Rating Systems and SBTool

Nils Larsson
The International Initiative for a Sustainable Built Environment

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Performance

- To improve building performance, we must first be able to measure it;
- Measuring energy or water consumption or indoor air quality during operations is relatively easy;
- At the design stage, energy can be predicted by simulation programs, and other parameters can be roughly predicted by following standards or by the type of equipment used;
- Given the popularity of “green” or “sustainable” we want to assess a wide range of performance, at design stage and during operations;
- The kinds of performance parameters relevant to green or sustainable building include the following:

A practical definition of specific performance aspects relevant to GB and SB

- Fuel consumption of non-renewable fuels
- Water consumption
- Land consumption
- Materials consumption
- Greenhouse gas emissions
- Other atmospheric emissions
- Impacts on site ecology
- Solid waste / liquid effluents
- Indoor air quality, lighting, acoustics
- Longevity, adaptability, flexibility
- Operations and maintenance
- Social and economic considerations
- Urban / planning issues

Green Building

Sustainable Building

Performance Rating Systems

- If we want to have an overall understanding of such a broad range of performance issues, we must make an overall assessment of performance;
- This means that we must develop an understanding of the relative importance of issues (e.g. air quality relative to emissions) as well as being able to estimate performance levels of specific issues;
- To meet this need, performance rating systems, such as BREEAM, LEED or CASBEE were developed;
- The early systems, BREEAM and LEED, started as checklists of what to do and what not to do;
- They rapidly developed into systems that awarded points for the achievement of various specific achievements;

Performance Rating Systems

- Since some issues were awarded more points than others (more for good air quality than for bicycle parking), these systems also include embedded weightings of importance;
- The advantage of such systems is simplicity, but the disadvantage is that the weightings of relative importance tend to be developed for one location, but then used in many others;
- Similarly, benchmarks of what is considered good performance also tend to have limited regional application;
- SBTool follows a different model.

SBTool

- The SBTool system is a rating framework or toolbox, designed to allow countries to design their own locally relevant rating systems;
- SBTool is designed to include consideration of regional conditions and values, in local languages, but the calibration to local conditions does not destroy the value of a common structure and terminology;
- SBTool produces both relative and absolute results;
- The system is therefore a very useful international benchmarking tool, one that provides signals to local industry on the state of performance in the region, while also providing absolute data for international comparisons;

Green Building Challenge and SBTool

- Through the work of more than 20 countries, iiSBE has developed the SBTool (formerly GBTool) international rating framework;
- The system has been largely developed through the Green Building Challenge (GBC) process, which extended from 1995 to 2005;
- National teams participated in the development of the method and tested it on case study buildings in their own countries;
- Teams then presented results at international SB conferences;
- Work by iiSBE has continued and a totally re-structured version has now been completed;
- The system is now called SBTool, reflecting the inclusion of a range of socio-economic variables.

SBTool Structure

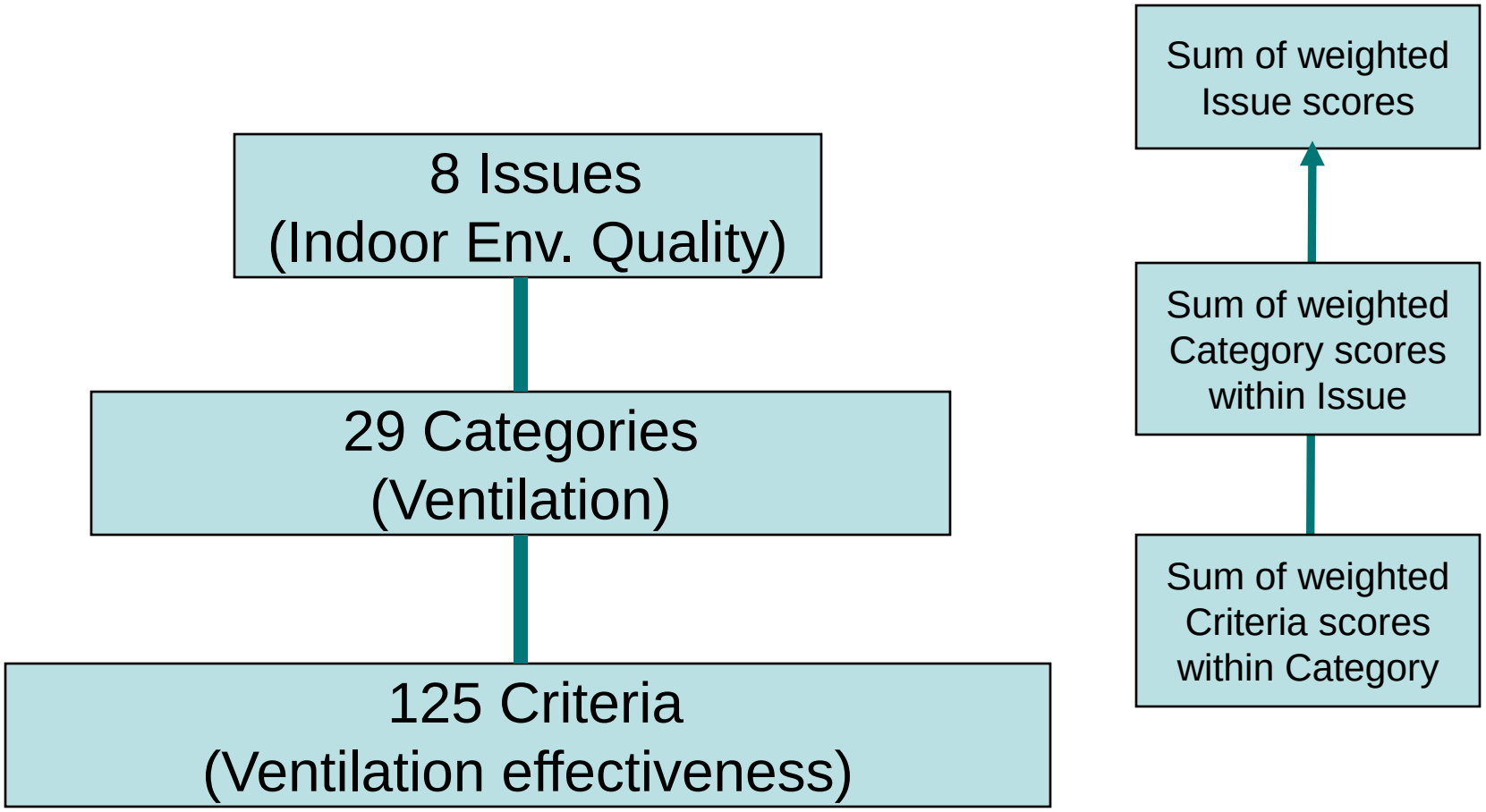
2007 SBTool - Features

- **Very important to note:** the system is a rating framework or toolbox and only becomes a rating tool after a third party calibrates it for their region by defining scope and setting weights, context and performance benchmarks;
- The system is totally modular in scope;
- It is set up to allow easy insertion of local criteria and/or language;
- It handles all four major phases;
- … new and renovation projects;
- … up to three occupancy types in a single project;
- SBTool provides relative and absolute outputs.

Basis of SBTool

- The system contains three levels of parameters that nest within each other; Issues, Categories and Criteria;
- Criteria are scored according to the following scale:
  -1 = Deficient
  0 = Minimum acceptable performance
  +3 = Good Practice
  +5 = Best practice
- Criteria scores are weighted;
- Category scores are the total of weighted Criteria scores;
- Issue scores are the total of weighted Category scores.

Structure and Scoring



A	**Site Selection, Project Planning and Development**
A1	Site Selection
A2	Project Planning
A3	Urban Design and Site Development
B	**Energy and Resource Consumption**
B1	Total Life Cycle Non-Renewable Energy
B2	Electrical peak demand for facility operations
B3	Renewable Energy
B4	Materials
B5	Potable Water
C	**Environmental Loadings**
C1	Greenhouse Gas Emissions
C2	Other Atmospheric Emissions
C3	Solid Wastes
C4	Rainwater, Stormwater and Wastewater
C5	Impacts on Site
C6	Other Local and Regional Impacts
D	**Indoor Environmental Quality**
D1	Indoor Air Quality
D2	Ventilation
D3	Air Temperature and Relative Humidity
D4	Daylighting and Illumination
D5	Noise and Acoustics
E	**Service Quality**
E1	Safety and Security During Operations
E2	Functionality and efficiency
E3	Controllability
E4	Flexibility and Adaptability
E5	Commissioning of facility systems
E6	Maintenance of Operating Performance
F	**Social and Economic aspects**
F1	Social Aspects
F2	Cost and Economics
G	**Cultural and Perceptual Aspects**
G1	Culture & Heritage
G2	Perceptual

Issues and Categories are the highest level of parameters.

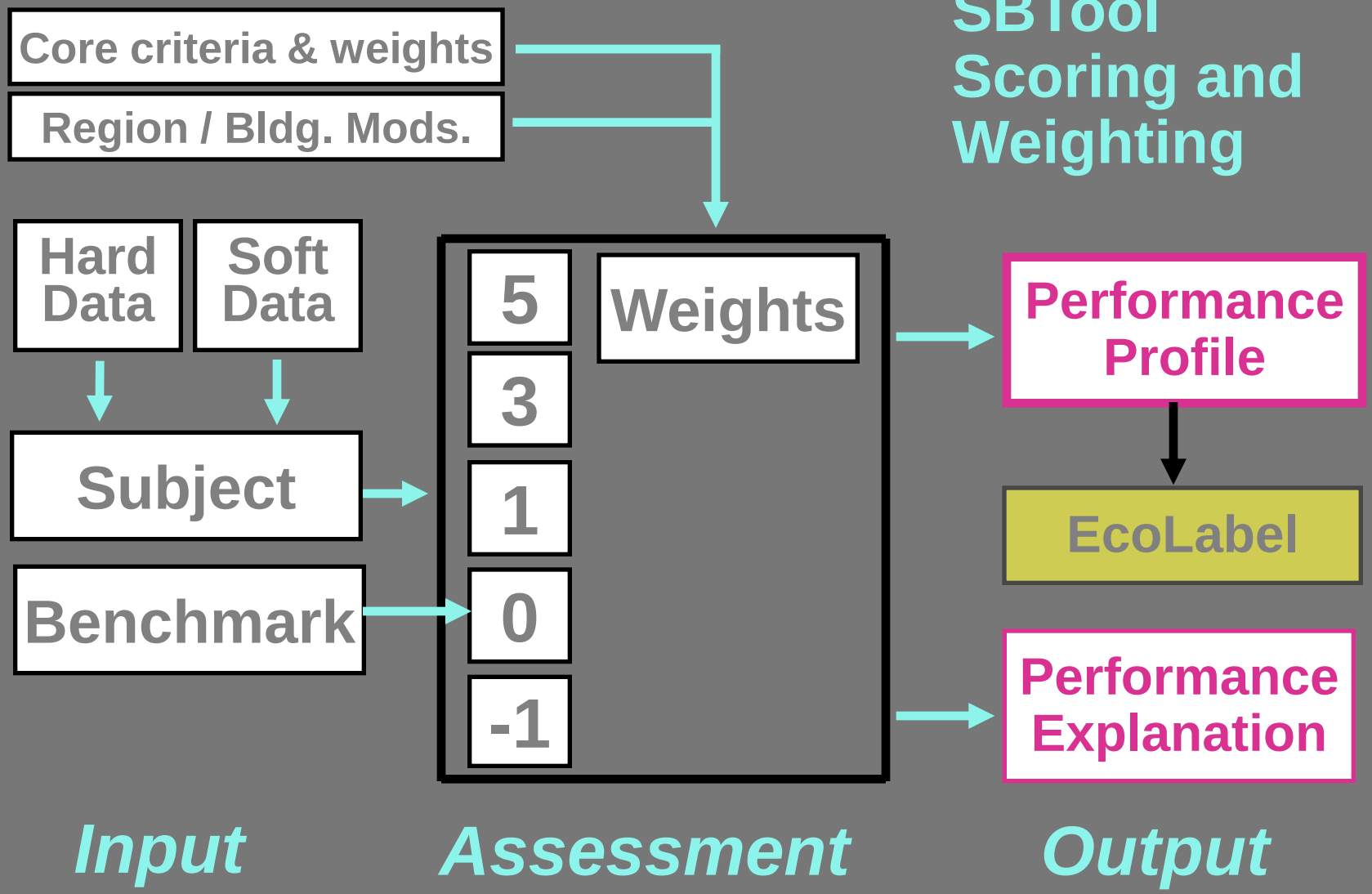
Master List of SBTool Parameters

02 September 2006

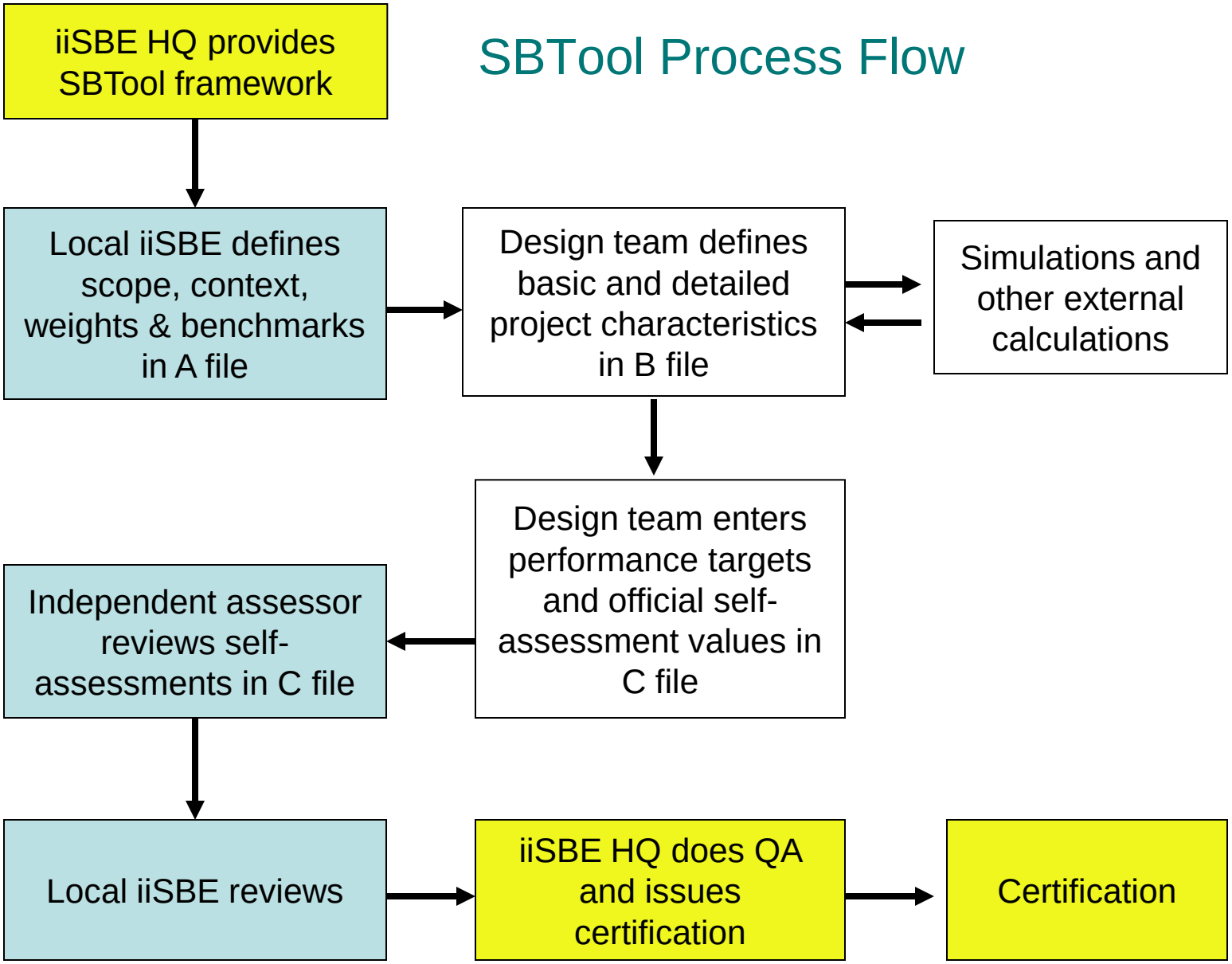
		Phase active			
		P-Dsn	Dsn	C&C	Ops
A	**Site Selection, Project Planning and Development**				
A1	**Site Selection**				
A1.1	Pre-development ecological value or sensitivity of land.	■	■		
A1.2	Pre-development agricultural value of land.	■	■		
A1.3	Vulnerability of land to flooding.	■	■		
A1.4	Potential for development to contaminate nearby bodies of water.	■	■		
A1.5	Pre-development contamination status of land.	■	■		
A1.6	Proximity of site to public transportation.	■	■		
A1.7	Distance between site and centres of employment or residential occupancies.	■	■		
A1.8	Proximity to commercial and cultural facilities.	■	■		
A1.9	Proximity to public recreation and facilities.	■	■		
A2	**Project Planning**				
A2.1	Feasibility of use of renewables.	■	■		
A2.2	Use of Integrated Design Process.	■	■		
A2.3	Potential environmental impact of development or re-development.	■	■		
A2.4	Provision of surface water management system.	■	■		■
A2.5	Availability of potable water treatment system.	■	■		■
A2.6	Availability of a split grey / potable water system.	■	■		■
A2.7	Collection and recycling of solid wastes in the community or project.	■	■		■
A2.8	Composting and re-use of sludge in the community or project.	■	■		■
A2.9	Site orientation to maximize passive solar potential.	■	■		
A3	**Urban Design and Site Development**				
A3.1	Development density.	■	■		
A3.2	Provision of mixed uses within the project.	■	■		■
A3.3	Encouragement of walking.		■		■
A3.4	Support for bicycle use.		■		■
A3.5	Policies governing use of private vehicles.		■		■
A3.6	Provision of project green space.		■		
A3.7	Use of native plantings.		■	■	■
A3.8	Provision of trees with shading potential.		■	■	■
A3.9	Development or maintenance of wildlife corridors.		■	■	■
B	**Energy and Resource Consumption**				
B1	**Total Life Cycle Non-Renewable Energy**				
B1.1	Annualized non-renewable primary energy embodied in construction materials.		■		
B1.2	Annual non-renewable primary energy used for facility operations		■		■
B2	**Electrical peak demand for facility operations**		■		■
B3	**Renewable Energy**				
B3.1	Use of off-site energy that is generated from renewable sources.		■		■
B3.2	Provision of on-site renewable energy systems.		■		■

The full list of Criteria is quite long…

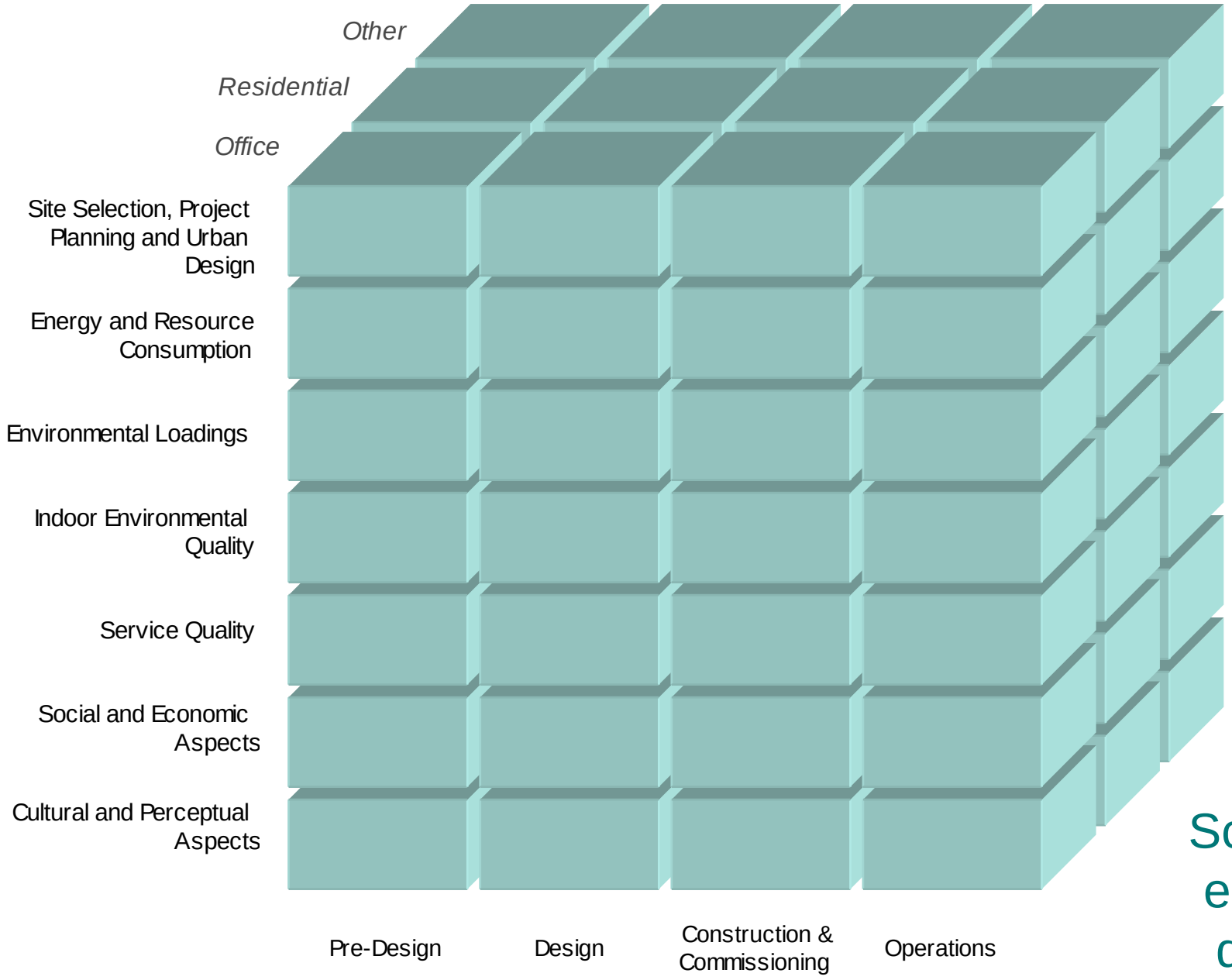
Schematic of SBTool Scoring and Weighting



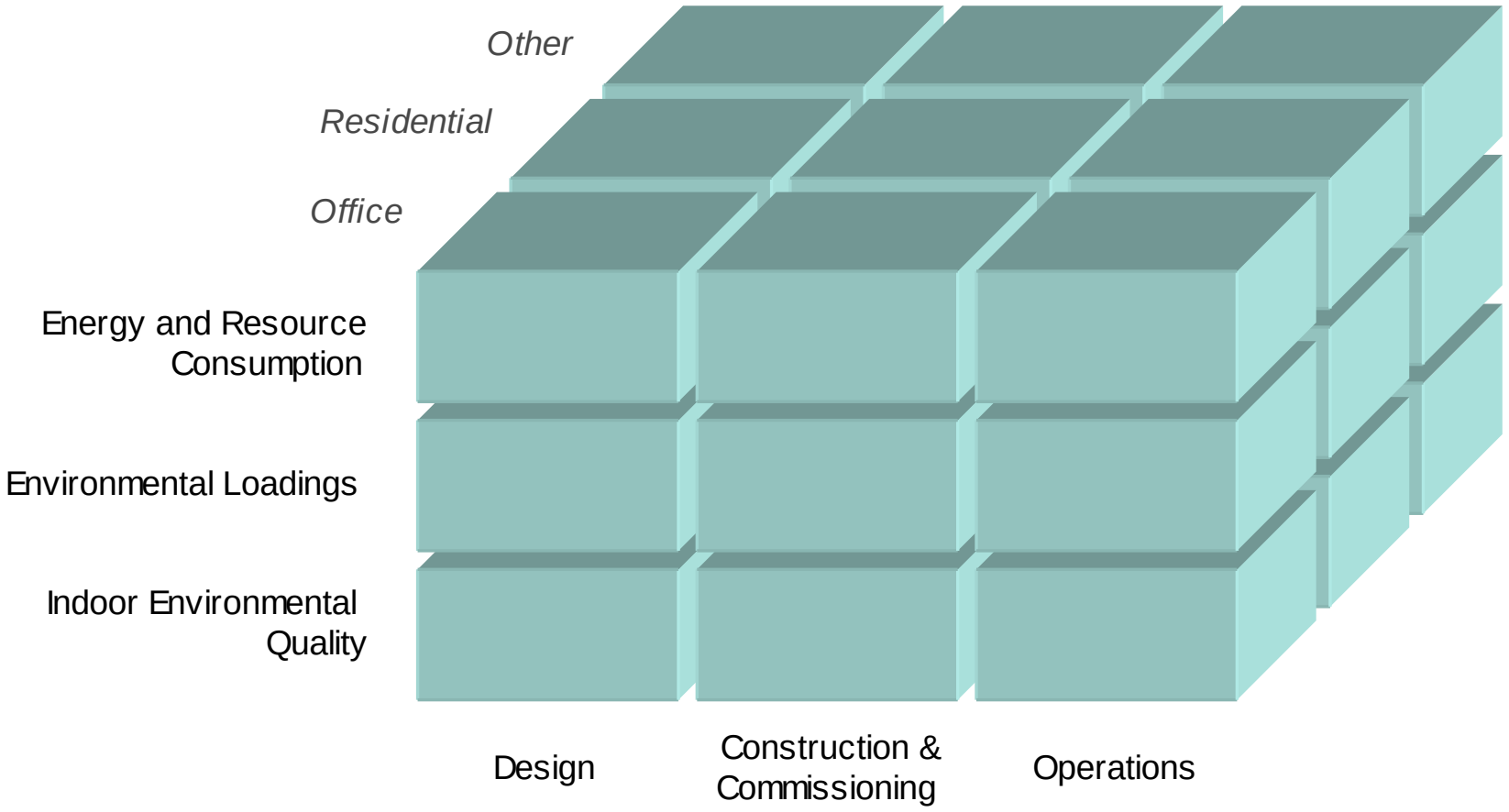
SBTool Process Flow



Defining scope and setting weights for the region and generic building type in the SBT07-A Settings file

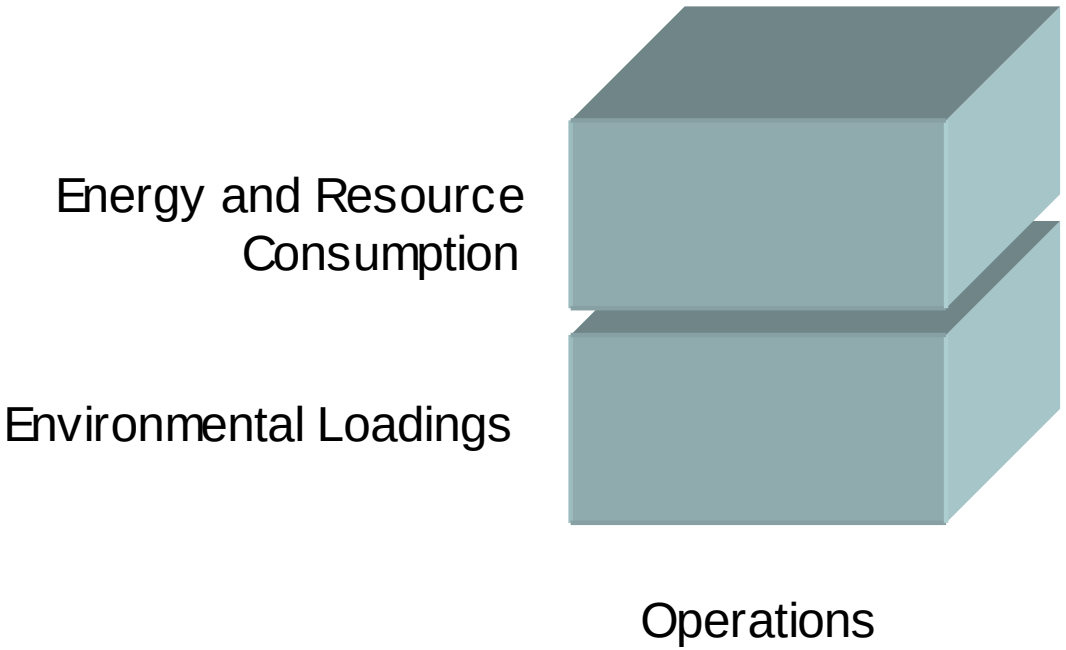


Scope is easy to define



… a form that suits the definition of Green Building….

…or a very compact form, suitable for governments…



Weighting of Issues and Categories for Dorval, Canada

Design Phase is active

Generic

Region file: Weighting of Issues and Categories

Using Defaults

Instructions:
First decide if you want to use the defaults
If you want to set your own weights
1. First set relative importance for highest level Issues
2. Then set values for Categories within each Issue area
3. To set lowest level weights, go to WtB worksheet

	Issues	Suggested nominal default values	Nominal weights adjusted for number of Categories	Weighted percent	Select your own nominal weighting values.	Mandatory
		Active				
A	Site Selection, Project Planning and Development	3	1.3	**7.6%**	0	
B	Energy and Resource Consumption	5	3.6	**21.0%**	4	M
C	Environmental Loadings	5	4.3	**25.2%**	5	M
D	Indoor Environmental Quality	5	3.6	**21.0%**	4	M
E	Service Quality	3	2.6	**15.1%**	3	
F	Social and Economic aspects	3	0.9	**5.0%**	0	
G	Cultural and Perceptual Aspects	3	0.9	**5.0%**	0	

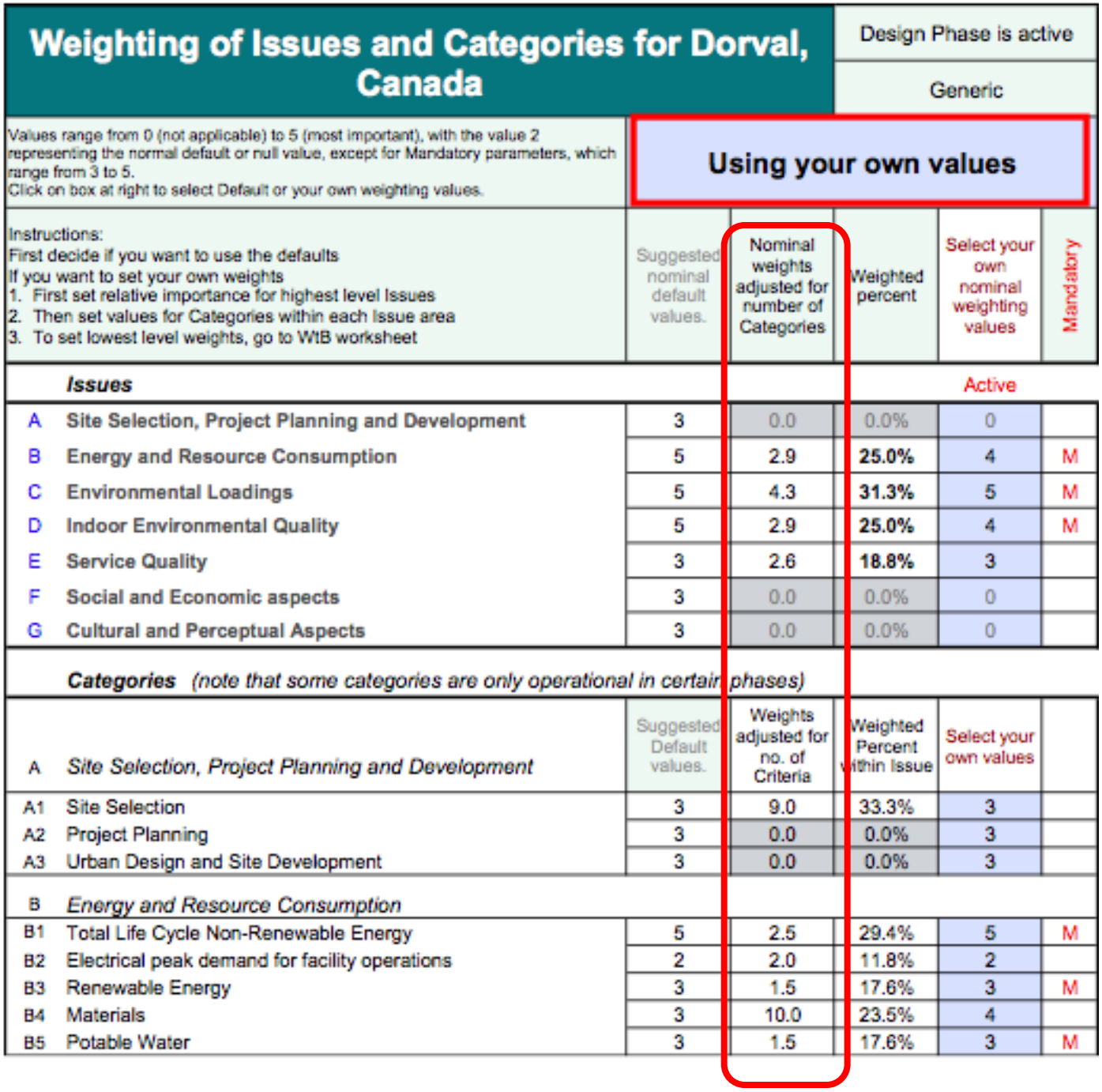
are only operational in certain phases)

	velopment	Suggested Default values	Weights adjusted for no. of Criteria	Weighted Percent within Issue	Select your own values.	
		3	9.0	34.6%	3	
		3	9.0	34.6%	3	
		3	8.0	30.8%	3	

B Energy and Resource Consumption

SBTool comes with some generic defaults, but….

… but in most cases, local organizations will want to establish their own scope, weights and benchmarks



Weighting of Issues and Categories for Dorval, Canada

Design Phase is active

Generic

Values range from 0 (not applicable) to 5 (most important), with the value 2 representing the normal default or null value, except for Mandatory parameters, which range from 3 to 5.
Click on box at right to select Default or your own weighting values.

Using your own values

Instructions:
First decide if you want to use the defaults
If you want to set your own weights
1. First set relative importance for highest level Issues
2. Then set values for Categories within each Issue area
3. To set lowest level weights, go to WtB worksheet

	Issues	Suggested nominal default values.	Nominal weights adjusted for number of Categories	Weighted percent	Select your own nominal weighting values	Mandatory
					Active	
A	Site Selection, Project Planning and Development	3	0.0	0.0%	0	
B	Energy and Resource Consumption	5	2.9	**25.0%**	4	M
C	Environmental Loadings	5	4.3	**31.3%**	5	M
D	Indoor Environmental Quality	5	2.9	**25.0%**	4	M
E	Service Quality	3	2.6	**18.8%**	3	
F	Social and Economic aspects	3	0.0	0.0%	0	
G	Cultural and Perceptual Aspects	3	0.0	0.0%	0	

Categories *(note that some categories are only operational in certain phases)*

		Suggested Default values.	Weights adjusted for no. of Criteria	Weighted Percent within Issue	Select your own values	
A	*Site Selection, Project Planning and Development*					
A1	Site Selection	3	9.0	33.3%	3	
A2	Project Planning	3	0.0	0.0%	3	
A3	Urban Design and Site Development	3	0.0	0.0%	3	
B	*Energy and Resource Consumption*					
B1	Total Life Cycle Non-Renewable Energy	5	2.5	29.4%	5	M
B2	Electrical peak demand for facility operations	2	2.0	11.8%	2	
B3	Renewable Energy	3	1.5	17.6%	3	M
B4	Materials	3	10.0	23.5%	4	
B5	Potable Water	3	1.5	17.6%	3	M

Weighting of Criteria for Ottawa, Canada

Generic

Design Phase

Weighting of Criteria for generic building type in SBT07-A Settings file

Weights for Criteria are established through the estimates of environmental impact at left. The initial weights are then modified by various Site Context conditions, or building characteristics, such as size, height etc. These settings can be seen in Columns H-J (hidden). The weights can also be turned off (Col. A).

Weighting on or off	Default values below =2. Range is 1 to 3.	Extent of potential effect (global or regional = 3, urban or nbhd. = 2, building or site = 1)	Intensity of potential effect (strong or direct = 3, moderate or indirect = 2, weak = 1)	Duration of potential effect (>50 yr = 3, >10 yr = 2, <10 yr = 1)				
					A	Site Selection, Project Planning and Development	9.3%	
					A1	Site Selection	0.0%	
✔	2	2	3		A1.1	Pre-development ecological value or sensitivity of land.	0.0%	0.0%
✔	2	2	3		A1.2	Pre-development agricultural value of land.	0.0%	0.0%
✔	2	3	1		A1.3	Vulnerability of land to	0.0%	0.0%
✔	3	2	3		A1.4	Potential for developm	0.0%	0.0%
✔	2	3	3		A1.5	Pre-development conta	0.0%	0.0%
✔	2	3	2		A1.6	Proximity of site to pul	0.0%	0.0%
✔	2	3	2		A1.7	Distance between site occupancies.	0.0%	0.0%
✔	2	1	2		A1.8	Proximity to commercial and cultural facilities.	0.0%	0.0%
✔	2	1	2		A1.9	Proximity to public recreation areas and facilities.	0.0%	0.0%
					A2	Project Planning	50.0%	
✔	1	2	3		A2.1	Feasibility of use of renewables.	10.0%	0.5%
✔	1	2	3		A2.2	Use c	10.0%	0.5%
✔	2	2	3		A2.3	Potential environmental impact of development or re-development.	20.0%	0.9%
✔	2	2	2		A2.4	Provi	13.3%	0.6%
✔	2	3	1		A2.5	Availability of potable water treatment system.	10.0%	0.5%

Criteria weights are set automatically, but can be toggled off

Weights are zero since Category A1 was set to zero

Weights within Category

Weights within all

Defining Context and Benchmarks for the generic building type in the region, in the SBT07-A Settings file

Regional or Urban Context for Ottawa, Canada

	Click 1 or 2 at upper left to show details	*The purpose of this worksheet is to characterize aspects of urban surroundings that may support or limit the performance of the building. Go to Level 2 to see available text to make your choice, c change those choices.*
	Context Issue	Click blue boxes to select specific condition
1	2 1/2% Winter Design Temperature	2 1/2% Winter Design Temperature is below 0 Deg. C.
2	Climate zone	5 (to be defined in the region)
3	Percentage of days during warm season when night temperatures are at least 10 deg. C. lower than day-time temps (free cooling potential).	75%
4	Average annual hours of sunshine in the region	2500
5	Urban area type	Small city of 10,000 to 50,000 population
6	Quality of public transportation in the area	There is public transport service with frequent service.
7	Capability of municipal potable water system to meet demand.	There is sufficient water for current and anticipated uses and there is no rationing.
8	Capability of local storm water infrastructure to meet marginal demand.	Existing storm water infrastructure can satisfy base and peak loads, using 95% of capacity or less.
9	Capability of local sewage infrastructure to meet marginal demand	Existing sewage infrastructure can satisfy base and peak loads, using 98% capacity or less.
10	Capability of electrical distribution infrastructure to meet marginal demand.	Existing infrastructure can satisfy base and peak loads, using 95% of capa or less.
11	Regional availability of materials and products that can be re-used in a new structure.	There are materials, products or furnishings available in the region for re-us in the project, and they can be refurbished.
12	Regional availability of recycled materials that are produced in an energy-efficient process.	There is an adequate range of recycled materials available in the region for use in the project, and the recycling processes are somewhat efficient.

Context for the Urban area is defined in the SBT07-A Settings file

Benchmarking

- To make the system relevant for local conditions, benchmarks must be established for the generic building type at the 0, +3 and +5 performance levels, for all active criteria;
- Benchmarks are structured in two forms: data-oriented benchmarks that describe performance parameters that can validly be described in numbers, and text-oriented; and text benchmarks that attempt to describe various levels of performance in more subjective areas;
- Benchmarks can be established through a review of regulations, analysis of local building performance data, or by consensus within small expert groups

SBT07-A Settings file : Example of a numeric Benchmark

Active phase is Operations

E2.5 Spatial efficiency.

		Applicable phases (Active if green)		
Intent	*To encourage the efficient utilization of space within buildings.*			
Indicator	The ratio of directly functional net areas to total net area in each occupancy. Total Net Areas exclude only structure and building envelope areas; Net Functional Areas exclude interior garages, vertical circulation and building mechanical rooms.	Dsn.		Ops
Information sources	0			
Applicable project type	All occupancies			
Applicable Standards	a			
	b			
	c			
	d			
Information Submittals	e			
	f			

Values entered in yellow cells determine the slope of the line and hence other values.

Occupancy 1	Office	on	Percent	Score
Negative	The ratio of directly functional net areas to total net area within the occupancy, according to design documentation.		71%	-1
Acceptable practice			75%	0
Good Practice			87%	3
Best Practice			95%	5

In this case, there is one occupancy (Office)

SBT07-A Settings file : Example of a text Benchmark

Active phase is Design

E3.1 Provision and operation of an effective facility management control system.

Intent	*To ensure that a building management control system is provided to maximize the operational efficiency of building systems, such as HVAC, lighting and vertical transportation systems.*	Applicable phases (Active if green)		
Indicator	The presence of a computerized building management control system whose capability is consistent with the complexity of building systems.	Dsn		Ops.
Information sources	0	●		
Applicable project type	0			
Assessment method	Review of contract documents and specifications of proposed system(s).			
Applicable Standards	a			
	b			
	c			
	d			
Information Submittals	e			
	f			

These are default benchmark statements, one for each major scoring level

Total project	Total Project	Score
Negative	The building has no management control system capable of ensuring the efficient operation of building technical systems.	-1
Acceptable practice	The building has a management control system capable of ensuring normal operation of building technical systems	0
Good Practice	The building has a management control system capable of ensuring that building technical systems operate at clos peak efficiency during normal operating conditions, and the system provides partial monitoring of system operatior	3
Best Practice	The building has a management control system capable of ensuring that building technical systems operate at peak efficiency during all operating conditions, and the system provides full monitoring of system operations, as well as diagnostic reporting.	5

C	Environmental Loadings
C1	Greenhouse Gas Emissions
C1.1	Annualized GHG emissions embodied in construction materials.
C1.2	Annual GHG emissions from all energy used for facility operations.
C2	Other Atmospheric Emissions
C2.1	Emissions of ozone-depleting substances during facility operations.
C2.2	Emissions of acidifying emissions during facility operations.
C2.3	Emissions leading to photo-oxidants during facility operations.
C3	Solid Wastes
C3.1	Solid waste resulting from the construction and demolition process.
C3.2	Solid waste resulting from facility operations.
C4	Rainwater, Stormwater and Wastewater
C4.1	Liquid effluents from facility operations sent off the site.
C4.2	Retention of rainwater for later re-use.
C4.3	Untreated stormwater sent off the site.
C5	Impacts on Site
C5.1	Impact of construction process on natural features of the site.
C5.2	Impact of construction process or landscaping on soil erosion.
C5.3	Adverse wind conditions at grade around tall buildings.
C5.4	Minimizing danger of hazardous waste on site.
C6	Other Local and Regional Impacts
C6.1	Impact of facility on access to daylight or solar energy potential of
C6.2	Cumulative thermal changes to lake water or sub-surface aquifers.
C6.3	Heat Island Effect - landscaping and paved areas.
C6.4	Heat Island Effect - roofing.
C6.5	Atmospheric light pollution.

Design Phase

SBT07-A Settings file **:** An excerpt from the Issues worksheet, showing that different parameters can be active in Design and Operations settings.

C	Environmental Loadings
C1	Greenhouse Gas Emissions
C1.1	N.A.
C1.2	Annual GHG emissions from all energy used for facility operations.
C2	Other Atmospheric Emissions
C2.1	Emissions of ozone-depleting substances during facility operations.
C2.2	Emissions of acidifying emissions during facility operations.
C2.3	Emissions leading to photo-oxidants during facility operations.
C3	Solid Wastes
C3.1	N.A.
C3.2	Solid waste resulting from facility operations.
C4	Rainwater, Stormwater and Wastewater
C4.1	Liquid effluents from facility operations sent off the site.
C4.2	Retention of rainwater for later re-use.
C4.3	Untreated stormwater sent off the site.
C5	Impacts on Site
C5.1	N.A.
C5.2	N.A.
C5.3	N.A.
C5.4	Minimizing danger of hazardous waste on site.
C6	Other Local and Regional Impacts
C6.1	N.A.
C6.2	Cumulative thermal changes to lake water or sub-surface aquifers.
C6.3	N.A.
C6.4	N.A.
C6.5	N.A.

Operations Phase

B5.2 Use of potable water for occupancy needs.

Intent	*To minimize the amount of potable water imported to the site and used for occupancy needs, excluding building system uses or irrigation of exterior areas.*	Applicable (Active if	
Indicator	Prediction of total potable water use, in L per person per day, based on a credible water management plan for occupancy fixtures and use.	Dsn	C&C
Information sources	Assumptions for daily use PP and volume per fixture: Toilet 6 L x 2 Times per Day, Urinal 1 x 3 TPD, Shower 70 L x 0.8 TPD, Tub 90 L x 0.2 TPD, Lavatory 0.6 L x 4 TPD, Kitchen sink 1 L x 2 TPD, Clothes washer 40 L x 0.2.	●	
Applicable project type	By separate occupancies, excluding irrigation water for outdoor areas.		
Assessment method	Review of contract documentation by a specialist in water use.		
Applicable Standards	a		
	b		
	c		
	d		
Information Submittals	e		
	f		

Occupancy 1	Apartment	on	L. pp / day.	Score
Negative	Based on a credible water management plan, the volume of potable water predicted to be used for occupancy needs :		400	-1
Acceptable practice			350	0
Good Practice			200	3
Best Practice			100	5

SBT07-A Settings file: examples of default text criteria tailored to suit Design and Operating phases.

		Applicable phases (Active if green)		
		n.	C&C.	Ops
Information Submittals	e			
	f			

Occupancy 1	Apartment	on	L. pp / day.	Score
Negative	The volume of potable water actually used for occupancy needs, as recorded on metering systems over a period of at least one year, is :		400	-1
Acceptable practice			350	0
Good Practice			200	3
Best Practice			100	5

Text used for Benchmarks is taken automatically from the Generic or Local (green) cells in SBT07-A Settings file

Applicable phases (Active if green)		
Dsn	C&C.	Ops.

	% by weight	Score
asonry	42%	-1
rban	50%	0
	74%	3
	90%	5

Generic benchmarks

Local benchmarks

To encourage the procurement of high-weight materials such a aggregate, sand, concrete, masonry, steel and glass,from sources within the greater urban region.	To encourage the procurement of high-weight materials such a aggregate, sand, concrete, masonry, steel and glass,from sources within the greater urban region.
The percentage, by weight, of the aggregate, sand, concrete, masonry, steel and glass used in the project produced within th greater urban region, if local sources of acceptable quality are available.	The percentage, by weight, of the aggregate, sand, concrete, masonry, steel and glass used in the project produced within the greater urban region, if local sources of acceptable quality are available.
LEED specifies specific distances, but we consider that this is not applicable to all areas.	LEED specifies specific distances, but we consider that this is not applicable to all areas.
Total building, all sizes.	Total building, all sizes.
Review of contract documentation by an outside materials specialist.	Review of contract documentation by an outside materials specialist.
a	a
b	b
c	c
d	d
e	e
f	f

The percentage, by weight, of the aggregate, sand, concrete, masonry, steel and glass used in the project produced within th greater urban region :	The percentage, by weight, of the aggregate, sand, concrete, masonry, steel and glass used in the project produced within the greater urban region :

SBT07 Ottawa Region Basic Settings

Revision date:	Reminder: unless you assign correct file names in the Open worksheet, the Macro features will not work, because the program will not know where it should look.	Titles	
9 June 2007		Click to select valu	
		Enter or revise tex	

To be completed by Regional Third Party

Name of this file	SBT07-ERP-Settings	This software tool was developed by iiSBE on behalf of the countries participating in the Green Building Challenge process. The intellectual content of the system is freely available, but use of the software requires agreement with iiSBE. For information on use or for regional contacts, e-mail Nils Larsson at: <larsson@iisbe.org>. Luis Ebensperger is thanked for ideas on enabling a dual-language versio and Caroline Cheng for her work in developing macros.
City / region location	Ottawa	
Country location	Canada	
Contact name		
Contact e-mail address		
Specify Local Content name	Plan B	
Select Generic or Local conte and/or language	Generic	**Current settings for this file**
Select Phase for Assessment	Design Phase	This file currently contains Generic User-selected benchmarks and weights for Design Phase assessment for a location in Ottawa, Canada, suited to the following parameters: New Apartment, and/or 0 and/or 0 occupancies.
Specify currency used	CD	
Select assumed lifespan o design in years	75	
Select amortization rate fo embodied energy of existin structures	2.0%	This feature allows a reduction in the embodied energy of existing structures and th materials that are re-used, with the reduction depending on the age of the existing structure or materials.
Set minimum score for Mandato items (min. 2 of 5	3	Mandatory items are those parameters considered to be of exceptional importance set on the WtA and WtB worksheets, see also IssuesA worksheet.
Define "Large Project" size, in m gross area.	10,000	Applies to parameters A3.2, A3.5, E5, E6.3 and E6.8
Select for height category o building, no. of floor	8 to 12	Applies to parameters C5.3 and D2.1

Select up to three possibl Occupancy types by clicking blu boxes at right	Apartment	Set parameter at right for renovation existing buildings	
		Set parameter at right for large projects th include both project planning and speci building requirements	No
		Select number of dwelling units in t housing projec	17 to 24

Basic parameters for the region and the generic building type are set in the **SBT07-A Settings** file (left).

Fuel Emissions Data for Ottawa, Canada

Title	
Click to select value	
Enter or revise text	

Ottawa, Canada	Emissions data and generation mix for :	Modify emissions data in this sheet to suit local generation mix.

Primary energy and environmental factors	Emissions from combustion i Kg. per GJ of energy produced		
	CO_2	SO_2	
Fuel used for on- site heating or cooling only			
Natural gas	50.95	0.00041	
Propane or LPG	57.52	0.00197	
Light Oil	72.94	0.45412	
Heavy Oil	73.57	0.06286	
Coal	81.37	0.46732	
Fuel used for off-site gen. of electricity only			Gross-up factor for primary energy (incl. combustion & delivery loss)
Natural gas (BC)	131.39	0.00105	2.84
Fuel Oil (QC)	200.00	1.93889	3.02
Coal (ON)	241.11	1.16389	3.26
biomass and other	0.00	0.00	0.00
nuclear	0.00	0.00	Composite gross-up fo electrical primary energy based on generation mix, assuming only deliver losses for nuclear or hydr **2.78**
hydro, with high-methane emission reservoir	0.00	0.00	
hydro, with moderate-methane emission reservoir	0.00	0.00	
hydro, with low- or no-methane emission reservoir	0.00	0.00	
wind	0.00	0.00	
geothermal	0.00	0.00	

Electricity power generation base load mix	Generation mix by source
natural gas	**8.40%**
oil-fired	**0.49%**
coal-fired	**24.59%**
nuclear	**40.80%**
hydro, with high-methane emission reservoir	0.00%
hydro, with moderate-methane emission reservoir	**24.91%**
hydro, with low- or no-methane emission reservoir	0.00%
wind	0.00%
solar	0.00%
geothermal	0.00%
biomass	**0.66%**
other	**0.0016%**

Arcane calculations for electricty GHGs

Fuel type	GHG fuels as % of all GJ	kg. GHG per GJ primary
Nat. gas	8.4%	11.04
Oil	0.5%	0.98
Coal	24.6%	59.29
Biom/Oth	0.7%	0.00
kg. GHG / GJ for elec.		71.31

Note: Only emissions from non-renewables are included. Emissions for biomass and other fuels are assumed to be zero, as per IPCC.

Fuel emissions data and power generation mix are set in the **SBT07-A Settings** file.

The resulting number at left is used to convert delivered electrical consumption to primary energy

Defining the Project in the SBT07-B Project file

Context for Megaplex project in Ottawa, Canada

Click 1 or 2 at upper left to show or hide details	*The upper section of this worksheet contains a description of conte conditions in the Urban Area, as defined in the SBT Region file. Th lower section contains descriptors of Site Conditions, as selected b the Project Assessor.*

Site context conditions defined by Architect

	Title	Descriptors
13	Solar availability for a new building on the site	Natural features or built structures on adjacent land will block solar access a 1200 on Winter Soltice to 40% or more of the building envelope located as close to the property line as regulations permit.
14	Height of immediately adjacent buildings	Immediately adjacent building(s) have 17-20 floors above grade.
15	Availability & adequacy of sub-surface aquifer.	Aquifer can be used with some adverse effect on long-term aquifer capacit
16	Presence of Radon	There is no Radon in the soil
17	Soil contamination	The site is documented as having moderate sub-surface contamination.
18	Existing land use on the site	The site has existing structures, or has previously been built on.
19	Agricultural value of land used for the project.	Land used for the project is Class C (lowest grade) agricultural land.
20	Ecological status of the site	The site currently supports a range of flora and fauna consistent with other sites in the area.
21	Ambient noise conditions at the noisiest site boundary. If residentia occupancy is included, measure average of peak values during hou of 2300-0600.	57.5 dba
22	Existence and suitability of existing structure(s) on the site	Not applicable - there is no existing structure on the site.
23	N.A.	Not applicable - no materials or components from an existing structure on th site can be re-used to meet the new requirements.
24	N.A.	Not applicable - there is no existing structure on the site.

Context for the site is defined by the Architect in the SBT07-B Project file

Preliminary Project Information for Megaplex project, Ottawa, Canada

The purpose of this worksheet is to identify the basic characteristics of the project and the separate Elements within it, far as may be known at this stage. Click on the upper left buttons to show 1, 2 or 3 block data sections.

Information	Click blue boxes to select specific conditions
Number of separate Elements in this project (1 to 3)	**1**
Identify existing Elements to be renovated (more than 50% of work).	All new
Estimated age of existing structure in years	
Is a site already selected?	No
Will the project include mechanical cooling?	Not yet decided
Will the project include mechanical ventilation?	Not yet decided
Will the project include hybrid or natural ventilation systems?	Not yet decided
Will the project include ground- or water-source heat pumps?	Not yet decided
Project name	**Megaplex project**
Site area of total project, m2	4,500
Name of Element 1 (new)	**Bayley Block**
Occupancy Type A in Bayley Block	Apartment
Specify number of residential dwelling units in Bayley Block	20
Number of floors below grade in Bayley Block	1
Number of floors above grade in Bayley Block	5
Building footprint of Bayley Block, m2	800
Gross floor area above grade in Bayley Block, m2	4,000
Total gross floor area in Bayley Block, m2	4,800
Summary project data for Megaplex project	
Total number of Elements in project	1
Site area in project, m2	4,500
Maximum number of floors below grade in project	1
Maximum number of floors above grade in project	5
Total building footprint in project, m2	800
Total gross floor area above grade in all Elements	4,000
Total gross floor area above and below grade in all Elements	4,800
Floor area ratio (total gross area above grade / site area)	0.9
Percent of site built on at grade	17.8%
Total number of dwelling units in Megaplex project	20
Gross floor area of Apartment occupancy in Megaplex project, m2	4,800
Gross floor area of 0 occupancy in Megaplex project, m2	0
Gross floor area of 0 occupancy in Megaplex project, m2	0

Preliminary project characteristics are defined by the Architect in the SBT07-B Project file

Detailed project characteristics in SBT07-B Project file: First part

Detailed data for Megaplex project, Ottawa, Canada

Title
Click to select value
Enter / revise text or data

Enter data relevant to the Design in this worksheet. Some data are taken from information provided in the InitialSpec worksheet, but this sheet provides much more detail. T system allows up to 3 basement floors and up to 49 floors above grade (6 plus 43 typical floors). It is assumed that Net Area is also Usable area.

A	General Project Information	C	D	E	F	G	H	I	Comments and warning messages
			Bayley Block	Element 2 unused	Element 3 unused	Total, direct input	Total, calculated	Unit	
	Element number		1	2	3				
1	New or Renovation		New	N.A.	N.A.				
2	Active Occupancies		Apartment	N.A.	N.A.				
3	Gross site area (from InitialSpec)						4,500	m2	
4	Gross project area above grade (from InitialSpec)						4,000	m2	
5	Actual Gross Floor Area ratio (GFA) of Design						0.89	Ratio	
6	Project footprint at grade (from InitialSpec)						800	m2	
7	Site area available for paved and landscaped areas						3,700	m2	
8	Total gross area, above and below grade		4,800	0	0		4,800	m2	
9	Assumed project population		45				45	persons	
10	Assumed population density, net m2 per person		100	0	0		107	m2 pp	
11	Assumed number of dwelling units		20	0	0		20	number	
12	Assumed days of operation		365				0	days / yr.	
13	Assumed hours of operation per year		8,760					hours / yr.	
14	Million annual person hours (mAph)		0.39	0.00	0.00		0.39	mAph	

C	Information on new and/or renovated elements: Total, Elements 1, 2 & 3	C	D	E	F	G	H = D * F	I = E * G	J = H - I	Comments and warning messages
		Number of floors	Gross floor height, m	Net floor height, m	Gross floor area, m2	Net floor area, m2	Gross volume, m3	Net volume, m3	Gross - Net volume, m3	
1	Basement 3 (below grade)	0	0.0	0.0	0	0	0	0	0	
2	Basement 2 (below grade)	0	0.0	0.0	0	0	0	0	0	
3	Basement 1 (below grade)	1	4.0	3.0	800	720	3,200	2,160	1,040	
4	Street or entry level - Floor 0	1	5.0	4.0	800	760	4,000	3,040	960	
5	Floor 1	1	4.0	3.7	800	760	3,200	2,812	388	
6	Floor 2	1	4.0	3.7	800	760	3,200	2,812	388	
7	Floor 3	1	4.0	3.7	800	760	3,200	2,812	388	
8	Floor 4	1	4.0	3.7	800	760	3,200	2,812	388	Enter notes here
9	Floor 5	0	0.0	0.0	0	0	0	0	0	
10	For additional typical floors, if applicable (per floor)	0	0.0	0.0	0	0	0	0	0	
11	Total floors below grade	1	Gross and net floor heights above are average of up to three occupancies		800	720	3,200	2,160	1,040	
12	Total floors above grade	5			4,000	3,800	16,800	14,288	2,512	
13	Total for all floors above and below grade	6			4,800	4,520	20,000	16,448	3,552	
14	Roof area (flat projection)				810					
15	Roof area (surface area)				810					
16	Roof area landscaped or "green"				600		600	m2		
17	Area of other roofing surface				210		210	m2		
18	Reflectance of other roofing surface				0.80		0.80	0 to 1		

Detailed project characteristics in SBT07-B Project file: Second part

E	Occupancies by type, by net area, and areas with natural or mechanical ventilation and cooling: Total, Elements 1, 2 & 3	C Number of Floors	D Net floor area, m2	E Occupancy type	F Area Nat. Ventilated	G % Area Nat. ventilated	H Area mech. Vent/cooled	I % area mech. Conditioned	Comments & messages
1	Basement 3 (below grade)	0	0		0	0%	0	0%	
2	Basement 2 (below grade)	0	0		0	0%	0	0%	
3	Basement 1 (below grade)	1	720		200	28%	520	72%	
4	Street or entry level - Floor 0	1	760	New Apartment	760	100%	0	0%	
5	Floor 1	1	760		760	100%	0	0%	
6	Floor 2	1	760		760	100%	0	0%	
7	Floor 3	1	760		760	100%	0	0%	
8	Floor 4	1	760		760	100%	0	0%	
9	Floor 5	0	0		0	0%	0	0%	
10	For additional typical floors, if applicable (per floor)	0	0		0	0%	0	0%	
11	Total Bayley Block below grade	1	720		200	28%	520	72%	
12	Total Bayley Block above grade	5	3,800		3,800	100%	0	0%	N.A.
13	Total Bayley Block above and below grade	6	4,520		4,000	88%	520	12%	

F	Performance calculations fo operating energy consumptio	Delivered energy Bayley Block	Element 2 unused	Element 3 unused	Total project	Total project direct entry	Primary non-renew able energy (B1.2) Bayley Block	Element 2 unused	Element 3 unused	Total project
1	Total net area, m2	4,520	0	0	4,520		4,520	0	0	4,520
2	Project estimated annual amount of fuel-based energy used operations, MJ / yea	2,000,000			2,000,000		2,000,000	0	0	2,000,000
3	**Project fuel-based MJ/m2 per year**	**442**	**0**	**0**	**442**		**442**	**0**	**0**	**442**
4	Project estimated annual amount of electrical energy used operations, MJ / yea	500,000			500,000	0	1,388,688	0	0	1,388,688
5	**Project electrical MJ/m2 per year**	**111**	**0**	**0**	**111**		**307**	**0**	**0**	**307**
6	Project estimated annual amount of total energy used operations, MJ / yea	2,500,000	0	0	2,500,000		3,388,688	0	0	3,388,688
7	Project total MJ/m2 per year	553	0	0	553		750	0	0	750
8	Reference estimated annual amount of fuel-based energy used operations, MJ	2,260,000	0	0	2,260,000		2,260,000	0	0	2,260,000
9	Reference fuel-based MJ/m2 per year	500	1,000	100	500		500	0	0	500
10	Reference estimated annual amount of electrical energy used operations, MJ	1,356,000	0	0	1,356,000		3,766,121	0	0	3,766,121
11	Reference electrical MJ/m2 per year	300	2,000	50	300	...	833	0	0	833
12	Reference estimated annual amount of total energy used operations, MJ	3,616,000	0	0	3,616,000		6,026,121	0	0	6,026,121
13	Reference total MJ/m2 per year	800	3,000	150	800		1,333	0	0	1,333
14	Best Practice estimated annual amount of fuel-based energy us for operations, MJ	1,582,000	0	0	1,582,000		1,582,000	0	0	1,582,000
15	Best practice fuel-based MJ/m2 per year	350	400	40	350		350	0	0	350
16	Best Practice estimated annual amount of electrical energy used operations, MJ	678,000	0	0	678,000	Enter total project data i Col. G above OR for each occupancy	1,883,061	0	0	1,883,061
17	Best practice electrical MJ/m2 per year	150	1,100	40	150		417	0	0	417
18	Best Practice estimated annual amount of total energy used operations, MJ	2,260,000	0	0	2,260,000		3,465,061	0	0	3,465,061
19	Best practice total MJ/m2 per year	500	1,500	80	500		767	0	0	767

Setting performance targets and assessing the project in the SBT07-C Evaluation file

A2.1 Feasibility of use of renewables.		Active	10.0%	0.5%
Intent	*To encourage the consideration of the technical and economic feasibility of renewable energy at the pre-design stage.*	Applicable Phases (active if green)		
Indicator	Results from analysis of feasibility using RETSCreen software.	P-Dsn.	Dsn	Ops.
Information sources	The RETSCreen software provides an analysis of Wind Energy, Small Hydro, Photovoltaics, Solar Air Heating, Biomass Heating, Solar Hot Water Heating, Passive Solar Heating and Ground-Source Heat Pumps.	Go to www.retscreen.net		●
Applicable project type	Any occupancy.	Apartment	0	0
Relevant Context information				
Assessment method	Review of design team analysis by renewables specialist.			
Applicable standards	a			
	b			
	c			
Design or Operating data				
Submittal requirements	d			
	e			
	f			
Total Project	**Total Project**			
			Score	Wtd. Score
Designer's target value		4.0	4.0	**0.40**
Actual performance as per contract documents	RETScreen software was used to study the feasibility of using PV, solar thermal, GSH and biomass for the project.	5.0	**4.5**	**0.45**
Negative	The RETScreen software has not been used to carry out a study of the feasibility of using renewable energy systems for the project.			-1
Acceptable practice	The RETScreen software has been used to carry out a study of the feasibility of using one renewable energy technology for the project.			0
Good Practice	The RETScreen software has been used to carry out a study of the feasibility of using three renewable energy technologies for the project.			3
Best Practice	The RETScreen software has been used to carry out a study of the feasibility of using more than three renewa energy technologies for the project.			5

SBT07-C Assess file

Weight within all

Weight within Category

Active occupancy

Architect enters relevant information

Architect or Third Party sets targets

Self-assessment score submitted

Weighted score

Official assessment score

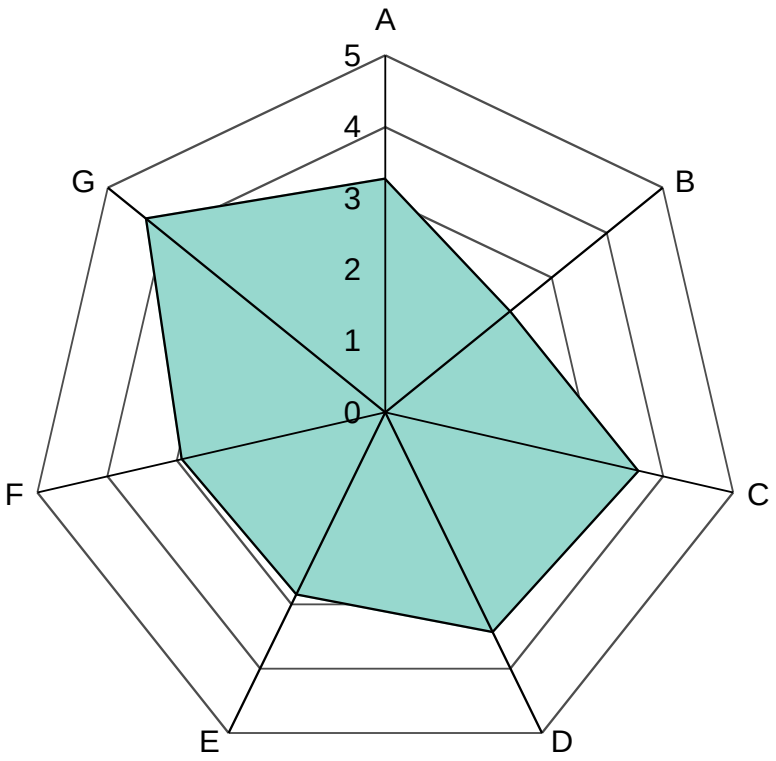
Results

Design target scores for Megaplex project, Ottawa, Canada

Predicted performance results based on information available during Design Phase	*Active Phase (set in Region file)*	**Design Phase**

Relative Performance Results

0 = Acceptable Practice; 3 = Good Practice; 5 = Best Practice



Performance Issue Areas

Design Phase scores indicate Potential Performance as predicted by an assessment of building features and plans for construction and operation that are developed during the design process.

Project Information

This is a Renovation project with a total gross area of 7000 m2. It has an estimated lifespan of 75 years, and contains the following occupancies: Apartment and Retail and is located in Ottawa, Canada. The assessment is valid for the Design Phase.

Assumed life span is 75 years, and monetary units are in CD	Amortization rate for embodied energy of existing materials is set at 2 %
The project contains 20 apartment units	

Design target scores

With current context and building data, t number of active low-level parameters i	**116**	Max. potential low-level parameters	**118**
The number of active low-level mandato parameters with a score of less than 3 is	**3**	Active low-level mandatory parameters:	**10**

To see a full list of Issues, Categories and Criteria, go the Issues worksheet.		Active Weights	Weighted scores
A	Site Selection, Project Planning and Development	8%	**3.3**
B	Energy and Resource Consumption	23%	**2.3**
C	Environmental Loadings	27%	**3.7**
D	Indoor Environmental Quality	18%	**3.4**
E	Service Quality	16%	**2.9**
F	Social and Economic aspects	5%	**2.9**
G	Cultural and Perceptual Aspects	3%	**4.3**
Total weighted building score			**3.1**

Design target scores for Megaplex project, Ottawa, Canada

Predicted performance results based on information available during Design Phase

Active Phase (set in Region file) **Design Phase**

Relative Performance Results

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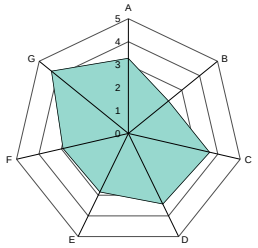

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G	Cultural and Perceptual Aspects	3%	4.3
	Total weighted building score		3.1

Design Phase scores indicate Potential Performance as predicted by an assessment of building features and plans for construction and operation that are developed during the design process.

Absolute Performance Results — Total performance level is Good Practice or better

	These data are based on the Self-Assessment values	By area	By area & occupancy	
1	Total net consumption of primary embodied energy for structure and envelope, GJ/m2	22	27	GJ/m²*maph
2	Net annualized consumption of embodied energy for envelope and structure, MJ/m2*yr.	296	361	MJ/m²*maph
3	Net annual consumption of delivered energy for building operations, MJ/m2*year	617	751	MJ/m²*maph
4	Net annual consumption of primary non-renewable energy for building operations, MJ/m2*yr.	1258	1533	MJ/m²*maph
5	Net annual consumption of primary non-renewable energy per dwelling unit in project, MJ/m2*yr.	63	77	MJ/m²*maph
6	Net annual consumption of primary non-renewable energy per dwelling unit in residential element, MJ/m2*yr.	63	77	MJ/m²*maph
7	Net annualized primary embodied energy and annual operating primary energy, MJ/m2*yr.	1554	1893	MJ/m²*maph
8	Total on-site renewable energy used for operations, MJ/m2*yr.	90	109	MJ/m²*maph
9	Net annual consumption of potable water for building operations, m3 / m2 * year	0.3	0.3	m³/m²*maph
10	Annual use of grey water and rainwater for building operations, m3 / m2 * year	18	22	m³/m²*maph
11	Net annual GHG emissions from building operations, kg. CO2 equivalent per year	69	84	kg/m²*maph
12	Total present value of 25-year life-cycle cost fot total project, CD per m2.		8,886	
13	Proportion of gross area of existing structure(s) re-used in the new project, percent		64%	
14	Proportion of gross area of project provided by re-use of existing structure(s), percent		63%	

Absolute results

Applications of SBTool

- Our SBTool work is mainly R&D and it has influenced national systems being used in Austria, Spain, Japan and Korea;
- A custom version has been developed to assess entries in an international competition for an 11 ha. urban expansion of Monaco (underway);
- Even in regions where other systems, such as BREEAM or LEED, are predominant, the wider scope of SBTool and its ease of adapting to local conditions - even down to a municipality or university campus - makes it a more relevant and finely graduated instrument than other commercial systems;
- Custom versions of SBTool have been produced for Italy, and several commercial assessments are being undertaken by iiSBE Italia;
- A compact version of SBTool is being used in Italy as a reference system in provinces, for a bank and for an insurance firm.

SBTool in Italy

- In 2002 ITACA, the *Federal Association of the Italian Regions*, adopted the GBC methodology as basis to develop an institutional assessment system for residential buildings: Protocollo ITACA;
- Main objective of the association is to promote and disseminate the good practices for the environmental sustainability and to develop common policies for the Regions (the environment falls within regional competence).
- The aim of ITACA was to establish an objective set of requirements to define “what is” a green building and to develop a simple assessment method to measure the environmental performance of buildings necessary to improve policies on sustainable building;
- The Green Building Challenge (GBC) method and its software tool (SBTool) was found to give local authorities the ability to adapt the tool to their own conditions and priorities;
- The “Protocollo ITACA” was officially approved by the Conference of the Presidents of the Italian Regions in January 2004. It is now the reference rating system of the regional authorities in Italy.

A brief overview of iiSBE

iiSBE at a glance

- An international non-profit networking organization;
- Focus on guiding the international construction industry towards sustainable building practices;
- Emphasis is on research and policy, with a special emphasis on building performance and its assessment;
- Board members from 16 countries;
- Secretariat is in Ottawa;
- Local chapters exist in Italy, Spain, Czech Republic, Israel and Canada, others are being formed in Poland, Portugal, France, Malaysia, Taiwan and Germany, and associated organizations exist in Korea, Mexico and Brazil;
- Andrea Moro is President, Nils Larsson is XD.

iiSBE –activities

- Leadership of the international *Sustainable Building Challenge* process (formerly GBC process);
- Development of rating framework, now called SBTool;
- Technical meetings in the Spring and Fall;
- Operation of SBIS, a web-based database of SB information;
- Operation of a *Sustainable Education* working group;
- Publication of PDF newsletters;
- Active networking support.

Other Projects and Activities

- Support to *Commission for Environmental Cooperation* (CEC) on a study on the status, future and implications of green building in Canada, USA and Mexico (2006);
- Preparation of a study on SB policies in six selected countries, for CMHC (2006);
- Sponsorship, with CIB and UNEP, of a series of major SB conferences.

SB07 conferences

Country	City	Date
Canada	Toronto	30 May - 01 June
Italy	Torino	7-8 June
Korea	Seoul	27-29 June
Portugal	Lisbon	12-14 September
Sweden	Malmš	12-14 September
Czech Republic	Prague	24-26 September
Brazil	S‹o Paulo	8-9 October
Chile	Santiago	10-11 October
Malaysia	Kuala Lumpur	5-7 November
Taiwan	Taipei	9-11 November
New Zealand	Auckland	14-16 November
China	Hong Kong SAR	4-5 December
Greece	Athens	10-12 January, 2008

SB08 World Conference, Melbourne

- Melbourne was selected by representatives of CIB, iiSBE and SB05 from proposals by Washington, Toronto, Berlin, Rome and Sydney;
- This will be a four-day event, to be held during 21-25 September, 2008;
- Case study assessments, using a variety of rating tools, will be presented as part of Sustainable Building Challenge (SBC);
- SB08 will offer travel bursaries and free registration to selected developing country delegates;
- It will aim for zero net emissions related to the conference;
- It will have solid links with the SB07 regional and national conferences;
- www.sb08melbourne.com

iiSBE

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Contacts & Info

- http://www.iisbe.org
- http://www.sbis.info
- Chair of Technical Committee:
  Manuel Macias, manuel.macias@upm.es
- SBTool design:
  Nils Larsson, larsson@iisbe.org