



Net Zero Carbon Statement

3 Andalusian Way, Castle Hill, 2150

Project No.	P00851
Revision	2
Issued	14 December 2023
Client	Deicorp Projects (Showground East) Pty Ltd

E-LAB Consulting

Where science and engineering inspire

Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
1	01/12/2023	Draft Issue to Project Team	MR	AK
2	14/12/2023	Including team feedback	MR	AK
3				
4				

Authorised by:

Engineering Lab Pty Ltd



Alex Kobler | Director

Sustainability



Table of Contents

1	INTRODUCTION	5
1.1	PURPOSE	5
1.2	THE PROJECT	5
1.3	SCOPE	5
2	PROJECT DESCRIPTION	6
2.1	ON AND OFF-SITE RENEWABLE ENERGY SOURCES	6
2.2	EMISSION REDUCTION MEASURES	6
2.3	ENERGY CONSUMPTION	6
3	NET ZERO CARBON STATEMENT	8
3.1	NET ZERO CARBON OVERVIEW	8
3.2	ENERGY EFFICIENT DESIGN	8
3.3	HIGH PERFORMANCE BUILDING SYSTEMS	8
3.4	RENEWABLE ENERGY SOURCES	8
3.5	ESTIMATES ENERGY CONSUMPTION	9
3.5.1	ENERGY SOURCES	9
3.6	ESTIMATED GHG EMISSIONS	9
3.6.1	SCOPE 1 EMISSIONS	10
3.6.2	SCOPE 2 EMISSIONS	10
3.6.3	SCOPE 3 EMISSIONS	11
3.7	CARBON OFFSETS	12
4	CONCLUSION	14



Abbreviations

TERM	DEFINITION
Greenhouse Gas Emissions	The release of gases, such as carbon dioxide (CO ₂), methane (CH ₄), and nitrous oxide (N ₂ O), into the atmosphere that have the potential to enhance the greenhouse effect and contribute to global warming and climate change.
Carbon Neutrality	Achieving a state in which the net emissions of carbon dioxide (CO ₂) and other greenhouse gases (GHGs) released into the atmosphere are equal to the amount removed from the atmosphere, resulting in a net-zero carbon footprint.
Emission scopes	A mechanism for classifying different sources of GHG emissions used in carbon accounting. There are three 'scopes'
Scope 1 GHG Emissions	Greenhouse gas emissions that result from sources owned or directly controlled by an organization or entity. These emissions typically include those from on-site combustion of fossil fuels, such as natural gas and diesel.
Scope 2 GHG Emissions	Greenhouse gas emissions associated with the consumption of purchased electricity, steam, or heating/cooling, but not directly owned or controlled by the organization. These emissions result from the generation of energy used by the organization.
Scope 3 GHG Emissions	Greenhouse gas emissions that occur as a result of an organization's activities but are not directly owned or controlled by the organization. These emissions encompass a wide range of indirect sources, such as supply chain, transportation, and employee commuting.
Carbon Offset	A compensatory measure in which an organization or individual invests in activities or projects that reduce or remove an equivalent amount of greenhouse gas emissions from the atmosphere to offset their own emissions, helping achieve carbon neutrality.

Executive Summary

Deicorp is dedicated to delivering a development that can operate Net Zero Carbon and minimise the Greenhouse Gas Emissions of the development. This report summarises the expected GHG-e of the development at 3 Andalusian Way, Castle Hill and highlights the design steps taken to reduce the carbon in the development.

Deicorp's dedication to reducing greenhouse gas emissions is a pivotal element of their organizational strategy. This commitment significantly shapes the strategies delineated for attaining carbon neutrality in their developments. The subsequent report offers a comprehensive overview of the strategies employed to achieve this goal specifically in the case of the Showground Precinct East.

Table 1 presents an analysis of the existing operational Scope 1 and 2 GHG emissions associated with Showground Precinct East. These calculations are based on emissions originating from the current electricity grid. Additionally, projections have been made for the year 2050, anticipating that the electricity grid will have achieved carbon neutrality by then.

Table 1 - Summary of estimated GHG Emissions

	SHOWGROUND PRECINCT EAST 2023 – GHG EMISSIONS	SHOWGROUND PRECINCT EAST 2050 – GHG EMISSIONS
GHG Emissions (KgCo2e)	2,800,000	250,000

To advance towards a zero-carbon future, an action plan has been developed for the building, aiming to achieve climate positivity by relying entirely on renewable energy while offsetting the remaining scope 1 and 2 emissions.



1 INTRODUCTION

1.1 PURPOSE

This Net Zero Carbon Statement outlines the actions to achieve Net Zero Greenhouse Gas emissions for the Showground Precinct East development and forms part of the project's Green Star Buildings submission to comply with Credit 23 – Energy Source.

The following plan aims to achieve the below objectives:

- Detail how the development will be fossil fuel-free during operational use.
- Describe energy reduction initiatives.
- Describe renewable energy generation infrastructure as part of the development.
- Estimate energy consumption of the development.
- Estimate GHG emissions for energy use of the development.

1.2 THE PROJECT

The Showground Precinct East development is located at 3 Andalusian Way, Castle Hill NSW. The development will include 3 development parcels containing several buildings ranging from 3 to 16 storeys which will house 873 apartments. Additionally, a park will be included in the development.

1.3 SCOPE

This Net Zero Carbon Statement has been created to align with the Green Star Buildings requirements, which focuses on scope 1,2 and 3 emissions. The action plan must ensure that 100% of the building's energy is sourced from renewables and all other operational greenhouse gas emissions from the building are offset.



2 PROJECT DESCRIPTION

Deicorp is developing a large residential development with a strong commitment to sustainability throughout design, construction, and operation. The development has been designed and constructed to achieve a 5 Star Green Star rating through the Green Star Buildings pathway. To reach this objective Deicorp will comply with the NSW Sustainable Buildings SEPP requirement of operating at net zero GHG emissions.

To assess the project's scope, the following elements are being assessed:

- On and off-site renewable energy sources.
- Measures for reducing emissions.
- Energy consumption
- GHG emissions

2.1 ON AND OFF-SITE RENEWABLE ENERGY SOURCES

To achieve no on-site fossil fuel consumption during the operational stage of the project all energy will be sourced from renewable sources. This includes a rooftop photovoltaic system to supply the project with on-site energy generation. To ensure 100% of the site's energy consumption is derived from renewable sources, Deicorp will enter a Purchase Power Agreement (PPA) to secure all the energy demand of the project is sourced from renewable sources.

2.2 EMISSION REDUCTION MEASURES

To minimize the building's emissions, a variety of emission reduction measures have been incorporated into the design. These measures encompass:

- A high-performance façade
- High efficiency LED lighting
- Energy meters and monitoring systems
- Efficient irrigation systems
- Natural ventilation

2.3 ENERGY CONSUMPTION

The only path to a low carbon economy and achieving a "2°C world", where the average global temperature is kept to less than 2°C above pre-industrial levels, is through comprehensive and complete consideration of how the development consumes resources, including energy, water, and material efficiency.

The energy efficiency strategy generally follows the energy efficiency pyramid of design in Figure 2. In the first instance demand for greenhouse gases should be reduced. Consideration should be to remove the need for energy to be consumed where possible. Beyond this, energy can be more efficient, through efficient lighting, mechanical systems, and appropriate services.

Once the system has reduced all available energy-consuming elements and made the remaining systems as efficient as possible, renewable energy sources will be considered. PV will be installed at a rate that maximises the coverage of the non-trafficable roof area provided this does not interfere with the reflectivity in relation to the Sydney Airport. Only after all the above steps have been completed should offsets be used to close the gap and achieve neutrality.



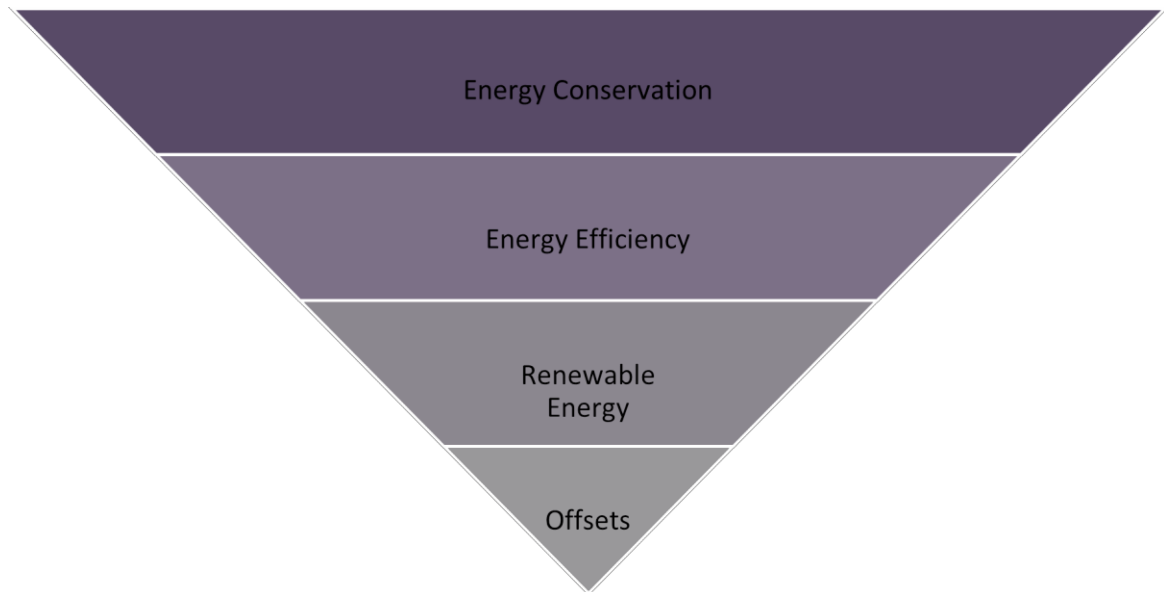
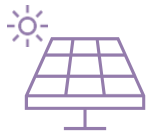


Figure 2. Energy efficiency pyramid: pathway to carbon neutrality.

To achieve the above, the following initiatives are proposed:



Renewable Energy – The roof area provides an excellent opportunity for installation of a solar photovoltaic system. The sizeable system will generate renewable electricity to offset grid use and minimise stress on the grid at peak times. PV will be installed at a rate that maximises the coverage of the non-trafficable roof area. This will achieve approximately 90 kW PV system across the buildings. The development will also potentially look into providing onsite battery storage to further reduce reliance on the grid. This will allow the site to store generated energy throughout the day.



Efficient Lighting Systems – High efficiency LED lighting throughout, including in common areas with efficiency controls to meet the requirements of NCC 2022 Section J. Controls will include motion sensors, time clocks and zoned switching.



Controls, Energy Metering and Monitoring – Energy meters and monitoring systems will be provided to comply with NCC 2022 Section J Part J8 requirements. Preference for natural ventilation and comfort through adaptive cooling and shading.



Facade – high performance façade systems and shading systems will reduce load on the HVAC system.

3 NET ZERO CARBON STATEMENT

3.1 NET ZERO CARBON OVERVIEW

Deicorp is dedicated to developing Showground Precinct East as net zero carbon for the entirety of the developments operational use. To reach this goal Deicorp will employ the following strategies.

- Energy efficient design
- High performance building systems
- 100% procurement of electricity from renewable sources

3.2 ENERGY EFFICIENT DESIGN

The development will be employing passive design features to create energy-efficient buildings, while reducing dependence on the electrical grid.

Integrating passive design features into the developments design, we can reduce reliance on the building's mechanical systems by accessing the natural resources available. The development will be utilising a high-performance façade and shading systems to reduce the load on the HVAC system. This façade will use the strategically placed eaves, awnings and landscaping to reduce this load. Additionally, cross ventilation and high-quality insulation will contribute to the reduction of the heat gain and loss of the buildings.

3.3 HIGH PERFORMANCE BUILDING SYSTEMS

Throughout the development high-performing building systems will be installed to reduce demand to the electrical grid. These systems include:

- High efficiency LED lighting throughout, including in common areas with efficiency controls to meet the requirements of NCC 2022 Section J. Controls will include motion sensors, time clocks and zoned switching.
- Energy meters and monitoring systems will be provided to comply with NCC 2022 Section J Part J8 requirements. Preference for natural ventilation and comfort through adaptive cooling and shading.
- Efficient irrigation systems will be considered, including underground surface drip systems, moisture sensors, and the use of native plants in the landscaping plan. Native plants have evolved to thrive in the Australian environment and are typically more resilient than their exotic counterparts. They typically require less water and are more likely to survive the predicted increase in extreme drought conditions due to climate change. Native vegetation also stores a significant amount of carbon, helping to mitigate climate change. The project is targeting an 80% native planting palette.
- The development will supply most of the irrigation needs from a minimum 50kL on-site rainwater tank. Rainwater will be captured from the roof of the buildings to reduce potable water demand and consumed in the park.

3.4 RENEWABLE ENERGY SOURCES

The roof area provides an excellent opportunity for installation of a solar photovoltaic system. The sizeable system will generate renewable electricity to offset grid use and minimise stress on the grid at peak times. The system will be sized to meet a minimum 5% of total predicted energy demand in operation. PV will be installed at a rate that maximises the coverage of the non-trafficable roof area. This will achieve approximately 90 kW PV system across the buildings.



In order to ensure that 100% of the site's energy consumption is derived from renewable sources, off-site renewable electricity will need to be obtained through the energy market. Deicorp will enter a PPA to supplement on-site generation to meet the project's energy demand.

3.5 ESTIMATES ENERGY CONSUMPTION

The estimated annual total energy consumption of the development is summarised in the table below.

Table 2, Estimated Annual Energy Consumption

	ELECTRICITY (KWH)
ESTIMATED FOSSIL FUEL CONSUMPTION	0
ESTIMATED ELECTRICITY CONSUMPTION	2,980,000
TOTAL ESTIMATED ENERGY CONSUMPTION (kWh/yr/m2)	2,980,000

3.5.1 ENERGY SOURCES

The development will be fossil fuel-free and will source all energy from renewable sources. Additionally, no gas will be included in the development.

Electricity consumption has been validated and estimated using the BASIX Calculation engine. This includes up-to-date and verified estimates of the actual energy consumption predicted to be used for the development.

Diesel has been predicted assuming minimal backup electricity power requirements for testing only.

Refrigerants have been estimated, using an estimated charge per apartment, and assuming a 2% loss factor each year. The working refrigerant is R410A.

3.6 ESTIMATED GHG EMISSIONS

The following table summarise the total GHG Emissions for the Showground Precinct East development based on the predicted energy consumption.

Table 3 - Total Greenhouse Gas Emissions breakdown for 2023.

SCOPE	EMISSION SOURCE	GHG EMISSION (KG CO2E)	GHG EMISSIONS %
1	Gas consumption	0	0%
	Diesel	2,680	0%
	Refrigerants	182,000	6%
2	Electricity Consumption	2,507,000	89%
3	All other sources*	135,000	5%
1,2 & 3	TOTAL	2,826,680	100%

*Scope 3 emissions has been estimated at 5% the total of Scope 1 & 2 emissions for this building.



3.6.1 SCOPE 1 EMISSIONS

Deicorp is committed to the electrification of the development and will not include any gas within the project.

The diesel consumption is restricted to the backup generators for emergency situations or power outages. Routine usage of the generator is confined to scheduled testing and maintenance. This estimation has been made conservatively, aligning with the principles of the NABERS energy rating tool.

Table 4 - Estimated Diesel consumption and GHG Emissions

EMISSION SOURCE	DIESEL CONSUMPTION (L)	GHG EMISSION FACTOR (KGC02E/L)	EMISSIONS (KGC02E)
DIESEL CONSUMPTION	1,000	2.68	2,680

The table below provides an overview of the total refrigerants related to the building's services and the associated annual emissions.

Table 5 - Annual Refrigerant GHG Emissions

REFRIGERANT	GWP (KGC02E/KG)	TOTAL CHARGE (KG)	EMISSIONS (KGC02E)
R-410A	2088	4,365	182,000

*Assuming a 2% leakage factor

3.6.2 SCOPE 2 EMISSIONS

The development's annual electrical consumption and the associated carbon emissions are summarised in the table below.

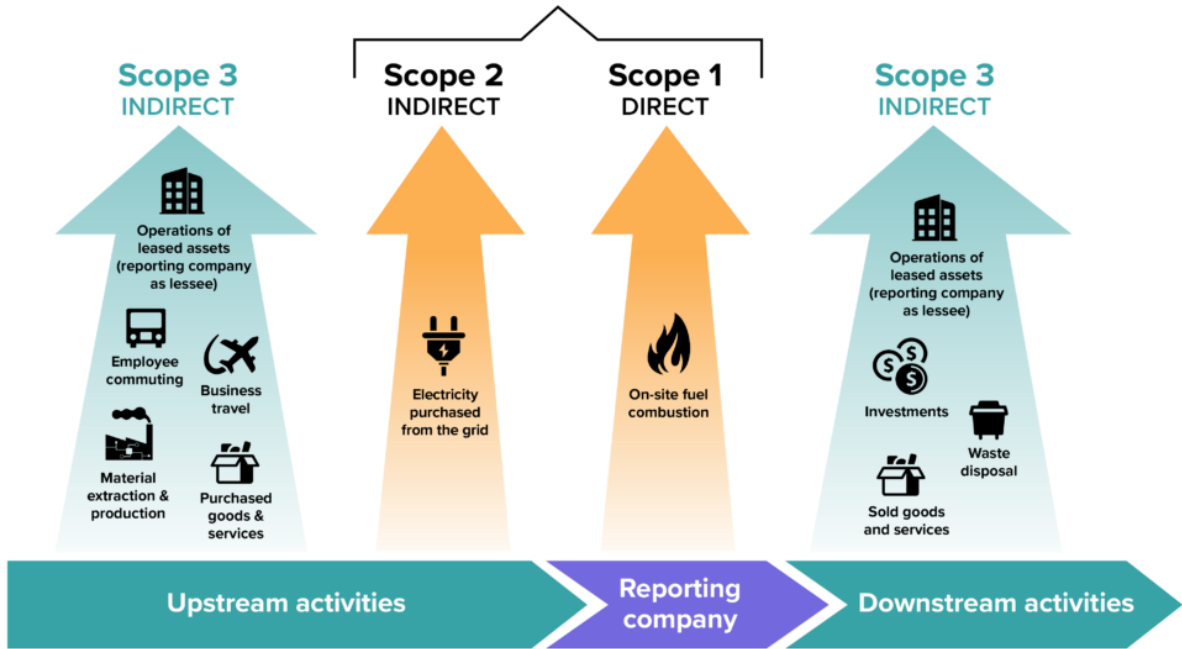
Table 6 - Electricity consumption and GHG Emissions

EMISSION SOURCE	ELECTRICITY CONSUMPTION (KWH)	GHG EMISSION FACTOR (CO2E / KWH)	EMISSIONS (KGC02E)
ELECTRICITY CONSUMPTION	2,980,000	0.84	2,507,000



3.6.3 SCOPE 3 EMISSIONS

Scope 3 emissions are all indirect emissions within the supply chain of offering Mainbrace as a business that are not fully under your control. This includes *upstream* activities such as energy in goods and services consumed and employee travel and *downstream* activities such as waste, investments and actions that occur from what Mainbrace produce.



This area of carbon emissions is the hardest to track as it requires a full assessment of the supply chain. It is typical to not assess the entire process, but only the elements that make up say 95% of the total. The remaining elements that make up the resulting 5% are not a focus as they are a small part of the total.

Typically, Scope 3 emissions are made up of the following:

UPSTREAM SCOPE 3	DOWNSTREAM SCOPE 3
Category 1: Purchased goods and services	Category 9: Downstream transportation and distribution
Category 2: Capital goods	Category 10: Processing of sold products
Category 3: Fuel- and energy-related activities (not included in scope 1 or scope 2)	Category 11: Use of sold products
Category 4: Upstream transportation and distribution	Category 12: End-of-life treatment of sold products
Category 5: Waste generated in operations	Category 13: Downstream leased assets
Category 6: Business travel	Category 14: Franchises
Category 7: Employee commuting	Category 15: Investments

3.7 CARBON OFFSETS

All carbon emissions accumulated from the development will be offset to maintain net zero status. All climate active carbon neutral works will be applicable to the operation of a building. The following steps are proposed to achieve Carbon Neutral Certification for the development:

Step 0: Enter into a Carbon Neutral Licence Agreement.

Step 1: Establish Baseline by Calculating Emissions

Step 2: Develop and Implement an Emissions Reduction Strategy

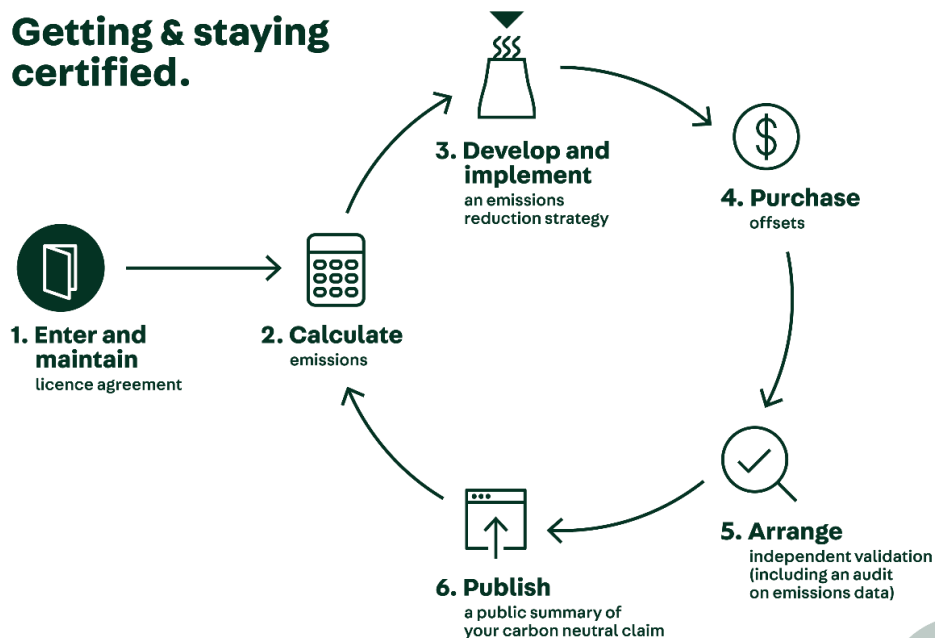
Step 3: Reduce Emissions

Step 4: Offset Emissions

Step 5: Audit

Step 6: Certification

Getting & staying certified.



Net Zero. Source: climateactive.org.au

The following are initiatives Deicorp may employ to reduce Scope 3 emissions. The final strategy will be developed with Deicorp to allow business certainty and continuance.

- Include Supplier form to request any or all information they have on Scope 3 emissions for their products.
- Explore opportunities in the supply chain to use less carbon-intensive technologies and solutions.
- Explore internal company reductions in Scope 3 that Deicorp can influence. This includes:
 - FSC Paper for all printing
 - Extending life of AV/IT equipment where possible
 - In-office on-site waste separation and diversion
 - Carbon Neutral consumables
- Consider methods to improve emissions associated with employee commuting.
- Continued development of “Skip the Bin” to assist in end of life treatment of sold products.
- Improved upstream transportation i.e. zero carbon shipping/freight



4 CONCLUSION

Deicorp's dedication to reducing greenhouse gas emissions is a pivotal element of their organizational strategy. This commitment significantly shapes the strategies delineated for attaining carbon neutrality in their developments. The subsequent report offers a comprehensive overview of the strategies employed to achieve this goal specifically in the case of Showground Precinct East.

Table 1 presents an analysis of the existing operational Scope 1 and 2 GHG emissions associated with Showground Precinct East. These calculations are based on emissions originating from the current electricity grid. Additionally, projections have been made for the year 2050, anticipating that the electricity grid will have achieved carbon neutrality by then.

Table 7 - Summary of estimated GHG Emissions

	SHOWGROUND PRECINCT EAST 2023 – GHG EMISSIONS	SHOWGROUND PRECINCT EAST 2050 – GHG EMISSIONS
GHG Emissions (KgCo2e)	2,800,000	250,000

To advance towards a zero-carbon future, an action plan has been developed for the building, aiming to achieve climate positivity by relying entirely on renewable energy while offsetting the remaining scope 1 and 2 emissions.

This report is intended solely to offer an approximate assessment of this development's performance concerning greenhouse gas emissions, as per the Green Star criteria. To this end, certain assumptions have been made regarding the development's energy consumption, which may not precisely mirror the building's actual consumption. Numerous factors linked to the building's tenancy, such as the loads from process equipment, occupancy rates, and operational schedules, will influence the building's energy consumption and the emissions associated with it. Consequently, any information concerning this development's specific energy usage and greenhouse gas emissions is unlikely to precisely represent the building's real-world performance.

Instead, this report serves as a guideline for understanding the magnitude of emissions and the necessary steps required for the building to attain a state of zero operational carbon emissions.



