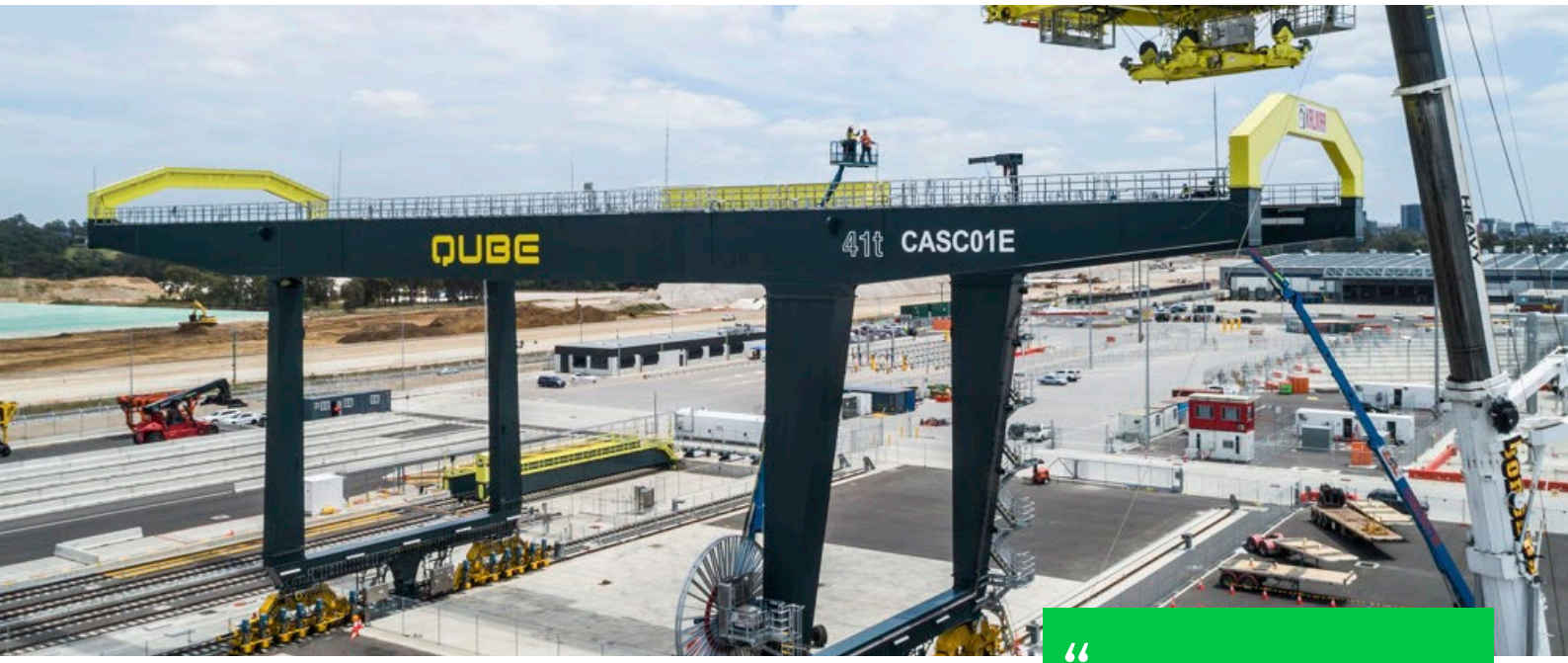
Australian Government

# Clean energy and greener infrastructure

**How can clean energy technologies deliver lower emissions and improved energy efficiency for Australia's freight and logistics infrastructure?**

MOOREBANK LOGISTICS PARK




## Infrastructure and emissions

An estimated 70 per cent of Australia's emissions are associated with infrastructure assets.[1]

Analysis from ClimateWorks Australia found that the construction and operation of physical infrastructure assets for transport, energy, water, waste and communications directly contribute to 15 per cent of Australia's annual emissions.

Once operational, these assets contribute to an additional 55 per cent of annual emissions through the activities they enable. Infrastructure assets are often long lived and provide critical services for modern societies. These assets offer significant potential for emissions abatement.

1 ISCA, ClimateWorks Australia and ASBEC "Reshaping Infrastructure for a net zero emissions future," March 2020.

## The investment

Moorebank Logistics Park (MLP) is a nationally significant infrastructure development that is set to transform the way containerised freight moves through Port Botany in Sydney, while delivering a significant reduction in carbon emissions.

The MLP development will support the increased use of rail in place of road freight, the introduction of on-site automation and significant use of renewable energy.

The **CEFC** invested $150 million in the MLP project in its first investment in clean energy transport infrastructure. With infrastructure owners facing new challenges in the way they manage the energy profile of their assets, the CEFC finance is supporting best practice and market leading design, construction and operations.

Leading infrastructure and supply chain and logistics company **Qube** owns and operates the MLP. Qube is Australia's largest integrated provider of import and export logistics services with a market capitalisation in excess of $5 billion.

Global design and consultancy agency **Arcadis** works with infrastructure owners and operators to deliver sustainable outcomes throughout the asset lifecycle. Arcadis worked with the CEFC and Qube to embed a holistic approach to emissions reduction across the MLP development.

> "Infrastructure is considered a challenging sector to decarbonise, yet this project shows that it also offers great potential. Qube tapped into that potential to find many creative ways to lower its carbon emissions."
>
> **Ian Learmonth**
> CEO, CEFC

## Australia's largest freight infrastructure project

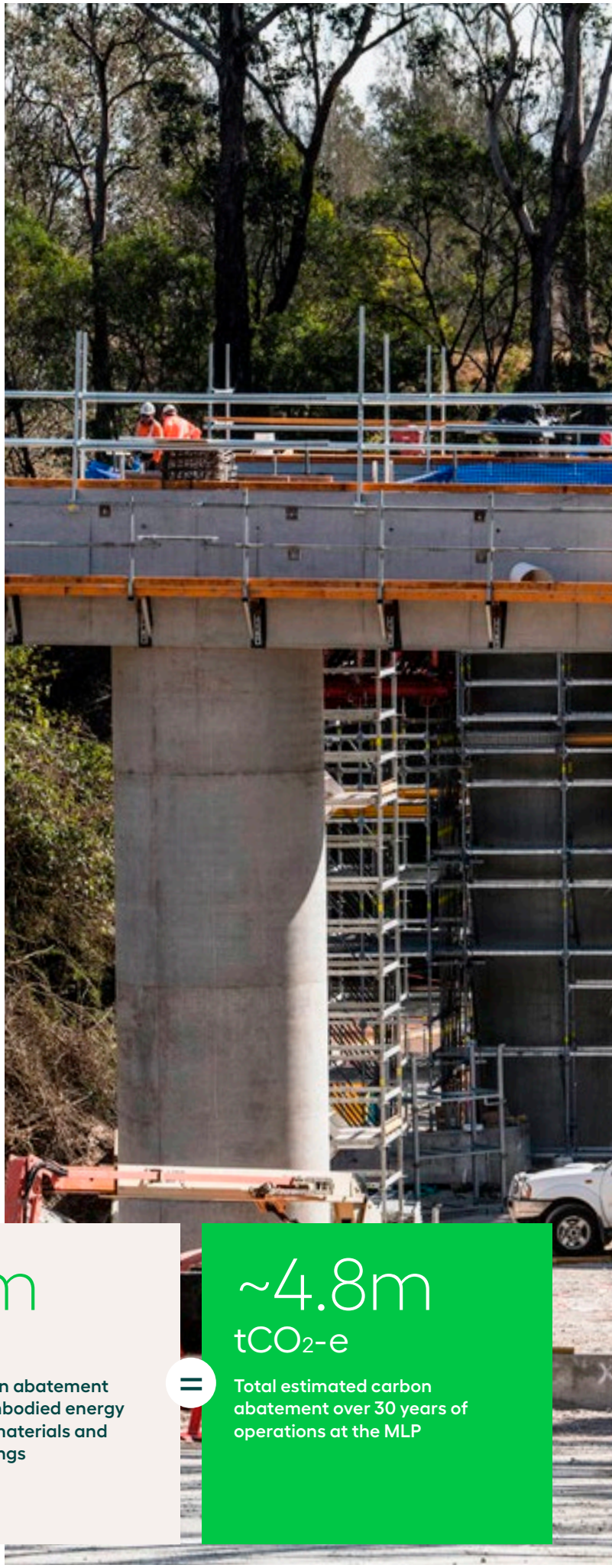
The MLP is the largest freight infrastructure project in Australia. The 243 hectare site, located in south western Sydney, is aiming to be a benchmark in environmentally sustainable design practices across every aspect of the development, from precinct wide initiatives to tenant led activity.

When complete, the MLP will have an IMEX (import and export) rail terminal, an interstate rail terminal, up to 850,000 square metres of high specification warehousing, auxiliary services and hospitality offerings.

The MLP will link Port Botany directly to rail terminals and warehousing facilities. It will be able to transport up to 1.05 million 20-foot equivalent units (TEUs) of import-export freight each year. A further 0.5 million TEU of interstate freight will also be supported.

The site, which is approximately the same size as Sydney's CBD, is large enough to handle interstate freight trains, which can be up to 1.8 kilometres long.

When fully developed, the MLP is expected to deliver more than $11 billion in economic benefits over 30 years through improved productivity and reduced business costs. Qube estimates the MLP development will create some 6,800 jobs.



### The MLP estimated emissions savings over 30 years

**>3.25m $tCO_2$-e**

**Estimated carbon abatement through switching from road to containerised rail freight**

+

**~1.5m $tCO_2$-e**

**Estimated carbon abatement from avoided embodied energy in construction materials and operational savings**

=

**~4.8m $tCO_2$-e**

**Total estimated carbon abatement over 30 years of operations at the MLP**



# Achieving a lifetime of emissions savings

## Arcadis carbon management hierarchy

Arcadis provided a comprehensive sustainability plan for the MLP aimed at driving the precinct forward over the coming decades, while minimising effects on the surrounding environment.

Arcadis adopted the principles of a carbon management hierarchy when designing each element of the MLP.

The Arcadis hierarchy ranks emissions avoidance as the most preferable option for carbon management. This is followed by reducing energy use. Once a lower demand for energy has been achieved, switching to a renewable energy source is the next preference, ahead of sequestering carbon and offsetting emissions through purchasing approved carbon credits.

Forecast emissions reduction calculations for the MLP were based on plans for the entire precinct, including the IMEX rail terminals and 850,000 square metres of warehousing.

Arcadis expects a total of 4.8 million $tCO_2$-e to be abated over 30 years of operations at the MLP. This abatement includes transportation savings, site operations and avoided embodied energy in construction materials.

## An 'excellent' initiative

The Infrastructure Sustainability Council of Australia (ISCA) awarded Stage 1 of the MLP an "Excellent" Infrastructure Sustainability (IS) rating for Design.

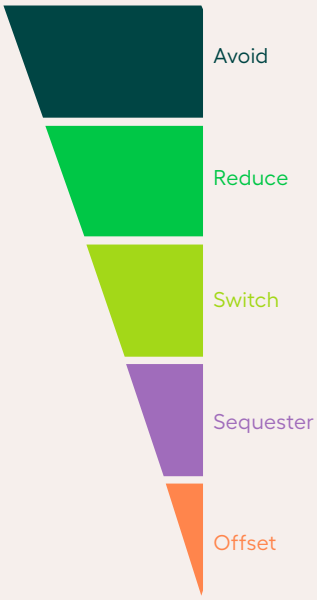
The IS Rating Scheme is Australia and New Zealand's only comprehensive rating system for evaluating sustainability across infrastructure programs, projects, networks and assets.

A design rating is based on the inclusion of design elements and construction requirements for sustainability in project documentation. It will be replaced with an As Built rating after construction.

ISCA recognised the innovative practices implemented at the MLP as being world first, in relation to the high degree of automation incorporated.

Additional credit was given to the MLP for its innovative approach to managing urban heat island effects, which ISCA classified as being a national first for Australia.

### Arcadis carbon management hierarchy



## Designing for low emissions operations

Stage 1 of the MLP includes the manual phase of the IMEX rail terminal, container processing areas and rail links from the MLP to the existing Southern Sydney Freight line.

Stage 1 has been designed to produce operational efficiencies onsite that result in a 77 per cent reduction in scope 1 and 2 emissions when compared with a business-as-usual freight delivery scenario. Scope 1 and 2 emissions are released to the atmosphere as a direct result of an activity, or series of activities at a facility level.

Arcadis estimates that efficient warehouse designs have achieved a 70 per cent reduction in energy demand, and the use of solar energy generated onsite will further reduce the need for electricity and gas sourced from fossil fuels.

## Innovation meets sustainability

The Moorebank Logistics Park boasts a range of innovative technology and emissions reduction initiatives which may be suitable for other infrastructure projects in the future.

| Innovative technologies | Design features | Outcomes |
|---|---|---|
| **World's first fully automated intermodal terminal for containerised freight** | State-of-the-art machinery including automated stacking cranes, rail mounted gantry cranes, a fleet of low emission hybrid auto shuttles and computer software to handle all containerised freight on the site. | The use of automation reduces energy use and greenhouse gas emissions, enhances safety and minimises environmental impacts. It also results in improved productivity and economic output. |
| **Urban Heat Island reduction** | The design of the MLP has incorporated features to help keep temperatures down. These features include landscaping and green spaces, roofing and building materials that minimise solar absorption, large awnings over loading docks and bioretention structures such as rain gardens that collect and treat stormwater runoff. | Arcadis is expecting to achieve a four degree Celsius reduction in temperature across the project site compared to neighbouring industrial developments. |
| **Onsite crusher** | The crusher is used to turn the concrete from existing redundant buildings located on the site into a new road base. | Arcadis estimates the use of recycled materials helped reduce the embodied energy for Stage 1 of the MLP by more than 39 per cent and abated 38,590 $tCO_2$-e. Approximately 130,000 tonnes of concrete has been recycled during Stage 1. Fill material was also sourced from Australia's largest road infrastructure project, the 33 kilometre WestConnex motorway network. Compared with importing new concrete for the site, using recycled concrete saved an average of $10 a tonne for total Stage 1 savings of approximately $1.3 million. |
| **Solar and embedded networks** | The solar PV installed onsite will feed into an embedded power network. | The embedded networks will enable businesses within the MLP to access renewable energy generated onsite, to potentially reduce their own power costs. |
| **Sustainability data capture** | An online tool is being used to capture sustainability performance data including electricity, fuel use and materials used. | Contractors have uploaded their energy and materials data to the sustainability online data capture tool during Stage 1 construction. The data capture tool has helped identify opportunities to improve sustainability during construction. Qube is planning to use the tool to monitor future construction at the MLP. |

## Proven technologies deliver long term energy savings

Readily available energy efficient and renewable energy technologies are being used across the MLP to achieve long term energy savings and emissions reductions. These include:

### Renewable energy

- A minimum of 12 MW of solar generation capacity, which will be capable of producing approximately 16,000 MWh of power each year
- The solar generation is expected to cover more than 70 per cent of the site's energy requirements

### Building elements

- Passive design techniques such as building orientation, layout design, thermal massing and facade design
- Material selection focused on reducing environmental impact and providing a healthy interior environment
- High performance double glazing to all facades
- Efficient heating, ventilation and air conditioning equipment
- High efficiency and intelligent lighting and control systems
- Extensive energy sub-metering and monitoring system
- Commissioning and tuning of building services

### Onsite transportation

- Use of electric machinery where possible, instead of diesel or LPG
- Electric cranes that recharge their own batteries
- Electric forklifts that can be repurposed as mobile batteries when needed
- Horizontal electric shuttles used within the precinct

### Waste reduction

- Comprehensive environmental and waste management practices during construction
- A dedicated central waste recycling area to facilitate recycling during operation

## Switching to rail to cut emissions

When operating at scale, the MLP will switch the movement of 1.55 million freight containers from road to rail each year.

Transporting the containers by rail, will replace an estimated 3,000 truck journeys on Sydney's road network each day and reduce the number of freight trucks making regular Sydney-Brisbane and Sydney-Melbourne trips. This switch is expected to reduce emissions by more than 110,000 $tCO_2$-e annually. Over 30 years, abatement is estimated at more than 3.25 million $tCO_2$-e.

Switching from road to using a dedicated rail link eliminates delays through road congestion and vehicle booking system scheduling. This can improve productivity by dramatically reducing the time it takes to move a container between Port Botany and MLP warehousing.



## Leading businesses sign in

Well-known Australian businesses, including Target Australia, Caesarstone and ATS Timber Supplies – are already using some of the state-of-the-art MLP warehouse facilities, reflecting the attractiveness of the landmark energy efficient, low emissions development.

| Moorebank Precinct East: MPE | Moorebank Precinct West: MPW | IMEX Rail Terminal |
|---|---|---|
| **Warehouses 1, 3a and 3b, 4a and 4b:** 76,435 square metre facilities completed and operational | **Woolworths Group 75,300 square metre facilities for national and regional distribution centres:** site preparation underway | The manual operation mode is completed; trains operating; truck grids completed |
| **Warehouses 5a and 5b:** 61,720 square metre facilities complete | | Works underway on the first cantilevered automated stacking crane and automated straddle carrier |
| **Warehouses 6, 7, and 8:** remediation and site preparation work underway for 104,250 square metre facilities | | |

At 30 September 2020

# Investing in better infrastructure with lower emissions

The CEFC is investing across the infrastructure sector to positively influence emissions reduction standards in social and economic assets, as well as transport and electricity assets. CEFC finance is backing best practice approaches to deliver market leading design, construction and operations.

Whether improvements are made to existing asset operations, or efficiencies are implemented at design and construction stages of new infrastructure projects, these investments offer significant potential for long term emissions abatement.

## CEFC finance in action

### IFM Australian Infrastructure Fund

The CEFC is working with IFM Investors to establish and meet new targets for energy and carbon emissions reduction across assets in the IFM Australian Infrastructure Fund. Our $150 million investment is supporting a comprehensive program of measures to cut the carbon footprint of both current and future Fund assets. Seven major infrastructure assets – Ausgrid, Melbourne Airport, Brisbane Airport, Port of Brisbane, NSW Ports Northern Territory Airports and Southern Cross Station – have set individual emissions reduction targets and are implementing pathways to achieving those targets. The programs and tools developed to assess these assets will be applied across the IFM Investors global infrastructure portfolio

### Macquarie Infrastructure and Real Assets

We are helping Macquarie Infrastructure and Real Assets (MIRA) pursue global best practice measures to drive positive change across its Australian infrastructure assets. The $100 million CEFC investment will support MIRA to focus on global best practice in decarbonisation strategies for its Australian assets in sectors including airports, electricity, ports, rail and water.

### Morrison & Co Growth Infrastructure Fund

The Morrison & Co Growth Infrastructure Fund (MGIF) is focusing on acquiring and developing a diverse range of essential social and economic infrastructure assets, concentrating on decarbonisation as a key investment strategy. Investments to date include multi-utility business Flow Systems and sustainable agriculture producer Sundrop Farms, which uses solar thermal technology to desalinate seawater for irrigation and to heat and cool its greenhouses. The CEFC has a $150 million investment in MGIF.

## About the CEFC

The CEFC has a unique role to increase investment in Australia's transition to lower emissions. With the backing of the Australian Government, we invest to lead the market, operating with commercial rigour to address some of Australia's toughest emissions challenges – in agriculture, energy generation and storage, infrastructure, property, transport and waste. We're also proud to back Australia's cleantech entrepreneurs through the Clean Energy Innovation Fund, and invest in the development of Australia's hydrogen potential through the Advancing Hydrogen Fund. With $10 billion to invest on behalf of the Australian Government, we work to deliver a positive return for taxpayers across our portfolio.

**cefc.com.au**