

# Electric Vehicle Recharging & Solar on Strata

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# Research Acknowledgement

## Developing Tools for Modelling Electric Vehicle Charging in High-Rise Apartment Buildings 6/6/2016

- **Author:** Thomas Crossman, Griffith School of Engineering
- **Griffith Uni Supervisor:** Dr. Prasad Kaparaju

## In Progress

- **Author:** Nikhil Kaswan, School of Geography, Planning and Environmental Management
- **UQ Supervisor(s):** Don Burt (PhD Candidate) under supervision of Associate Professor, Paul Dargusch



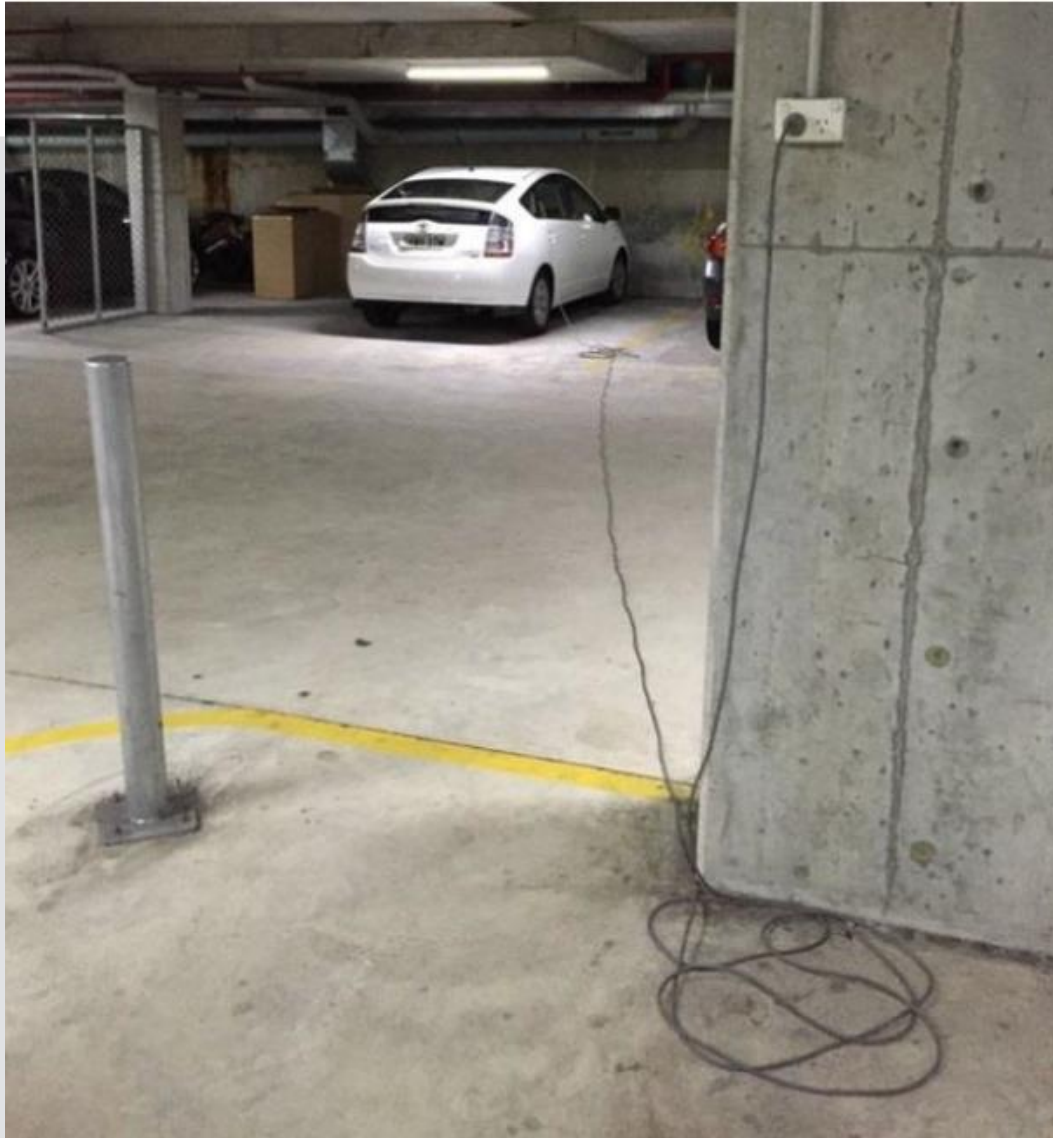
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# How do they do it in British Columbia?

- 1) Identify suitable parking for charging location(s).
- 2) Determine the type of charging system necessary.
- 3) If parking re-allocation is deemed necessary, negotiate for re-assignment by special resolution or AGM.
- 4) Identify the cost in installation of the electric vehicle charging system accounting for any electrical or other service necessary.

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# How do they do it in British Columbia?

- 5) Identify any upgrades or permits that are necessary as a result of step four.
- 6) Seek approval for expenses incurred by the Owners Corporation at an annual general meeting or special general meeting.
- 7) Establish a rule to recoup electricity costs incurred by the electric vehicle charging system.

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# Types of Electric Vehicles

HEV = Hybrid Electric Vehicle

- e.g. Toyota Prius
- more than 2m sold worldwide



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# Types of Electric Vehicles

PHEV = Plug-in Hybrid Electric Vehicles

- e.g. Mitsubishi Outlander



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# Types of Electric Vehicles

EV = Electric Vehicle

- e.g. Tesla Model S



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Manufacturer	Model	Electric Range (km)	Top Speed (km/h)	Electric Power (kw)	Battery (kWh)	Consumption (kWh/100km)	Price (AUD)
Tesla [9]	Model S 70D	375	230	285	70	18.67	\$70,000 USD
	Model S 90D	430	249	376	90	20.93	\$108,000 USD
Nissan [10]	Leaf	170	144	80	24	14.12	\$51,000
Ford [11]	Focus Electric	122	135	107	23	18.85	\$37,000
BMW [12][13]	i3	160	150	125	18.8	11.75	\$64,000
	i8	37	250	-	7	18.92	\$300,000
Mitsubishi [14][8]	MiEV	150	130	49	16	10.67	\$52,000
	Outlander PHEV	53	-	120	12	22.64	\$50,000
Volkswagen [15][16]	e-up	160	135	82	18.7	11.7	\$39,500
	e-Golf	145	-	115	24	12.7	\$37,500
Holden [17]	Volt	83	-	111	16.5	19.88	\$60,000

Table 1 Sample of Electric Vehicles in Australia

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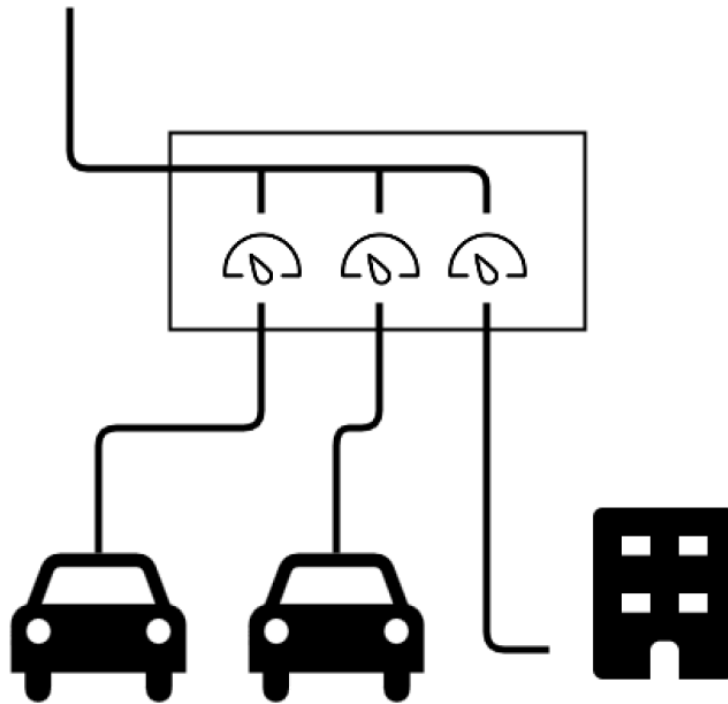
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# Unmanaged Charging



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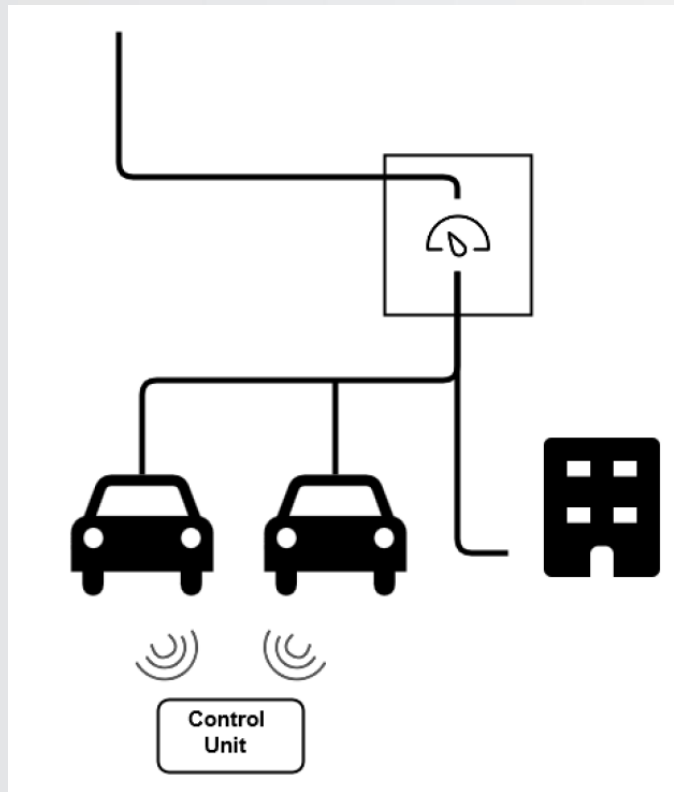
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# Managed Charging



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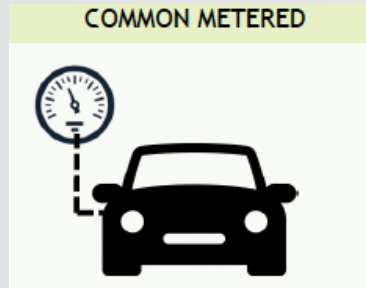
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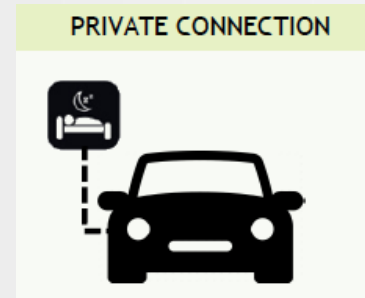
# Which meter? – common or private



Setup Cost: \$2,500

Operating Cost: \$589 p.a.

Cost per 1,000km: \$14.80



Setup Cost: \$8,000

Operating Cost: \$421 p.a.

Cost per 1,000km: \$27.10

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# Types of Recharge Solutions



**Tritium**

Queensland company

Veefil Fast Charger

**Too expensive for strata**

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# Types of Recharge Solutions



## Jetcharge

Victorian company

Demand Response

Load Leveling

Peak demand shaving

Maximum amperage configuration

**Billing service for strata**

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# Types of Recharge Solutions



**Delta**

Taiwanese company

**No special service for strata**

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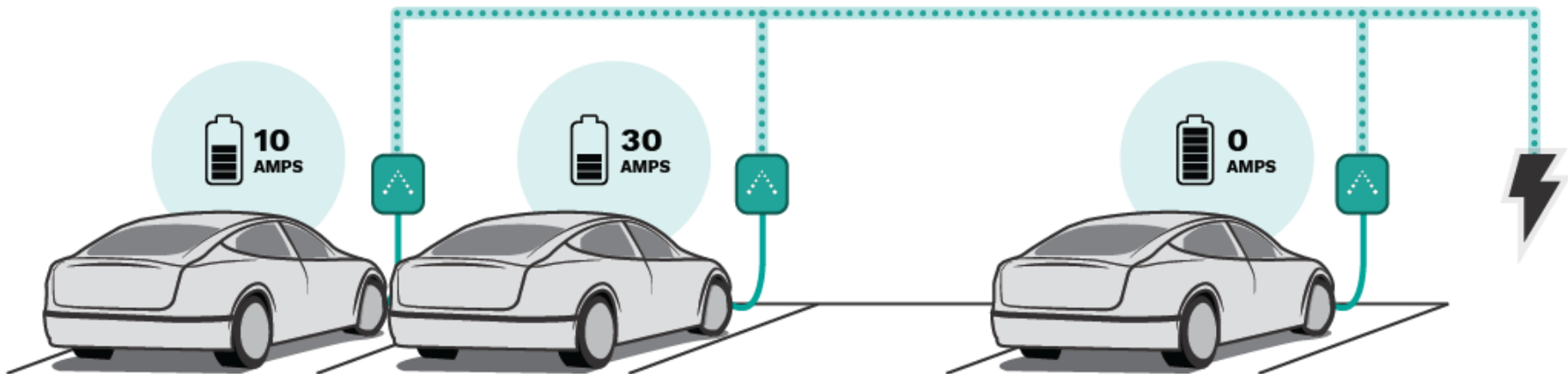
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# Types of Recharge Solutions

**Evercharge** is a San Francisco-based company focused on recharge for 'condos'. The Evercharge System intelligently manages power based upon vehicle demand. When a vehicle completes a charge or requires less power, the excess capacity is distributed to other vehicles. Not yet available in Australia.



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# Case Study - Quay West

Age of the block: 20-30 years  
2 x Tesla Model 'S' drivers

After energy efficiency, will be able to  
charge 12 Electric Vehicle's  
simultaneously

Should plan for installing a power  
management system for EV  
recharging in 2018



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# Case Study - Regis Towers

Age of the block: 20-30 years  
3 towers and 646 apartments

After energy efficiency, will be able to  
charge 30 Electric Vehicle's  
simultaneously

Should plan for installing a power  
management system for EV  
recharging in 2018



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# Case Study - The Abode

Age of the block: 12years  
2 towers and 189 apartments

After energy efficiency, will be able to  
charge 15 Electric Vehicle's  
simultaneously

Should plan for installing a power  
management system for EV  
recharging in 2018



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# Solar Journey at “Generation W”



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10 kW Solar System  
40 solar panels

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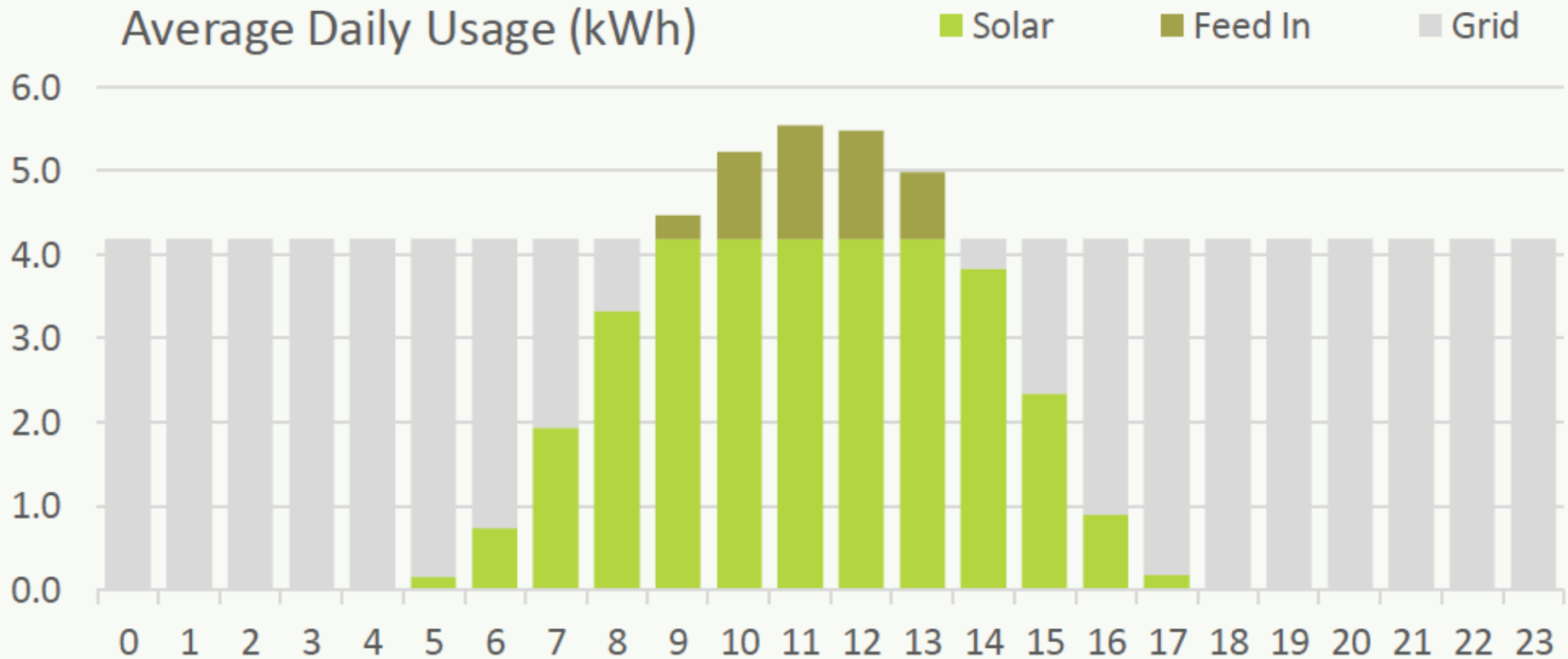


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# What is a solar load profile?



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# Financial Analysis

## ENERGY BILLING ASSESSMENT

Current energy billing includes fixed daily access charges and tiered pricing for usage charges.

### Grid Usage Charges

Tier 1 25.36c / kWh

Tier 2 35.26c / kWh

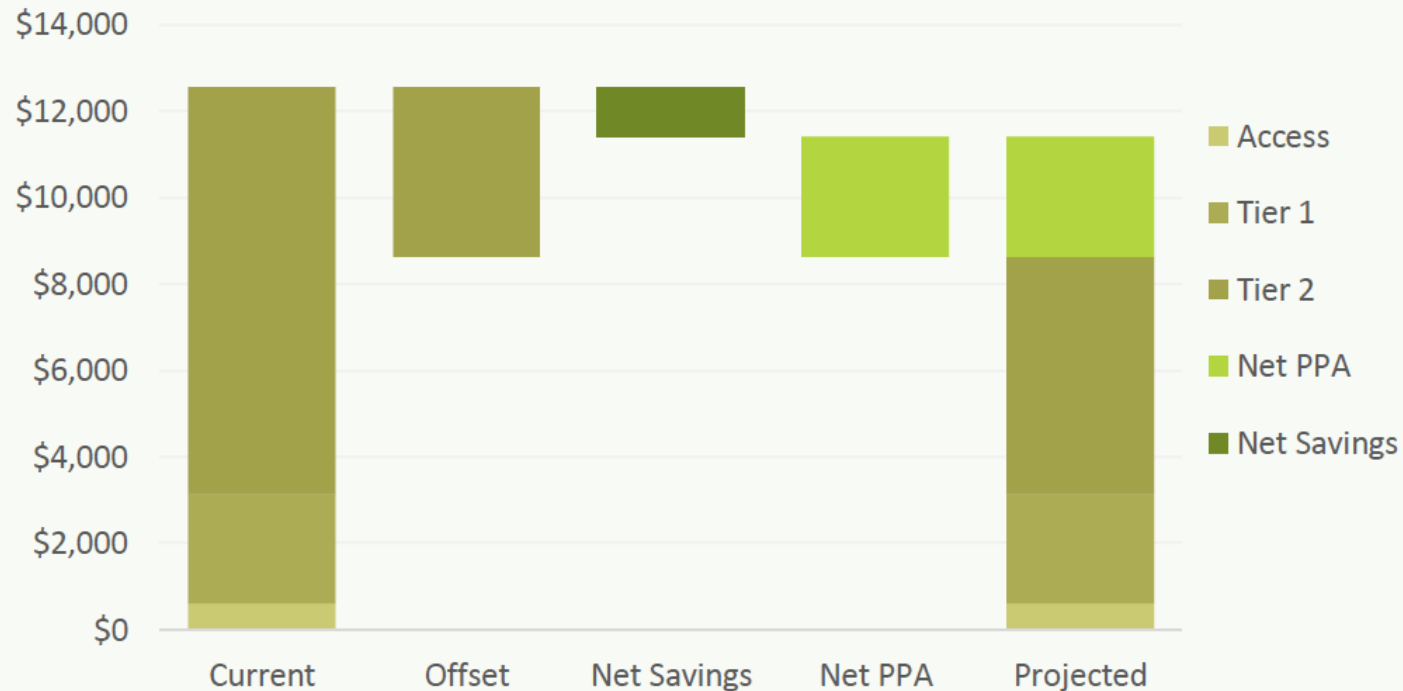
### AGL Solar PPA

Solar PPA 21.67c / kWh

\*Solar PPA offsets Tier 2 usage

\*\* No PPA charge after 15 years

Annual Electricity Cost 2014-15 (Inc GST)



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# Generation W Solar Case Study

Choice between:

- buying the solar panels OR
- solar finance

Committee decided to take a **\$0 upfront cost solar finance model** to power their common areas

Expected Solar System lifespan: 25 years

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# Generation W Solar Case Study

## First 10 years

- Owners Corp pays 21c for each kWh of solar power generated off solar panels
- External maintenance contract covers anything which goes wrong with the system
- Remote monitoring provides alerts if anything goes wrong

## From year 10 onward

- Owners Corp pays nothing for solar power generated
- Takes on maintenance responsibility

**Total savings estimate: \$65,000 over 25 years**

**Environmental benefit: planting 315 trees or taking 3 cars off the road**

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