

Workshop on SB Assessment Methods and Tools

VERDE

(New Construction, Multi-residential and Offices)

Manuel Macias

R&D Department, GBC España

manuel.macias@gbce.es

VERDE OU 2011 Methodology

– **VERDE methodology is based on LCA approach for each stage of the building.**

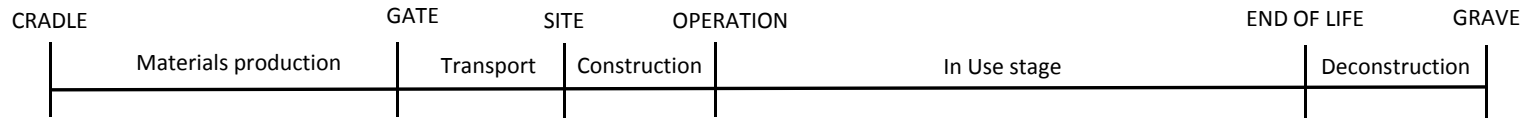
- Product stage. **prEN15804 EPD-Core rules for the product category, prEN 15942_Communication format and ISO 21930 EPD.**

In 2011 the new Construction Product Regulation (CPR) came into force. The CPR defines the requirements for building products to obtain the CE label. It adds new environmental and health related requirements and the demand for a sustainable use of natural resources. In this context the CPR refers to EPDs (wherever available) as a preferred possibility to verify the compliance with its requirements.

- Construction process stage. Transport and construction / Installation process
- In use stage **prEN15643-1-2-3-4. ISO 21929-1 – Indicators and ISO 21931-1 – Environmental performance of Buildings.**
- End of life

BUILDING LIFE CYCLE																
PRODUCT			CONSTRUCTION		USE							END OF LIFE			BEYOND BUILDING LIFE CYCLE	
Raw material supply	Transport	Manufacturing	Transport	Construction / installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operation use energy	Operational use water	De-construction	Transport	Waste processing	Disposal	Benefits and loads for future uses
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

VERDE Spanish Tool



Impact categories

Impact Category	CRADLE (Materials production)	GATE (Transport)	SITE (Construction)	OPERATION (In Use stage)	END OF LIFE (Deconstruction)	GRAVE
• Energy depletion	Embodied Energy	Fuels		HVAC + lighting + equipments		
• Biodiversity				Use of native plants		
• Climate change	CO2 emissions from EPD	CO2 emissions		CO2 emissions from HVAC + lighting + equipments + process loads		
• formation of ground-level ozone	NOx emissions from EPD	NOx emissions		NOx emissions from gas boiler		
• Acidification	SO2 emissions from EPD	SO2 emissions		HVAC + lighting + equipments+ process loads		
• Water use				Water efficiency + reuse		
• Waste			Constr. waste	Urban waste	Dec. waste	
• Health, well-being and productivity for users of facility				Confort and indoor environmental quality		
• Life cycle cost			construction	Energy and water ost		

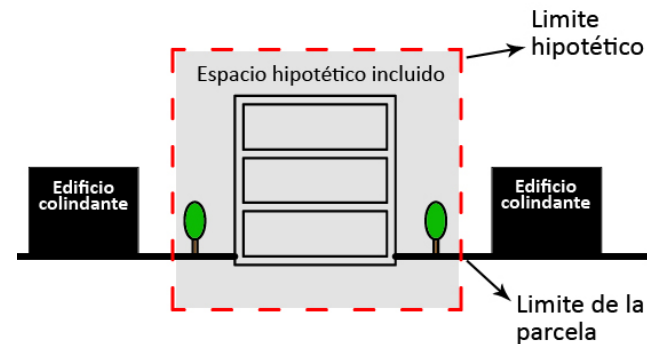
VERDE RO 2011 Methodology

- *VERDE estimated the impacts at each stage of building life cycle and applies the technique of “adding impact “to the final result for both the reference(Baseline) building to the proposed building*
- *This requires a calculation tool used instead of a “check list” as it makes the calculation of the impact reduction for each building evaluated.*
- *This methodology is applicable only when you can clearly identify a reference building*
- *Impact calculation:*
 - Product stage. Data from Environmental Product Declaration EPD.
 - global warming
 - ozone depletion
 - acidification of land and water
 - Eutrophication
 - photochemical ozone creation
 - depletion of abiotic resources (elements)
 - depletion of abiotic resources (fossil).
 - Construction process stage. D
 - global warming
 - depletion of abiotic resources (fossil).
 - *Exhaustion of suitable solid waste sites for non-hazardous waste*
 - In use stage
 - global warming
 - Stratospheric ozone depletion
 - acidification of land and water
 - Eutrophication
 - photochemical ozone creation
 - depletion of abiotic resources (elements)
 - depletion of abiotic resources (fossil).
 - *Exhaustion of suitable solid waste sites for non-hazardous waste*
 - *Health, well-being and productivity for users of facility (IAQ, Hygrothermal, ventilation, noise, acoustics, lighting, water quality, odours)*
 - *Financial risks or benefits for investors. Life cycle cost*

VERDE RO 2011 List of criteria

A.- PLOT AND LOCATION

- A14 Provision of solid waste collection and sorting services.
- A23 Use of native vegetation.
- A24 Shading of buildings by deciduous trees.
- A31 Heat island effect non roof
- A32 Heat island effect roof
- A33 light pollution



B.- ENERGY AND ATMOSPHERE

- B1 Embodied non-renewable energy in original construction materials.
- B2 Consumption of non-renewable energy used for project-related transport.
- B3 Consumption of non-renewable energy used for all purposes in facility operations.
- B4 Electrical peak demand for building operations.
- B6 Energy produced on-site using renewable energy production systems
- B7 Emissions leading to photo-oxidants during facility operations.
- B8 Emissions of ozone-depleting substances during facility operations.

C.- NATURAL RESOURCES

- C1 *Design measures to minimize use of potable water for occupancy needs.*
- C2 *Retention of rainwater for later re-use.*
- C4 *Design features for grey water reuse*
- C16 Strategic planning of selective demolition
- C17 management of construction waste.
- C20 Impact from construction materials (EPD's)

VERDE RO 2011 List of criteria

D.- INDOOR ENVIRONMENTAL QUALITY

D2	Low emitting materials
D3	Building cleaning before occupation
D7	CO2 concentrations in indoor air.
D9	Air movement in mechanically ventilated occupancies.
D11	Effectiveness of ventilation in naturally ventilated occupancies
D13	Thermal comfort in natural ventilated occupancies
D14	Appropriate day lighting in primary occupancy areas.
D15	Control of glare from day lighting.
D16	Appropriate illumination levels and quality of lighting.
D17	Noise attenuation through the exterior envelope.
D18	Transmission of facility equipment noise to primary occupancies.
D19	Noise attenuation between primary occupancy areas.

E.- SERVICE QUALITY

E1	Spatial efficiency
E5	Degree of local control of lighting systems.
E6	Degree of personal control of technical systems by occupants.
E13	Development and implementation of a management and maintenance plan

F.- SOCIAL AND ECONOMICS

F02	Access for mobility-impaired persons on site and within the building.
F03	Access to direct sunlight from living areas of dwelling units.
F04	Access to private open space from dwelling units.
F05	Visual privacy in principal areas of dwelling units.
F06	Access to exterior views from interior.
F08	Construction cost.
F09	Operating and maintenance cost.

VERDE RO 2011 Impact category list

1. *Climate change*
2. *Depletion of the stratospheric Ozone Layer*
3. *Loss of fertility*
4. *Loss of aquatic life*
5. *Production of cancer and other health problems*
6. *Changes in biodiversity*
7. *Depletion of non-renewable primary energy;*
8. *Depletion of non-renewable resources other than primary energy;*
9. *Depletion of non-renewable freshwater resources*
10. *Land use*
11. *Exhaustion of suitable solid waste sites for non-hazardous waste*
12. *Hazards from disposal or storage of non-radioactive hazardous waste*
13. *Hazards from disposal or storage of radioactive waste*
14. *Ability of users with functional impairments to use the facility*
15. *Personal safety and security of users*
16. *Health, well-being and productivity for users of facility
(IAQ, Hygrothermal, ventilation, noise, acoustics, lighting, water quality, odours)*
17. *Health, security and well-being of off-site population*
18. *Changes to social or cultural systems*
19. *Financial risks or benefits for investors. Life cycle cost*
20. *Housing affordability or commercial retail viability*
21. *Changes in economic system (employment, economic stimulus)*

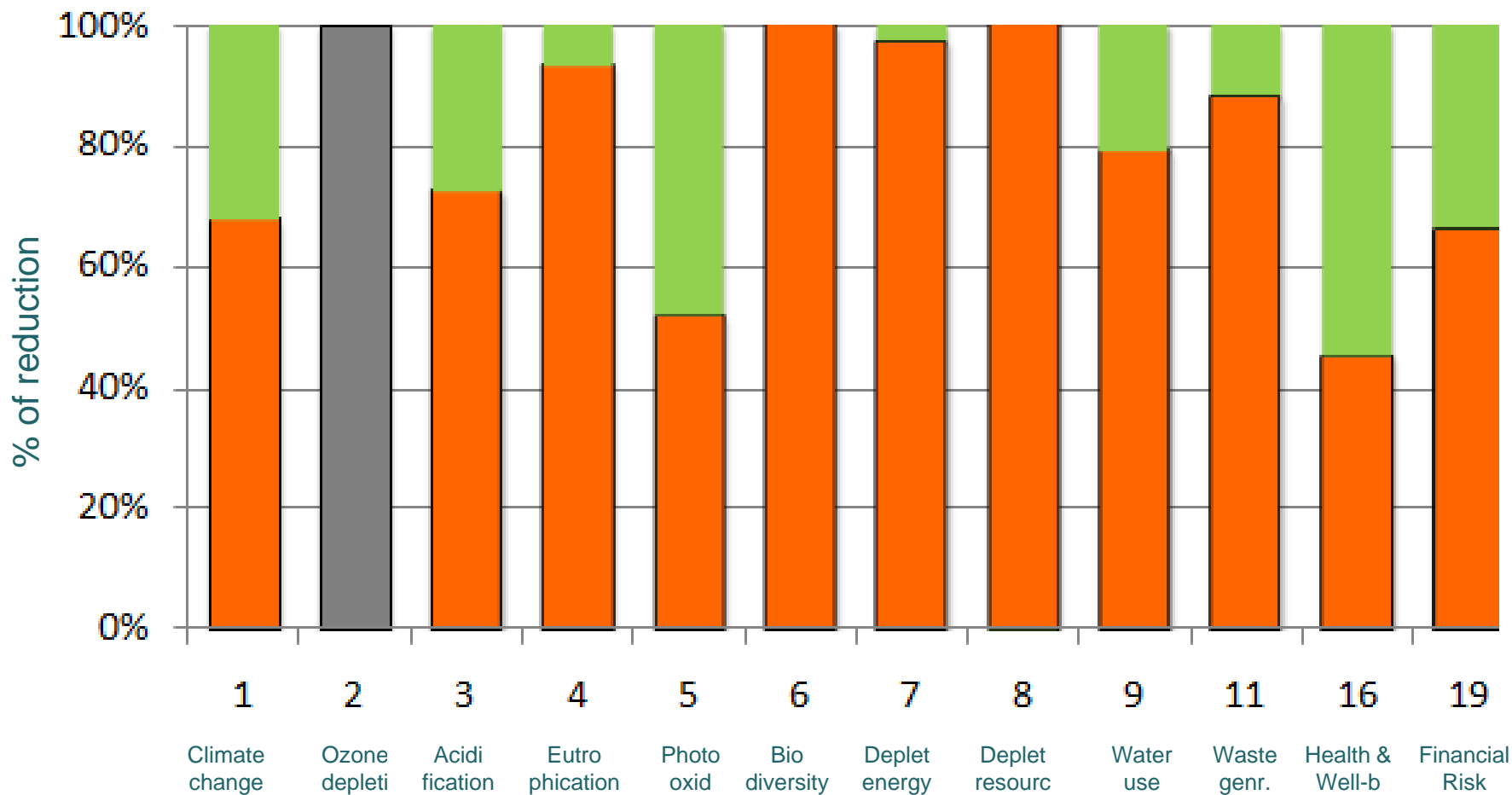
Criteria / Impact Relations

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		IMPACTOS																			
		1	2	3	4	5	6	7	8	9	11	16	19								
CRITERIOS	Parcela y Emplazamiento	A 14	Estrategias para la clasificación y el reciclaje de residuos sólidos urbanos																		
		A 23	Uso de plantas autóctonas																		
		A 33	Contaminación lumínica																		
	Energía y Atmósfera	B 01	Uso de energía no renovable en los materiales de construcción																		
		B 02	Energía no renovable en el transporte de los materiales de construcción																		
		B 03	Consumo de energía no renovable durante el uso del edificio. Demanda y eficiencia de los sistemas																		
		B 04	Demanda de energía eléctrica en la fase de uso																		
		B 06	Producción de energía renovable en la parcela																		
		B 07	Emisión de sustancias foto-oxidantes en procesos de combustión																		
	Recursos Naturales	C 01	Consumo de agua potable																		
		C 02	Retención de aguas de lluvia para su reutilización																		
		C 04	Recuperación y reutilización de aguas grises																		
		C 16	Planificación de una estrategia de demolición selectiva																		
		C 17	Gestión de los residuos de la construcción																		
	Calidad del Ambiente Interior	C 20	Impacto de los materiales de construcción distintos del consumo de energía																		
		D 02	Toxicidad en los materiales de acabado interior																		
		D 03	Realización de un proceso de purga																		
		D 07	Concentración de CO2 en el aire interior																		
		D 09	Limitación de la velocidad del aire en las zonas de ventilación mecánica																		
		D 11	Eficiencia de la ventilación en áreas con ventilación natural																		
		D 13	Confort térmico en espacios con ventilación natural																		
		D 14	Iluminación natural en los espacios de ocupación primaria																		
		D 15	Deslumbramiento en las zonas de ocupación no residencial																		
		D 16	Nivel de iluminación y calidad de la luz en los puestos de trabajo																		
		D 17	Protección de los recintos protegidos frente al ruido procedente del exterior																		
		D 18	Protección de los recintos protegidos frente al ruido generado en los recintos de instalaciones																		
		D 19	Protección de los recintos protegidos frente al ruido generado en recintos no pertenecientes a la misma unidad funcional de uso.																		
	Calidad del Servicio	E 01	Eficiencia de los espacios																		
		E 05	Capacidad de control local de los sistemas de iluminación en áreas de ocupación no residencial																		
		E 06	Capacidad de control local de los sistemas de HVAC																		
E 13		Desarrollo e implementación de un plan de gestión de mantenimiento																			
Aspectos Sociales y Económicos	F 02	Acceso universal																			
	F 03	Derecho al sol																			
	F 04	Acceso a espacios abiertos privados desde las viviendas																			
	F 05	Protección del interior de las viviendas de las vistas desde el exterior																			
	F 06	Acceso visual desde las áreas de trabajo																			
	F 08	Coste de construcción																			
	F 09	Coste de uso																			

VERDE Result of impacts reduction calculation

Impact Categories



VERDE RO 2011 Weighting based on environmental goals

Impact categories	weight
1 Climate change	27 %
2 Depletion of the stratospheric Ozone Layer	0%
3 Loss of fertility	5%
4 Loss of aquatic life	6%
5 Production of cancer and other health problems	8%
6 Changes in biodiversity	4%
7 Depletion of non-renewable primary energy	8%
8 Depletion of non-renewable resources other than primary energy	9%
9 Depletion of non-renewable freshwater resources	10%
11 Exhaustion of suitable solid waste sites for non-hazardous waste	6%
16 Health, well-being and productivity for users of facility (IAQ, Hygrothermal, ventilation, noise, acoustics, lighting, water quality, odours)	12%
19 Financial risks or benefits for investors. Life cycle cost	5%
Total	100%

VERDE Final score



0-0,5

0 hojas



0,5-1,5

1 hoja



1,5-2,5

2 hojas



2,5-3,5

3 hojas



3,5-4,5

4 hojas



4,5-5

5 hojas

