

Case Study #3: A Sustainable Site & Building

Brooks Boyer, Leah Bafus, &
Elizabeth Vos

Building Description



The CORE 9 home, specifically designed for the Australian climate, incorporates many sustainable design strategies, balancing optimal energy efficiency, material sustainability and affordability.

CORE=
Carbon Positive
Zero Waste
Recyclability
Economics

Location: Cape Paterson, Australia

Q A.1 Sustainability

SBSE Graph with imputed data from the Core 9 house.

Regeneration-Based Checklist for Design and Construction Chesapeake Bay Foundation © SBSE @ Tadoussac 1999												
Project:		Headquarters										
		degeneration			sustainability			regeneration				
		-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always		
the site	pollutes air										cleans air	
	pollutes water										cleans water	
	wastes rainwater										stores rainwater	
	consumes food										produces food	
	destroys rich soil										creates rich soil	
	dumpes wastes unused										consumes wastes	
	destroys wildlife habitat										provides wildlife habitat	
	imports energy										exports energy	
	requires fuel-powered transportation										requires human-powered transportation	
	intensifies local weather										moderates local weather	
	excludes daylight										uses daylight	
	uses mechanical heating										uses passive heating	
	uses mechanical cooling										uses passive cooling	
	needs cleaning and repair										maintains itself	
produces human discomfort										provides human comfort		
the building	uses fuel-powered circulation										uses human-powered circulation	
	pollutes indoor air										creates pure indoor air	
	is built of virgin materials										is built of recycled materials	
	cannot be recycled										can be recycled	
	serves as an icon for the apocalypse										serves as an icon for regeneration	
	is a bad neighbor										is a good neighbor	
	is ugly										is beautiful	
		negative score 2200 possible			positive score 2200 possible							
		-200			+825							
		final score:			625							

Pollutes air/ Cleans Air 0

- Balanced- doesn't clean nor pollute
- Plants clean the air



Pollutes water/ cleans water +25

- Balanced- site does not have a retention pond or green roof
- solar hot water, and rain water harvesting



Stores rainwater +100

- Rainwater harvesting help reduce household utility bills
- solar hot water, and rain water harvesting



Consumes food -100

- No food produced on site
- Any food consumed is brought in from off site

Creates rich soil -25

- Balanced. Ruins soil where the building footprint lies, maintains soil through its landscaping

Consumes waste +100

- Zero waste by adapting design to use standard recycled materials
- Ability to be up-cycled also avoids construction waste contributing to landfill



[Upcycling]

- ✓ Conserves the environment
- ✓ Reforms a product into a **new product**
- ✓ **Unlimited** available usage of raw materials

- ✓ Better quality
- ✓ Designed unique
- ✓ Handmade
- ✓ Limited editions



[Recycling]

- ✓ Conserves the environment
- ✓ Reforms a product into a **material**
- ✓ **Limited** available usage of raw materials
- ✓ Requires processes to break down the original materials

Destroys wildlife habitat -50

- Bare landscaping, no trees or other plants to provide for habitats

Exports energy 0

- generates enough clean energy to sustain itself and a surplus to feed back to the grid. The CORE 9 will pay homeowners \$90 year to operate rather than cost in energy bills.

Requires fuel-powered transportation/ Requires human-powered transportation 0

- Family can have cars
- Man powered window openings

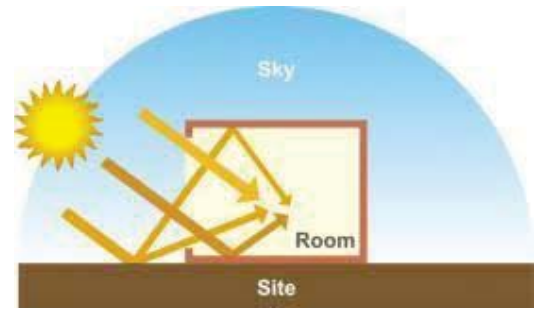


Intensifies local weather/ Moderates local weather 0

- Neither, surrounding landscape is bare besides native plantings
- No neighbors or surrounding asphalt

Uses Daylight +75

- The design was adapted to increase the northern light
- the inverted roof truss allows more light into the building



Uses mechanical heating/Uses Passive heating +75

- eliminated wasted space (such as hallways and entrance areas) reducing construction costs as well as heating and cooling load

Uses passive cooling +75

- maximise cross ventilation
- Truss system, opening large windows

Maintains itself +75

- low maintenance and compact three-bedroom design can be adapted for energy ratings
- ensure minimal maintenance and longevity



Produces human discomfort/Provides human comfort +75

- suitable for the modern family, with three bedrooms, two bathrooms and opening plan living areas.



Uses fuel-powered circulation/Uses human-powered circulation +50

- Floor plan used to maximise cross ventilation
- Large man opening windows
- Ceiling fans



Pollutes indoor air/Creates pure indoor air 0

- Balanced- exterior plants may help improve air quality
- Zero waste contributes to a balanced air quality



Is built of recycled materials +75

- Through environmentally friendly building products, the impact of the construction on the environment has been reduced
- Each component to be manufactured with recycled content to reduce raw material extract, with the ability to be recycled, up-cycled or re-processed after use

Cannot be recycled/Can be recycled +75

- Selection of materials which are recycled or have the ability to be up-cycled also avoids construction waste contributing to landfill.



Serves as an icon for regeneration +25

- ensure minimal maintenance and longevity
- Sustainable materials



Is a bad neighbor/Is a good neighbor 0

- Balanced- bad because of its appearance but good because of its material sustainability and optimal energy efficiency

Is ugly/Is beautiful -25

- Back looks similar to a shipping container



Regeneration-Based Checklist for Design and Construction
Chesapeake Bay Foundation © SBSE @ Tadoussac 1999

Project: **Headquarters**

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negative score: 2200 possible: **-200** positive score: 2200 possible: **+825**

final score: **625**

Q A.2 Sustainability

52/69 points totaled in favor for the Core 9 house. A majority of "No's" came from the Sustainable Sites category. That is one thing we aim to better in our redesign is some site improvements.

Same documentation analysis from the previous SBSE charting as does for this LEED charting.

LEED-NC
LEED-NC Version 2.2 Registered Project Checklist
 << enter project name >>
 << enter city, state, other details >>

8 | 6 Sustainable Sites 14 Points

Prereq	1	Construction Activity Pollution Prevention	Required
Credit 1	Y	Site Selection	1
Credit 2	N	Development Density & Community Connectivity	1
Credit 3	N	Brownfield Redevelopment	1
Credit 4.1	Y	Alternative Transportation, Public Transportation Access	1
Credit 4.2	Y	Alternative Transportation, Bicycle Storage & Changing Rooms	1
Credit 4.3	Y	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehi	1
Credit 4.4	Y	Alternative Transportation, Parking Capacity	1
Credit 5.1	N	Site Development, Protect of Restore Habitat	1
Credit 5.2	Y	Site Development, Maximize Open Space	1
Credit 6.1	Y	Stormwater Design, Quality Control	1
Credit 6.2	Y	Stormwater Design, Quantity Control	1
Credit 7.1	Y	Heat Island Effect, Non-Roof	1
Credit 7.2	Y	Heat Island Effect, Roof	1
Credit 8	N	Light Pollution Reduction	1

5 | Water Efficiency 5 Points

Credit 1.1	Y	Water Efficient Landscaping, Reduce by 50%	1
Credit 1.2	Y	Water Efficient Landscaping, No Potable Use or No Irrigation	1
Credit 3	Y	Innovative Wastewater Technologies	1
Credit 3.1	Y	Water Use Reduction, 20% Reduction	1
Credit 3.2	Y	Water Use Reduction, 30% Reduction	1

13 | 2 Energy & Atmosphere 17 Points

Prereq	1	Fundamental Commissioning of the Building Energy Systems	Required
Prereq 2	Y	Minimum Energy Performance <td>Required</td>	Required
Prereq 3	Y	Fundamental Refrigerant Management <td>Required</td>	Required
Credit 1	10	Optimize Energy Performance <td>1 to 10</td>	1 to 10
Credit 2	3	On-Site Renewable Energy <td>1 to 3</td>	1 to 3
Credit 3	N	Enhanced Commissioning <td>1</td>	1
Credit 4	N	Enhanced Refrigerant Management <td>1</td>	1
Credit 5	Y	Measurement & Verification <td>1</td>	1
Credit 6	Y	Green Power <td>1</td>	1

10 | 3 Materials & Resources 13 Points

Prereq	1	Storage & Collection of Recyclables	Required
Credit 11	N	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
Credit 12	N	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof	1
Credit 13	N	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
Credit 21	Y	Construction Waste Management, Divert 50% from Disposal	1
Credit 22	Y	Construction Waste Management, Divert 75% from Disposal	1
Credit 3.1	Y	Materials Reuse, 5%	1
Credit 3.2	Y	Materials Reuse, 10%	1
Credit 4.1	Y	Recycled Content, 10% (post-consumer + ½ pre-consumer)	1
Credit 4.2	Y	Recycled Content, 20% (post-consumer + ½ pre-consumer)	1
Credit 5.1	Y	Regional Materials, 10% Extracted, Processed & Manufactured F	1
Credit 5.2	Y	Regional Materials, 20% Extracted, Processed & Manufactured F	1
Credit 6	Y	Rapidly Renewable Materials	1
Credit 7	Y	Certified Wood	1

12 | 3 Indoor Environmental Quality 15 Points

Prereq	1	Minimum IAQ Performance	Required
Prereq 2	Y	Environmental Tobacco Smoke (ETS) Control	Required
Credit 1	Y	Outdoor Air Delivery Monitoring	1
Credit 2	Y	Increased Ventilation	1
Credit 3.1	N	Construction IAQ Management Plan, During Construction	1
Credit 3.2	N	Construction IAQ Management Plan, Before Occupancy	1
Credit 4.1	Y	Low-Emitting Materials, Adhesives & Sealants	1
Credit 4.2	Y	Low-Emitting Materials, Paints & Coatings	1
Credit 4.3	Y	Low-Emitting Materials, Carpet Systems	1
Credit 4.4	Y	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
Credit 5	N	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Y	Controllability of Systems, Lighting	1
Credit 6.2	Y	Controllability of Systems, Thermal Comfort	1
Credit 7.1	Y	Thermal Comfort, Design	1
Credit 7.2	Y	Thermal Comfort, Verification	1
Credit 8.1	Y	Daylight & Views, Daylight 75% of Spaces	1
Credit 8.2	Y	Daylight & Views, Views for 90% of Spaces	1

4 | 1 Innovation & Design Process 5 Points

Credit 1.1	Y	Innovation in Design, exemplary green power	1
Credit 1.2	Y	Innovation in Design, exemplary construction waste management	1
Credit 1.3	Y	Innovation in Design, exemplary renewable energy	1
Credit 1.4	Y	Innovation in Design, exemplary upcycled materials	1
Credit 2	N	LEED Accredited Professional	1

52 | Project Totals (pre-certification estimates) 88 Points

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-68 points

Q A.3 Sustainability

The CORE 9 home achieves many of its sustainability goals as:

- it generates all of its own clean energy through solar panels
- avoids construction wastes by using recycled materials or allowing for materials to be upcycled
- incorporates rain water harvesting

Q B.1 Sustainability Redesign

In order for the Core 9 house to better meet its goals for a greener building it needs help in the areas of: **producing food, creating rich soil, providing wildlife habitat** (all within the category of Site Design/Sustainable Site), **creating pure indoor air, and being beautiful** (from the category of The Building). In order to do those things, we have decided to:

- Create a compost which will help richen the soil which will make it easier to produce food on the site.
- Landscaping to also help enrich the soil, create habitats for wildlife, create a more moderate weather, make the house more beautiful form the outside, and clean more exterior air.
- Vent all mechanical equipment to the outside of the house such as dishwashers, washer/dryers, HVAC systems in order to increase the quality of the indoor air.



Q B.3 Sustainability Redesign

(3) Summarize how well your redesigned case study building now achieves its sustainability goals.

Compost

Landscaping

Exterior/Interior Vents

By adding these elements, the soil will be enriched and users will be able to see a noticeable difference in wildlife on site. The landscaping will also create more pleasant views and increase the overall beauty of the project.

Conclusion

From this lab, we learned that it is equally as important to maintain the site and take it into consideration just as much as the building itself. Specific aspects of the site can greatly affect how sustainable the project is. For example, the soil, wildlife habitat, and pollution of the air and water on site have the potential to change the project from a degenerative one to a regenerative one.
