
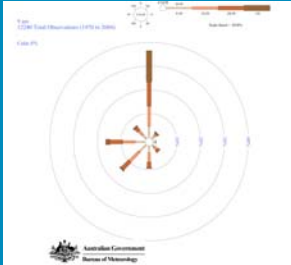



# Site Description

- Located in Yarra Ranges, near Melbourne Australia
- 6 acre, pre-landscaped site
- The house is oriented at 45 degrees to the landscaping- different themes and zones of landscaping codify and disguise the house
- Climate
  - Temperature: ranges from 51° - 75°
  - Wind- from the North, blows about 48-67% of the year
  - Elevation- 35 meters above sea level (115ft)
  - Rainfall- about 1.8" to 2.6"/month
    - Total: about 24"/yr



	65	62	58	49	46	52	62	63	67	66	64	67	60
Wind probability >= 4 Beaufort (%)	14	13	12	12	11	12	14	14	15	14	13	14	13
Average Wind Speed (Knots)	24	22	21	18	14	11	11	12	15	17	20	22	17
Average Airtemp. (°C)													

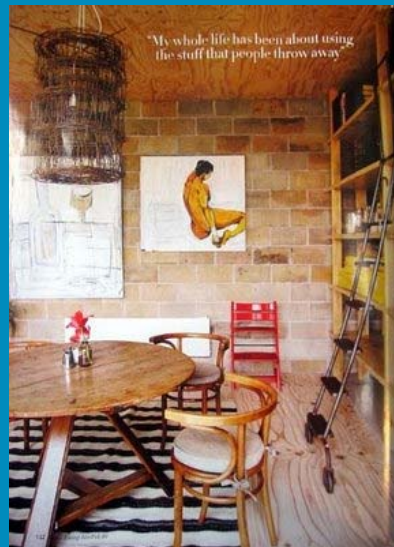
## Building Description

- Two pre-fabricated steel sheds with straw bale walls and roof.
- The house has an autonomous water supply, water recycling system and solar power and hot water generation.
- The house is large due to the integration of workshop and studio space- 7,900 sq ft
- Large roof area over 900 m2 (9687 sq ft) specifically intended for the collection of rain water, enough to provide for all usage within the house and workshop.
- A series of water storage tanks are located downhill from the building and these tanks supplement the reticulated potable water supply
- All organic waste and water goes into an 8000L tank filled with worms for treatment, then is reused in the garden



## Material Description

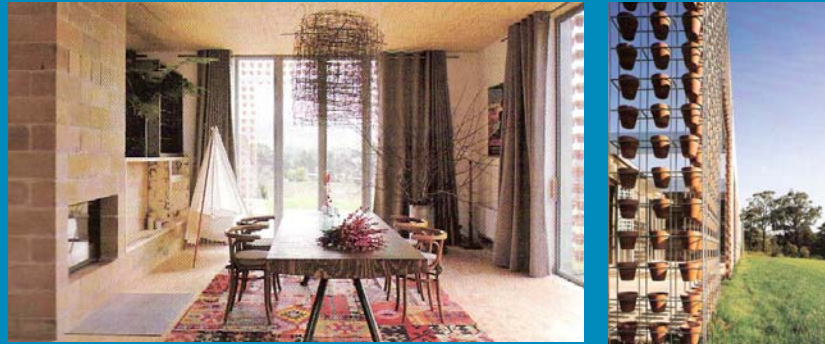
- All of the materials used in the house are recyclable or recycled
  - Recyclable, external galvanized reinforcement mesh wall that houses 7140 terracotta pots. The pots will contain various plants depending on the orientation, location and degree of shading.
  - All non- load bearing walls use reclaimed structurally flawed concrete block
  - Plywood sheathing, straw bale insulation
  - Wood planks on the exterior from Sydney's Woolloomooloo Wharves
  - Shelves, cabinetry, beds and front door from plywood crates used to hold mining equipment
  - Exterior uses galvanized, corrugated iron with zinc coating that can also be extracted and recycled
  - Wood is sealed with store bought soap, tradition from Scandinavia
  - Light fixtures made of rusty fencing around halogen bulbs





Reasons: Site

- **Cleans air (50):** because of the integration of plants into the building and site.
- **Cleans water (100):** because they have a filtration system that filters rainwater and all grey and black water
- **Harvests rainwater (100):** because they have a green roof as well as water storage tanks to collect and store runoff that is used on site.
- **Resides on a green field (-100):** because it is a site with new construction
- **Produces food (25):** because strawberries are grown in the terracotta pots.
- **Creates rich soil (50):** because the building doesn't create much hardscape, and its green roof reduces the amount of hardscape even more. The site is fully landscaped, but we are unsure if pesticides and harmful fertilizers are used.



Reasons: Site

- **Uses wastes as resources (100):** because it uses many reclaimed products and recycles all grey and black water.
- **Creates a wildlife habitat (50):** because the interior of the house does not provide this, but the green roof and exterior skin of the building do. Also, the treatment tank provides a large habitat for worms.
- **Integral to the site (75):** because they oriented the building in a way to interact with the landscape, but we aren't sure about its interaction with the sun.
- **Decreases density (-100):** because it is on a 6 acre lot out in urban area so it increases sprawl.
- **Promotes fuel powered transportation (-75):** because it is located in more of a rural setting and people will need to rely on fuel-powered means of transportation. Also, it is also a 6 acre site so people may need a form of transportation to get around.
- **Creates comfortable micro-climates (100):** because it doesn't mitigate the heat island effect by being in a rural area and incorporating many plants that increase oxygen levels around the site. Also, the straw bales are good insulators and the interior uses untreated movers felt as curtains which don't allow any heat to leave the windows.



## Reasons: Building

- **Optimizes building size (75):** because it has two large workshops as part of the house that is included in the square footage. A large roof area provides adequate rainwater for the house and workshops.
- **Uses natural light efficiently (75):** because it has many windows and uses the vertical plantings as shading in some situations. There are open spaces in the interior with reflective surfaces that allow the light to penetrate deep into the space.
- **Uses passive heating and cooling (100):** because there is cross ventilation through the windows. The hay bale construction and the curtains act as good insulators.
- **Balanced performance (0):** because there is no proof of it not performing, but we know that the water catchment and the solar power works.
- **Encourages user control of systems (100):** because the windows, shading devices and electric lighting are all operable. Unfortunately, since this house is user controlled, all of the plants must be hand potted.
- **Enhances human comfort (75):** because there is quite a bit of natural daylight and vegetation around the home. However, the materials used may not conform to everyone's aesthetic preferences.



## Reasons: Building

- **Uses highly efficient equipment (75):** because it doesn't use city water, it treats all of its grey and black water, uses solar power and solar hot water generation. We don't know the specific efficiencies of the other appliances and fixtures, but assume they save energy and water.
- **Uses benignly powered circulation (100):** because it is only one level and doesn't need any elevators, ramps or escalators.
- **Enhances indoor air quality (100):** because the plants surrounding the building cleanse the air before it enters the home.
- **Maintains itself (75):** because the flower pots are water with a drip system and since the materials are recycled, it is ok if they start to look weathered.
- **Uses carbon-sequestering materials (100):** because the plants sequester the carbon and the materials have low emissions.
- **Designed for disassembly (100):** because it is a prefabricated house that is easy to put up and take down. The materials are all supposed to be recyclable so this means they can be easily used in a different setting.
- **Uses materials carefully (100):** because great care was given to the types of material used and it is supposed to be an inexpensive house. The aesthetic throughout the house seems to use the bare minimum (plywood ceilings and CMU block walls)
- **Can be recycled or reused (100):** because it is made of completely recyclable materials and a lot of the materials used are being recycled from another use.

## Reasons: Culture

- **Serves as an icon for regeneration (75):** because all the materials used in the building are either recycled or recyclable. Australian plywood is used in this building and it is recyclable, but in order for them to use it in this building, trees had to be cut down.
- **Balanced community interaction (0):** because it is a private residence and doesn't invite people to come explore it, but its feature in Interior Design magazine exposes it to the community and world.
- **Socially and ecologically inclusive (75):** because socially, it is a private place and it doesn't invite people in, but ecologically it integrates nature.
- **A good neighbor (100):** because it is a large site and is well landscaped. Also, it uses energy well.
- **Sublimely beautiful (75):** because it is unconventionally beautiful.



## Redesign

- Overall, building is very sustainable in its materials, construction and some of its strategies.
- Things to change:
  - Negative Values- some are hard to change without completely relocating the building
    - Serves Few
    - Is built on a greenfield
    - Decreases density
    - Encourages fuel-powered transportation
  - Balanced Values-
    - Neither imports or exports energy
    - Neither disregards or monitors and improves performance
    - Neither discourages or encourages community interaction

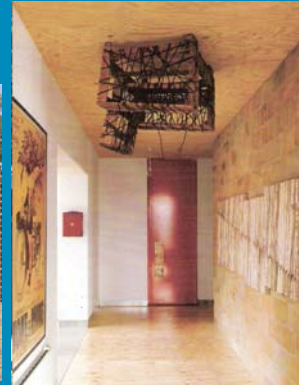
Redesign Strategies

1. **Problem: Serves few**

Solution: Use the workshops to create multifamily dwellings on the site

2. **Problem: Encourages fuel powered transportation**

Solution: While we cannot change its location, we can create a bike path on site to allow for transportation throughout the site



Redesign Strategies

3. **Problem: Neither discourages or encourages community interaction**

Solution: The site already has a garden that supplies flowers to his shop. By making this garden a public walking garden and possibly holding classes on flower arranging, gardening, or sustainability, the residence would invite more community interaction and would also serve more people.

4. **Problem: Produce more food**

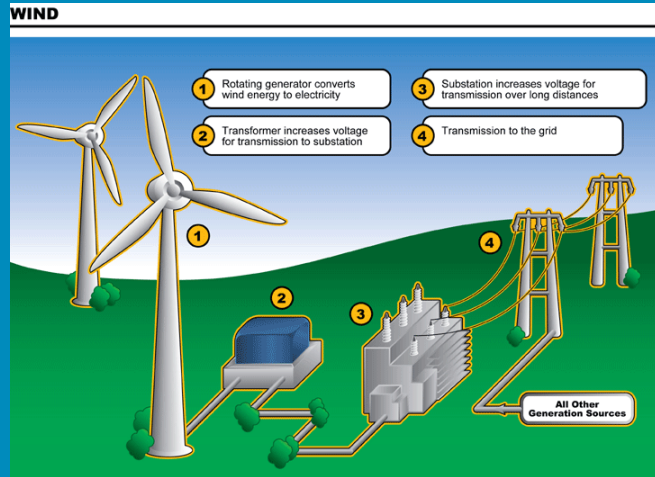
Solution: Plant a produce garden on site. By doing this, the Bakker's will help enrich the soil and also have produce that they can sell at an onsite farmer's market or consume themselves. The farmer's market will also encourage more community interaction.



Redesign Strategies

5. Problem: Neither imports or exports energy

Solution: Install wind turbines. With the site being windy approximately 50% of the time, the Bakker's can harvest this wind to send energy back to the grid.



New Checklist

Regeneration-Based Checklist for Carbon-Neutral, Zero Net Energy Design and Construction

Project: \_\_\_\_\_ © 2008 © Gustaf Ols 2008

	degeneration		sustainability				regeneration		
	100 always	75 usually	50 sometimes	25 a lot	0 elements	25 a lot	50 sometimes	75 usually	100 always
<b>Energy</b>									
consumes energy disproportionately									consumes energy equitably
serves few									serves many
differentiates man-made and natural									correlates man-made and natural
imports all its energy									exports energy from site
emits carbon									sequesters carbon
pollutes air									cleans air
pollutes water									cleans water
wastes wastewater									harvests wastewater
is built on a greenfield									is built on a brownfield
consumes food									produces food
destroys rich soil									creates rich soil
dumping wastes unrecd									uses wastes as resources
destroys wildlife habitat									provides wildlife habitat
lacks site integration									is integral to the site
decreases density									increases density
promotes fuel-powered transportation									promotes pedestrian and transit access
creates uncomfortable micro-climates									creates comfortable micro-climates
ignores building size issues									optimizes building size
excludes natural light									uses natural light effectively
uses mechanical heating and cooling									uses passive heating and cooling effectively
is unconcerned with performance									monitors and improves performance
discourages user control of systems									encourages user control of systems
produces human discomfort									enhances human comfort
uses inefficient equipment									uses highly efficient equipment
uses non-renewable fuel-powered circulation									uses benignly powered circulation
pollutes indoor air									enhances indoor air quality
needs cleaning and repair									maintains itself
uses high-carbon materials									uses carbon-sequestering materials
is designed for demolition									is designed for disassembly
uses materials wastefully									uses materials carefully
cannot be recycled or reused									can be recycled or reused
serves as an icon for the apocalypse									serves as an icon for regeneration
discourages community interaction									encourages community interaction
is socially and ecologically exclusive									is socially and ecologically inclusive
is a bad neighbor									is a good neighbor
is cresty ugly									is sublimely beautiful

negative score 3700 possible -325

positive score 3700 possible 2750

**Final score: 2425**



## Conclusion

We found that although Joost Bakker's house is already a great example of sustainable architecture, there were a few things that could be changed to make it better.

By implementing a bike path, public garden, produce garden, and wind turbines, we were able to raise Joost Bakker's house **1275 points** to a total of **2425** on the SBSE checklist.

