



Energy Reduction Review



Sustainable Power Solutions



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Advanta Commercial Furniture

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Executive Summary

Advanta Commercial Furniture has engaged the services of Regen Power Pty Ltd to perform an energy reduction review. The primary focus of the review is to highlight the costs and benefits associated with investing in a solar power electricity generation system, LED lighting and other energy efficiency solutions.

The onsite review component was completed through a walk-through of Advanta's operations to collect information on current electricity tariff charges, consumption patterns, and suitability of energy reduction + efficiency strategies.

A **30kW** solar power system has the potential of generating ~133kWh (or units) per day. This estimated average solar power generation would offset approximately 64% of Advanta's annual electricity consumption with a simple payback period of 3.92 years.

A **LED Lighting Upgrade** has the potential of saving ~26kWh (or units) per day. This estimated average energy saving would reduce approximately 12% of Advanta's annual electricity consumption with a simple payback period of 1.97 years.

Energy Monitoring and Management has the potential of saving ~12kWh (or units) per day. This estimated average energy saving would offset approximately 5% of Advanta's annual electricity consumption with a simple payback period of 1.11 years.

An **A/C Hydrocarbon upgrade** has the potential of saving ~3kWh (or units) per day. This estimated average energy saving would offset approximately 1% of Advanta's annual electricity consumption with a simple payback period of 4.03 years.

Client:	Advanta Commercial Furniture
Facility:	Head Office + Manufacturing
Facility Address:	25 Chisholm Crescent, KEWDALE WA 6105
Client Contact:	Brad Harris
Auditor:	Mark Timson – Scientist in Sustainable Energy Management
Audit start date:	11 th February 2013
Audit end date:	18 th February 2013





TARIFF SUMMARY

ELECTRICITY

Site	Tariff	Supply Charge	Peak Charge (inc GST)	Off Peak Charge (inc GST)	Max Demand Charge
Advanta Commercial Furniture	Synergy L3 Tariff	49.9964c / day	35.1416c per kWh	35.1416c per kWh	N/A

Peak Periods = Mon – Fri (8am to 10pm)

Off Peak Periods = Mon – Fri (10pm to 8am) + Sat – Sun (All Day)

ELECTRICITY CONSUMPTION

Advanta Commercial Furniture has the following average daily electricity consumption:

- Chisholm Crescent Facility = ~210 units/day

Based on this billing information; the annual estimated electricity consumption costs can be calculated as follows:

- Annual kWh Consumption = ~76,650 kWh = ~\$26,936

This equates to \$73.80 per day*.

**calculated with the current tariff charges (inc GST).*

ENERGY REDUCTION OPPORTUNITIES

Advanta Commercial Furniture has the opportunity for offsetting and reducing energy consumption within its facility through the following measures.

A breakdown of the estimated costs and benefits associated with each energy reduction initiative is given below:

Opportunity	Indicative Cost	Estimated Annual Savings	Simple Payback	Comments
30kW Solar Power System	\$49,000	\$12,500	3.92 years	Install on northern roof profiles
LED Lighting Upgrade	\$6,080	\$3,090	1.97 years	Upgrade existing Fluorescent tubes & High Bays with LED
Energy Monitoring and Management	\$1,500	\$1,350	1.11 years	Install Solar + LED lighting
A/C Hydrocarbon Upgrade	\$1,350	\$335	4.03 years	Install Hydrocarbon Refrigerant
Air Compressor Optimisation	TBA	TBA	TBA	Review & Repair Air Leaks





30kW SOLAR POWER SYSTEM

As highlighted below; a **30kW Solar Power System** is estimated to offset approximately **64%** of the current average electricity consumption at Advanta Furniture's Kewdale facility.

ESTIMATED SYSTEM PERFORMANCE SUMMARY

Location	Perth
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Client	Advanta Furniture
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Input Tables

Array orientation (° East of North)

Array Tilt Angle (° from Flat)

Shading (% shaded)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0	0	0	0	0	0	0	0	0	0	0	0

Array size kw Inverter Eff.

Customer Load

	Av. Daily	Per Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
76650 kW/h per year	210.0	Per Mth	210	210	210	210	210	210	210	210	210	210	210	210
			6510	5880	6510	6300	6510	6300	6510	6510	6300	6510	6300	6510

Output Tables

System Output	Av. Daily	Per Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
48756 kW/h per year	133.7	Per Mth	181.5	165.6	140.6	112.6	90.1	80.5	84.6	102.0	127.6	158.1	175.6	186.1
			5625.8	4636.7	4358.1	3376.7	2793.5	2415.6	2623.3	3163.0	3826.7	4899.6	5269.1	5768.0

Contribution to Load **64%**

From optimal **97%**

System Performance

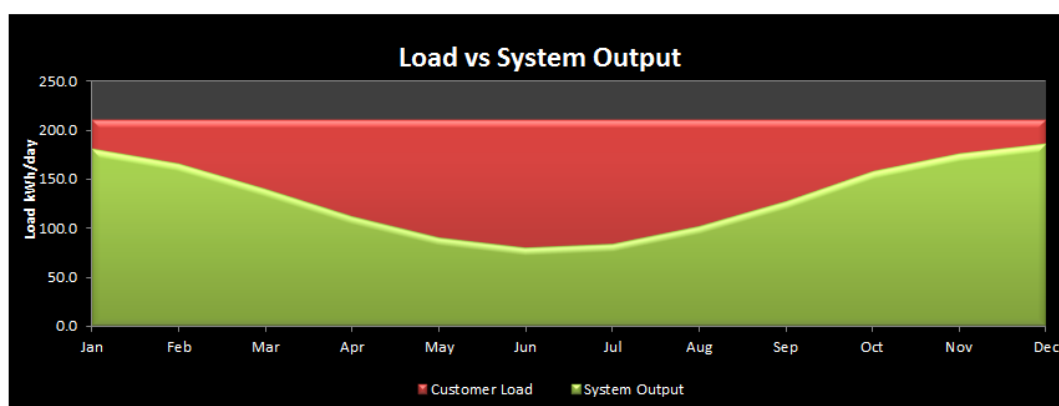


Figure 1: 30kW Solar Power System Estimated Performance (Advanta Furniture)



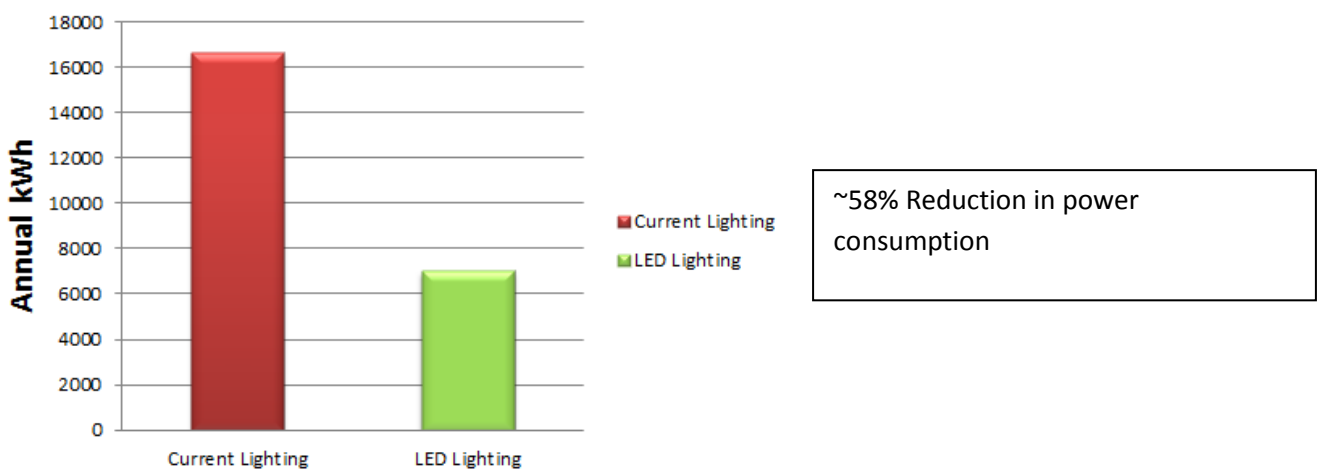
LED LIGHTING UPGRADE

LED lighting can be used instead of the existing lighting infrastructure. The opportunities are detailed as follows:

- Replacing 94 x 36W Fluorescent Tubes with 94 x 18W LED Tubes
- Replacing 7 x 400W MH High Bays with 7 x 200W LED High Bays
- Replacing 4 x 400W MH High Bays with 4 x 120W LED High Bays

The costs and savings associated with a LED lighting upgrade at the Thornlie Facility are:

1. The cost to operate the current lighting system is approximately **\$5,325** per year.
2. The cost to operate the LED lighting system is approximately **\$2,240** per year.
3. The savings from using the LED lighting system is approximately **\$3,090** per year.
4. The cost to supply the LED lighting system is **\$6,080**.
5. The payback period for the LED lighting system is **1.97 years**.
6. Estimated maintenance savings are approximately **\$745** per year
(*not included in payback calculation*).
7. Total carbon reduction from implementing the upgrade is **9,665 kg CO₂e** per year.



Graph 1 Annual kWh – Current Lighting versus LED Lighting Upgrade



ENERGY MONITORING AND MANAGEMENT

An energy monitoring system has the potential to improve energy management, and assist in tracking and assuring the improvements obtained from other energy efficiency and renewable energy offsetting projects. An energy monitoring solution can be used as the centre piece of an overarching Energy Management Plan and/or Policy at Advanta Furniture.

Improved energy management and associated behaviour change has the potential to reduce energy costs by between 5% and 30% depending on the facility (including both consumption and demand related energy costs).

An indicative solution for the Advanta Furniture facility would include the following:

- Whole building electricity consumption (CT's installed on Utility Power Meters)
- Staff engagement workshop (Energy Efficiency Awareness)
- Office equipment "power off" review

The indicative cost and payback period for such a system is as follows:

- Current estimated annual operating costs = \$26,936
- Estimated energy monitoring annual savings =, \$1,350*(3.06 tonnes of CO₂e)
** based on 5% reduction due to improved energy awareness/reduction initiatives*
- Energy monitoring + workshop indicative supply costs = \$1,500
- **Simple Payback Period = \$1,500/ \$1,350 = 1.11 years**



Picture 1 – Example dashboard of a Real-Time Energy Monitoring Solution



A/C HYDROCARBON UPGRADE

The Advanta Furniture facility air-conditioning equipment has the potential for re-gassing the existing refrigerant gases with hydrocarbon replacement gases.

Typically hydrocarbon installers guarantee a 10% saving on operating costs.

Based on the three A/C systems operating in the ground floor office space, upstairs sales/showroom and warehouse office, the costs and savings associated with a hydrocarbon retrofit at the Kewdale facility is:

- Current estimated annual operating costs = \$3,350
- Hydrocarbon retrofit annual operating savings = \$335* (0.76 tonnes of CO₂e)
- *Based on 10% savings*
- Hydrocarbon retrofit indicative costs = \$1,350*
- *Based on 3 x \$450 for each split system A/C*
- **Simple Payback Period = \$1,350 / \$335 = 4.03 years**

AIR COMPRESSOR OPTIMISATION

The Advanta Commercial Furniture facility air-compressor system has the potential for improving the operating efficiency by reducing the air-leaks through the lines that the compressor currently operates through.

Further investigation is needed by a qualified electrician/compressed air technician to quantify the costs and benefits for optimising the compressed air lines, and rectifying any air leaks. A real-time energy meter can assist with tracking improvements in the performance of the compressed air system.



Picture 2 – Advanta's Compressed air system



Carbon Reduction

Based on the information collected during the audit; Advanta Commercial Furniture facility has the following carbon footprint associated with the electrical consumption:



Total Site Annual Consumption (CO₂e) = 61,320 kg CO₂e or 61.3 tonnes CO₂e

*This is the equivalent carbon footprint of **12** x average WA household's annual electrical consumption, or consuming **24,530** litres of petrol in a vehicle per year.*

By implementing Solar Power, LED Lighting, and Energy Efficiency solutions; Advanta Commercial Furniture Facility has the potential to reduce its carbon footprint by ~**71%** and save the following annual CO₂e:



Total Site Annual Saving (CO₂e) = 43,748 kg CO₂e or 43.75 tonnes CO₂e

*This annual saving is the equivalent of eliminating the carbon footprint of **8** x average WA household's annual electrical consumption, or eliminating the consumption of **17,500** litres of petrol in a vehicle per year.*





About Regen Power

Experience of the Regen Power Pty Ltd

Rising energy demands and climate change are amongst the most significant challenges facing our society today. With an increasing global population and diminishing fossil fuel reserves, the need to develop innovative and practical solutions to address these issues is now more urgent than ever.

Our Mission

Regen Power has uniquely positioned itself in the renewable energy market with the intention to respond to the growing demand for energy-efficient solutions in the business, residential and industrial sectors.

We believe that renewable energy hybrid systems will play a key role in providing sustainable power to the remote and metropolitan regions, and it is through the research and development of innovative solutions which will enable Australia to have sustainable power solutions for the future.

Our Promise

With its strong background in academic research, Regen Power will continue to provide products with leading-edge technology for households and businesses.

Regen Power also provides turnkey consulting for large scale renewable energy projects. With a strong research and design team, Regen is poised to reduce the carbon footprint through innovative product design.

Regen Power Advantages

- ✓ Affordable pricing
- ✓ In house engineering & technical experience
- ✓ High quality products
- ✓ Over 4000 systems installed
- ✓ Tidy & polite salespeople & tradesmen
- ✓ Installed within 4 weeks

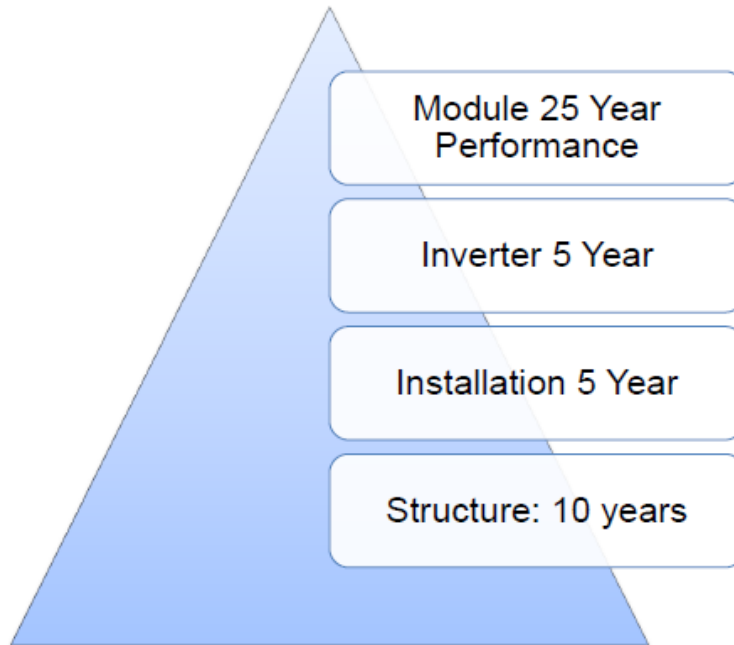
Some of our recent achievements in collaboration with our strategy partners include:

- ✓ **Power farm installations over 1 MW**
- ✓ **10 - 100kW Commercial Solar Power Solutions**
- ✓ **120 KW Eco Resort**
- ✓ **162.4 KW solar-wind hybrid systems**
- ✓ **Roof top solar power plants in Australia over 7 MW**





System & Components Warranty



Designed by

- BSc Elec Engg, MTech (IIT Kanpur), PhD (Wind Power), Univ. of Western Australia
- Professor of Electrical and Renewable Energy Engineering, Curtin University
- Visiting Professor –Hefei University, China
University of Mining and Technology , United Arab Emirates University, Chiang Mai University (Thailand)
- 42 years teaching , research and industry experience
- Chairman, Regen Group Pty Ltd, Australia
- Director, Radiant Solar , Hyderabad, India
- Supervised /supervising 20 PhDs, 300 research papers, 8 million in research grants
- Winner of Sustainable Energy Industry Excellence Award 2011 : (1) The Ambassador Award and (2) Product and Technology Award



Professor Chem Nayar

