Sunulator Training Notes

ATA Alternative Technology Association

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Document Information

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Promoting Renewable Energy, Energy Efficiency and Water Conservation since 1980

Introduction

Sunulator is a simulation tool that can help you plan a grid-connected solar-battery project.

For more background information, please see http://www.ata.org.au/ata-research/sunulator.

Sunulator has been developed by the Alternative Technology Association (ATA), www.ata.org.au, Australia's leading not-for-profit organisation promoting sustainable solutions for the home.

1.1 Purpose of this document

These notes are intended to be used in a training workshop provided by the ATA, which generally lasts 3 hours. Attendees get hands-on experience in using Sunulator.

These notes present sample information for a sample solar project. You should copy these values into your own copy of Sunulator.

Then we'll run Sunulator and compare results.

1.2 Other documentation

These notes should be used together with the Sunulator user guide, available at the Sunulator web page.

1.3 System requirements to use Sunulator

To use Sunulator, you must have:

- A reasonably fast, stable computer.
- Microsoft Excel 2007 or later.
- System permissions to run Excel macros (VBA code).

1.4 Prerequisites for using Sunulator

To get the most out of Sunulator, we recommend that you have some prior skills and understanding, for example:

- Confidence in using your operating system, eg creating folders and viewing file extensions.
- Have a basic understanding of energy concepts, eg kWh and kW.
- Have a basic knowledge of financial concepts, eg Return on Investment and Net Present Value.

1.5 User Tips

- Yellow cells are for user entry.
- CTRL-down arrow jumps to the bottom of a filled table. CTRL-right arrow jumps to the right.
    - Holding down shift selects the cells while it jumps.
- You can copy and paste within yellow cells.
- After selecting a range, you can use CTRL-D to copy down, or CTRL-R to copy right.
    - But not if the range spans a white cell.

1.0 Demo project: The Karralyka Centre

http://www.maroondah.vic.gov.au/Karralyka.aspx

The Karralyka Centre is the premier theatre and function centre in Melbourne's eastern suburbs.

The architecturally award-winning building offers outstanding facilities and services for:

- live theatre
- corporate events
- social functions
- wedding receptions
- conventions
- exhibitions.

The superb in-house food and beverage service, tailored to your event by our highly regarded chef, is complemented by ample free parking and magnificent views of the Dandenong Ranges. At Karralyka, equipment that you'd expect to pay for elsewhere is included.

The fully equipped theatre hosts the Maroondah Professional Theatre Season, the annual Morning Music program and a range of community performances.

The centre is fully air-conditioned and fully licensed.

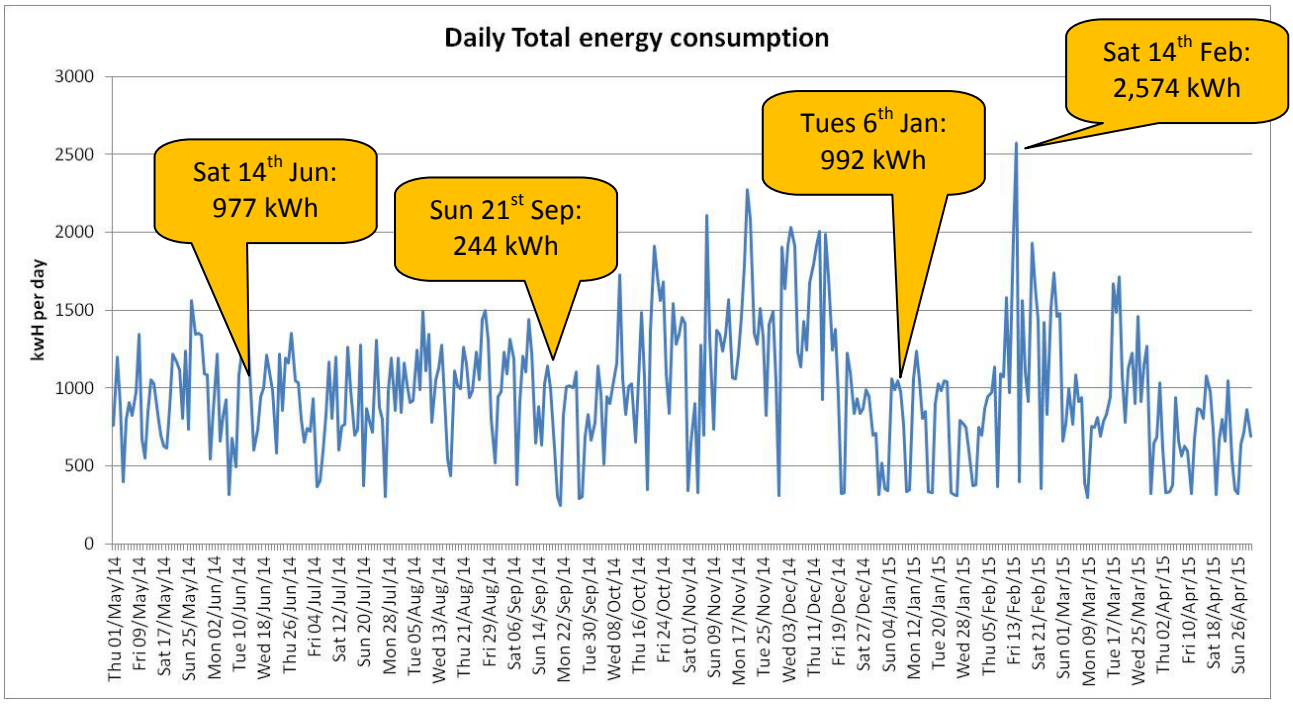

304A
Karralyka Centre

2.0 Consumption

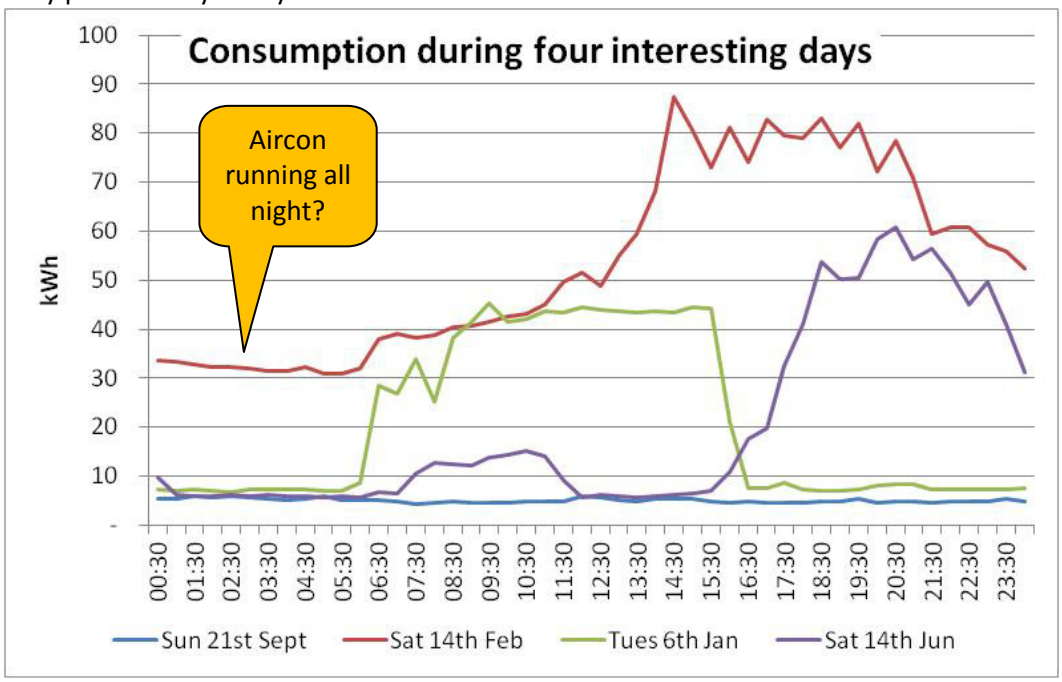
Consumption data was obtained from the electricity distributor or retailer in 15-minute intervals. This was then summed into 30-minute intervals.

Activity varies by day, with daily consumption varying:

- Minimum: 244 kWh
- Average: 984 kWh
- Max: 2,574 kWh



Daily profiles vary wildly.



3.0 Change Grid tariffs

In worksheet 5a, change all the tariff types from "Peak/Offpeak/TOU" to "Anytime Peak Demand"

				Scenario Names			
Variable	**Info**	**Unit**	**Example**	**BAU**	**99kW**	**99kW50**	**99kW100**
Financial Assumptions							
ImpTariff	Retailer import Tariff Type	Lookup	Peak-Offp	Anytime Pe	Anytime Pe	Anytime Pe	ytime Pe
FiT	Retailer feed-in Tariff for export (excl. GST)	$/kWh	$ 0.08	$ 0.05	$ 0.05	$ 0.05	$ 0.05
DiscountRateCons	Discount rate for the consumer.	%	*6.5%*	2.5%	2.5%	2.5%	2.5%
Horizon	No. of years to include in NPV and ROI (IRR) calcs	yrs	*20*	20	20	20	20
GSTRate	Rate of Goods & Services Tax		*10.0%*	10.0%	10.0%	10.0%	10.0%
RecPrice	Value of Renewable Energy Certificates (STCs)	$	*$30.00*	$ 30.00	$ 30.00	$ 30.00	$ 30.00
RecDeeming	Number of years the REC is deemed to cover	yrs	*15*	15	15	15	15

4.0 Add in Batteries

4.1 Scenarios

In sheet 4a, change the Scenario names to match the following:

Scenario number	Name
1	BAU
2	99kW
3	99kW50
4	99kW100
5	
6	

99kW50 refers to a solar system with a rated power of 99 kW and 50 kWh of battery storage.

4.2 Solar

In Sheet 4b, Please update to match the picture below. You can copy and paste values from the previous column.

				Scenario Names			
Variable	**Info**	**Unit**	**Example**	**BAU**	**99kW**	**99kW50**	**99kW100**
Location Variables							
Location	Used for solar data		Melbourn	Melbourn	Melbourn	Melbourn	Melbourne
Solar - First Array							
ArrayAkW	Rated capacity of the first panel array	kW	2		50	50	50
ArrayATilt	Panel tilt above horizontal	degrees	30		20	20	20
ArrayAOrient	Orientation - bearing or description	degrees	NorthEast		NW	NW	NW
ArrayAEff	Efficiency from panel to socket	%	80%		80%	80%	80%
Solar - Second Array							
ArrayBkW	Rated capacity of the 2nd panel array	kW	0		49	49	49
ArrayBTilt	Panel tilt above horizontal	degrees	30		20	20	20
ArrayBOrient	Orientation - bearing or description	degrees	+45		N	N	N
ArrayBEff	Efficiency from panel to socket	%	80%		80%	80%	80%

4.3 Batteries

In sheet 4c, please update to match the picture below.

				Scenario Names			
Variable	**Info**	**Unit**	**Example**	**BAU**	**99kW**	**99kW50**	**99kW100**
Overall battery variables							
Rated capacity	Should be o	kWh	15.0		0.0	50.0	100.0
Chemistry	Type of batt		Gel	Lithium	Lithium	Lithium	Lithium
Max DOD	Maximum d		50%	100%	100%	100%	100%
Max SOC	Maximum st		100%	100%	100%	100%	100%
Usable capacity	Capacity bel	kWh	7.5	0.0	0.0	50.0	100.0
Strategy	Strategy for		SolarBuffe	SolarBuffer	SolarBuffe	SolarBuffe	SolarBuffe
Initial SOC	Battery char		80%	80%	80%	80%	80%