Procuring Sustainable Buildings and Construction

SE4All Building Efficiency Accelerator webinar

Sustainable Procurement Principles for Building Efficiency

19 July 2016

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Procuring Sustainable Buildings and Construction

1. sustainable procurement
2. innovation in the supply chain
3. managing performance and value
4. procurement examples
5. discussion


Eco-Viikki, Finland


Mwanza, Tanzania


Kigali, Rwanda


Masdar, UAE

Procuring Sustainable Buildings and Construction

- Sustainable Procurement is a process whereby organisations **meet their needs** for goods, services, works and utilities in a way that achieves
- **value for money on a whole life basis** in terms of generating benefits not only to the organisation, but also to society and the economy, whilst
- **minimising damage to the environment** [UNEP]


Eco-Viikki, Finland


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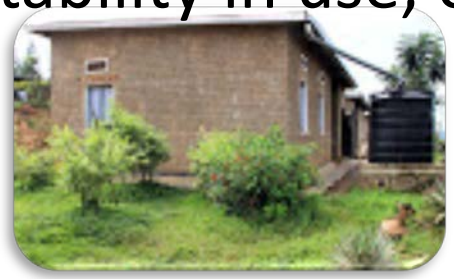
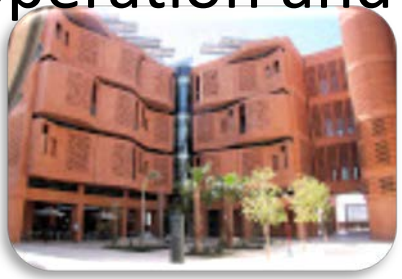
Procuring Sustainable Buildings and Construction

- sustainable development of buildings and other construction works brings about
- the **required performance** and functionality with **minimum adverse environmental impact** while
- encouraging improvements in economic and social (and cultural) aspects at local, regional and global levels [ISO 15392:2008]
- **long service life**: adaptability in use, operation and maintenance
- **location!**


Eco-Viikki, Finland


Mwanza, Tanzania


Kigali, Rwanda


Masdar, UAE

Eco-efficiency

1. Eco-Efficiency = Values of products or services / Environmental load unit

⇩

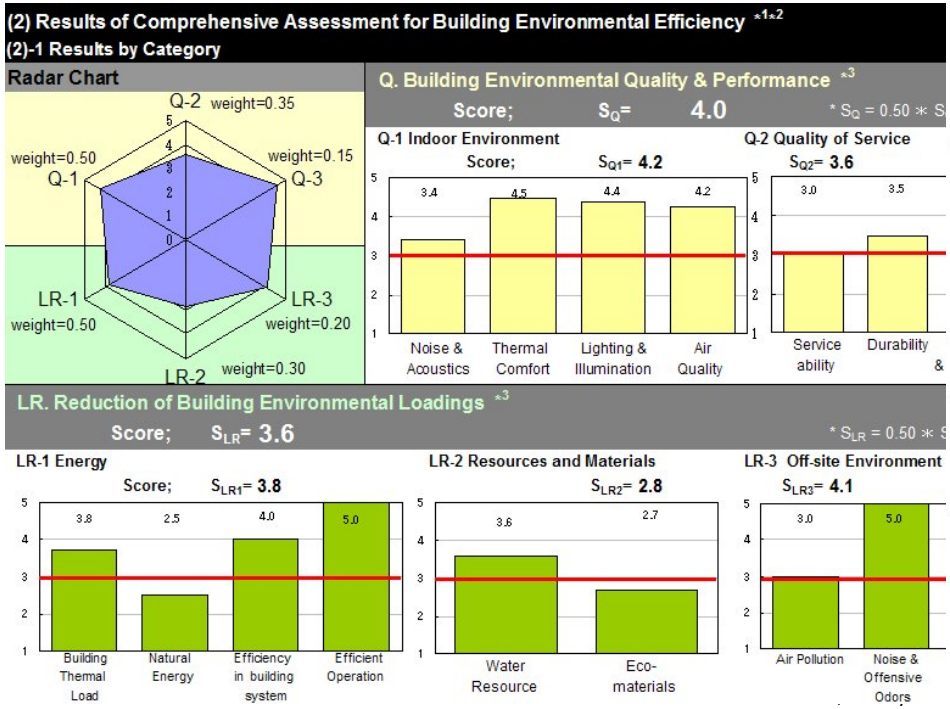
2. Revised definition = Beneficial output / Input + non-beneficial output

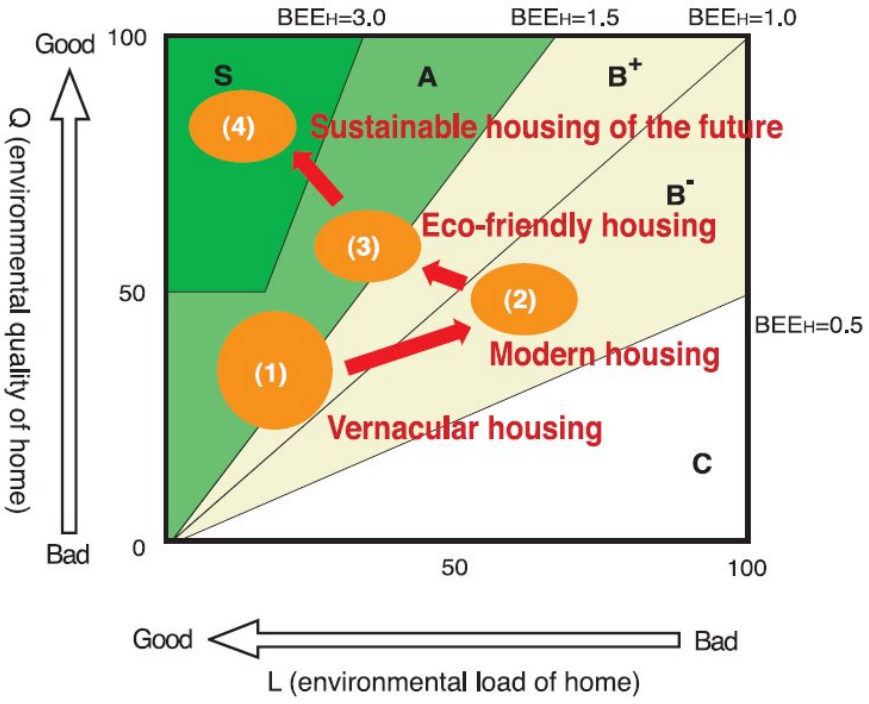
⇩

3. BEE in CASBEE = Building environmental Quality and performance / Building environmental Loadings

CASBEE® 建築環境総合性能評価シ

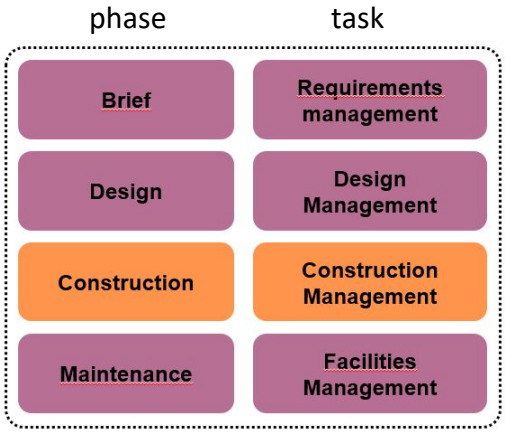
Comprehensive Assessment System for Built Environment Efficiency



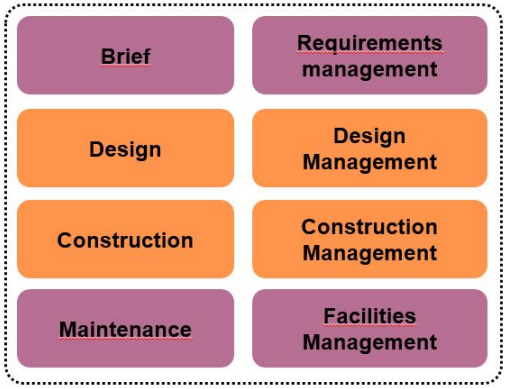


Project Delivery Systems

- Client Driven (DBB, CM) **prescriptive**
  - client defines the solutions and lowest bid wins
  - client is in charge of maintenance
  - little space for innovation in the supply chain

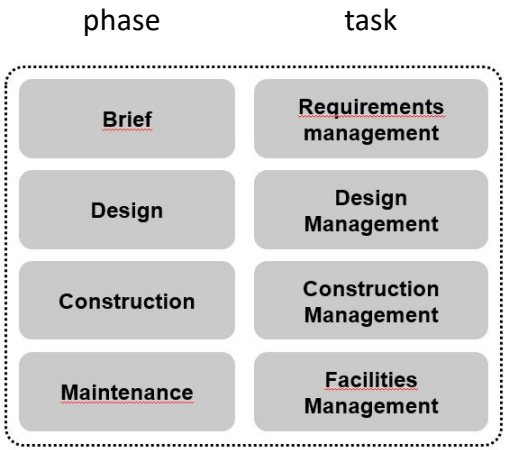


- Supplier Supported (DB, DBO) **performance based**
  - client describes the performance but not solutions
  - contractor is in charge of design and maintenance
  - DBOF: suppliers organize also finance



Project Delivery Systems

- Collaborative (AC, IPD)
  - shared responsibilities and risks
  - early involvement of key partners
  - often linked with Lean construction principles and building information modelling (BIMs)
- **many variations exist** (PPP)



Procuring Sustainable Buildings and Construction

- Setting requirements
  - document the performance target
- Choosing the contractual mode
  - define your financing strategy
- Selecting the team
- **Managing the Performance**
  - certification schemes
  - core indicators
  - examples
- Monitoring and Continuous Improvement

NO. 2 SILO – V&A WATERFRONT

No. 2 Silo, Clocktower, V&A Waterfront, Cape Town, SA

GREEN BUILDING COUNCIL SOUTH AFRICA

greenstar

4 Star Green Star SA – Multi Unit Residential v1 Design Rating

Achieved in July 2013

No. 2 Silo is a high-end residential development, part of the re-development of the Silo area at the V&A Waterfront. There are two distinct buildings linked together. No. 1 Silo is office space, and No. 2 Silo is the residential building. These two buildings stand side by side and are separated by the lift and stair core of No. 2 Silo. No. 2 Silo has 1 level of retail, plus 7 levels of residential above the basement. The design of the building optimises views of both the Silo building and the harbour.

Sustainable building features include:

- All dwellings have been fitted with low-flow fittings, water efficient washing machines and dishwashers.
- High performance glazing enables good views, while minimising solar gain and optimising natural daylight. External, controllable shutters are provided.
- Low-VOC carpets, paints, adhesives and sealants have been specified. Timber products have low formaldehyde content.
- The hot water for No. 2 Silo is supplied from a communal system comprised of solar water heating panels, with a heat pump back up.

PROJECT TEAM:

OWNER
V&A Waterfront

ARCHITECTS
VDMMA/ Rick Brown Associates

ELECTRICAL ENGINEERS
Solution Station

FIRE ENGINEERS
Arup

LIFT SPECIALISTS
Solution Station

MECHANICAL ENGINEERS
Arup

QUANTITY SURVEYORS
MLC

STRUCTURAL ENGINEERS
Sutherland

SUSTAINABLE BUILDING CONSULTANTS
Arup

SUSTAINABLE DESIGN REVIEW CONSULTANTS
Arup

WET SERVICES
Arup

MAIN CONTRACTORS
WBHO

PROJECT MANAGERS
Mace

TOTAL POINTS: 48

POINTS ALLOCATION:

PROJECT FLOOR AREAS:

TOTAL GROSS FLOOR AREA (GFA):	5 084 m²
TOTAL COMMERCIAL OFFICE AREA:	3 112 m²
CAR PARKING AREA:	1 792 m²

Certification

© Peter Ruge Architekten © Landsea Group

CHANGXING, CHINA

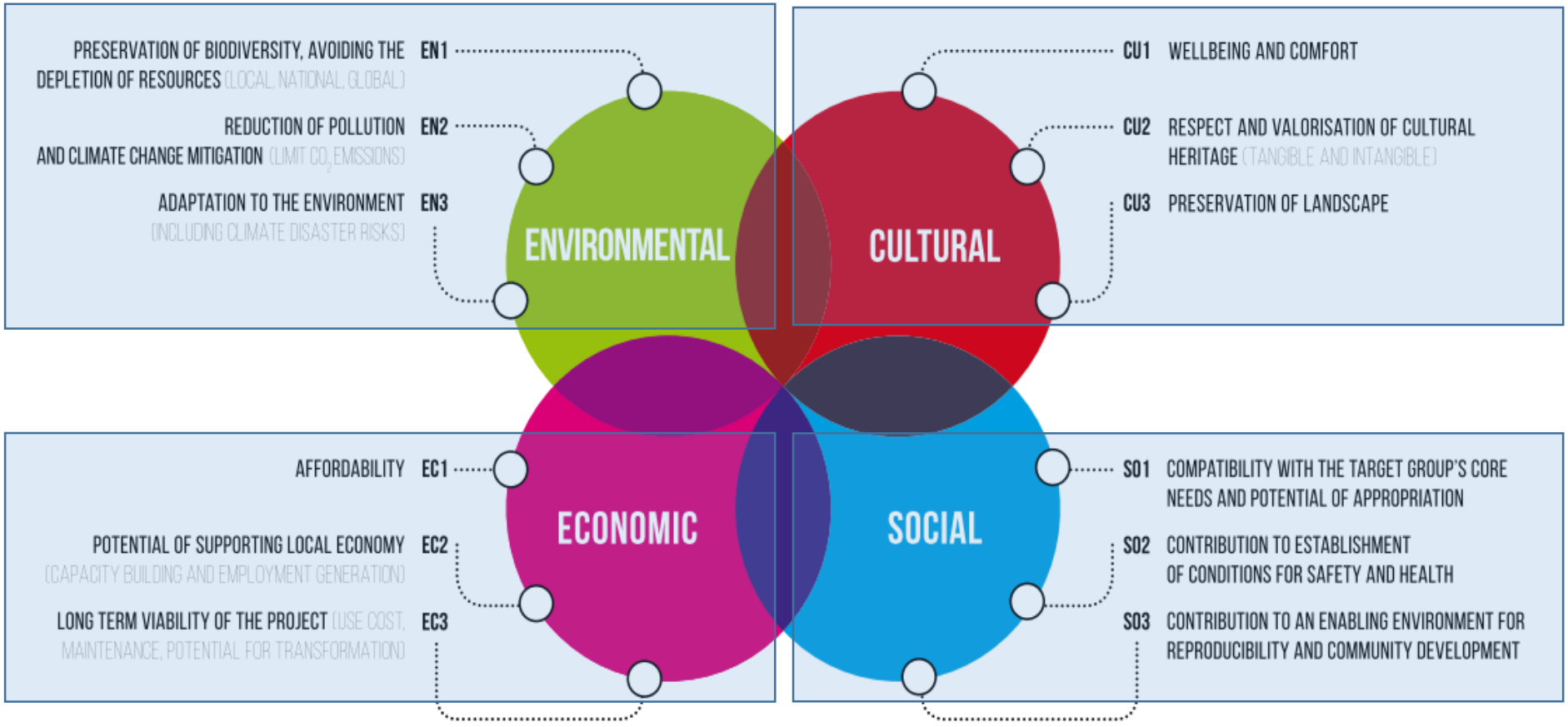
Bruck Passive House

DGNB Certificate in Gold
New Residential Buildings
Certified by: DGNB

Client	Changxing Landsea
Applicant	Changxing Landsea
Architect	Peter Ruge Architekte
Year of completion	2014
Year of certification	2015
Gross floor area	2445 m²
DGNB Auditor	van der Elst, Joseph
Project evaluation	80,5 %
Ecological quality	81,4%
Economic quality	83,1 %
Sociocultural and functional quality	81,1 %
Technical quality	83,5 %
Process quality	64,5 %
Site evaluation	35,0 %

SUSTAINABLE HOUSING RATING TOOL

GNSH GLOBAL NETWORK FOR SUSTAINABLE HOUSING



SUSTAINABLE HOUSING RATING TOOL

GNSH GLOBAL NETWORK FOR SUSTAINABLE HOUSING

Social	2.9
Environmental	2.4
Economic	2.5
Cultural	2.7

Social	**2.9**
Compatibility with group	3.0
Health and security	2.9
Reproducibility	2.7
Environmental	**2.4**
Against depletion	2.3
Limit to pollution	2.2
Adaptation environment	2.6
Economic	**2.5**
Accessibility	2.5
Support local economy	2.5
Long term viability	2.7
Cultural	**2.7**
Wellbeing and comfort	3.0
Heritage value	2.4
Landscape preservation	2.8

Use of Core Indicators

Life cycle environmental performance macro-objectives for buildings			
	indicator	unit	scope
1	**GREENHOUSE GAS EMISSIONS FROM BUILDING LIFE CYCLE ENERGY USE**		
1.1	**Operational energy consumption**		
	Total primary energy consumption	kWh/m².yr	Calculation according to the scope of EN 15603 of the minimum EPBD regulated energy consumption scope – with heating (b) and cooling (c) consumption also identified separately
1.2	**Life cycle Global Warming Potential**		Calculation for the following life cycle stages according to EN 15978: - A1-3 Production - B6 Operational energy use - C3-4 End of life
	Operational and embodied Global Warming Potential	kg CO2eq/m2 .yr	
2	**RESOURCE EFFICIENT MATERIAL LIFE CYCLES**		
2.1	**Full LCA**		
	Cradle to grave LCA	Impact category results normalised to m2	Cradle to gate LCA according to EN 15978 and with an expanded list of impact categories (to be specified)
2.2	**Building, element and component service life**		
	Service life reporting	Design service life of the building and specified building elements and components	Inventory of service lives for specified major building elements and components
2.3	**Design for deconstruction and recyclability**		Rating of the disassembly potential and recyclability of three main building aspects: - Building services - Non-load bearing components of the building shell - Load-bearing components of the building shell
	Ease and scope for disassembly and recycling	Sum of category scores	
2.4	**Construction and demolition waste minimisation**		
	Waste arisings a. Demolition b. Construction	For each: i. Tonnes per 100m² floor area ii. % diversion to recycling and re-use (excluding backfilling)	Reporting on total waste arisings and diversion rates from demolition sites (excluding excavations) and, following on from that, the construction site
3	**EFFICIENT USE OF WATER RESOURCES**		
3.1	**Operational water consumption**		
	Total mains drinking water consumption (during use stage)	Residential and office buildings m3 per person per year	Cradle to gate LCA according to EN 15978 and with an expanded list of impact categories (to be specified)

http://susproc.jrc.ec.europa.eu/Efficient_Buildings/documents.html

Quality, performance and value macro-objectives for buildings			
	indicator	*unit*	*scope*
4	**HEALTHY AND COMFORTABLE SPACES**		
4.1	**Indoor air quality**		Quantitative reporting: - CO2 - Total VOCs - Carcinogenic VOCs - R-Value - Formaldehyde - Benzene - Particulates (PM 2,5/10) Qualitative reporting: - Presence of mould
	Reporting on specific pollutant levels and the presence of hazards	Quantitative reporting: ppm, µg/m3 and R-Value Qualitative reporting: Damp/mould inspection classification	
5	**RESILIENCE TO CLIMATE CHANGE**		
5.1	**Thermal comfort** (*to include within* **indicator 4***)*		
	Overheating risk assessment	(adaptive) degree hours	Variance in degree hours over baseline temperature in 2030s and 2050s compared to the present weather file
5.2a	**Additional cooling demand** (*reported alongside* **indicator 1.1**)		
	Additional cooling primary energy consumption	kWh/m2	Calculated additional cooling energy in 2030s and 2050s compared to the present weather file in order to maintain a defined interior temperature
5.2b	**Microclimate cooling benefit Proxy indicator** (where 5.2a is not feasible)		
	Green factor	Sum of weighted cooling effect for green features on/around the building	A set of weightings would be used to favour spaces around, within and on the building that have deep soil, semi-mature trees and have the potential to have a significant Leaf Area Index by 2030/2050
6	**OPTIMISED LIFE CYCLE COST AND VALUE**		
6.1	**Life Cycle Costing**		Real energy and water costs with sensitivities applied. Greater certainty will be attributed to dynamic energy simulations, renovations based on detailed building surveys and quality assurance actions (see B1) B1 – B7: Use stage
	a. Long-term utility costs	€ per year normalised per m² over 30 years (offices and individual houses) and 50 years (apartment blocks)	
	b. Long-term acquisition and maintenance costs	€ per year normalised per m² over 30 years (offices and individual houses) and 50 years (apartment blocks)	Outline cost plan for 30 year service life and inclusive of initial capital costs. The plan to be split into routine, cyclical and major repair schedules. A fixed minimum list of building elements to be specified for reporting. Scope of life cycle stages: A5: Construction stage (capital/acquisition costs for the asset) B1-B7: Use stage - Maintenance - Repair - Replacement
6.2	**Creating value and managing risk**		Step 1 Identify those common framework indicators that are referred to in the TEGoVA valuation factors and which have been incorporated into the building's appraisal or risk rating, indicatively to include: 1.1/3.1/6.1 Operating costs (energy and water) 2.2 Building element/component lifespans 4.1 Indoor air quality 5.1/5.2 Present and future thermal comfort conditions and additional cooling requirements 6.2 Long term maintenance costs Step 2 Carry out a simplified rating of the data and assumptions used for each of the identified common framework indicators. An aggregation step could be added in order to give a headline rating
	Value and risk factors	Reliability rating for the input data and assumptions for each indicator	

Energy Performance Contracting

EPC for social housing, Emilia Romagna, Italy

- the pilot site consisted of 13 public dwellings built in 1981 in a quarter that needed complete renovation to improve both comfort and energy efficiency
- the EPC was awarded to an ESCo (Energy Services Company) through the competitive dialogue process
- the final 12 year contract included a guarantee of 35 % energy savings per year, providing an immediate 7 % reduction ion tenants annual energy bill

Energy Performance Contracting

Bundling buildings for EPCs in Berlin, Germany

- different buildings are bundled into so called ’building pools’, each covering different types and standards, more than 1.300 buildings covered in total
- the savings achieved vary across pools from 15 % to 35 %
- the contracts are awarded through a negotiated procedure
- the contractors are responsible for the cost of refurbishment, operations, maintenance, inspection, systems management and continuous optimization

Demanding Client and Innovative Approach

Passive social housing in southwest Finland

- ambitious objectives to meet Finnish Passive House criteria
- two procurement clinics held for the potential constructors and technology suppliers
- open, interactive workshops to facilitate market dialogue between potential service providers, consultants and investors
- the clinics also included a customer satisfaction survey
- the future inhabitants are trained in energy saving measures

Demanding Client and Innovative Approach

Advice service for municipalities in Voralberg, Austria

- all 96 member communities wanting to renovate or build energy-efficient or eco-friendly are supported by experts through the whole planning, tendering and building process
- four modules: preplanning, planning and tendering, control and execution, control of success
- energy savings of around 70 % and reduction of indoor air emissions of 90 % have been achieved

Sustainable Building Procurement Process

Discussion

- Set sustainability targets and document them
- Define financing strategy, choose the contractual mode
- Select the supply team
- Assess the conformity throughout the process
- Monitor, Report and Verify - continuous improvement

Eco-Viikki, Finland

Mwanza, Tanzania

Kigali, Rwanda

Masdar, UAE