

# Zero Carbon

## Principle Vision

One Planet Vision is for all buildings to be energy efficient and run completely from renewable energy.

Target	Baseline Monitoring	3 to 5 Year Target	Target - 2020
Energy Efficient: 1. Net Annual Cooling Thermal Energy = 9 Star NATHers. 2. Net Annual Heating Thermal Energy = 9 Star NATHers.	MJ/m <sup>2</sup> (Elec. And Gas) Annual Carbon Emissions = 0 Net.	Energy bills	
100% renewable energy		Energy bills	100%
Maximise onsite generation - target 100% of demand		Energy bills	75%

## Design

Category	Strategy	Description	Metric	Status - 10/15	Comment - 121015
Demand reduction	Phase change material (PCM) embedded into building fabric	PCM to be incorporated within the wall construction, to store and release large amounts of heat energy in order to help maintain comfortable internal conditions using less A/C or heating energy	n/a	installed	
	High building fabric performance	High performance building fabric will reduce energy transfer through the fabric, hence lowering A/C and heating energy usage.	Target values in the range of the following: <ul style="list-style-type: none"> <li>• Walls: R4-5,</li> <li>• Roof: R6-7,</li> <li>• Floor: R4,</li> <li>• Windows: U= 2.0, SHGC = 0.4</li> </ul>	installed - performance monitoring underway?	
	Openable windows/Louvers	Building to have high-performance facades in conjunction with smart shading systems, with openings that open when appropriate and are well-sealed otherwise.	Achieve > 10% of floor Area as Opening	Manually Operated Sash Windows/louvers installed	

	Energy Recovery Ventilation Units for Whole House Ventilation	Specialised ventilation units will reclaim waste energy from exhaust airflows to pre-treat incoming outside air, thereby minimising heating or cooling loads and maintaining high air ventilation rates	% of total mechanically supplied air that is pre-treated via ERVU	installed	
	Optimised thermal zoning	Thermal zones properly laid out to take into account perimeter and internal areas, occupancy profiles, hours of operation, etc.	Each space on each floor to be individual thermal zone, volumetrically separated	installed	
	Well Sealed, Airtight construction	Infiltration minimised by tight construction to eliminate energy losses. Blow door testing with sealing to be conducted after construction	<1 ACHR @ 50Pa	Achieved 4,3 AC	The design concept is not compatible with the 1ACHr target, but being below 5 is sufficient
Efficient appliances	Installation of energy efficient lifts	Most energy-efficient residential lift available are to be specified Kone Lift (with Regeneration) Energy Use estimate	<1700 kWh Annual electricity consumption	Lift not installed	
	Energy efficient appliances	Install most efficient appliances that is practical	3,5 star fridge, but it has a separate freezer, so fridge can be switched off if not required 6 star drier - 900w/cycle 5 star washer	installed for the drier (1/5th of standard)	
Renewable energy	PV	Approximately 3000 kWh/year produced from roof mounted PV panels -	3.5kWp installed	producing 16-19kWh/day probably 100% of demand	
	Battery storage	Modular (so as to be sized to storage requirements) storage include in PV system to maximise use of own electricity	installed	To be installed	
	Geothermal	For heating - no gas	5kW system 65m deep	Not operating at full capacity - no COP data yet	
	Off-site renewable energy	100% Renewable energy purchased from Grid - from diamond energy			

### Construction

Category	Strategy	Description	Metric	Status - 10/15	Comment - 121015
Electricity	Renewable energy	Used a green supplier		Achieved	
Mobile power	Minimise fuel use	charged the batteries with electricity (from renewable energy supplier) not generators		Achieved	

### Operation

Category	Strategy	Description	Metric	Status - 10/15	Comment - 121015
Metering	Smart and individual Metering to main resource consumers	Install smart meters to monitor individual energy consumption of any HVAC units, lift, lighting etc. which will help meet energy consumption targets and ensure the building operates efficiently.	Sub-meters (including small power metering) to be specified.	Green Star – Multi-Unit Residential standard	
Behaviour change	Metering and feedback	active automation system to support sustainable behaviour			

# Zero Waste

## Principle Vision

One Planet Vision is of a future where resources are used efficiently, waste levels are close to zero and ultimately zero waste is sent to landfill.

Target	Baseline Monitoring	2015	Target - 2020
recycle 80% of construction waste			
40% reduction compared to reference case	BoL/Garbage/Week and Annual waste 4oL/Comingled Recyclables/Week audit	-	-
2% waste to landfill	-	-	-
85% recycling rate	-	-	-

## Design Strategy

Category	Strategy	Description	Metric	Status - 10/15	Comment 121015
Designing out waste	Offsite construction	Factory produced modular system		installed	
Final waste treatment	Approaching zero waste (2%) to landfill by 2020	Setting a 2020 target for reduction of waste generated to near-zero levels.	Target 2% of overall waste generated to Landfill by 2020.		
Recycling (reuse)	Segregate recycled waste stream	Segregated waste bins to be installed in house.		installed	
Compost	Compost and waste management system	Incorporate a demonstration-scale application of compost system; e.g. - roof-mounted compost application Worm Farm.	Compost system to be incorporated.	installed	

## Construction

Category	Strategy	Description	Metric	Status - 10/15	Comment 121015
Recycling	Site waste management plan	Separate skips		concrete went to roadfill, foundations designed to minimise waste	

## Operation

Category	Strategy	Description	Metric	Status - 10/15	Comment 121015
Waste reduction	Reduction in all waste generation including recyclables	Reduce waste generated as measured against a benchmark level.	20% reduction compared to reference case of 80L/Garbage/Week and 40L/Comingled Recyclables/Week.	Ralph is to undertake a 4 week "regular consumption" trial period, where all waste is monitored and recorded, for base case	Base case will be measured by end 2016 An 4 week audit will be done each year
Recycling (reuse)	Internal sorting - behaviour	Recycle 95% of consumable waste by volume	recycling %	Baseline to be calculated	Audit once a year
	wider community engagement	Educate local neighbours, liaise with local council to provide communal waste bins.	Meetings attended	several tours to date	Some councils have booked tours. local community: local magazine doing an article
Composting	Utilising compost waste	Use on-site produced compost for herb gardens. Excess compost to be used for public gardens.	Compost facilities provided	Producing compost	

# Sustainable Transport

## Principle Vision

One Planet vision is one where walking and cycling are norm; need to travel is reduced and low / zero carbon modes of transport are provided.

Target	Baseline	Monitoring	3 to 5 Year Target	Target - 2020
Personal transport emissions - 50% improvement on basecase: target 1 tCO <sub>2</sub> eq/year				
Facilitate low and zero carbon solutions				
Offset all transport related emissions				

## Design Strategy

Category	Strategy	Description	Metric	Status 10/15	Comment 121015
Reducing the need to travel	Central location	Services and public travel easily available - CBD just 800m away	KM driven/year	Complete	
Soft modes	Location	Excellent location	East Melbourne Walk Score = 87		
Low carbon vehicles	Car fuel efficiency	Ownership of a small fuel efficient car, or no car at all	Fuel efficiency of car (L/100km)	No car owned just a scooter	
Facilitating low and zero carbon transport solutions	Facilitating low and zero carbon transport solutions	Provision of bicycle parking, minimising personal transport and utilising car-sharing programs (e.g. flexicar)	Bicycle storage area in property Electric vehicle sharing Number of Flexicar hire points within walkable distance	to be installed	
car parking	Minimise space	1 space (internal) for a small car - smart car	1 space	1 space but no car owned	
public transport	Access to public transport modes	nearest stop 80m, 3 different modes within 500m		Complete	

## CONSTRUCTION

Category	Strategy	Description	Metric	Status 10/15	Comment 121015
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Construction	Construction	Offset all construction-transport related emissions	No. of transport trips by contractors to site to be monitored.  50% of workforce to carshare.	Statement on Monitoring Trips: "Contractors to record all trips to site, listing the origin of their trips"	reporting in progress  reporting in progress
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OPERATIONS

Category	Strategy	Description	Metric	Status 10/15	Comment 12/10/15
'Zero emissions'	'Zero emissions'	Offset all transport-related emissions - including flying  Monitor number of flights taken Uber/Taxi - will record number of journeys	Number of kilometres travelled during year to be recorded, and subsequently offset.	to be offset	
monitoring	Personal transport emissions consistent with GHG target	Commitment to monitoring resident's emissions to be made, with the aim to reduce emissions by 50% against the base case	50% Improvement on Base Case (4 week test period)	baseline to be measured	
Commuting	25% reduction in commute to work emissions	Reducing the associated travel GHG emissions for the daily commute by considering alternative forms of transport	Kilometres travelled – by travel mode 25% reduction in associated GHG travel emissions	Not to be monitored as no standard daily commute	

# Sustainable Materials

## Principle Vision

One Planet vision is one where all goods and materials used are made from renewable or waste resources with low embodied energy and wherever possible sourced locally.

Target	Baseline	Monitoring	2015	Target - 2020
Embodied energy reduction - a % reduction target of 30% against baseline				
Operation phase - sustainable purchasing to be undertaken				

## Design Strategy

Category	Strategy	Description	Metric	Status	Comment 121015	
Embodied energy	Reduce the impacts of all goods and materials used in the construction, maintenance & occupation of the community	A Life-Cycle Analysis of the embodied energy associated with the ARKit construction to demonstrate a % reduction against an equivalent standard construction base case.	Base case = 12.5 GJ/m <sup>2</sup>  Establish % Improvement of ARKit over base case.	Studies to be undertaken by:  Dr. Robert Crawford, University of Melbourne  eTool Life Cycle Assessment Software		
Emissions	Specify Low VOC Paints, adhesives, sealants  Low/Zero use of Aluminium and PVC.	Avoid use of toxic and high-embodied energy materials	Low VOC paint specified throughout  Specify zero-aluminium content Window Frames.  PVC to comply with Green Star best-practice guidelines.	installed  installed  Completed		
	Use FSC timber only	Request this of suppliers	% FSC Certified Timber.	100% FSC,		



Timber	Waste timber	Laminate hardwoods made from offcuts normally sent for chipping	Maximise use of this product	Timber and doors made from this timber	An innovation for the industry	
Material reuse	Building construction waste minimisation and management scheme	Produce a tailored plan specific to the site outlining the strategy for reducing overall building construction materials and maximising potential for reuse or recycling.	Produce waste management plan.			

### Operations strategy

Category	Strategy	Description	Metric	Status	Comment	
Certified materials	Maximise their use - one new product a year	e.g. natural clearing products, identify products with recycled content	Number of products			
Sustainable consumption (e.g. sharing)	reduce consumption	Identify opportunities to reduce consumption	Number of initiatives	Initiatives include: - Member of community garden, and can borrow tools - all the tools bought for the construction are being shared with neighbours		

# Local and Sustainable Food

## Principle Vision

One Planet vision is one where people eat healthy diets higher in vegetable protein and lower in animal protein, diets high in local, seasonal and organic produce.

Target 2020	Baseline	Monitoring	2015	Target - 2020
5% of food to be produced onsite - 3 vegetables				
10% organic				
15% local (100km)	-		-	-
To reach 1.9 global Hectares (30% reduction).	-		15% reduction	1.9
Healthy eating - 50% reduction in animal protein				

## Design Strategy

Category	Strategy	Description	Metric	Status 1015	Comment 121015
Onsite food growing	provide a roof garden	Communal Gardens to be established. Local park to be investigated as a potential area for growing herbs etc.		Installed - 11m2 (in an 88m2 house)	

## Operations

Category	Strategy	Description	Metric	Status 10 15	Comment 121015
Onsite/local food growing	5% of food to be produced on site and in community garden	Communal Gardens to be established. Local park to be investigated as a potential area for growing herbs etc. Join the local allotment	% of food produced on site - value/weight?	Planted fruit trees for neighbours	

Local production	Local, fresh unprocessed produce, organic produce	Purchase locally-grown, organic produce; Ralph to develop a purchasing strategy. This will revolve around his intention to purchase fresh food from the local market.	To be covered in the strategy	Procurement policy to be written shortly. Farmers' market at 2km, organic one at 3km	
Low impact food	Food footprints consistent with overarching targets	Provide data on local dietary consumption breakdown and identify the key impact areas.	Trail period to be used as baseline Provide data on local dietary consumption breakdown and identify the key impact areas.	To be undertaken	
Onsite production	Onsite food growing	Investigate the feasibility of growing high-impact vegetables on site.	3 vegetables to be grown.  Bees on the roof	Planted: - chillies (giving them away!) - Herbs - strawberries Not practical	
Healthier eating	Food footprints consistent with overarching targets	Provide data on local dietary consumption breakdown and identify the key impact areas.	Lower protein diet. Target is 50% reduction in animal protein by weight in first year.	Look at initiatives like: weekday veggie	

# Sustainable Water

## Principle Vision

One Planet vision is one where water is used efficiently and managed to support a healthy environment, avoid local flooding and avoid pollution.

Target	Baseline	Monitoring	2015	Target - 2020
20% reduction in mains potable water consumption (<120l/person/day)	±55			
Reduction in flow to sewer < 115l/person/day				50%
Nutrient loading: 100% STORM calc rating				
Stormwater run off - 100% STORM rating				

## Design Strategy

Category	Strategy	Description	Metric	Status 1015	Comment 121015
Reduce demand	20% reduction in mains potable water consumption	Low flow appliances, plus: - 'red valve' to divert cold shower water to rainwater tank - drainwave product for 3/2l flush toilet	Between 5 and 6 Star WELS rating for water fixtures.	installed	
	Reduction in flows to sewer network	Reducing the property's contribution to sewer - through the low flow appliances	Volume m <sup>3</sup> water - target 115l/p/d	installed	

Stormwater	Reduction in flows to stormwater drainage network	Reduce the impact of stormwater runoff from the site through a number of strategies, such as the use of a rainwater tank system, using porous materials and minimising non-permeable surfaces, and through the installation of features such as raingardens or filtration beds <a href="http://storm.melbournewater.com.au/">http://storm.melbournewater.com.au/</a>	100% STORM Calculator Rating  1-in-5 year event	Rainwater tank installed. Porous bluestone uncovered	
Rainwater	100% rain capture	Design system so that rainwater capture from roof is stored in rainwater tank and distributed for irrigation and/or toilet flushing.	2000l tank installed from neighbours roof	installed	2000l tank installed from neighbours roof

#### Construction

Category	Strategy	Description	Metric	Status - 1015	Comment 121015
Construction	Construction	Estimate total water consumption and comparison to local best practice	ML/ m2 ARKit to monitor and report water use during construction		

#### Operation

Category	Strategy	Description	Metric	Status - 1015	Comment 121015
Irrigation	Only use rainwater	All irrigation from rainwater tank	%	on track to date	
Planting	low water use plants			Mostly edible plants and herbs Any other specific plants?	
Behaviour/monitoring			litres/person/day		
Storm water	Reduction in nutrient loading to stormwater drainage network	Minimise the levels of nitrates, phosphates and other nutrients found in sewage which can offset the natural balance of waterway ecosystems	Suspended solids and nutrient loads (N+P)	No use of fertilisers onsite	

# Land Use and Wildlife

## Principle Vision

One Planet vision is of regions that contribute to an overall increase in biodiversity and biological productivity, as well as supporting beautiful landscapes.

Target	Baseline	Monitoring	3 to 5 Year Target	Target - 2020
Improve sites Ecological value		Ecologist report		
Protect existing ecological value		Ecologist report		
-	-	-	-	-

## Design Strategy

Category	Strategy	Description	Metric	Status 1015	Comment - 121015
Ecological value of site	It is a brownfield site	Undertake an Ecological Study	Report	Report not undertaken - site was previously occupied by a shed	
Protecting habitat and species	Ensuring that the Ecological value of the site is improved after the building's inception.	This will primarily be achieved by, reducing rainwater runoff and naturally filtering the runoff that does occur.			
Habitat creation	Bird boxes	Install local bird landing on roof or a	Number of them	none installed as not possible to fix them to the structure	

## Operations strategy

Category	Strategy	Description	Metric	Status - 1015	Comment 121015
Habitat creation	Planting flowering plants for bees			Planted e.g. jasmine	
Management and maintenance	Follow basic biodiverse gardening principles:	e.g. no use of pesticides or fertilisers			

Offsite	Support global need for 20-30% of biologically productive land for nature			Supporting offsite initiatives, e.g.: planting fruit trees locally	

# Culture and Community

## Principle Vision

One Planet vision is one where a culture of sustainability, community and a sense of place has been built using local cultural heritage to foster social capital and connectedness.

Target	Baseline Monitoring	3 to 5 Year Target	Target - 2020
Promote a culture of sustainability			

## Design Strategy

Category	Strategy	Description	Metric	Status - 1015	Comment 121015
Local materials	Identify any local materials and products that can be used	Timber within state			
		Furniture maker - 3 blocks away			
Publicity and tell story					
Heritage features	uncover laneway	Bluestone had been bitumened over		Complete	

## Construction Strategy

Category	Strategy	Description	Metric	Status - 1015	Comment 121015
Culture of sustainability					
Arts	Photo record	Take photos and make publicly available		5280 images - not yet available	



Neighbourliness	minimise nuisance of construction process	Keep neighbours informed	number of complaints	2 complaints - minor and both resolved	

## Operations strategy

Category	Strategy	Description	Metric	Status 1015	Comment 121015
local culture	Enhance and revive valuable aspects of local culture and heritage.	Ralph to research and assess local heritage and display on website and external wall or fence at site.	Number of displays via web or signage	Not started yet	
Sense of place	Develop engagement plan with community involvement	Will cover: archaeology architecture public art A commitment of time or funds to be made to implement the plan		Not started yet	
Community level education	Community level education	Hold community events during the year. (Kick-off party, 2 x events throughout the year, and an Openhaus event). Engage local immigrant population	4 Events to be held per year.	3 held in 2015 - 2 local councils attended	
Neighbourliness	minimise nuisance of events				
Art		Investigate possibility of showcasing local Indigenous artwork			
Culture of sustainability	Promote One Planet Living and sustainability	Follow all opportunities to promote more the project and sustainable living		Projects to date: - Website - Grand Designs - Visits - Article in the E. Melb Community magazine	
		Make all data and information from the project publicly available - share information on the process and what has been learnt	see website	Speaking at Melbourne University - at a technical level as built the project Pursuing consulting opportunities	

# Equity and Local Economy

## Principle Vision

One Planet vision is where thriving, diverse and resilient local economies support fair employment, inclusive communities and international fair trade.

Target	Baseline	Monitoring	3 to 5 Year Target	Target - 2020
50% of workers to reside within 10km of either Arkit factory in Sunshine, or East Melbourne project site.				
All community and open-house events to be catered using fair-trade food.				
Support local NGOs				

## Design Strategy

Strategy	Strategy	Description	Metric	Status 1015	Comment 121015
Support and promote local / small businesses	Support and promote local / small businesses	Source workers from local firms. Potentially look at assisting disadvantaged groups through work placements etc.	50% of workers to reside within 10km of either Arkit factory in Sunshine, or East Melbourne project site.	Most people employed were local (head carpenter within 3km)	Great

## OPERATION

Strategy	Strategy	Description	Metric	Status 1015	Comment 121015
"Fair Trade"	Support and Promote "Fair Trade"	All community and open-house events to be catered using fair-trade food. Ralph to buy fair-trade where practicable	Receipts to show proof of purchase	All events in 2015 used fair trade	
Local NGOs	Support and promote not-for-profit organisations	Ralph to engage and promote local not-for-profit organisations	Number of not-for-profit organisations within X-kms of site	How to measure progress?	
Inclusiveness	Inclusiveness	Design house for high levels of accessibility.	Incorporate lift in order to allow for disabled access and to add to : future proofing" of building	Not installed - too large for the building - no lift	

Participation	Participation	Develop participation plan by 2 months after the one Planet Rio 2012 summit. Develop video for One Planet conference in Rio. Exploiting other participation opportunities - such as Grand Designs	Participation plan to be developed.	Cancelled as not ready in time to be aired in November 2015	
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# Health and Happiness

## Principle Vision

One Planet vision is a future where its easy, attractive and affordable for people to lead happy and healthy lives within earth's resources.

Target	Baseline	Monitoring	3 to 5 Year Target	Target - 2020
Sense of community - neighbours know by name				
Survey to be conducted to ascertain the mental and physical health of residents - % spent on health				
	-	-	-	-

## Design Strategy

Category	Strategy	Description	Metric	Status - 1015	Comment
Healthy internal environment	Utilise natural ventilation	Provide openable windows or automated louvres in order to aid indoor air quality.	Ventilation openings to amount to an area equal or greater than 10% of floor area	Installed	
	High frequency Lighting	Specify efficient LED lighting	All Lighting to be LED.	Installed	
	Maximisation of Natural Daylight Levels	Maximise natural daylight levels for internal spaces, in order to generate positive health and productivity benefits for building occupants	90% GFA to have DF>3%	Achieved	
	Built environment CPTED	GHD to abide by "Safety in Design" internal design procedure CPTED methodology on designing out crime to be incorporated into 5x4 design process	GHD to provide signed safety-in-design internal QA form.	Achieved	

## Construction

Category	Strategy	Description	Metric	Status - 1015	Comment
Safety		Ensure construction process follows environmental management plan (EMP) and ARKit OH&S policy.	100% Commitment	Achieved	

## OPERATION

Category	Strategy	Description	Metric	Status - 1015	Comment
Lifestyles and community	Lifestyles and community	Educational Courses to be arranged throughout the year 4 Events to be offered per year on the following topics: -Open House -Energy Efficiency -Water Efficiency -Sustainable food	number of events	3 held in 2015	
Well-being	Two showcase initiatives aimed to support people in improving their well-being.	Ralph to showcase his living and consumption habits via website. GHD to lecture at property council event (or similar) on the 5x4 initiatives.	2 Initiatives		
	Sense of community	Interaction with the local community	Survey of neighbours known by name	Knows - most of the community! Survey of names to be held	