Section 1

Executive Summary

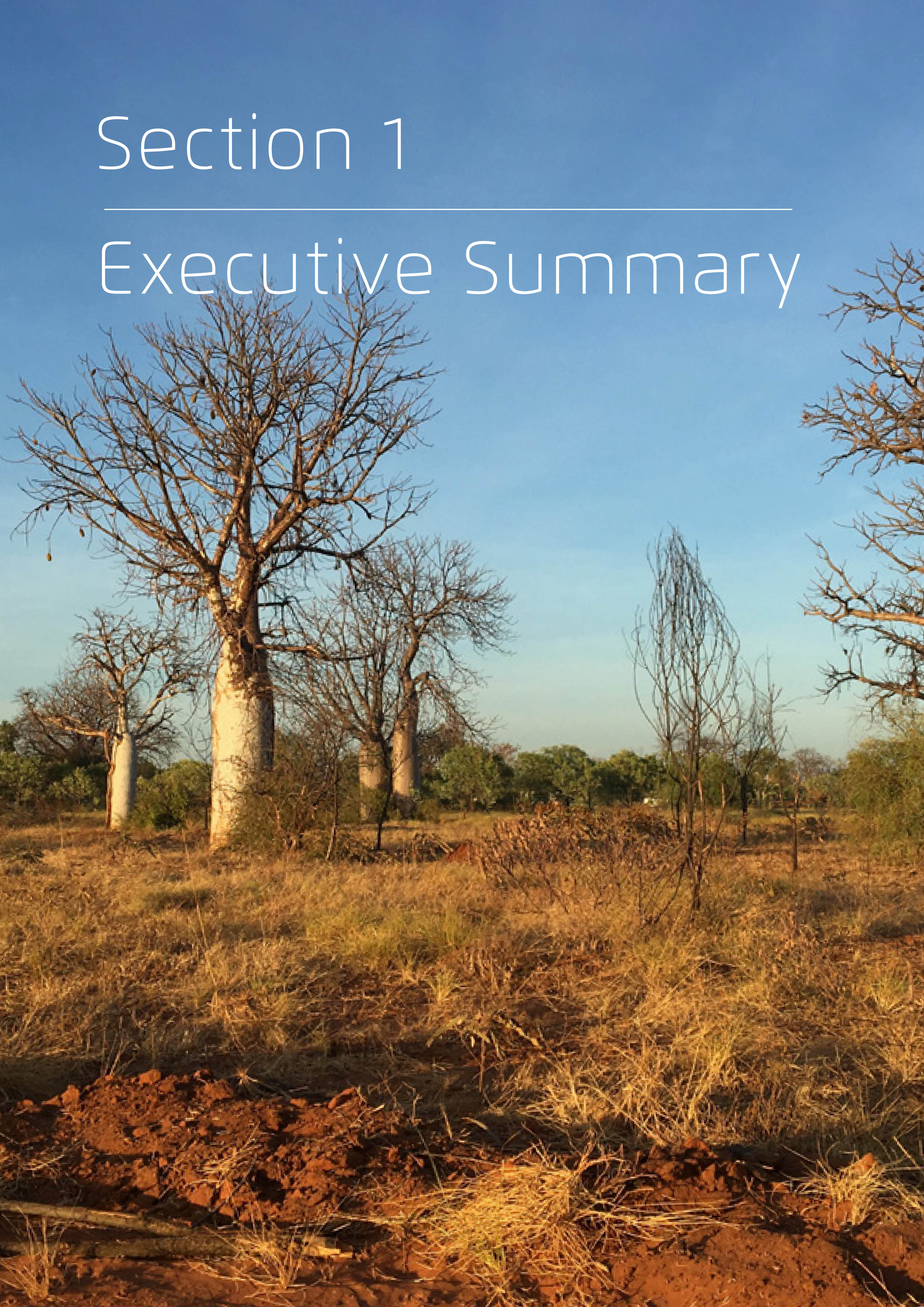

Image: Jenita Enevoldsen

1.1 Introduction

The Kimberley Clean Energy Roadmap was commissioned by The Wilderness Society (WA), Environs Kimberley and the Lock the Gate Alliance. This study considered a geographical region extending from Broome in the west to Halls Creek/Warmun in the east, and from Bidyadanga in the south to Kalumburu in the north. Nevertheless, the majority of population and population centres are in the West Kimberley, encompassing Broome, Derby, Fitzroy Crossing and numerous smaller communities.

The brief for the Roadmap was to analyse energy options and deliver a comprehensive, fully costed, clearly articulated renewable energy (RE) roadmap to achieving a cleaner, and ultimately cheaper, energy future for the towns, a proposed mine, and communities of the Kimberley region. Open source modelling software, SIREN and Powerbalance, developed by SEN members, was used to produce the RE modelling which underpins this Report.

1.1.1 Kimberley Context

Providing electricity to the remote Kimberley region of Western Australia (WA) currently poses significant challenges in terms of fuel costs and plant maintenance. The tropical climate and cyclone-prone nature of some areas pose additional challenges for electricity distribution and ability to deliver fuel.

On the other hand, the region has significant RE resources which can offset some of these challenges, and ultimately provide cheaper and more environmentally-friendly energy solutions. This Report explores these options.

1.1.2 Isolated Microgrids

Like much of regional WA, the Kimberley has no electricity grid, per se. Each town or community is essentially an isolated microgrid in terms of electricity supply.

Managing energy supply in such a context is fundamentally different than in a large grid, like the South West Interconnected System (SWIS) in the south-west of WA. If load increases on one part of a larger grid, or generation decreases, any shortfall in one area can be met by other areas of the grid (given adequate transmission and reserve generation capacity), which provides system operators an opportunity to more easily balance supply and demand.

The variability of solar and wind generation on an isolated microgrid presents unique challenges which do not exist on a distributed grid like the SWIS. Clouds obscuring solar photovoltaic (PV) panels can reduce output very quickly, and battery systems need to be in place to 'balance' this as existing internal combustion (IC) technologies cannot respond quickly enough. For this reason, Horizon Power has constrained the amount of rooftop solar PV which can be installed in towns like Broome. This is one compelling argument to modernise the electricity system in the Kimberley with properly integrated renewable and storage technologies.

1.1.3 Weather conditions

Wind patterns across the day are fairly stable during the Wet season. Average wind patterns during the Dry season tend to be more variable. However, the strongest winds are at night and the weakest winds are during the afternoon, when solar radiation is highest. During the Dry season, wind and solar therefore complement each other.

Cyclonic conditions pose a risk in the Kimberley. Most of the West Kimberley can expect occasional category 2 cyclones, with wind strengths up to 160 kph. The coastal areas south of Broome are in the path of occasional cyclones up to category 4 (>200 kph).

Cyclonic wind strength decreases with distance from the ocean. To minimize cyclone risk and construction cost, proposed wind farms have been located at least 10 km from the ocean and are not recommended for coastal areas south of Broome. The proposed concentrating solar thermal (CST) plant location is 70 km from King Sound and 150 km from open ocean; it has never recorded wind speeds in excess of 100 kph.

1.1.4 Existing Power Purchase Agreements (PPAs)

Most of the generators that Horizon Power uses in the Kimberley are governed by PPAs, which expire between 2023 and 2027. These generators will still be needed as backup for the RE scenarios recommended in this study. As they will be used much less, the existing PPAs will need to be amended or bought out. This relatively distant time horizon also provides time for planning for a managed transition. Fuel provision is outside the PPAs, and Horizon Power is responsible for these costs.

1.1.5 Technologies

Cyclone-rated wind and solar technologies exist that can be used in the Kimberley. The Kimberley region is no longer considered remote, as it is serviced by two ports, with a major sealed highway connecting the towns. The port at Broome is capable of handling large wind turbine components, for example, tower sections and blades up to 70 m long, and nacelles weighing up to 70 tonnes.

This Report has explicitly considered the following technologies: onshore wind; rooftop solar PV; utility scale PV; utility scale batteries; CST generation; and fossil-fuelled IC generators powered by diesel, liquefied natural gas (LNG) and piped unconventional fracked natural gas (FNG).

1.1.6 Horizon Power's Role

Horizon Power appears to be positioning itself to be a leader in the transition to RE. It has developed:

- A 'distributed energy resources management system' (DERMS), designed to manage and optimise the technical operations of grid-connected renewable generators, ***"to dynamically manage supply and demand, maintain system stability and optimise long-term economic efficiency"***
- Its own advanced microgrid roadmap, forecasting the levelised cost of electricity (LCOE) over time for different 'business futures', for each of its 38 systems
- 'Micro power systems' (off-grid, utility-scale power systems) that can be remotely managed.

Horizon Power has been slowly taking control of power provision in larger communities over the last few years, e.g. Kalumburu and Yungngora. Access to subsidised power and innovative tariff arrangements have reduced prices for community customers.

It is encouraging that Horizon Power is working progressively to integrate RE in its areas of responsibility, and lobbying for legislative and regulatory reform to facilitate this. While Horizon Power has developed some plans for rolling out renewables, its ability to implement these plans appear to be constrained by being unable to install its own assets, by being forced to 'go out to market', and by needing to tender for each individual generation asset – removing the ability to benefit from economies of scale.

The absence of a mature RE construction industry in the Kimberley has led to very high quotes for RE generation projects, mainly because no substantial RE industries operate in the Kimberley. However, if there were a 'pipeline' of works, industry would set up to meet the demand. Government action is required to adopt a Kimberley Clean Energy Roadmap, help establish RE industries in the Kimberley and provide greater regulatory and financial flexibility for Horizon Power to effectively roll out renewables.

Engaging with Horizon Power about the Kimberley Clean Energy Roadmap will be an important factor in developing and implementing rollout of RE across the Kimberley. Similarly, advocacy with Government and other stakeholders should promote the adoption and implementation of Horizon Power's "Distributed Energy Resources" blueprint.

1.2 Modelling

This Report is built upon three sets of modelling:

- The region between Broome and Derby, as the largest source of electricity demand, both as a new High Voltage Transmission Grid (see ***Figure 1.2***), and as stand-alone centres
- Two smaller towns – Fitzroy Crossing and Halls Creek
- Two Indigenous communities – Beagle Bay (medium-sized community) and Kalumburu (remote community). Results were extrapolated for six other medium-sized communities, and to the 57 smaller communities with populations of less than 200.

Five general scenarios were explored in the modelling:

- CST for the Grid scenario, supported by solar PV generation, and augmented by battery storage and fuelled backup
- Combinations of wind and solar PV generation, supported by battery storage and fuelled backup (WPVB)
- Solar PV generation, supported by battery storage and fuelled backup (no wind)
- Internal combustion engines fuelled by LNG or diesel with the existing small amount of rooftop PV ('business as usual')
- Internal Combustion engines fuelled with piped FNG with existing small amount of rooftop PV.

We have used conservative cost assumptions, especially for batteries.

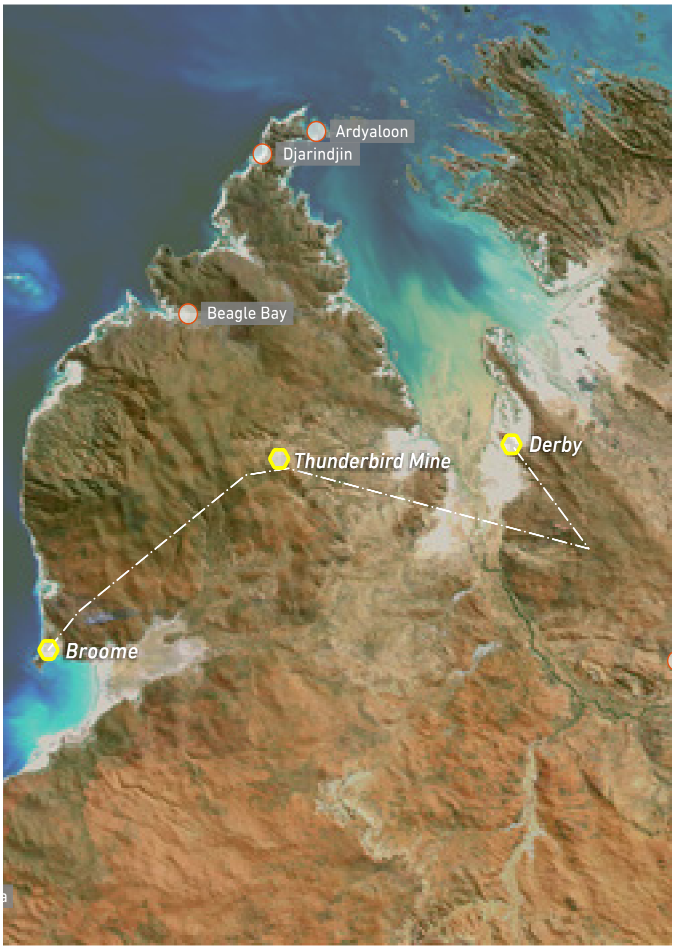

Figure 1.2 Major locations on the potential Broome – Derby Grid

1.3 Results

A detailed summary of the modelling results is shown in ***Table 1.3.4***. The key points are summarised below.

1.3.1 Model 1: Cost-minimised

The model optimised for minimum cost resulted in around 50% RE, but, compared to the modelled fuelled scenario, LCOE values were less expensive, as follows:

Broome: $53 per megawatt-hour (MWh) less than the modelled fuelled scenario

Fitzroy Crossing: $58/MWh less than the modelled fuelled scenario

Beagle Bay: $40/MWh less than the modelled fuelled scenario

The Broome-Derby Grid scenario was $65/MWh less expensive than its fuelled equivalent, but $20-30/MWh more expensive than the stand-alone alternatives, mainly due to the cost of the transmission lines.

1.3.2 Model 2: $30/MWh Lower Cost Than Generation

Optimising the renewable mix to be $30/MWh less than the modelled fuelled generation results in 74-88% renewables in larger centres and 60-71% RE in communities, saving 153,000 tonnes of CO_2 emissions per annum.

Wind turbines are an important part of the generation mix, to reduce battery requirements and fuelled generation at night.

1.3.3 Model 3: Lower Cost Assumptions

A third round of modelling was performed with the most recent Australian Energy Market Operator (AEMO) price predictions, which predict 25% lower prices for utility solar PV and CST by 2021-22, and a lower cost of capital. Under these new assumptions, the savings from the Grid CST scenario more than double to $65/MWh less than the LNG Grid equivalent. Furthermore, the cost of the Grid CST scenario reduces to around the same as the stand-alone WPVB scenario, making it a viable option.

1.3.4 Overall Summary

This study demonstrates that it is possible to transition to 60-90% RE in the Kimberley while creating savings of a minimum of $30/MWh in the wholesale price of electricity. The generation mix modelled is for solar, wind and batteries to be rolled out across every town and community in the West Kimberley region. In total, 117 MW of Wind and 97 MW of utility-scale solar PV generation can be installed, with battery storage of 132 MWh, whilst retaining some fossil-fuelled backup. A graphical overview is shown in ***Figure 1.3.4***.

Table 1.3.4 expands on this summary. It combines the results of Models 2 and 3 for stand-alone population centres. For most population centres, ***Table 1.3.4*** displays Model 2 results with price predictions for 2019, optimised to be $30/MWh less than the modelled fuelled generation. For Broome, Derby and the Thunderbird Mine, Model 3 results are presented, using 2021-22 AEMO price predictions. This results in a cost $40-44/MWh less than the equivalent fuelled cost.

Table 1.3.4 also provides details of the physical size of the renewable installations at each location. In Broome, the largest centre, less than 12 sq. km is required for the 19 wind turbines and 41 MW of solar panels. Most of this land can also be used for other purposes, because only a fraction of the available surface area is taken up by wind turbines and associated infrastructure. There is much flexibility in where RE generation facilities can be sited. A mutually-agreed location on aboriginal-managed land could be a win-win proposition.

An investment of $449 m in RE ($560 m total investment), amortised over 25 years, would save more than $45 m in fuel costs per year. When loan repayments (from higher capital expenditure for renewables) and operating costs are accounted for, overall annual savings are estimated at $14.8 m per year.

Figure 1.3.4 Overview of the Kimberley Clean Energy Roadmap **(See overleaf on p5)**

Sustainable Energy NOW

Kimberley Clean Energy Roadmap: Key Findings

	City/Town/ Community	Population	RE as portion of Gen. (%)	Savings $p.a.	Total RE Invest-ment ($)	LCOE ($/MWh)	Wind (MW)	Wind Farm Area (ha)	Turbine size (MW)	Number of Wind Turbines	PV (MW)	PV Farm Area (ha)	Number of Panels	Battery Capacity (MWh)	Fossil-fuelled Capacity. (MW)	CO2-e saved (kilo-Tonnes)
Towns and Industry	Broome*	14,000	80%	$5.8 m	$168 m	$197	37	962	2.0	19	41	172	132,000	45	27	54.0
	Thunderbird*	N/A	85%	$6.0 m	$203 m	$204	49	1456	2.0	28	45	198	152,000	61	18	61.5
	Derby*	3,300	82%	$1.3 m	$46 m	$225	9.5	247	2.0	5	12	58	44,400	13	6.0	13.5
	Fitzroy Crossing	1,140	74%	$419 k	$17 m	$223	4.2	109	0.5	9	3.9	20	15,600	1.8	2.8	5.5
	Halls Creek	1,550	74%	$380 k	$16 m	$223	3.8	99	0.5	8	3.5	18	14,179	1.6	2.5	5.0
	Abattoir	N/A	77%	$353 k	$15 m	$218	3.0	78	0.5	6	3.0	16	12,000	5.5	1.8	4.5
Medium Sized Communities	Beagle Bay	350	60%	$49 k	$2.0 m	$247	0.30	7.8	0.23	2	0.39	2	1,560	0.36	0.40	0.7
	Kalumburu	400	69%	$62 k	$3.1 m	$278	0.54	14.0	0.23	3	0.58	3	2,320	0.44	0.38	1.0
	Ardyaloon	350	62%	$56 k	$2.3 m	$247	0.34	8.9	0.23	2	0.45	2	1,783	0.41	0.46	1.0
	Bidyadanga	600	62%	$92 k	$3.7 m	$247	0.56	14.5	0.23	3	0.72	4	2,898	0.67	0.74	1.5
	Camballin	550	62%	$73 k	$3.0 m	$247	0.45	11.6	0.23	2	0.58	3	2,318	0.53	0.59	1.0
	Djarindjin	450	62%	$49 k	$2.0 m	$247	0.30	7.8	0.23	2	0.39	2	1,560	0.36	0.40	0.7
	Warmun	200	71%	$90 k	$3.7 m	$278	0.56	14.5	0.23	3	0.72	4	2,898	0.67	0.74	2.0
	Yungngora	400	62%	$99 k	$4.0 m	$247	0.60	15.6	0.23	3	0.78	4	3,120	0.72	0.80	1.5
Total		**23,290**	**N/A**	**$14.8 m**	**$449 m**	**N/A**	**117**	**3046**	**N/A**	**95**	**97**	**505**	**388,636**	**132**	**62**	**153**

Table 1.3.4 Full details of the stand-alone scenarios, for all towns and communities supplied by Horizon Power (plus industrial sites), using AEMO price predictions for 2019, and optimised to be $30/MWh less than the equivalent fuelled cost. The figures provided here result from evidence-based assumptions. RE generation is not subsidised.
*** Modelled on the latest, lower AEMO price predictions for solar PV for 2021-22. This results in a cost $40-44/MWh less than the equivalent fuelled cost.**

If the Federal Government's RET subsidy was added, further savings of approximately $4.7 m p.a. are achievable.
If a hypothetical $20 /Tonne Carbon Price on fossil-fuelled generation is also included, savings of approximately $2.6 m p.a. are also possible.
Electricity generation capacity is measured in Kilowatts (kW) or Megawatts (MW). Electricity energy use is measured in kilowatt hours (kWh) or Megawatt hours (MWh) – the amount of electrical energy consumed.

1.3.5 Subsidies and Incentives

Further calculations were carried out on Model 2, to ascertain the effects of subsidies: the existing Renewable Energy Target (RET) large-scale generation certificate (LGC) mechanism; and a hypothetical 'carbon price' of $20 per tonne of carbon emissions.

When both subsidies are applied at the same time, renewables become between $52 and $56/MWh (~5.5c/kWh) less expensive than the modelled LNG generation. This is equivalent to a wholesale price reduction of 20%.

1.3.6 Hourly Analysis

An analysis was performed of the hourly generation mix across the year for the two Grid scenarios. In the WPVB scenario (82% RE WPVB), fuelled generation is needed throughout the year, but less so in the Dry season. The CST Grid scenario (88% RE) has less need for fuelled backup, because the molten salt storage can meet night time demand on many occasions. In fact, during the Dry season, molten salt from CST, and some battery drawdown, can meet all modelled demand. However, fuelled backup will still be needed on cloudy days during the Wet season. Of the two grid scenarios (CST and WPVB), the CST option provides the greater proportion of RE and requires less fuelled backup. The CST scenario is therefore preferred in the following discussion.

1.3.7 Best-case Costings

Both the addition of subsidies and incentives, and the use of lower cost assumptions, have a significant impact on the outcome of the modelling for Broome, Derby and the Thunderbird mine. *Table 1.3.7* displays the Model 2 results in column 2 and the fuelled scenario with a carbon price (column 3). The best-case scenario (column 6) combines the cost benefits of Model 3 (column 4) with those from the subsidised scenario with LGCs (column 5).

Columns 7-9 compare the best-case situation and the LNG-fuelled equivalent with a carbon price.

This shows that the best-case scenario is between 24 and 32% less expensive than the fuelled equivalent (a reduction of 6.6-8.9c/kWh on the wholesale price). The overall annual savings would be $28.2 m for the Grid scenario, and $20.4 m for stand-alone generation for Broome Derby and the Thunderbird mine.

Location	Base case [1]	LNG with Carbon Price [2]	Low cost	Base case with LGCs	Best case [3]	LCOE Savings best case [4]	LCOE Change [4]	Total Savings [4] best-case
Grid CST	$240	$281	$205	$226	$192	$89	32%	$28.2 m
Broome WPVB	$211	$251	$197	$197	$185	$66	26%	$8.6 m
Thunderbird WPVB	$217	$257	$204	$200	$188	$69	27%	$9.7 m
Derby WPVB	$235	$276	$225	$219	$210	$66	24%	$2.1 m

Table 1.3.7 Comparison of the Model 3 scenario with subsidies (LGC's and a Carbon Price) with the LNG-fuelled equivalent. LCOE in $/MWh.

[1] Model 2 scenario – optimised for $30/MWh less than the unsubsidised LNG equivalent
[2] Modelled LNG scenario with a $20 per tonne Carbon price
[3] Best case scenario, with low-cost assumptions (Model 3), LGCs and a Carbon Price.
[4] compared to LNG with a Carbon Price

1.3.8 Comparison with Piped FNG

The best-case RE options for the Broome-Derby region are compared with existing generation fuelled by piped FNG from the Canning Basin. The modelling assumes gas will be supplied via spur-lines from a future large pipeline from Kimberley gas fields to a large liquefaction/ export plant.

Generation fuelled by piped FNG is cost equivalent to the cost-minimised RE scenario for the Broome-Derby region. It is also roughly equivalent to the best-case (80-88% RE) scenario.

However, such a large pipeline is unlikely. The proposed James Price Point gas hub was terminated in 2013, and an agreement to support a pipeline from the Canning Basin to Dampier was terminated by the WA Labor Government in August 2018.

A second option, to build a smaller pipeline from the Canning Basin to the major centres, is unlikely to be economical for the required volumes. Other methods of delivering FNG, by trucking LNG or compressed natural gas (CNG), are only slightly less expensive than the current approach of trucking LNG from Dampier.

Should unconventional gas fracking be permitted by the State Government, other factors are likely to make FNG extraction more expensive than the modelled cost assumptions, for example, through the costs of monitoring and offsetting the risks of methane leakage and pollution of fresh water aquifers.

In summary, this research demonstrates that the only way that FNG generation can compete with RE is if it is provided by spur lines from a future major pipeline, but this seems an unlikely outcome. Further, renewables can be installed and commissioned in a shorter timeline.

1.4 Implementation

There are too many unknowns at the current stage of development of the Kimberley Clean Energy Roadmap to develop a comprehensive timeline. Certainly, there is a need for solid transition planning, feasibility studies and updating of policy settings to facilitate a roll-out of RE in the Kimberley.

Existing PPAs complicate timelines, but we suggest ways they can be circumvented.

We suggest a suitable starting point would be a staged roll-out plan across the 57 small communities, moving to the larger communities and towns as time passes. In the larger centres, 50% RE could be the initial aim, with a subsequent round of development bringing RE up to 70-80%. There is no current prospect of moving to 100% RE.

A major political and technical decision will be related to the Broome-Derby region, in particular whether or not to build a high voltage grid between Broome, the Thunderbird mine and Derby, powered predominantly by a CST plant with molten salt storage. The decision is basically about replacing existing town infrastructure with renewable equivalents, or pursuing a nation-building agenda, with the potential to open up other economic opportunities in the Kimberley.

1.4.1 Employment

The Kimberley Clean Energy Roadmap, if implemented, will potentially result in numerous long-term jobs within WA, made up as follows (see also ***Table 1.4.1*** for details):

- 88 long-term jobs in Construction and Installation
- 26 long-term jobs in Manufacturing across WA
- 70 ongoing Operations and Maintenance jobs
- 162 long-term jobs in the Kimberley
- 184 long-term jobs across WA

Thus, if this clean energy roadmap for the Kimberley is adopted by the WA Government, a new a sustainable workforce of ongoing local jobs could be created.

1.4.2 Indigenous Benefits

The Kimberley Clean Energy Roadmap provides significant opportunities for employment and benefit sharing/investment arrangements for Native Title holders and/or communities.

Long term, 160+ jobs in manufacturing, construction, installation, operations and maintenance will be available in the Kimberley.

The major providers of electricity supply services in the Kimberley (Horizon Power, Department of Communities, Kimberley Remote Service Providers and potentially EMC Kimberley) have committed to training and employing Indigenous workers as part of their activities.

1.5 Conclusion

This study provides a comprehensive, fully-costed RE roadmap for the West Kimberley. Wind, PV and CST are all currently viable electricity technologies for the West Kimberley, combinations of which will provide substantial cost savings over the current LNG and diesel generation.

1.5.1 Economics

When the scenarios were modelled for minimum cost, approximately 50% RE generation could be achieved for $40-60/MWh less than fuelled generation. When modelling was optimised for savings of $30/MWh over fuelled generation, 60-90% RE generation can be achieved, depending on the location.

More recent cost assumptions for 2021-22, and the use of subsidies, makes RE $65/MWh cheaper than existing fossil fuel generation. There is reason to expect that RE costs will continue to fall, making the RE option even more favourable.

A mixture of wind (117 MW) and 97 MW of utility-scale solar PV generation, with battery storage (132 MWh) and fossil-fuelled backup can achieve ongoing annual net savings of $14.8 m compared to the existing fuelled generation. An investment of $449 m in RE over 25 years would save more than $45 m in fuel costs per year.

Combustion emissions of CO_2 in the West Kimberley would be reduced by at least 150,000 tonnes per annum, the equivalent of taking 25,000 petrol-powered cars off the roads each year.

Long term, 160+ jobs in manufacturing, construction, installation, operations and maintenance are estimated to be available in the Kimberley.

This Roadmap is clearly in alignment with the WA Labor Government's Jobs Plan, which focusses on:

- Local jobs and content
- Creating jobs in regions

Construction, Installation and Manufacturing (Job-Years)		**Total** (Job-Years)	**Towns & Industry** (Job-Years)	**Medium Communities** (Job-Years)	**Small Communities** (Job-Years)
Employment by sector (Job-years)	Construction and Installation	**879**	794	47	38.1
	Manufacturing (Kimberley)	**36**	33	2	N/A
	Manufacturing (Rest of WA)	**221**	209	8	4
Construction phase period (years)		10	10	10	10
Long-term Jobs		**Total Jobs**	**WK Towns & Industry**	**WK Medium Communities**	**WK Small Communities**
Employment by sector	Construction and Installation (Kimberley)	88	79	5	4
	Manufacturing (Kimberley)	4	3.3	0.2	N/A
	Manufacturing (All of WA)	26	24	1.1	0.4
	Operations (Kimberley)	70	65	3	2
	Total long-term jobs (Kimberley)	**162**	**148**	**8**	**6**
	Total long-term jobs (All of WA)	**184**	**169**	**9**	**6**

Table 1.4.1 Jobs modelling results for renewables in the Kimberley

- An innovation economy
- Integrated, coordinated infrastructure planning
- Supporting a Renewables Industry

This research shows that significant amounts of surplus RE will be generated. This energy could be used for new industry opportunities, such as to produce liquefied hydrogen fuel, which could be used to fuel IC generators or other engines.

In summary, substantial amounts of RE, from 50% to 80%, depending on specific locations) can be justified on purely financial grounds. When non-financial aspects are also considered (e.g. carbon pollution reduction; increased employment), RE in the Kimberley has a strong justification.

The majority of the investment required for the Kimberley Clean Energy Roadmap need not come from the Government. RE investment projects with long-term PPAs are attractive 'fortress investments' for superannuation funds and other investors.

1.5.2 Prospects for Fracking

There is no economic benefit in using FNG generation for electricity in the Kimberley. While supply from spur lines from a new major export pipeline is competitive with two of the RE scenarios presented, this option is unlikely in the medium term, given that the current State Government has terminated an agreement to support a pipeline from the Canning Basin to Dampier, and the proposed James Price Point gas hub was terminated in 2013. Furthermore, renewables can be installed and commissioned in a shorter timeline than gas pipelines and processing.

The alternative of using road trains to deliver either fracked LNG or CNG to sites offers no significant cost savings over the existing North-West Shelf LNG and imported diesel fuels.

Should unconventional gas fracking be permitted by the State Government, other factors are likely to ensure FNG extraction is more expensive than the modelled cost assumptions. This is due to the high costs of stringent regulations, monitoring and offsetting methane fugitive emissions, as well as the potentially significant costs of remediating any contamination of freshwater sources.

1.5.3 Implementation

The implementation of the Kimberley Clean Energy Roadmap will need to include agreements and partnerships with Native Title groups and Indigenous communities, based on the principles of free, prior and informed consent. The involvement of other local stakeholders, and the State Government and Horizon Power, will also be crucial.

Implementation of the Kimberley Clean Energy Roadmap will be easier to achieve if there is political direction for a broad transition across the Kimberley. A long-term plan for a staged rollout of renewables across the Kimberley will enable economies of scale to be realised. Mechanisms need to be put in place to provide investment certainty for businesses, and local long-term employment. A mature RE industry in the Kimberley can be encouraged, for example, by letting tenders for numerous installations concurrently.

Some legislative and regulatory barriers may need to be resolved to allow Horizon Power to realise these economies of scale and roll out renewables across the Kimberley. Achieving these changes requires clear political direction from the Western Australian Government.

Horizon Power's submission to the Legislative Assembly Microgrid Inquiry identified a need:

- For coherent regulation encompassing all owners of microgrids – generators, distributors, and retailers
- To address the inconsistencies in information that exist between Horizon Power and the Government
- To update generation rules to reflect current and emerging market requirements and become more flexible
- For more flexible tariff structures to support current and emerging market requirements.

Once regulatory barriers are resolved, a **managed transition plan** is key to maximising the benefits from implementing this RE roadmap. Such a plan would:

- Build upon the groundwork already begun by Horizon Power
- Put appropriate control and monitoring structures in place, to enable a secure and stable supply of electricity to consumers
- Provide investment certainty and economies of scale to reduce installation costs
- Have the potential for co-investment by Indigenous communities or Native Title groups
- Map out the creation of a new sustainable regional workforce, providing training opportunities and boosting local indigenous employment opportunities
- Create a sustainable regional workforce
- Reduce reliance on fossil fuels, such as gas and diesel

Some RE training opportunities are available in the Kimberley, but there is scope to extend training opportunities in Remote Services and Utilities Maintenance. The Kimberley Clean Energy Roadmap can act as a catalyst for this Indigenous training and employment initiative.

1.5.4 Recommendations

That the WA Government:

- Adopts a West Kimberley Clean Energy Roadmap
- Supports implementation of Horizon Power's advanced microgrid roadmap
- Develops a Kimberley Electricity Transition plan from this Roadmap
- Updates policy settings to enable Horizon Power to facilitate a RE transition in the Kimberley (update generation rules, adopt microgrid standards, and enable an ongoing pipeline of RE installation, enabling economies of scale)
- Conducts in-depth feasibility studies for the uptake of renewable electricity in the Kimberley as soon as possible
- Conducts a feasibility study into the viability of a Broome-Derby Grid
- Conducts a feasibility study into suitable wind turbine models (of different sizes) for Kimberley weather conditions
- Allocates funding in the forward estimates to develop the managed transition plan and implement a Kimberley Clean Energy Roadmap
- Pre-approves RE development zones and transmission corridors to enable rapid implementation
- Develops plans/ support for a Kimberley RE construction industry
- Develops tender requirements, reverse auction conditions and PPA criteria
- Develops staged plans of works for the towns and industry, medium communities and small communities.

This Report demonstrates that the commitment to a RE future for the Kimberley will create a reliable, economically-favourable source of electricity for the future, reduce electricity costs for consumers, and create ongoing jobs.

If adopted by the WA Government, this visionary model could be rolled-out to other parts of regional and remote WA. It can also provide case experience and an incentive for wider adoption of RE across the south-west corner of the State.

Image: Coober Pedy, Les Pullen, Professional Photographer