DAINTREE / CAPE TRIBULATION ELECTRICITY SURVEY

"How households and businesses actually react in a situation of not having grid power available, the technology adopted and questions of cost, reliability and safety."

March 2016

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Terminology

Median – Where half the responses were above and half below.

Modal Group – The group with the largest number of responses.

Mean – Average of responses - sum of values recorded divided by number of responses.

SUMMARY OF MAIN POINTS

Background

- The survey was carried out in an area along the coast north of Cairns that for environmental and cost reasons was excluded by the State Government from the Queensland electricity grid (Ergon) service area, ie. the area is off the grid. Residential population not on the grid is estimated to be about 600 plus of the order of 500 visitors staying overnight during peak winter months.
- Aim of the survey was to obtain information about how households and businesses actually reacted in a situation of not having grid power available, the technology adopted and questions of cost, reliability and safety.
- A sample of 100 (ie. half the households and businesses in the area) identified with telephone connection, were interviewed.
- Some 71% were separate households, 25% were combined households/businesses and only 4% separate businesses.
- Compared with national averages, population has a lower proportion of children and young people 15 to 29 and of persons aged 65 plus.
- Businesses are mainly very small but with 30% recording 10 or more employees. Most businesses related to tourism with some farms and one construction.

Solar Generation Conditions

- In evaluating results of this survey, it is important to note that the Cape Tribulation/Daintree area is one of the wettest areas in Australia with many days a year when some level of cloud cover is experienced affecting solar generation. High mountains to the immediate west also reduce hours of sunshine. Natural vegetation in the area is mainly dense tropical rainforest. Humid conditions can result in mould growth if solar panels are not cleaned regularly.

Sources of Power Used

- There is a wide combination of power sources used including generators, gas, batteries, solar and a few hydro. (Note: For this survey gas was considered a power source if used for cooking, water heating and the like.)
- The respondents had a high occurrence of fossil fuel sources.

Table – Percent of Respondents with Different Types of Power Sources

		%
Fossil fuel	Gas	*100%*
Fossil fuel	Generators	*97%*
Chemical	Batteries	*86%*
Renewables	Solar	*82%*
Renewables	Hydro	*4%*

- None were completely independent of fossil fuels.
- Some 18% did not use any renewable sources and depended on generators alone for their main source of power.
- All households/businesses use gas, 99% for cooking and 75% for water heaters and a few for refrigeration.
- Some 30% use extra low voltage systems.

- Generators are about half diesel and half petrol, with about 13% having more than one generator.
- Businesses depend on generators more and solar less, and run generators for longer hours.
- Some businesses run generators virtually around the clock. Average is about 6 hours a day.
- Some 86% use batteries which are mainly lead acid 80% (gel 20%).
- Batteries are charged using solar and generators about equally with a few using hydro.
- Average time to replace batteries is 9 years.
- About 30% are considering purchasing lithium batteries mainly because of performance but for those saying no, mainly because of cost.
- 55% of batteries are located in homes and not in separate structures.
- Some 82% had solar.
- There were only three that depended solely on solar and batteries (one with hydro also).
- Average age of solar panels is 11 years.
- Half of solar panels are cleaned less than three times a year.
- Some 4% had hydro as a component in their system.

Capacity and Amount of Power Generated

- The survey does not allow for calculation of total power used but using FNQ Ergon averages, the 100 respondents would use about 1.6 million KWh per annum.
- Based on installed solar capacity estimated at 322 KW over the 100 respondents modified for inefficiencies and age of panels and based on Daily Global Solar Exposure equivalent of 5.3 hours per day at Cape Tribulation Store, total solar generation is estimated at about 500,000 KWh per annum.
- Total capacity of fossil fuel generators identified was 1,342 KW, about four times that of solar in the area.
- Based on hours of operation given in responses about fossil fuel generators, total generation would be 6.7 million KWh per annum. Obviously generators run at much lower levels than capacity.
- Installed generator capacity excluding solar is 6.0 KW per person compared with the national grid estimated at 2.5 KW per person, ie. 2.4 times higher than the national average.

Costs

- Amount spent on individual power systems to date (or replacement value), ranged from $100 to $300,000 with average $53,000. Average per business was $100,000, residents only, $34,000. Total amount invested for the 100 respondents was $5.1m..
- Some 22% said they had received State subsidies and 30% Commonwealth, but there was a high don't know factor.
- Average likely to be spent on system over the next 5 years was $14,800 (business $26,800 and resident only, $10,000).
- Average cost of maintenance of system was put at $5,800 per annum (business $12,400 and resident only, $2,300).

- Average annual cost of power recorded per respondent was $12,500 (businesses $30,000 and residents only, $2,300), but with businesses recording up to $70-$90,000 per annum.

Limitations of System

- Only 14% run air-conditioning and majority of those said the capacity of their system limits its use.
- Some 73% said that their system limited the use of other appliances (other than air-conditioning).
- Some 56% said they had to have neighbours/other people regularly check their system when they go away.
- Some 26% said not all members of households/businesses were capable of operating their system.
- Some 11% said they had safety/accident incidents with their current system. They related mainly to batteries and generators.
- Some 78% said they carried out maintenance on their system with 65% using professionals. (Note: The 30% using extra low voltage systems (<50 volts) do not need to have professional assistance.)

Good and Bad Things About System

- Main good things recorded:
  - By those using generators only:
    - consistent, reliable.
  - By those using solar/generator/battery
    - Self reliant
    - Consistent reliable
    - Eco clean energy
    - Efficiency
- Main Bad things recorded:
  - By those using generators only:
    - Maintenance
    - Fuel costs
  - By those using solar/generator/battery
    - Constant maintenance
    - Appliance limitations
    - Set up/replacement costs

Design an Ideal System

- Highest mention of components were solar 60%, back-up generator 44%, main grid 37%, hydro 27%, micro grid 20%.

Attitude to Grid Power Delivery System

- Leading factors that would convince to connect to a local renewables micro grid were affordability and reliability.
- Attitudes to connecting to national grid if a local micro grid was not available were 'don't know/no response' 11%, 'against' 28%, 'for' 61% (of those with an opinion, 69% 'for', 31% 'against')

1. INTRODUCTION

1.1 General

The following provides a report on a survey carried out by Compass Research, the market research arm of Cummings Economics, at the instigation of the Far North Queensland Electricity Users Network, with funding support from Energy Consumers Australia Ltd, among residents and businesses located in the Daintree Cape Tribulation area, north of Cairns - an area not connected to the ERGON/national electricity grid.

The aim of the survey was to identify how households and businesses actually reacted in a situation of not having grid power available, the technology adopted, the resulting costs and reliability questions, to help inform decision making on electricity industry policies.

1.2 Background, Daintree Cape Tribulation[1] Area

The Daintree Cape Tribulation area north of Cairns has a special history in relation to electricity supply.

The coastline north of the Daintree River is backed by high mountains and covered, except for some cleared areas, in dense rainforest.

Although there are some areas of relatively flat land, they are limited and the barrier of the Daintree River and the need to cross the Alexandra Range (see Map, Appendix 1) historically led to it being uneconomic to extend light rail lines into the area to support sugar cane farms to supply Mossman Mill. Historically, there was some clearing of land for farming, especially in the Cape Tribulation area, with various crops tried over the years.

To this day, access to the area from the south is still via a ferry over the Daintree River.

The situation started to change in the 1960s, 70s and 80s as major expansion of tourism into the Cairns region commenced and the Daintree Cape Tribulation area (Daintree rainforests), developed as a tourism experience. The special qualities of the area with its dense rainforests and the Great Barrier Reef close offshore led to a major surge in visitor interest. This was heightened in the 1980s by a proposal to extend the then unsealed road to Cape Tribulation further north to Bloomfield to connect with an unsealed road south from Cooktown to Bloomfield.

Environmental interests set up a blockade to try to stop the road being built attracting national and international media attention on a scale similar to the Franklin Dam issue in Tasmania. In the end, Douglas Shire built the road but the blockade site became something of a “shrine” for a backpacker trade.

About 1990, large parts of the area were included into the World Heritage Wet Tropics Management area.

Growing visitor numbers into the area along with development of accommodation and services and new residents moving in to develop lifestyle blocks led to requests to extend the electricity grid into the area.

[1] Note: The name Cape Tribulation was given by Lt James Cook in 1770 after his ship the “Endeavour” struck a coral reef in the area. After being re-floated with difficulty jettising cargo and guns, it limped north to the current site of Cooktown for repairs.

Costs of extending the electricity grid into the area combined with pressure from environmentalists and tourism considerations resulted in the grid not being extended and the area being excluded by the State Government from Ergon's service requirements.

The road has subsequently sealed as far as Cape Tribulation to facilitate tourism access.

There has been, over the years, continuing requests by local residents to have the grid extended. As a result, it was important to explain in the introduction to this survey that the aim of the survey was not to address that issue, but provide information to help national decision making on electricity supply issues.

1.3 Demographics of the Area

Census data for the Statistical Areas Level 1 3116417 and 3116409 covers the area in question (see Maps, Appendix 2).

The area not connected to the grid covers all of SA1 3116409 (Cow Bay and Diwan area). It also covers the coast section of SA1 3116417 from north of Diwan to Cape Tribulation. This leaves a substantial part of SA1 3116417 in the Daintree area that is either steep mountainous country or connected to the grid, especially in the Upper Daintree Valley area. As part of the questionnaire/interview process, households and businesses in the grid area were excluded from the survey.

Census 2011 indicates that total residential population was 640 and households in the two relevant SA1s (including those connected to the grid) were as follows. In addition to residential population, overnight visitor population counted was domestic 305, international 245, total 550. On top of this, there would be substantial numbers of day visitors in the area on any given day.

	No.	***%***	**(cf Australia)**
Family households	159	*58%*	(72%)
Single and lone households	99	*36%*	(24%)
Group households	15	*5%*	(4%)
Total	**273**	***100%***	**(100%)**

The area has a higher proportion of single and one-person households and lower family households than national averages.

The following gives age profile.

Years	**Cape Trib/Daintree**	**(cf Australia)**
0 - 14	13.3%	(19.3%)
15 - 29	10.4%	(20.3%)
30 - 49	40.1%	(28.1)
50 - 64	26.7%	(18.3)
65 plus	9.4%	(14.0%)

The indications are that the population is dominantly in the 30 – 49 and 50 – 64 age range 66.7% (cf Australia 46.4%) and low in children and young up to 29 and low in over 65.

The following compares median weekly incomes.

	SA1 3116409	SA1 3116417	(cf Australia)
Personal	$460	$531	($77)
Family	$739	$1,052	($1,481)
Household	$700	$955	($1,234)

Median incomes are thus substantially below national averages, especially in the SA1 3116409 covering Cow Bay/Diwan.

1.4 Conditions Affecting Solar Generation

In evaluating the results of this survey, it is important to note that the Cape Tribulation/Daintree area is one of the wettest areas in Australia with some 265 days a year when some level of cloud cover is experienced.

Natural vegetation in the area is mainly dense tropical rainforest.

Humid conditions can result in growth of mould on solar panels if not cleaned regularly.

1.5 Methodology

The survey was conducted by telephone using experienced interviewers and a set questionnaire (see Appendix 3).

A telephone book setting out numbers in the Douglas Shire area was used to help identify residents and businesses in the area. Numbers were called up to three times in the process of the survey. Responses were recorded direct into a data base using a CATI type system. Some 192 were identified excluding those ascertained to be on the grid or disconnected.

Some 100 interviews were carried out. Of the remaining 92, 41 were on answering machines and 13 no answer despite call-backs, two were on fax, three were call-backs not finalised by time of wind-up, one not in the required category and 32 were refusals.

1.6 Timing

Interviewing was carried out over the period 15th December to 22nd December 2015 and 13th January to 15th January 2016.

1.7 Accuracy

Total sample achieved was 100 residences and businesses.

However a sample of 100 in this situation represented more than one in every two households in the survey area. Most businesses were run from or attached to residences and only four identified as separate businesses.

A random sample of 100 in a population of 200 has a 6.95% level of variance at a 95% degree of confidence when results are about 50% one way and 50% the other way.

2. SAMPLE CHARACTERISTICS

2.1 Sample Level

A total sample of 100 was achieved out of an estimated number of households / businesses identified with telephone numbers not connected to the grid of the order of about 190 in locations as follows.

Table #1: Q1 – Location

Cape Tribulation	26
Cow Bay	37
Diwan	22
Forest Creek	11
Kimberley	2
Thornton Beach	2
Total	**100**

2.2 Residents/Businesses

Table #2: Q2 – Residents/Businesses

	No.	%
Residents only	71	*71%*
Residents/Businesses	25	*25%*
Businesses only	4	*4%*
Total	**100**	***100%***

While 29 businesses were identified, only 4 operated separately to residences with 25 mixed residential and business. Even larger businesses, especially in the accommodation field, identified as being mixed business/residential. Some businesses were, at times, mixed with a number of different activities. The following table groups by main activity.

Table #3: Q3a – Type of Business

Tourism	
B&Bs	8
Resorts/hotel	4
Holiday lets/cabins	2
Restaurants/cafes/food	4
Attractions	3
Farms (including farm stay)	4
Construction	
Construction	1

Note: In the following analysis, responses are analysed at times by the three categories of resident only, mixed business/resident, and business only. Where analysis is given with resident separate from business, the classification of "resident' means 'resident only' and 'business' includes both the four separate businesses and the 25 mixed business/resident respondents.

2.3 Businesses Employment

The following gives peak number of people employed in businesses including owners/family members/casuals.

Table #4: Q3b – Numbers Employed at Peak by Businesses

Peak employment No.	No. of residents	%
1 - 2	13	46%
3 - 9	6	21%
10 - 15	5	18%
16 - 25	4	14%
Total	28	100%

Almost half had only 1 or 2 employed. However 14% employed over 15 and average per business was 7.1.

The following gives details of combination for businesses by whether business only or business/residential by size as per numbers employed.

Table #5: Q2 x 3b – Business Only & Business/Residence by Employment Size

	Employees	No.
Business Only	16 plus	2
	10 - 15	1
	3 - 9	0
	1 or 2	1
Business/Residence	16 plus	2
	10 - 15	4
	3 - 9	6
	1 or 2	13

Two of the 4 respondents in the larger employment category (15 plus) were “Business only” and two “Business/Residence”.

2.4 Household Numbers – Adults and Children

Households were asked how many adults in the household and how many children.

Table #6: Q3c – Household Numbers, Adults

No. of adults in household	No. of households	
	No.	%
1	24	25%
2	61	64%
3	3	3%
4	3	3%
5+	4	4%
Total	**95**	**100%**

Some 25% were single adult households (cf Census 2011 36% of the population), indicating a tendency for the survey to have had a lower response from single/lone person households.

Mean and average number was 2 per household.

Table #7: Q3c – Household Numbers, Children

No. of children in household	No. of households	
	No.	%
1	5	25%
2	8	64%
3	3	3%
Total	**16**	**100%**

Some 16 households indicated they had children with none recorded with more than 3 children and average number 1.9 per household with children.

Average number of total persons per household was 2.3.

2.5 Age and Gender of Respondents

The questionnaire asked to speak to the person in the household (if available) most familiar with the electrical system. Some 65% of respondents were male.

Age groups were as follows.

Table #8: Q36 – Age Groups

Years	No.
30 - 34	3
35 - 44	12
45 - 54	23
55 - 64	41
65 plus	20
Not recorded	1

The sample had an older profile than the general community (see Table Page 6)

2.6 Employment Where

The following gives place of work.

Table #9: Q35 – Main Place of Employment

Home	6%
In Daintree	51%
Out of Daintree	22%
Retired	19%
Don't work/unspecified	2%
Total	**100%**

About 20% were retired or didn't work. Of those working, 28% worked outside of the Daintree area. Note: Most would probably work in Mossman or Port Douglas.

2.7 Length of Residence

The following summarises length of residence in the Cape Tribulation/Daintree area.

Table #10: Q34 - Length of Residence in Area

2 – 4 years	10
5 – 9 years	15
10 – 14 years	19
15 – 19 years	14
20 – 24 years	16
25 – 29 years	10
30 – 34 years	10
35 plus years	5
Not specified	1

Only 10% were less than 5 years.

Modal group was 10 – 14 years. Median group was 15 – 19 years. Average was 17.4 years.

3. Power Systems

3.1 Power Generation Systems Used

The following gives responses.

Table #11: Q4 – Detailed List of Responses

	No.	%
Diesel generator/Gas	11	*11%*
Diesel generator/Petrol generator/Gas	1	*1%*
Petrol generator/Gas	6	*6%*
Solar/Gas	2	*2%*
Solar/Diesel generator/Gas	28	*28%*
Solar/Diesel generator/Hydro/Gas	3	*3%*
Solar/Diesel generator/Petrol generator/Gas	12	*12%*
Solar/Hydro/Gas	1	*1%*
Solar/Petrol generator/Gas	34	*34%*
Solar/Petrol generator/Hydro/Gas	1	*1%*
Solar/Petrol generator/LPG gas generator/Gas	1	*1%*
Total	**100**	***100%***

For this question, 'Gas' was treated as a power source even if it did not go through a generator and was used for cooking, hot water, refrigeration, etc., (see Section 3.6, Table #17). 100% had 'Gas'. One respondent with an LPG gas generator is classified with the 'Solar/generator' group.

Ignoring gas, the above simplifies into:

Table #12: Q4 – Electricity Power Generation Systems Used

Power Systems	No. of respondents
Solar/generator	79
Generator only	18
Other	3
Total	**100**

Thus apart from the 3 "Other", all had generators.

"Other" were 'Solar/gas' 2, and 1 'Solar/hydro/gas'.

Within the solar/generator group, there were 3 with hydro, making 4 in total with hydro.

Of the generators, a number had more than one type, with total of 113 for the 97 with generators:

Diesel.....57
Petrol 55
LPG.....1
Total 113

The following analyses by business/residence.

Table #13: Q4 by Q2 – Power Systems by Business/Residence

		No.	%
Generator	Business only	2	*2%*
	Resident	8	*8%*
	Resident/Business	8	*8%*
Other	Resident	2	*2%*
	Resident/Business	1	*1%*
Solar/Generator	Business only	2	*2%*
	Resident	61	*62%*
	Resident/Business	16	*15%*
Total		**100**	***100%***

Analysis of this table indicates that 32% of the businesses had generator only while only 11% of the residents had generators only.

The following analyses those businesses with generators only by size of business.

Table #14: Q4 by Q3b – Business Respondents, Generators Only, by Size (Employees)

		No.
Generator	Very small	3
	Small	3
	Medium	4
	Large	1
Other		Nil
Solar/generator	Very small	11
	Small	2
	Medium	1
	Large	**3**

The table indicates that among the businesses with generator only, some 6 were in the small and very small category. Of the medium businesses, 4 were generator only out of 5. However 3 out of 4 of the larger businesses had solar as well as generators.

3.2 Power Voltage

Table #15: Q5 – Power Voltage Used

Voltage	No. of respondents
Extra Low Voltage	
12	4
24	23
48	3
Low Voltage	
240	66
415	3
Not specified	1
Total	**100**

Although 240 volt dominates at 66%, there is a substantial number 23% on 24 volt and a few 12, 48 and 415. (Note: Extra low voltage systems do not require 'professionals' to install and maintain.)

Table #16: Q5 x Q2 – Power Voltage by Business/Residence

	Voltage						
	12	**24**	**48**	**240**	**415**	**n/a**	**Total**
Business only	0	0	0	3	1	-	**4**
Business/Resident	1	11	1	9	-	-	**22**
Resident	3	12	2	54	-	1	**72**
Total	**4**	**23**	**3**	**66**	**1**	**1**	**98**

As might be expected, the four business only were on 240 (3) and 415 (1). Surprisingly, a substantial proportion of the business/resident respondents were on 12, 24, or 48 volts – more than the number of those on 240 volts.

3.3 Gas Use

As indicated by Section 3.1, all respondents use gas, almost all for cooking but heavily for 'Hot water' and some for 'Refrigeration'.

Table #17: Q5 – What Use Gas For

	No.	%
Cooking	99	*99%*
Hot water	75	*75%*
Refrigeration	6	*6%*

3.4 Solar

3.4.1 General

Some 78% use solar. 22% do not use solar at all.

3.4.2 How old solar panels

Table #18: Q6 – How Old Solar Panels

Years	No.	%
0.3	3	*3%*
0.6	3	*3%*
1	3	*3%*
2	3	*3%*
3	2	*2%*
4	1	*1%*
5	2	*2%*
6	2	*2%*
7	3	*3%*
8	7	*7%*
9	1	*1%*
10	10	*10%*
12	8	*8%*
15	13	*13%*
16	2	*2%*
17	2	*2%*
19	2	*2%*
20	8	*8%*
21	1	*1%*
22	1	*1%*
28	1	*1%*
No solar	22	*22%*
Total	**100**	***100%***

Modal group was 15 years. Median was 10 years and mean (average) was 11.2 years. (Note: Some of the older systems may not be photo voltaic but earlier designs.)

3.4.3 How often clean solar panels

Table #19: Q7 – How Often Clean Solar Panels

Times a year	No.	%
na	23	*23%*
0	8	*8%*
1	17	*17%*
2	10	*10%*
2.4	1	*1%*
3	3	*3%*
4	2	*2%*
12	9	*9%*
24	9	*9%*
36	11	*11%*
52	1	*1%*
72	4	*4%*
144	1	*1%*
156	1	*1%*
Total	**100**	***100%***

Median was 3 times a year, ie. every 4 months. However because of a few washing every 2 to 3 days, the average is 18 times a year.

Interviewer feedback indicates that those washing frequently probably have their panels at ground level and not on a roof.

3.4.4 Will roof need replacing or repainting before the life span of solar system

Table #20: Q8 – Roof Needs Replacing or Repainting Before Current Life Span

	No.	%
No	50	*68%*
Yes	24	*32%*
Total	**74**	***100%***

About a third said, "Yes".

3.5 Batteries

Table #21: Q9 – Use Batteries for Storage

	%
Yes	86%
No	13%
No response	1%
Total	**100%**

Some 86% use batteries.

Table #22: Q10 – Type of Batteries Mentioned

	No.	% of respondents
Lead acid	70	*80%*
Gel	17	*20%*
Calcium	1	*1%*

There was one response that said both "lead acid" and "gel". While 80% said "lead acid", a significant 20% said "gel".

Table #23: Q10 x Q4 – Use of Batteries by Type of Power System

	No.	%
Generator (no batteries)	12	*12%*
Generator/Gel	1	*1%*
Generator/Lead acid	5	*5%*
Other/Gel	1	*1%*
Other/Lead acid	2	*2%*
Solar/Generator (no batteries)	2	*2%*
Solar/Generator/Calcium	1	*1%*
Solar/Generator/Gel	14	*14%*
Solar/Generator/Lead acid	61	*61%*
Solar/Generator/Lead acid/Gel	1	*1%*
Total	**100**	***100%***

Most of those who use generators only (12 of 18, ie. 67%) do not use batteries. This compares with those with solar/generator and other, where only 2 out of 82, ie. 2% do not use batteries.

Table #24: Q10 – How Often Replacing Batteries

Years	No.	%
0	1	*1%*
1	4	*4%*
2	2	*2%*
3	1	*1%*
4	2	*2%*
5	5	*5%*
6	1	*1%*
7	6	*6%*
7.5	1	*1%*
8	4	*4%*
9	3	*3%*
10	20	*20%*
11	4	*4%*
12	11	*11%*
More than 12 years	3	*3%*
No response	32	*32%*
Total	**100**	***100%***

Modal was 10, median was 10, but mean 'average' was 8.7 years.

Table #25: Q11 – Considering Purchasing Lithium Batteries

	%
Yes	34%
No	36%
Don't know	15%
Not applicable (don't use batteries)	15%
Total	**100%**

A significant proportion said, Didn't know, but over a third were considering.

Respondents were asked, "Why?" their response.

The following table summarises responses by whether they said "Yes" or "No" and the current type of batteries they have.

Table #26: Q11 – Considering Purchasing Lithium Batteries in the Future – Why Considering

Yes Considering		**No.**	*%*
Currently have Gel	Cost	3	*4%*
	Performance	2	*3%*
Currently have Lead acid	Cost	8	*10%*
	Performance	11	*14%*
	Lifespan	3	*4%*
	Maintenance	5	*6%*
No Not Considering			
Currently have Gel	Cost	3	*4%*
	Maintenance	1	*1%*
Currently have Lead acid	Cost	14	*18%*
	Limited Lithium resources	1	*1%*
	Limited knowledge	4	*5%*
	Better technology future	1	*1%*
	Heating issues	1	*1%*
	Efficiency / reliability	3	*4%*
	Prefer Gel	4	*5%*
	Maintenance	1	*1%*
Don't know			
Currently have Gel	Price	1	*1%*
	Limited knowledge	1	*1%*
Currently have Lead acid	Limited knowledge	6	*8%*
	Better technology future	3	*4%*
	Efficiency / reliability	1	*1%*
	Cost	1	*1%*
Total		**78**	***100%***

The table indicates that those who said "Yes" mostly said "Better performance" followed by "Cost". Those who said "No" mentioned "Cost". Those who "Didn't know" recorded "Limited knowledge" and "Better technology in the future".

Table #27: Q12 – How Charge Batteries

	%
Solar	74%
Generator	75%
Hydro	5%

Responses indicate that many use both solar and generator to recharge batteries.

Table #28: Q13 – Where Batteries Located

	No.	***%***
Home	48	*55%*
Away from home		
In shed	21	*24%*
In separate structure	19	*22%*
Total	**88**	***100%***

Over a half had batteries in their home.

4. GENERATORS

4.1 Use of Generators

Respondents were asked how many hours they ran their generators in "Winter", "Early summer" and "Wet season". Some 78% said they used generators. The following table for the winter months illustrates the wide spread of responses.

Table #29: Q20 – Hours Run Generator per Week – Winter Months

Hours per week	No.
0.50	1
0.75	1
1.00	1
1.25	2
1.50	1
2.00	1
2.50	1
3.00	7
4.00	3
5.00	8
6.00	2
6.25	1
7.00	5
8.00	2
10.00	2
11.00	2
12.00	1
14.00	4
20.00	1
21.00	2
25.00	3
28.00	2
35.00	2
56.00	2
66.50	1
70.00	3
90.00	2
112.00	5
154.00	7
168.00	1
NA/No response	22
Total	**100**

Early summer and wet season ranges were similar.

For winter, median group was 11 hours a week (ie.1.6 hours a day). However because of some running at or towards 24 hours a day, average was 40 hours (ie. 5.7 hours a day).

The following table sets out average hours run per day by whether business or residential and at different times of the year.

Table #30: Q20 – Average Hours Run Generator per Day

	Winter months	Early summer	Wet season
Business only	17.1	17.1	17.1
Business/Resident	9.9	9.4	10.0
Resident only	3.7	3.3	4.4
Overall Average	**5.7**	**5.3**	**6.1**

It can be seen that there are substantial differences between businesses and residents. Businesses only were running an average of 17.1 hours a day, ie. 120 hours a week whereas residents only average about 3 – 4 hours a day.

There is a variation between seasons with lowest being early summer when sun intensity is high and cloud cover low. Wet season is the highest with cloud cover high along with hot humid conditions.

4.2 Fuel Usage

Respondents were asked how much fuel they used and its cost.

The following table summarises by fuel types.

Table #31: Q22 – Indicated Fuel Usage

Fuel	Usage	
Diesel used	341,946	Litres
Diesel cost	$465,807.96	Year
Petrol used	53,956	Litres
Petrol cost	$77,579.90	Year
Bio used	884	Litres
Bio cost	$3,712.80	Year
Total used	**396,786**	**Litres**
Total cost	**$547,100.66**	**Year**

The indications are that about 400 tonnes of fossil fuel is used at a cost of $500,000 a year by the 100 residents/businesses surveyed. Average cost given was diesel $1.36/litre and petrol $1.44/litre.

5. CAPACITY AND AMOUNTS OF POWER GENERATED

5.1 General

The following looks at indications of the amount of installed generating capacity among respondents, likely power consumption and split between solar and generators as a source of power.

5.2 Consumption

To provide some benchmark comparisons, the following provides estimates of likely consumption based on regional grid averages.

The Queensland Productivity Commission Report, March 2016, indicates that average electricity consumption per household in 2013-14 in the Cairns/Far North Queensland (FNQ) region was 6.678 KWh. Thus at FNQ area averages, the 96 households surveyed could be expected to be using 641,000 KWh.

An Ergon Data Summary Analysis gives electricity use in the Network in the FNQ region in 2012-13 as:

Residential ..... 760 GWh
Businesses ..... 1,153 GWh
Total ..... 1,913 GWh

This ratio of 'total' use to 'household' use is 2.517.

Based on the FNQ averages, total use by the 100 respondents in the Daintree/Cape Tribulation area would come out at 1,613,000 KWh per annum.

Because of a likely lower ratio of business to household use, the high usage of gas to replace electricity for cooking and water heating and limitation imposed by the systems used and costs, actual use could be substantially less.

5.3 Likely Solar Generation and Use

For the solar generation system in the area, the installed solar capacity comes from Question 4.

Output is related to the amount of sunlight. The area is often affected by rainy and cloudy days. Long-term records indicate the Mean Daily Global Solar Exposure at the Cape Tribulation Store is 5.3 KWh per sq metre per day which works out at the equivalent of 5.3 hours of input into solar panels.

Choice magazine, March 2016, gives CSIRO test data that indicates real solar output with new panels is 92% of manufacturer's indicated capacity.

It is also well known that efficiency declines with age. The following works on efficiency of 20 year old panels being 12% rather than 15%, ie. 80% of new panels, a decline of 1% point per annum. Average age of panels was 11.2 years, making adjusted efficiency factor 0.888.

Taking these factors into account, the total solar output for the 100 respondents is estimated as follows.

Estimated installed solar capacity .....322.85 KW

Adjusted for general efficiency factor CSIRO research 0.92...297.02 KW

Adjusted for age factor 0.888 .....261.38 KW

5.3 hours of sunlight .....1,385 KWh per day

365 days a year .....506,000 KWh per annum

We thus have estimated power generated by solar panels by the 100 respondent households/businesses of about 500,000 KWh per annum.

The above installed capacity represents of the order of 1.4 KW per person.

This does not take into account the fact that panels will accumulate dust and mould if not cleaned regularly. The survey indicated that many panels in the area are not being cleaned regularly. However, insufficient empirical evidence was available upon which to base an adjustment factor.

Thus, the real solar output can be expected to be less than the above figure.

5.4 Generators

Data from Question 4 indicates that installed generator capacity of the 100 households/businesses is 1,342 KW, about four times the installed solar capacity of 323 KW.

Although the average daily usage of generators from the survey was 6.1 hours, there is a tendency for the larger businesses to run generators longer hours. Some have more than one generator and assuming that second generators are idle, the indication from the survey is that an average of 18,575 KWh are potentially generated per day with a total per annum of 6,780,000 KWh.

Obviously, generators are operating at much less than installed capacity. However it can be inferred that they are supplying a greater proportion of the respondents' electricity use than the installed solar systems.

5.5 Installed Capacity Compared

An interesting comparison however is that installed generator capacity at 1,342 KW is approximately 13.8 KW per household/business surveyed. At average household size of 2.3, average installed generator capacity is about 6.0 KW per person.

By comparison, generating capacity in the National Electricity Market Grid is given as currently 51,363 MW or 51 million KW or approximately 2.5 KW per head of population.

To cope with being off the grid, installed diesel/petrol/LPG generating capacity per person is thus of the order of 2.4 times that of the grid.

6. COST OF POWER SYSTEM

6.1 Amount Spent on System or Replacement Value

Table #32: Q14 – The Amount Spent on Power System to Date or What is Replacement Value

	Total No.	Businesses	Residents only
$0 - $5,000	6	1	5
$5,000 - $9,000	5	-	5
$10,000 - $19,000	11	-	11
$20,000 - $29,000	15	2	13
$30,000 - $39,000	9	1	8
$40,000 - $49,000	7	1	6
$50,000 - $59,000	13	6	7
$60,000 - $69,000	5	-	5
$70,000 - $79,000	7	3	4
$80,000 - $99,000	3	1	2
$100,000 - $190,000	10	8	2
$200,000 - $300,000	5	5	-
Not applicable/no response	4	1	3
Total	**100**	**29**	**71**

Amounts ranged from $100 to $300,000. Overall median was $40,000. Average was $53,000.

As might be expected, very few of respondents with businesses (17%) had invested less than the $50,000-$60,000 range and only 18% of the residents only had invested more than the $50,000-$60,000 range.

Median for businesses was $80,000 and average $100,000 and median for residents only, $26,000 and average $34,000.

Total amount indicated was $5.1m (split $2.8m businesses and $2.3m residents only). This is the equivalent of $22,200 per head of population. This would be the equivalent of Australia as a whole having $532 bn invested in its electricity distribution and generation systems.

6.2 Government Subsidies

Table #33: Q15 – Received Subsidies

	Federal	Queensland State
Yes	30	22
No	48	47
Don't know	22	31
Total	**100**	**100**

Some 30% said they received Federal Government subsidies, 48% said they didn't and 22% didn't know.

Some 22% said they had received State subsidies, 47% said they didn't and 31% didn't know.

Table #34: Q15.1 – Summary of Subsidies Received

Amount	No.
$1,000 - $9,000	9
$10,000 - $19,000	22
$20,000 - $29,000	6
$30,000 - $39,000	2
$40,000	1
$50,000	1
Total	**41**

The 41 who said they received subsidies were businesses 12 and residents only, 25. They recorded a total of $671,000. Median was $15,000 and average was $16,400 (businesses $24,000 and residents only, $15,300).

6.3 Expect to Spend on System over Next 5 Years

Table #35: Q16 – Summary – Amount Expect to Spend on System Over Next 5 Years

Amount	No.
$0	15
$50 - $1,000	9
$1,500 - $3,000	8
$4,000 - $6,000	11
$6,500 - $10,000	12
$12,000 - $20,000	25
$25,000 - $50,000	17
$80,000 - $100,000	3
Total	**100**

Median was $8,000, total spending $575,000 and average $14,800 per respondent (businesses $26,800 and residents only, $9,980).

6.4 Maintenance Cost of System

Table #36: Q17 – Approximate Maintenance Cost of System

$ per annum	No.
Nil	4
36	2
100	3
200	2
250	1
300	3
500	2
600	1
780	1
1,000	9
1,200	5
1,800	3
2,000	10
2,400	1
2,500	3
2,600	2
3,000	3
3,600	4
4,000	2
4,800	1
5,000	5
6,000	2
7,000	1
7,800	1
8,000	1
9,600	1
14,400	1
15,000	1
15,600	1
18,000	1
24,000	1
60,000	1
120,000	1
NA/No response	21
Total	**100**

Median was $2,000 (businesses $4,000, residential only, $1,800). Total for 75 responding was $434,000 (estimated for 100 respondents $579,000). Average due to a few very large responses was much higher at $5,800 (businesses $12,365, residents only, $2,300).

7. ESTIMATED COST OF POWER

Respondents were asked how much they believed their power was costing them.

Only 38 of the sample were able to respond with estimates, with the following results.

Table #37: Q21 – How Much Power Costing Per Annum

Cost per annum	No.
$72	1
$200	1
$350	1
$400	1
$1,000	2
$1,200	2
$1,300	1
$1,560	3
$1,606	1
$1,800	1
$2,000	1
$2,080	1
$2,400	1
$2,500	1
$3,000	2
$3,500	1
$3,640	1
$3,900	1
$4,000	1
$4,160	1
$4,927	1
$5,000	1
$6,000	1
$7,280	1
$8,840	1
$10,000	1
$24,000	1
$31,200	1
$42,000	1
$43,800	1
$73,000	1
$80,300	1
$90,000	1
No response	62
Total	**100**

Average estimated amount spent by those responding was $12,500. However businesses' responses recorded $29,900 and residences only, $2,360.

Table #38: Q21 – How Much Power Costing Per Annum

	$
Average Residence	$2,365
Average Business	$29,899
Average Total	**$12,509**

Only a very few could give an estimate of how much power was costing them per kwhr as follows and there is some uncertainty as to whether this includes capital write off or not..

Table #39: Q22 – Cost of Power per Hour

Hours per week	**No.**
80 cents	1
60 cents	2
55 cents	1
20 cents	1
15 cents	1
Total	**6**
No response	92
Overall Total	**100**

8. LIMITATIONS OF SYSTEMS

8.1 Air-conditioning

Table #40: Q25 – Have Air-conditioning

	No.	%
Yes	14	*14%*
No	84	*84%*
No response	2	*2%*
Total	**100**	***100%***

Only 14% have air-conditioning. Of the 14 who had air-conditioning, 8 said that the capacity of their system limited its use.

8.2 Other Appliances

Table #41: Q27 – Because of Capacity of System – Do not have appliances or limit use of appliances (other than air-conditioning)

	%
Yes	73%
No	23%
No response	4%
Total	**100%**

Some 73% said yes.

Table #42: Q28 – Have to Buy Appliances Specifically Designed to Suit Power Generation System

	%
Yes	71%
No	27%
No response	2%
Total	**100%**

Some 71% have to buy specifically designed appliances.

Table #43: Q28 – Have to Buy Appliances Specifically Designed to Suit Power System by Voltage

	% Yes
12 volt	75%
24 volt	96%
48 volt	67%
240 & 415 volt	64%

Those on 24 volt especially had very high “Yes” responses.

8.3 Need to Check System

Table #44: Q29 – Need to Have Neighbours/Other Regular Check System When Go Away

	%
Yes	56%
No	40%
No response	4%
Total	**100%**

The majority of systems need to be regularly checked while owners away.

8.4 Household Numbers Able to Operate System

Table #45: Q30 – Are All Members of Household /Business Capable of Operating System

	%
Yes	70%
No	26%
No response	4%
Total	**100%**

About a quarter had members of household/business who couldn't operate the system.

8.5 Safety

Table #46: Q31 – Have You Had Any Safety/Accident Incidents with Current System

	%
Yes	11%
No	87%
No response	2%
Total	**100%**

Some 11% had safety/accident incidents. The following sets out details.

Table #47: Q31 – Details of Safety/Accident Incidents with Current System

	No.
▪ Acid burns from battery	1
▪ Acid spill from batteries that burn - minor	1
▪ Clothes caught in fan of generator and pulled into generator - now have remote off-switch	1
▪ Electric shock from washing machine due to generator not being earthed	1
▪ Generator blew up - had burns to legs	1
▪ Generators catch on fire also inverter caught on fire	1
▪ It caught on fire, the read out on the solar panels. They were not connected properly.	1
▪ My original system installed by 'x', the batteries were faulty, they would not charge up. 'x' asked me to do a boost charge, I had to start the generator up in the morning when I got up and let it run until it shut down, at about 8.30pm that night the generator was still running, went to see why it had not shut down when I opened the shed door I was hit with a massive amount of sulphuride gas which is explosive. It burnt my air passages when I sucked it in, I ran and shut the generator down	1
▪ Rat issue destroyed fridge	1
▪ I had to give my husband mouth to mouth to revive him, he is still alive.	1
▪ When the red ants chewed the wiring loom from the generator to the house	1

The responses mainly relate to batteries, generators and faults.

8.6 Maintenance of System

Table #48: Q32 – Who does Maintenance of Your System

	%
Self	76%
Other	18%
Friend	3%
Professionals	65%

Note: The 30% of respondents with extra low voltage systems (< 50 volts) do not need to use 'professionals' on maintenance of the system.

9. GOOD AND BAD THINGS ABOUT SYSTEM

Respondents were asked about the good and bad things of the systems. Appendix 4 lists detailed responses. The following tables summarise.

Table #49: Q18 – Summary of What is Good About Your System

Generator	No. of Mentions		
Consistent / reliable	10	9%	77%
No power bill	2	2%	15%
Cheaper	1	1%	8%
Total	**13**	**12%**	**100%**
Generator/Battery			
Consistent / reliable	2	2%	50%
Eco / clean energy	2	2%	50%
Total	**4**	**4%**	**100%**
Solar/Generator/Battery			
Self reliant	26	24%	28%
Consistent / reliable	25	23%	27%
Eco / clean energy	14	13%	15%
Efficiency	11	10%	12%
Nothing	5	5%	5%
Economical	5	5%	5%
Minimal weather concerns	3	3%	3%
Total automated	2	2%	2%
Energy consumption awareness	1	1%	1%
Air-conditioning	1	1%	1%
Total	**93**	**85%**	**100%**
Overall Total	**110**	**100%**	

The indications are that almost all those on generator without solar say the good thing is that it is consistent and reliable.

For those with solar in the system, there was a high proportion who said self-reliance 28%, ecoclean friendly 15%. However 27% said consistent/reliable and 12% efficiency.

Table #50: Q18 – Summary of What is Bad About Your System

Generator	No. of Mentions		
Constant maintenance	5	4%	20%
Fuel Costs	5	4%	20%
Maintenance cost	3	2%	12%
Reliant on fossil fuels	2	1%	8%
Appliance limitations	2	1%	8%
Generator issues noise / emissions / costs	2	1%	8%
Setup / replacement costs	2	1%	8%
Brownouts	1	1%	4%
Nothing	1	1%	4%
Operating knowledge issues	1	1%	4%
No Air-conditioning	1	1%	4%
Total	**25**	**18%**	**100%**
Generator/Battery			
Generator issues noise / emissions / costs	4	3%	40%
Fuel cost & transportation	2	1%	20%
Nothing	2	1%	20%
No government assistance	1	1%	10%
Constant maintenance	1	1%	10%
Total	**10**	**7%**	**100%**
Solar/Generator/Battery			
Appliance limitations	26	19%	25%
Constant maintenance	19	14%	18%
Setup / replacement costs	18	13%	17%
Maintenance cost	12	9%	11%
Generator issues noise / emissions / costs	8	6%	8%
Service provider problems	5	4%	5%
Operating knowledge issues	4	3%	4%
Nothing	4	3%	4%
Reliant on fossil fuels	4	3%	4%
Fuel cost & transportation	2	1%	2%
No government assistance	1	1%	1%
Everything	1	1%	1%
Lightning strikes	1	1%	1%
Total	**105**	**75%**	**100%**
Overall Total	**140**	**100%**	

Responses were much more dispersed than the “Good” things. Among those with generators without batteries, constant maintenance and maintenance costs were high and fuel costs. For those with generator and batteries, “Noise, emissions and fuel costs” led. For those with solar, “Appliance limitations” was highest and with constant maintenance, setup and replacement costs also high.

10. DESIGN AN IDEAL SYSTEM

Table #51: Q33 – If Could Design Ideal system, What Would It Be – Mention of Elements

	%
Solar	60%
Back-up generator	44%
Main grid	37%
Hydro	27%
LAPN/Micro grid	20%
240°	9%
Wind	8%
Lithium	6%
Generator	5%
Other	3%
Lead acid	2%
Computer controlled	
Gel batteries	2%
Storage battery system	2%
Inverter	1%
Gravity fed	1%
Grid connection	1%
Renewable	1%

Most commonly mentioned were solar, back-up generators, main grid, hydro, LAPN/micro grid.

11. ATTITUDE TO GRID POWER DELIVERY SYSTEMS

11.1 Micro Grid

Respondents were asked, *"If an off-grid local area power network (micro grid) was set up in your area based on renewable sources that you could join, what would be needed to convince you to connect to it?"*

Few could respond re price. Other factors mentioned are set out in Appendix 5. The following summarises.

Table #52: Q23 – Summary of Factors to Convince to Connect to Local Area Micro Grid

	No.	%
Affordability / cost effective / economical / cheaper	46	*46%*
Reliability	29	*29%*
Would connect / relief / nothing / love it	19	*19%*
Don't want / wouldn't connect / more bills	8	*8%*
Environment factors / trees / bio diesel / technology	7	*7%*
Subsidies / government	5	*5%*
Tariff rates	4	*4%*
Cost without it / maintenance / emissions	4	*4%*
Could feed back / paid / rebate	4	*4%*
Convenience	4	*4%*
Don't know	4	*4%*
Would connect / keep existing system	3	*3%*
Accessibility / availability	3	*3%*
Nothing / wouldn't work / too remote	3	*3%*
Community support	1	*1%*
No limitations	1	*1%*
Total	**100**	***100%***

Comments about "Affordability cost" led followed by "Reliability" and then positive comments about "Would connect" and the like. Only 8% said that they "Didn't want it/wouldn't connect".

11.2 Grid Power

Table #53: Q24 – For or Against Grid Power Being Extended into the Area

	Sample	Of those responding Yes or No
For	61%	69%
Against	28%	31%
Don't know/No response	11%	-
Total	**100%**	**100%**

Some 69% of those with an opinion were in favour and 31% against.

Table #54: Q24 – For or Against Grid Power by Whether Resident only or Business

	For	Against	Don't know	Yes of those Yes or No
Residents only	56%	28%	15%	67%
Businesses	72%	28%	Nil	72%

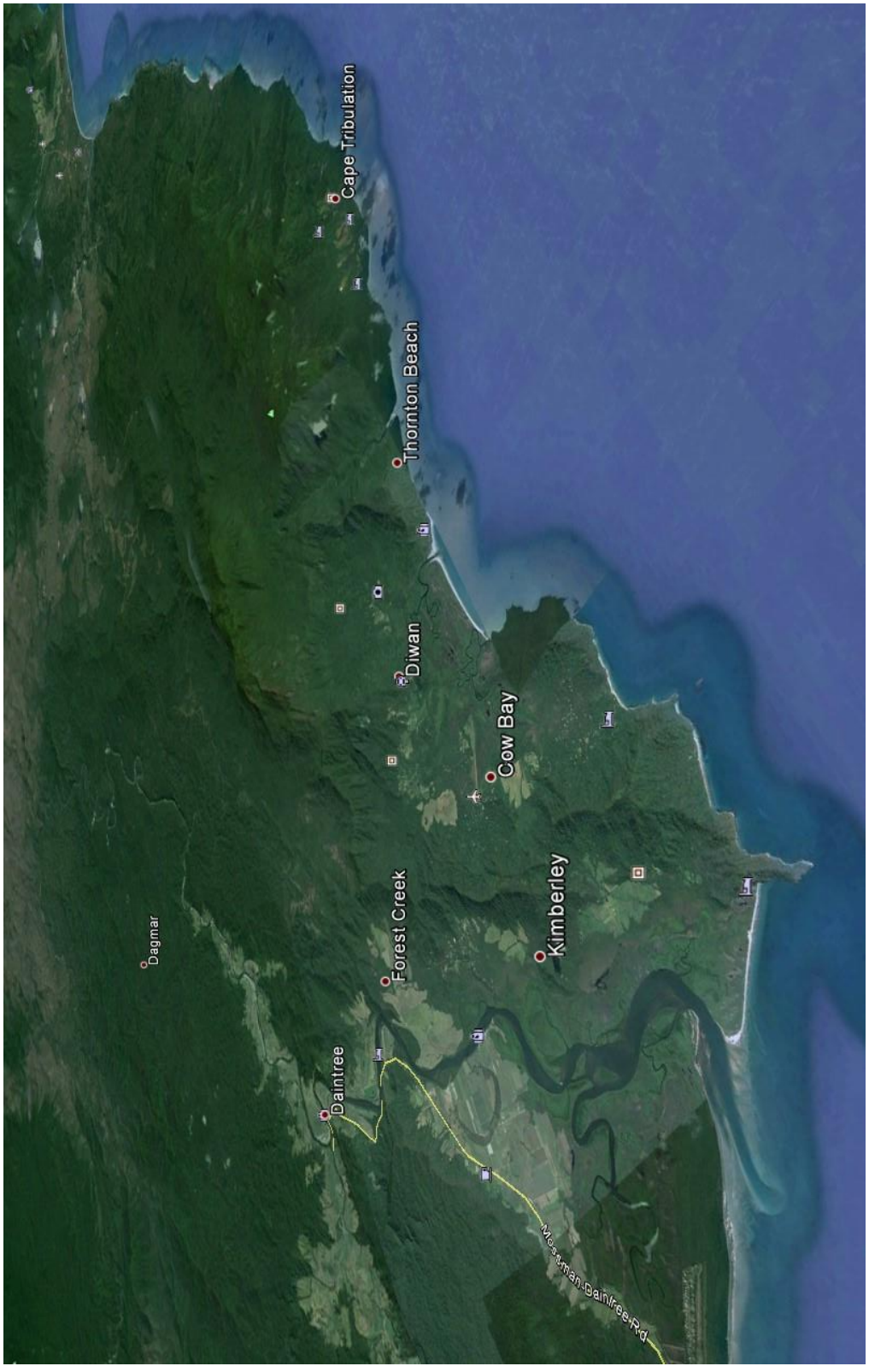
The "Don't know" were all residents only. Of those with an opinion, businesses recorded 72% "Yes" and residents only, 68%.

DAINTREE / CAPE TRIBULATION ELECTRICITY SURVEY

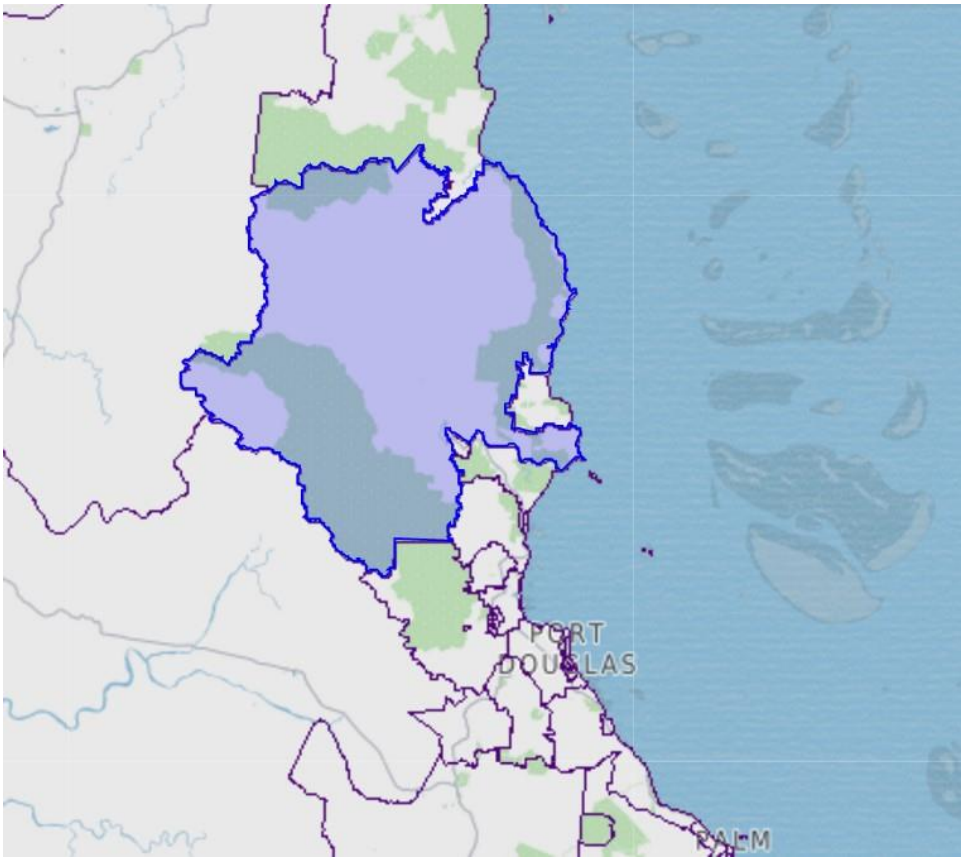
APPENDICES

APPENDIX 1

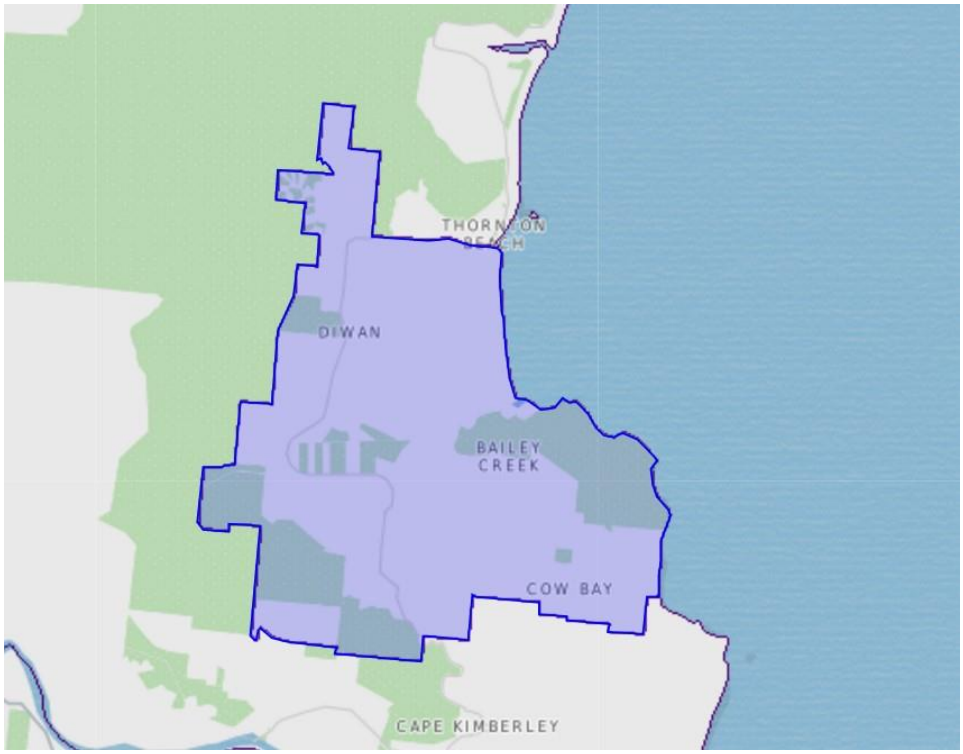
MAP – DAINTREE CAPE TRIBULATION AREA



MAP – SA1 – 3116417



MAP – SA1 - 3116409



APPENDIX 3

QUESTIONNAIRE

compassresearch.net.au

Hello my name is ▾ *of Compass Research Cairns. We are carrying out research into electricity and power systems on behalf of Energy Consumers Australia.*

Could I speak to the person in the household or business who is most knowledgeable about your electricity power systems?

This research survey is not aimed at the question of whether the electricity power grid should be extended into the Daintree area or not. It is about how households & businesses operate separately from the national power grid, and it is to help develop government policies on how electricity can be supplied to households and businesses throughout Australia in the future.

Individual responses are confidential and inputs only into an overarching report providing the findings. It should only take about 10 minutes of your time.

Could I just confirm that you are not connected to the grid? ***(If connected, terminate survey)***

Reset

Q1. First, could I just check the area you live in?

- ○ Cape Tribulation
- ○ Cow Bay
- ○ Diwan
- ○ Forest Creek
- ○ Kimberley
- ○ Thornton Beach
- ○ Other

MAP

Q2. What type of user are you?
(Note if business or residential on separate systems, complete two different responses.)

- ○ Resident only
- ○ Business only
- ○ Residence & Business combined

Q2.1. Is your network shared? all or part shared?

- ○ Not shared
- ○ All shared
- ○ Part shared

Q3a. What is the nature of your business?

Q3b. Total employed at peak (including owners/family members/casuals)?

Q3c. How many people reside at your household?

- Adults ▾
- Children ▾

Q4. Which of the following power generation systems do you use?

1.Diesel generators, Petrol generators, Solar panels, Gas, Wind, Hydro, Anything else? ***(include multiples)***

2.Is it fixed or portable?

3.What size or power output does it generate? Watts, Kilowatts or Kilovolt Amps/kVA
(if solar and in doubt, what is on the inverter (kW) or how many panels)(rated)

4.***For solar only*** How many solar panels do you have installed?

5.***For part shared only*** Is that power source/generater/solar part shared?

Do you have any other sources for power generation?

Power generator	Fixed or Portable	Output No (rated)	Output type	Panels No/Gas yearly	Other specify:	Part shared

Q5. What voltage is your house running on? ***(Appliances)***
DC = Direct current, AC = Alternating current
3 Phase = 3 wires of alternating current (240) to deliver more power, industrial usage

○	12 volt DC
○	24 volt DC
○	48 volt DC
○	240 volt AC
○	415 volt (3 phase)
○	Other
○	Not sure / don't know

IF gas used What do you use your gas for?

The regular household cooking	☐
Hot water system	☐
Refrigeration	☐

Does the household / business use solar panels?

Yes	○
No	○

Q6. How old are your solar panels? [ ] *years.months*

Q6.1.***Only if solar panels are older than 15 years old***
Can we contact you again regarding your solar panels for further research?

- [ ] Yes

Q7. How often do you carry out maintenance / cleaning of your solar panels? [ ] [▾]

Q8. Will your roof need replacing or painting before the current life span of your solar system?

- ( ) Yes
- ( ) No

Q9. Do you use batteries for storage?

- ( ) Yes
- ( ) No

Q10. What type of batteries do you use & how many & how old & lifespan***(Lead acid, Lithium, Other) (age years.months)***

Type	Qty	Age	Lifespan
[▾]			
[▾]			
[▾]			
[▾]			

Other: [ ]

Q10.1.How often do you find yourself replaceing your led acid batteries? [ ] *years.months*

Q11.Are you considering purchasing lithium batteries in the future?

- ( ) Yes
- ( ) No
- ( ) Don't know

Why?

[ ]

Q12. How do you charge your batteries?

- [ ] Via solar
- [ ] Via generator
- [ ] Via wind
- [ ] Via hydro

Q13. Where are your batteries located?

☐	Inside or adjoined to house or business
☐	Away from house business in general shed
☐	Away from house business in special structure

Q14. About how much do you think you have spent on your power system to date or what is the replacement value?

$ ____

Q15. Did you receive any Govt subsidies to purchase your power system?

Government	Yes	No	Don't know
Australian Federal	○	○	○
Queensland State	○	○	○

Q15.1. Approximatly what is the total amount of subsidies you recieved?

$ ____

Q16. Excluding operating costs about how much do you expect to spend on your power system in the next 5 years?

$ ____

Q17. Approximatly what is the overall maintenance cost of your system?

Cost	Per
$ ____	▾

Q18. What are the good things and bad things about your current system?

Good?

Bad?

Does the household / business use generators?

Yes	○
No	○

Q19. For Generators, how much fuel do you typically use on average?

Type	Litres	Per	Average Cost per Ltr
Diesel			$
Petrol			$
Bio fuel			$
LPG			$

Q20. Can you estimate how many hours you run your generators for the following seasons?

Season	Hours	Per
Winter months		
Early summer		
Wet season		

Q21. Can you estimate how much you believe your power is costing you?

Cost	Per
$	

Q22. Do you know how much your power costs on a cents per Kilowatt hour basis?

$ per kWh

Q23. If an off grid local area power network (micro grid) was set up in your area based on renewable sources that you could join, what would be needed to convince you to connect to it?

What price? $ or cents per KWh (Kilowatt hour)

What other factors? ***Tariff, reliability, subsidies, Other?***

Q24. If a satisfactory off grid local area power network was not available, what is your attitude to connecting to grid power. Are you for or against grid power being extended into your area?

- Yes
- No

Why do you say that?

Q25. Do you have air-conditioning?

- Yes
- No

Q26. Does the capacity of your system limit the use of your air-conditioner?

- Yes ○
- No ○

Why do you say that?

Q27. Excluding airconditioning are there any appliances you do not have, or appliances you limit the use of, because of the capacity of your system?

- Yes ○
- No ○

What appliances?

Q28. Do you have to buy appliances specifically designed to suit your power generation system?

- Yes ○
- No ○

What appliances?

Q29. When you go away, do you need to have neighbours/others regularly check your electricity system?

- Yes ○
- No ○

Q30. Are all members of your household / business capable of safely operating your system?

- Yes ○
- No ○

Which members are unable?

	Male	Female
Adults	▾	▾
Children	▾	
Business	▾	

Q31. In relation to safety, have you had any safety/accident incidents with your current system?
(Ok to refuse to answer)

- Yes ○
- No ○
- Refused ○

Q31. In relation to safety, have you had any safety/accident incidents with your current system?
(Ok to refuse to answer)

Yes	○
No	○
Refused	○

Describe?

Q32. Who does the maintenance on your system?

Yourself	☐
Other person in household/business	☐
Friend	☐
Paid professional	☐

Q33. If you could design an ideal system, what would it be?

Generator	☐
Back up generator	☐
Solar	☐
Wind	☐
Hydro	☐
Main grid	☐
Local area power network (Micro grid)	☐
Lead Acid Batteries	☐
Lithium Batteries	☐
240v	☐
415 (3 phase)	☐
Other:	☐

Now for some question on usage and costs

Demographics to help us analyse the results:

Q34. How long have you lived in the Daintree/Cape Tribulation area? _____ *years.months*

Q35 Where is your main place of employment?

- ○ Home
- ○ In the Daintree/Cape Tribulation area
- ○ Outside the Daintree/Cape Tribulation area
- ○ House duties
- ○ Retired
- ○ Student
- ○ Don't work

Q36. Finally, which age group do you fall into?

- ○ 18-24 years
- ○ 25-29 years
- ○ 30-34 years
- ○ 35-44 years
- ○ 45-54 years
- ○ 55-64 years
- ○ 65+ years

Q37. Record Gender:

- ○ Male
- ○ Female

Do you have any other comments you think might be helpful?

Your individual comments are confidential. My name is _____ from Compass Research our office number is 40312888. Thank you very much for your time & have a great day.

Phone Number:

Submit

APPENDIX 4

Q18 – DETAILED RESPONSES WHAT GOOD AND BAD ABOUT SYSTEM

Q18a. What are the good things and bad things about your current system? Good?	No.
100% clean, efficient, no noise, no break downs, no wastage	1
24 hr continual power, reliable, economical compared to grid in that area, awareness regarding energy usage	1
As long as I look after it, it goes well	1
Automated, reliable,	1
Clean energy, minimal usage of fossil fuels	1
Consistent & reliable	1
Echo friendly	1
Eco friendly, convenient, no breakdowns, reliable, clean energy	1
Efficient, balanced, continuous power with no breakdowns	1
Efficient, basically maintenance free and almost cost free	1
Efficient, low cost	1
Fully automatic	1
Gone to solar and no generator noise, air not polluting, no bills	1
Greener System	1
Have not got a current system	1
Have power all the time	1
Having two generators we can switch if one goes down.	1
Hydro is fantastic we can operate all the year round.	1
I am a Green person, we do not use the generators unless we have to	1
I am independent from the grid, I can generate my own power and I have no power bill.	1
I am off the main grid	1
I can run anything I want, I have the power I need when I need it	1
I do not always have to use the generator	1
I do not have to worry about anything apart from the weather	1
I do not have to worry about blackouts	1
I do not know	1
I have a light and fan	1
I have gone for a very good system, so I am hoping it will last me ten years.	1
I have lived with little power for 20 years and now with the new system I have plenty of power.	1
I have only had the system for 3 months. I have no bills for power, only time it will cost me is in the wet season.	1
I know I have paid in advance.	1
I like being independent about my power	2
I love having now power. I only need the power on for about 6 hours per day	1
I would be lost if I had a switch to turn off.	1
If you do the maintenance on it, it works well. We can run our air-conditioner.	1
Independence, environmentally sound, not dependant on fossil fuel, reliable	1
Independent	1
Is reliable and is maintained regularly	1
It is all good for us	1
It is easy to budget yourself	1
It is new, as they get older they do not charge up as well	1
It is reliable, when it is working it costs very little, I still think I am ahead against the grid.	1
Much cheaper and convince	1
Never goes out in a Cyclone, no power bill	1
No answer	3
No bill for electricity.	1
No blackouts, and it is a pre-paid bill.	1
No breakdowns, clean energy	1

▪ No cost really only batteries	1
▪ No monthly accounts, no loss of power,	1
▪ No power account	1
▪ No power bill and I can control it all	1
▪ No power bills	3
▪ No power bills, no blackouts, it is green energy.	1
▪ No power bills. Being independent of the grid.	1
▪ No regular power bills, paid for all power usage up front, never have a power cut	1
▪ Not much	1
▪ Not reliant on Grid	1
▪ Nothing	5
▪ Nothing good about it.	1
▪ Nothing, I can turn a light on.	1
▪ On a sunny day the cost is nothing.	1
▪ Reliability, greener energy	1
▪ Reliable	3
▪ Reliable in all seasons, clean, efficient, independent	1
▪ Reliable power, self sufficient	1
▪ Reliable, good for conditions	1
▪ Reliable, self sufficient	1
▪ Self-sufficient, developed for optimum use, quiet, fuel & maintenance efficient, low emission, as eco-friendly as possible to run all services	1
▪ Self-sufficient, independent, as far as bush living goes have some comforts	1
▪ Self-sufficient, reliable power	1
▪ Small carbon footprint, reliability. relatively efficient	1
▪ Still going	1
▪ Still runs	1
▪ That I have 24 hour power	1
▪ The cost is minimal, my only cost this year has been replacing the batteries and they last about 10 years.	1
▪ The environmental side of things. No power bill	1
▪ There is none	1
▪ We are in control of what we use, we only pay for what we've used or what we are going to use.	1
▪ We are self-sufficient and in I cyclone we have power	1
▪ We do not get a power bill. You do not have to run your generator for 6 months if you have good weather	1
▪ We do not have to worry about blackouts.	1
▪ We don't get blackouts and we don't get bills from anyone	2
▪ We don't get bills	1
▪ We have our own power, so if we have a storm, we do not lose power.	1
▪ We have power all year round	1
▪ We have power all the time	1
▪ When the sum is out it is great.	1
Total	**100**

APPENDIX 4 Cont

Q18b. What are the good things and bad things about your current system? Bad?	No.
$15-20 thousand dollars it will cost to replace the system in 5 or so years.	1
Breakdown expense, the maintenance.	1
Brown outs	1
Cannot run freezer or air conditioning	1
Cannot use air conditioner or large element appliances, restricted usage	1
Cannot use anything with an element.	1
Careful with energy usage, special appliances	1
Checking usage, battery maintenance	1
Constant cost of batteries, constant maintenance	1
Constant maintenance - especially batteries, cleaning of panels	1
Constant maintenance,	2
Constant maintenance, cost of replacement, reliable contractors to do servicing	1
Constant maintenance, limited in use of appliances	1
Constant maintenance, reliant on fossil fuels, fuel costs	1
Constant maintenance, replacement costs, service providers not always reliable or efficient	1
Constant maintenance, responsibility of running system,	1
Cost involved in the maintenance of it.	1
Cost of constant maintenance, replacement, set up of system	1
Cost of maintaining it, with limited income.	1
Cost of running the system,	1
Cost of servicing and maintenance, the cost of fuel, having someone come in and monitor the system while I am away. Climb upon the shed roof to clean the panels, having to regularly top of the batteries with water, having to run the generator every day because of the wet season, having to cart 100ltrs of fuel. Having to lift fuel up to fill generator, very hard for the elderly. If there is a breakdown with the electrical system it is hard to get someone out to repair it.	1
Cost of setup, no subsidies at present, cannot run many appliances, limited appliances - no elements	1
Cost of the fuel	1
Cost, constant maintenance, limited supply, limited appliance usage	1
Cost, cost, cost	1
Educating people when stay during the wet season on reasons to limit usage	1
Everything.	1
Expensive, lots of maintenance, must be knowledgeable, generator noisy	1
Expensive, unreliable, break downs, noisy , dependant on fossil fuels,	1
Fuel costs, noise, maintenance, limited usage of appliances	1
Getting fuel I am an hours drive from town.	1
Government not coming to the party.	1
Having to run the generator in the winter time, and the heavy batteries.	2
High cost of system, constant maintenance, limited usage of appliances	1
I am working so I saved for it, a lot of people here would not be able to afford it.	1
I have nothing else	1
I have to run the generator every day	1
I need more power	1
If I want to weld I have to use the generator	1
If we want to run the air-conditioner we have to run a generator, you have to charge the batteries all the time.	1
If you run out of power and have no fuel. you have no power until you get it fix, top it up	1
It costs a lot of money to maintain the system	1
It is expensive	1
Lightning strikes.	1
Low lights, noise pollution, no availability use anything over750w	1
Maintenance and up keep of it.	1
Maintenance, generator noisy	1
Maintenance, keeping an eye on usage, unable to use whatever you want	1

Needs boosting up, needs more power	1
No air conditioner	1
No air conditioning	1
No air-conditioning, in the office	1
No comment	3
Noisy, emissions, cost of fuel, maintenance, needs daily constant attention	1
Non	1
Not enough sun light	1
Not really, it keeps everything cold.	1
Nothing	1
Nothing	3
Nothing at all	1
Nothing I can think of.	1
Ongoing maintenance and up keep of the system.	1
Other people not knowing what they are doing	1
Regular maintenance, limited, living within energy footprint	1
Reliance on fossil fuels. Requires regular maintenance. Some noise, cost of setup and replacement	1
Replacement costs, running costs, limited usage of appliances, need caretaker for maintenance if away	1
The amount of power you use	1
The breakdowns and the lack of service where we live	1
The cost	4
The cost of maintaining it	1
The cost of running the system is high	1
The cost of the system	2
The noise	1
The noise of the generator.	1
The weather	1
Very expensive to set up & run. Constant maintenance, high cost of maintenance	1
Very expensive, continual maintenance, ability to maintain, limited in appliance usage, noisy,	1
Very expensive, noisy, constant maintenance, shed maintenance, running costs	1
Very limited in usage, very basic items	1
Very, very expensive, impacts on lifestyle, not everyone can operate system	1
We are going to have to replace the system	1
We cannot have air conditioning.	1
We could go with a few more panels.	1
We do not have any.	1
We have a composting toilet if we have a black out the fan stops and it is bad.	1
When it shuts down and you have a fridge full of food.	1
When there is no sun our weekly fuel bill is approximately $100 and that would be for approximately 70% of the year	1
Where I am in a very wet area and have to use a generator	1
Where I live it is hard to get someone out too fix things	1
You need to spend a lot of money to run air-conditioning	1
Total	**100**

APPENDIX 5

Q23 – FACTORS TO CONVINCE TO CONNECT TO LOCAL MICRO GRID

Q23.What other factors? Tariff, reliability, subsidies, Other?	No.
A three pin plug	1
Affordability, reliable, subsidies	1
An invitation, either way I would connect to it.	1
As long as I could keep my own system, keep the batteries there and use the power system to charge the batteries	1
As long as it did not cost me any more than it is now, if it was a community thing. I may think about it.	1
As long as it is cost effective	1
As long as it is safe	1
Buy Back And Price	1
Connection costs, must be underground, supply voltage, reliability, cost of distribution	1
Connection costs, paid to put back in	1
Connection fees to be reasonable, tariff, reliability	1
Connection fees, tariff, having funds to connect, reliability, restrictions, breakdowns	1
Convenience, cost effective,	1
Cost efficiency	1
Cost factor	1
Cost free	1
Cost of connections, reliability	1
Cost of it, if I could feed back extra power. I don't want to get an extra bill	1
Cost, reliability, be able to feed back into system	1
Costing to set up, very important	1
Costing, availability	1
Don't know	1
Guaranteed feed to the house.	1
Happy with current system	1
How much it would cost	1
How much it would cost me.	1
I am not sure	1
I do not know, have never thought about it.	1
I do not think it could happen	1
I do not want them to cut down trees or alter the landscape	1
I have no need to connect am very happy with my system,	1
I will never want mains power from across the river.	1
I would connect to a network like that because of cost.	1
I would join up to it as I would not have the maintenance.	1
I would not connect to it.	2
I would not need it I am on mains power	1
I would not, that means I would be paying bills	1
If it was cheaper	1
If the cost would be cheaper	1
If they hooked on to bio diesel	1
If we could still use our own system and feed off it	1
It would all depend on how it would work, What would the cost be. We need a good Government subsidies.	1
It would be the price and cost, as I am only a pensioner.	1
It would depend on cost, I would connect to it.	1
It would have to be worth my while	1
It would have to economical , and it should be cheaper	1
It would need to be the same as what we are paying now or cheaper	1
It would not work	1

▪ Less maintenance, cost emission offsets etc	1
▪ Less maintenance, less fuel costs, happy with partial source. Tired system - value for value	1
▪ Need to own the land	1
▪ No answer	1
▪ No impact on the local area and reasonably priced	1
▪ Not in favour of this	1
▪ Not interested	2
▪ Not relevant - too remote. Cost of power, damage of connecting power	1
▪ Nothing at all, I would be jumping for joy, I would have the trenches dug before they could build the power station	1
▪ Nothing I would be straight into it, if we could link all of the systems into it it would be great	1
▪ Nothing I would be straight onto it.	1
▪ Nothing would convince me.	1
▪ Nothing, I would love it.	1
▪ Nothing, if it was at my front gate I would connect to it.	1
▪ Only If Affordable And Reliable	1
▪ Permission or invitation to do so, when	1
▪ Price Structure, Reliability	1
▪ price, reliability, subsidies	1
▪ Put it in and I will connect	1
▪ Reasonable price of connection and Kilowatt	1
▪ Reliability of the power and the system to be maintained.	1
▪ Reliability,	1
▪ Reliability, connection fees, environmental impact	1
▪ Reliability, cost	1
▪ Reliability, cost, accessibility, power availability, restrictions	1
▪ Same price as mainstream, reliability, not limited in usage	1
▪ Some certainty, what is the rate going to be. Would that mean that we would be on Ergon rates	2
▪ Tariff & Reliability, cost	1
▪ Technology, environmental effects, rebate on excess	1
▪ That it was cheap and good for the environmentally safe	1
▪ The cost	1
▪ The cost of getting the power to you	1
▪ The cost of installing it.	1
▪ The cost to connect to it.	1
▪ The load on that power system would be the bigger one	1
▪ The price of the power,	1
▪ Very very little	1
▪ We are too far out . We are in the forest.	1
▪ We would connect immediately. Labour government said there would be no main grid power while they are in government	1
▪ What the cost would be compared to what it costs at the moment,	2
▪ Willingly join; reliability	1
▪ Would join for convenience and use of equipment not able to use now	1
▪ Would join immediately	1
▪ Would not consider	1
▪ Would not join	1
▪ Wouldn't connect to it, cost too much to get the power connected	1
▪ Yes, provided it is reliable and cost effective	1
▪ Zero cost to connect.	1
Total	**100**