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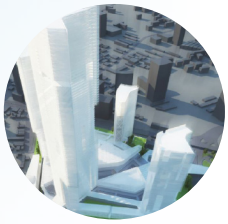
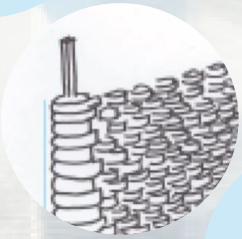




Environmentally Sustainable Design

Capability Statement

bec.studio

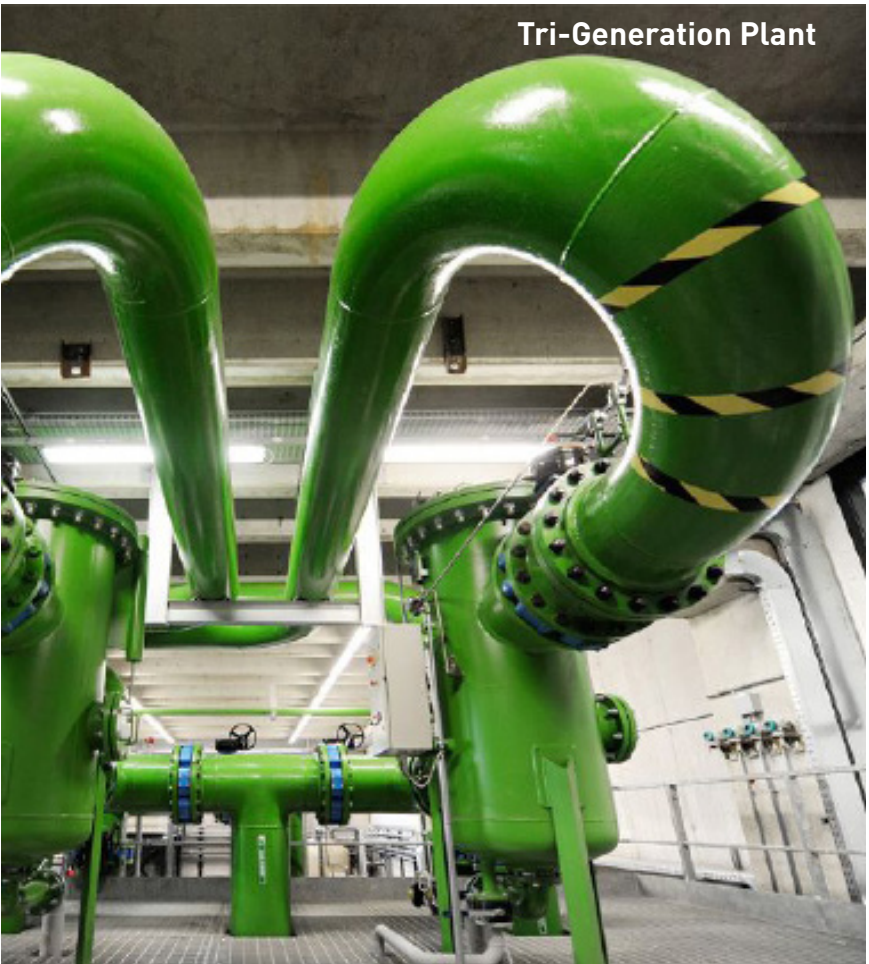
CONTENTS

Project: **Verde Apartments**
Location: **Brisbane**

“We challenge mediocrity & strive towards client relationships & project team associations where a collective approach is championed in recognition of enhanced outcomes.”

John Tuxworth
Managing Director - BEC
President and Chair - Australian Green Development Forum

Project: **Bangkok Sustainable Masterplan**
Architect: **The Buchan Group**



Our Company

Built Environment Collective is an Australian-based design consultancy offering enhanced Client outcomes via sustainable integrated engineering solutions and a holistic approach to design and construction. Our team are professionally passionate about and personally invested in sustainability.

Founded on the 20-year international experience of Managing Director, John Tuxworth, the company provides a unique value-adding contribution across a range of market sectors and project types, from boutique architectural homes, to large-scale, mixed-use towers.

From the main operation in Brisbane we have delivered projects as far as Angola, on the west coast of Africa, to Tonga in the Pacific.

Our People

BEC is comprised of diligent, passionate consultants, who utilise their professional expertise to facilitate optimal Client outcomes.

We maintain a rigorous approach to Continuous Professional Development (CPD). In addition to the commitment required by the relevant institutes and councils, CPD targets are mandated as part each staff member's employment contract.

Managing Director John Tuxworth's interest in becoming a multi-discipline building professional saw him undertake architectural studies at the University of Westminster in London, and he has also undertaken MBA studies through Latrobe University. John is also one of few structural/civil specialists to be accredited as a Green Star Professional.

John's commitment to sustainability has seen him through years of service to the Australian Green Development Forum (AGDF), initially as a Board Director, and now as the sitting President.

Our ESD Capabilities

Our Team of experienced professionals use advanced engineering software to produce designs and documentation that are highly functional, fit-for-purpose, and which provide enhanced assistance to contractors.

We design buildings, structures, and operational works to a Client's detailed specifications and eliminate unnecessary costs, whilst still achieving compliance with Australian and international building codes. A strong focus on collaboration with other design team members and the contracting team benefits our Clients by integrating a larger pool of ideas and experience.

Our designs respond positively to the local environment with a focus on reduced maintenance and operating costs. We offer a multi-disciplined experience to assist with the reduction of materials and utilities requirements, and the maximisation of natural light and ventilation.

In addition, we offer experience with environmentally friendly systems such as energy efficient and automated lighting, solar hot water, and rainwater harvesting for reticulation to amenities and swales. Our innovative approach to buildability is based on construction techniques which lend themselves to safety and efficiency.

Our commitment to sustainability can not only be seen in our work, but also in our office policies, educational efforts, and sponsorships. As a part of this commitment, BEC has been the Sustainable Architecture Awards Sponsor for the AIA Brisbane Region for five-years running.

We consistently work hard to ensure that Client objectives and outcomes are clearly defined from the outset. Our hands-on approach to project management assists to drive each project towards delivery, with an emphasis on quality, cost and program.

Our ESD Expertise

We have significant experience delivering Environmentally Sustainable Design & consultancy across the East-Coast of Australia, and beyond. While our ESD consultancy services are typically delivered as a complimentary offering integrated into our core disciplines of Structural, Civil, Hydraulic, and Project Management, ESD principles are interwoven into our design philosophy, underpinning and informing our design choices across the business.

Our Environmentally Sustainable Design (ESD) journey began with Managing Director John Tuxworth's work on the Greenwich Millennium Village (GMV) Project in 1998 working with renowned architect, Ralph Erskine. The GMV Project was undertaken with reference to BREEAM – arguably the world's foremost environmental assessment method and rating system.

Our team now regularly delivers the following Environmentally Sustainable Design consultancy services:

Green Star Accredited Professionals (GSAP)

> Green Star is the Green Building Council of Australia's (GBCA) rating and CPD programme

Nationwide House Energy Rating Scheme Energy Efficiency Assessment & Ratings (NatHERS)

> Determines compliance with mandatory energy efficiency requirements for dwellings and major renovations as based on the National Construction Code (NCC).
> Covers insulation, glazing, shading, energy use, air conditioning, lighting etc.

Building Sustainability Index (BASIX) Certification

> Legal requirement for development applications lodged in NSW for a new home or and alteration or addition worth more than $50,000

Section J Compliance Assessments

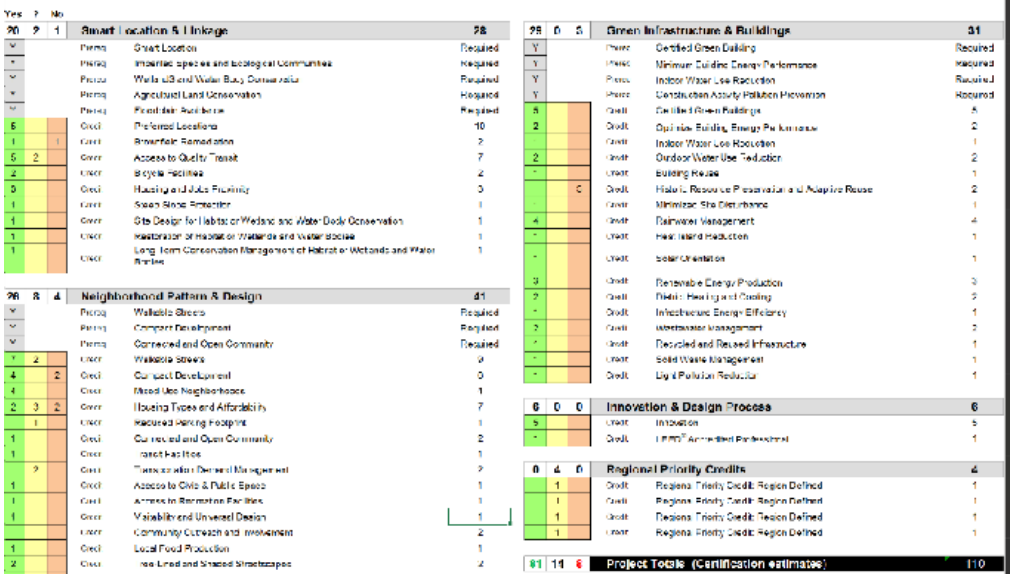
> Determines compliance with mandatory energy efficiency requirements for commercial and industrial buildings based on Section J of the National Construction Code (NCC) Volume One. This covers insulation, glazing, shading, air conditioning, lighting etc.

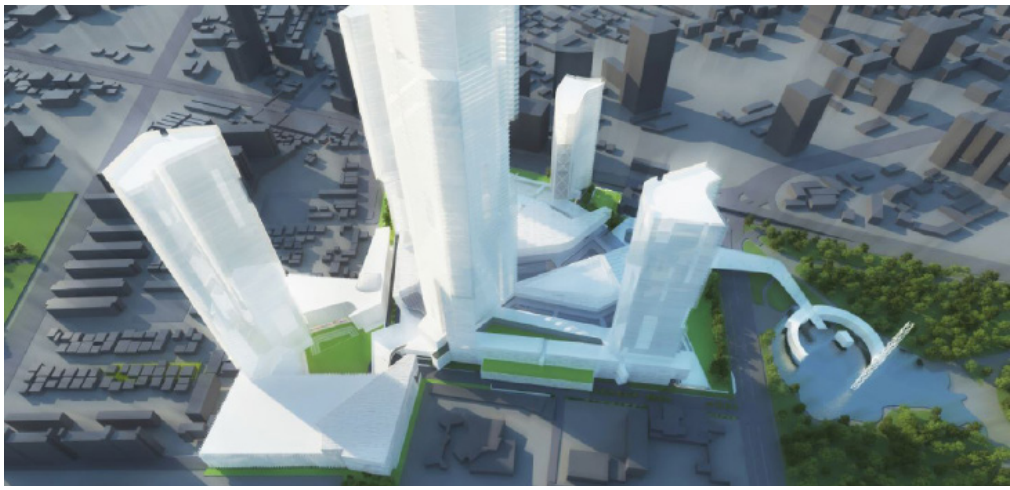
Triple Bottom Line Sustainability

> Delivering the best outcomes for our Clients with regards to social, economic, and environmental aspects of each project.

Beyond Zero ESD Design and Specifications

> Leading the industry in challenging traditional 'non-worsening' standards
> Covering photovoltaic solar systems, generators, batteries, bio-retention spaces, porous concrete pavements, stormwater management, geo-thermal energy, UV air-scrubbing treatment and more.





01

PROJECT: Bangkok Sustainable Masterplan
ARCHITECT: The Buchan Group
RELEVANCE: ESD

The BEC team was commissioned to provide ESD services in support of a huge 17-hectare high-density, mixed-use development concept in Suan Lum in the heart of Bangkok; master-planned by The Buchan Group.

The BEC team looked to push ourselves and the project beyond the typical 'carbon neutral' standards that are the core of most current energy efficiency rating schemes. We envisaged a group of buildings that drew-in air pollution and breathed out fresh air for the neighbourhood. We pictured structures that harvested clean energy from the heat of the sun and of the earth to mitigate its own energy needs. A development that took in the polluted water of Bangkok's struggling waterways and returned it clean and fresh.

Our proposed solutions included a UV treatment and air scrubbing system, an extensive network of stormwater traps, structural use of cross-laminated timber and bamboo, porous concrete pavements and bio retention spaces, a tri-generation plant, wind turbines and photovoltaic glass. Through these initiatives we were proud to achieve a Gold rating through LEED v4, the new revised standard for high performance buildings worldwide.

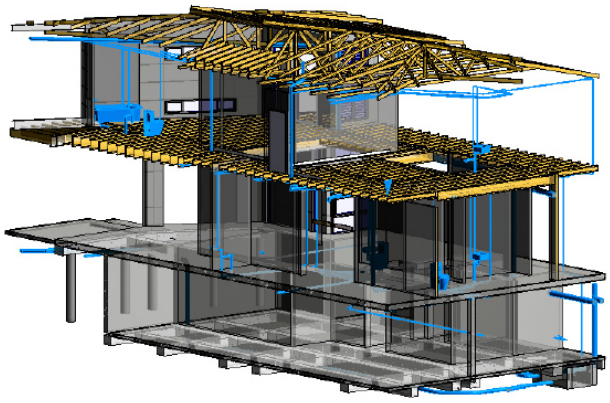
02

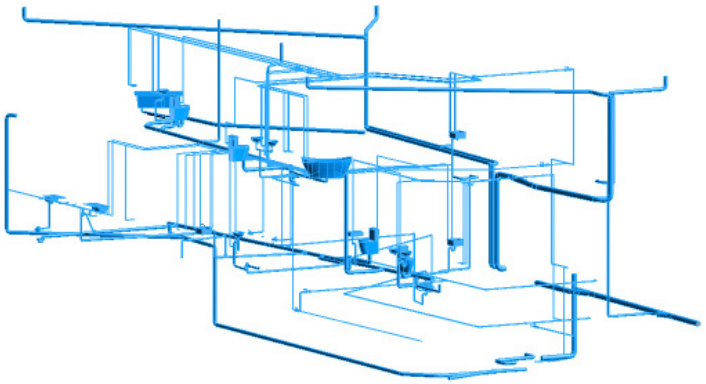
PROJECT: Boree Street
ARCHITECT: Winfried Sitte
RELEVANCE: ESD | Energy Efficiency Assessment

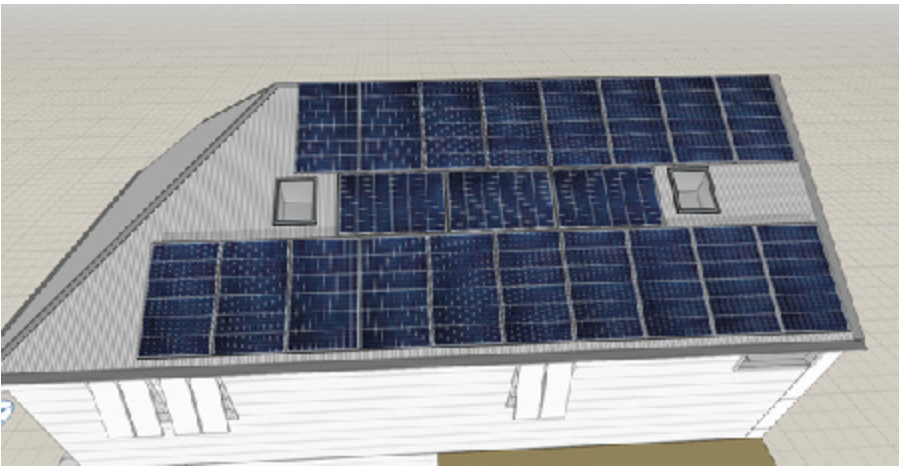
Our Boree St project scope included structural, civil, hydraulic and ESD engineering services; including ESD modelling, compliance, recommendations and energy efficiency analysis on a new 3-storey architectural home in Kedron.

The client wanted a house that would be resilient to the extreme weather that would result from future climate change, a goal that directed each step of our design process.

Our ESD contribution covered NatHERS modelling for compliance, solar PV system consultancy, and electricity usage analysis. The Solar PV system feeds into multiple Tesla Powerwall II systems to ensure the battery power storage is sufficient to continue to power the entire house (and basement pumping to prevent flooding) during heavy storm conditions with no grid power.







03

PROJECT: Princess Street, Petrie Terrace
CLIENT: Owen Architecture
RELEVANCE: ESD | Solar | Energy Efficiency Assessment

BEC was commissioned to provide ESD (Environmentally Sustainable Design) consultancy services on a fantastic bespoke design for a new home in Brisbane's Petrie Terrace. We were thrilled to work closely with Owen Architecture.

We undertook the required energy efficiency assessment, satisfying the requirements for a Class 1 building in Queensland, covering insulation, glazing, shading, and energy use.

Our works also included design and specification for a large solar photovoltaic system, capable of generating 6.5 kilowatts of energy. We designed a tailor-made system for a FIFO worker, using in-depth analysis of energy demand and usage patterns. 3D modelling and hourly energy usage and generation data profiles were used to evaluate a range of solar energy options. This energy will be stored in one of the first Tesla Powerwall 2's ever to be fitted in Australia. The Powerwall 2's 14kWh capacity Li-ion battery means the home will be effectively energy self-sufficient.

04

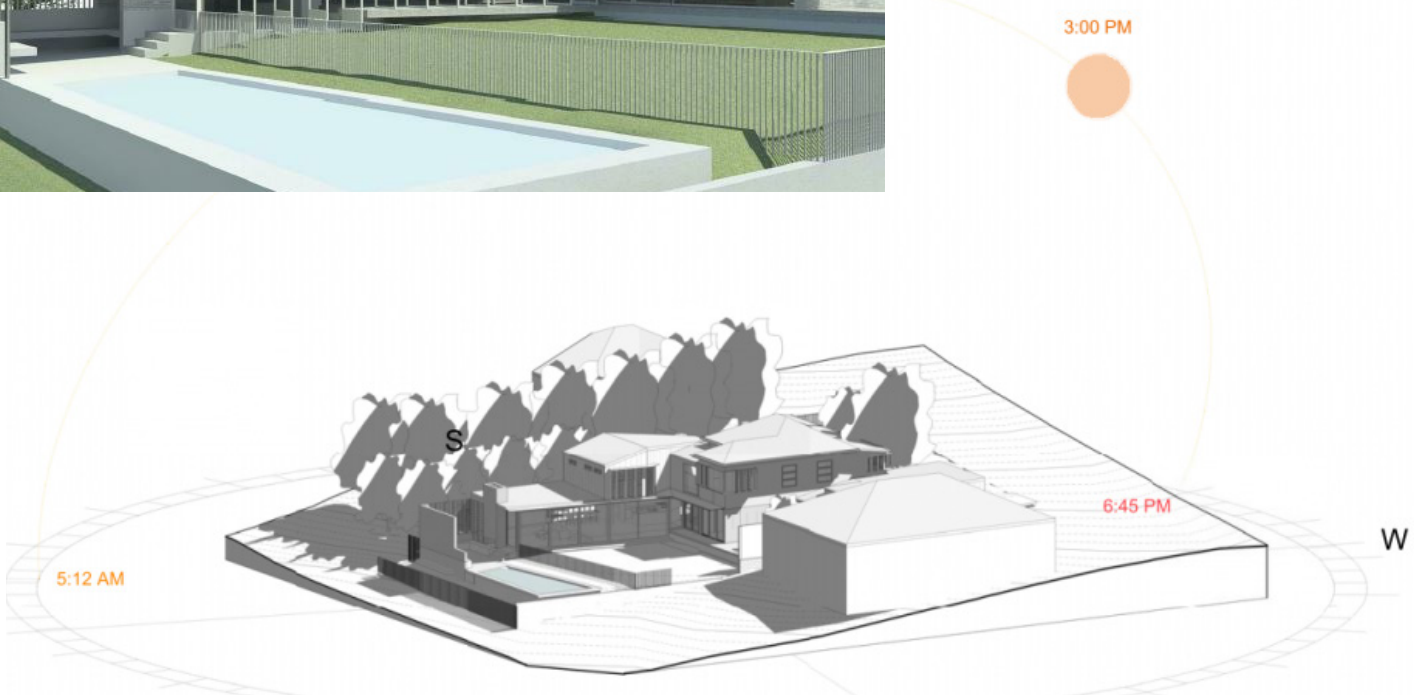
PROJECT: Barton Street
DESIGNER: Built Environment Collective
RELEVANCE: ESD | Energy Efficiency Analysis

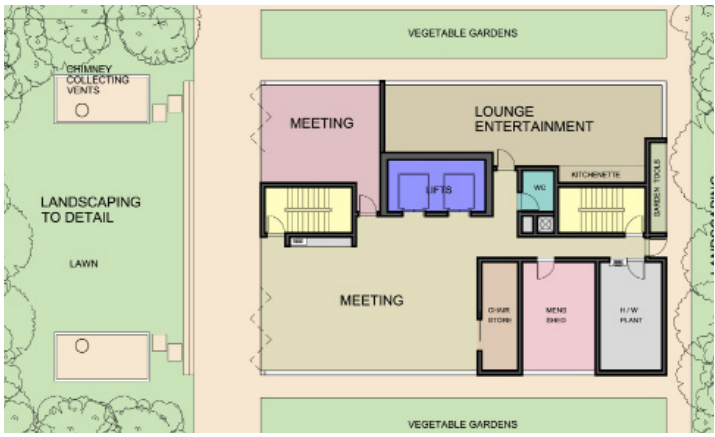
BEC was commissioned to design, engineer, and provided ESD consultancy for significant alterations and additions to an existing two-storey home on stumps; with single-storey street frontage, and a lower partly built in storey.

BEC was tasked with transforming the existing home into a modern dwelling that grows from and compliments the surrounding terrain. Our work included an extension, pool, and carport to create a comfortable living space.

The diverse professional skillset of our team allowed us control of the project across disciplines comprehensively and internally - resulting in a unity of vision throughout every stage & discipline of the project including building design, structural analysis and design, energy efficiency, and solar system specification.

After taking over the design process, BEC was able to drastically reduce construction costs, while increasing thermal performance of the building. Our team used Solar Modelling (see below) to inform solar system specification and building design choices very early on in the process, and followed through by delivering energy efficiency consulting and reporting including thermal modelling.





05

PROJECT: Hercules Street
ARCHITECT: CCN
RELEVANCE: ESD

BEC was commissioned to provide ESD services for this multi-storey development in Hamilton. The project included 144 units over 14 levels with a rooftop terrace and basement parking. Fundamental to the approach of the new development were the following targets:

- Reduced environmental impact: minimised energy use and resource conservation;
- Economic savings: reduced operational and maintenance costs;
- Better and healthier living environments.

BEC has been involved in the project from inception to implement design features which will reduce its environmental impact. The innovative ESD technologies/ features include climate-sensitive building design, energy and water efficient fixtures and fittings as well as rainwater harvesting and recycling. This inclusion of these features will result in superior design outcomes that will benefit occupants whilst minimising the impact to the broader environment.

06

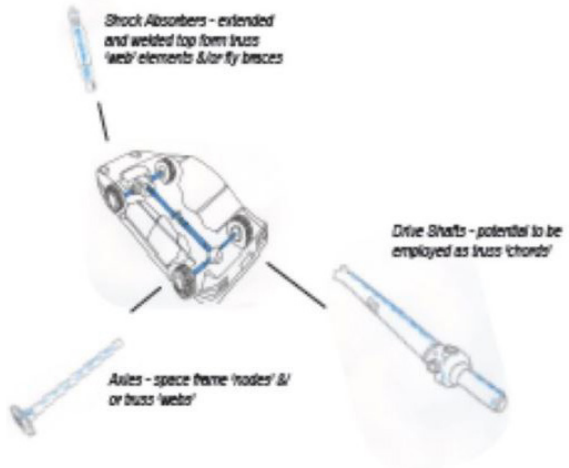
PROJECT: River Community Centre
ARCHITECT: Eco Effective Solutions
RELEVANCE: Pro Bono | Repurposed Materials | ESD

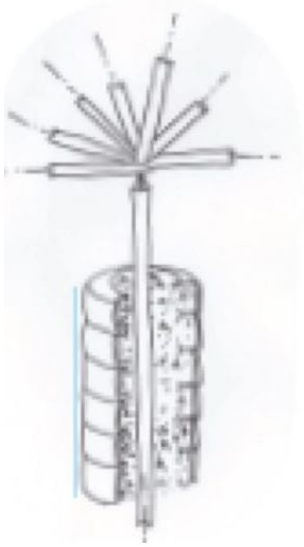
BEC provided structural and ESD services pro-bono for a unique sustainability project in the form of a Community Centre Concept.

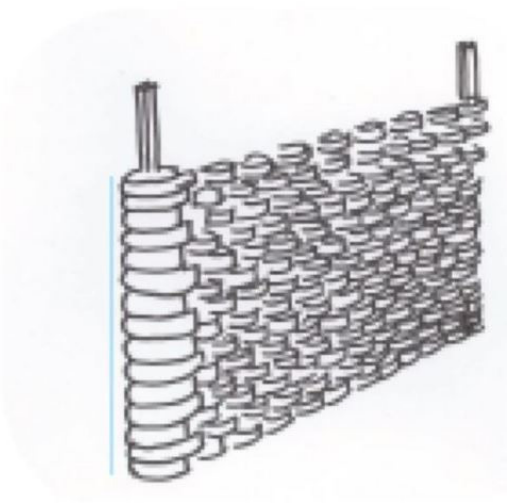
With a focus on Triple Bottom Line Sustainability objectives (economic, social and environmental) BEC proposed the re-use of used car components in support of a 'many hands' construction methodology.

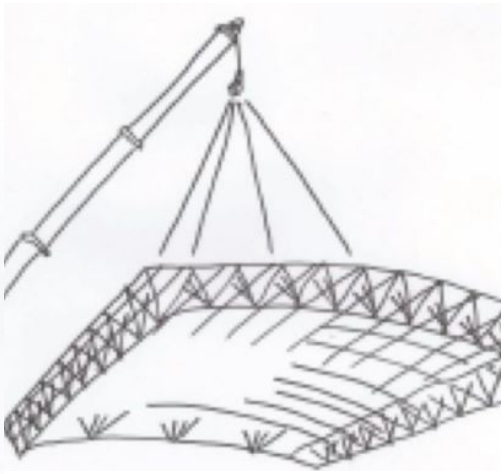
Car tyres were nominated as sacrificial concrete formwork about slender steel columns, to provide lateral stability and fire protection. These columns were nested within rammed-earth external and party walls facilitating both acoustic and thermal insulation. Axles, drive shafts and shock absorbers that would normally be wasted would be repurposed as structural space-frame roof elements.

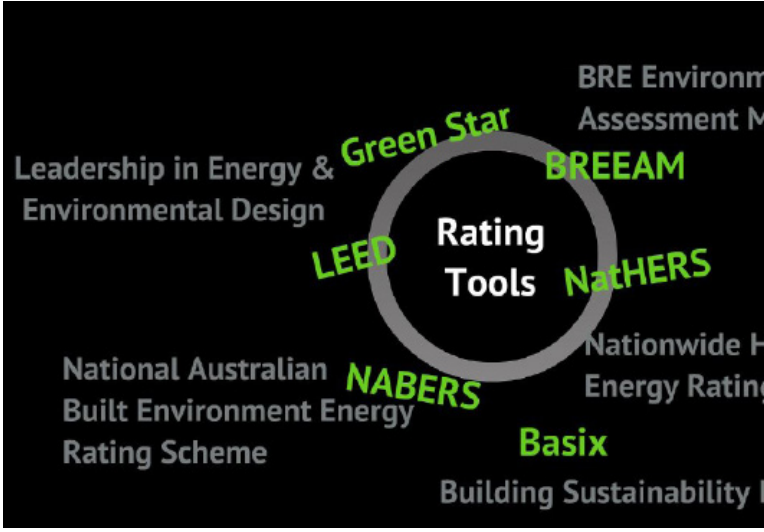
BEC chose a space-frame style roof for its inherent strength and to take advantage of the access to a 'many hands' volunteer labour force, facilitating rapid construction by a relatively unskilled workforce.











07

PROJECT: ESD Workshops & Presentations
ARCHITECT: Buchan Group | AGDF
RELEVANCE: ESD | Education

BEC's Managing Director John Tuxworth has a deep-seated passion for sustainable design. This commitment to environmentally minded decision making has driven BEC to goals and policies that challenge the industry norm.

These efforts were spotted by the Buchan Group, who subsequently requested a series of Environmentally Sustainable Design and Development workshops. Through the workshops John was able to define ESD's base paradigms in terms of design and construction, drawing upon William McDonough's Cradle to Cradle theories for inspiration. Presentation topics also included leading ESD standards and rating tools, including LEED, Green Star, BREEAM, NatHERS, BASIX, and NABERS, as well as solar energy, climate specific design strategies, and improving energy efficiency.

John was also invited to present at the Australian Green Development Forum's (AGDF) Green Speed Learning Forum (GSLF) on Sustainable Master-planning. This event covered BEC's ambitious sustainability initiatives for the Bangkok Sustainable Masterplan. John's service to the AGDF was formally recognised in 2017, when he was elevated from a Board Director, to his current position as the Forums' sitting President.

08

PROJECT: Burwood Nursing Home
ARCHITECT: Jackson Teece
RELEVANCE: ESD

BEC was proud to work alongside Jackson Teece on a 3-storey plus basement building, which will facilitate a high-end aged care facility for inner Sydney.

Our commission included preliminary structural, building services, a Stormwater Drainage Concept Plan (SDCP), and mechanical consultancy including advice on basement ventilation and Heating, Ventilation and Air Conditioning (HVAC).

Our team had to work within rigid height restrictions and coding, specifically in regards to reducing energy demand. We proposed a cutting-edge gas-powered air-conditioning system, which would save the client energy costs (and space which would otherwise have to be dedicated to a pad-mounted generator), improve the sustainability of the building, and could be moved off the top of the building to ensure compliance.

These kinds of systems are only just being introduced to Australia by Yanmar, who were the only supplier in Australia at the time of publication. Our ESD Team also liaised with Burwood City Council throughout the approvals process.

Our Values

We challenge mediocrity & strive towards Client relationships & project team associations where a collective approach is championed in recognition of enhanced outcomes.

We are acutely aware of the adverse impact that current development paradigms have on the Triple Bottom Line sustainability.

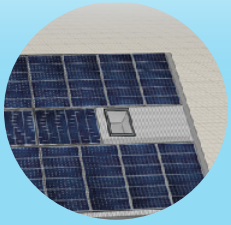
We believe in professionals adopting a multi-disciplinary perspective in delivering projects.

Our Vision

To be the first choice of Clients who value quality, & to be recognised as adding-value [as opposed being just another commodity service] - by providing creative solutions based on diversified skill and experience.

To lead positive triple-bottom-line change in the construction industry.

To found our business success on a passionate approach towards Continual Professional Development targets in excess of the commitment required by the relevant institutes and councils.



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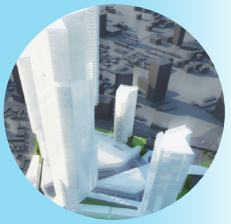

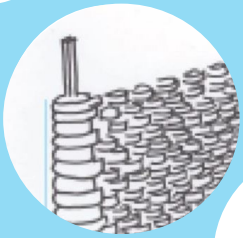

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