Colonial-SFL Group Life Cycle Analysis Standard

2024

Colonial

- Colonial-SFL Group Life Cycle Analysis Standard –

Life Cycle Analysis & Embodied Carbon Methodology

I. Life Cycle Analysis – Colonial Group Standards for calculation

Framework – Importance of Life Cycle Analysis (LCA)

Efforts in energy efficiency improvements and carbon footprint reductions have traditionally been focused on the operational phase of the building's life cycle due to building regulations and more feasible specific targets. The embodied carbon assessment, on the other hand, has been less widespread.

According to RICS, the progressive removal of operational emissions, added to the lack of regulation for the non-operational emissions, will lead to an increasing importance of embodied carbon in the total emissions related to real estate sector. An integrated approach, therefore, needs to address the whole life cycle carbon emissions to achieve and monitor decarbonisation targets. This comprehensive analysis allows the Colonial Group to adopt a more holistic perspective on its decarbonisation strategy, supported by the commitment to reduce the carbon footprint involved in developing a project from design to the end of its lifecycle.

The present document represents Colonial/SFL's Group Standard for the Life Cycle Analysis providing a common and comparable approach for the whole group.

II. Colonial/SFL's Group LCA principles

In order to develop the Colonial/SFL's Group LCA Principles, four leading methodologies/standards have been analysed:

- RICS *Whole life carbon assessment for the built environment*
- Hines *Embodied Carbon Reduction Guide*,
- European Comission Framework - Level(s)
- Low Carbon Building Initiative LCBI (BBCA in French).

The life cycle standard of the Colonial Group takes into account the following principles across nine characteristics.

1) Scope of life cycle stages

According to the ISO 14.044:2006 (Environmental management — Life cycle assessment — Requirements and guidelines), the whole life cycle of an asset can be disaggregated in a modular structure of different stages:

> Product & Construction stages (A1-A5)
> Use stage (B1-B7): includes part of embodied use (B1-B5) and operational use (B6-B7).
> End-of-life stage (C1-C4)
> Potential benefits and loads from the material recovery (D1-D2)

Carbon at the beginning of the life cycle		Operations			Carbon at the end of the life cycle	Supplementary information beyond the building life cycle
		Embodied carbon	Operational carbon			
Design	Building	Maintenance, repairs and renovations	Energy use	Water use	Demolition, transport and disposal of waste	Benefits and loads beyond the system boundary
Phases of production and construction of materials prior to building use		Materials and processes needed to maintain the building during use	Future use of the building		Demolition and demolition of a building after use	
A1 to A3	A4 to A5	B1 to B5	B6 to B7		C1 to C4	D1 to D2
Embodied carbon					Embodied carbon	

Colonial/SFL standard will follow the named “Cradle-to-Grave” approach, which covers from product to end-of-life stage (A, B and C stages), as it is the system boundary for a full carbon assessment. The results will be broken down by these stages.

The embodied carbon during the use stage should consider the number of suitable replacements required due to the shorter lifespan of the components used in the building.

The outside system boundary stage (D1-D2) is excluded in the Colonial/SFL’s LCA Standard due to the difficulty in making reliable predictions.

2) <u>Key project phases</u>

During the Life Cycle Analysis process, when LCAs are calculated over the entire course of a project, forecasts must be gradually reviewed at key project phases while monitoring progress throughout the project.

The Colonial/SFL’s LCA Standard considers the following four key project phases:

1. Concept design phase
2. Technical design phase
3. Construction phase
4. Post-completion phase

3) <u>Reference study period</u>

Defining a common reference study period is key to create a comparable analysis. The reference study period is intended to enable a sufficient lifespan for the building to reflect the whole life carbon emissions, also considering the maintenance, deconstruction, and disposal of the asset. There are some differences between methodologies regarding the use of a 50 or 60-year study period:

> European Commission, Taxonomy and LCBI methodology are using 50-year reference study period, and it is the current base case approach in SFL. Consistent with European stakeholders’ standpoint.

> RICS, Hines and Mace best practices are using 60-year LCAs, being the current base case approach. Consistent with Anglo-Saxon stakeholders’ standpoint.

In order to provide useful KPIs for all stakeholders (European and Anglo-Saxon), the Colonial/SFL’s Standard advocates for calculating and disclosing LCAs using both reference study periods.

4) Reference area for intensity KPIs

The results must be estimated using $kgCO_2e$ and normalised with the reference area. For the reporting of the LCA intensity ratios, Colonial/SFL's Standard establishes the use of the Gross Internal Area, as defined in the RICS principle, ensuring comparability of Group's metrics with other references.

5) Renewable energy production

For operational emissions after project completion, the renewable energy produced and consumed on-site is deducted from the total amount of energy consumed during the use stage of the building. This captures the improvement resulting from the actions implemented during the project.

6) Biogenic carbon

Following BBCA methodology, Colonial/SFL's Standard aims to calculate additional carbon sinks in case of carbon removal elements included in the project work. Biogenic carbon storage must be estimated across the entire building and accounted separately from the rest of stages on a pro-memoria basis but not deducted in carbon performance calculation.

7) Emission factors for operational stages

For the operational emissions, Colonial/SFL's Group Standard uses Location-based emission factors.

The Group calculates operational emissions using two different approaches:

1. Static approach

   This approach assumes the emission factor remains constant and does not change across the LCA of the asset.

   Using a static approach permits to simplify the analysis and directly capture the marginal impacts of the company's actions and efforts on the asset.

2. Dynamic approach

   The dynamic approach of the Colonial/SFL's Standard estimates an evolution of the emission factors for the future. To establish the best prediction of future emission factors, the Colonial/SFL Group estimations are based on government's projections or designated bodies. The source for the Spanish emission factors is MITECO (the national ministry of environment) while the source for the French emission factors is SNBC (Stratégie Nationale Bas-Carbone or Low carbon national strategy, roadmap reliant on the national Ministry of Ecological Transition) and / or future emission factors from providers.

   Calculating the emissions related to operational stages with dynamic emission factors enables to approximate the carbon impact of the building taking into account the future energy projections and the subsequent electricity grid decarbonisation.

These two estimations can be useful to isolate both the effect of the emission factors and that of the project itself.

8) ***Embodied carbon emission factors (Environmental Product Declaration, EPD)***

For the calculation of carbon emissions related to embodied carbon, use country and product specific Environmental Product Declaration (EPD). In the case of missing EPDs, use OneClick LCA tool to calculate those emission factors based on default features of the EPDs.

9) ***Calculation tools***

The OneClick LCA software is the most suitable tool for the life cycle approach since it complies the necessary requirements, its linked to LEED and BREEAM certifications and it can calculate missing EPDs.

III. Carbon Footprint Reduction Impact through Asset Transformation/ Projects – Calculation principles

In the framework of Colonial's Decarbonization Strategy, the efficient execution of projects plays a major role in progressing on a climate strategy that aims to reduce own and other's carbon emissions.

In particular, in the case of asset transformations (projects), the following aspects have to be taken into account:

- Projects generate the largest amount of annual carbon emissions > 60% in 2021 (75 ktCo2e of Capital Goods on a total annual Group footprint of 114 ktCo2e)
- Colonial has one of the most efficient transformation processes in projects achieving embodied carbon ratios at the low end of the spectrum.
- Consequently, projects can be an efficient way to improve Life Cycle footprints of assets making a significant contribution to carbon neutrality through the creation of "low carbon destinations."

To assess properly the Group contribution to carbon neutrality and the evolution of the group's decarbonization trajectory it is very important to establish a clear standard / methodology for the calculation of the marginal contribution on LCA footprint.

In Colonial's Group LCA methodology, each project analysis should take into account the following considerations:

1. LCA Carbon footprint pre-project/ transformation:

> Embodied carbon: Recurring embodied carbon with the assumption to maintain the current status and quality of the asset without any improvement project – asset situation without marginal action.

> Operational emissions: base for calculation must be the energy performance of the asset in the year pre project start (if not available: same KPI from a comparable asset and our estimate via general market data (least preferred option as very inaccurate).

2. *LCA Carbon post transformation/ project*

> <u>Embodied carbon</u>: embodied carbon of the asset transformation (project). Calculation based on latest best practice and considering Colonial/ SFL standard methodology explained in previous point.

> <u>Operational emissions</u>: recurrent emissions of stabilized asset (Location-Based) including the additional impacts of the mitigation actions implemented with the project works as well as additional carbon reductions through installation of solar panels on the asset or any other source of renewable energy for on-site energy generation.

3. *Carbon footprint reduction impact through Asset Transformation/ Projects:*

The impact of the of carbon footprint reduction through Asset Transformation/ Projects is the result of comparing the LCA asset footprint of the building post transformation ("*LCA Carbon post transformation "*) versus the building in the case of going concern scenario that maintains the asset characteristics constant *("LCA Carbon footprint pre-project/ transformation")*

Carbon footprint reduction impact through Asset Transformation/ Project	=	*LCA Carbon footprint post transformation*	-	*LCA Carbon footprint pre-project/ transformation*

With respect to the contribution impact to type of calculations can be taken into account:

(1) Static Impact - Carbon Reduction impact with constant emission factors

This calculation principle allows a straightforward assessment of the carbon reduction impact through transformation of the asset if current external conditions (emission factors and climate) remain constant and show the full benefit of the transformation efforts in current situation.

(2) Dynamic Impact - Carbon Reduction impact with a forward-looking estimate on emission factors for recurring carbon emissions

This calculation principle allows for a more sophisticated approach, combining the transformation action impacts with the dynamic evolution of emission factors. If the market converges to greener energy, this methodology adds another reduction element of carbon, making the efforts of the transformation less meaningful in relative terms.

However, as it is impossible to estimate other additional external factors like worsening climate conditions, the reduction contribution of the transformation could be different.

With the ambition to have the best view on the project transformation impact the Colonial/ SFL Group calculates the impact with both methodologies.