

Deep Learning and Energy Transformation in High Density Urban Environments

Australia–India Knowledge Exchange: Workshop on Climate-Smart Cities





UNSW
SYDNEY

F O U N D E R S

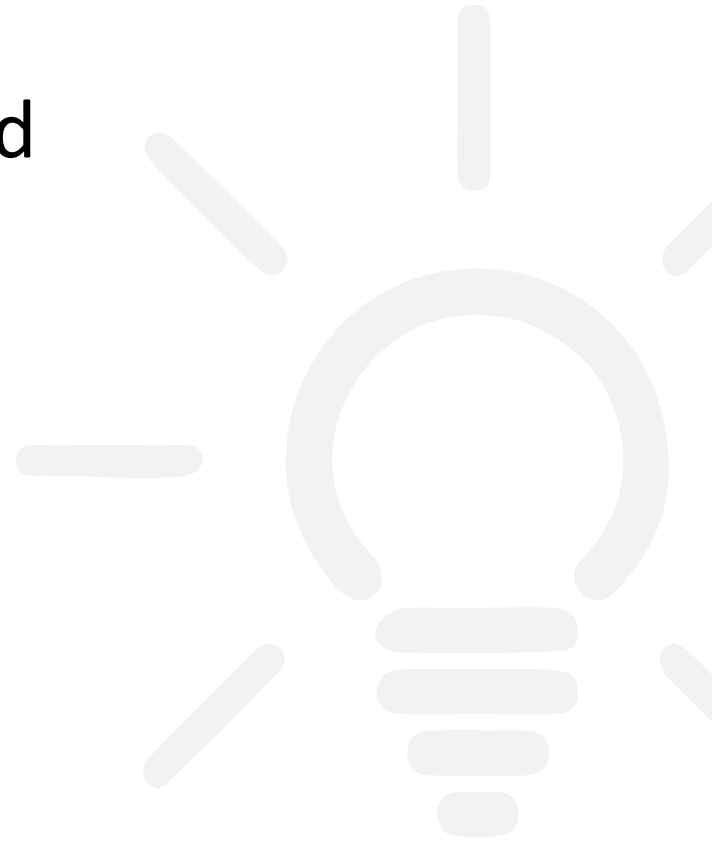
<https://founders.unsw.edu.au/>



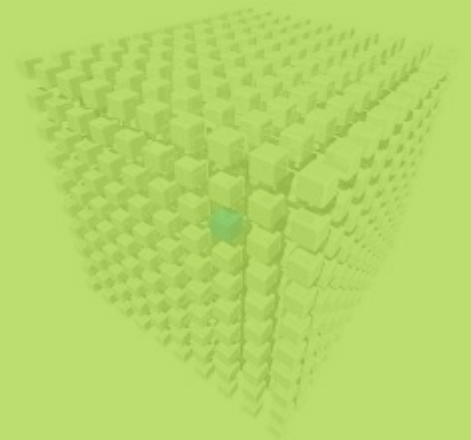
F O U N D E R S

Outline

- Introduction
- NABERS for Apartment Buildings
- Energy and Water Systems Covered
- Energy Transformation
- Interval Data Analysis
- Application of Deep Learning



NABERS for Apartment Buildings



Strata schemes we have worked with



NABERS for Apartment Buildings

Launched June 2018



Benchmark data has been collected

Analysis of data from over 217 apartment buildings showed the correlation between the **Number of Apartments & Greenhouse Gas Emissions** was stronger than correlation with Number of Bedrooms.

Some interesting facts from the data on the 217 strata buildings:



- **5%** have full air conditioning
- **7%** have condenser water as a common service provided to individual apartments
- **80%** have no air conditioning



- **33%** have a heated pool
- **20%** have an unheated pool
- **46%** have no pool



- **65%** have mechanically ventilated carparks
- **32%** have naturally ventilated carparks
- **3%** have no car park



- **32%** have a gym



- **33%** have no lift



- **12%** have all gas paid for by strata
- **4%** have domestic hot water provided by strata

Residential Energy Waste



Electrical Infrastructure

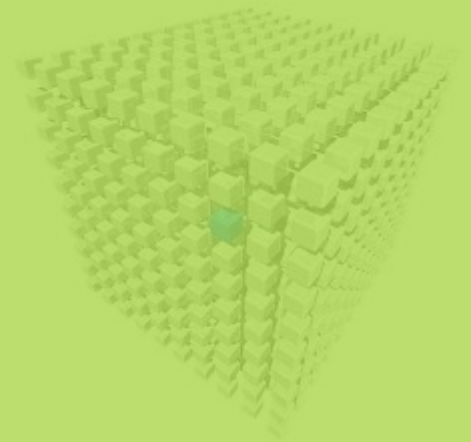


“Generation W” achieves Zero Star Rating



Ross McIntyre, CDO Wattblock

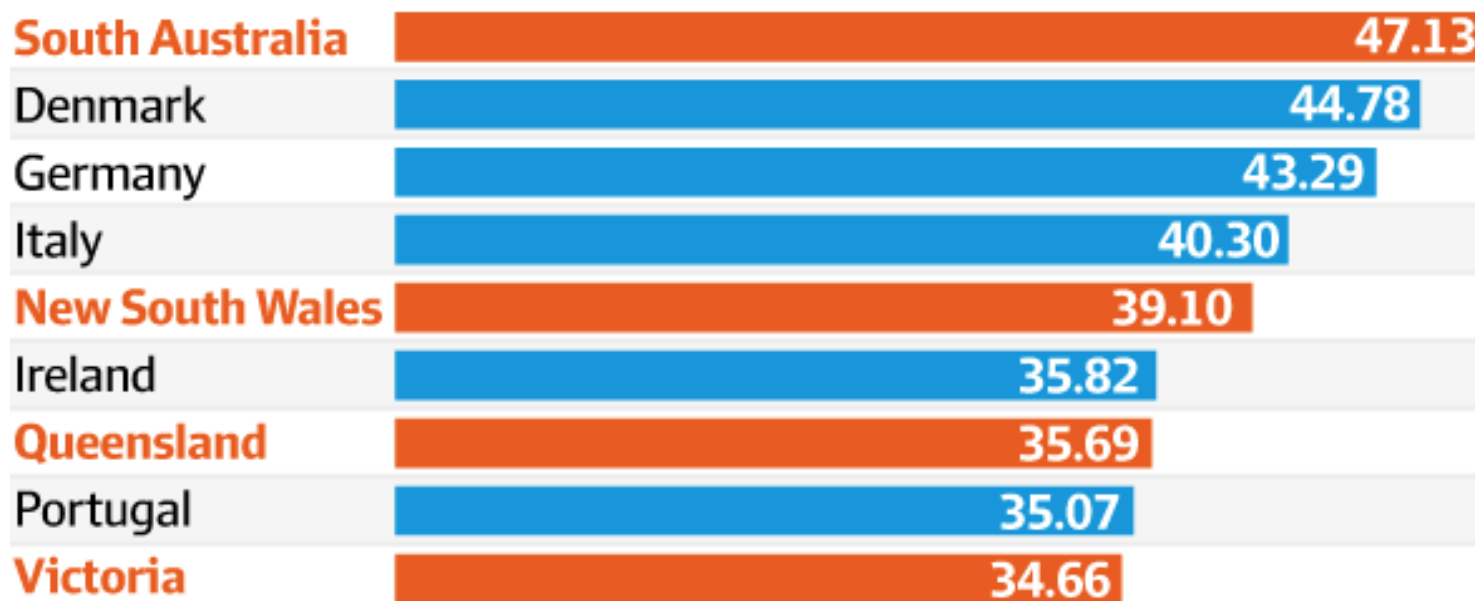
High Density Living



Australian Apartment Buildings

- \$3.6 Billion in electricity
- 500,000 apartment blocks
- 528 cranes in Sydney, Melbourne & Brisbane

Highest Prices in the World (c/kWh)

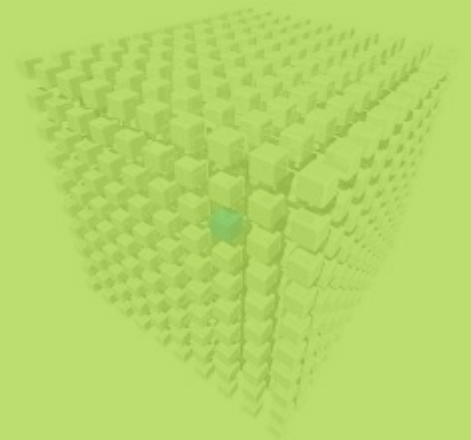


High Density Apartment Buildings



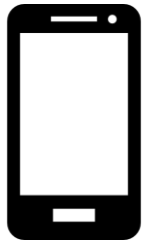
Buildings consume \$2 Trillion in energy each year

Smart Buildings

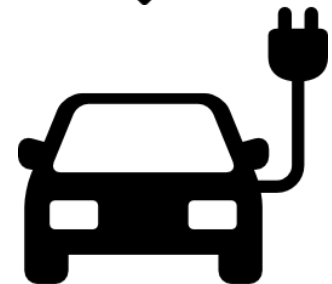
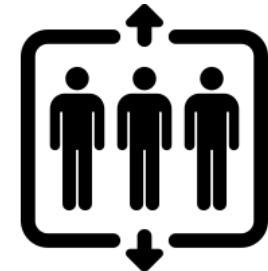
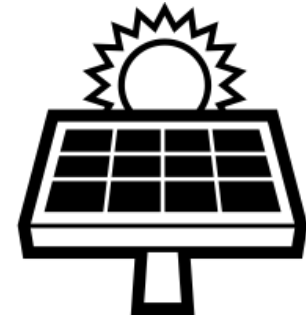


Smart Buildings

User Engagement



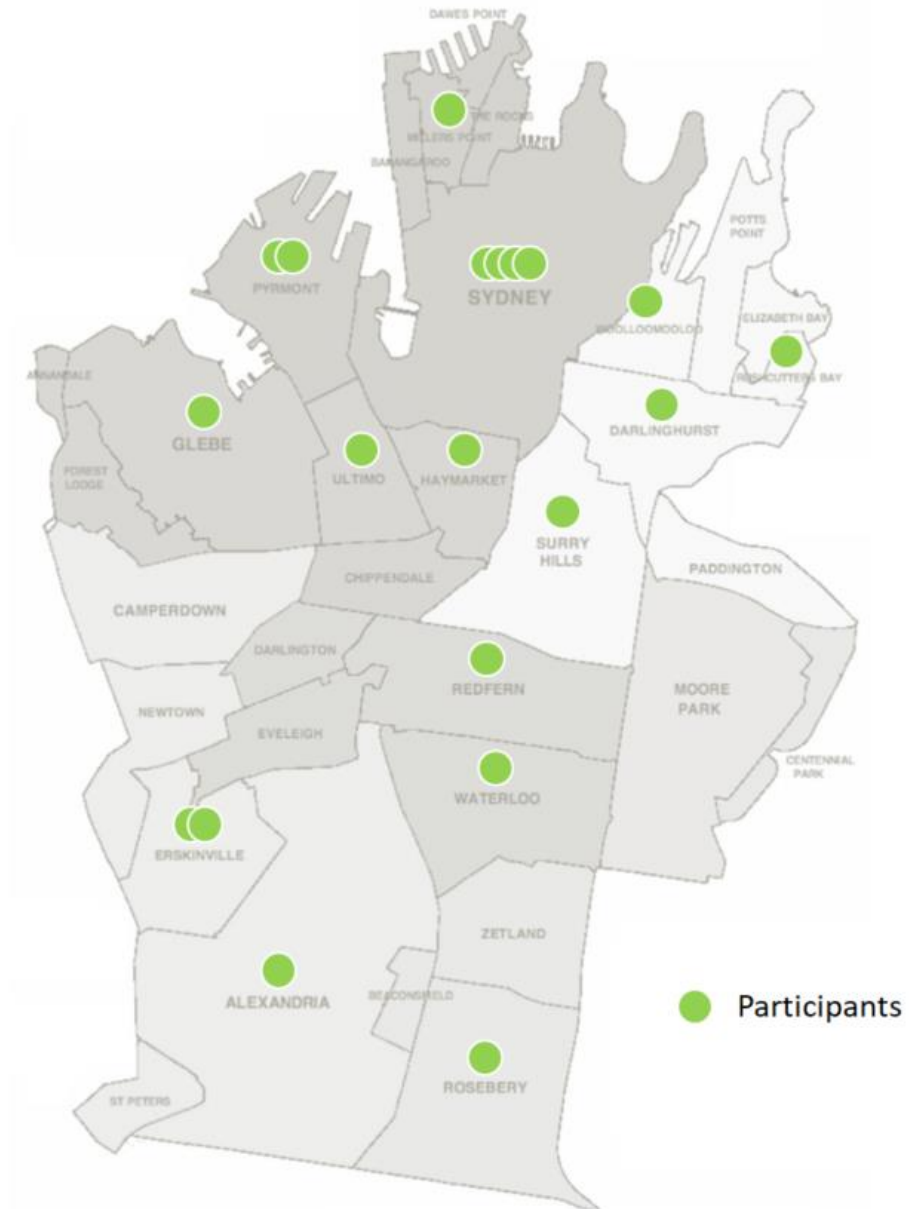
Building Systems



Energy Revolution



Study Conducted in Association with



High Engagement on EV Charging

112 apartment blocks have participated so far.

850 residents within those apartment blocks have participated.

Participants from:

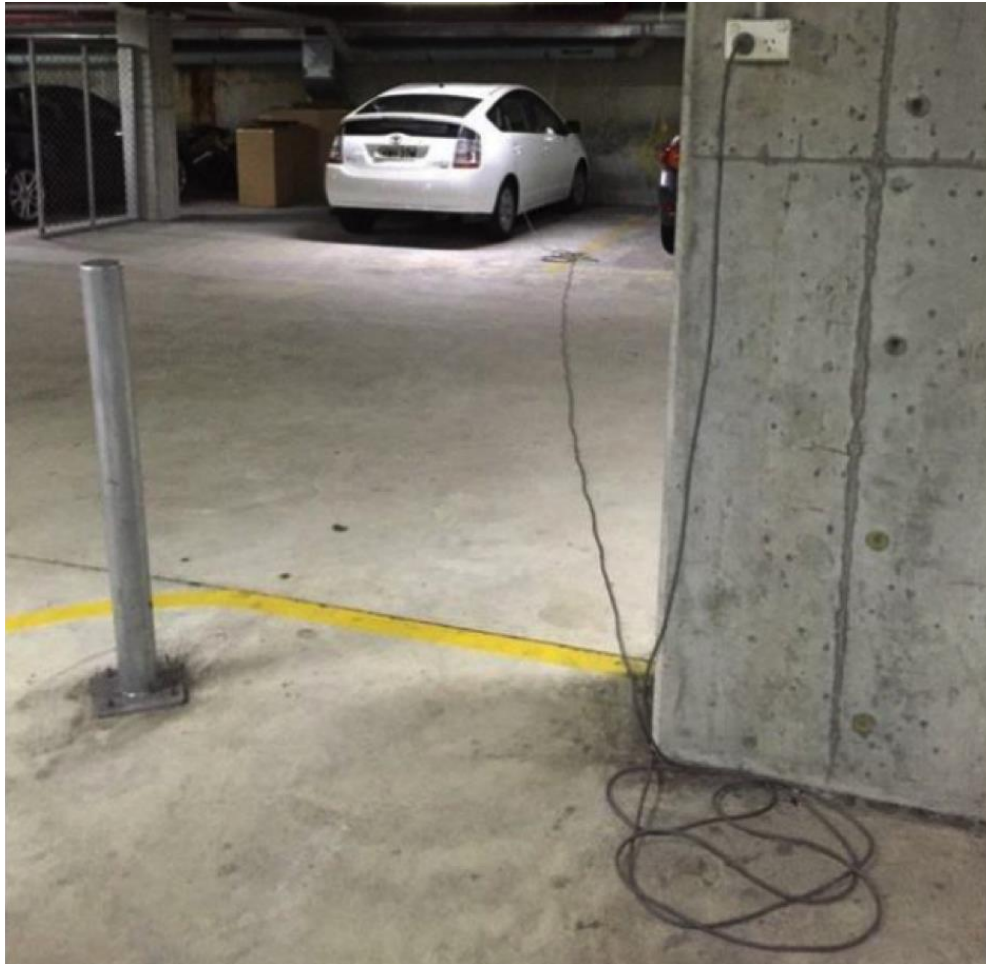
- Sunshine Coast
- Brisbane
- Gold Coast
- Sydney
- Melbourne
- Perth (coming soon!)

Provided input to:

- City of Sydney
- City of Melbourne
- City of Perth
- North Sydney Council
- Kuring-Gai Council
- NSW Department of Industry
- Department of Planning, Lands & Heritage (Western Australia)



Residents Already Charging Today



***WILL ELECTRIC VEHICLES CATALYZE THE FUTURE OF
SMART BUILDINGS, CITIES AND UTILITIES?***

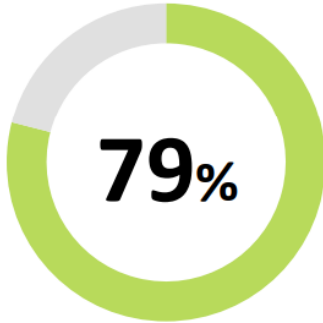
Adoption Rates

Study	Year	Uptake rate
Network Transformation Roadmap (ENA and CSIRO, 2016)	2035	20% of light vehicle fleet
Pathways to Deep Decarbonisation in 2050 (ClimateWorks Australia and ANU, 2014)	2030	45% of light vehicle fleet
Zero Carbon Australia, Electric Vehicles (Beyond Zero Emissions, 2016)	2030	100% of passenger car fleet
Australia's emission projections 2016, (Department of the Environment & Energy, 2016)	2030	15% of new light vehicle purchases
Projections for the National Electricity Market (AEMO, 2016)	2025	6.5 to 27% of new light vehicle purchases
	2036	16 to 45% of new light vehicle purchases

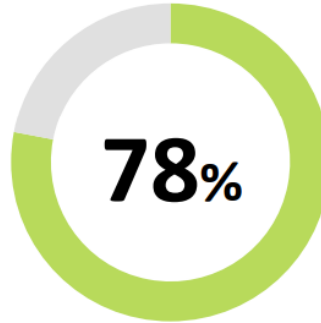
Source: The state of electric vehicles in Australia, Electric Vehicle Council & ClimateWorks, June 2017

- *lots of different projections around!*
- *Electric Vehicle Council*
 - *conservatively estimates **10% of sales** will be EV by 2025*
 - *expects uptake to increase rapidly once purchase price drops below \$50,000 (early as FY2018-19)*
- *average age of passenger vehicles in NSW is 9.3 years – will take time for EVs to penetrate the passenger fleet even at increased purchase rates*
(Source: Motor Vehicle Census, Australia, ABS, 31 Jan 2018)

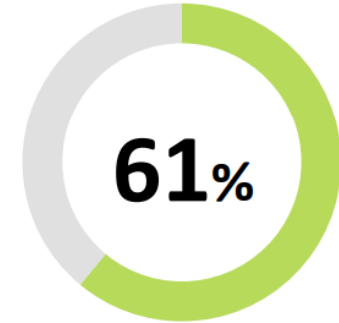
Resident Survey Findings



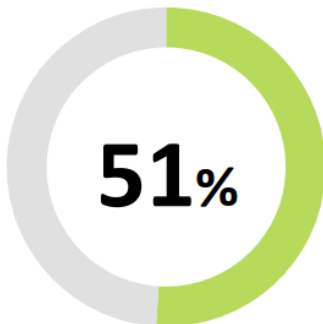
Favoured a **user pays** charging system



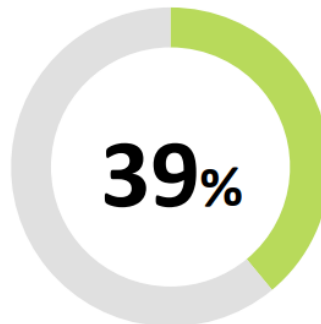
Were in favour of **installing** charging systems now



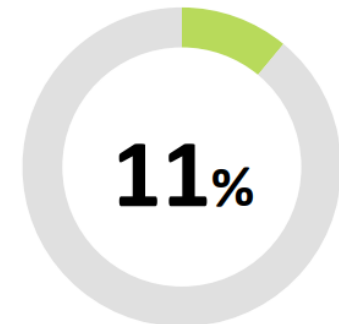
Favoured charging in their **individual lot carspaces**



Expressed **no preference** of hybrid electric vehicles over electric vehicles

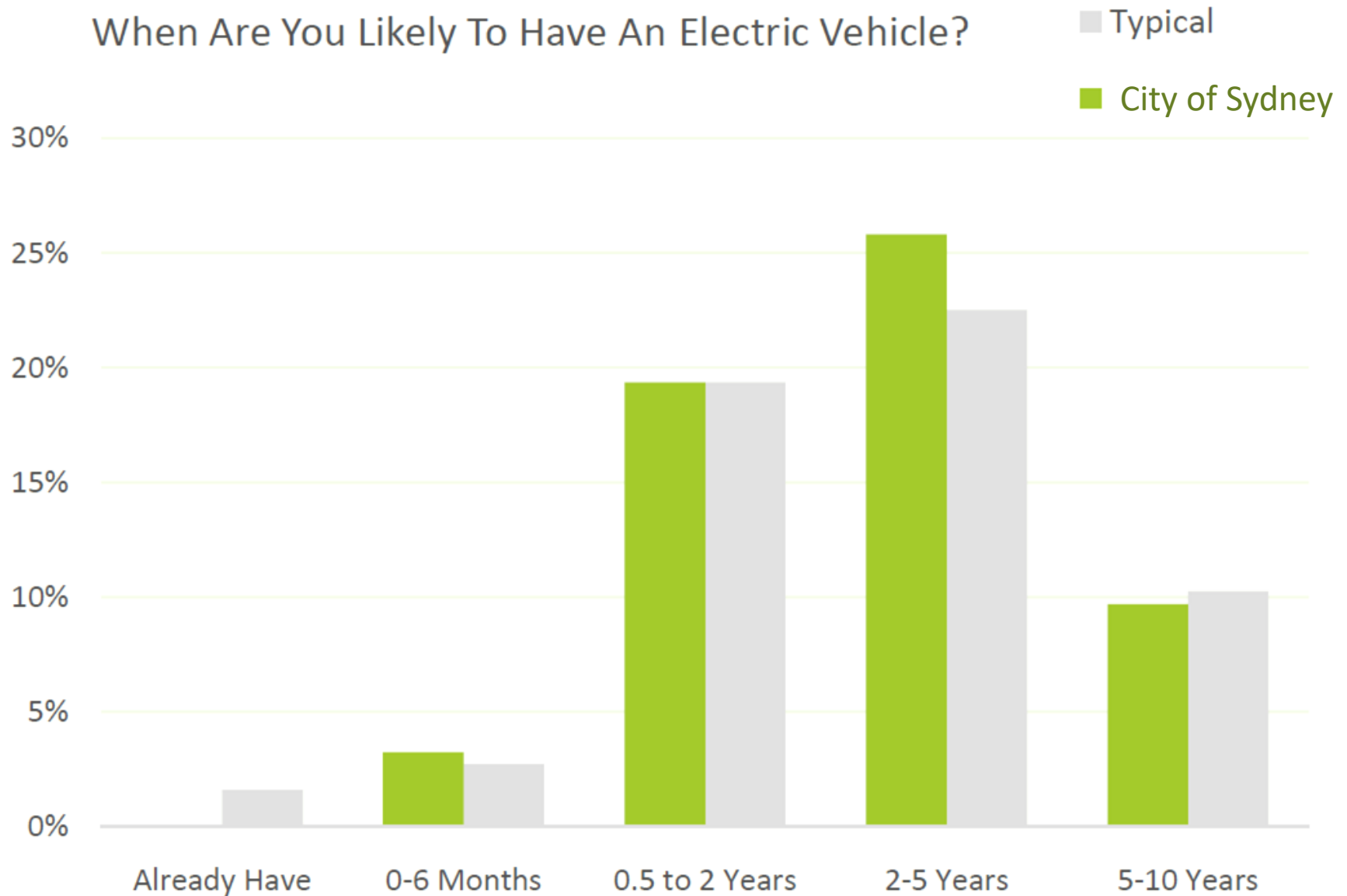


Of vehicles in strata are **family cars**, which is the most common type of vehicle



Knew the location of the nearest public charging station

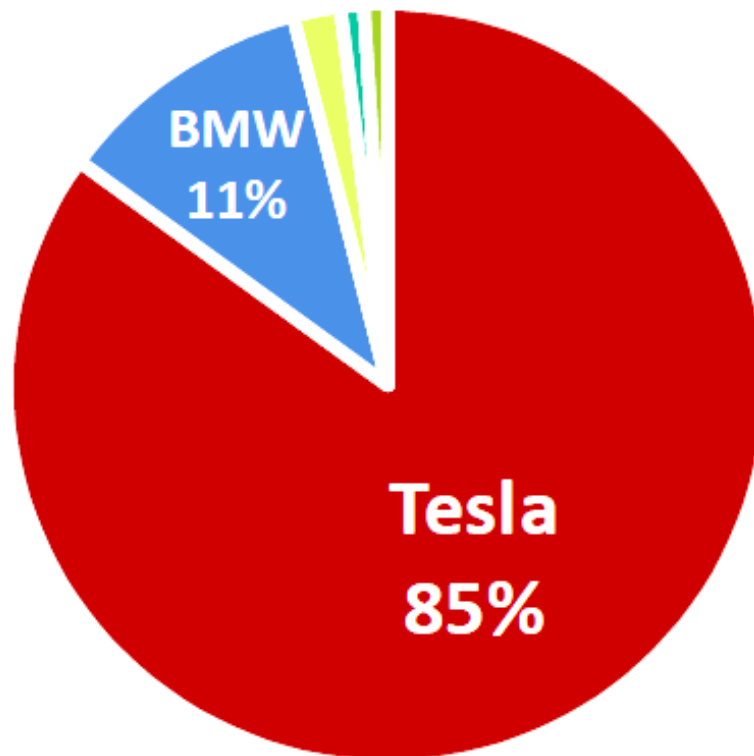
Electric Vehicle Purchase Intentions



Source: Electric Vehicle Recharging in Residential Strata Buildings, Wattblock, July 2018

Electric Vehicle Preferences

Which Make, Model or Brand?



- Tesla
- BMW
- Nissan
- Jaguar
- Mitsubishi



Source: Electric Vehicle Recharging in Residential Strata Buildings, Wattblock, July 2018

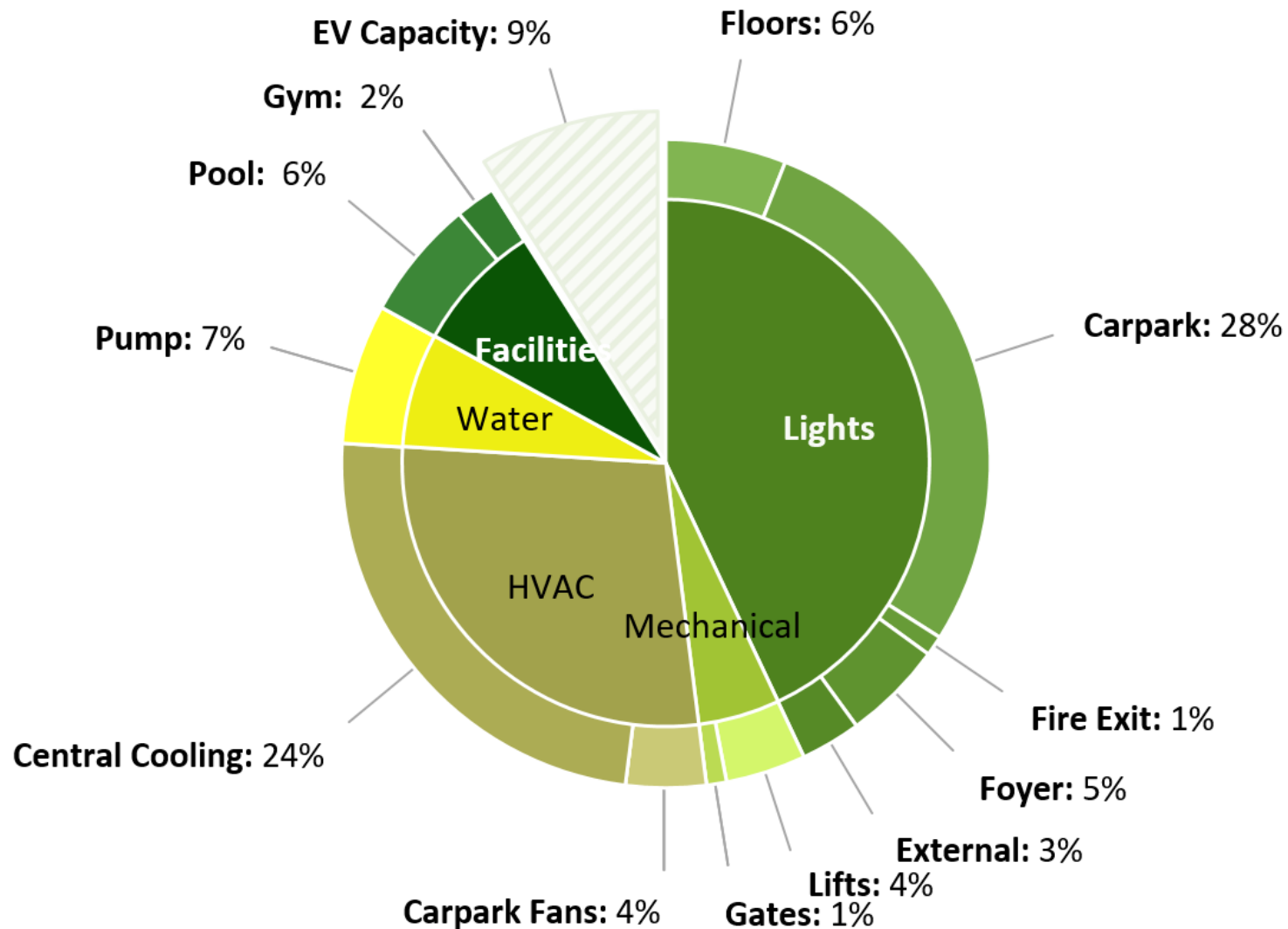
Distribution Board Limitations



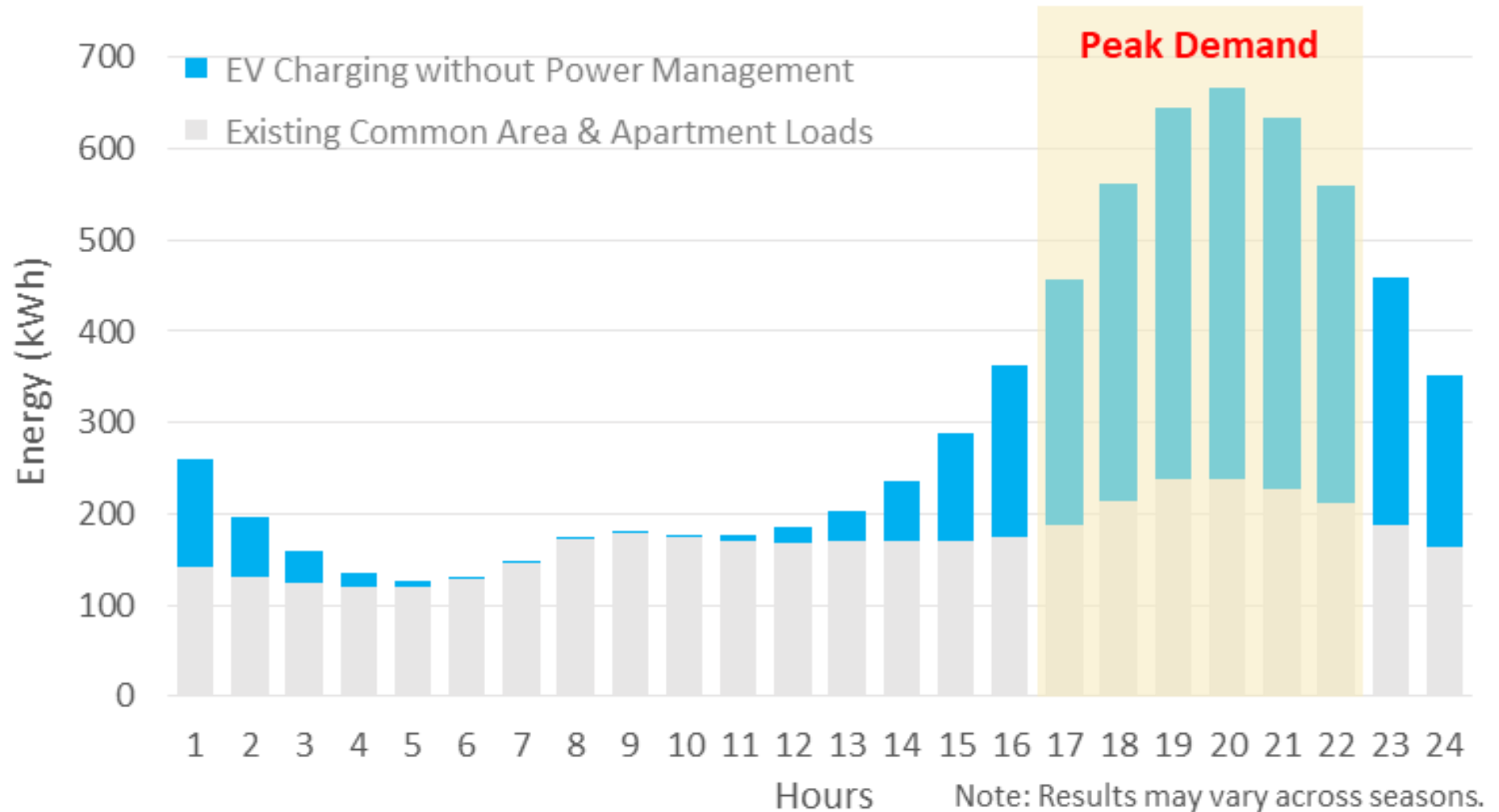
- Unchecked and unmanaged, the installation of EV charging equipment is limited
- Cannot charge all at same time



EV Capacity on Common Power



After Work Charging Peak



Demand Management Systems

Smooth energy loads from larger numbers of vehicles to avoid overloading power boards

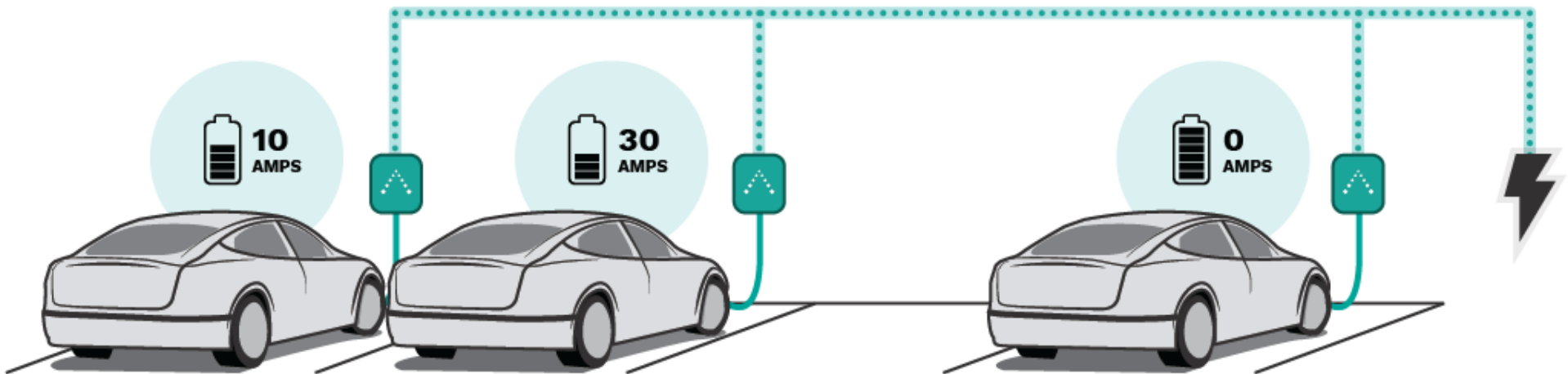
Can also include integrated metering and billing services

- **Staggered charging**

- separate EV chargers into two or more circuits set up to charge on different time intervals.
- in-line timers can be used to stagger the charging cycles.
- e.g. one group of EVs might charge for 30 minutes at a time overnight with 30 minute breaks, while a second group of chargers kick in. This effectively doubles the maximum number of EV chargers with relatively minimal infrastructure cost

- **Demand management systems**

- charging infrastructure has built-in power management functions to intelligently allocating power
- identify which vehicles have the highest priority for charging and supply power to them first
- can support up to 10 times more vehicles charging simultaneously than a traditional solution by



High Density Challenge



Marketing EV Ready Developments



Focused on Sustainability

Genesis Shepherds Bay values and has put emphasis on being a truly sustainable development. The development will have a focus on energy efficiency, renewable energy, water efficiency and communal green roof at the core of its design. Whilst developing a sustainable building is important for the environment it also has direct benefits to the owners with 'green buildings' enjoying lower operating costs which drives additional value into the units.

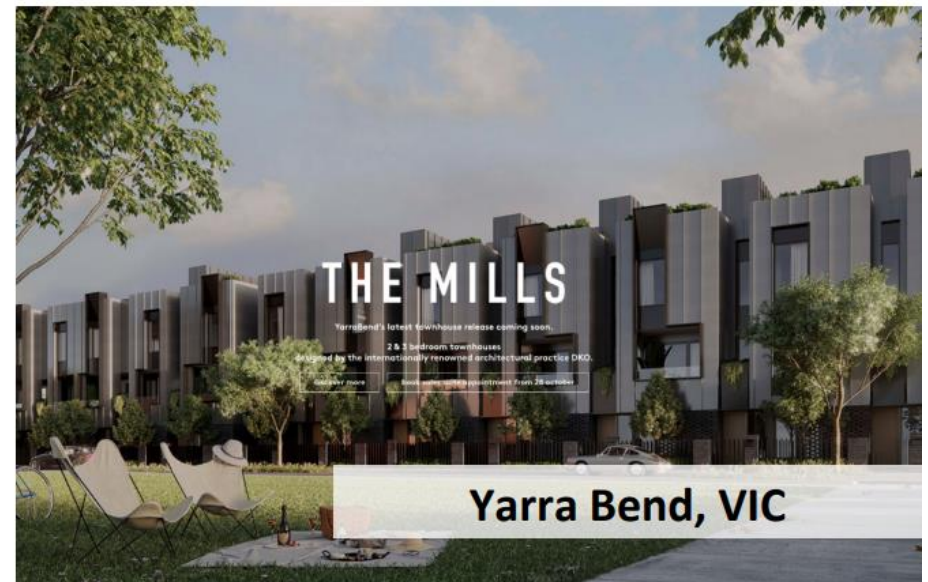
Some key elements of sustainability at Genesis Shepherds Bay are:

- A community solar system which can share solar power inside individual apartments
- Smart metering allowing all residents to bulk-buy electricity together, saving money
- Ready for electric vehicle recharging
- Carbon emissions reduction equivalent to planting over 2,000 trees, 7 times the national target for 2020
- Wattblock 5-Star energy rating

[Click here to download the full WattBlock Building Report](#)



Sustainable Developments



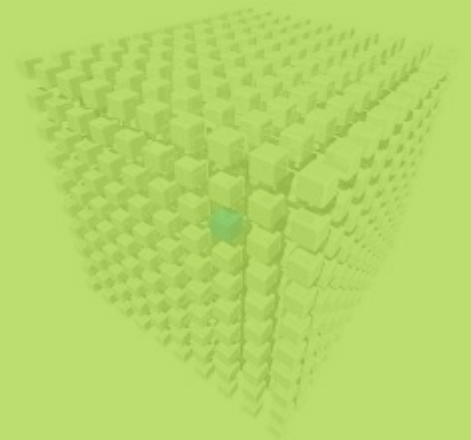
Blackwattle Mews Solar Project



Customer Pain Points



Data Analytics



Data Types

Usage Data

What For?

- Electricity
- Gas
- Water

How?

- Billing Capture
- Interval Data
- Data Loggers

Where?

- Common Areas
- Apartments
- Sub-metering

Raw Data Formats

KogBill Invoice Data

Account Name	STRATA PLAN NO 21252
Invoice Number	
Account Number	1073 5355
NMI	NCCC0022995
Address1	1 Tewkesbury Avenue
Address2	Darlinghurst NSW 2010
Invoice Date From	1-Aug-15
Invoice Date To	31-Aug-15
Invoice Issued Date	1-Sep-15
Invoice Date Due	15-Sep-15
Energy Peak Kwh	2209.784
Energy Peak Rate	0.0496
Energy Peak Charge	116.47
Energy Shoulder Kwh	4139.072
Energy Shoulder Rate	0.0496
Energy Shoulder Charge	218.16
Energy Off Peak Kwh	8540.352
Energy Off Peak Rate	0.0302
Energy Off Peak Charge	274.08
Market Pool Kwh	14889.208
Market Pool Rate	0.000325
Market Pool Charge	5.11
Lrec Kwh	14889.208
Lrec Rate	0.004005
Lrec Charge	63.37
Sres Kwh	14889.208
Sres Rate	0.003497
Sres Charge	55.33
Environmental State Kwh	14889.208
Environmental State Rate	0.00184
Environmental State Charge	29.11

Energy Co Interval Data

NMI	4102018296
DATE	1/11/2014
TIME	0:00
METERNUMBER	441121
SUFFIX	E1
QUALITYFLAG	A
SUBREASONCODE	
CONSUMPTION	5.34
NTC	EA302
JURISDICTION	NSW
TOU	TOU
CONTROLLEDLOAD	No

NMI	NCCC0026336
Read Date/Time	01.01.2015 00:00:00
kWh	0.000
kW	0.000
Kvarh	8.430
Kvar	33.720
kVA	33.720
PF	0.000
B1	0.000
E1	0.000
E1F	0.000
K1	0.000
Q1	8.430

Taggle Data Logger

tag_id	41965
time	22/03/2014 14:36
counter	2456
event	0

Wattwatchers Data Logger

Building Name	Building 1
Circuit/Phase	Load 1- Circuit 1
Date	1/11/2014
Time	0:00
Interval	300
Energy (J)	2930874
Reactive Energy (VARS)	-2814162
Min Voltage (V)	242.1
Max Voltage (V)	244.8
Min Current (A)	25.232
Max Current (A)	29.944
Apparent Power (kVA)	13.54397372
Power Factor	0.721323018
Energy (kWh)	0.814131667

.... Currently 126 fields

Star Schema

NCCC005560
Data Logger Number

Fact Table

NMI
Meter Number
Tag Number
Account Number

Time Dimension

Year
Quarter
Month
Day
15 minute interval

Load Dimension

kW
kVA
PF
MJ
kL

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Meta Data

What For?

- Buildings
- Products
- Projects

How?


- Static Data
- Change Log




Apartments
Levels

.....

Pool Temp Settings
HVAC Timer Settings
Light Wattages
Project Quotes

Wattblock Registration Form





Michael Crouch Innovation Centre
Gate 2, High St, UNSW 2052
Phone: (02) 9977 1801
Email: support@wattblock.com.au

Sustainability Report Registration Form

Complete as much detail as you are able to, click submit, and we do the rest. * Recommended Minimum Inputs

Building ID

Block Name: Strata Plan #:

Street Address:

Suburb / City:

State: Postcode:

General Building Size

Leave blank where not relevant.

Number of Apartments: Number of Blocks:

Largest buildings	Residential Levels	Commercial Levels	Carparking Levels	Lifts
Building 1:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Building 2:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Building 3:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Building 4:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Building 5:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Building Facilities: yes no

☐ External Carparking (Off Street, Ground Level)

☐ Outdoor Roof Area (BBQ, Leisure)

☐ Outdoor Ground Level Common Area (Garden, BBQ)

☐ Common Facilities (Leisure, Laundry)

☐ Solar Panels Installed

Utility Billing

Consult energy bills or strata statements. Leave blank if unknown.

	Electricity	Gas	Water
Billing Period	<input type="text"/>	<input type="text"/>	<input type="text"/>
Period Cost (Inc GST)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Period Usage	<input type="text"/> kWh	<input type="text"/> MJ	<input type="text"/> kL

Detail Worksheet

Skip questions if you are unsure. Additional responses help improve accuracy of results.

Building Details

In approximately what year was the building built?

How many foyers / lobbies on the entrance levels?

How many carpark garage doors / gates?

How many stairwells? (excluding fire stairs)

How many fire stairs?

LED Lighting

yes no

☐ Gardens / roof

☐ Foyers / lobbies

☐ Carparking

☐ Stairwells / corridors

☐ Fire stairs

Apartments

yes no

☐ Gas connection for apartments

☐ Common hot water system ☐ Electric ☐ Gas ☐ Heat Pump ☐ Solar Hot Water

☐ Central cooling system

☐ Central heating system

☐ Electricity bulk billing

Provider:

Ventilation Systems

yes no

☐ Common apartment exhaust system

☐ Foyer ventilation system

☐ Garbage ventilation system

☐ Carpark ventilation system

Fan Count	Hours/Day
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

☐ Foyer air conditioning

☐ Natural ventilation

☐ Carbon monoxide sensors

☐ Variable Speed Drive

Common Facilities

Swimming pools

Spas

Saunas

Other

☐ Tennis / Squash

Pool & Spa Details

☐ Outdoor ☐ Pump on Timer ☐ Electric Heating ☐ Gas Heating

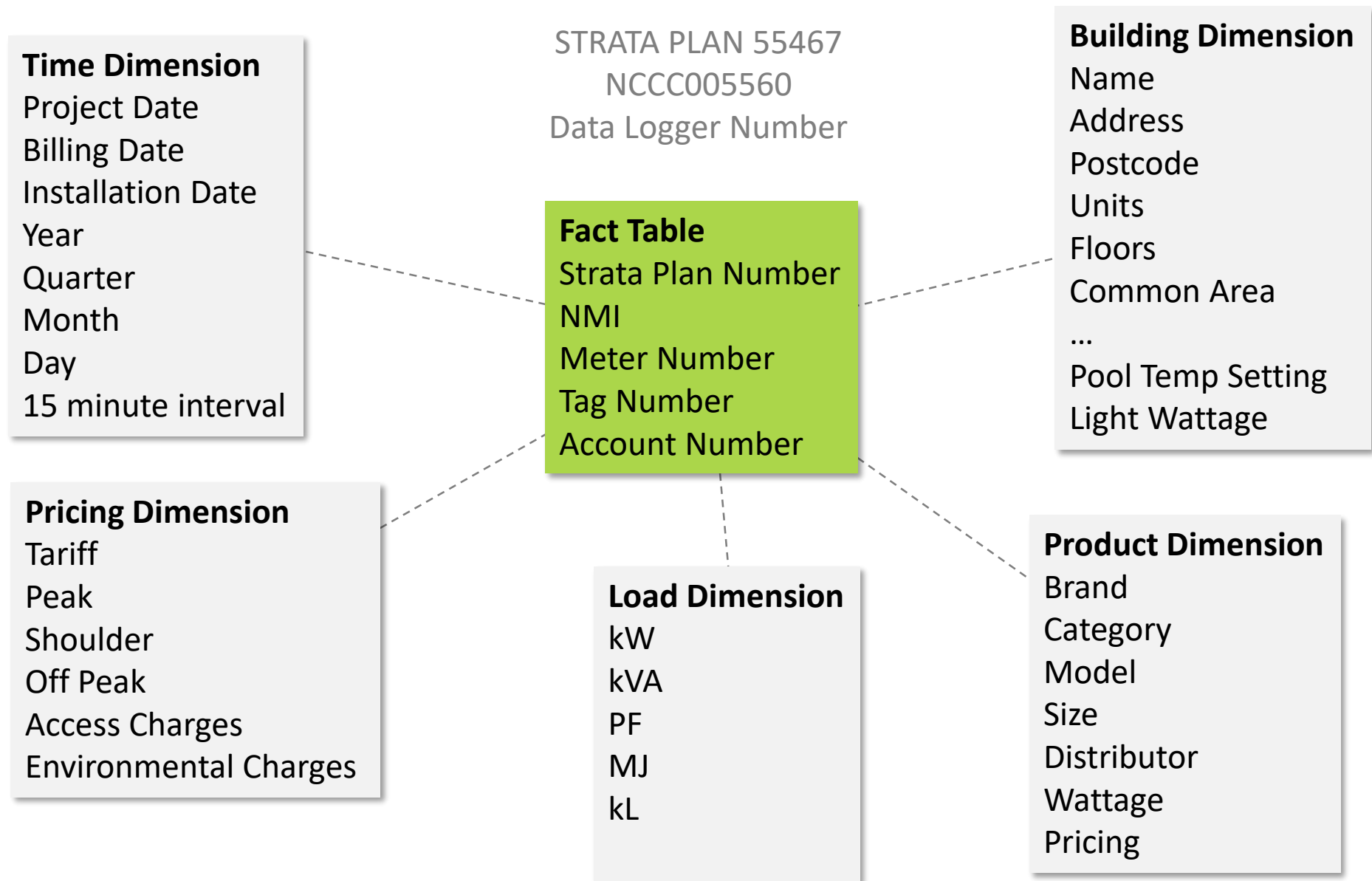
☐ Heat Pump ☐ Solar Hot Water ☐ LED Lighting

☐ Gym Air Conditioning ☐ LED Lighting

☐ Common Laundry ☐ Electric Vehicle Recharge

Additional Details / Comments

Data Analytics + Benchmarking



Data Types

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Apartments Levels

.....

Pool Temp Settings
HVAC Timer Settings
Light Wattages
Project Quotes

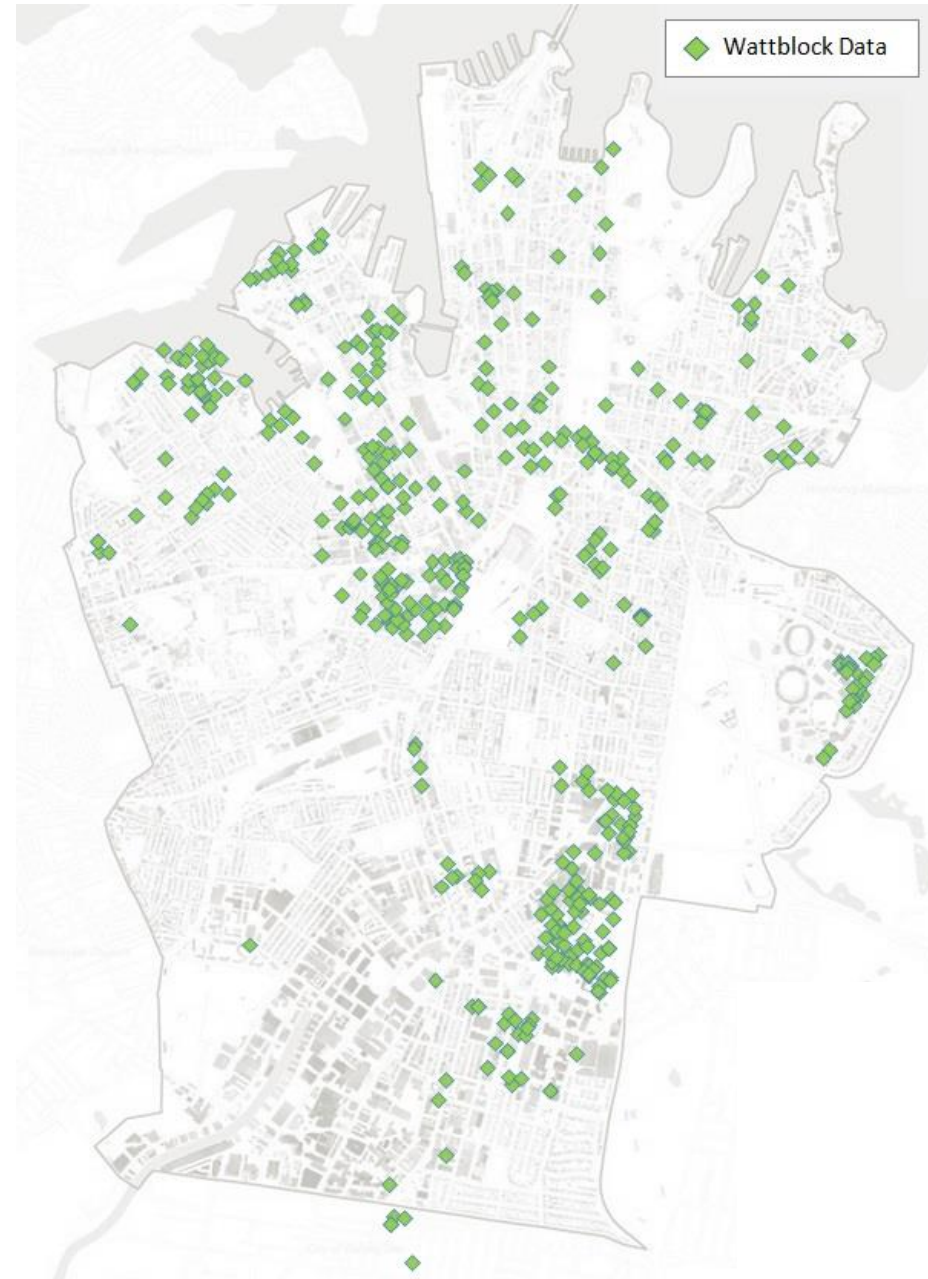
Benchmarking

- Usage Data
- Pricing Data
- Building Data
- Product Data
- Project Data
- Weather Data



Building Attribute Data

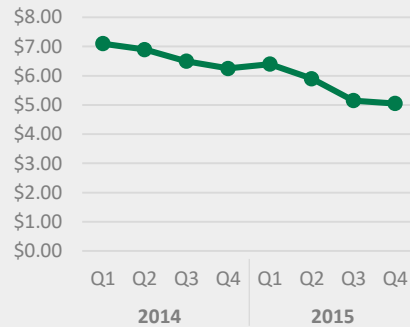
Wattblock has accumulated building attribute data on 500 residential strata buildings in the City of Sydney LGA.



[Home](#) > [Building Data Portal](#) > [Achievements 2014/15](#)

Cost of Carbon Saved

Cost Per 10kg Carbon Saved p.a.



Projects

Category	Complete	In Progress
Electricity	11	13
Water	6	9
Gas	1	3

Tonnes of Carbon Saved

2,600 tonnes

+500



Apartment Blocks

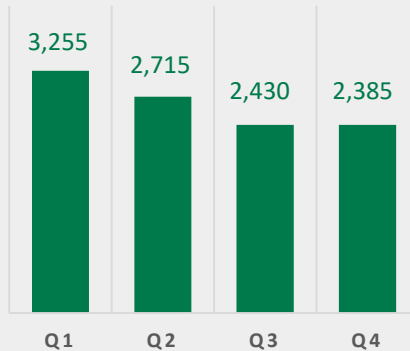
23

+3



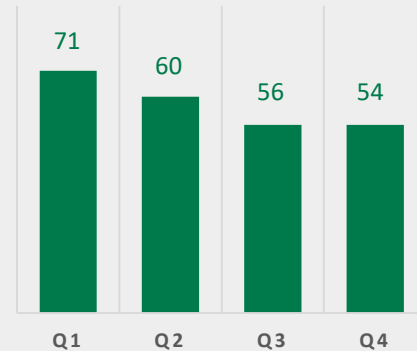
Electricity (MWh)

Aggregate Total TTM



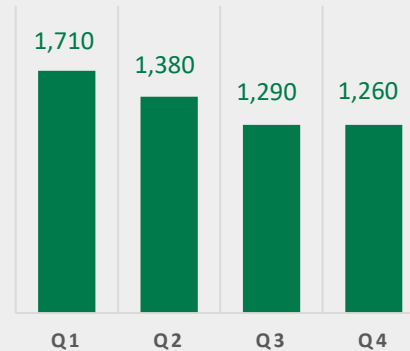
Water (ML)

Aggregate Total TTM





Gas (GJ)

Aggregate Total TTM

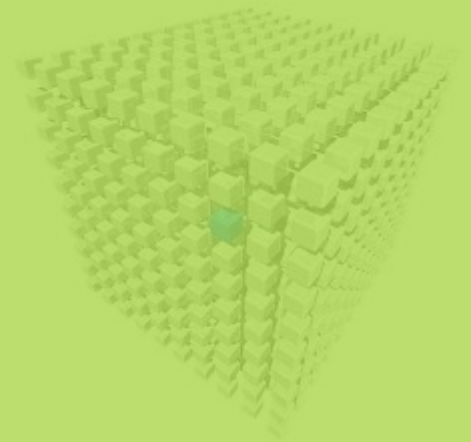


Alerts

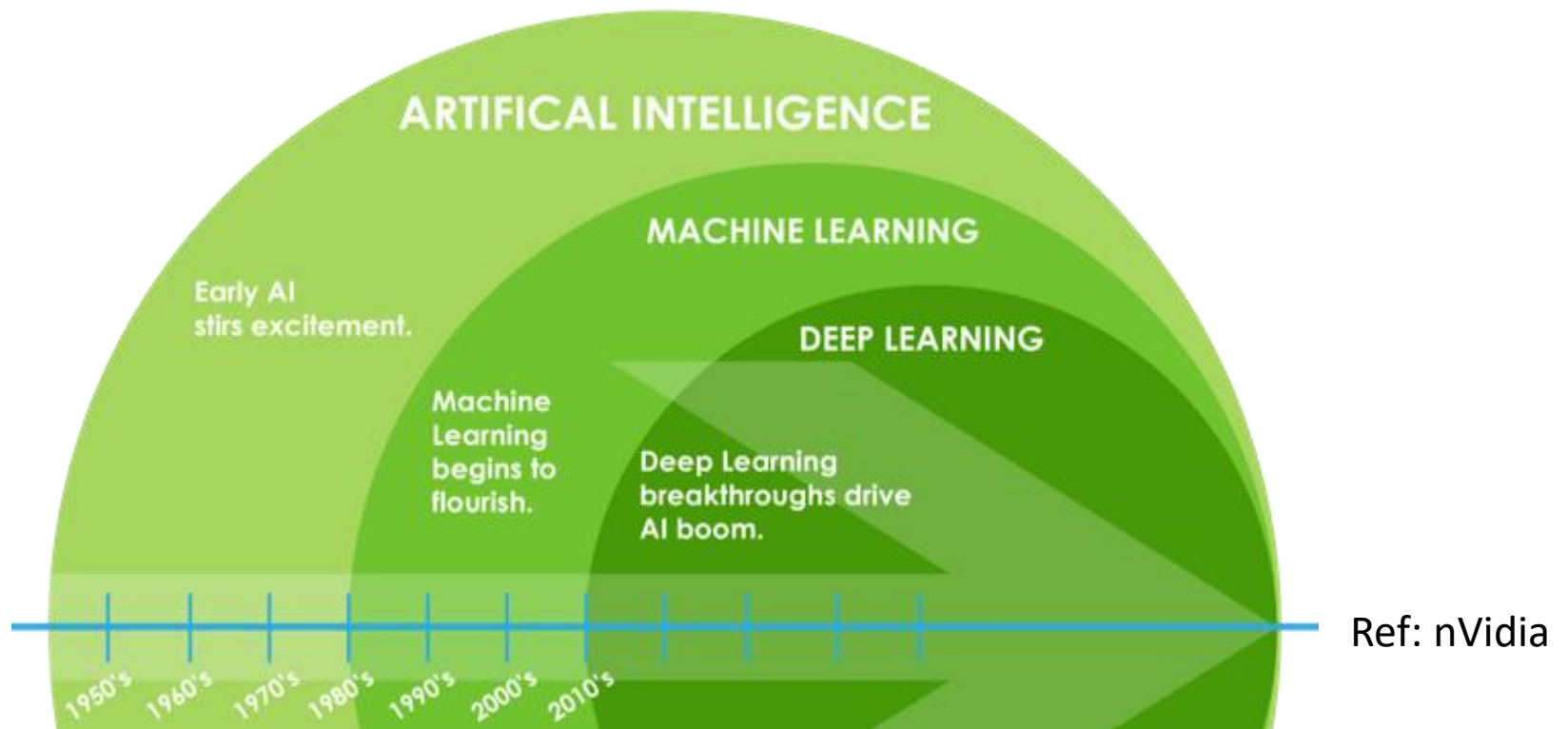
- **Customer Milestone** (18/11/15) 
SP61321 saves 77% on electricity
- **Customer Milestone** (29/08/15) 
SP53232 saves \$6,000 on water

View all 

Artificial Intelligence

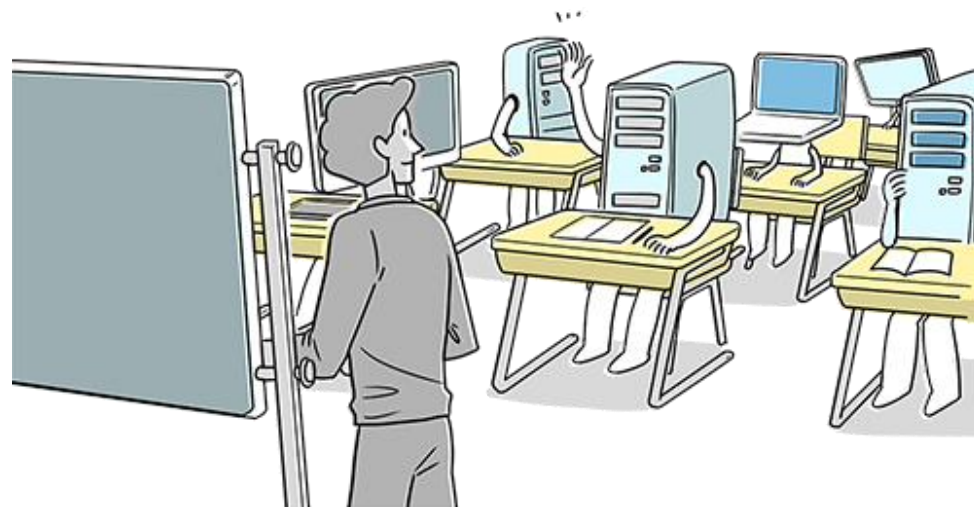


Evolution of Artificial Intelligence (AI)



Machine Learning

- Natural language processing
- Computer vision
- Medical outcomes analysis
- Robotics
- Computational biology
- Web search
- Finance
- E-commerce
- Space exploration
- Information extraction
- Social networks
- Debugging



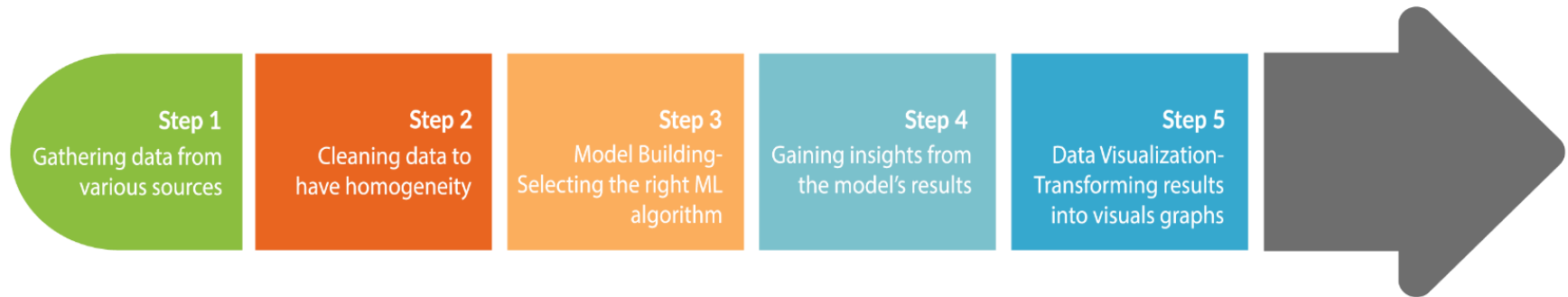
“A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E .”

Tom Mitchell, Machine Learning 1997

Machine Learning Process

Three components: Representation, Evaluation Optimization

- Solve the optimization problem
- Representing and evaluating the model for inference



- Occam's razor (14th Century) Law of parsimony ... minimal assumptions
- Bonferroni's principle ... interesting patterns from low data likely rubbish
- Regression versus Classification
- Clustering (KMeans)

Types of Machine Learning

Supervised (inductive) - Training data includes desired outputs

Unsupervised - Training data does not include desired outputs

Semi-supervised - Training data includes a few desired outputs

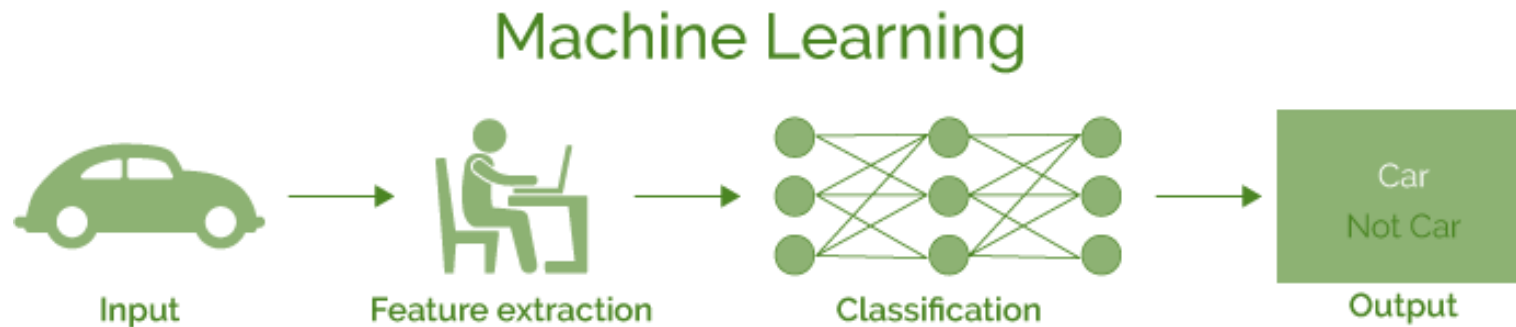
Reinforcement - Rewards from sequence of actions

Random Forrest (RF) - provide variable importance (VI) measurement to reduce dimensions of hyperspectral data

Support Vector Machines (SVM) - plotting points (features) in a n-dimensional space / hyperplane

Artificial Neural Networks (ANN) - eg AlphaGo “black-box algorithms”

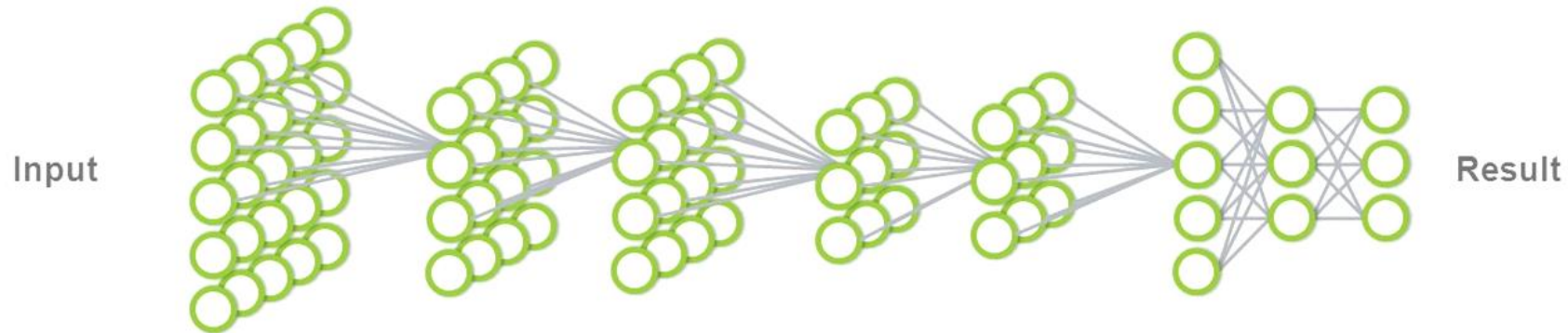
Deep Learning Breakthrough



Deep Neural Network (DNN)



Ref: nVidia

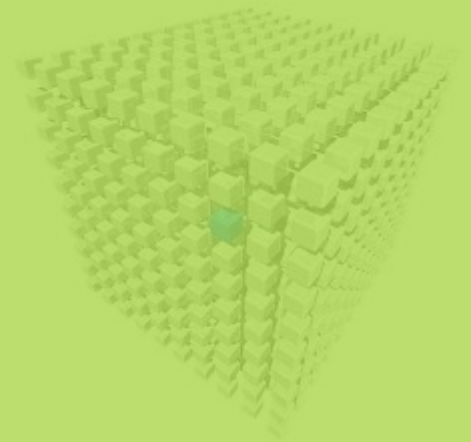


Hinton et al., 2006; Bengio et al., 2007; Bengio & LeCun, 2007; Lee et al., 2008; 2009

Visual Object Recognition Using Deep Convolutional Neural Networks

Rob Fergus (New York University / Facebook) <http://on-demand-gtc.gputechconf.com/gtcnew/on-demand-gtc.php#2985>

Deep Learning on Interval Data



Data Export

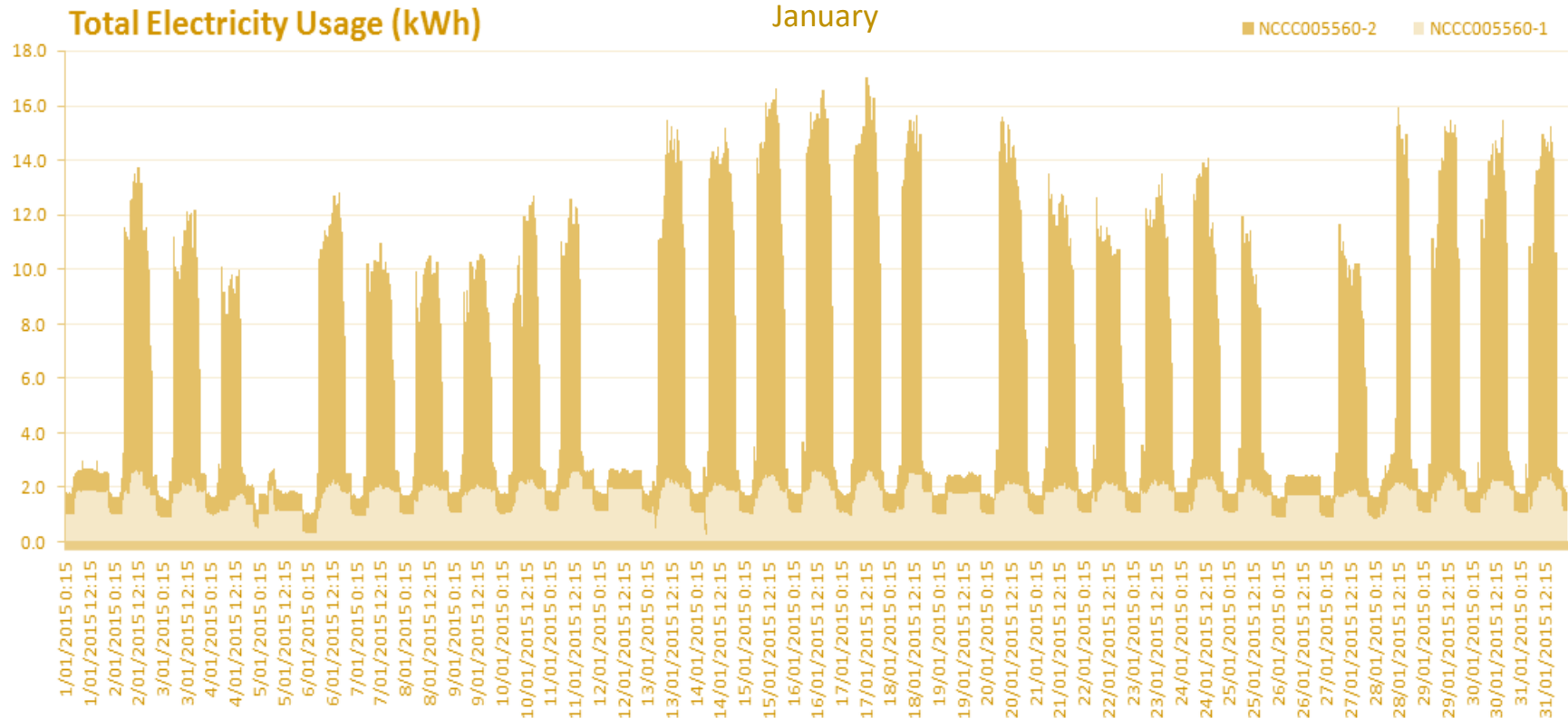
Line 1
 Meter Channels STRATA PLAN 55467 - S1 NCCC005560 kWh In 1
 Meter Units kW
 Export Units kW
 Consumption (kWh) 235829.8
 Load Factor 45.7
 Peak Value 15.24

Time (Period Ending)	12:00:00	12:15:00	12:30:00	12:45:00	13:00:00	13:15:00	13:30:00	13:45:00	14:00:00
Date									
1-Jan-12	4.7	4.7	4.74	4.74	4.72	4.72	4.44	4.44	4.4
2-Jan-12	4.72	4.72	4.7	4.7	4.76	4.76	4.4	4.4	4.36
3-Jan-12	4.7	4.7	4.72	4.72	4.76	4.76	4.44	4.44	4.44
4-Jan-12	4.34	4.34	4.38	4.38	4.4	4.4	4.4	4.4	4.4
5-Jan-12	4.44	4.44	4.46	4.46	4.48	4.48	4.48	4.48	4.52
6-Jan-12	4.32	4.32	4.36	4.36	4.36	4.36	4.36	4.36	4.38
7-Jan-12	2.78	2.78	2.72	2.72	2.74	2.74	2.72	2.72	2.72
8-Jan-12	2.92	2.92	2.92	2.92	2.92	2.92	2.88	2.88	2.86
9-Jan-12	2.9	2.9	2.9	2.9	2.86	2.86	2.88	2.88	2.86
10-Jan-12	4.36	4.36	4.42	4.42	4.34	4.34	4.32	4.32	4.32
11-Jan-12	4.52	4.52	4.52	4.52	4.56	4.56	4.56	4.56	4.5
12-Jan-12	2.76	2.76	2.74	2.74	2.72	2.72	2.72	2.72	2.72
13-Jan-12	4.46	4.46	4.44	4.44	4.48	4.48	4.48	4.48	4.52
14-Jan-12	4.22	4.22	4.26	4.26	4.22	4.22	4.2	4.2	4.22
15-Jan-12	3.12	3.12	3.1	3.1	3.08	3.08	3.06	3.06	3.08

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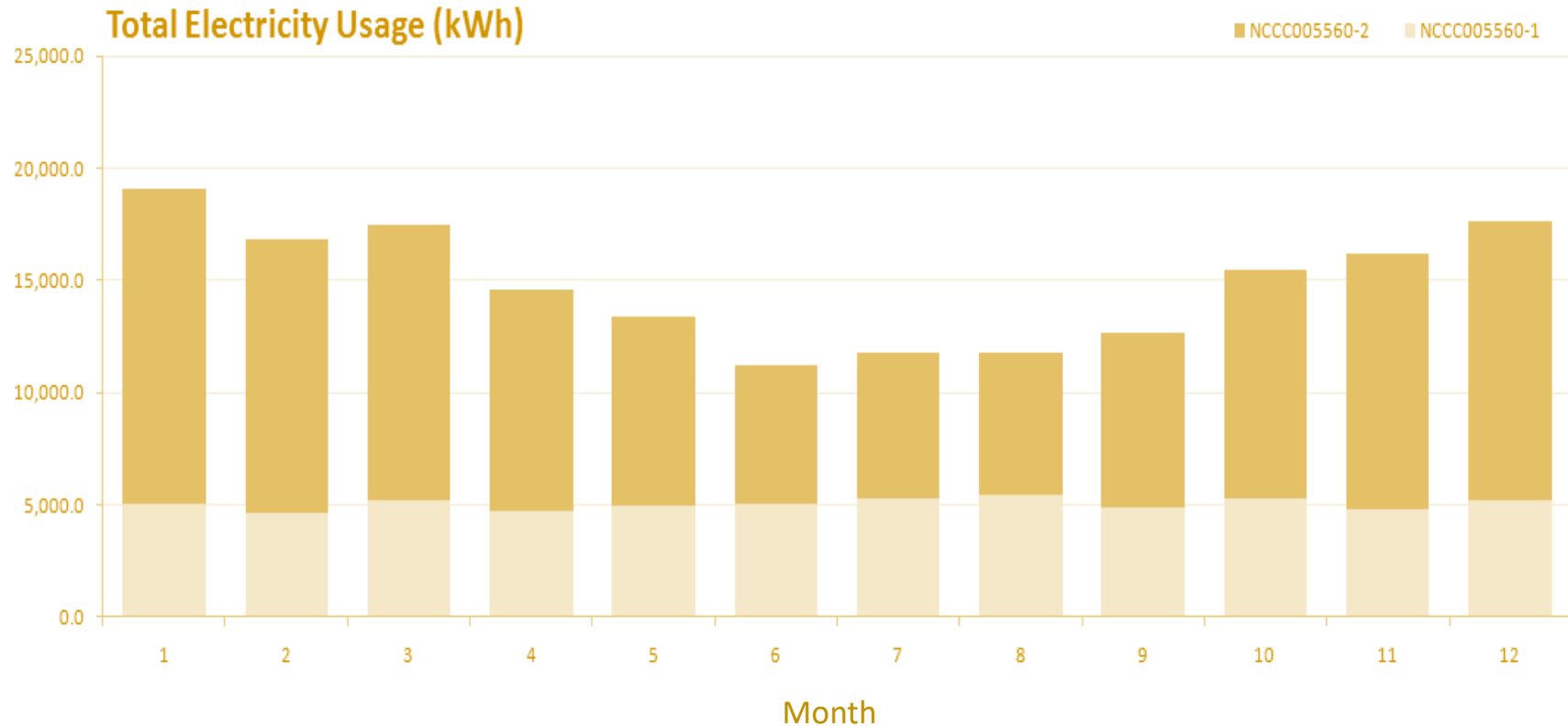
↓

Interval Data Plot



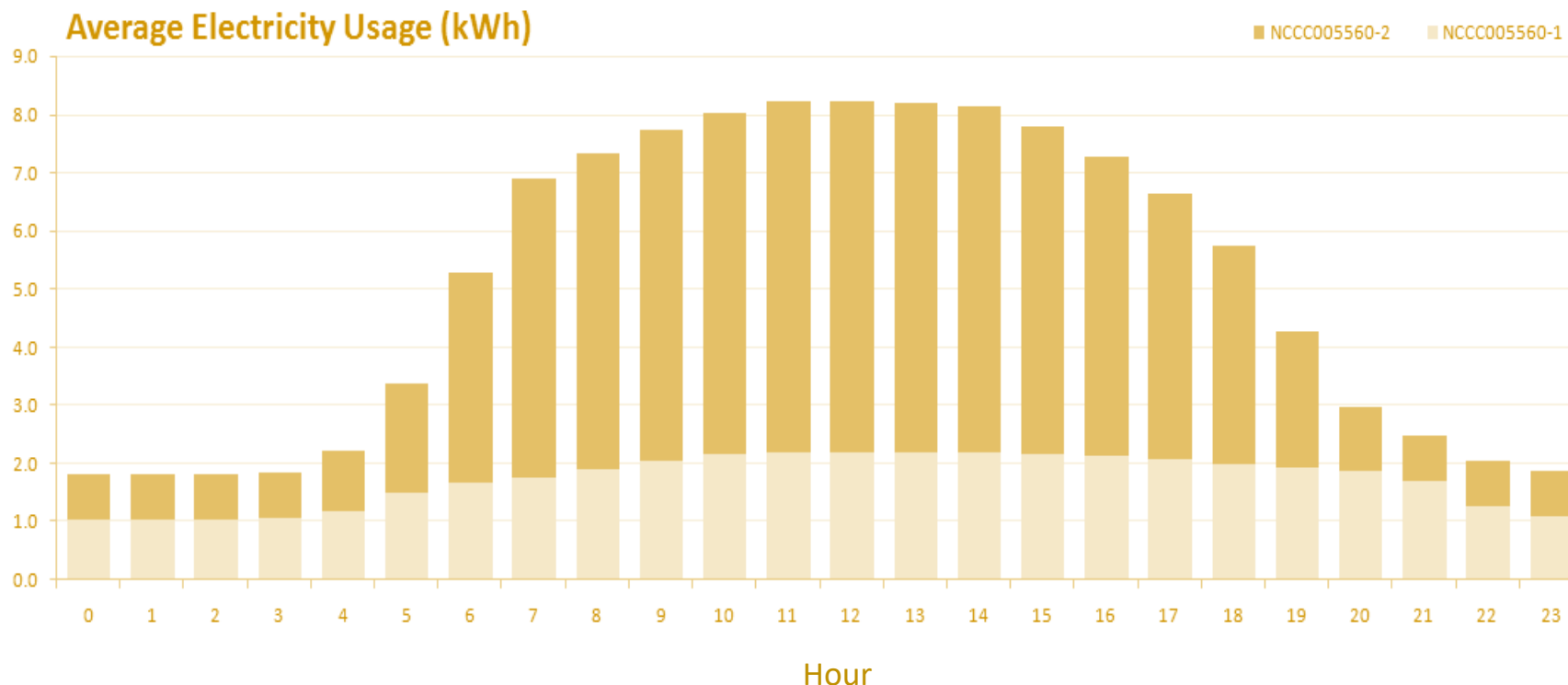
- Strata Building in Sydney
- Two NMI for common area power
- 15 minute interval data

Monthly Total



- Monthly total summation of kWh
- Seasonal trend

Average Daily Usage Profile



- Daily Usage Profile kWh
- Average kWh over a 365 day period
- Potential for confusion eg Average kWh per 15 minute interval

Energy Fingerprint

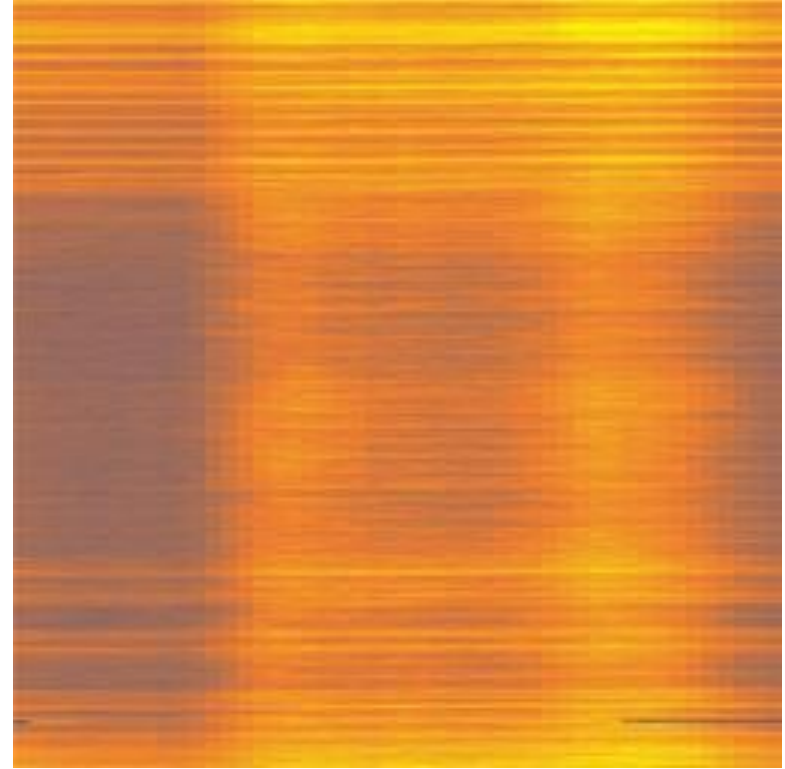
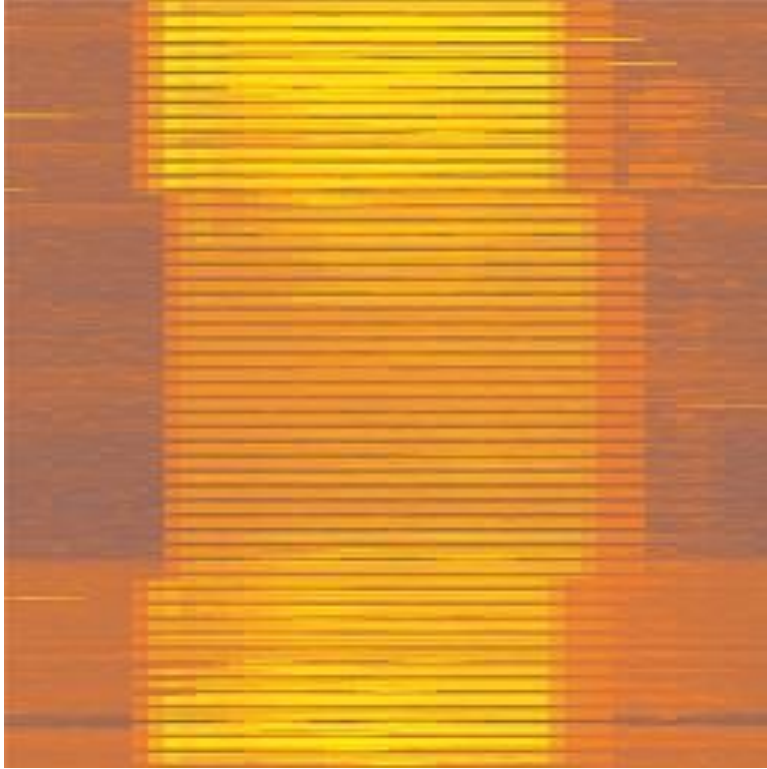
Commercial

Residential

Jan

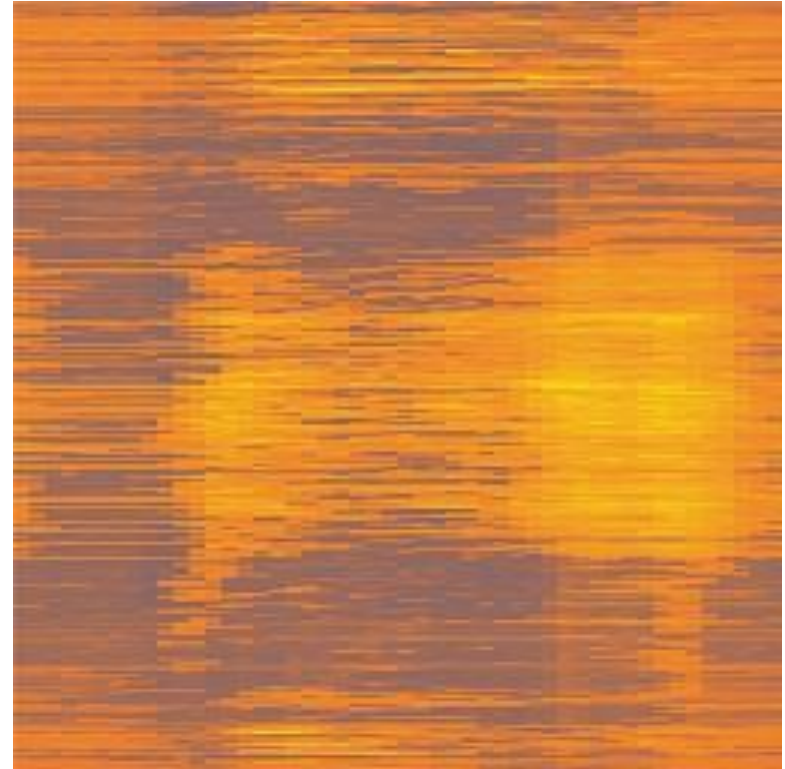
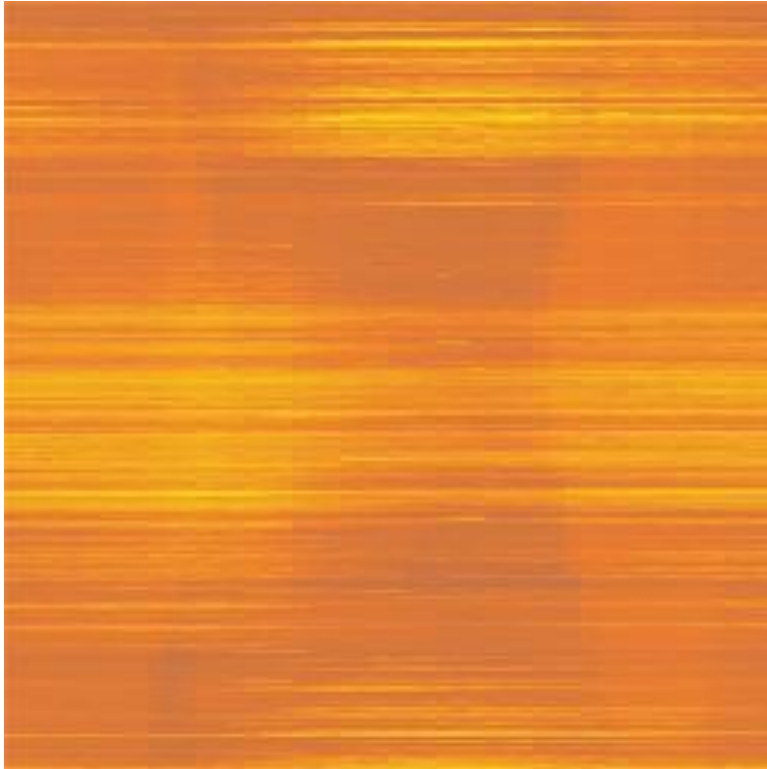


Dec

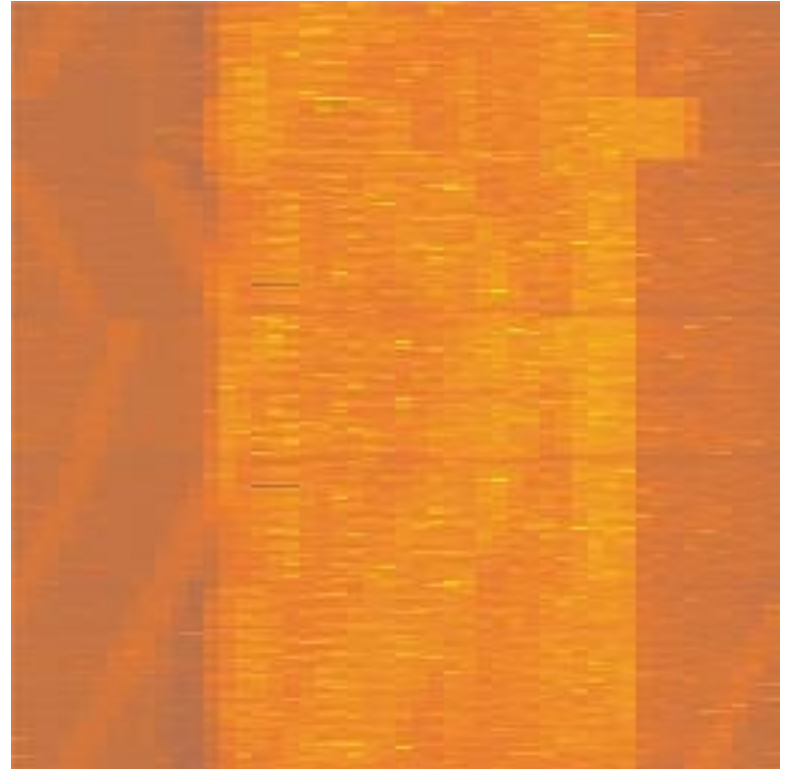
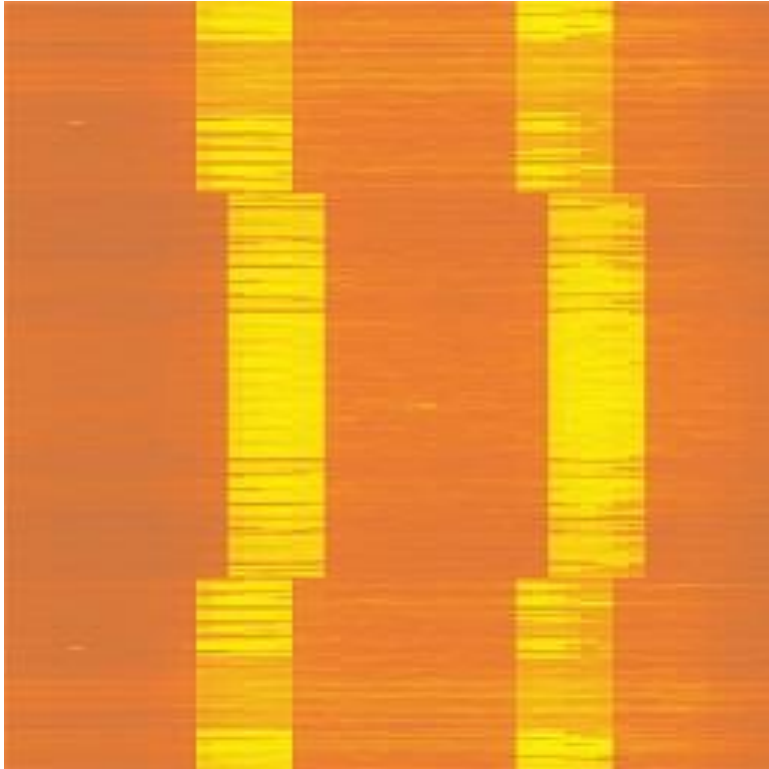


24 Hours

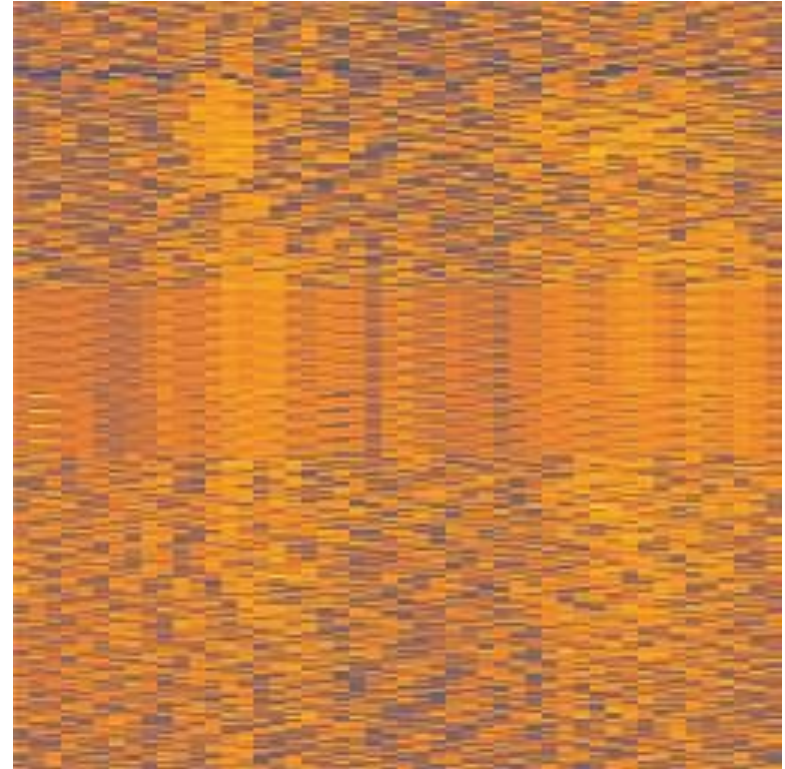
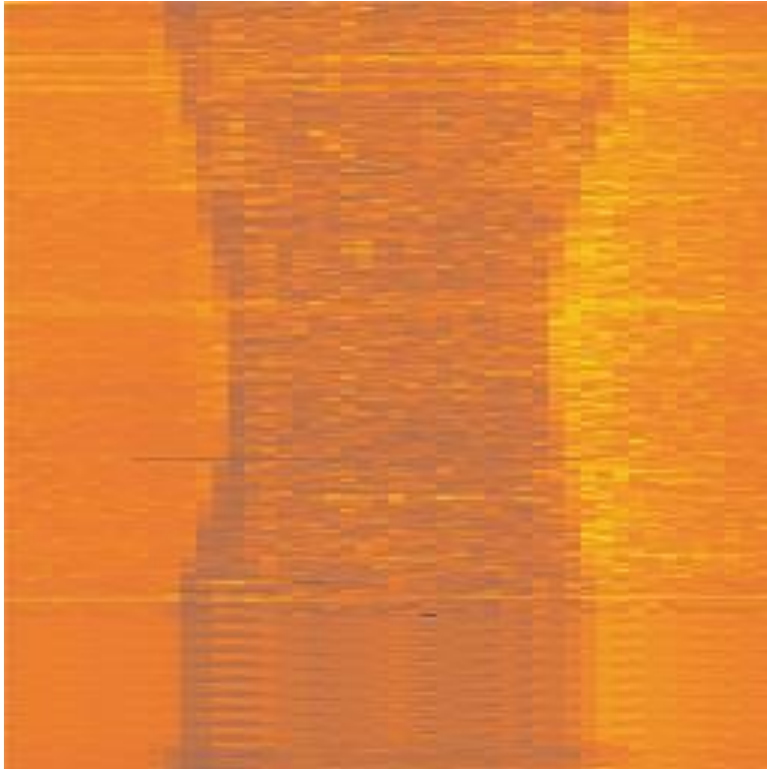
Central Heating and Cooling



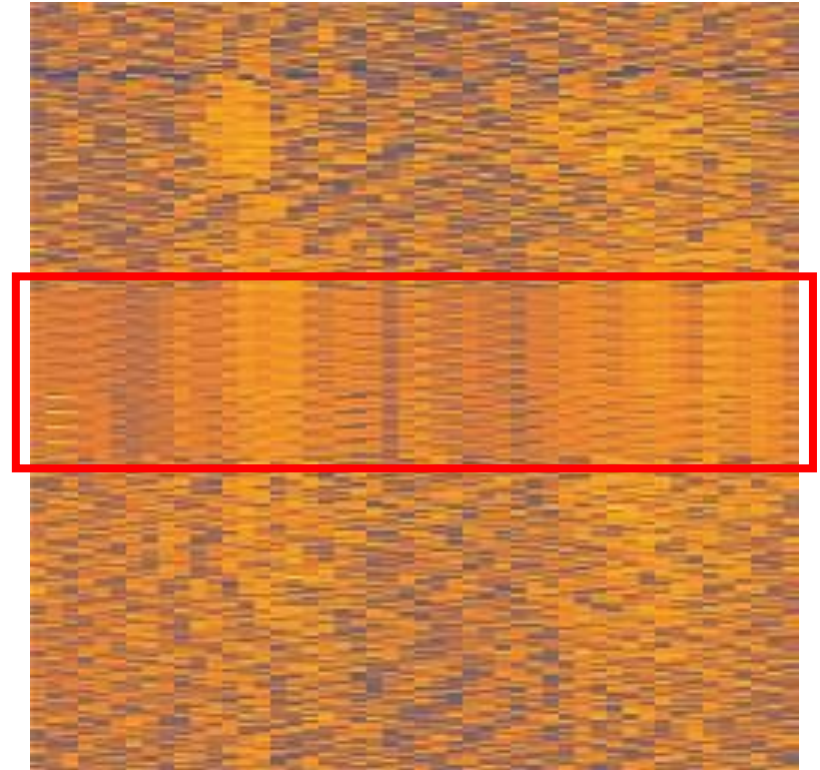
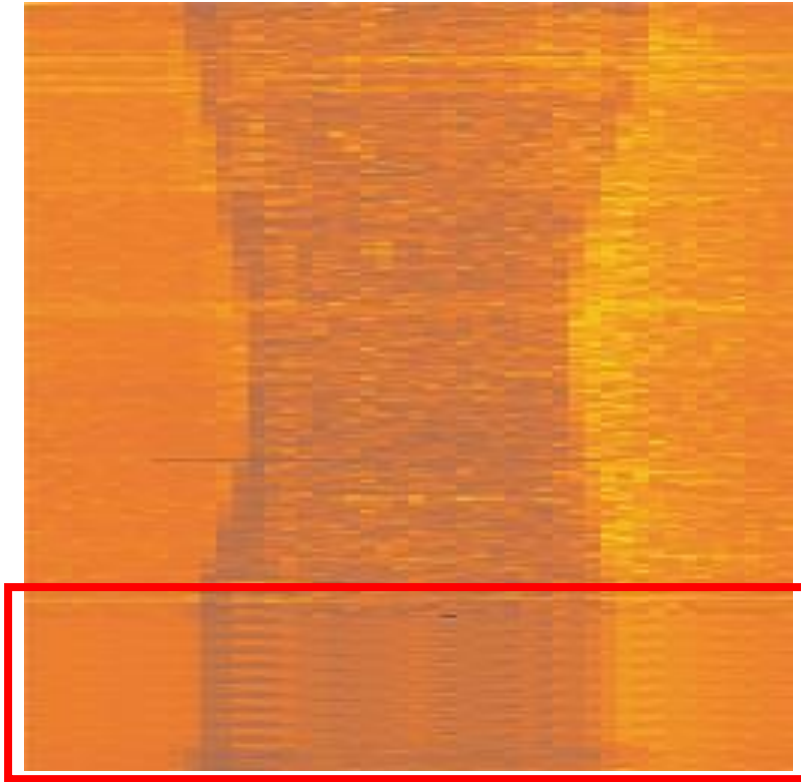
Systems on Timers



Estimated Energy Consumption

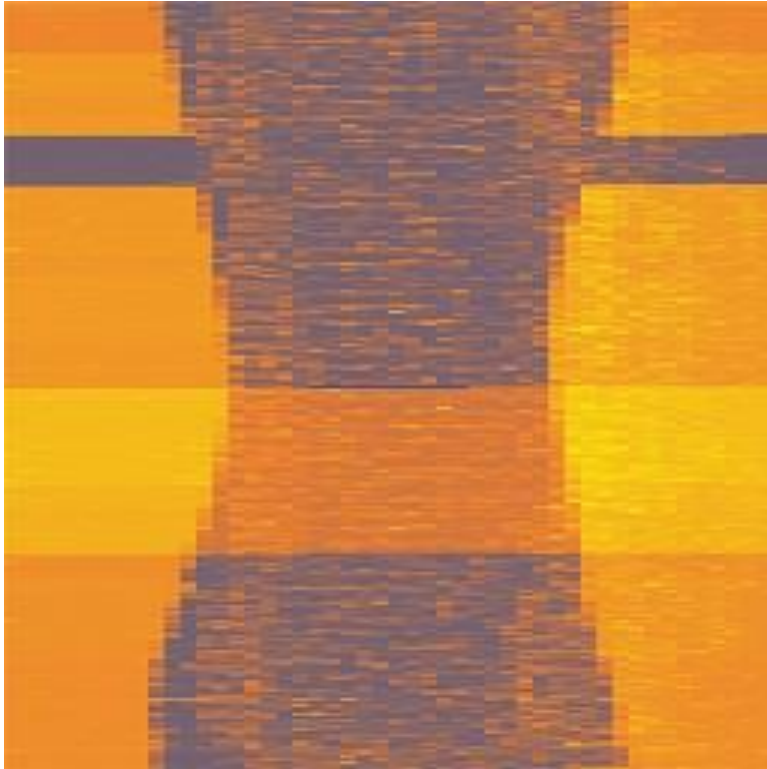


Estimated Energy Consumption

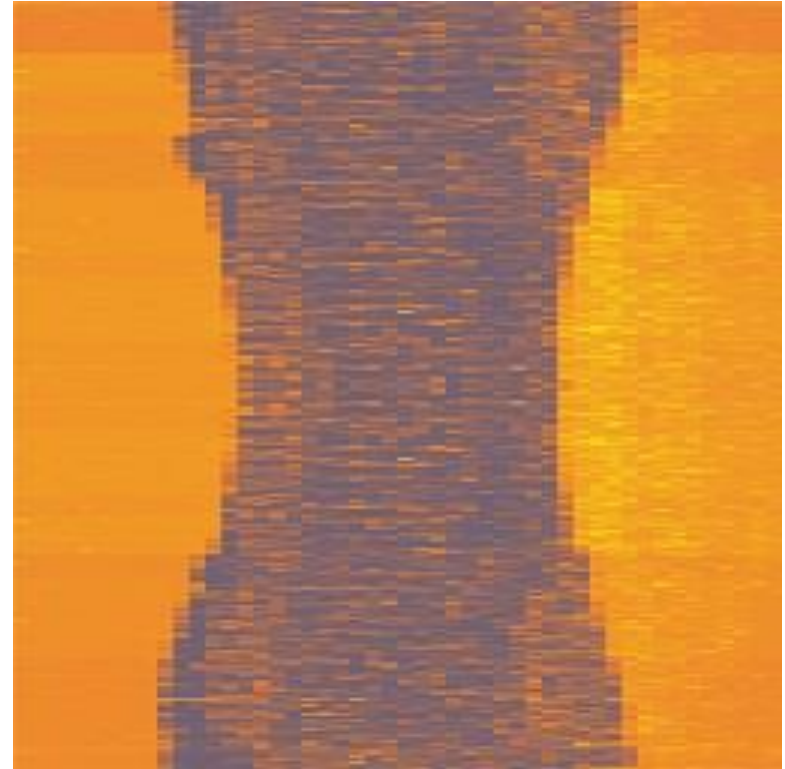


Smart meter down?

System Outages and Irregularities



Raw Data



Normalised Data

Pre Assessment for Star Rating

28 March 2019



INNOVATION OF THE YEAR

After Hours 'Phone-In'
(02) 9977 1801



WATTBLOCK ENERGY REPORT PRE-ASSESSMENT

Sample Apartments SP9999
1 Indicative Street
North Sydney NSW 2060

Block Type: High Rise (2 Blocks)
Total Floors: 22 + 3 Parking
Total Units: 199
Age of Block: 0 - 10 Years

Common Electricity: 455,826 kWh | Common Gas: 351,241 MJ | Common Water: 35,763 kL

RATING ESTIMATES

Wattblock estimates a 5 star energy rating and a 3 star water rating based on available data.



STRATA SCHEME ASSUMPTIONS

The estimated ratings in this report are based on inputs and assumptions about the strata scheme. Where data is inaccurate or out of date a revised report should be obtained.

Contact Wattblock if you would like to obtain an official NABERS for Apartment Buildings rating. Official ratings require payment of lodgement fees and are valid for 12 months.

Wattblock is also able to assist with recommended projects to improve star ratings.

	TOTAL	PER UNIT
Annual Electricity Usage	455,826 kWh	2,290.6 kWh
Annual Gas Usage	351,241 MJ	1,765.0 MJ
Less Exclusions	0 kWh	
Adjusted Energy Usage	479,447 kWh	2,409.3 kWh
Green Power	0%	5,448.3 Typical
Annual Water Usage	35,763 kL	179.7 kL
		188.8 Typical
Number of Apartments	199	
Lift Serviced Apartments	100%	Six Star Energy
Central Hot Water	100%	39.7% lower
Central Cold Water	100%	
Central Aircon	100%	Six Star Water
Condenser Units	100%	72% lower
Number of Car Spaces	199	
Naturally Ventilated	0%	
Gym	Yes	
Swimming Pool	Unheated	

Contact Wattblock:
Phone: (02) 9977 1801
support@wattblock.com.au

The information, statements, statistics and commentary contained in this report have been prepared by Investment Advantaged Software Pty Ltd, trading as Wattblock. Wattblock does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made or any conclusions reached. Wattblock may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement this report at any time. The information contained in this report has not been subject to an energy audit by a certified industry practitioner. The information must not be copied, reproduced, distributed, or used, in whole or in part, for any commercial purpose without the written permission of Wattblock.

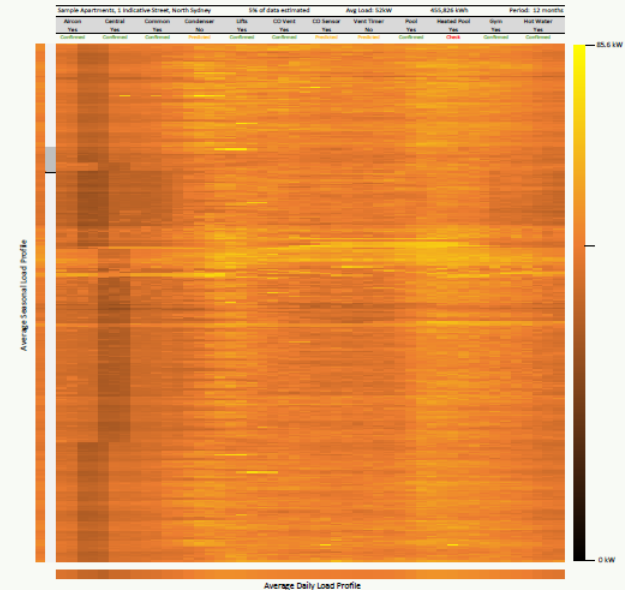
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ENERGY USAGE HEATMAP SIGNATURE

This report is based on energy data analytics. Your energy data produces a unique fingerprint which reflects the types of equipment in use and the operating hours.



How Does It Work?

Your heat map shows 24 hours across and January to December down the page. The colour scale on the right shows peak and average energy usage levels. Contact Wattblock for further interpretation.

Air Conditioning

Energy data analytics assists to identify central air conditioning for apartments as well as air conditioning in foyers and other common areas. It can also detect the type of air conditioning.

Car Park Ventilation

Underground car park ventilation is typically set up on a timer or CO detection system. High powered fans may also be controlled by variable speed drives. Energy data analytics can determine such characteristics.

Common Facilities

Common facilities in apartment buildings include things like gyms, pools, spas and saunas. For example, pools may have pumps, filters, and heating systems which all leave their energy signature in the data.

The information, statements, statistics and commentary contained in this report have been prepared by Investment Advantaged Software Pty Ltd, trading as Wattblock. Wattblock does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made or any conclusions reached. Wattblock may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement this report at any time. The information contained in this report has not been subject to an energy audit by a certified industry practitioner. The information must not be copied, reproduced, distributed, or used, in whole or in part, for any commercial purpose without the written permission of Wattblock.

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WATTBLOCK ENERGY REPORT

PREMIUM ASSESSMENT

Prepared For: Owners Corporation
1 John Street
Brisbane QLD 4000

Block Type: High Rise
Total Floors: 16 + 4 Parking
Total Units: 82

★★★★★
Estimated 3-STAR NABERS ENERGY RATING

Common Energy: \$39,139 p.a. | Apartment Energy: Est. \$137,500 p.a. | Water: Est. \$42,977 p.a.

FAST PAYBACK OPPORTUNITIES

Wattblock estimates the annual energy costs for your common areas can be reduced by 44% after all fast payback projects.

ESTIMATED
COST
REDUCTION

44%

ESTIMATED
ANNUAL
SAVINGS

\$17,331

ESTIMATED
PROJECT COSTS

\$35,797

ESTIMATED
PAYBACK

2.1 Years

Note: All figures are GST inclusive.

SUSTAINABILITY ROADMAP

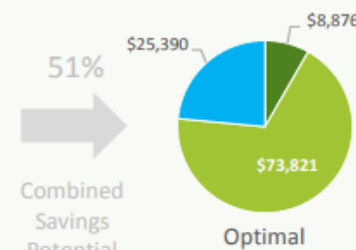
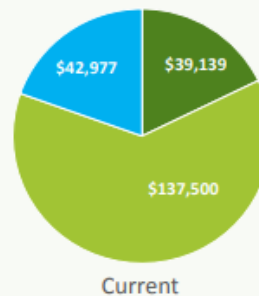
Energy efficiency upgrades (e.g. LED lighting) and renewable technologies can lower your energy bill by reducing grid usage.

The energy rate for tenants can be reduced through the use of bulk billing.

Water savings can be achieved by targeting water leakages and efficiency.

Annual Utility Costs

■ Common Energy ■ Tenant Energy ■ Water



LOW HANGING FRUIT

Wattblock recommends the top projects for your block as summarised in the table.

Projects	Description	Est. Savings	Est. Cost	Est. Payback
1 Carpark Lighting	Replace fluoro tubes in basement carpark with LED.	\$3,848	\$7,274	1.9 Years
2 Common Area Lighting	Replace common area lighting in foyers, floor, fire escapes and stairs with LED.	\$8,162	\$19,370	2.4 Years



Resources

EV Recharging in Residential Strata Buildings

wattblock.com/ev-report

How to use Machine Learning to Build Predictive AI Models with Big Data?

Clariden Global

Energy Efficient Apartment Buildings

University of NSW

Wattblock Publications & Presentations

wattblock.com/publications



Further Information



Prepared by:

Ross McIntyre
CDO and Founder

www.wattblock.com



Wattblock provides sustainability reports for strata buildings covering energy efficiency, solar, batteries, smart meters, electric vehicle recharging, gas and water. It has offices in Sydney and Brisbane and has assisted strata buildings across Australia.

Wattblock has received an environmental innovation grant from the City of Sydney. The development of this solution has been supported in part by the Department of Industry, Skills and Regional Development through the Innovate NSW program.

Wattblock has received investment from muru-D as part of Telstra's startup accelerator program.

Ross is the CDO, director and a co-founder of Wattblock. Winner of the SCA Innovation of the Year in 2016, Wattblock has developed a “smart city” analytics platform to reduce energy waste in high density urban environments. Previously Ross spent 10 years working for First Data in Australia, Hong Kong, Singapore and China. He has consulted to tier 1 banks on high volume transaction data for ATMs and merchant acquiring. Ross has a masters in finance and an honours degree in product development and innovation from the University of NSW.

Wattblock NSW

Michael Crouch Innovation Centre
Gate 2, High St, UNSW, 2052

Wattblock Queensland

32 Saul St Brighton
Queensland, 4017

Wattblock Victoria

Gurrowa Lab, 242 Exhibition St
Melbourne Vic 3000