the local energy system and allow higher rates of low cost solar to be installed into WA's electricity system.



Investing in modern large-scale electricity storage for Darwin

Installing an equivalent battery in the DKIS is estimated to cost \$327.8 million. This would deliver a 150 MW/600 MWh Big Battery that is capable of delivering power for 4 hours – essentially helping to meet more than half of evening demand using stored solar energy from earlier in the day. The ownership model for the battery could include joint management with an entity like Larrakia Energy to ensure the project delivers energy justice and economic development benefits to Traditional Owners.

While detailed system modelling is required to properly size large-scale storage this provides an illustration and indicative costing, while also aligning with the need for 110 MW battery capacity and 600 MWh storage outlined in the Darwin Katherine Electricity System Plan.²⁴

Alternatively, a 2 hour Big Battery (250 MW/500 MWh) is modelled to cost \$336.5 million dollars for the Territory, equivalent in size to the Canberra Big Battery which services a population larger than the DKIS.

While detailed system modelling is required to properly size large-scale storage this provides an illustration and indicative costing, while also aligning with the need for 110 MW battery capacity and 600 MWh storage outlined in the Darwin Katherine Electricity System Plan.

Unlocking large-scale solar.

Installing a modern Big Battery into the DKIS will enable more households to install solar and unlock supply from three large-scale solar projects in the Northern Territory that were completed in 2022. These solar farms are complete but are currently prevented from connecting their low-cost and clean power supply to the grid.

The failure to connect the Batchelor 1 (10 MW), Batchelor 2 (10 MW), and Manton (10 MW) solar farms since 2020 is costing energy consumers in Darwin and Katherine, and forcing the use of much more expensive gas fired power. Additionally, the 25 MW solar farm in Katherine has been allowed to connect but still can't send energy to consumers due to the grid issues.²⁵

Investing in a Big Battery is the key that will unlock the Northern Territory's clean energy future and attract new industries to the region.

Expanding renewable microgrids

Expansion of solar and storage microgrid projects will also help reduce energy costs in remote communities including the 72 communities serviced by Indigenous Essential Services.²⁶

A \$50 million dollar top up investment would substantially expand the \$75m of funding committed to First Nations Community Microgrids in ARENA's Regional Microgrids Program.²⁷

Many remote communities depend on diesel generators. Emissions from diesel generators pose serious negative health effects on remote residents who already experience a higher disease burden.

Expanding renewable microgrid investments will enable more solar to be installed in remote communities and reduce the \$30 million per annum cost of supplying diesel to remote and regional mini-grids.²⁸

\$50 in million top-up funding will support more high-impact projects, like the Ngardara Solar Microgrid Project led by Original Power in Borroloola,²⁹ the Alice Springs Future Grid project run by Desert Knowledge Australia which has helped deliver a large-scale battery and residential battery trial for 50 residents,³⁰ and the Solar SETuP program which has seen the construction of 10 MW solar capacity in 25 remote Indigenous communities in the Northern Territory.³¹

A Northern Australia Renewable Energy Training Centre of Excellence

A domestic and global shortage of skilled electrical workers is an opportunity for the Northern Territory to build a world-class Northern Australia Renewable Energy Training Centre of Excellence with four campuses throughout the Northern Territory.

The Electrical Trades Union has calculated that Australia requires 100,000 new electrical trades apprentices to successfully transition to a clean energy future and called for the establishment of dedicated renewable energy training centres across the country.³²

A \$25 million investment could establish a primary campus for the Northern Australia Renewable Energy Centre of Excellence in Darwin/Garramilla (\$15m) at Charles Darwin University, plus three regional campuses at the Intyalheme Centre for Future Energy in Alice Springs (\$7m), as well as Katherine (\$2m), and Tennant Creek (\$1m) to ensure Territorians can receive world-class electrical training.

Investing in a Centre of Excellence modelled upon the successful Asia Pacific Renewable Energy Training Centre at Federation University in Victoria and the Electro Group Training Centre in Queensland will enable the Northern Territory to capitalise on its established higher education sector and equip local workers with the skills needed to prosper in the growing energy economy.

Establishing a Centre of Excellence will position Darwin as a dedicated training hub providing first-class education services for energy specialists across northern Australia and neighbouring countries.

Conversely, a failure to invest in this sector will deprive the region of skilled workers and jeopardise the development of the large scale solar projects, long-distance transmission, and microgrid services that will underpin the industrial future of the Northern Territory.

The Northern Territory is already experiencing shortages of most electrical occupations according to the National Skills Commission. This makes training a new generation of workers all the more urgent.

OCCUPATION	ANZSCO CODE	RATING	FUTURE DEMAND
Electrical Engineer	233311	Shortage	Moderate
Electrical Engineer Draftsperson	312311	No shortage	Moderate
Electrical Engineer Technician	312312	No shortage	Moderate
Automotive Electrician	321111	Shortage	Moderate
Electrician (General)	341111	Shortage	Strong
Electrician (Special Class)	341112	Shortage	Strong
Electrical Linesworker	342211	Shortage	Moderate

Source: National Skills Commission, Skills Priority List [45]

Case Study: The Asia Pacific Renewable Energy Training Centre (APRETC) model

The APRETC at Federation University in regional Victoria offers a model for establishing a Northern Australia Renewable Energy Skills and Training Centre of Excellence. Established in 2021, APRETC features a 23-metre wind turbine training tower – the first of its kind in Australia – where the next generation of workers can develop their skills working at heights on a real tower.

Focussed on training, research-led maintenance and innovative diagnostics to support the local wind energy industry, APRETC was established with \$6 million in funding from the Victoria State Government³³ and \$1.8 million in funding from renewable energy companies Vestas, Acciona, GPG and Tilt Renewables.³⁴

APRETC is the only location in Australia to offer internationally-recognised turbine technician training including the Global Wind Organisation (GWO) basic safety training and refresher training courses and BZEE accreditations.

Building on the Territory's energy legacy

Establishing a four-campus Northern Australia Renewable Energy Training Centre of Excellence will build on the NT's pioneering energy leadership, including through innovative programs such as Bushlight, Alice Solar City and Solar SETuP.³⁵

A dedicated Centre of Excellence will help ensure residents from across the Territory will be able to receive best practice electrical education in accessible locations. This will provide Territorians with good quality job prospects and ensure there is the talent pool of workers needed to build the Northern Territory's clean energy future.

Energy skills and training package

The establishment of a Northern Australia Renewable Energy Skills and Training Centre of Excellence could be complemented with a \$15 million education and training package.

The package would provide free or heavily subsidised courses for Territorians undertaking university courses such as Electrical Engineering and TAFE courses such as Cert III in Electrotechnology, as well as support for apprentices and remote community members.

A top priority should be on providing support to increase the number of indigenous, female and culturally diverse electrical workers who are highly underrepresented in the energy sector.

The package could also be utilised to support a targeted extension of the New Colombo Plan³⁶ to enable students from neighbouring nations such as Timor-Leste, Indonesia and Papua New Guinea to study electrical courses in the Northern Territory. This would help the two-way flow of skills and support the electrification and decarbonisation efforts of the region.

STREAM 3:

BETTER HOMES UPGRADE PROGRAM

“Energy poverty amplifies poor health in remote communities, and this runs hand-in-hand with very poor quality housing.”³⁷

Dr Simon Quilty

Investing the remaining \$587.3 million of the Middle Arm industrial precinct funding into a Better Homes upgrade program will provide climate safe upgrades for every single low-income household in the NT, and fund solar, insulation, and a new air conditioner for all public housing properties. Additionally, it will double the number of homes with solar panels, and provide a \$120.2 million top-up of the Remote Housing Investment Package.

Investing in a Better Homes Upgrade program will create good quality, ongoing work for trades workers throughout the Territory, provide more Territorians with solar energy and directly tackle the rising cost of living. Importantly, this initiative will capitalise on the existing workforce strengths and capabilities within the NT, providing jobs for locals and mitigating the negative impacts on house prices and rents caused by dependency on FIFO workers.

Homes in the Northern Territory, especially those in remote areas, experience high rates of energy disconnection and are poorly equipped to deal with extreme temperatures becoming more frequent.³⁸

This creates risk and vulnerability for people who require a stable power supply for medication storage (e.g. insulin) and dialysis, as well as disproportionate risk of heat stress.

Additionally, the number of households with rooftop solar is half that of the neighbouring states of Queensland, Western Australia and South Australia. This denies many households energy independence and locks households into paying more for electricity from the grid rather than relying on their own low-cost solar power. This is a direct cost to households as well as to the Territory’s budget.

The cost of the NT’s power bill subsidies rose by \$71.1 million to a total cost of \$161.3 million in 2023–24.³⁹

Despite these subsidies, experts say they will do little to help those in social and remote housing who must use pre-paid meters for their electricity supply.⁴⁰

A dedicated Public Housing Cost of Living upgrades program to install solar and energy efficiency improvements in public housing, plus a Climate Smart Housing Upgrade program to provide upgrades for all low-income households,⁴¹ will lead to a direct and lasting reduction of the cost of energy for the most vulnerable Territorians.

A four-stream Better Homes Upgrade program will help solve these issues by supporting Territory households to catch up in the national solar race, increasing investment in remote housing construction and providing critical investments that will make all low-income and public housing properties climate safe and energy efficient.

Increasing household solar installation rates will bring further downward pressure on energy costs, delivering energy cost relief to households and reducing recurrent budget impacts.

Doubling the number of solar homes in the Territory

Darwin has the highest solar irradiance of any capital city in Australia and the Northern Territory as a whole has higher rates on average than anywhere else in the country.

Yet despite this natural advantage, the Northern Territory has one of the lowest rates of household solar installations in Australia, with only 23% of dwellings hosting a rooftop solar system, equivalent to southern states like Tasmania (19%) and Victoria (24%).

In contrast, more than 40% of dwellings in each of the Territory’s neighbouring states have solar, with 44% in Queensland, 41% in Western Australia’s, and 47% in South Australia.

The low uptake of solar systems on rooftops in the Territory is depriving local households of low-cost clean power and is exacerbating the cost of living pressures facing many households.

A \$116 million Territory Solar program could double the number of dwellings with solar in the Northern Territory and help it catch up to neighbouring states.

A program offering a combination of grants and zero interest loans of up to \$6,000 in value per dwelling would drastically reduce the upfront cost of solar and help more households switch. If every applicant applied for the maximum value this would result in an additional 19,313 houses with solar in the NT and increase the percentage of dwellings with solar from 23% up to 42.7% – equivalent to Queensland.

If each house installed a 7.3 kW system, the current average system size in Darwin⁴², this would see 141 MW of solar being connected to the grid. This is more than the 129 MW⁴³ rated capacity of the Weddell Power Station, the second largest in the Territory, albeit with a lower capacity factor.

A scheme with these terms would also be the most generous on offer in Australia by far and would guarantee high rates of uptake. Alternatively, a less generous program could be designed so as to support a higher number of households or provide support for residential battery storage systems.

A Territory Solar program would be a significant job creator. Using job creation analysis by the University of Technology Sydney, a rooftop solar program of this size would create 818 job years⁴⁴ worth of employment in the Northern Territory.

Source: Analysis based on data from the Clean Energy Regulator⁴⁵ and the ABS Census 2021⁴⁶

Climate smart housing upgrade package

Residential homes are bearing the brunt of climate change impacts in the Northern Territory. Modelling shows that the hottest days in the Northern Territory are set to become hotter still and more frequent, and warm spells will be longer. The impacts of this will fall disproportionately on low-income and vulnerable people, especially those who live in poor-quality housing.⁴⁷

Healthabitat found that of the more than 7,500 Indigenous households it had surveyed in Australia, 59% regularly reached maximum summer temperatures above 40C, with 36% not having any active cooling system installed, and that 51% of the buildings reached a minimum temperature between 0C and 10C. High temperatures in the NT (and in the Top End, high humidity) already place people at risk of heat stress. Vulnerability to heat stress is heightened in people with chronic diseases like heart disease and kidney disease, and these conditions occur among Aboriginal people at some of the highest rates in the world.⁴⁸

The Northern Territory also has one of the lowest energy efficiency standards for buildings, a gap which is growing wider following the rejection of the new 7 star Energy Efficiency standards for homes which has been adopted by every other state and territory except Tasmania.

A \$225 million Climate Smart Housing Upgrade package could turn this situation around for thousands of households in the Territory.

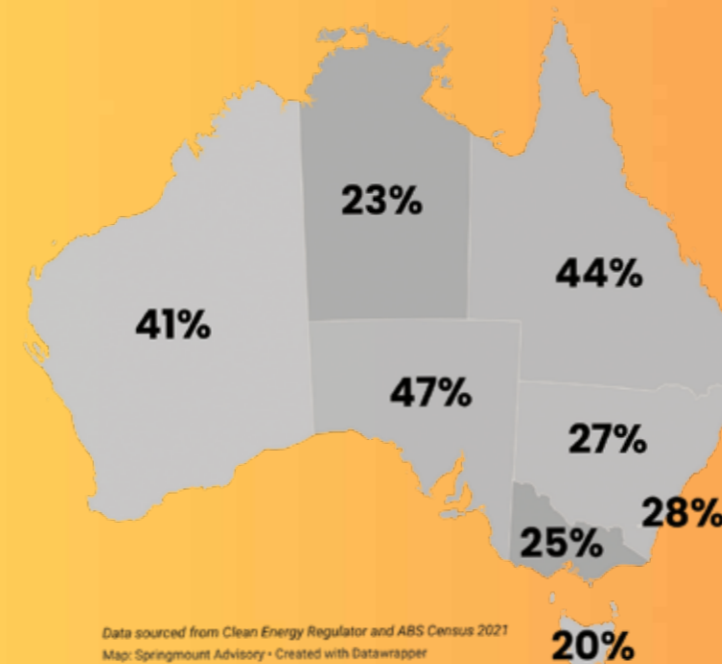
The Climate Smart Housing Upgrade program would provide efficiency upgrade grants of up to \$10,000 in value for all low income households in the entire Northern Territory. The program could be used for the installation of insulation, air conditioning and other energy efficiency upgrades for households with an equivalised income of less than \$1000 a week.

This would improve the quality of households across the Territory, cut the cost of living for low-income households, and reduce future health impacts from the changing climate. If all eligible households received an upgrade, this program would create an estimated 4494 job years worth of employment for local tradespeople.

"In extreme weather, these houses regularly become dangerously hot. On an extremely hot Northern Territory day, the electricity is more likely to go off."

Dr Simon Quilty

HOMES WITH SOLAR PANELS



Public housing cost of living package

"Incidents of involuntary 'self-disconnection' were up 6.4% between 2020/21 and 2021/22, and up 21.4% for the last two years to 41.4 disconnections per household. That represents nearly one disconnection a week for households with prepayment meters⁵⁴."

NT Council of Social Services

In addition to the Climate Smart Housing Upgrade program, there is an urgent need to upgrade the portfolio of 10,318 public housing dwellings in the NT, including 4890 in urban areas and 5428 in remote locations⁵³ overseen by the Department of Territory Families, Housing and Communities.

A \$126.5 million dollar Public Housing Cost of Living Upgrades program would deliver a 4kW solar system, insulation and a new split system air conditioning system for every single public housing dwelling in the Northern Territory.

The cost assumes that every single public housing unit requires solar, insulation and a split system air conditioner, and that a more competitive rate could not be negotiated via a bulk purchase contract.

This program would drastically cut the cost of living for all public housing tenants in the Northern Territory by providing low-income earners in public housing the benefits of solar energy, as well as improved thermal efficiency and efficient air conditioning. In addition, it would result in 41.3 MW of additional solar added to the NT grid and provide a degree of energy independence for all public housing residents.

Remote Housing Investment Package top up funding

Upgrading every single public housing and low income household in the Northern Territory is one part of the opportunity, but redirecting the Middle Arm industrial precinct funding will also enable the construction of more housing in remote regions.

The Northern Territory Housing Strategy calculates that over 5000 three-bedroom homes are required in order to alleviate undersupply in remote communities. Increasing supply will also help reduce the cost of living, with the NT reporting the second-highest average rent price for a 3 bedroom house in 2022.⁵⁵

The remaining \$120 million of the \$1.5 billion Middle Arm industrial precinct funding could be redirected to expand the Federal contribution to the existing Remote Housing Investment Package which is improving Aboriginal housing in remote communities.⁵⁶

Alternatively, funding could be directed to the HomeBuild Access program aimed at increasing the supply of new and affordable housing in the Northern Territory.⁵⁷ If the additional funding was spent by the HomeBuild program at the same efficiency as the current program average, this would result in 342 more new homes being built⁵⁸.

“Over 5000 three-bedroom homes are required in order to alleviate the undersupply in remote communities”⁶³

- Northern Territory Housing Strategy

A dedicated program to establish a high quality modular housing industry could also be funded to create local manufacturing jobs as well as more affordable remote housing solutions.⁵⁹

Similarly, the funding could alternatively be deployed through the Room to Breathe program⁶⁰ aimed at addressing overcrowding by increasing living spaces in existing housing. If the additional funding was spent by the Room to Breathe program at the same efficiency as the current program average, this would result in expansions of 1,350 more homes.⁶¹

Home construction is a major job creator. Research by National Housing Finance and Investment Corporation has shown that every \$1 million invested into residential housing construction supports nine jobs across the economy.⁶² Investing the final \$120 million into housing construction would help support an additional 1,081 jobs for local tradespeople.

CONCLUSION

The Federal Government’s commitment to invest \$1.5 billion into the Northern Territory could be a game changer for tens of thousands of households and build a firm foundation for the future of industry. Choosing to direct the \$1.5 billion into a Recharging the Territory package will deliver benefits to all Territorians through improved job opportunities, skills and training, and household upgrades that reduce cost of living pressures and provide climate resilience.

Additionally, the Territory’s industrial development prospects will be strengthened by stabilising the energy network and making East Arm a sustainable industrial hub. This approach aligns with the Federal Government’s values and vision for the future and would provide energy security for the Territory and national security for Australia.

Recharging the Territory would:

- establish East Arm and the Port of Darwin as a sustainable industrial precinct;
- establish a four-campus Northern Australia Renewable Energy Training Centre of Excellence;
- construct a Darwin Big Battery and fix systemic grid stability issues;
- expand the deployment of microgrids throughout the NT;
- subsidise TAFE training and electrical degrees for local students;
- provide solar, insulation and air conditioning upgrades for every single public housing dwelling;
- fund climate safe upgrades for every low-income household;
- deploy solar on twice as many household rooftops and catch up to neighbouring states;
- build hundreds of new homes and household expansions in remote areas.

Alternatively, continuing with the plan to fund Middle Arm will subsidise fossil fuel export wharves, the dredging of Darwin Harbour, and the clearing of mangroves. This dangerous precedent will result in gas companies seeking further handouts to underpin unviable business plans, while also endangering the health of the local community, lighting the fuse on untapped carbon bombs in the Beetaloo Basin and the establishment of a dangerous petrochemical precinct next to Palmerston’s residential area.

The choice is clear. Recharging the Territory will create more jobs, address the cost of living crisis, and build the foundations for a cleaner, more prosperous future for the Northern Territory.

Appendix I – Household solar installation rates

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
Small scale solar installations per state Sept 2023	52,228	901,607	22,311	969,662	382,252	51,008	696,197	475,392	3,446,720
Dwellings by state 2021	187,153	3,364,802	96,564	2,195,595	808,379	259,318	2,810,815	1,150,416	10,873,042
Sources: Clean Energy Regulator, Small Scale Installation Data; ABS, Housing Census 2021									

Appendix II – Public Housing Upgrade Inputs

Technology	Unit cost
Solar system investment (4kW) https://www.solarchoice.net.au/solar-panels/solar-power-system-prices/	\$7,210.00
Insulation* https://hipages.com.au/article/how_much_does_insulation_cost	\$3,000.00
Split system airconditioner (5kW system)** https://darwincooling.com.au/collections/split-system-air-conditioners	\$2,050.00
*Cost range of \$2500 to \$4500, assumed \$3000 due to smaller average size of public housing ** Unit plus installation cost	

Appendix III – Remote Housing program performance data

	Total expenditure	Total homes approved	Modelled increase from additional investment of \$223m
Room to Breathe Performance	\$88,600,000.00	996	1,350
HomeBuild Performance	\$567,300,000.00	1617	342

Appendix IV– Employment Factors

Work type	Jobs per unit	Unit	Notes
Battery storage (4hrs)	0.62	MW	UTS ISP 2022 Workforce Study
Battery storage (2hrs)	0.52	MW	UTS ISP 2022 Workforce Study
Battery storage (installation)	0.61	MW	UTS ISP 2022 Workforce Study
Battery storage (O&M)	0.04	MW	UTS ISP 2022 Workforce Study
Household retrofits	0.2	Household	RACE for 2030 One Million Homes Report
Rooftop solar	5.8	MW	UTS ISP 2022 Workforce Study
Water heating system installation	0.015	unit	UTS RE Employment Methodology
Insulation installation	0.0225	property	EEC calculates that installing insulation require 1.5 as much time as installing a water heater
Housing construction	9	\$ million	NHFIC Building Jobs Report
Microgrid (US ratio)	3.4	\$USD million	The Renewable Energy Economic Benefits of Microgrids (USA)
TMicrogrid (Converted AU ratio)	2.55	\$AUD million	Average USD:AUD exchange rate in 2021 = 0.7513 USD
Regional Tertiary education job creation	4.65	\$AUD million	Nous Group Economic Impact of the Regional Universities Network study

Appendix V– Total Additional Solar

	Quantity of systems	Average system size (kW)	Total MW
Territory Solar program	19313	7.3	141.0
Public housing solar	10318	4	41.3
Total			182.3

- 1 Institute for Energy Economics and Financial Analysis (2023), Middle Arm Gas and Petrochemicals Hub: Unprofitable and Problematic. <https://ieefa.org/resources/middle-arm-gas-and-petrochemicals-hub-combination-problems-makes-it-unprofitable-business>
- 2 *Ibid*
- 3 Health professionals' letter to the Prime Minister - in support of NT paediatricians (2023). https://docs.google.com/forms/d/e/1FAIpQLSebfKj7hKMYcs9_E9547CInm3TEZ290IMje_G45y0D5VmvhMA/viewform
- 4 Yin, R. and Barraclough, K. (2023), Health professionals urged to join fight against harmful developments in the Northern Territory, Croakey. <https://www.croakey.org/health-professionals-urged-to-join-fight-against-harmful-developments-in-the-northern-territory/>
- 5 Chamber of Commerce Northern Territory (2022), Strategic Assessment Workforce Development, page 41
- 6 Oaten, J. (2014), Inpex shedding 1,400 jobs in Darwin, with many gone just before Christmas, ABC. <https://www.abc.net.au/news/2014-12-14/inpex-sheds-1400-jobs-just-before-christmas/5963254>
- 7 Northern Territory Government - Middle Arm Community Feedback Map. <https://haveyoursay.nt.gov.au/middle-arm-sustainable-development-precinct/maps/feedback-map#marker-130245>
- 8 Adam, N. (2023), Ship Lift Back on Track, Territory Business Magazine. <https://territoryq.com.au/ship-lift-back-on-track/>
- 9 Land Development Corporation NT, Marine Industry Park. <https://landdevcorp.com.au/project/marine-industry-park/>
- 10 Darwin Port, East Arm and Fort Hill Wharf Overview. <https://darwinport.com.au/facilities-services/east-arm-fort-hill-wharf-overview>
- 11 Land Development Corporation NT, Truck Central. <https://landdevcorp.com.au/project/truck-central/>
- 12 Gibson, J. (2023), Darwin Port lease remains under scrutiny as PM's department seeks input from national security agencies, ABC. <https://www.abc.net.au/news/2015-10-13/chinese-company-landbridge-wins-99-year-darwin-port-lease/6850870>
- 13 Institute for Energy Economics and Financial Analysis (2023), Middle Arm Gas and Petrochemicals Hub: Unprofitable and Problematic, *op cit* p14.
- 14 Cox, L. (2023), Albanese government knew 'sustainable' Darwin harbour project would be used for gas export, documents show. Guardian Australia <https://www.theguardian.com/australia-news/2023/jun/07/albanese-government-knew-sustainable-darwin-harbour-project-would-be-used-for-gas-export-documents-show>
- 15 Darwin Port, East Arm and Fort Hill Wharf Overview. <https://darwinport.com.au/facilities-services/east-arm-fort-hill-wharf-overview>
- 16 Institute for Energy Economics and Financial Analysis (2023), Middle Arm Gas and Petrochemicals Hub: Unprofitable and Problematic. *op cit* p14

- 17 Australian Renewable Energy Agency (2023), Regional Microgrids Program. <https://arena.gov.au/funding/regional-australia-microgrid-pilots-ramp/>
- 18 PowerWater (2022), Transmission and Distribution Annual Planning Report, https://www.powerwater.com.au/_data/assets/pdf_file/0031/153967/20221229_DA_TDPAR-Report_2022_Accessibility-AW.pdf
- 19 Fitzgerald, D. (2022), NT's Blacktip gas field production drops, forcing shutdown of Northern Gas Pipeline, ABC. <https://www.abc.net.au/news/2022-10-22/blacktip-gas-field-production-problems-power-and-water/10155526>
- 20 Northern Territory Government (2021), Darwin-Katherine Electricity System Plan. https://territoryrenewableenergy.nt.gov.au/data/assets/pdf_file/0011/1056782/darwin-katherine-electricity-system-plan-web.pdf
- 21 PowerWater (2022), Transmission and Distribution Annual Planning Report. https://www.powerwater.com.au/_data/assets/pdf_file/0020/62138/2020-TDAPR-updated-23-03-2022.pdf
- 22 Carrol, D. (2023), NT's shift to solar takes step forward with big battery milestone, pv magazine. <https://www.pv-magazine-australia.com/2023/05/15/nts-shift-to-solar-takes-step-forward-with-big-battery-milestone/>
- 23 Parkinson, G. (2023), "Batteries are a good replacement for coal:" Utility unveils another 2,000MWh big battery, Renew Economy. <https://reneweconomy.com.au/batteries-are-a-good-replacement-for-coal-utility-unveils-another-2000mwh-big-battery/>
- 24 Northern Territory Government (2021), Darwin Katherine Electricity System Plan, p42. https://territoryrenewableenergy.nt.gov.au/data/assets/pdf_file/0011/1056782/darwin-katherine-electricity-system-plan-web.pdf
- 25 Parkinson, G. (2023), NT solar farms still sitting idle after three years, now a consultant has been called in, Renew Economy. <https://reneweconomy.com.au/nt-solar-farms-still-sitting-idle-after-three-years-now-a-consultant-has-been-called-in/>
- 26 PowerWater, Where we operate. <https://www.powerwater.com.au/about#locations>
- 27 Australian Renewable Energy Agency (2023), Regional Microgrids Program. <https://arena.gov.au/funding/regional-australia-microgrid-pilots-ramp/>
- 28 PowerWater (2019), Solar/Diesel Mini-Grid Handbook Second Edition, page 16. https://www.powerwater.com.au/_data/assets/pdf_file/0014/32306/1090241-PWC-Solar-Diesel-Mini-Grid-Handbook-web.pdf
- 29 Original Power (2023), Borrooloola's Ngardara Solar Microgrid Project. <https://www.originalpower.org.au/borrooloola>
- 30 Australian Renewable Energy Agency (2020), A clean energy future for Alice Springs. <https://arena.gov.au/news/a-clean-energy-future-for-alice-springs/>
- 31 Australian Renewable Energy Agency (2023), NT Solar Energy Transformation Program. <https://arena.gov.au/projects/northern-territory-solar-energy-transformation-program/>
- 32 Electrical Trades Union (2023), Tomorrow's Trades to Power Australia's Future <https://www.etunational.asn.au/wp-content/uploads/2022/08/Draft-4-Trade-Summit-Policy-Document971.pdf>.

ENDNOTES

- 33 Premier of Victoria (2023), Training The Renewable Energy Workforce Of The Future Media Release. <https://www.premier.vic.gov.au/training-renewable-energy-workforce-future>
- 34 Federation University (2021), New tower to provide real-world training for renewable energy industry. <https://federation.edu.au/news/articles/new-tower-to-provide-real-world-training-for-renewable-energy-industry>
- 35 Intyalheme Centre for Future Industry, A Solar History. <https://intyalheme.dka.com.au/resources/why-alice>
- 36 Department of Foreign Affairs and Trade, New Colombo Plan. <https://www.dfat.gov.au/people-to-people/new-colombo-plan>
- 37 Longden, T, Quilty, S, et al (2022), Energy insecurity during temperature extremes in remote Australia, Nature Energy <https://www.anu.edu.au/news/all-news/power%2%A0disconnections%2%A0put-first-nations%2%A0people-at-risk#>
- 38 *ibid*
- 39 Northern Territory Council of Social Service (2023), Northern Territory government promises power bill subsidy worth \$71 million. <https://ntcoss.org.au/media-releases/northern-territory-government-promises-power-bill-subsidy-worth-71-million/>
- 40 *ibid*
- 41 Low income households are defined as those with equivalised total income of less than \$1000 a week.
- 42 Clean Energy Regulator (2023), *op cit*
- 43 Territory Generation, Our Power Stations. <https://territorygeneration.com.au/about-us/our-power-stations/>
- 44 Rutovitz, J., Langdon, R, Mey, F., Briggs, C. (2022) The Australian Electricity Workforce for the 2022 Integrated System Plan: Projections to 2050. https://www.uts.edu.au/sites/default/files/2022-11/ISP2022_Workforce_v1.pdf
- 45 Clean Energy Regulator (2023), Solar installation numbers by state/territory (as of September 2023) <https://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>
- 46 Australian Bureau of Statistics (2021), Census of Population and Housing: Housing data summary. <https://www.abs.gov.au/statistics/people/housing/housing-census/2021>
- 47 CSIRO (2020), Climate Change in the Northern Territory: State of the science and climate change impacts. https://depws.nt.gov.au/_data/assets/pdf_file/0011/944831/state-of-the-science-and-climate-change-impacts-final-report.pdf
- 48 Lea, T., Grealy, L., Moskos, M., Brambilla, A., King, S., Habibis, D., Benedict, R., Phibbs, P., Sun, C. and Torzillo, P. (2021) Sustainable Indigenous housing in regional and remote Australia, AHURI Final Report No. 368, Australian Housing and Urban Research Institute, page 58 <https://www.ahuri.edu.au/research/final-reports/368>

ENDNOTES

- 49 Hare M, Barzi F, Boyle J, Guthridge S, Dyck E, Singh G, Falkahammar H, Webster V, Shaw J, Maple Brown L (2020). Diabetes during pregnancy and birthweight trends among Aboriginal and non-Aboriginal people in the Northern Territory of Australia over 30 years. The Lancet Regional Health - Western Pacific. eCollection 2020 Aug; Hare M, Zhao Y, Guthridge S, Burgess P, Barr E, Ellis E, Butler D, Rosser A, Falhammer H, Maple Brown L (2022). Prevalence and incidence of diabetes among Aboriginal people in remote communities of the Northern Territory, Australia: a retrospective, longitudinal data-linkage study. BMJ Open. 2022 May 15;12(5):
- 50 Health Habitat | Housing for Health <https://www.healthhabitat.com/news-policy-ministers-agree-to-new-minimum-building-performance/>
- 51 Australian Bureau of Statistics, Data by Region <https://dbr.abs.gov.au/region.htm?lyr=ste&rgn=7> Derived from ABS Census data, <https://www.abs.gov.au/statistics/labour/earnings-and-working-conditions/income-and-work-census/2021>
- 52 Longden, T, Quilty, S, et al (2022), Energy insecurity during temperature extremes in remote Australia, Nature Energy <https://www.anu.edu.au/news/all-news/power%2%A0disconnections%2%A0put-first-nations%2%A0people-at-risk#>
- 53 Territory Families, Housing and Communities (2022), Annual Report 2021-2022, page 56. https://tfhc.nt.gov.au/_data/assets/pdf_file/0005/1168979/territory-families-housing-and-communities-annual-report-2021-22.pdf
- 54 Northern Territory Council of Social Service (2023), *op cit*
- 55 Northern Territory Council of Social Service (2023), *op cit*
- 56 Northern Territory Government (2023), Remote Housing Investment Package Program progress overview. <https://ourfuture.nt.gov.au/accountability-and-reporting/program-progress>
- 57 Northern Territory Government (2023), HomeBuild Access. <https://nt.gov.au/property/home-owner-assistance/low-or-middle-income-earners/homebuild-access>
- 58 *ibid*
- 59 D. and Prosser, D. (2023), More modular homes trucked into outback where housing shortage solutions in high demand. <https://www.abc.net.au/news/2023-05-01/modular-home-delivery-booming-queenslands-outback-housing-crisis/102282454>
- 60 Northern Territory Government (2023), Room to Breathe program. <https://ourfuture.nt.gov.au/about-the-program>
- 61 Northern Territory Government (2023), Room to Breathe progress. <https://ourfuture.nt.gov.au/accountability-and-reporting/program-progress#/room-to-breathe>
- 62 National Housing Finance and Investment Corporation (2020), Building jobs: How residential constructions drives the economy. <https://www.nhfc.gov.au/research/building-jobs-how-residential-constructions-drives-economy>
- 63 Northern Territory Housing Strategy 2020 - 2025 https://tfhc.nt.gov.au/_data/assets/pdf_file/0010/765433/nt-housing-strategy-2020-2025.pdf

INVESTING \$1.5 BILLION ON A RECHARGING THE TERRITORY PACKAGE WOULD:

- Create 7622 good-quality, sustainable jobs for local workers
- Establish a four-campus Northern Australia Renewable Energy Training Centre of Excellence
- Subsidise TAFE training and electrical degrees for local students
- Provide solar, insulation, and air conditioning upgrades for every single public housing dwelling
- Fund climate safe upgrades for every low-income household
- Deploy solar on twice as many household rooftops and catch up to neighbouring states
- Construct a Darwin Big Battery and fix systemic grid stability issues
- Expand the deployment of microgrids throughout the NT
- Build hundreds of new homes and household expansions in remote areas
- Open up East Arm and the Port of Darwin for a future industries precinct

The choice should be easy.

