EG

DECARBONISATION PATHWAY

95 North Quay, Brisbane City, Queensland

1. EXECUTIVE SUMMARY

EG's Real Zero Strategy is targeting zero carbon by 2030 across the Delta portfolio. A Real Zero Carbon building matches all energy demand with the supply of carbon free renewable energy in accordance with the United Nations 24/7 Carbon Free Energy Compact, of which EG is a proud member.

EG worked with built environment experts Buildings Alive to create these bespoke decarbonisation pathways for each asset and has since partnered with EGX climtech Avani to deliver these ambitious, market leading pathways.

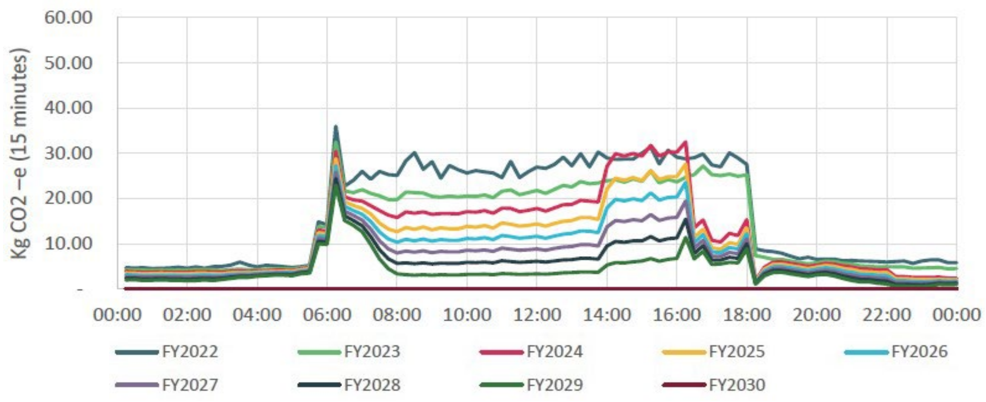
These pathways are;

- Credible - emissions reductions should be “real” and beyond question
- Accountable - progress should be measurable, measured and reported
- Commercial - maximise investment opportunity / minimise operating costs
- Future-ready - thinking ahead
- Recognised - aligned with emerging frameworks
- Practical - applied and in ‘action’ rather than theoretical
- Targeted - within the boundaries of organisational control
- Timely - this is the ‘decisive decade’ and EG can display leadership

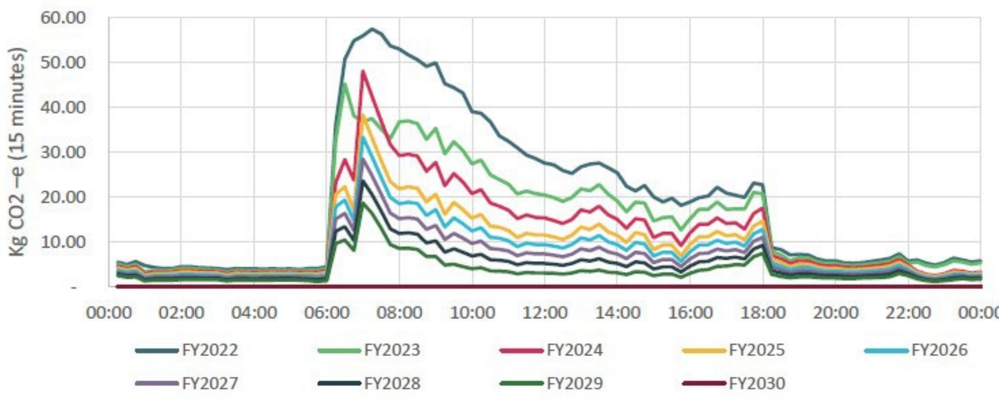
A high level analysis was conducted to generate a potential decarbonisation pathway for 95 North Quay based on near real-time grid carbon intensity. The below plots illustrate the potential decarbonisation pathways for a summer and winter day targeting FY30 to achieve Real Zero for Scope 1 & 2 site energy emissions.

If measures on the following page were implemented, in FY30 around 13% of emissions remain to be addressed through a combination of electricity procurement and on-site battery / thermal storage.

Summer Day – Resulting Carbon Profile (kg/interval)



Winter Day – Resulting Carbon Profile (kg/interval)



1. EXECUTIVE SUMMARY **SUMMARY OF MEASURES**

Summary of Measures	Timing
Baseline Year Energy Carbon Emissions (NGA)	FY22
Undertake **Real-time Grid Carbon Measurement**. Emissions reduce in line with grid decarbonisation	FY23 onwards
Energy Efficiency • Electric duct heater optimisation • Lighting lux sensor upgrade and schedule optimisation • Global zone temperature setpoint controls upgrade	 FY24 FY24 FY25
Electrification Replacement of gas boiler and domestic hot water systems with heat pumps	N/A (no existing gas connection)
Demand Flexibility Implement automated demand / response strategies based on building / carbon profile forecasts	FY24 onwards
On-Site Renewable Energy Limited opportunity for on-site solar – assume 20kW system installed	FY25
On-Site Battery Storage A 200 kWh battery in 2030 could remove 55% of remaining emissions on a summer's day, 34% on winter's day	FY30 (or sooner)
Off-Site Renewable Energy Energy procurement of time matched power purchase agreement for removal of remaining emissions	FY30 (or sooner)
Resulting Real Carbon Emissions	**0 kg CO_2 –e pa**

TABLE OF CONTENTS

2. SITE OVERVIEW 95 NORTH QUAY, SYDNEY

This report is a "Real Zero" decarbonisation pathway document for 95 North Quay based on Buildings Alive's analysis conducted in Oct / Nov 2022. It assesses the potential contribution of various strategies to a FY30 Real Zero Carbon target for the building.

This assessment is based on documentation provided and various assumptions as stated. It follows procedures as set out in "220913 Zero Carbon Roadmap Methodology - EG Funds“

Basic Building Details

- NLA 8,417 of office space
- Buildings Aliave Rapid Efficiency Feedback service in place since 22/02/2019
- Whole Building NABERS Rating of 3.5 Stars (Valid thru Dec 2022)
- 82.4% occupied at time of report

Energy Source (Base Building)

- Grid Import (Electricity)

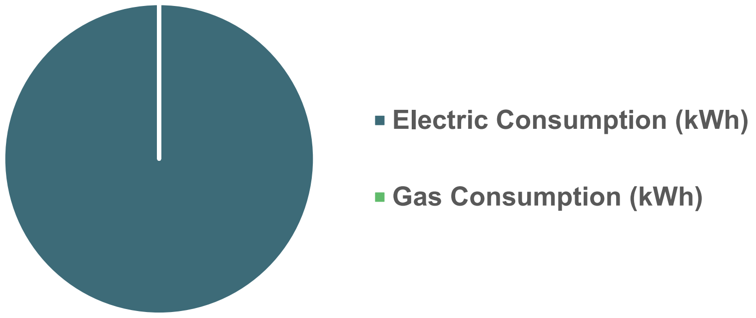
The scope of this assessment includes Scope 1 & 2 direct emissions. EG is committed to exploring collaborative opportunities with tenants to measure the carbon footprint of their energy use in real time and reducing it to Real Zero by 2030. It is EG's intent that these Scope 3 emissions (the carbon emissions resulting from tenant energy use) be included within EG's target in the future.

3. SITE ENERGY SOURCES / EMISSIONS

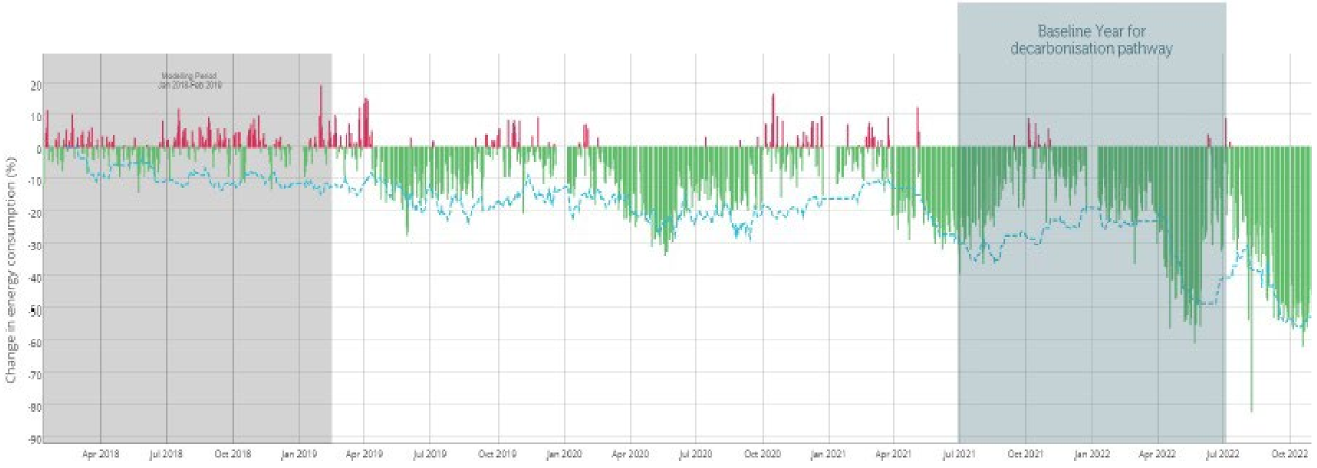
For this analysis, a baseline year of FY22 has been selected based on analysis of past several years of operation.

- Baseline year energy split is 58% gas (549,500 MJ) and 42% electricity (111,661 kWh).
- Scope 1 & 2 energy emissions for the baseline year were 116,457kg as calculated using NGA factors.
- By measuring emissions utilising actual interval level carbon intensity of the electricity grid, baseline year emissions would have been 105,396kg, 9.5% lower.

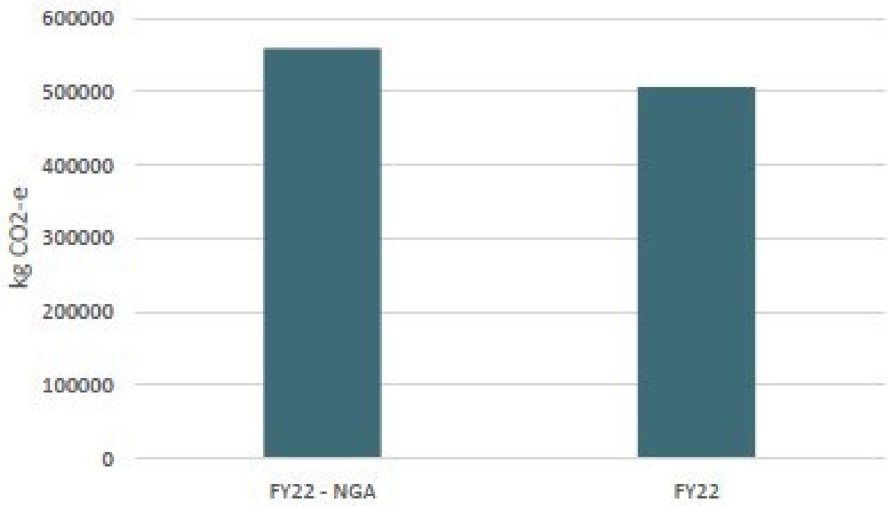
FY22 Baseline Year Energy Consumption



Buildings Alive REF Building Performance Tracker - Model baseline year in grey, baseline year for study in blue



FY22 Site Energy Emissions – NGA vs Measured



4. DECARBONISATION PATHWAY

4.1 ENERGY EFFICIENCY OPTIMISATION

Overview

Most buildings are not fully optimised based on the control systems and equipment currently in place. If these systems run at their optimum every day, significant savings can be made.

Initiative

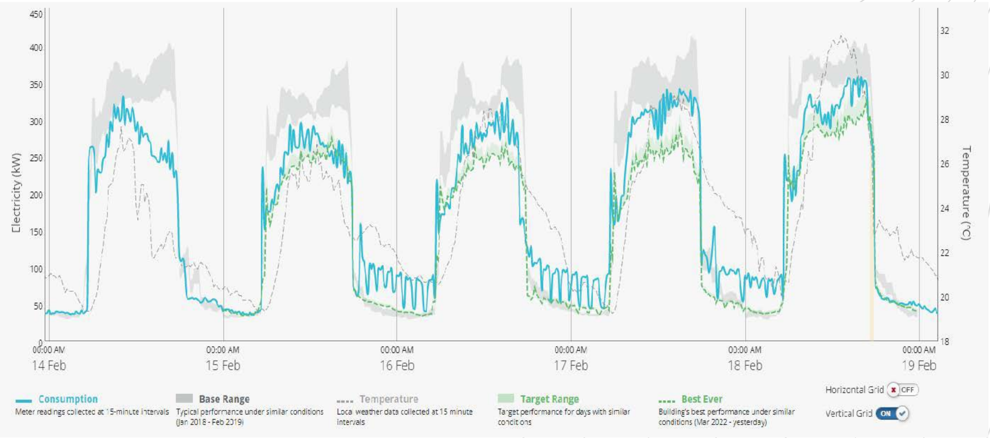
The Rapid Efficiency Feedback (REF) service provided on site by Buildings Alive provides estimated potential savings made from operating the building at its best every day and calculates a "Target" profile that the building should be striving to achieve. This feedback is utilised by the building operators to tune and optimise the existing control strategies on site.

EG continues to investigate further energy efficiency opportunities across the asset, striving to reach peak performance.

Results

Energy Savings of 10% on summer day and 19% on winter's day are possible.

This figure shows an example week for this building where potential performance ("Best Ever") is compared to actual consumption



4.1 DECARBONISATION ENERGY CONSERVATION MEASURES

Overview

The building has recently completed a large BMS and mechanical systems upgrade. As such, this review has not found any substantial Energy Conservation Measures (ECMs). That said, the ECMs described on this page can be implemented to save further energy beyond optimisation of existing systems.

With real-time carbon intensity measurement, Energy Conservation Measures (ECM) will have different decarbonisation impacts at different times.

External Lighting Lux Sensor Upgrade (FY23)

The external lighting currently controls according to schedules. Adding a lux sensor and trimming schedules will allow the lights to operate for fewer hours per year, as they will only operate when ambient light levels are low.

Electric Duct Heater Controls Optimisation (FY24)

The existing electric heaters would benefit from global lockout controls, to prevent simultaneous heating and cooling during milder conditions.

Global Zone Temperature Optimisation (FY24)

To establish a pathway for grid-interactive buildings and semiautomate seasonal tuning, a global zone temperature override feature is invaluable.

This figure shows a summary of Energy Conservations measures assessed using traditional energy / cost methods.

ECM Description	1. External lux sensor upgrade	2. Electric heater optimisation	3. Global zone temperature optimisation
Electricity Saving PA (kWh)	10,465	5,100	9,250
Energy Cost Savings PA ($)	$2,165	$1,055	$1,900
Implementation Cost ($)	$3,000	$5,000	$6,000
Simple Payback (Years)	1.4	4.7	3.2
Simple ROI (%)	72%	21%	32%
Annual Energy Savings (%)	1.0%	0.5%	0.9%

4.2 ELECTRIFICATION

In order to remove all Scope 1 emissions from site, all gas end uses need to be electrified. Fortunately, 95 North Quay does not have a gas connection. The equipment used for space heating and domestic hot water is described below.

Space heating

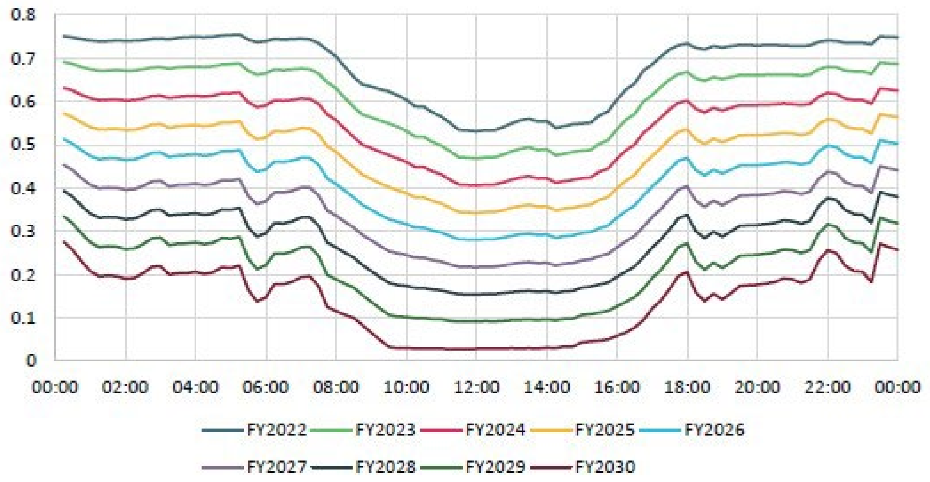
The building relies on electric resistance heating to satisfy space heating requirements in winter. Typically, this type of heating system has much lower efficiency than a modern heat pump system. High efficiency systems can deliver hot water 4 times as efficiently than a typical electric resistance heater. As a result of this, the current heating system results in higher emissions than a high efficiency gas boiler system, if powered by grid electricity at current grid carbon intensities. As the grid decarbonises, electric resistance heating will become cleaner than gas-powered heating equipment. Based on analysis conducted by the Buildings Alive R&D team, we expect this to happen in FY28 for Brisbane buildings. While electric heating will remain slightly dirtier than gas boiler for morning warm-up, the heating throughout the day will remain noticeably cleaner than a gas alternative. The graph to the right shows the predicted carbon intensity for the SE QLD grid until FY23.

Domestic hot water

Domestic hot water is provided by 50 litre electric hot water tanks on each floor. Some floors have been upgraded with shower facilities and these floors are served by 150 litre electric units. As the virtual power plant (VPP) industry develops, there may be further opportunities to upgrade these units with grid-interactive functionality. This will allow for the units to heat water when there is a surplus of renewables on the grid and further assist with grid decarbonisation.

Due to logistical limitations (domestic hot water units are in tenancy space and plant rooms have limited free space), upgrading the electric element heating systems to heat pumps is unlikely to be feasible. Further, the number of days where the building requires space heating is low, making payback on a heat pump system very long.

Predicted Grid Carbon Intensity - Winter Day (kg/kWh)



4.3 DEMAND RESPONSE LOAD FLEXIBILITY

Overview

The ability to shift building load from periods of high carbon intensity to adjacent periods of lower grid carbon intensity is key to delivering an optimised daily profile and minimising total emissions.

This will require controls optimisation based on a provided signal. Notable controls strategies which can be automated on the building-side to achieve this function have been identified here.

Initiative

Global VAV Zone Temperature SP offset

This allows multiple VAV terminal units across the buildings to have their zone temperature setpoint adjusted simultaneously to allow for the cooling / heating load to be shifted as required.

AHU Supply Fan Speed Limiting

This allows the AHU fan speed to be limited based on the demand stage of the building. The fan speed can also be dynamically reset up / down and locked control the Fan kW load during a peak event.

Chiller Demand Limiting

The chiller installed on site is a new, high-efficiency chiller equipped with control cards that are integrated with the BMS. One feature of modern chiller controls is demand limiting, where chiller current draw can be restricted to reduce peak demand.

Electric Duct Heater Limiting

This strategy allows for banks of electric duct heaters to be locked out during high carbon intensity periods, i.e. during winter mornings. By activating perimeter units only as the first stage of warm-up, demand can be shifted slightly later in the morning, when grid electricity is cleaner.

Results

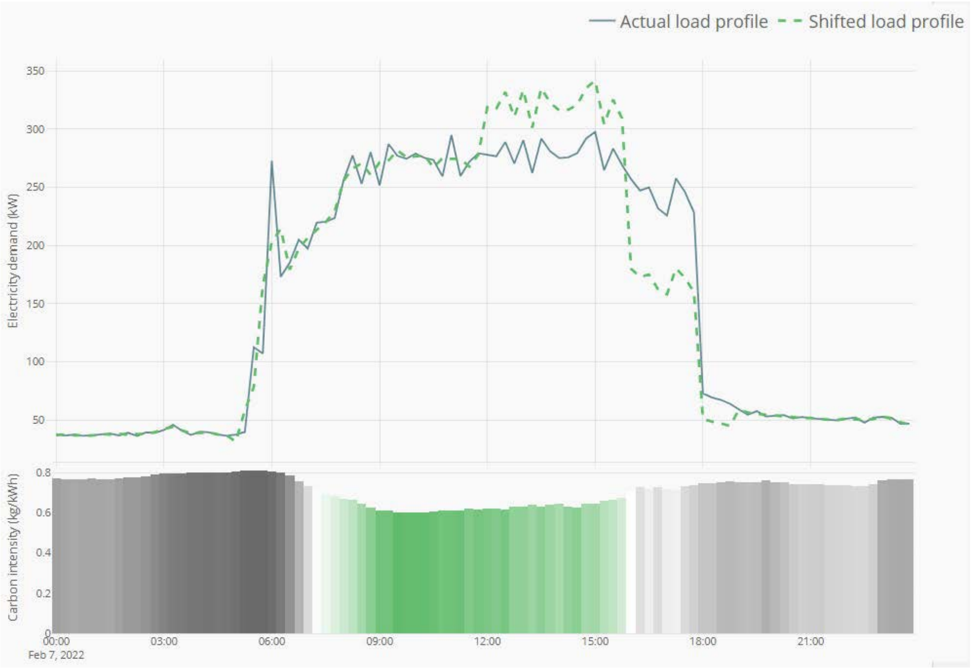
FY24: Implement control strategies to shift 30% of evening summer load utilising the aforementioned strategies. Winter load shifting should focus on delaying morning warmup peak (based on carbon / building forecasts). This could shift 30% of winter load.

4.3 DEMAND RESPONSE SUMMER EXAMPLE

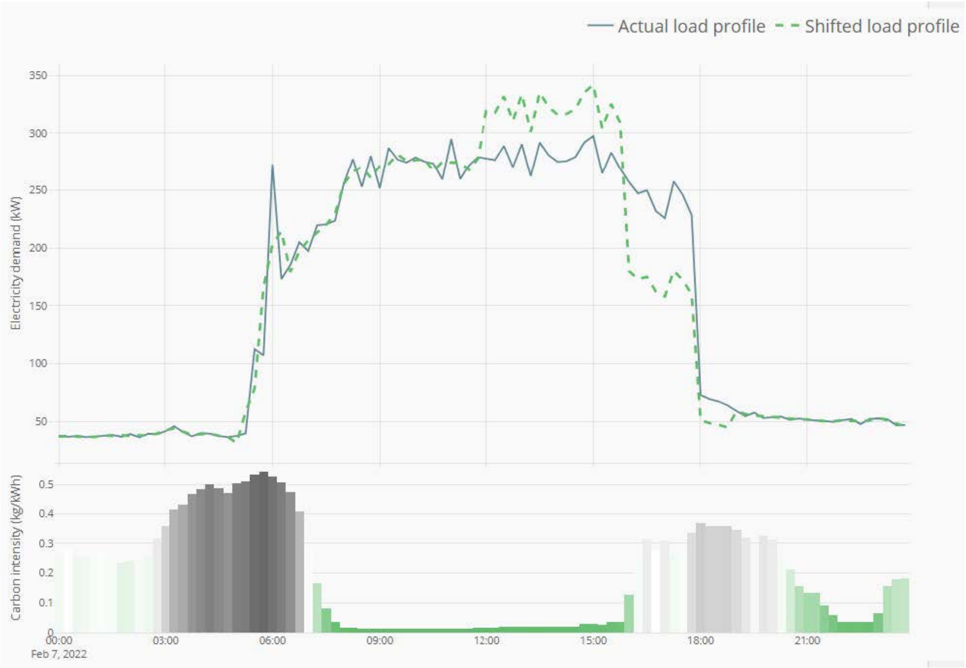
The impact of shifting load using the previously identified strategies has been simulated for 95 North Quay and emissions savings compared across current and future decarbonised grid intensity profiles.

The analysis assumes that 30% of the evening load between 4PM - 7PM is shifted to 1PM - 4PM.

Demand shifting under the existing grid carbon intensity profile results in a 0.6% daily emissions saving



Demand shifting under future decarbonised grid results in a 8.9% daily emissions savings

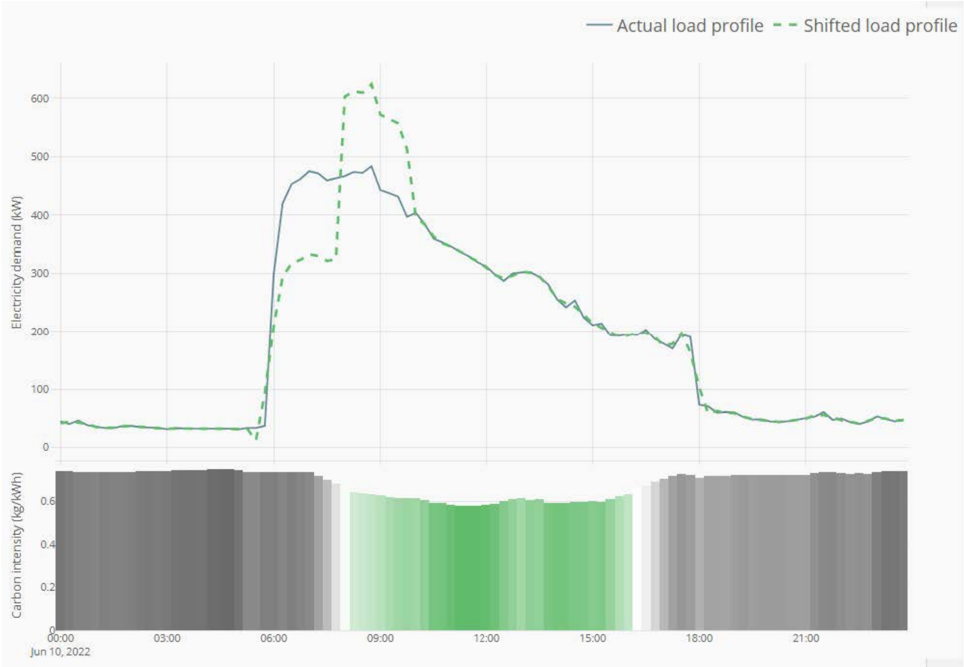


4.3 DEMAND RESPONSE WINTER EXAMPLE

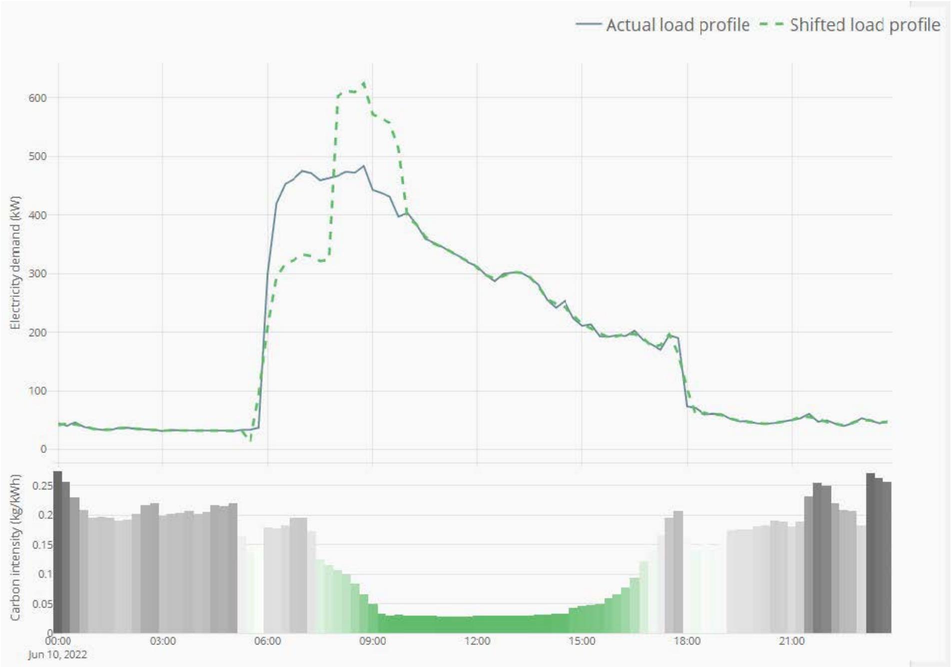
Load shifting in winter is difficult for a building that relies on electric resistance elements for heating. The impact of shifting load using a large battery has been simulated for 95 North Quay and emissions savings compared across current and future decarbonised grid intensity profiles. Negotiating wider temperature ranges on tenant leases would also allow the building to reduce the amount of heating early in the morning, when the grid is dirtier.

The analysis assumes that 30% of the evening load between 6AM - 8AM is shifted to 8AM - 10AM.

Demand shifting under the existing grid carbon intensity profile results in a 0.6% daily emissions saving



Demand shifting under future decarbonised grid results in a 6.3% daily emissions savings



4.4 ON-SITE RENEWABLE ENERGY SOLAR PV

Overview

On-site Solar PV is currently a very cost effective form of energy. It has its highest carbon impact the earlier it is implemented; as the grid decarbonises its carbon reduction benefit is lessened. Therefore, it is ideal to install it early in the decarbonisation journey.

Initiative

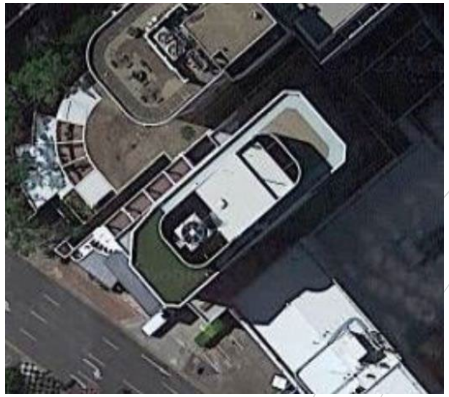
The site was assessed for potential rooftop Solar PV install.

- There is limited roof space for Solar PV at this site. While the building footprint is approximately 500sqm, there is likely less than 150sqm of roof space suitable for Solar PV. Due to the shape of the roof plant room and surrounding buildings, there would be some shading on the panels in the morning and afternoon.

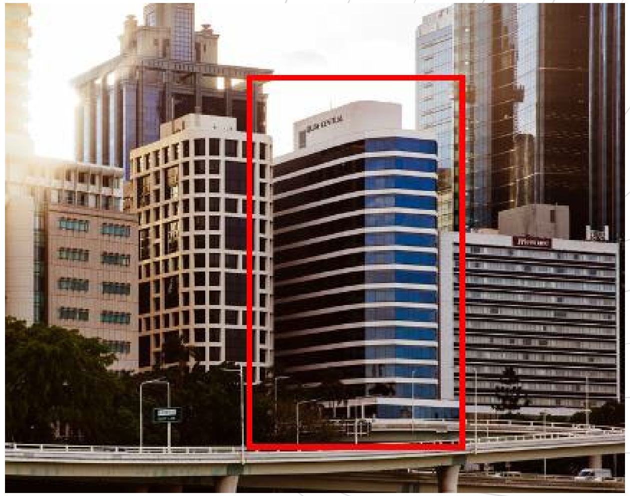
Results

- Maximum installed PV size would be 20 kW approx. which would yield 31,700 kWh or 3% of electricity consumption in the baseline year FY22.
- A detailed analysis of shading has not been conducted for this site but neighbouring buildings are expected to impact generation.

Rooftop view



95 North Quay (source: NABERS)



4.5 ON-SITE ELECTRICAL STORAGE

Overview

An basic assessment of the potential for electric storage on site was conducted. Note that the ultimate mix between site-battery I electricity procurement / EVs will be determined later in the decarbonisation process.

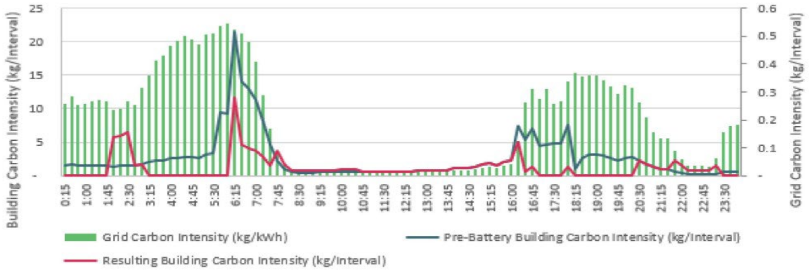
Battery Storage

- There is potential to integrate a sufficient battery system to enable greater demand flexibility include electrical peak demand reduction and load shifting for carbon optimisation.
- If a 200 kWh battery was installed, in FY30 it would likely be able to save 30-50% of the remaining emissions and would occupy approx. ¼ of a carpark space. This would be in the order of $200k at current battery prices.

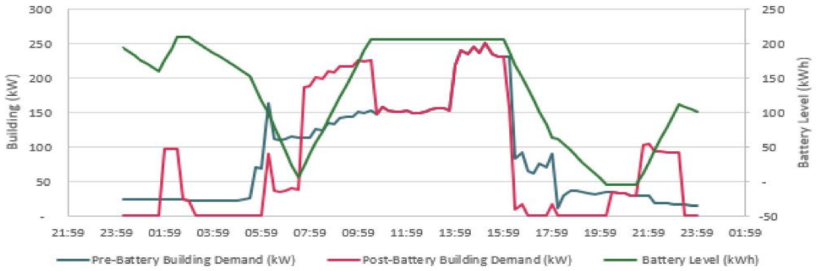
Electric Vehicles (EVs)

- Over coming years increasing amounts of EVs will be increasingly common. EVs will eventually be a potential resource to assist with decarbonisation if they are managed intelligently. Specific modelling of EV charging / discharging has not been included in this report, but eventually they may help reduce the size of onsite battery storage / off-site renewable energy procurement required.
- Consideration for charging infrastructure should be incorporated into building CapEx planning.

2030 Summer Day Battery Impact (Electrical)



2030 Summer Day Battery Impact (Carbon)



Example SOkWh battery installation

(https://www.teslaratj.com/tesla-largest-powerwallinstallatjon-goes-Hve/)

4.6 OFF-SITE RENEWABLE ENERGY

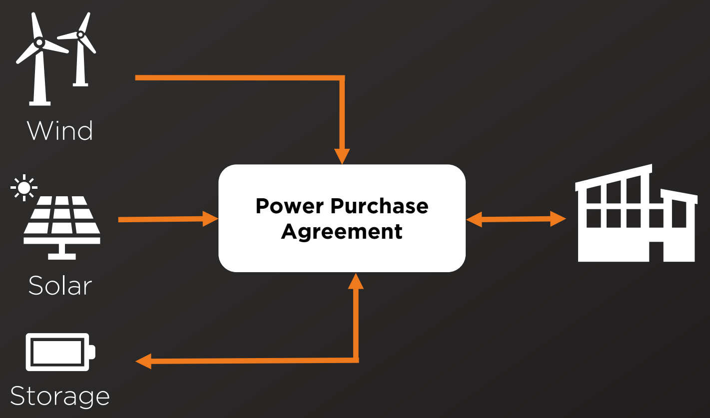
Remaining Scope 2 emissions which are not eliminated through any of the previous measures need to be removed through procurement of time-matched renewable energy.

The ultimate mix between on-site storage and timematched renewable energy procurement will be determined later in the pathway as the full impact of other decarbonisation measures are measured.

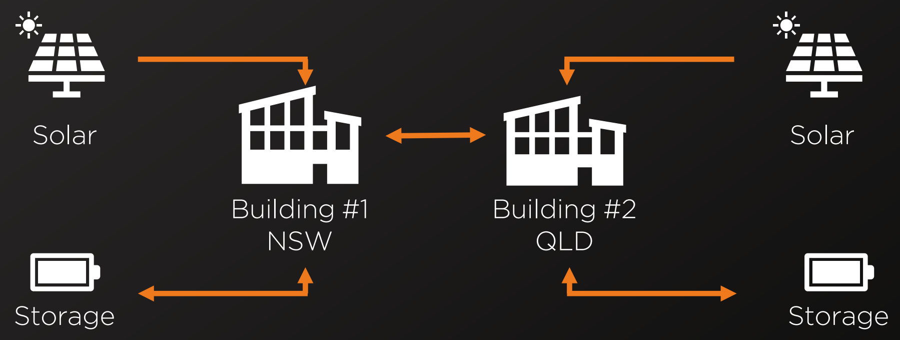
Power Purchase Agreements (PPAs) have been a common form of procuring renewable energy on a non-time matched basis. Increasingly, time-matched PPAs are available and there are new purchasing models being rapidly developed to serve this emerging market[1].

Another potential approach is to measure / share excess energy (renewables / batteries) between sites within the fund and use this to help reduce overall emissions.

Power Purchase Agreement (PPA) representation needs to be time-matched



Peer-to-peer granular energy sharing



1 https://cloud.google.com/blog/topics/sustainability/a-new-clean-energy-purchasing-model-to-drive-decarbonization

4.7 OTHER SCOPE 1 EMISSIONS

Additional emission sources considered part of Scope 1 emissions.

Refrigeration Equipment

- Minimal - a small number of packaged HVAC units supply areas such as the ground floor cafe and lift motor room.
- All other packaged HVAC units are tenant equipment and would fall under Scope 3 emissions. Most units on site have a charge of R32. This refrigerant has a GWP of 677. While much lower than R134a, this refrigerant still has a high global warming impact when it leaks from equipment.
- It is recommended that existing standalone systems are replaced with lower Global Warming Potential (GWP) alternatives as they reach end of life.

Chiller Refrigerant

- 1 x 1200kWr Smardt Powerpax chiller producing chilled water for space cooling.
- Refrigerant charges of 467 kg (R1234ze).
- R1234ze is a low GWP refrigerant, with a GWP of 7. This refrigerant can be substituted for R134a in HVAC applications, which substantially lowers the emissions impact of inevitable refrigerant leaks.

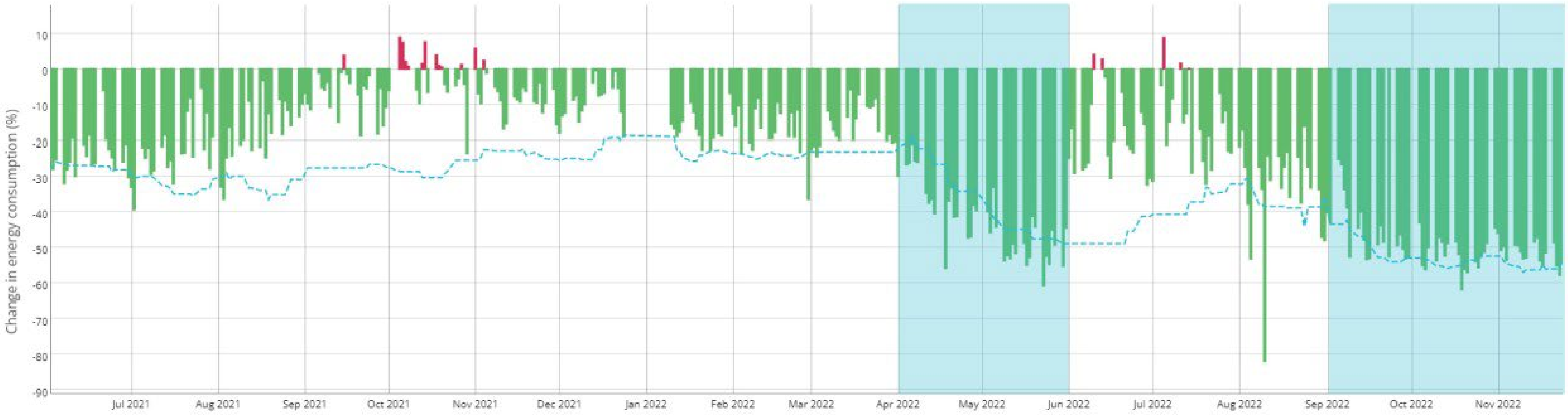
Car park packaged HVAC unit Compressors

The recently installed Smardt Powerpax chiller

5. CAPEX AND ADDITIONAL CONSIDERATIONS

In FY22, 95 North Quay undertook a significant mechanical and controls upgrade, which has drastically reduced energy consumption on site. As such, there is limited opportunity for further HVAC-related capex upgrades.

In the graph below, the savings due to the chilled water upgrade are obvious in the weather-normalised tracking results:



Due to the impressive results, the focus for the building in coming years will be to minimise electric heating in winter and to ensure the building loads are as flexible as possible.

6. CONCLUSION

EG's Real Zero Strategy is an ambitious, market leading approach to realise real zero carbon across EG's Delta Portfolio

EG is proud to have worked with industry experts Buildings Alive and Avani along this pathway, and will report on progress in EG's annual ESG Report, as well as in Delta Fund Quarterly Reports.

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