

SEMINAR 16

ESD Architecture: A Comprehensive Evaluation of 30 The Bond, Lend Lease Headquarters at Hickson Road, and Workplace 6 at Darling Island, Sydney

Borg, Luke – Carbone, Nicolas – Fitzgerald, Cian - Gonzalez, Alfredo
Jerome, Joseph – Lie, Monika – Neilson, Warren



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1. INTRODUCTION

HYPOTHESIS

“Workplace 6 would not exist without 30 The Bond”



1. INTRODUCTION

What is ESD

?

Ecologically Sustainable Development

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987).



2. RATING SCHEMES

NABERS

(National Australian
Built Environment Rating System)

“A performance-based rating system for existing buildings (formerly AGBR). That rates a building on the basis of its measured operational impacts on the environment” (NABERS, 2010)

- Energy
- Water
- Indoor Environment
- Waste

GREEN STAR

“Environmental rating system that evaluates the environmental design and construction of buildings” (GBCA, 2010)

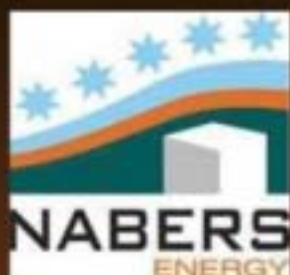
- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use & Ecology
- Emissions
- Innovation



Result
S

2. RATING SCHEMES

- 60 Points (Green Star)
- First in Australia to achieve 5 star Green Star - Office As Built Certified Rating,
- Also achieved 5 Star Green Star - Office Design Certified Rating
- First to achieve 5 Star AGBR rating NABERS



- 83 Points (Green Star)
- First in NSW to achieved 6 star Green Star - Office As Built Certified Rating
- Was the first to achieve The 6 Star Green Star – Design Certified Rating
- Targeting 5 star NABERS

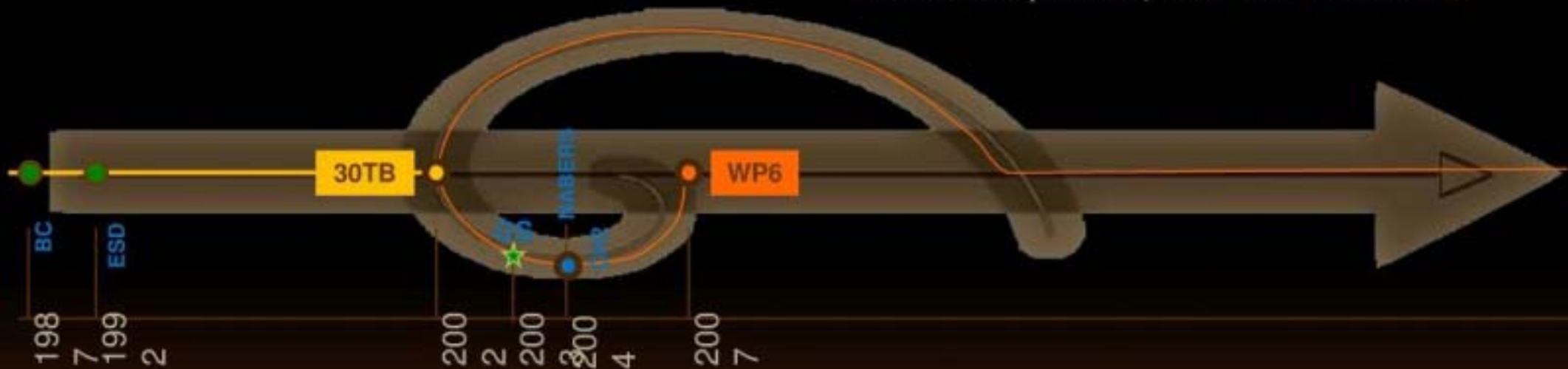


Building Owner	Dexus Property Group
Developer	Lend Lease Development
Architect	Lend Lease Design
Engineers	Lincolne Scott, Arup, Cundall
Builder	Bovis Lend Lease
Construction Costs	\$112 Million
Floor Area	Approx. 38,000 m ²
Rate per m ²	\$2,947.00
Composition	9 office levels, 1 ground retail level and 2 basement levels for car parking

Building Owner	GPT Group
Developer	Citta Property Group
Architect	Nettleton Tribe
Engineers	Taylor Lauder Bersten, Waterman AHW
Builder	Buildcorp
Construction Costs	\$53 Million
Floor Area	Approx. 18,000 m ²
Rate per m ²	\$2,945.00
Composition	5 office levels, 1 ground retail level and 1 basement level for car parking

3. DRIVERS AND MOTIVATIONS

In 1992 the Commonwealth of Australia created the National Strategy for Ecologically Sustainable Development (ESD). Brundtland Report 1987, 1992 Earth summit in Rio.



- Project commenced: 2002
- No Green Star Rating System
- Ad hoc sustainability
- LLC in a down cycle

KEY FACTS

- Project commenced: 2007
- Green Star & Nabers Energy Rating Systems in place
- Well developed CSR and Sustainability framework in GPT.

3. DRIVERS AND MOTIVATIONS



- LEND LEASE HEADQUARTERS

- **Goal:** Revitalise the corporation
- **Tactic:** Use the building to re-focus company & staff
- **How:** Build an 'Iconic Building' that is 'User Driven' = Green Building
- **8 Task Forces** set up to address critical issues
- **'Organisational Champions'** push for sustainable building

- **Sydney Harbour Foreshore Authority** required a Green Building on the site

- Tender won by GPT and Citta, offering a **6 Star Green Star** building
- GPT sustainability strategy
- **'Future Proofing'** the property portfolio
- Clear targets: Achieve the required number of points for GBCA 6 Star Rating
- Develop **Proficiency** in delivering Green Buildings

4. SITE AND MATERIALS



4. SITE AND MATERIALS



- Decontaminated site from bitumen residues left by the first gasworks in Sydney
- Heritage rock wall in the atrium is twice as significant, layering historical form with contemporary functionality.
- Hand hewn by convicts in the early 1800s, it's the longest and oldest sandstone cutting in Sydney.
- Commitment to site and heritage

4. SITE AND MATERIALS

- **Recycled Wharf timber** (stair treads and exterior shade devices)

- **Furniture**

- Wood tables from sustainably forested timbers (koskela)

- All office furniture eco - Labeled

- **Flooring** : Bamboo rood | Recycled plastic vinyl | Goats hair carpet



- **Recycled timber** (stair treads)

- **Low e glazing** (reduce solar heat gains)

- **Structural Concrete:**

- 40% fly ash (steel manufacturing bi-product)

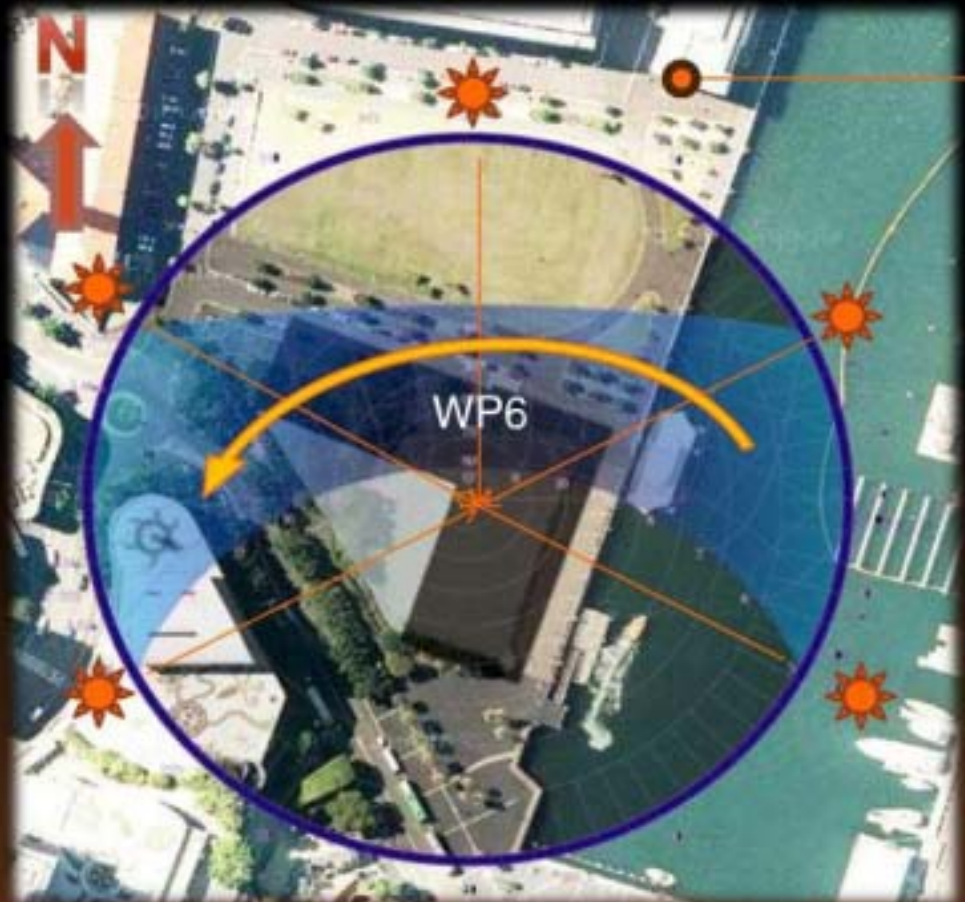
- 20% recycled crushed concrete as an aggregate

- 30% recycled fiber

- 10% conventional cement mix

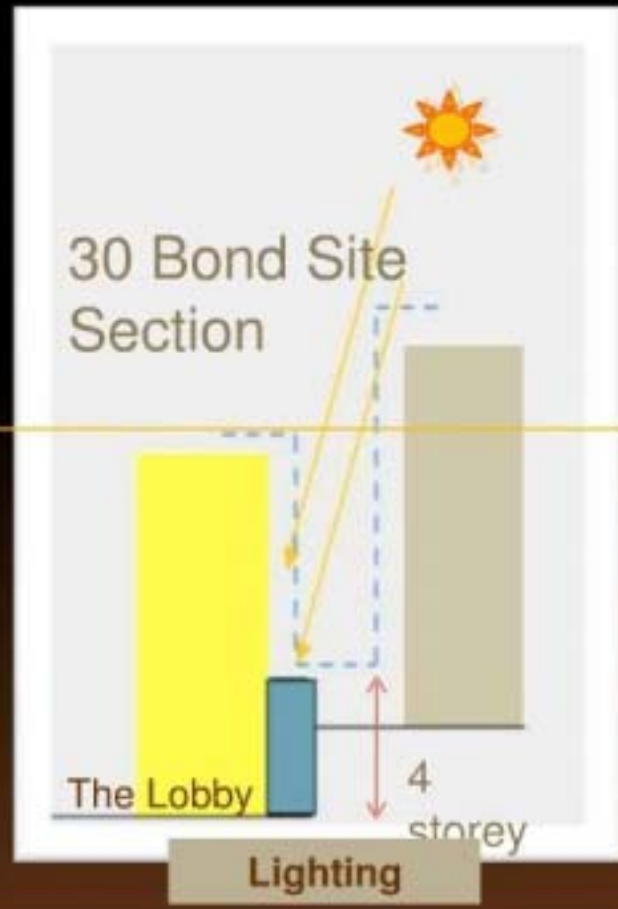
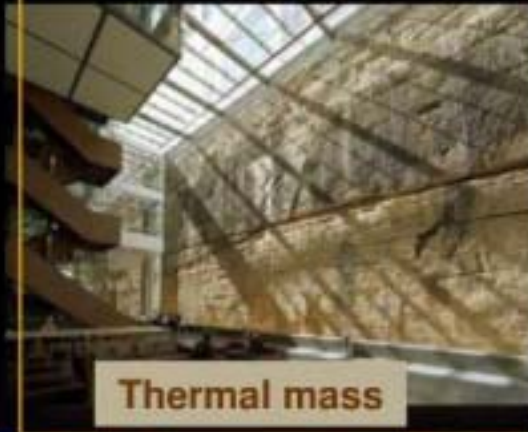


4. SITE AND MATERIALS



5. PASSIVE DESIGN

- Lighting + Thermal Mass + Green Roof

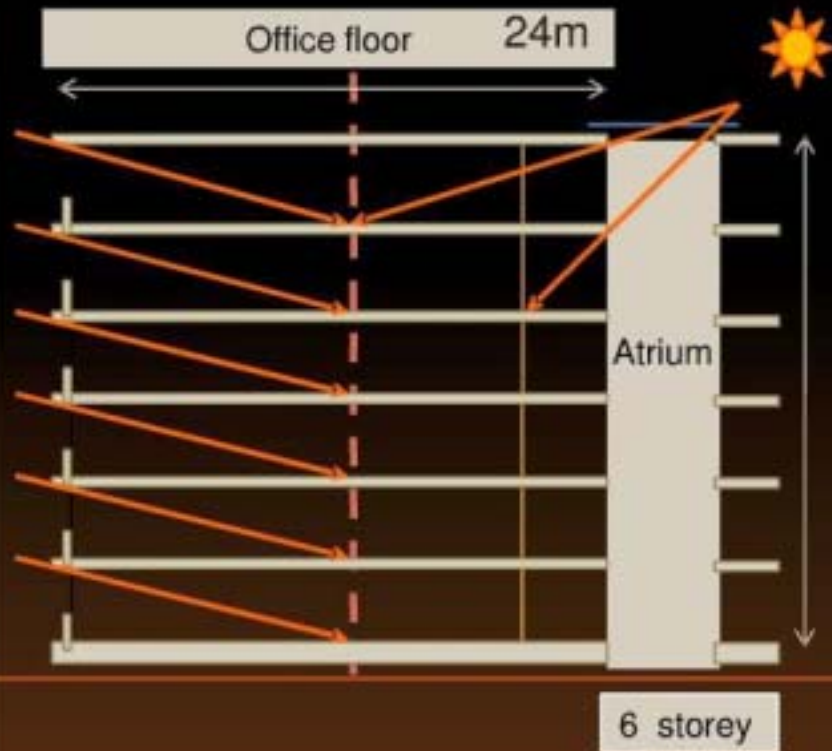


5. PASSIVE DESIGN

- Natural day lighting + Solar HW

Solar Hot Water

Lighting



5. PASSIVE DESIGN

- Shading + Glazing



EXTERIOR FACADE

6. HEATING AND COOLING STRATEGIES

• Cooling



- First Building in Australia to incorporate Chilled Beam technology.
- Innovation points awarded for Green Star Rating
- Reduction in ducting space needed, reduction in building height

PASSIVE CHILLED BEAM TECHNOLOGY



- Hot air from occupants and equipment rises and makes contact with the chilled beam
- The chilled water inside the beam cools down the air.
- Cooled air falls by natural convection due to gravity

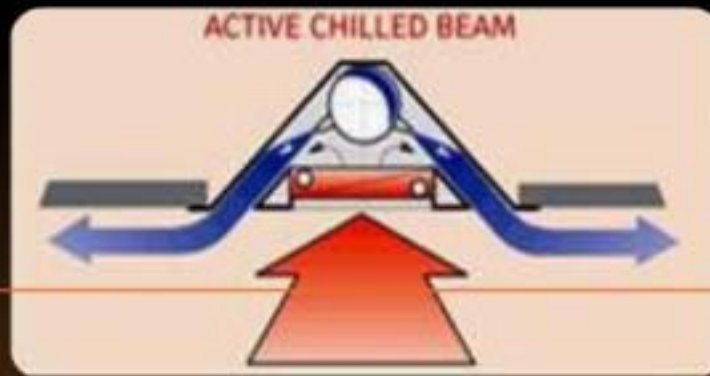
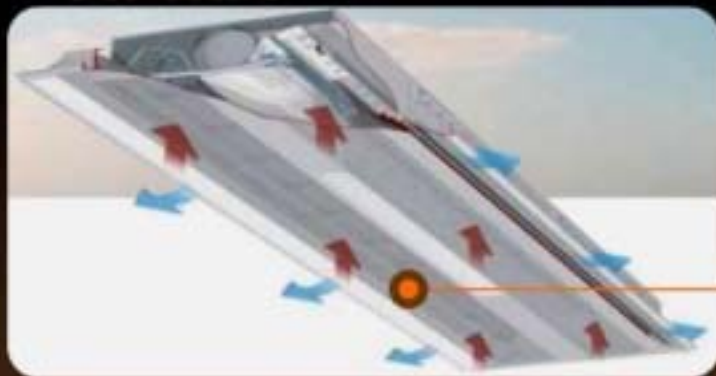
6. HEATING AND COOLING STRATEGIES

• Cooling

ACTIVE CHILLED BEAM TECHNOLOGY

Technology Transfer → Lessons learned from 30 The Bond enhance improving Chilled Beams technology

- Passive chilled beams on interior and active ones at the perimeter
- Air is distributed through special swivel distributors
- 50% higher fresh air rate than prescribed by Australian Standards
- CO₂ Sensors on every level



How Active Chilled Beam work:

Air is continuously supplied to the chilled beam by the central air handling system. The chilled water inside the beam cools down the air.

6. ENERGY EFFICIENCIES

- HVAC

Harbour Water Heat Rejection System

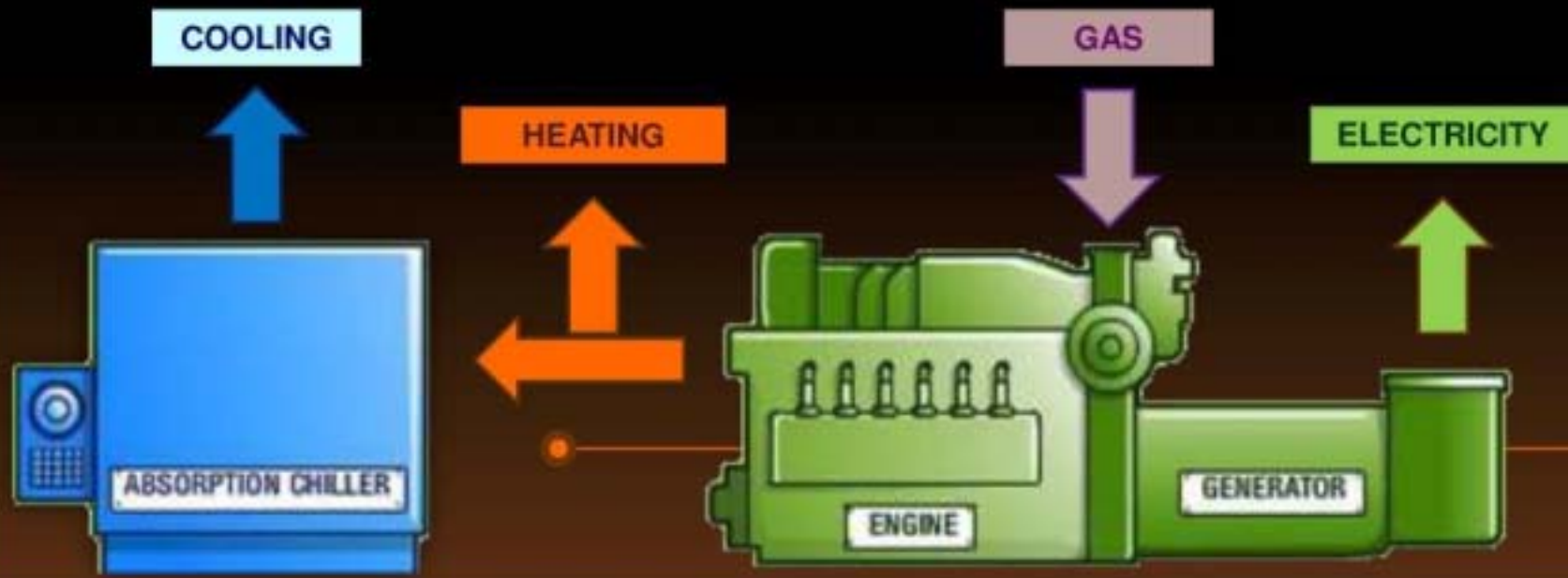


7. ENERGY EFFICIENCIES

• Tri-Generation

- Reduces peak energy demand by 25%
- Natural Gas is cleaner source of electricity generation than coal

- Provides 400kW of cooling (third of the building's cooling load)
- In winter, the generator's hot water supply can be used for space heating in place of a gas-fired boiler (three).



7. ENERGY EFFICIENCIES

• GHG Emissions

30 The Bond

- 1,103,300 kg CO₂ emissions per year.
- 59 kg CO₂ emissions per m² per year.
- Overall 56% reduction of GHG Emissions.

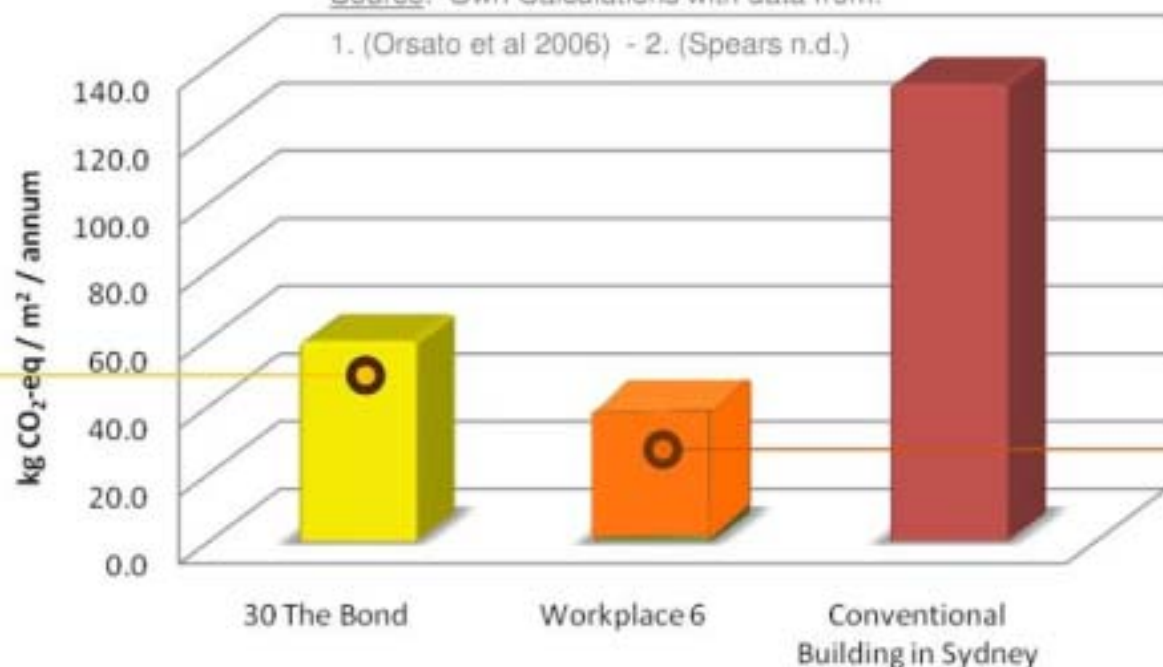
Workplace 6

- 631,800 kg CO₂ emissions per year.
- 39 kg CO₂ emissions per m² per year.
- Overall 70% reduction of GHG Emissions.

GHG Emission Comparison

Source: Own Calculations with data from:

1. (Orsato et al 2006) - 2. (Spears n.d.)



7. WATER EFFICIENCIES

• Water Features



AAA Rated Fixture



Waterless Urinals

30 The Bond

- Installation of AAA rated water fixtures, dual flush toilets and waterless urinals. + Rain water collection on the roof
- No Blackwater or Grey water treatment

- **Black water treatment plant**, consists of a black and grey water recycling system recovering **40,000 litres/day**, 5 times bigger than the building needs
- The system uses public sewer for water
- Recycled water is reused for landscape irrigation (in all the building and two nearby parks) and for flushing toilets



Water recycled for Irrigation



Water Treatment Show Room

7. WATER EFFICIENCIES

- Water Analysis

30 The Bond

- 17,700,000 Lts of water per year
- 947 Lts of water per m² per year.¹
- Not rated NABERS Water
- **30% reduction of water consumption**

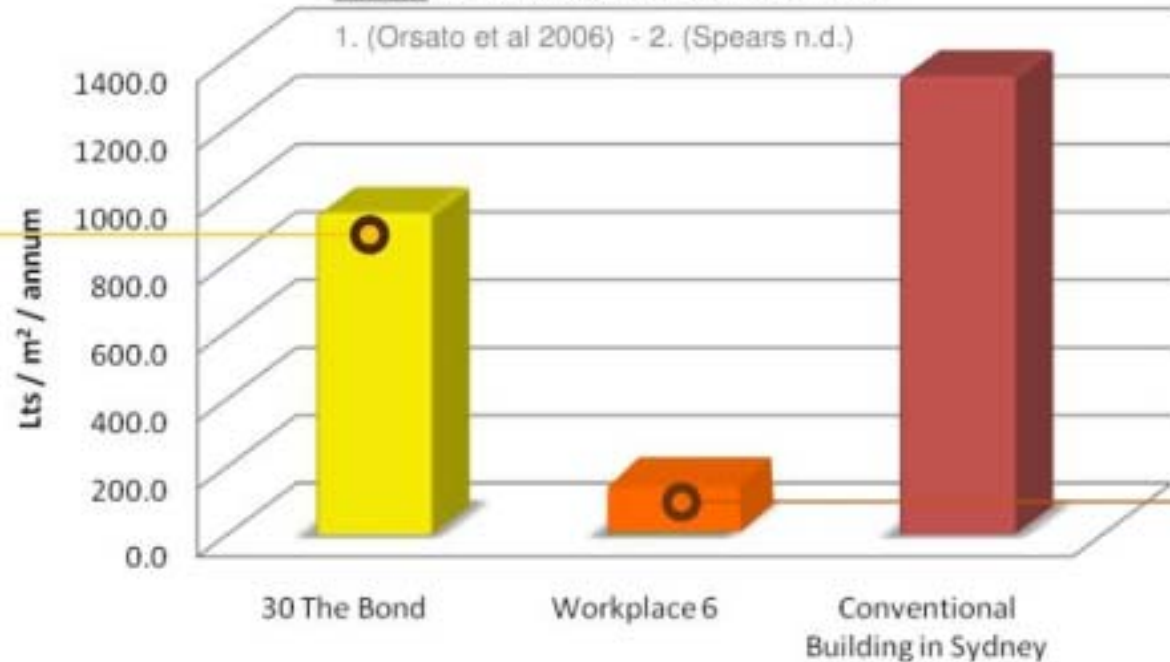
Workplace 6

- 2,100,000 Lts of water per year.²
- 130 Lts of water per m² per year
- Designed for 5 star rating in NABERS Water
- **90% reduction of water consumption.**
- 29 million litres / year for total water savings

Water Consumption Comparison

Source: Own Calculations with data from:

1. (Orsato et al 2006) - 2. (Spears n.d.)



8. CONCLUSION



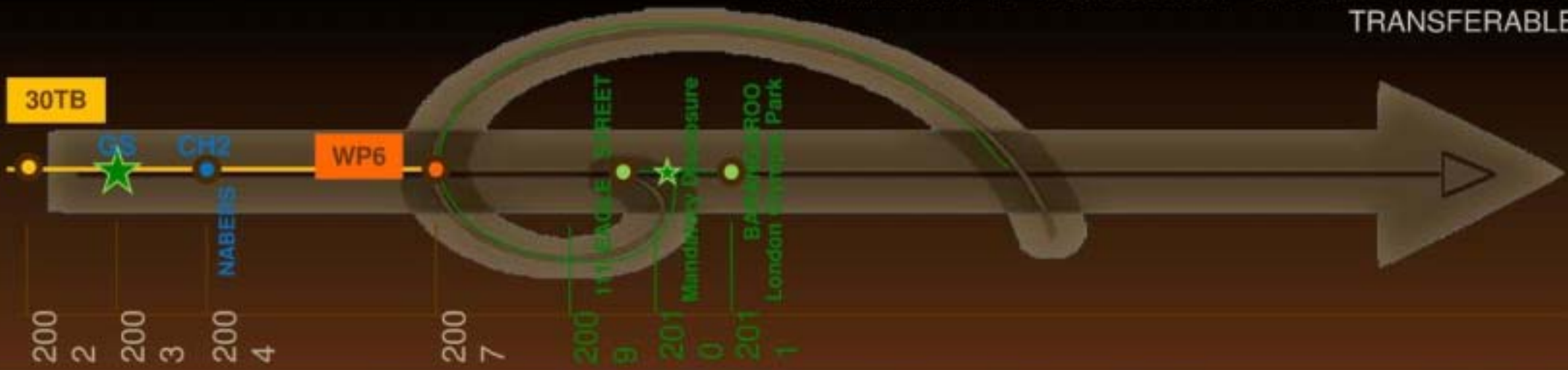
- Green Star 5 star
- NABERS 5 star
- Creating a New Corporate Culture (HQ building)
- Made Great use of Site (Sandstone Wall for T-mass)
- Roof Covered with Landscape (Green Roof)
- Passive Chilled Beam
- Energy Use From Conventional Means
- Highly Water Efficient Plumbing

- Green Star 6 stars
- NABERS 5 star
- Future Proof Portfolio
- Made Great Use of Site (Harbor Heat Rejection)
- Roof Covered with Solar Hot Water Panels
- Active Chilled Beam
- Tri-generation & purchase of 25% green power
- Black Water Recycling System

8. CONCLUSION



INFORMATION & TECHNOLOGY SHOULD ALWAYS BE TRANSFERABLE



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THANK YOU

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