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ASSESSING LOW-CARBON TRANSITION BUILDING SECTOR METHODOLOGY

PART I: CONSTRUCTION

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76 1. Introduction

77 The 2015 United Nations Climate Change Conference (COP21) in Paris further strengthened the global
78 recognition of limiting dangerous climate change. Political agreement was reached on limiting warming to
79 2 degrees above pre-industrial levels. The project 'Assessing low Carbon Transition' (ACT) measures a
80 company's alignment with a future low-carbon world. The goal is to drive action by companies and
81 encourage businesses to move to a 2-degrees compatible pathway in terms of their climate strategy,
82 business model, investments, operations and GHG emissions management. The general approach of ACT
83 is based on the Sectoral Decarbonization Approach (SDA) developed by the Science Base Target initiative
84 (SBTi) in order to compare company's alignment with a 2-degrees world, the application of which is
85 described in the ACT Methodological Framework document [1].

86 Nearly 40% of the greenhouse gas (GHG) emissions worldwide are related to the building sector (scope 1,
87 2 and 3). This proportion is likely to increase due to world population growth, ongoing urbanization and
88 easier access to property in emerging countries which will all contribute to the addition of 230 billion m²
89 of new buildings within the next 40 years [1]. In the International Energy Agency (IEA) ETP Reference
90 Technology Scenario (RTS), which considers only countries' existing commitments, global buildings energy
91 consumption is seen to increase by more than 30% in the next 40 years while only by 5% in the 2DS
92 (decrease by 7% in the B2DS) [10]. In terms of CO₂ emissions (including scope 2 energy emissions), this
93 translates to a reduction of 85% by 2060 for the 2DS. To achieve that, energy efficiency measures (e.g.
94 envelope improvement, technology performance, etc.) coupled to a gradual electrification of building end
95 uses and decarbonization of electricity will be essential¹.

96 The prominent role of the building sector in the fight against climate change reflects the need to assess
97 companies involved in this industry and encourage them to achieve low carbon targets.

98 The particular position of the building industry in the economy makes it difficult to grasp the reality of it.
99 Indeed, the sector covers different activities (real estate development, construction work, building
100 management, etc.) operated by diverse companies. Therefore, assessing the building sector emissions
101 requires a life-cycle approach, integrating all parts of the supply chain. This makes the building sector
102 suitable for analysis via a SDA [3] and allows the ACT assessment to focus on quantitative indicators.
103 Nevertheless, due to the complexity of the sector and its economic importance, other qualitative
104 indicators (e.g. business models...), are also highly significant when considering the alignment with a low-
105 carbon future and should not be neglected or underweighted.

106 In order to better address the variety of issues related to carbon assessment in the building sector, two
107 separate reference methodologies have been implemented to cover all the relevant stakeholders. The
108 Construction methodology focuses on the low-carbon alignment of companies that construct and

¹The IEA ETP Reference Technology Scenario refers only to the use of buildings and excludes construction and raw materials emissions.

109 renovate buildings; whereas the goal of the Real Estate methodology is to assess firms whose main
110 business is property management.

111 This present document introduces the ACT construction methodology. Particular emphasis will be placed
112 on the GHG emissions released during the construction phase (including raw materials) and operational
113 emissions caused by the building use, which represents from 43% to 58% of total emissions over a new
114 building's lifetime [4]. The assessment methodology also considers factors such as: market share of low-
115 carbon buildings, R&D expenses in Climate Change Mitigation Technologies as well as low carbon
116 transition plan. This information will feed simplified assessment models that aim to quantify the
117 implications of initiatives such as installing smart building systems or taking part in the construction of
118 "exemplary buildings". In addition to business model considerations, other qualitative indicators included
119 are the company's stance on climate change regulations and engagement with the supply chain.

120 **2. Principles**

121 The selection of principles to be used for the methodology development and implementation is explained
122 in the general Framework. Table 1 recaps the adopted principles that were adhered to when developing
123 the methodology.

124 Table 1 Principles for implementation

Principles

- Relevance - Select the most relevant information (core business and stakeholders) to assess low carbon transition.

- Verifiability - The data required for the assessment shall be verified or verifiable.

- Conservativeness - Whenever the use of assumptions is required, the assumption shall err on the side of achieving a 2 degrees maximum temperature rise.

- Consistency - Whenever time series data is used, it should be comparable over time.

- Long-term orientation - Enable the evaluation of the long-term performance of a company while simultaneously providing insights into short- and medium-term outcomes in alignment with the long-term.

125

126 3. Scope

127 Scope of the document

128 This document presents the ACT assessment methodology for the Building Construction sector. It includes
129 rationales, definitions, indicators and guidance for performance assessment. It focuses on the specific
130 considerations and constraints that need to be taken into account when assessing the low-carbon alignment
131 of the Building Construction sector.

132 Scope of the Building Construction sector

133 The present methodology refers to construction companies and not real estate companies. The activities of
134 the Building Construction sector may include:

- 135 1. Real Estate Development & Operations (due diligence, land use permitting, leasing marketing)
- 136 2. Architectural Engineering (building design, building engineering)
- 137 3. New Construction (site management, construction of new structures)
- 138 4. Renovation (existing buildings' retrofit)

139 The scope includes the activities mentioned above as they are all considered within the life cycle assessment
140 of a building.

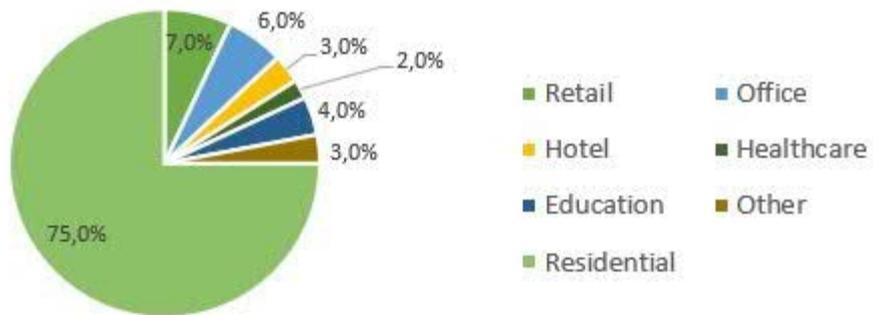
141 Companies that provide construction materials and equipment are not specifically assessed by the following
142 assessment methodology. They are not eligible to participate in the assessment. However, their impacts are
143 considered through the LCA approach when assessing the emissions related to materials (see "4.
144 Boundaries").

145 Companies which carry out projects in separate lots (opposed to general contracting) are currently excluded
146 from the scope of the Building Construction Methodology.

147 Business Segments

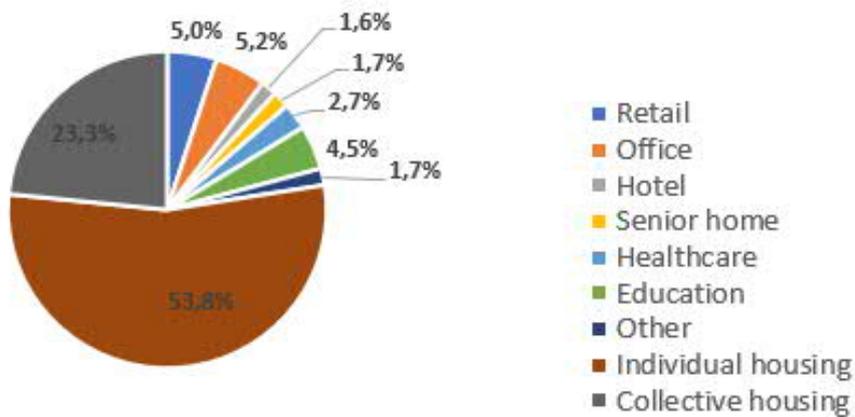
148 The buildings delivered by construction companies greatly vary according to their physical characteristics
149 and use. The scope includes different business segments in order to emphasize the specific features of each
150 type of building. These segments are defined based on the building use (i.e. commercial, residential and
151 industrial) and the occupancy. In the case of a mixed-use building (e.g. residential building with commercial
152 stores in the ground floor), the business segment occupying the highest floor space area should be
153 considered. This breakdown represents the reference framework to be used when conceiving the sectoral
154 benchmarks.

155 Residential buildings represent the vast majority (75%) of floor space in Europe [6]. Retail and offices
 156 respectively cover 7% and 6% of total floor area (see figure 1). The specific benchmarks cover those three
 157 segments. Furthermore, the methodology provides two specific benchmarks for the residential segment:
 158 multi-family and single family housing; as they are very different in terms of energy consumption and spatial
 159 organization. Besides, each of them represents a large part of the total floor space (see figure 2 with the
 160 example for France). Given the data availability and methodology simplicity, the rest of the business
 161 segments, which represent less significant shares of total floor area, are compared to the sector average.



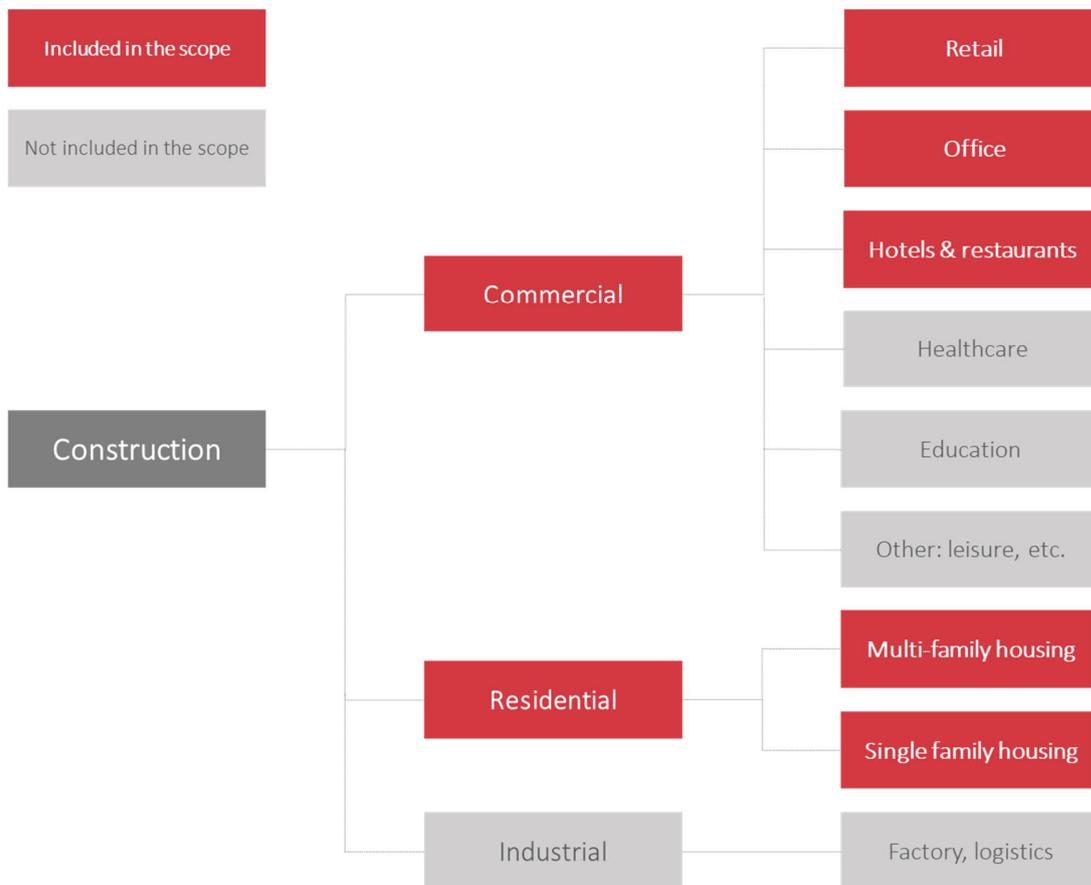
162 Figure 1: Breakdown of floor area in Europe. Source: European Commission (2017).

163



164
 165 Figure 2: Breakdown of floor area in France. Source: ADEME (2014).

166 Figure 3 illustrates the main business segments that constitute the Construction sector and those included
 167 in the scope



168

169 Figure 3: Business segments of the Construction sector.

170 Source: GRESB, RE Developer Reference Guide, 2017.

171 **Geographical scope**

172 The ACT methodology aims to assess companies on an international level, covering building stocks located
 173 in various regions. Those areas display specific characteristics (climate, urbanization model, data availability)
 174 and therefore may require to be assessed separately. The methodology thus considers the following
 175 geographical areas:

- 176 ▪ Europe;
- 177 ▪ North America;
- 178 ▪ China;
- 179 ▪ India;
- 180 ▪ ASEAN (ten countries of South East Asia with only global data including Brunei, Cambodia,
 181 Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam);
- 182 ▪ Africa (South Africa).

183 Table 2 illustrates the main components of regulated and unregulated energy use components.

Regulated Energy use	Unregulated Energy use
Heating	Transportation (elevators...)
Cooling	IT equipment
Ventilation	Catering facilities
Interior lighting	Lab equipment
Hot water	...

184

185 Table 2: Components of regulated and unregulated energy use.

186 Source: ASHRAE Standard 90.1.

187 4. Boundaries

188 Reporting boundaries

189 The methodology should consider:

- 190 ▪ Company's own buildings (occupied by the company);
- 191 ▪ New buildings delivered by the company;
- 192 ▪ Renovated buildings delivered by the company.

193 The most significant sources of emissions for construction companies are those related to the delivered
194 buildings, which include the emissions associated with raw materials, construction works and use phase.
195 The reporting boundaries of the ACT methodology for construction companies focus on the delivered
196 buildings emissions, which are considered as the "products sold" by construction companies. Although GHG
197 emissions related to buildings occupied by the construction companies such as offices are relatively
198 insignificant compared to delivered buildings' emissions, they reflect the companies' willingness to tackle
199 environmental issues within the industry. They should therefore be considered within the reporting
200 boundaries of the construction companies as well.

201 Temporal boundaries – Building's Life-Cycle Assessment (LCA)

202 Buildings' emissions are coming from different phases covered by the LCA:

- 203 ▪ Emissions related to production, transformation and transport of materials;
- 204 ▪ Emissions released during on-site operations (construction phase);
- 205 ▪ Emissions caused by the use of the building (mostly energy consumption);
- 206 ▪ Emissions due to potential renovation works, demolition and disposal of residual materials marking
207 the end of the building's life-time.

208 Figure 4 illustrates the different phases involved in a buildings' LCA.



209
210 Figure 4: Broad areas of a building's life cycle.

211 Source: BIS, 2010.

212 Theoretically, the assessment should take into account the entire temporality of the building through LCA.
213 However, for practical reasons (e.g. data availability), the ACT assessment quantitative indicators should

214 rely on a simplified building LCA (see Figure 5), which includes materials, on-site operations² and use phase.
215 Together, they represent more than 98% of a building's life cycle emissions [11].



216
217 Figure 5: Parts of a building life cycle covered by quantitative indicators.

218 Regarding the buildings' energy consumption, construction companies are required to report only the
219 regulated components of the energy use.

220 The five business segments selected in the scope are to be associated with specific benchmarks. The rest of
221 the business segments could be compared with the sector average. Each benchmark covers the five
222 geographic areas (see "geographic scope").

223 **Rationale**

224 **Reporting Boundaries**

225 Use phase emissions represent the highest share of the total emissions in a building's life-time. Nonetheless,
226 the share related to material and on-site operations vary considerably depending on the type of building
227 and the location. For instance, in France, the construction materials are responsible for 37-52% of the total
228 emissions of a building, the construction phase for 5% and the energy use phase for 43-58% [4]; whereas in
229 China, the part related to the use phase goes up to 75-86% [5]. Including the different phases is the best
230 approach to capture the specific characteristics of each type of buildings. Besides, assessing the GHG
231 emissions of a building through the LCA requires to include all the phases mentioned in Figure 3.

232 **Scope of the end-use of energy**

233 The energy consumption of a building is multidimensional and needs to be detailed. Even though there is
234 no taxonomy commonly agreed upon worldwide, national and regional initiatives converge towards the
235 identification of two main categories of energy use components. On one hand, the regulated components
236 of energy use (e.g. heating, cooling, etc.) are supposed to be under the control of building sector companies.
237 They are taken into account in most of the labels developed to assess low-carbon buildings: i.e. BBCA,
238 Minergie label, HQE (FR), LEED (USA), BREEAM (UK), and LIDERa (PT). On the other hand, building companies

² The on-site operations include GHG emissions related to transport of materials to construction sites, on-site processes not already included in materials' LCA, as well as disposal of waste and excavated soil.

239 do not have control on unregulated energy use components which are often in the hands of occupants.
240 Construction companies are not legally required to record them when reporting energy consumption.

241 Companies are required to report only on the regulated components of the energy use. Asking for this
242 information only is relevant for two reasons. First, companies have little control on unregulated energy use
243 since these components are mostly associated with equipment used by the occupants or tenants. Following
244 the principle of Relevance, the methodology assesses the company's willingness to align with low-carbon
245 scenario only where it has the ability to influence. Last but not least, since companies do not report on
246 unregulated energy use, data is highly uncertain and largely based on estimates.

247 5. Construction of the data

248 5.1. Data sources

249 In order to carry out a company level assessment, many data points need to be gathered which can be
250 sourced from various locations. Principally, ACT relies on the voluntary provision of data by the participating
251 companies.

252 Next to this however, external data sources might be consulted where this would streamline the process,
253 ensure fairness, and provide additional value for verification and validation.

254 5.2. Company Data request

255 The data request will be presented to companies in a comprehensive data collection format.

256 5.3. Performance indicators

257 The performance indicators have been conceived following the main principles described in 2.

258 **Intensity metric – Floor area**

259 The carbon intensity requested to the company which is considered for some indicators (BC 1.1, BC 1.2, BC
260 1.3, BC 1.4, BC 1.5 and BC 1.6) shall be calculated based on the floor area (m²).

261 With the various metric systems per country of type of building, a correction factor is applied to match with
262 CO₂ intensity's benchmark. The floor area considered is the whole building area excluding external, outdoor
263 and parking areas. If data for some operations is unavailable, resulting in a lower coverage, a correction
264 factor shall be applied to the scoring.

265 Table 3 illustrates the key performance indicators used by Building Construction (BC) companies in ACT
266 sector assessment.

		Building Construction			
		Past	Present	Future	
	1. Targets		BC 1.6 Historic target ambition and company performance	BC 1.1 Alignment of owned buildings reduction targets BC 1.2 Alignment of new buildings delivered (use phase) reduction targets BC 1.3 Alignment of renovated buildings (use phase) reduction targets BC 1.4 Alignment of new buildings (materials) reduction targets BC 1.5 Time Horizon of targets	
	Core business performance	3. Intangible investment		BC 3.1 R&D in Climate Change mitigation technologies	
		4. Sold product performance		BC 4.1 Alignment of carbon performance trend for new buildings (use phase)	BC 4.4 Emissions lock-in
				BC 4.2 Low carbon buildings share	
		BC 4.3 Renovated buildings subject to thermal renovation share			
5. Management			BC 5.1 Oversight of climate change issues	BC 5.3 Low carbon transition plan	
			BC 5.2 Climate change oversight capability		
			BC 5.4 Climate change management incentives	BC 5.5 Climate change scenario testing	
Influence	6. Supplier		BC 6.2 Activities to influence suppliers to reduce their GHG emissions	BC 6.1 Strategy to influence suppliers to reduce their GHG emissions	
	7. Client		BC 7.2 Activities to influence consumer behaviour to reduce their GHG emissions	BC 7.1 Strategy to influence customer behaviour to reduce their GHG emissions	
	8. Policy engagement		BC 8.1 Company policy on engagement with trade associations		
			BC 8.2 Trade associations supported do not have climate-negative activities or positions		
		BC 8.3 Position on significant climate policies			
	9. Business model		BC 9.1 Integration of the low-carbon economy in current and future business model		

Table 3 indicator overview

268 Table 4 displays how the proposed indicators cover the different GHG emissions scopes identified in the “Scope” and “Boundaries” chapters above, in the
 269 consideration of the availability of sectoral benchmark for these scopes, as well as of company data availability.

BC	Indicators	Scope of GHG emissions						
		New buildings delivery			Renovated buildings delivery			Own buildings
		Building Use	Work & logistics	Materials	Building Use	Work & logistics	Materials	Building Use
	Sectoral benchmarks availability	✓		✓	✓			✓
1.1	Alignment of owned buildings reduction targets							
1.2	Alignment of new buildings delivered (use phase) reduction targets							
1.3	Alignment of renovated buildings (use phase) reduction targets							
1.4	Alignment of new buildings (materials) reduction targets							
1.5	Time horizon of targets							
1.6	Historic target ambition and company performance							
3.1	R&D in Climate Change mitigation technologies							
4.1	Alignment of carbon performance trend for new buildings (use phase)							
4.2	Low carbon buildings share							
4.3	Renovated buildings subject to thermal renovation share							
4.4	Emissions lock-in							
5.1	Oversight of climate change issues							
5.2	Climate change oversight capability							
5.3	Low carbon transition plan							
5.4	Climate change management incentives							
5.5	Climate change scenario testing							
6.1	Strategy to influence suppliers to reduce their GHG emissions							
6.2	Activities to influence suppliers to reduce their GHG emissions							
7.1	Strategy to influence customer behaviour to reduce their GHG emissions							
7.2	Activities to influence consumer behaviour to reduce their GHG emissions							
8.1	Company policy on engagement with trade associations							
8.2	Trade associations supported do not have climate-negative activities or positions							
8.3	Position on significant climate policies							
9.1	Business model							

Table 4: Indicators and scope of GHG emissions

270 1. Target indicators (Weighting: 15%)

271 BC 1.1 Alignment of owned buildings reduction targets (Weighting: 1%)

Description & Requirements BC 1.1 Alignment of owned buildings reduction targets

Short description of indicator A measure of the alignment of the company’s own buildings emissions reduction targets with their decarbonization pathway. The indicator will identify the gap between the company’s targets and the decarbonization pathway as a percentage, which is expressed as the company’s commitment gap.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A1: Current internal targets set on carbon performance (kgeCO₂/m²)
- A7: Breakdown of floor areas per business segment and country

The benchmark indicators involved are:

<u>Target type</u>	<u>Parameter</u>	<u>Intensity metric</u>	<u>Benchmark</u>
<u>Own buildings emissions</u>	<u>CB_{OB}</u>	<u>kgeCO₂/sqm</u>	Real-Estate_In-Use-all_Services_Office_“Geo-zone”_“Country” (possibly combination of offices in different zones/countries)

How the assessment will be done The assessment is based on the difference between the company’s target (T_{OB}) and the company benchmark (CB_{OB}) 5 years from the reporting year.

The company target pathway (T_{OB}) is the decarbonization over time, defined by the company’s emission reduction target. To compute T, a linear line is drawn between the starting point of the assessment and the company’s target endpoint.

The company benchmark (CB_{OB}) pathway is the 'company own buildings decarbonization pathway'. See section 6 for details on the computation of this pathway.

The assessment will compare T_{OB} to CB_{OB}, by assessing the difference between these pathways 5 years after the reporting year. The pathways are expressed in kilograms of CO₂ per unit of square meter (intensity measure). Where necessary, targets will be normalized to this unit to enable the comparison. The result of the comparison is the commitment gap.

To assign a score to this indicator, the size of the commitment gap will be compared to the maximum commitment gap, which is defined by the business as usual pathway (BAU_{OB}). BAU_{OB} is defined as an unchanging (horizontal) intensity pathway, whereby the emissions intensity is not reduced at all 5 years after the reporting year.

Calculation of score

The score is a percentage of the maximum commitment gap. It is calculated by dividing the company's commitment gap by the maximum commitment gap (taking all values 5 years after the reporting year):

$$\text{Commitment gap [Own Buildings]} = \frac{T_{OB} - CB_{OB}}{BAU_{OB} - CB_{OB}}$$

$$\text{Score} = 1 - \text{Commitment gap}$$

The score assigned to the indicator is equal to 1 minus the commitment gap and is expressed as a percentage (1 = 100%). Therefore, if T_{OB} – CB_{OB} is equal to zero, and so the company's target is aligned with the sectoral benchmark, the maximum score is achieved.

The aggregation system of the various benchmarks (country, business segment) is based on the proportion of each segment/country represented in average square meter unit.

Rationale

BC 1.1 Alignment of owned buildings reduction targets

Rationale of the indicator

Relevance of the indicator:

Emissions reduction targets related to the company's own buildings are included in the ACT Building Construction (BC) assessment for the following reasons:

1. Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.
2. Targets are one of the few metrics that can predict a company's long-term plans beyond that which can be projected in the short-term, satisfying ACT's need for indicators that can provide information on the long-term future of a company.
3. Although the company's own buildings emissions are negligible compared to delivered buildings emissions, they have a symbolic value for the construction firm and reflect the willingness of the management to develop sustainable building practices.

Scoring rationale

Targets are quantitatively interpreted and directly compared to the low-carbon benchmarks for the sector, using the SDA benchmark, which is further explained in section 6.1.

Targets are compared to the benchmark directly, and the relative gap is calculated compared to the business as usual pathway. The gap method was chosen for its relative simplicity in interpretation and powerful message, which aligns with the UNEP's narrative of the global commitment gap of the UNFCCC Climate Agreements [7]. The simple percentage score also needs no further computation to become meaningful on its own, as well as be useable for aggregation in the performance score.

To ensure comparability of the scores and replicability of the measurement, targets are compared to the benchmark at a fixed point in time, similar to all companies. This is necessary, because the method interprets linear decarbonization pathways from the targets, while the decarbonization pathways are nonlinear. Therefore, the measurement gaps would vary over time if the time of measurement was not constant, and undesired precedent is set for reporting only targets with short-time horizons.

5 years after the reporting year was chosen as the reference for this measurement, as it is far enough in time to make a meaningful measurement of the company's future pathway, while close enough to be able to include the typical short to medium time scale of present-day company targets.

BC 1.2 Alignment of new buildings delivered (use phase) reduction targets (Weighting: 5%).

Description & Requirements BC 1.2 Alignment of new buildings delivered (use phase) reduction targets

Short description of indicator This indicator assesses the company's emissions reduction targets in regard to emissions related to energy consumption and released during the use phase of new delivered buildings. The indicator will identify the gap between the company's target and the decarbonization pathway as a percentage, which is expressed as the company's commitment gap.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A1: Current internal targets set on carbon performance (kgeCO₂/m²)
- A7: Breakdown of floor areas per business segment and country

The benchmark indicators involved are:

<u>Target type</u>	<u>Parameter</u>	<u>Intensity metric</u>	<u>Benchmark</u>
<u>New buildings use</u>	<u>CB_{nbu}</u>	<u>kgCO₂/sqm</u>	Construction_In-Use-reg_ "Building-type" _ "Building-typology" _ "Geo-zone" _ "Country" (in most cases, combination of several pathways according to shares of buildings typologies and zones/countries)

How the assessment will be done The assessment of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the assessment of indicator BC 1.1 for more details.

Rationale BC 1.2 Alignment of new buildings delivered (use phase) reduction targets

Rationale of the indicator **Relevance of the indicator**

Targets related to new delivered buildings are included in the ACT BC assessment for the following reasons:

1. Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.
2. Targets are one of the few metrics that can predict a company's long-term plans beyond that which can be projected in the short-term, satisfying ACT's need for indicators that can provide information on the long-term future of a company.
3. The use phase represents a large part of emissions in the building's LCA, that is, 43% to 58% of total emissions in a new building's lifetime [4]. Therefore, this indicator dedicated to the use phase of buildings captures a large of total scope of GHG emissions.

Scoring rationale.

The scoring of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the rationale of indicator BC 1.1 for more details.

273

274

BC 1.3 Alignment of renovated buildings (use phase) reduction targets (Weighting: 3%).

Description & Requirements	BC 1.3 Alignment of renovated buildings (use phase) reduction targets
Short description of indicator	This indicator assesses the company's emissions reduction targets as regards with the emissions related to energy consumption during the use phase of renovated delivered buildings. The indicator will identify the gap between the company's target and the decarbonization pathway as a percentage, which is expressed as the company's commitment gap.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none">- A1: Current internal targets set on carbon performance (kgeCO₂/m²) for renovated and new buildings- A7: Breakdown of floor areas per business segment and country for renovated and new buildings

The benchmark indicators involved are:

<u>Target type</u>	<u>Parameter</u>	<u>Intensity metric</u>	<u>Benchmark</u>
<u>Renovated buildings use</u>	<u>CB_{rbu}</u>	<u>kgCO₂/sqm</u>	Renovation_In-Use-reg_ "Building-type" _ "Building-typology" _ "Geo-zone" _ "Country" (in most cases, combination of several pathways according to shares of buildings typologies and zones/countries)

How the assessment will be done

The assessment of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the assessment of indicator BC 1.1 for more details.

Rationale

BC 1.3 Alignment of renovated buildings (use phase) reduction targets

Rationale of the indicator

Relevance of the indicator:

Targets related to the use phase of renovated delivered buildings are included in the ACT BC assessment for the following reasons:

1. Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.
2. Targets are one of the few metrics that can predict a company's long-term plans beyond that which can be projected in the short-term, satisfying ACT's need for indicators that can provide information on the long-term future of a company.
3. Renovation of existing building stocks is an impactful tool to increase building energy efficiency thus necessary for the energy transition. Although refurbishment works represent a small part of the sales, such targets would reflect the ambition of the company to integrate the whole scope of its activities in its environmental strategy.

Scoring rationale

The scoring of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the rationale of indicator BC 1.1 for more details.

275

BC 1.4 Alignment of new buildings (materials) reduction targets (Weighting: 3%).

Description & Requirements

BC 1.4 Alignment of new buildings (materials) reduction targets

Short description of indicator

This indicator assesses the company's emissions reduction targets in regard to emissions related to materials used for new delivered buildings. The indicator will identify the gap between the company's target and the decarbonization pathway as a percentage, which is expressed as the company's commitment gap.

Data requirements

The questions comprising the information request that are relevant to this indicator are:

- A1: Current internal targets set on carbon performance (kgCO₂/m²) for renovated and new buildings

- A7: Breakdown of floor areas per business segment and country for renovated and new buildings

The benchmark indicators involved are:

<u>Target type</u>	<u>Parameter</u>	<u>Intensity metric</u>	<u>Benchmark</u>
<u>Materials emissions</u>	<u>CB_{nbm}</u>	<u>kgCO₂/sqm</u>	Construction_Materials_ "Building-type" _ "Building-typology" _ "Geo-zone" _ "Country" (in most cases, combination of several pathways according to shares of buildings typologies and zones/countries)

How the assessment will be done

The assessment of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the assessment of indicator BC 1.1 for more details.

Rationale

BC 1.4 Alignment of new buildings (materials) reduction targets

Rationale of the indicator

Relevance of the indicator

Targets related to the use phase of renovated delivered buildings are included in the ACT BC assessment for the following reasons:

1. Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.
2. Targets are one of the few metrics that can predict a company's long-term plans beyond that which can be projected in the short-term, satisfying ACT's need for indicators that can provide information on the long-term future of a company.
3. The materials represent a significant part of a new building's lifetime that is, 37% to 52% of the total emissions [4]. They represent a powerful lever for construction firms to reduce their carbon footprint.

Scoring rationale.

The scoring of this indicator follows the same general methodology of scoring indicator BC 1.1. Therefore, refer to the rationale of indicator BC 1.1 for more details.

276

BC 1.5 Time horizons of targets (Weighting: 2%)

Description & Requirements	AU 1.5 Time horizons of targets
Short description of indicator	A measure of the time horizons of company targets for all delivered buildings. The ideal set of targets is forward looking enough to include a long-time horizon that includes the majority of a company's asset lifetimes, but also includes short-term targets that incentivize action in the present.
Data requirements	The question comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none">- A1: Current internal targets set on carbon performance (kgeCO₂/m²)
How the assessment will be done	The analysis has two dimensions: <ol style="list-style-type: none">1. A comparison of: (a) the longest time horizon of the company's targets, and (b) the long-term point fixed by ACT assessment methodology.2. The company has interval targets that ensure both short and long-term targets are in place to incentivize short-term action and communicate long-term commitments.

Dimension 1: Target endpoint

The company's target endpoint (T_e) is compared to the long-term point (LT), which is fixed at 2050 minus the reporting year, aligned with 2°C scenario. The company's target endpoint (T_e) is equal to the longest time horizon among the company's targets, minus the reporting year:

$$T_e = \text{Longest target time horizon} - \text{reporting year}$$

The analysis compares T_e to LT. This analysis measures the horizon gap:

$$\text{Horizon gap} = LT - T_e$$

The company's target endpoint is compared according the following scoring table:

Horizon gap	Score
$LT - T_e < 0$	50%
$LT - T_e \leq 10$	35%
$LT - T_e \leq 15$	20%
$LT - T_e > 15$	0%

Dimension 2: Intermediate horizons: All company targets and their endpoints are calculated and plotted. The ideal scoring company does not have intervals between target endpoints larger than 5 years from the reporting year.

Measurements are done in five-year intervals between the reporting year and LT.

The company's targets are compared according the following scoring table:

Intermediate target gaps	Score
All the gaps until LT are equal or less than 5 years	50%

All the gaps until 60% of LT are equal or less than 5 years	35%
All the gaps until 40% of LT are equal or less than 5 years	20%
All the gaps of 5 years or less do not reach 40% of LT or there is no such gaps disclosed by the company	0%

For all calculations:

- The company is asked to report the 'base year' of the targets. The 'base year' will be used for calculations if the company does not report 'year of target establishment'.
- If the company reports 'year of target establishment' in the data request, then the calculations may be redone using this as the baseline instead of the reporting year. The company can attain up to 80% of the maximum score with this alternate calculation. The baseline that results in the higher score will be used for the final score.
- Targets that do not cover > 95% of generation emissions are not preferred in the calculations. If only such targets are available, then the score will be adjusted downwards equal to the % coverage that is missing.
- If the company discloses targets with different time horizons depending on the geographical area or the type of building, the score will be aggregated based on the proportion of each segment/country represented in average square meter unit.

Aggregate score: Dimension 1: 50%, Dimension 2: 50%.

Rationale

BC 1.5 Time horizons of targets

Rationale of the indicator

Relevance of the indicator:

The time horizon of targets is included in the ACT BC assessment for the following reasons:

1. The target endpoint is an indicator of how forward looking the company's transition strategy is.
2. The very long expected lifetime of buildings sold means that construction companies 'commit' a large amount of carbon emissions into the future through the delivered buildings today, which requires targets that have time horizons which align with this reality.
3. Aside from communicating long-term commitments, short-term action needs to be incentivized. This is why short time intervals between targets are needed.

Scoring rationale.

The score of this indicator is tied to how the target timeline compares to the lifetimes of the company's delivered buildings. The company has a 'horizon gap' if their targets do not include a significant part of their products sold (buildings). It is however recognized that some products may have lifetimes that exceed beyond meaningful target endpoints.

277

BC 1.6 Historic target ambition and company performance (Weighting: 1%)

Description & Requirements	BC 1.6 Historic target ambition and company performance
Short description of indicator	A measure of the company's historic target achievements and current progress towards active emission reduction targets. All the scopes of the company are considered. The ambition of the target is qualitatively assessed and is not included in the performance indicators.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none"> - A2: Past internal targets set on carbon performance (kgeCO₂/m²) - A3: Average carbon intensity of company's own building in the past 5 years (use phase)
How the assessment will be done	For the performance score, this will assess on two dimensions, whereby companies achieve the maximum score if: <p>Dimension 1: The company achieved all previous emission reduction targets with a target year in the past.</p>

Dimension 2: The company is currently on track to meet an existing emission reduction target, whereby the ratio between the remaining time period and the level remaining to target achievement (Progress Ratio p) is not lower than 0.5:

$$p = \frac{1 - \% \text{ time}}{1 - \% \text{ complete}} \geq 0.5$$

The highest score is attained if p is 1 or higher. A percentage score is assigned for any value between 0.5 and 1.

Aggregate score: Dimension 1: 25%, Dimension 2: 75%.

For all calculations:

- Companies who do not have targets with target years in the past but only with target years in the future are not assessed on dimension 1, but only on dimension 2.
- Weightings applied to targets that cover only the performance of company's own buildings are lower than those applied to targets covering the performance of delivered buildings.
- If the company has multiple targets in different scopes that can be assessed according to the above criteria, then the score will be an average score based on the progress ratios of all targets assessed.

The performance score does not assess the ambition level of previous targets, and therefore dimension 1 only has a low weight in the final performance score. This information is also qualitatively assessed in the assessment narrative, which will have another look at the following dimensions:

1. Achievement level: To what degree has the company achieved its previously set emission reduction targets.
2. Progress level: To what degree is the company on track to meet its currently active emission reduction targets?
3. Ambition level: What level of ambition do the previously achieved emission reduction targets represent?

Rationale

BC 1.6 Historic target ambition and company performance

Rationale of the indicator

Relevance of the indicator

The historic target ambition and company performance is included in the ACT BC assessment for the following reasons:

- The ACT assessment looks only to the past to the extent where it can inform on the future. This indicator is future-relevant by providing information on the organizational capability to set and meet emission reduction targets. Dimension 1 of this indicator adds credibility to any company claim to commit to a science-based reduction pathway.
- Indicators 1.1, 1.2, 1.3 and 1.4 look at targets in a vacuum. Dimension 2 of this indicator adds value to the assessment of comparison to the company's performance with respect to their targets in the reporting year.

Scoring rationale

Previous target achievement is not straightforward to interpret quantitatively. Therefore, the performance score makes no judgement of previous target ambition, and leaves it to the assessment narrative for a meaningful judgement on the ambition level of past targets.

- Dimension 1 of the performance score will penalize companies who have not met previous targets in the past 10 years, as this means the company has lower credibility when setting ambitious science-based targets.
- Dimension 2 uses a simple ratio sourced from existing CDP data points (CC 3.1e) in order to compare targets. The threshold 0.5 was chosen as it allows companies some flexibility with respect to the implementation of the target, but it does have the ability to flag companies who are definitely not on track towards achievement. When p is lower than 0.5, the company needs to achieve more than twice the reduction per unit of time than the target originally envisioned.

279 **3. Intangible investments indicators (Weighting: 10%)**

280 **BC 3.1 R&D in Climate Change mitigation technologies (Weighting: 10%)**

Description & Requirements BC 3.1 R&D in Climate Change mitigation technologies

Short description of indicator A measure of R&D costs/investments share into mitigation-relevant technologies.

Data requirements Relevant and external sources of data used for the assessment of this indicator:

- R&D costs/investments in climate change mitigation technologies of the company.
- Total R&D costs/investments of the company.

How the assessment will be done The assessment is based on the share of the company's R&D costs and/or investments in climate change mitigation related technologies. The company's share will be compared to the maturity matrix developed to guide the scoring and a greater number of points will be allocated for companies indicating a higher level of maturity, which means a higher share in R&D costs/investments in these technologies.

The matrix is provided below:

Question	Basic	Standard	Advanced	Next practice	2' aligned
What is the share of R&D costs/investments in climate change mitigation technologies compared to the total R&D costs/investments?	Below 20%	Between 20% and 40%	Between 40% and 60%	Between 60% and 80%	Above 80%

Rationale

BC 3.1 R&D in Climate Change mitigation technologies

Rationale of the indicator

Relevance of the indicator

- To enable the transition, sectors such as the Building Construction sector rely heavily on the development of low-carbon technologies to replace existing high-emitting materials and equipment. For instance, innovative technologies are crucial to monitor and optimize building's energy consumption. R&D is the principal proactive action to develop these technologies.
- Lastly, the R&D investment of a company into non-mature technologies allows for a direct insight in the company's commitment to alternative technologies that may not currently be part of its main business model.

Defining R&D

Research and experimental development (R&D) comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. The term R&D covers three activities:

- Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
- Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

R&D covers both formal R&D in R&D units and informal or occasional R&D in other units.

(OECD 2012)

Defining the R&D scope

The indicator focuses on non-mature technologies or construction and organizational methodologies that mitigate climate change.

Climate mitigation technologies for the Building Construction sector may include:

- development of new, improved, or more reliable products, processes, or techniques;
- design work for energy efficient projects;
- integration of renewable energy sources in buildings;
- custom design work to accommodate visual or structural needs;
- development of a unique assembly or construction method or process;
- experimentation with new building materials;
- energy efficient lighting technologies;
- energy efficient heating, ventilation or air conditioning;
- technologies aiming at improving the efficiency of home appliances;
- energy efficient technologies in elevators, escalators, and moving walkways;
- information and communication technologies aiming at the reduction of own energy use;
- technologies for an efficient end-user electric power management and consumption;
- architectural of constructional elements improving the thermal performance of buildings;
- enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation.

282 **4. Sold product performance indicators (Weighting: 30%)**

283 **BC 4.1 Alignment of carbon performance trend for new buildings (use phase) (Weighting: 10%)**

Description & Requirements BC 4.1 Alignment of carbon performance trend related to new delivered buildings (use phase)

Short description of indicator This metric assesses the company’s reduction in emissions intensity of new delivered buildings (use phase) emissions over the next 5-year period to the reporting year (reporting year plus 5 years) and the past 5 year-period (reporting year minus 5 years)

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A7: Breakdown of floor areas per business segment and country
- A8: Average carbon intensity of buildings delivered in the past 5 years (use phase)

The benchmark indicators involved are:

<u>Target type</u>	<u>Parameter</u>	<u>Intensity metric</u>	<u>Benchmark</u>
<u>New buildings use</u>	<u>CB_{nbu}</u>	<u>kgCO₂/sqm</u>	Construction_In-Use-reg_“Building-type”_“Building-typology”_“Geo-zone”_“Country” (in most cases, combination of several pathways according to shares of buildings typologies and zones/countries)

The same benchmark is used for the two dimensions (past and future).

How the assessment will be done A trend analysis is used to measure the trend in emissions intensity of new delivered buildings over the last five years (dimension 1). A gap analysis is used to calculate the trend of future emission intensity of new delivered buildings over the next 5 years (dimension 2).

Following the principle of future orientation, more weight is placed on the role of future emissions. Dimension 1 has a weight of 40% and dimension 2 has 60%.

Dimension 1: trend in past emission intensity

The analysis is based on the ratio between the company's recent (reporting year minus 5 years) emissions intensity trend gradient (CR_{XX}) for new delivered buildings (use phase) and the company's decarbonization pathway trend gradient (CB_{XX}) in the short-term (reporting year plus 5 years).

CB_{XX} is the gradient of the linear trend-line of the company benchmark pathway for emissions intensity (CB_{XX}). See section 6.2 for details on the computation of the company specific decarbonization pathway.

The difference between CR and CB will be measured by their ratio (r_{S12}). This is the 'New buildings use Transition ratio' which is calculated by the following equation, with the symbol ' used to denote gradients:

$$r_{XX} = \frac{CR'_{XX}}{CB'_{XX}}$$

If the transition ratio is a negative number, it means the company's recent emissions intensity has increased (positive CR_{XX}) and a zero score is awarded by default. If the company's recent emissions intensity has decreased, the transition ratio will be a positive. The value of the ratio is capped to 1, which represents the maximum score. A score is assigned as a percentage value equal to the value of r_{XX} (1 = 100%).

Dimension 2: trend in future emissions intensity

The assessment is based on the difference between the company's action pathway (A_{nbu}) and the company benchmark (CB_{nbu}) developing from the reporting year to 5 years after.

The company action pathway (A_{nbu}) is the emissions intensity of company's delivered new buildings over time, assuming constant evolution of the business background.

The company benchmark (CB_{nbu}) pathway is the 'company new buildings specific decarbonization pathway'. See section 6.1 for details on the computation of this pathway.

The assessment will compare A_{nbu} to CB_{nbu} , by examining the difference between these pathways in 5 years after the reporting year. The pathways are expressed in kilograms of CO_2 per square meter (intensity measure). The result of the comparison is the action gap.

Calculation of score

To assign a score to this indicator, the size of the action gap will be compared to the maximum action gap, which is defined by the business as usual pathway (BAU_{nbu}). BAU_{nbu} is defined as an unchanging (horizontal) intensity pathway, whereby the emissions intensity is not reduced at all over a period after the reporting year.

$$\text{Future emissions action gap} = \frac{A_{nbu} - CB_{nbu}}{BAU_{nbu} - CB_{nbu}}$$

$$\text{Score} = 1 - \text{Future emissions action gap}$$

The score assigned to the indicator is equal to 1 minus the action gap and is expressed as a percentage (1 = 100%). Therefore, if $A_{nbu} - CB_{nbu}$ is equal to zero, and so the company's target is aligned with the sectoral benchmark, the maximum score is achieved.

Aggregate score: Dimension 1: 40%, Dimension 2: 60%.

Rationale

BC 4.1 Alignment of carbon performance trend related to new delivered buildings (use phase)

Rationale of the indicator

Relevance of the indicator

The carbon performance trend related to new delivered buildings is included in the ACT assessment for the following reasons:

1. Recent emissions intensity performance indicates the company's progression towards, or away from, the future emissions intensity necessary for the sector to decarbonize in-line with a low-carbon scenario.

2. In the building construction sector, emissions from the use of sold products (i.e. new delivered buildings) outweigh Scope 1+2 emissions.
3. This indicator only assesses use phase of delivered buildings because there is not yet available data regarding emissions related to materials and renovation.

Scoring rationale: dimension 1

While 'gap' type scoring is preferred for any indicator where possible, this indicator only looks at past emissions, and would therefore require a different baseline in order to generate a gap analysis. Thus, instead of a gap analysis a trend analysis is conducted. An advantage of the trend analysis is that it does not require the use of a 'business as usual' pathway to anchor the data points and aid interpretation, as trends can be compared directly and a score can be directly correlated to the resulting ratio.

Scoring rationale: dimension 2

This indicator is where the principal 'action gap' between the company's actions and the benchmark is assessed.

To ensure comparability of the scores and replicability of the measurement, delivered buildings emissions related to use phase are compared to the benchmark at a fixed point in time, similar to all companies. This is necessary, because the method interprets linear trend lines from company data, while the decarbonization pathways from the benchmark are nonlinear. Therefore, the measurement gaps would vary over time if the time of measurement was not constant.

As the reporting year is the most recent year of data, this is the base-year chosen for measurement of the score.

284

BC 4.2 Low carbon buildings share (Weighting: 8%)

Description & Requirements

BC 4.2 Low carbon buildings share

Short description of indicator

A measure of the company's growth in sales of low-carbon buildings as compared with a benchmark. This criterion only applies to new buildings.

Data requirements

The questions comprising the information request that are relevant to this indicator are:

- A9: Revenues share of low carbon delivered buildings, with breakdown per business segment and country

How the assessment will be done

A low-carbon building is defined by a carbon intensity threshold including in-use energy-related CO₂ emissions and materials-related CO₂ emissions. These emissions depend on the building segment, the climate, and the electricity mix CO₂ content of the country. The construction company, for each building segment and country, has to determine the share of low-carbon buildings, in comparison with a threshold adapted to each element of the company's activity.

The analysis is based on the difference between the company's low-carbon buildings sales (CS_{LCB}) across the 2 years that precede the reporting year (e.g. 2015-2017 if reporting year is 2017) and the low-carbon buildings sales required by the IEA ETP 2DS (or B2DS) scenario across the same period to reach the global target set 10 years after the reporting year.

The company's sales 2 years before the reporting year (e.g. in 2015 if reporting year is 2017) will be compared to the global average, and a company-specific benchmark (CB_{LCB}) is computed using a partial convergence method similar to SDA. Please see section 6.Assessment for more details on the computation of this benchmark.

Gap comparison

The gap comparison follows the methodology of BC 4.1, 'Alignment of carbon performance trend related to new delivered buildings (use phase)'. The difference between the company sales and what the company sales should have been according to the benchmark is computed for the reporting year. For this, the business as usual sales pathway (BAU_{LCB}) is computed, which assumes no growth in Low Carbon Buildings's from the base year (and potentially 5/3 years before the base year onwards). The resulting number is the 'LCB sales gap'. The anchor point in time from which the pathways (benchmark, company sales, business as usual) can vary is yet to be determined, as it is dependent on data availability and data quality.

$$LCB\ sales\ gap = \frac{CS_{LCB} - CB_{LCB}}{BAU_{LCB} - CB_{LCB}}$$

Scoring rationale

A significant share of construction of low-carbon buildings in the company's activity is a tangible and positive signal that can place the company on a low-carbon transition pathway.

Rationale

BC 4.3 Low carbon buildings share

Rationale of the indicator

Relevance of the indicator:

Low carbon buildings share is included in the ACT BC assessment for the following reasons:

1. Emissions intensity pathways in the sector cannot be met without a change in building conception, and the sales is the direct 'output measure' that indicates how this change is incorporated in the business model.
2. Both in-use emissions and material-embodied emissions contribute to a low-carbon transition.

Definition of low-carbon buildings

The definitions of low-carbon buildings greatly vary according to countries and types of standards. For data availability purposes, ACT assessment defines a threshold for "low carbon" buildings based on the French environmental label framework "E+C-" and depending on the building typology, the geographical area (country/zone and related climate) and the electric mix of the country.

Therefore, a low carbon building can be defined through two perspectives:

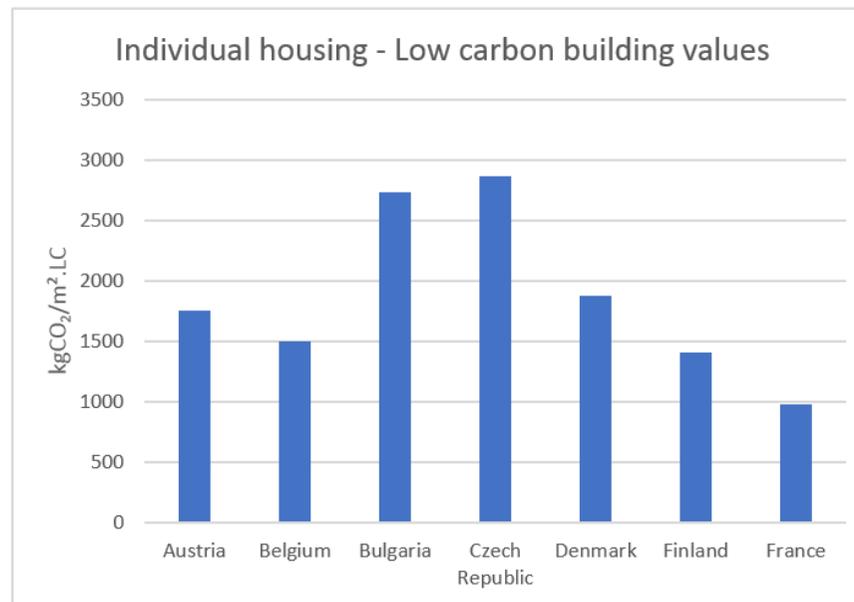
- 1- The new building meets at least the energy requirements corresponding to new buildings (regarding national building energy code, if it exists, or else a good current practice)
- 2- The carbon performance is set by a threshold table (depending on business segment, per country/geographical area)
- 3- The starting value is based on the performance levels of the "E+C- label", set at the middle point between C1 level and C2 level, from which are only considered the "regulated energy uses" as meant in the EU-28 Community. This last precision is useful because E+C- in-use calculation is based on all uses occurring in the building (including users' appliances).

For instance, for individual houses with a default service life of 50 years, the central starting values (excluding user's appliances CO₂ emissions) are the following:

C1 = 1250 kg eqCO₂/m² and C2 = 700 kg eqCO₂/m²

So the threshold corresponding to the middle point is 975 kg eqCO₂/m². This includes both in-use emissions and material-embodied emissions, integrated on 50 years.

The following figure is showing, for the typology of individual houses, the influence of climate (according to HDD, heating degree-days, and for hot climate CDD, cooling degree-days) and of electricity mix CO₂ content, on the threshold value in different EU countries.



Scoring rationale

A share of 50% corresponds to the best score.

A share of 0% leads to a zero score.

In order to reflect the difference of means between OECD countries and non-OECD ones, it may be applied less ambitious requirements, for instance admitting low-carbon buildings with thresholds values increased by 20%. To be validated.

285 **BC 4.3 Renovated buildings subject to thermal renovation share (Weighting: 6%)**

Description & Requirements	BC 4.3 Renovated buildings subject to thermal renovation share
Short description of indicator	A measure of the company's growth in renovated buildings sales of buildings subject to thermal renovation as compared with a benchmark TBD.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none"> - A10: Revenues share of renovated buildings subject to thermal renovation
How the assessment will be done	<p>The analysis is based on the difference between the company's renovated buildings subject to thermal renovation sales (CS_{RBTR}) across the 2 years that precede the reporting year (e.g. 2015-2017 if reporting year is 2017) and the renovated buildings subject to thermal renovation sales required by the IEA ETP 2DS (or B2DS) scenario across the same period to reach the global target set 10 years after the reporting year.</p> <p>The company's sales 2 years before the reporting year (e.g. in 2015 if reporting year is 2017) will be compared to the global average, and a company-specific benchmark (CB_{RBTR}) is computed using a partial convergence method similar to SDA. Please see section 6.Assessment for more details on the computation of this benchmark.</p> <p>Gap comparison</p> <p>The gap comparison follows the methodology of BC 4.1, 'Alignment of carbon performance trend related to new delivered buildings (use phase)'. The difference between the company sales and what the company sales should have been according to the benchmark is computed for the reporting year. For this, the business as usual sales pathway (BAU_{RBTR}) is computed, which</p>

assumes no growth in renovated buildings subject to thermal renovation from the base year (and potentially 5/3 years before the base year onwards). The resulting number is the 'RBTR sales gap'. The anchor point in time from which the pathways (benchmark, company sales, business as usual) can vary is yet to be determined, as it is dependent on data availability and data quality.

$$RBTR \text{ sales gap} = \frac{CS_{RBTR} - CB_{RBTR}}{BAU_{RBTR} - CB_{RBTR}}$$

Rationale

BC 4.3 Renovated buildings subject to thermal renovation share

Rationale of the indicator

Relevance of the indicator:

Renovated buildings subject to thermal renovation share is included in the ACT BC assessment for the following reasons:

1. Emissions intensity pathways in the sector cannot be met without a change in building renovation ambition, and the sales is the direct 'output measure' that indicates how this change is incorporated in the business model.
2. It is important to consider both the reduction of in-use energy consumption (energy efficiency is one of the necessary measures to reach CO2 targets) and the reduction of CO2 emissions (also through the CO2 contents per kWh)

Performing deep thermal/energy renovation is a key action towards a global warming limited to 2°C. In France, where 2 thirds of the buildings were constructed before 1975 (date of the 1st thermal regulation), the recent Law for Energy Transition and Green Growth set the following objective: to achieve 100% of the building stock deeply renovated by 2050, in compliance with the low-energy-consumption label "BBC renovation". For residential buildings, the BBC renovation threshold in terms of primary energy for the 5-regulated end-uses is 80 kWh/m².an (central value, modulated by climate zone and altitude).

A recent French study³ done by Effinergie association in 2018 on more than 500 BBC renovated buildings, residential and non-residential, has shown that:

³ « Observatoire BBC – Etude sur les bâtiments rénovés à basse consommation », Effinergie, 2018.

- the consumption of primary energy was reduced by 70% on average, concerning the 5-regulated end-uses,
- the reduction of envelope thermal losses achieved 60% on average.

Nevertheless, we have to recognize that BBC renovation is of a high level of ambition, probably overpassing what we mean by deep renovation here in ACT methodology.

Definition of thermal renovation

Deep renovation shall result in energy abatement of 40%, and a reduction of 60% of carbon emissions. These 2 conditions are necessary. This is the result of a consensus between a group of experts and stakeholders.

A lower difference after vs before renovation may be accepted if the energy consumption after renovation is equal or less to 70 kWh/m².year, this value being adapted for a EU temperate climate around 2500 HDD. The consumption covers the so-called 'regulated' uses and is expressed in final energy.

The 40% reduction of energy consumption applies to the following so-called 'regulated' end-uses: space heating, space cooling, domestic hot water, lighting and – if significant – ventilation.

In order to reflect the difference of means between OECD countries and non-OECD ones, it may be applied less ambitious requirements, leading to -30 % of energy consumption and -40 % of CO₂ emissions. To be validated.

Scoring rationale

It is important to have a double requirement, on energy efficiency and carbon reduction. Switching from a fossil energy source to a decarbonated one (solar, biomass, district heating network fed by renewable energy...) without improving energy efficiency (ideally acting both on the building envelope and on the HVAC equipment) is not considered as satisfactory.

286

BC 4.4 Emissions lock-in (Weighting: 6%)

Description & Requirements

BC 4.4 Emissions lock-in

Short description of indicator A measure of the company's cumulative emissions from the reporting year up until 25 years in the future from new delivered buildings. The indicator will compare this to the emissions budget entailed by the company's generation intensity decarbonization pathway and projected generation trends in the sector at the country/regional level.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A8: Average carbon intensity of buildings delivered in the past 5 years (use phase and materials)

How the assessment will be done The analysis is based on the ratio between the company's new delivered buildings' emissions for the 25 years after the reporting year [$L_G(t)$], and the emissions budget entailed by the company's carbon budget [$B_G(t)$] over the same period of time. Assuming that the lifetime of a building is around 50 years, the period until the first deep renovation, which would increase emission intensity, would be 25 years. This period corresponds to the time when emissions are locked-in, until the decrease in emissions caused by first deep renovation.

$L_G(t)$ is calculated as the total cumulative emissions implied by the lifetimes of new buildings delivered at reporting year.

$L_G(t)$ is calculated as the company's locked-in carbon commitments, up until the chosen time period t , which is derived by taking the area under the company's future locked-in emissions curve. This curve in turn is derived from the company's intensity pathway, multiplying with floor area emission intensity F_G :

$$L_G(t) = \int_{\text{the reporting year}}^t F_G * CA_G$$

$B_G(t)$ is calculated as the company's carbon budget up until time t , which is derived by taking the area under the absolute emissions reduction curve. This curve in turn is derived from the company benchmark pathway (CB_G) by multiplying with floor area emission intensity F_G :

$$B_G(t) = \int_{\text{the reporting year}}^t F_G * CB_G$$

Depending on the data availability, the computation of these areas may not be as straightforward as the equations present and will be done by approximation, but the principles will hold.

The locked-in ratio (r_{LB}) is calculated:

$$r_{LB}(t) = \frac{L_G(t)}{B_G(t)}$$

The default value for t is 30 years after the reporting year.

Calculation of score

If r_{LB} is 1 or lower, then the company stays within its carbon budget, and will be assigned the maximum score (100%). If r_{LB} is 1.5 or higher, then the company strongly exceeds its carbon budget, and will be assigned the minimum score (0%). If r_{LB} is between 1 and 1.5, then the company will be assigned a score of $1.5 - r_{LB}$ divided by 50%.

Rationale

BC 4.4 Emissions lock-in

Rationale of the indicator

Relevance of the indicator

Emissions lock-in is included in the ACT BC assessment for the following reasons:

1. Absolute greenhouse gas emissions over time is the most relevant measure of emissions performance for assessing a company's contribution to global warming. The concept of Locked-in emissions allows a judgement to be made about the company's outlook in farther time periods.

2. Analyzing a company's locked-in emissions alongside science-based budgets also introduces the means to scrutinize the potential cost of inaction, including the probability of stranded assets.
3. Examining absolute emissions, along with recent and short-term emissions intensity trends, forms part of a holistic view of company emissions performance in the past, present, and future.

Scoring rationale

Unlike the 'gap' and 'trend' comparisons done in all other quantitative indicators, this indicator compares two areas: that of the carbon budget until t and the locked-in emissions until t . It is expected that companies exceed their budget when it is in the short-term future, but will not when it is in the long-term future. However, any short-term exceedance will have to be compensated for in later time periods. This is called carbon budget displacement, which further makes the company's actual decarbonization pathway steeper than the original benchmark. There is a dimension of risk from inaction here.

When the company exceeds its full carbon budget up until 2050, it will not be able to displace enough carbon from farther time periods to nearer, and will be faced with stranded assets when the current lifetime estimates are held up. This is a major problem, and this situation will certainly result in a zero score.

When companies are closer to their carbon budget than others, they will be less flexible in their future strategy as there is more pressure to add renewable capacity whenever a fossil fuel asset is decommissioned. There is also less room for refurbishment to extend the lifetimes of existing assets as this carries the risk of exceeding the carbon budget. Therefore, there is rationale for intermediate scoring levels that magnify this level of risk due of future flexibility in the future.

288 **5. Management indicators (Weighting: 10%)**

289 **BC 5.1 Oversight of climate change issues (Weighting: 3%)**

Description & Requirements	BC 5.1 Oversight of climate change issues
Short description of indicator	The company discloses that responsibility for climate change within the company lies at the highest level of decision making within the company structure.
Data requirements	The question comprising the information request that are relevant to this indicator are: - A5: Environmental policy and details regarding governance
How the assessment will be done	The benchmark case is that climate change is managed within the highest decision-making structure within the company. The company situation will be compared to the benchmark case, if it is similar then points will be awarded. The position at which climate change is managed within the company structure will be determined from the company data submission and accompanying evidence.

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
What is the position of the employee/ committee with highest responsibility for climate change?	Position of individual(s)/ committee with highest responsibility for climate change	No one in charge of climate change issues	Manager /officer	Senior Manager/ Officer	Senior Manager/Officer closely related to decision-making structure within the company	Board or individual/sub-set of the board or other committee appointed by the board	100%

Rationale BC 5.1 Oversight of climate change issues

Rationale of the indicator Successful change within companies, such as the transition to a low-carbon economy, requires strategic oversight and buy-in from the highest levels of decision-making within the company. For the building sector, a change in strategy and potentially business model will be required and this cannot be achieved at lower levels within an organization. Evidence of how climate change is addressed within the top decision-making structures is a proxy for how seriously the company takes climate change, and how well integrated it is at a strategic level. High-level ownership also increases the likelihood of effective action to address low-carbon transition.

290 **BC 5.2 Climate change oversight capability (Weighting: 3%)**

Description & Requirements BC 5.2 Climate change oversight capability

Short description of indicator Company board or executive management has expertise on the science and economics of climate change, including an understanding of policy, technology and consumer drivers which can disrupt current business.

Data requirements The question comprising the information request that are relevant to this indicator are:

- A5: Environmental policy and details regarding governance

How the assessment will be done The presence of expertise on relevant topics to climate change and low carbon transition within the individual or committee with overall responsibility for it within the company will be assessed. The presence of expertise is the condition that must be fulfilled for points to be awarded in the scoring.

The assessor will determine if Company has expertise as evidenced through a named expert biography outlining capabilities. The assessment is binary: expertise is evident or not. A cross check will be performed against 3.1 on the highest responsibility for climate change, the expertise should exist at the level identified or the relationship between the structures/experts identified should also be evident.

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
Does this employee/committee have a proven expertise regarding climate change topics	The presence of expertise on relevant topics to climate change and low carbon transition within the individual or committee with overall CC responsibility	Expertise is not evident from assessor's analysis	Expertise is evident from assessor's analysis but the relationship between the structures/experts identified is not evident	Expertise is evident from assessor's analysis and the relationship between the structures/experts identified is evident	Expertise is evident from assessor's analysis and the relationship between the structures/experts identified is evident. Expertise is closely related to decision-making	Expertise is evident from assessor's analysis	100%

Rationale

BC 5.2 Climate change oversight capability

Rationale of the indicator

Effective management of low-carbon transition requires specific expertise related to climate change and its impacts, and their likely direct and indirect effects on the business. Presence of this capability within or closely related to the decision-making bodies that will implement low-carbon transition indicates both company commitment to that transition and also increases the chances of success.

Even if companies are managing climate change at board or equivalent level, a lack of expertise could be a barrier to successful management of low-carbon transition.

291

BC 5.3 Low-carbon transition plan (Weighting: 2%)

Description & Requirements

BC 5.3 Low carbon transition plan

Short description of indicator

The company has a plan on how to transition the company to a business model compatible with a low-carbon economy.

Data requirements

The question comprising the information request that are relevant to this indicator are:

- A5: Environmental policy and details regarding governance

How the assessment will be done

The assessor will evaluate the description and evidence of the low carbon transition plan for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence will be compared to the maturity matrix developed to guide the scoring and a greater number of points will be allocated for elements indicating a higher level of maturity.

Best practice elements identified to date include:

- Plan includes financial projections
- Plan should include cost estimates or other assessment of financial viability as part of its preparation
- Description of the major changes to the business is comprehensive, consistent, aligned with other indicators
- Quantitative estimations of how the business will change in the future are included
- Costs associated with the plan (e.g. write-downs, site remediation, contract penalties, regulatory costs) are included
- Consideration of potential “shocks” or stressors (sudden adverse changes) has been made
- Relevant region-specific considerations are included
- Plan’s measure of success is SMART - contains targets or commitments with timescales to implement them, is time-constrained or the actions anticipated are time-constrained
- Plan’s measure of success is quantitative
- Description of relevant testing/analysis that influenced the transition plan is included
- Plan is consistent with reporting against other ACT indicators
- Scope – should cover entire business, and is specific to that business
- Should cover the short, medium and long term. From now or near future <5 years, until at least 2035 and preferably beyond (2050)
- Contains details of actions the company realistically expects to implement (and these actions are relevant and realistic)
- Approved at the strategic level within the organization
- Contains discussion of the potential impacts of a low-carbon transition on the current business
- The company has a publicly-acknowledged 2°C (or beyond) science-based target (SBT).
- Maximum points will be awarded if all of these elements are demonstrated.

Question	Subdimension	Basic	Standard	Advanced	Next practice	2 ^o aligned	Subscore
What is the highest-level approval of low carbon transition plan?	Level of approval within the organization	Not known	Operational level (CSR level)	Upper management level	Board/strategic level	Matches highest level of responsibility as previously reported	20%
How the success of the plan is measured?	Measure of success	No measure of success	Measure of success in mainly qualitative	SMART KPI: specific, measurable, acceptable, realistic, time bound.	Measure of success is SMART. Measure of success contains both qualitative and quantitative targets.	Measure of success is quantitative	20%
Does the plan comprise financial content? If it does, what type of content?	Financial content in plan	No financial content	Financial projections, cost estimates or other estimates of financial viability are described but not quantified	Financial projections, cost estimates or other estimates of financial viability are laid out OR short-term actions to start implementing plan are quantified in more detail	Quantitative estimations of how the business will change in the future are included Costs associated with the plan (e.g. write-downs, site remediation, contract penalties, regulatory costs) are included	Description of the major changes to the business is comprehensive, consistent, aligned with other indicators	8%
To what extent business future considerations are integrated in the plan?	Future considerations	Implications to future business noted but not discussed properly	Contains actions the company expects to implement to make the transition a reality without any details	Contains discussion certain current company elements that need to be changed to make the transition a reality	Contains discussion of the potential portfolio of a future, low-carbon ready company	Contains one or more elaborate outlines of how the far-future company could look like in terms of physical assets and business model	8%

To what extent short term considerations and remedial actions are integrated in the plan?	Current considerations and plans	Short-term considerations and remedial actions can be discussed but are not integrated in the plan	List of short-term considerations and remedial actions integrated in the plan	Contains discussion of the potential impacts of a low-carbon transition on the current business Relevant region-specific considerations are included	Contains details of actions the company realistically expects to implement (and these actions are relevant and realistic)	Consideration of potential short-term "shocks" or stressors (sudden adverse changes) has been made	16%
What is the scope of the plan?	Transition plan scope, consistency, analysis	No clear scope to the plan, no consistency among sections and no analysis presented	The scope covers the entire business.	The scope covers the entire business. Plan is consistent with reporting against other ACT indicators Contains a description of relevant testing/analysis	The scope covers the entire business and is specific to it. Plan is consistent with reporting against other ACT indicators. Contains a description of relevant testing/analysis	Transition covers entire business and is specific to it, with proper scoping, consistency and proper analysis	20%
What is the time horizon of the plan?	Transition timescale	Covers only short-term (< 3 years)	Covers only medium term (2020)	Should cover the short, medium and long term. From now or near future <5 years, until at least 2025 and preferably beyond (2035)	Covers the short, medium and long term. From now until at least 2035	Covers the short, medium and long term. From now and beyond (2050)	8%

Rationale

BC 5.3 Low carbon transition plan

Rationale of the indicator

The Building Construction sector will require substantial changes to their business to align to a low-carbon economy, over the short, medium and long term, whether it is voluntarily following a strategy to do so or is forced to change by regulations and

structural changes to the market. It is better for the success of its business and of its transition that these changes occur in a planned and controlled manner.

292

BC 5.4 Climate change management incentives (Weighting: 1%)

Description & Requirements	BC 5.4 Climate change management incentives
Short description of indicator	The Board's Compensation Committee has included metrics for the reduction of GHG emissions in the annual and/or long-term compensation plans of senior executives; the Company provides monetary incentives for the management of climate change issues as defined by a series of relevant indicators.
Data requirements	The question comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none">- A6: Management incentives
How the assessment will be done	The assessor will verify if the company has compensation incentives set for senior executive compensation and/or bonuses, that directly and routinely rewards specific, measurable reductions of tons of carbon emitted by the company in the preceding year and/or to the future attainment of emissions reduction targets, or other metric related to the company's low carbon transition plan.

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
Who is entitled to benefit?	Who is entitled to benefit?	Any other answer		Executive	Senior executive	Board chairman - Board/Executive board - Director on board - Corporate executive team - Chief Executive Officer (CEO) - Chief Operating Officer (COO) - Chief Financial Officer (CFO) - All employees	33%
What is the type of incentives (non-monetary/monetary)?	Type of incentives	Non-monetary	Recognition (non-monetary)	Other non-monetary reward	Monetary reward	Monetary reward or Other non-monetary reward	33%
What are the targets related to CC incentives? *	Incentivized performance indicator	No targets incentivized	Behavior change related indicator or other specification	Efficiency project, Efficiency target, Environmental criteria included in purchases, Supply chain engagement, or other specification		Emissions reduction project, Emissions reduction target, Energy reduction project, Energy reduction target, or other specification	33%

(*) : Note from EY : Targets may be achieved on a variable scope

Rationale

BC 5.4 Climate change management incentives

Rationale of the indicator Executive compensation should be aligned with overall business strategy and priorities. As well as commitments to action the company should ensure that incentives, especially at the executive level, are in place to reward progress towards low-carbon transition. This will improve the likelihood of successful low carbon transition.

Monetary incentives at the executive level are an indication of commitment to successful implementation of a strategy for low carbon transition.

293 **BC 5.5 Climate change scenario testing (Weighting: 1%)**

Description & Requirements BC 5.5 Climate change scenario testing

Short description of indicator Testing or analysis relevant to determining the impact of transition to a low-carbon economy on the current and projected business model and/or business strategy has been completed, with the results reported to the board or c-suite, the business strategy revised where necessary, and the results publicly reported.

Data requirements The question comprising the information request that are relevant to this indicator are:

- Scenario testing

How the assessment will be done The analyst evaluates the description and evidence of the low-carbon economy scenario testing for the presence of best-practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points are allocated for elements indicating a higher level of maturity.

Best-practice elements to be identified in the test/analysis include:

- Entire coverage of the company's boundaries
- Timescale from present to long-term (2035 - 2050)
- Translation of results into value-at-risk or other financial terms

- Multivariate: a range of different changes in conditions are considered together
- Changes in conditions that are specific to a 2° decarbonization climate scenario
- Climate change conditions are combined with other likely future changes in operating conditions over the timescale chosen.

Question	Subdimension	Basic	Standard	Advanced	Next practice	2° aligned	Subscore
What is the scope of the scenario testing?	Boundary	Large element not included	Large element included	Small element not included	Small element included	Covers entire boundary of the company	35%
What is the time horizon of the scenario testing?	Timescale	From present to future	From present to 2020	From present to 2025	From present to 2035	From present to 2050	20%
Are the results in qualitative/ quantitative/ financial terms?	Results	Expressed in qualitative terms	Expressed in qualitative terms	Expressed in financial terms	Expressed in financial terms and results are translated into value-at-risk	Expressed as value-at-risk	10%
What are the type of changing conditions considered?	Conditions considered	Considers no particular changing conditions	Considers a narrow range of different changes in conditions.	Considers a range of changing conditions together (multivariate)	Considers changing climate conditions in combination with changes in operating conditions	Considers changing conditions specific for a 2-degree decarbonization scenario	35%

Rationale

BC 5.5 Climate change scenario testing

Rationale of the indicator

Changes predicted to occur due to climate change could have a number of consequences for the Building Construction sector, including increased costs, a dramatically changed operating environment and major disruptions to the business. There are a variety of ways of analyzing the potential impacts of climate-related changes on the business, whether these are slow and gradual developments or one-off “shocks”. Investors are increasingly calling for techniques such as use of an internal price on carbon, scenario analysis and stress testing to be implemented to enable companies to calculate the value-at-risk that such

changes could pose to the business. As this practice is emergent at this time there is currently no comprehensive survey or guidance on specific techniques or tools recommended for the sector. The ACT methodology thus provides a broad definition of types of testing and analysis which can be relevant to this information requirement, to identify both current and best practices and consider them in the analysis.

Scenario stress testing is an important management tool for preparing for low-carbon transition. For businesses likely to be strongly affected by climate change impacts (both direct and indirect), it has even greater importance.

295 **6. Supplier engagement indicators (Weighting: 10%)**

296 **BC 6.1 Strategy to influence suppliers to reduce their GHG emissions (Weighting: 5%)**

Description & Requirements	BC 6.1 Strategy to influence suppliers to reduce their GHG emissions
Short description of indicator	This indicator assesses the level of engagement that the company has with its suppliers, based on an assessment of the supplier policy formalized and implemented by the company.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none"> - A13: List of environmental/CSR contract clauses in purchasing & suppliers' selection process
How the assessment will be done	<p>The assessment will assign a maturity score based on the company's formalized strategy with their suppliers, expressed in a maturity matrix.</p> <p>A company that is placed in the 'aligned' category will receive the maximum score. Companies who are at lower levels will receive a partial score, with 0 points awarded for having no engagement at all.</p> <p>This maturity matrix is indicative but does not show all possible options that can result in a particular score. Companies responses will be scrutinized by the assessor and then placed on the level in the matrix where the assessor deems it most appropriate.</p>

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
To what extent GHG emissions reduction issues are integrated in engagement with suppliers?	Consideration of reduction targets	No consideration	CSR clause included in engagements with suppliers. Means commitment included in contracts	CSR clause with GHG emissions reduction included in engagements with suppliers. Results-driven commitment in contracts	CSR clause with quantified GHG emissions reduction included in engagements with suppliers. Results commitment in	CSR clause with GHG emissions reduction included as priority in engagements with suppliers. Results-driven commitment in contracts. Regular reporting.	20%

					contracts. Regular reporting		
What action levers are used by the company to encourage suppliers to develop low carbon offer?	Use of action levers	No action levers used	Passive approach (suppliers may offer low-carbon product but no specific requirements from the company)	Use of one action lever (awareness campaign, compensation, purchasing rule, etc.)	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.)	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.). Regular audits of the supplier by the purchaser or a representative	30%
What is the scope of the action levers used?	Scope	No strategy applied to any suppliers	Strategy applied to few large suppliers	Strategy applied to most large suppliers	Strategy applied to all large suppliers and few small suppliers	Strategy applied to all of suppliers	20%
To what extent carbon issues are integrated in the selection process of suppliers?	Suppliers selection process	No selection of suppliers based on environmental criteria No change in suppliers' base	Selection of suppliers based on at least one environmental criteria No change in suppliers' base	No change in suppliers' base Selection of suppliers with low carbon alternatives	No change in suppliers' base Selection of suppliers offering low-carbon alternatives	Engaging suppliers over low carbon alternatives	30%

Rationale

BC 6.1 Strategy to influence suppliers to reduce their GHG emissions

Rationale of the indicator

Relevance of the indicator:

Supplier engagement is included in the ACT BC assessment for the following reasons:

1. As every part of the building's LCA (materials, management, etc.) has a significant impact in terms of GHG emission, achieving decarbonization of the whole supply chain is also key to reach the ambitious goals in the construction segment.

2. Engaging suppliers through contract clauses and sales incentives is necessary to take them on board.

Scoring the indicator

Because of data availability and complexity, a direct measure of the outcome of such engagement is not very feasible at this time. It is often challenging to quantify the emissions reduction potential and outcome of collaborative activities with the supply chain. Therefore, the approach of a maturity matrix allows the analyst to consider multiple dimensions of supplier engagement and assess them together towards a single score for Supplier Engagement.

297 **BC 6.2 Activities to influence suppliers to reduce their GHG emissions (Weighting: 5%)**

Description & Requirements	BC 6.2 Activities to influence suppliers to reduce their GHG emissions
Short description of indicator	This indicator assesses the level of engagement that the company has with its suppliers, based on an assessment of previous initiatives that show whether or not the company engages with suppliers in various ways.
Data requirements	The questions comprising the information request that are relevant to this indicator are: - A14: List of initiatives implemented to influence suppliers to reduce their GHG emissions, green purchase policy or track record, supplier code of conduct
How the assessment will be done	

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
How the company encourage suppliers to reduce their GHG emissions?	Suppliers GHG emissions	No activity	Company requires suppliers to sign a code of conduct (or similar) and/or to provide data regarding their environmental performance (for audited suppliers). Means-driven commitment	Company assists suppliers to reduce their GHG emissions Company monitors GHG emissions along its value chain Provision of documents and tools by the lessor	Company partners with large suppliers to define common GHG emissions reduction plan Provision of documents and tools Multi-party working group with annual meeting at least	Company contributes in GHG emissions reduction along its value chain through close partnerships with suppliers	60%
Does the company develop a low-carbon demand?	Low-carbon offer of suppliers	No green purchase	No green purchase	Company purchases low-carbon products/equipment to reduce its materials and construction phase emissions	Company purchases low-carbon products/equipment to reduce its materials and construction phase emissions Company partners with suppliers to develop low-carbon products	Company purchases low-carbon products/equipment to reduce its materials and construction phase emissions Company partners with suppliers to develop low-carbon products	40%

Rationale

BC 6.2 Activities to influence suppliers to reduce their GHG emissions

Rationale of the indicator

Relevance of the indicator

Activities to influence suppliers are included in the ACT BC assessment for the following reasons:

1. As each part of the building LCA (materials, management, etc.) has a significant impact in terms of GHG emission decarbonization of the whole supply chain is also key to reach ambitious decarbonization goals in the construction segment.

2. Beyond the supplier selection process, construction companies have the capacity to influence suppliers through the development of low-carbon products demand. If companies develop green purchase volume, suppliers would be encouraged to adapt.

Scoring the indicator

Because of data availability and complexity, a direct measure of the outcome of such engagement is not very feasible at this time. It is often challenging to quantify the emission reduction potential and outcome of collaborative activities with the supply chain. Therefore, the approach of a maturity matrix allows the assessor to consider multiple dimensions of supplier engagement and assess them together towards a single score for all the activities related to Supplier Engagement.

299

7. Clients engagement indicators (Weighting: 10%)

300

BC 7.1 Strategy to influence customer behaviour to reduce their GHG emissions (Weighting: 5%)

Description & Requirements BC 7.1 Strategy to influence customers to reduce their GHG emission

Short description of indicator This indicator assesses the level of engagement that the company has with its clients, based on an assessment of the client policy formalized and implemented by the company.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A15: Client policy

How the assessment will be done

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
To what extent GHG emissions reduction issues are integrated in engagement with clients?	Consideration of reduction targets	No strategy	GHG emissions reduction included in engagement with clients Means-driven commitment	Quantified GHG emissions reduction included in engagement with clients	Quantified GHG emissions reduction included in engagement with clients	Quantified GHG emissions reduction included as priority in engagements with clients	40%
What action levers are used by the company to encourage clients to buy low carbon products?	Influence on clients	Company only delivers buildings that meet regulation requirements	Passive approach (offers buildings that go beyond regulation but no incentive for clients to choose energy efficient buildings rather than standard ones)	Use of one action lever (awareness campaign, compensation, purchasing rule, etc.) Provision of documents and tools by the lessor	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.) Provision of documents and tools Multi-party working	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.) Contribution to shift demand towards low-carbon buildings	40%

					group with annual meeting at least		
What is the scope of the action levers used?	Scope	No clients in the scope		Only large clients	Majority of clients	All clients	20%

Rationale

BC 7.1 Strategy to influence customers to reduce their GHG emission

Rationale of the indicator

Relevance of the indicator

Strategy to influence customers are included in the ACT BC assessment for the following reasons:

1. As each part of the building LCA (materials, management, etc.) has a significant impact in terms of GHG emission, decarbonization of the whole supply chain is key to reach ambitious decarbonization goals in the construction segment. Building occupants and building managers have also a key role to play in order to achieve the 2DS.
2. Companies who wish to develop low carbon buildings or more sustainable buildings need to be able to market them, and convince their clients to adopt sustainable practices for their new/renovated buildings.

Scoring the indicator

Because of data availability and complexity, a direct measure of the outcome of such engagement is not very feasible at this time. It is often challenging to quantify the emission reduction potential and outcome of collaborative activities with the supply chain. Therefore, the approach of a maturity matrix allows the assessor to consider multiple dimensions of supplier engagement and assess them together towards a single score for all the activities related to Client Engagement.

301 **BC 7.2 Activities to influence consumer behaviour to reduce their GHG emissions (Weighting: 5%)**

Description & Requirements

BC 7.2 Activities to influence customers to reduce their GHG emissions

Short description of indicator This indicator assesses the level of engagement that the company has with its clients, based on an assessment of previous initiatives that show whether or not the company engages with clients in various ways.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A16: List of initiatives implemented to influence client behavior to reduce their GHG emissions

How the assessment will be done

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
How the company encourage clients to reduce their GHG emissions?	Clients GHG emissions	No engagement	Company promotes buildings with lower carbon footprint but no data reported Company defines means-driven commitment	Company assists clients to reduce their GHG emissions Provision of documents and tools by the lessor	Company partners with large clients to define common GHG emissions reduction plan Provision of documents and tools Multi-party working group with annual meeting at least	Company contributes in GHG emissions reduction along its value chain through close partnerships with clients	20%
What actions levers are used by the company to encourage buildings users to reduce their GHG emissions?	Users GHG emissions	No action	Passive approach (company implement action in response of specific request of tenants/users)	Company influence building users through awareness campaigns	Company integrates actions within the construction/renovation of buildings (parking for electrical vehicles, bicycle parking, etc.)	Use of several actions levers along the whole life of the building (construction, renovation, management)	80%

Rationale

BC 7.2 Activities to influence customers to reduce their GHG emissions

Rationale of the indicator

Relevance of the indicator

Activities to influence customers are included in the ACT BC assessment for the following reasons:

1. As each part of the building LCA (materials, management, etc.) has a significant impact in terms of GHG emission, decarbonization of the whole supply chain is also key to reach ambitious decarbonization goals in the construction segment. Building occupants and building managers have also a key role to play in order to achieve the 2DS.
2. Construction companies have the capacity to influence their clients when providing support to reduce their GHG emissions (partnership, common action plan, etc.).

Scoring the indicator

Because of data availability and complexity, a direct measure of the outcome of such engagement is not very feasible at this time. It is often challenging to quantify the emission reduction potential and outcome of collaborative activities with the supply chain. Therefore, the approach of a maturity matrix allows the assessor to consider multiple dimensions of supplier engagement and assess them together towards a single score for all the activities related to Client Engagement.

304 **8. Policy engagement indicators (Weighting: 5%)**

305 **BC 8.1 Company policy on engagement with trade associations (Weighting: 2%)**

Description & Requirements	BC 8.1 Company policy on engagement with trade associations
Short description of indicator	The company has a policy on what action to take when industry organizations to which it belongs are found to be opposing “climate-friendly” policies.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none">- A12: Company policy on engagement with trade associations
How the assessment will be done	<p>The assessor will evaluate the description and evidence of the policy on trade associations and climate change for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence will be compared to the maturity matrix developed to guide the scoring and a greater number of points will be allocated for elements indicating a higher level of maturity.</p> <p>Best practice elements to be identified in the test/analysis include:</p> <ul style="list-style-type: none">- A publicly available policy is in place- The scope of the policy covers the entire company and its activities, and all group memberships and associations- The policy sets out what action is to be taken in the case of inconsistencies- Action includes option to terminate membership of the association- Action includes option of publicly opposing or actively countering the association position- Responsibility for oversight of the policy lies at top level of the organization- There is a process to monitor and review trade association positions

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
What is the scope covered by the engagement policy? Is the policy publicly available?	Transparency and scope	Does not cover entire company or all group memberships. Is not publicly available.	Does not cover entire company or all group memberships. Is publicly available.	Covers the entire company and its activities, and all group memberships and associations, but not publicly available		Covers the entire company and its activities, and all group memberships and associations. Public policy is publicly available	40%
Does the company have a review process of trade associations?	Oversight	No process to review trade associations positions	A process to monitor and review trade association positions exists but is not necessarily implemented	A process to monitor and review trade association positions exists and is well implemented	A process to monitor and review trade association positions exists and is well implemented at a high level of the organization	A process to monitor and review trade associations positions exists. Responsibility for oversight of the policy lies at top level of the organization	40%
Does the plan have an action plan regarding engagement with trade associations?	Action plan	No mention of this element		Sets out what action is to be taken in the case of inconsistencies	Option to terminate membership of the association	Option of publicly opposing or actively countering the association position	20%

Rationale

BC 8.1 Company policy on engagement with trade associations

Rationale of the indicator

Trade associations are a key instrument by which companies can indirectly influence policy on climate. Thus, when trade associations take positions, which are negative for climate, companies need to take action to ensure that this negative influence is countered or minimized.

BC 8.2 Trade associations supported do not have climate-negative activities or positions (Weighting: 1%)

Description & Requirements	BC 8.2 Trade associations supported do not have climate-negative activities or positions
Short description of indicator	The company is not on the board or providing funding beyond membership of any trade associations that have climate-negative activities or positions. It should also be considered if the company is supporting trade associations with climate-positive activities and/or positions.
Data requirements	The questions comprising the information request that are relevant to this indicator are: <ul style="list-style-type: none"> - A12: Company policy on engagement with trade associations
How the assessment will be done	<p>The list of trade associations declared in the CDP data and other external source entries relating to the company (e.g. RepRisk database), is assessed against a list of associations that have climate-negative activities or positions. The results are compared to any policy described in 5.1.</p> <p>If the company is part of trade associations that have climate-positive activities and/or positions, this should be considered for the analysis.</p>

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
Does the company support trade associations that have climate negative activities/positions?	Membership/funding	Company is on the board or provides funding beyond membership to trade associations that have climate-negative activities or positions.		The company is not on the board or providing funding beyond membership of any trade associations that have climate-negative activities or positions. Company can be member.		Company is not a member of any trade associations that have climate negative activities or positions	100%

Rationale BC 8.2 Trade associations supported do not have climate-negative activities or positions

Rationale of the indicator Trade associations are a key instrument by which companies can indirectly influence policy on climate. Thus participating in trade associations which actively lobby against climate-positive legislation is a negative indicator and likely to obstruct low-carbon transition. However, membership in association that supports climate positive policies should also be considered in the analysis.

307 **BC 8.3 Position on significant climate policies (Weighting: 2%)**

Description & Requirements BC 8.3 Position on significant climate policies

Short description of indicator The company is not opposed to any significant climate relevant policy and/or supports climate friendly policies.

Data requirements The questions comprising the information request that are relevant to this indicator are:

- A11: Position of the company on significant climate policies (public statements, etc.)

How the assessment will be done The assessor will evaluate the description and evidence on company position on relevant climate policies for the presence of best practice elements, negative indicators and consistency with the other reported management indicators. The company description and evidence will be compared to the maturity matrix developed to guide the scoring and a greater number of points will be allocated for elements indicating a higher level of maturity.

Maturity matrix contents could include (decreasing maturity)

1. Publicly supports relevant significant climate policies
2. No reports of any opposition to climate policy
3. Reported indirect opposition to climate policy (e.g. via trade association)
4. Reported direct opposition to climate policy (third-party claims are found)

5. Company publicizes direct opposition to climate policy (direct statement issues or given by a company representative in e.g. speech or interview)

Question	Subdimension	Basic	Standard	Advanced	Next practice	2' aligned	Subscore
What is the position of the company on significant climate policies?	climate policy support	Reported direct opposition to climate policy can be found (third-party claims are found)	No reported direct opposition to climate policy	No reported direct opposition to climate policy, but indirect may exist.	No reports of any opposition to climate policy	Publicly supports relevant significant climate policies	100%

Rationale

BC 8.3 Position on significant climate policies

Rationale of the indicator

Private and public stakeholders of the building sectors have been developing initiatives about sustainable building practices that contribute to the transition to a low-carbon economy. Companies should not oppose effective and well-designed regulation in these areas, but should support it. Assessing the position of the company regarding the evolution of the context is thus key to understand the corporate vision in these matters.

309 **9. Business model indicators (Weighting: 10%)**

310 **BC 9.1 Integration of the low-carbon economy in current and future business models (Weighting: 10%)**

Description & Requirements	BC 9.1 Integration of the low-carbon economy in current and future business models
Short description of indicator	<p>The company is actively developing business models for a low-carbon future by demonstrating its application of low-carbon business model pathways. The innovative business models that have been identified as being strategic for the company's low-carbon transition are:</p> <ul style="list-style-type: none">- Energy performance guarantees and services- Use of circular economy as cost reduction driver- Design and offer multi-purpose and collaborative buildings
Data requirements	<p>The questions comprising the information request that are relevant to this indicator are:</p> <ul style="list-style-type: none">- A17: List and turnover of activities in new businesses related to low carbon buildings- A18: Current position and action plan of the company towards the identified low-carbon business models
How the assessment will be done	<p>The analysis is based on the company's degree of activity in one of the 3 future business model areas used to benchmark. The analyst evaluates the implementation of the future business model pathways through a maturity matrix and the highest level achieved determines the current level of the company.</p> <p>The 3 business model categories, comprising subcategories (non-exhaustive list) are the following ones:</p> <ol style="list-style-type: none">1. Energy performance guarantees and services<ol style="list-style-type: none">a. Offer low carbon buildings with energy performance guarantees (if the energy consumption is higher than a fixed threshold set down in the contract, the construction company covers the extra costs)b. Offer renovation services with guaranteed savings (if the savings are less than those set down in the contract, the construction company covers the extra costs)

- c. Offer low carbon building with energy services (renewable production, electricity storage, ...) over 10-15 years
 - d. ...
2. Use circular economy as cost reduction driver
- a. Integrate used material in construction operations to reduce cost of construction
 - b. Upcycle construction materials and waste to optimize construction costs
 - c. ...
3. Design and offer multi-purpose and collaborative buildings
- a. Design of multi-purpose buildings
 - b. Design of buildings for collaborative use (coworking, coliving, etc.)
 - c. ...

In order for companies to align with a low-carbon future and meet the future mobility needs, it is expected that they pursue at least one of these future business model pathways and integrate them in their strategic plans. The analyst evaluates the description and evidence of the company's degree of activity in one of the future business model areas for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points are allocated for elements indicating a higher level of maturity.

The minimum requirement for points to be awarded is that some level of exploration of one or more of these relevant business areas has started. This could include participation in collaborations, pilot projects, or research funding.

Best-practice elements to be identified in the test/analysis include:

- the company has developed a mature business model that integrates one or many of the above elements
- the business activity is profitable
- the business activity is of a substantial size
- the company is planning to expand the business activity
- expansion will occur on a defined timescale

Maximum points are awarded if all of these elements are demonstrated

Rationale

BC 9.1 Integration of the low-carbon economy in current and future business models

Rationale of the indicator

In addition to developing sustainable building practices, a company may transition its business model to other areas to remain profitable in a low-carbon economy. The company's future business model should enable it to decouple financial results from GHG emissions, in order to meet the constraints of low-carbon transition while continuing to generate value. The business model shifts identified do not conflict with the changes that are implied by decarbonizing the company's conception and construction of buildings.

This indicator aims to identify both relevant current business activities, and those still at a burgeoning stage. It is recognized that transition to a low carbon economy, with associated change in business models, will take place over a number of years. The assessment will thus seek to identify and reward projects at an early stage as well as more mature business activities, although the latter (i.e. substantially sized, profitable, and/or expanding) business activities will be better rewarded.

311 The maturity matrix is provided below:

		Basic	Advanced	2° aligned	
	Associated score	0%	50%	100%	Weight of the indicator in business model score
9.1	Profitability of business model	Non- estimated or in a very early stage of development (research or conception stage)	Mature business model but non- profitable or in a development stage (prototype / demonstration or test)	Mature and profitable business model	25%

9.2	Size of business model	Non- estimated	Limited size of business for the company (few FTE or time dedicated, small turnover, few revenues expected, etc.)	Substantial size of market for the company (significant number or FTE or dedicated hours, great turnover, great anticipated profitability, etc.)	25%
9.3	Growth potential of business model	Non- estimated or exploration of the business model interrupted	Scheduling next development steps	Scheduling the expansion of the target or size of the business model	25%
9.4	Deployment schedule of business model	Non- scheduled	Deployment scheduled with a 2 years horizon or less	Deployment scheduled with a 2 years horizon or more	25%

312

313 6. Assessment

314 6.1. Sectoral Benchmark

315 Description of the benchmark

316 The fundamental target to achieve for all organizations is to contribute to not exceeding a threshold of 2°
317 global warming compared to pre-industrial temperatures. This target has long been widely accepted as a
318 credible threshold for achieving a reasonable likelihood of avoiding climate instability, while a 1.5°C rise has
319 been agreed upon as an aspirational target.

320 Every company shall be benchmarked according to globally and/or nationally acceptable and credible
321 benchmarks that align with spatial boundary of the methodology. If the methodology is only applied to a
322 local sample, the associated benchmarks shall still be compatible with global low-carbon scenarios.

323 Next, the geographical zone coverage and the reference pathway definition and classification are
324 presented. After, the company benchmark construction is described, and one example of the benchmark
325 construction is given.

326 Geographical areas coverage

327 The geographical zones are defined as a large world zone containing similar characteristics. Thus, some
328 countries can be considered as geographical zones.

329 The external sources and available data used (IEA ETP 2017, n.d.) (International Energy Agency, Transition
330 to sustainable buildings, 2013) for the construction of the benchmark cover the following areas:

- 331 ■ Europe;
- 332 ■ USA and Canada⁴;
- 333 ■ Brazil;
- 334 ■ China;
- 335 ■ India;
- 336 ■ ASEAN (ten countries of Southeast Asia with only aggregated data including Brunei, Cambodia,
337 Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam);
- 338 ■ South Africa.

339 Reference pathway classification

340 A reference pathway defines the carbon intensity (kgCO₂/m²) pathway from a given geographical zone
341 and/or country, as well as by building type and typology.

342 For the Construction sub-sector, we must consider 2 types of pathways (of different nature):

⁴ Canada is not covered by IEA ETP 2017.

- 343 - the "In-Use" part corresponding to carbon intensities linked to predicted operational energy
344 consumption of buildings newly built or renovated by the company (similarities with the
345 methodology developed for the Real-Estate sub-sector, but excluding user's appliances),
346 - the "Materials" part corresponding to embodied-carbon intensities linked to the materials (and
347 equipment) used to build and maintain the new buildings produced by the company (life cycle
348 approach of products, assuming a building conventional service life of 50 years).

349 These two types of pathways can be combined for new buildings, provided they are expressed in the same
350 unit, that is kg CO₂/m².year.

351 For the construction of new buildings, the reference pathway considers the operational energy
352 consumption – and related carbon – from four major end-uses (space heating, space cooling, Lighting, water
353 heating) plus the embodied-carbon of the materials composing the building, annualized. Those four end-
354 uses correspond, in new buildings, to the major part of the energy consumption that can be defined during
355 the design phase and generally addressed by energy performance regulations. Since the energy
356 consumption of user's appliances is not included here, the "In-Use" perimeter is different from the Real-
357 Estate sub-sector.

358 For renovation works, the reference pathway only considers the operational energy consumption from the
359 four major end-uses (space heating, space cooling, lighting, water heating).

360 The reference pathway classification is defined considering the five input data parameters:

- 361 ▪ Activity: Construction or Renovation⁵
362 ▪ Building type: Residential or Services
363 ▪ Building typology:
364 - Individual housing or multi-family housing (for Residential building type)
365 - Office, Retail or Hotel (for Services building type)
366 ▪ Geographical zone: group of countries or individual country in terms of CO₂ Emissions
367 ▪ Country level: Country pathway or the state pathway for certain countries (e.g. USA).

368 The generic reference pathway designation is composed as follows:

369 Pathway_name = "Activity"_"Building type"_"Building typology"_"Geographical zone"_"Country"

370 Example:

371 Pathway for construction of new offices in France = Construction_Services_Office_Europe_France

372

373 **Company Benchmark**

⁵ For "In-Use" calculation for renovated buildings, see ACT – Building Sector – methodology – Real Estate

374 The company benchmark is a customized benchmark based on the 2°C scenario from the IEA, and on the
375 main features of its works. If the company builds new buildings and renovate existing buildings, two
376 company benchmarks are created: one for new buildings and the other for renovation.

377 If the company business concerns only one type of construction, then only one benchmark is created.

378 To build the company benchmark(s) two steps are generally needed:

- 379 ▪ First, the company must calculate the different reference pathways for each building typology and
380 country, that was constructed (and/or renovated) for the last 5-year period by the company and
381 the undergoing building construction (new and/or renovation).
- 382 ▪ Then, the company benchmark is built as a weighted (according to Floor area of buildings) sum of,
383 one or, a combination of several reference pathways.

384 Example:

385 A company that has no historical in construction and that builds two new office buildings with 1000 m² and
386 2000 m² of floor area in France and Germany.

387 To determine the company benchmark two reference pathways are needed (Construction Services Office
388 buildings Europe France and Construction Services Office buildings Europe Germany).

$$389 \text{ Company benchmark} = \frac{\text{Floor_area_office_France}}{\text{Total company floor_area}} * \text{Construction_Services_Office_Europe_France} +$$
$$390 \frac{\text{Floor_area_office_Germany}}{\text{Total company floor_area}} * \text{Construction_Services_Office_Europe_Germany}$$

391 Note - the reference pathways consider the in-use and materials emissions. (to keep them separated?)

392 The calculation of the reference pathways needs several information's:

- 393 ▪ Current New and renovated buildings (typology, country, floor area)
- 394 ▪ Previously built or renovated buildings (in the last five years) (typology, country, floor area)

395 Available reference pathways

396 To date, 19 reference pathways are available:

- 397 ▪ Geographical Zones available: Europe, USA, Chine, India, Brazil, AESEAN and South Africa
- 398 ▪ Countries available = France
- 399 ▪ Building type available = Residential and Services
- 400 ▪ Building typology: Individual housing, multi-family housing, Office, Retail and Hotel (**Reference**
- 401 **pathways for the different building typologies are only available at country level!**)

402 Since the ACT methodology for Construction sub-sector is meant to be global, the assessment report shall
 403 mention when data is unavailable for an area and which “proxy” or specific local data have been used, with
 404 justification, according to the following table:

Description of the area with missing data compared to another documented area	Proxy
Country level data not available	1. If this zone is relatively similar (in terms of GDP/capita, type of energy and industry infrastructure, main features of the building stock...) to another one already documented, consider the same data, 2. If this zone is relatively similar to another one, but differs by climatic conditions, use the same data where applying specific climatic coefficients to in-use energy consumption, 3. If this zone is included in a larger zone that is already characterized, then consider the data of the larger zone,
Specific data for the given area can be provided and sources justified	Specific data may be considered

405 In any case, the assessment report shall mention which “proxy” or specific local data have been used, with
 406 justification.

407 6.2. Quantitative benchmarks used for the indicators

408 The construction of new buildings sector takes into account two different indicators related to in-use
 409 consumption and the materials used in construction. If the benchmark is related to renovation, only in-use
 410 consumption indicator should be considered.

411 The methodology is divided into 2 calculations:

- 412 ▪ In-use consumption:
 - 413 - Scope 1 – building direct emissions
 - 414 - Scope 2 – Electricity Consumption emissions
- 415 ▪ Construction Materials emissions

416 In-use consumption

417 Scope 1
 418 IEA ETP 2017 (IEA ETP 2017, n.d.) gives the buildings direct CO2 emissions by geographical zone in MtCO2
 419 from 2014 up to 2060. The timescale chosen for the ACT methodology was 2014-2050. Only the end-uses
 420 corresponding to heating, cooling, Domestic hot water and lightning as they correspond to the major part
 421 of the energy consumption that can be defined during the design phase by energy performance
 422 regulations.

423 From these values and the geographical building floor area(s)(International Energy Agency, 2013) , with a
 424 five-year step, we can calculate the **Scope 1 geographical zone Carbon intensity of the building stock**. The
 425 calculation is done using the following formula:

$$426 \text{ Zone building stock type pathway (year)} = \frac{\text{Direct CO2 emissions (year)}}{\text{Zone Surface (year)}} \left(\frac{\text{kgCO2eq}}{\text{m}^2} \right) 1$$

427 The **zone Carbon intensity for new buildings** is calculated by applying an Energy intensity ratio.

428 To calculate the Zone new buildings type pathway, the zone building stock type pathway is multiplied by a
 429 ratio between the EI of new buildings type and the stock energy intensity. The stock energy intensity is
 430 calculated from IEA ETP 2017 (IEA ETP 2017, n.d.), by considering heating, cooling, domestic hot water and
 431 lightning end-uses. The following formula used.

$$432 \text{ Zone new building type pathway (year)} = \text{Zone building stock type pathway (year)} * \\ 433 \text{ Ratio EI zone new building type vs EI zone stock building type (year)} 2$$

434 With,

$$435 \text{ Ratio EI zone new building type vs EI zone stock building type (year)} = \frac{\text{EI zone new buildings type (year)}}{\text{EI zone building stock type (year)}} 3$$

436 Values for *EI⁶ for new buildings* are calculated considering current new building standards and
 437 increase of the energy efficiency of 20% every 10 years. For Europe countries the data from current new
 438 building standards come from (ZEBRA2020 - DataTool, n.d.). The value for the zone Europe new building
 439 standards EI, is calculated as a weighted sum of Europe countries.

440 The new building standards values are defined in primary energy. To convert to these values into final
 441 energy, we consider a Primary Energy Factor (PEF) for electricity equal to 2.5 (Average European reference
 442 value of the electricity PEF, 2.50, is given in the (Directive 2006/32/EC, 2006)) for each country (all
 443 other Fuels (Gaz, oil...) are considered to have a PEF equal to 1). The PEF is then multiplied by the country
 444 building stock electricity share, to convert the new building standards primary energy to final energy.

445 *EI zone building stock* type is calculated using values from (IEA ETP 2017, n.d.) and (International
 446 Energy Agency, 2013).

$$447 \text{ EI zone building stock (year)} = \frac{\text{Zone building type Energy consumption (4 major end-uses) (year)}}{\text{Zone building type total floor area (year)}} 4$$

448

⁶ - Energy Intensity [kWh/m²]

449 **The country carbon intensity for new buildings:**

450 $Country\ new\ building\ typology\ pathway\ (year) = Zone\ building\ stock\ type\ pathway\ (year) *$
451 $Ratio\ EI\ country\ new\ building\ typology\ vs\ EI\ zone\ new\ building\ stock\ type\ (year) \quad (5)$

452 With,

453 $Ratio\ EI\ country\ new\ building\ typology\ vs\ EI\ zone\ new\ building\ stock\ type\ (year) = \frac{EI\ Country\ new\ buildings\ typology}{EI\ zone\ building\ stock\ type(year)}$ 6

454 For *EI Country new buildings typology* values come from countries building codes (ZEBRA2020 -
455 DataTool, n.d.). The conversion of these values to final energy is made using the same methodology as for
456 the **zone Carbon intensity for new buildings**.

457 Scope 2

458 The calculation of the Scope 2 emissions only concerns the electricity consumption. As electricity is the
459 main source of indirect emissions in most countries, commercial heat is not considered. The data from
460 building type electric consumption by geographical zone can be retrieved in the IEA ETP 2017 data.

461 The **Zone building type electricity carbon intensity** is calculated as follows:

462 $Zone\ building\ type\ electricity\ carbon\ intensity\ (year) =$
463 $\frac{Zone\ building\ type\ electric\ consumption\ (year) \times Zone\ Electricity\ mix\ emissions\ (year)}{Zone\ Building\ type\ surface\ (year)}$ (kgCO₂/m²) 7

464 With,

465 *Zone building type electric consumption (year)* : Electric consumption is calculated from the total
466 electric consumption of the zone building type minus the energy used for cooking and other appliances
467 and miscellaneous. The percentage of electricity used for each end-use is provided by (EU building
468 database, 2018, IEA ETP 2017, n.d.).

469 *Zone Electricity mix emissions (year)*: data gathered from IEA ETP 2017 data.

470 **Country building typology electricity carbon intensity**

471 The calculation at country level are made using the following formula:

472 $Country\ building\ typology\ electricity\ carbon\ intensity\ (year) = \frac{Zone\ building\ type\ electric\ consumption\ (year)}{Zone\ Building\ type\ surface\ (year)} \times$

473 $Ratio\ EI\ country\ new\ building\ typology\ vs\ EI\ zone\ new\ building\ stock\ type\ (year) \times$

474 $country\ Electricity\ mix\ emissions\ (year)$ 8

475 **Country electric mix emissions (year):**

476 The electric country mix emissions pathway is calculated by applying the same ratio of electricity
477 decarbonization to the country current emissions, as in its geographical zone (data from IEA ETP 2017).
478 Country current emissions (Only Europe countries available) come from the scientific paper (Moro and
479 Lonza, 2018). The data in this article is given in kgCO₂/kWh_{electricity}.

480 The final carbon pathway for construction In-Use is calculated by doing the sum of scope 1 and 2.

481 **Materials benchmarks**

482 The needed data for calculating embodied-carbon intensity for building materials are the following:

- 483 ▪ Quantities of materials in kg/m² of building:
 - 484 – Drawn for a study for ADEME on material consumption for new buildings in France, and
 - 485 trends until 2050 (CSTB for ADEME, 2018),
 - 486 – 10 families of materials have been defined, covering the majority of buildings materials,
 - 487 – Replacement coefficient is defined for each family, knowing that the conventional service
 - 488 life of a building is 50 years,
 - 489 – Distinction between residential and non-residential buildings.
 - 490
- 491 ▪ Embodied-carbon based on the full life cycle of construction products:
 - 492 – Use of INIES French database in order to get a realistic amount of CO₂/kg of each family of
 - 493 materials, representing diverse construction products,
 - 494 – Calculation of CO₂/m² of building,
 - 495 – Addition of building-related equipment as HVAC, PV panels, etc. (because not included in
 - 496 the above-mentioned study), using the default values given in the E+C- method,
 - 497 – Adjustment of the final result (CO₂/m²) so as to correspond to C1 level of E+C- label.

498 This approach gives the first benchmark point corresponding to a new building in France in 2015.

499 The benchmark pathway is drawn for the above-mentioned study, where several scenarios based on market
500 shares are suggested. The scenario “pushing” the bio-based buildings was chosen, in terms of market
501 shares, better in line with low-carbon transition than the others. The IEA ETP 2017 industry pathways
502 reflects decarbonation of industry sub-sectors and electricity mix.

503 The results are then adapted/translated to other countries, taking into account:

- 504 – the market share of different types of building structures, as given in GABC 2018 Global
- 505 Status Report,
- 506 – the electricity mix and the 2DS-related IEA pathway.

507 **Elaboration of benchmark pathway for each company**

508 Several « elementary » benchmark pathways for new buildings material-related CO₂ intensities are drawn,
509 from 2015 to 2050 with 5 years step (e.g.: office buildings in Italy, hotels in France, etc.)

510 One or a combination of several elementary pathways according to the real activity of the construction
511 company / developer (average activity on 5-year period):

- 512 – X m² of offices in France → x % (= France-office pathway weighted by x %)

- 513 - Y m² of collective housing in France → y %
 514 - Z m² of offices in Italy → z %
 515 - W m² of hotels in Italy → w %

516 Regarding activity evolution over time (according to a company's strategy) until 2050, previous figures are
 517 set as constants. The result is a customized benchmark pathway for the "Materials" component, to be
 518 combined with the "In-Use" component in order to represent the activity of construction of new buildings.

519 The following table lists the benchmarks used for the quantitative indicators and their sources:

Benchmark(s)	Parameter	Source	Indicator relevance
Real-Estate_In-Use-all_Services_Office_"Geo-zone"_"Country" (set of several elementary reference pathways)	CB _{OB}	EU Buildings database IEA ETP 2017	BC 1.1
Construction_In-Use-reg_"Building-type"_"Building-typology"_"Geo-zone"_"Country"	CB _{nbu} (value or gradient)	ZEBRA2020 – data tool IEA ETP 2017	BC 1.2 BC 4.1
Renovation_In-Use-reg_"Building-type"_"Building-typology"_"Geo-zone"_"Country"	CB _{rbu}	BBC Observatory (FR)	BC 1.3

520 **List of sources:**

521 **Materials**

- 522 ■ IEA ETP 2017 (industry and energy sectors)
- 523 ■ INIES database (FR)
- 524 ■ Bilan-GES database (FR)
- 525 ■ CSTB study for ADEME on resources consumption in the building sector (FR, 2018)
- 526 ■ Arrêté of 2012/11/19 (bio-based buildings)
- 527 ■ Recent documents on neutral carbon policy (European Commission)
- 528 ■ Energy Transitions Commission: reports of Plastics, Steel and Cement industries
- 529 ■ IEA technology roadmap (cement industry) and other IEA industry data
- 530 ■ IEA sub-sectoral information

531 **In-use**

- 532 ■ IEA ETP 2017
- 533 ■ Global surface projections: Transition to Sustainable Buildings, IEA 2013
- 534 ■ Diverse countries: DDPP

- 535 ▪ Europe country surface projections: EU buildings database, [http://www.entranze-](http://www.entranze-scenario.enerdata.eu/site/)
- 536 [scenario.enerdata.eu/site/](http://www.entranze-scenario.enerdata.eu/site/)
- 537 ▪ United states electricity mix: <https://www.eia.gov/>
- 538 ▪ Europe electricity mix : [https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-](https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-2/assessment-4)
- 539 [electricity-production-2/assessment-4](https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-2/assessment-4)
- 540 ▪ CEA Mémento de l'Énergie - Energy Handbook (FR, 2018)
- 541 ▪ China: scientific articles
- 542 ▪ Directive 2006/32/EC, 2006.
- 543 ▪ Ecofys & WWF, 2010. The Energy Report: 100% renewable energy by 2050. Ecofys.
- 544 ▪ EU building database, 2018.
- 545 ▪ IEA ETP 2017, n.d.
- 546 ▪ International Energy Agency (Ed.), 2013. Transition to sustainable buildings: strategies and opportunities to 2050. IEA Publ, Paris.
- 547
- 548 ▪ Moro, A., Lonza, L., 2018. Electricity carbon intensity in European Member States: Impacts on
- 549 GHG emissions of electric vehicles. Transp. Res. Part Transp. Environ. 64, 5–14.
- 550 <https://doi.org/10.1016/j.trd.2017.07.012>
- 551 ▪ Sectoral Decarbonization Approach (SDA): A method for setting corporate emission reduction
- 552 targets in line with climate science, 2015. . Science Based Targets Initiative.
- 553 ▪ ZEBRA2020 - DataTool, n.d
- 554 ▪ « Observatoire BBC – Etude sur les bâtiments rénovés à basse consommation », Effinergie, 2018

555

556 6.3. Weightings

557 The quantitatively scored modules (Targets, Sold Product Performance) carry 45% of the final weight, and

558 the qualitatively scored modules (Intangible Investment, Management, Policy engagement, Supplier

559 engagement, Client, Business model) carry 55%. The indicators within the modules also carry their own

560 weighting.

BC	Module	Indicator	Module weight	Indicator weight
1.1	Targets	Alignment of owned buildings reduction targets	15%	1,0%
1.2		Alignment of new buildings delivered (use phase) reduction targets		5,0%
1.3		Alignment of renovated buildings (use phase) reduction targets		3,0%
1.4		Alignment of new buildings (materials) reduction targets		3,0%

1.5		Time horizon of targets		2,0%
1.6		Historic target ambition and company performance		1,0%
3.1	Intangible Investment	R&D in Climate Change Mitigation Technologies	10%	10,0%
4.1	Sold Product Performance	Alignment of carbon performance trend for new buildings (use phase)	30%	10,0%
4.2		Low carbon buildings share		8,0%
4.3		Renovated buildings subject to thermal renovation share		6,0%
4.4		Emissions lock-in		6,0%
5.1	Management	Oversight of climate change issues	10%	3,0%
5.2		Climate change oversight capability		3,0%
5.3		Low carbon transition plan		2,0%
5.4		Climate change management incentives		1,0%
5.5		Climate change scenario testing		1,0%
6.1	Supplier	Strategy to influence suppliers to reduce their GHG emissions	10%	5,0%
6.2		Activities to influence suppliers to reduce their GHG emissions		5,0%
6.1	Client	Strategy to influence customer behavior to reduce their GHG emissions	10%	5,0%
6.2		Activities to influence consumer behavior to reduce their GHG emissions		5,0%
7.1	Policy engagement	Company policy on engagement with trade associations	5%	2,0%
7.2		Trade associations supported do not have climate-negative activities or positions		1,0%

7.3		Position on significant climate policies		2,0%
8.1	Business model	Integration of the low-carbon economy in current and future business model	10%	10,0%
	Overall		100%	100%

561

562 **Rationale for weightings**

563 The selection of weights for both the modules and the individual indicators was guided by a set of principles
564 (see the ACT framework document for more information). These principles helped define the value of the
565 indicators.

Principle	Explanation
Value of information	The value of the information that an indicator gives about a company's outlook for the low-carbon transition is the primary principle for the selection of the weights.
Impact of variation	A high impact of variation in an indicator means that not performing in such an indicator has a large impact on the success of a low-carbon transition, and this makes it more relevant for the assessment.
Future orientation	Indicators that measure the future, or a proxy for the future, are more relevant for the ACT assessment than past & present indicators, which serve only to inform the likelihood and credibility of the transition.
Data quality sensitivity	Indicators that are highly sensitive to expected data quality variations are not recommended for a high weight compared to other indicators, unless there is no other way to measure a particular dimension of the transition.

566

567 **Targets** **15%**

568 The targets module has a relatively large weight of 15%. Most of it is placed on the alignment of reduction targets
569 of new buildings with 8%, compared to 3% for renovated buildings. This dichotomy reflects the revenues breakdown
570 of the building construction company, between renovation and new construction related activities. As for new
571 buildings delivered, an indicator of 5% measures the targets related to the use phase and another one of 3% considers
572 the targets related to materials. This breakdown is similar to the emissions breakdown related to materials and energy
573 use as the result of the life cycle analysis of a new building. 1% scores are attributed to the alignment of reduction
574 targets of company's owned buildings and to the previous achievement indicator, which measures the company's past
575 credentials on target setting and achievement. It is not very important by the principles outlined above, but
576 nonetheless can provide contextual information on the company's experience to meet ambitious targets Finally, the
577 time horizon of targets has a weight of 2%. It is a proxy of how forward-looking the company is, which is very long-
578 term oriented.

579 **Material Investment** **0%**

580 This module is not relevant for construction companies since they do not properly hold owned asset base
581 (product lines). The weight of this module is therefore 0%.

582 Intangible investment 10%

583 The R&D in climate change mitigation technologies indicator is focused around the company's intangible
584 investments or financial costs into climate change mitigation technologies. Given the higher amount of
585 environmentally related R&D undertaken by Building Construction companies compared to Real Estate
586 ones, the weight of this indicator and thus the module is heightened to 10% compared to the ACT Real Estate
587 methodology. R&D efforts must be increased in the sector to enable the transition.

588 Sold product performance 30%

589 This module carries by far the largest weight out of all the modules. Indeed, it holds most of the information
590 about the company's actions to reduce emissions on its products, i.e. the buildings delivered, where most
591 of the emissions occur. The focus is put on the alignment of carbon performance trend (past and future) for
592 new buildings with a weight of 10%. The share of low carbon buildings (weight of 8%) and renovated
593 buildings to thermal renovation (weight of 6%) are also relevant indicators to take into consideration for
594 this module.

595 Management 10%

596 Management is a multi-faceted module that makes up 10% of the score, because it incorporates many
597 different smaller indicators that together paint a picture of the company's management and strategic
598 approach to the low-carbon transition. The majority of this weight is placed on the oversight of climate
599 change issues and the climate change oversight capability, which are weighted 3% each. These two
600 indicators measure the ability of the company to integrate sustainability to its strategy and to embrace the
601 main challenges related to low-carbon transition. Besides, according to the principle of future orientation,
602 the transition plan provides more information on how this company will specifically deal with the transition,
603 and has a weight of 2%.

604 The other two indicators have a low weight of 1%, as they are contextual indicators whose outcome can
605 strengthen or undermine the company's ability to carry out the transition plan and meet ambitious science-
606 based targets.

607 Supplier engagement 10%

608 In order to reduce emissions from the whole lifetime of the buildings, it is imperative that construction
609 companies involve their supply chains. Nonetheless, it is not an indicator that is easy to measure, and relies
610 heavily on data quality to make a proper analysis. Therefore, this indicator has a medium weight of 10%.
611 This indicator focuses on the global strategy and general activities that a construction company has in place
612 with respect to its engagement with suppliers.

613 Client 10%

614 The client engagement indicator is focused around the company's efforts to reduce the emissions
615 generated after the buildings have been delivered and to influence customer practices towards low-carbon

616 consumption and circular economy practices. As with the influence on suppliers, it is not an indicator that
617 is easy to measure, and relies heavily on data quality to make a proper analysis. This indicator therefore
618 focuses on the global strategy and general activities that a construction company has in place on their
619 engagement with its customers.

620 **Policy Engagement** **5%**

621 In line with the rationale for the management indicators of low weight, the policy engagement indicators
622 are also contextual aspects which tell a narrative about the company's stance on climate change and how
623 the company expresses it in their engagement with policy makers and trade associations. The total weight
624 for this module is therefore medium at 5%. The company policy on engagement with trade associations,
625 and the company's position on relevant climate policy make up the bulk of this, with 2% each. Finally, 1% is
626 allocated to positions of the company's trade associations that do not have climate-negative activities as
627 this is a very specific question and concern a minority of companies.

628 **Business model** **10%**

629 The integration of a low-carbon economy in current and future business model is a composite indicator that
630 captures many elements and aspects that cannot otherwise be captured in any of the other modules. It
631 includes those aspects that are relevant to the transition but are not directly a part of the primary
632 generation activities. It is future oriented by asking the companies on its narrative on certain future
633 directions that the sector can/has to take to enable the transition.

634

635

6.4.Data request

636 Table 6 introduces the list of information which will be requested to companies through a questionnaire,
637 as well as the corresponding indicators.

Number	Data requested to the company	Indicator relevance
A1	Current internal targets set on carbon performance (kgeCO ₂ /m ²) for new and renovated buildings	BC 1.1, BC 1.2, BC 1.3, BC 1.4, BC 1.5
A2	Past internal targets set on carbon performance (kgeCO ₂ /m ²)	BC 1.6
A3	Average carbon intensity of company's own building in the past 5 years (use phase)	BC 1.6
A4	R&D detailed expenses	BC 3.1
A5	Environmental policy and details regarding governance	BC 3.1, BC 3.2, BC 3.3
A6	Management incentives	BC 3.4
A7	Breakdown of floor areas per business segment and country for renovated and new buildings	BC 4.1, BC 1.1, BC 1.2, BC 1.3, BC 1.4,
A8	Average carbon intensity of buildings delivered in the past 5 years (use phase and materials)	BC 1.7, BC 4.1
A9	Revenues share of low carbon delivered buildings	BC 4.2
A10	Revenues share of renovated buildings subject to thermal renovation	BC 4.3
A11	Position of the company on significant climate policies (public statements, etc.)	BC 5.1
A12	Company policy on engagement with trade associations	BC 5.2
A13	List of environmental/CSR contract clauses in purchasing & suppliers' selection process	BC 6.1

A14	List of initiatives implemented to influence suppliers to reduce their GHG emissions, green purchase policy or track record, supplier code of conduct	BC 6.2
A15	Client Policy	BC 7.1
A16	List of initiatives implemented to influence client behavior to reduce their GHG emissions	BC 7.2
A17	List and turnover of activities in new businesses (list TBD) related to low carbon buildings	BC 8

638

639 **7. Rating**

640 The ACT rating combines quantitative and qualitative information on a company’s past, present and
641 projected future to reveal its alignment with the low-carbon transition.

642 The ACT rating consists of three elements:

- 643 ▪ A Performance Rating, represented as a number from 1 up to 20
- 644 ▪ An Assessment Rating, represented as a letter from A down to E
- 645 ▪ A Trend Rating, represented as +, improving trend; -, worsening trend; or =, stable trend

The highest available ACT rating is 20A+	A performance rating of 20 : the company received high scores in its assessment against the methodology indicators.
	An assessment rating of A : the information reported by the company and available from public sources was consistent and showed that the company is well aligned to transition to the low-carbon economy
	A trend rating of + : the information provided shows the company will be better placed to transition to the low-carbon economy in future.

646 Each responding company in the ACT pilot project received not only an ACT rating but a commentary on
647 their performance across the three aspects of the rating. This gave a nuanced picture of the company’s
648 strengths and weaknesses. Detailed information on the ACT rating is available in the ACT Framework
649 document.

650 **7.1. Performance scoring**

651 Performance scoring shall be performed in compliance with the ACT Framework. However, material
652 investment module has a zero weighting since this module is not relevant when it comes to the Construction
653 sector. No other additional sector-specific issue that impact the analysis scoring for the companies of the
654 sector has been identified to date

655 **7.2. Narrative scoring**

656 Performance scoring shall be performed in compliance with the ACT Framework. No sector-specific issue
657 that impacts the analysis scoring for the companies of the sector has been identified to date.

658 **7.3. Trend scoring**

659 Scoring shall be performed in compliance with the ACT Framework.

660 To apply the trend scoring methodology presented in the ACT Framework, the analyst should identify the
 661 trends from the existing data infrastructure based on the data points and/or indicators that can indicate
 662 the future direction of change within the company.

663 The table below includes an overview of which indicators/data points could possibly have valuable
 664 information about future directions for the BC sector.

665 *Table 2 Relevant performance indicators for trends identification for the BC sector*

Module	Indicator
Targets	BC 1.1 Alignment of own buildings reduction targets
	BC 1.2 Alignment of new buildings delivered (use phase) reduction targets
	BC 1.3 Alignment of renovated buildings (use phase) reduction targets
	BC 1.4 Alignment of new buildings (materials) reduction targets
	BC 1.5 Time horizon of targets
Sold product performance	BC 4.1 Alignment of carbon performance trend related to new delivered buildings (use phase)
Management	BC 5.4 Low-carbon transition plan
	BC 5.5 Climate Change Scenario testing

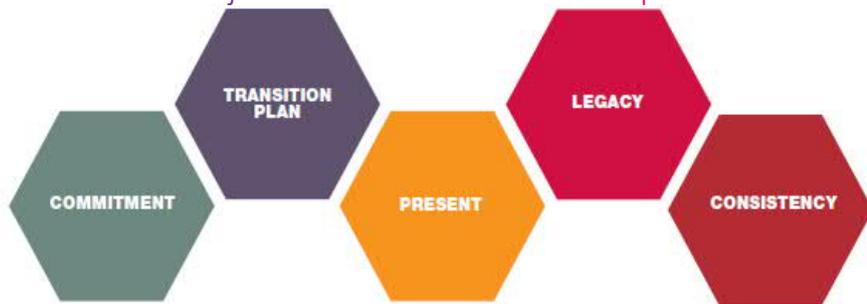
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667 **8. Aligned state**

668 The table below presents the response of a low-carbon aligned company of the sector to the 5 questions
669 of ACT:

670 The company discloses a
671 transition plan that details a
672 growing share of low-carbon
673 buildings and operation steps
674 to achieve their objectives.

A trend is evident of lowering emissions
intensity of delivered buildings and
developing renovation projects. The
company achieved this decrease through
deliberate operational decisions.



684 The company has science-
685 based targets on every
686 dimension of the building:
687 materials, use phase and
688 renovation. These objectives
689 are aligned with a relevant
time horizon which reflects
the lifetime of a building.

The company is currently
investing in R&D project
related to low-carbon
technologies and deploying
a strategy to increase the
sales of low-carbon
buildings' research.

The company's targets, transition
plan, present action and past legacy
show a consistent willingness to
achieve the goals of low-carbon
transition. The company publicly
supports more stringent standards
and emissions disclosure
improvement.

690

691 **9. Sources**

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- 705

706 **10. Glossary**

707 Commercial or services building: buildings that are used for commercial or services purposes, and include
708 for ACT methodology office buildings, hotels, and retail buildings.