ACT

SECTOR METHODOLOGY

Assessing low-Carbon Transition

Chemicals

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1. Introduction

The 2015 United Nations Climate Change Conference (COP21) in Paris further strengthened the global recognition of limiting dangerous climate change. Political agreement was reached on limiting warming to well below 2 degrees above pre-industrial levels. The Assessing low-Carbon Transition (ACT) initiative measures a company's alignment with a future low-carbon world. The goal is to drive action by companies and encourage businesses to move to a low-carbon pathway with regards to their climate strategy, business model, investments, operations and GHG emissions management. The general approach of ACT is described in the ACT Framework document (1). A company's public expression of short, mid and long-term emissions reduction targets is considered as a demonstration of a "willingness" (or commitment) to transition that is then compared with a specified low-carbon transition scenario that depends on the sector of activity considered (e.g., the Sectoral Decarbonization Approach developed by the Science Base Targets initiative (SBTi)). This is then further assessed through a range of detailed indicators which the Framework provides, and sector methodologies detail. The ACT methodology is not explicitly aligned with the TCFD guidelines (2), but they are complementary and have a common goal: to help companies to manage their risks related to climate change and support them to identify opportunities provided by the shift towards a low-carbon business model.

The chemicals sector: a large diversity of actors and products

The chemicals sector is a pillar of the current world economy. It aims to convert raw materials such as oil & gas products, minerals, metals or water into thousands of end products. Different categories exist within the sector as stated within the NACE code 20: industrial inorganic chemicals; plastics and synthetics; drugs; soap, cleaners, and toilet goods; paints and allied products; industrial organic chemicals; agricultural chemicals; and miscellaneous chemical products.

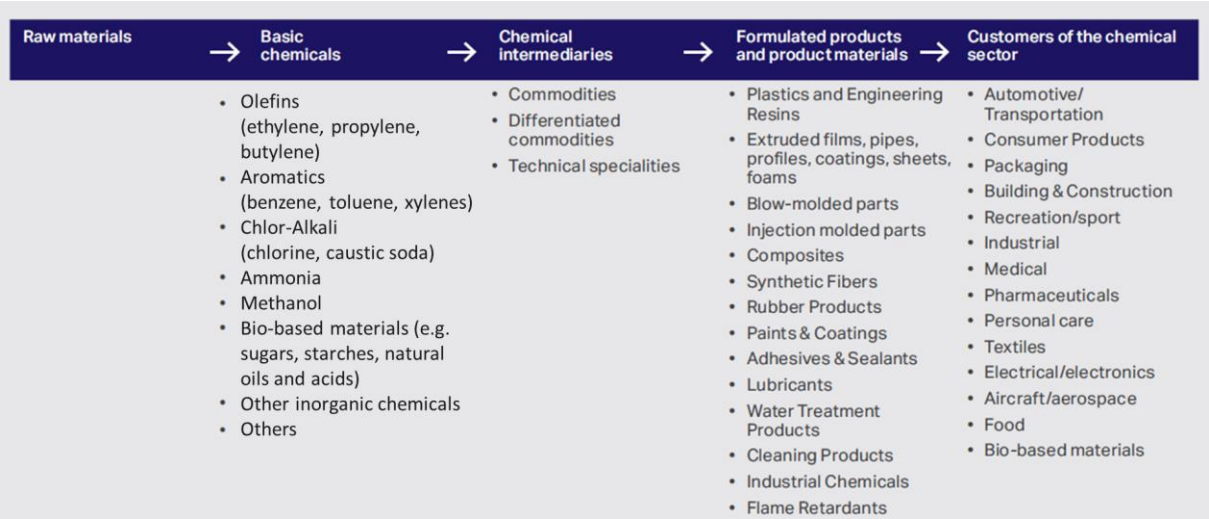


FIGURE 1: CHEMICALS SECTOR VALUE CHAIN (3)

A major challenge in the ACT Chemicals Methodology is to create a relevant assessment method that is applicable to the major emitters within the chemicals industry despite the high number of products that exist. Because of this, it has been chosen to reduce the scope of the methodology in order to keep it relevant to most critical chemical companies from a decarbonization perspective (see section 3.2). In addition, particular attention is needed if one aims at comparing scores obtained by companies assessed by the ACT Chemicals Methodology. Indeed, various products and dedicated processes are encompassed within the sector, meaning strict comparison of different company profiles is tricky and may be limited in its usefulness.

Statistics of the sector

The chemicals sector accounts for 18% of the emissions from heavy industries, which amounts to 1.5 $GtCO_2$ scope 1 worldwide (4), which corresponds to about 4% of global CO_2 emissions (4).

Direct CO_2 emissions from the production of seven primary chemicals (ammonia, ethylene, propylene, BTX, chlorine, methanol and hydrogen) amounted to 925 $MtCO_2$ in 2021, a 5% increase from the previous year, which was driven by growth in production (5). The chemicals industry is not the most emissions intensive industry in terms of direct CO_2 emissions: it ranges third behind the cement and the iron & steel industries. However, the chemicals sector is the largest industrial energy consumer - accounting for 15% of total primary demand for oil on a volumetric basis and 9% of gas demand (6). This is largely because around half of the chemical sector's energy input is consumed as feedstock – where fuel is used as raw material input rather than as a source of energy. Hence the chemicals industry would be the most emissions intensive industry if feedstock were to be considered as an emission.

In 2019, the amount of chemicals produced in the world reached 2 Gt with the main products being ammonia (9.3% of production, 185 Mt/year), ethylene and propylene (12.8% of production, 255 Mt/year), BTX (5.5% of production, 110 Mt/year), chlorine (3% of production, 60 Mt), methanol (5% of production, 100 Mt/year) and hydrogen (3.5% of production, 70 Mt/year). Energy demand from the chemicals sector is projected to increase by half by 2050, according to the IEA (4).

Levers to decarbonize the sector

Since the chemicals sector is highly complex and encompasses very different actors both in terms of size, activities and end products, various solutions are available to decrease the GHG emissions of the sector. Each of these solutions are not applicable to all activities. The ACT Chemicals Methodology has been designed to take into account relevant levers of decarbonization for each assessed company, which are:

- Switch to renewable sources of energy for chemical processes
- Alternatives to fossil fuels feedstocks
- Circular economy practices
- Energy efficiency
- Carbon capture, use and storage (CCU and CCS) technologies

This document introduces the ACT Chemicals Methodology. The assessment methodology is composed of 9 performance modules, with quantitative indicators (GHG emissions performance, etc.) and qualitative ones (supplier engagement, management practices, etc.), as well as a narrative and trend assessment (see the ACT Framework for more details (1)). A pilot (roadtest) phase has been carried out with 13 voluntary companies and 2 companies assessed based on public data. The methodology has thus been tested with real company data, and feedback from analysts and companies' representatives has been collected and integrated to improve the methodology's content and make it more operational[1].

[1] See the dedicated Roadtest report on ACT website: Publications – actiniative.org (actinitiative.org)

2. Principles

The selection of principles to be used for the methodology development and implementation are explained in the general ACT Framework. Table 1 recaps the principles that were adhered to when developing the methodology.

TABLE 1: PRINCIPLES FOR IMPLEMENTATION

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 well-below 2°C maximum global warming and pursuing efforts to limit the temperature increase to 1.5°C (compared to pre-industrial levels).
CONSISTENCY - Whenever time series data is used, it should be comparable over time.
LONG-TERM ORIENTATION - Enables 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.

3. Scope

3.1. SCOPE OF THE DOCUMENT

This document presents the ACT assessment methodology for the chemicals sector. It includes the rationales, definitions, indicators and guidance for the sector-specific aspects of performance, narrative and trend scoring. It was developed in compliance with the ACT Guidelines for the development of sector methodologies, which describe the governance and process of this development, as well as the required content for such documents (7). It is intended to be used in conjunction with the ACT Framework, which describes the aspects of the methodology that are not sector specific (1).

3.2. SCOPE OF THE SECTOR

CHEMICALS SECTOR VALUE CHAIN

The core activities of the chemicals sector can be divided into three main steps of the value chain: upstream, midstream and downstream. Beyond those steps, the chemicals value chain strongly relies on the oil & gas and mining sectors (Figure 2). Companies can be more or less integrated along the sector's value chain, which contributes to the complexity of evaluating such a diverse sector.

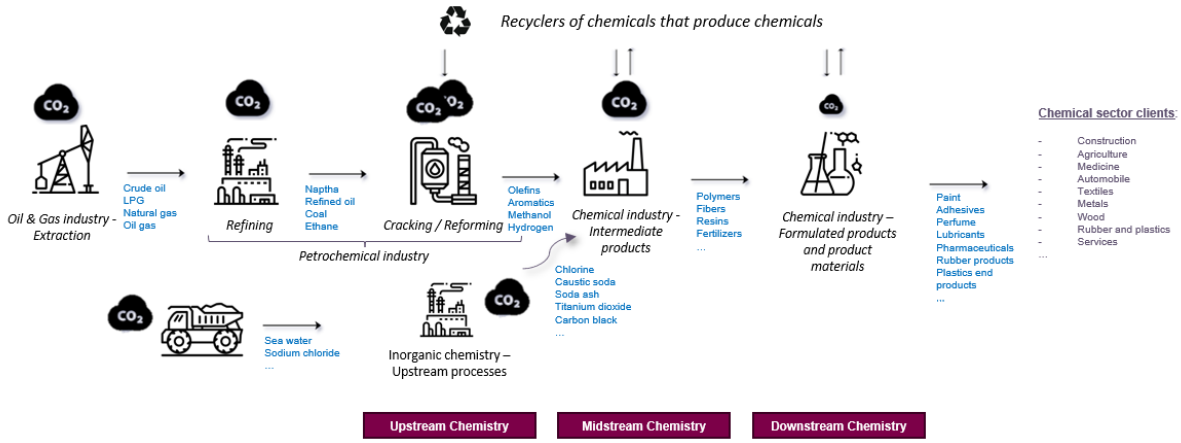


FIGURE 2 – CHEMICALS SECTOR VALUE CHAIN ILLUSTRATION

As mentioned in the introduction, the chemicals sector accounts for 4% of global CO_2 emissions[2].

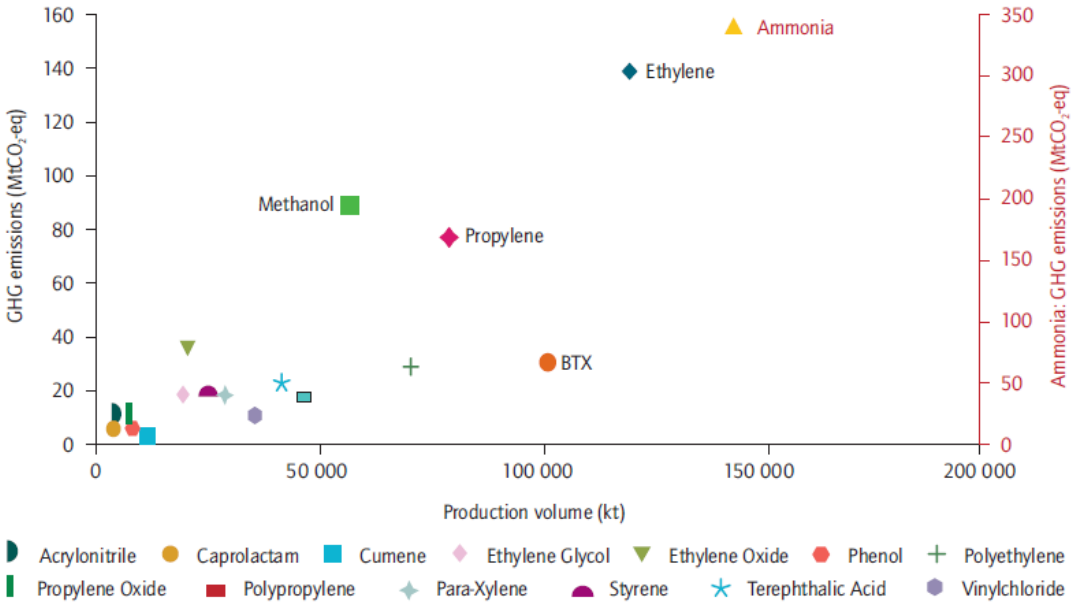
On the upstream side of the value chain of the chemicals sector there are a few main chemicals often referred to as 'primary' chemicals that are directly produced from the exploitation of natural resources (mining, fossil fuel extraction, air/water treatment, etc.). These chemicals come from both petrochemistry and inorganic chemistry (8).

[2] Considering annual global CO_2 emissions to be 36.44 Gt (2019), data from https://ourworldindata.org/co2-emissions

Petrochemistry corresponds to the transformation of crude oil and natural gas into raw materials, the main outputs of which are[3]:

- **Ethylene, propylene, butadiene and BTX** (benzene, toluene and xylenes, which are aromatic compounds) mainly resulting from naphtha cracking or fluid catalytic cracking. This group of chemicals is often referred as 'High-Value Chemicals' (HVC). These chemicals are mainly used as precursors for polymers (9) (polyethylene, polypropylene) or secondary chemicals (styrene, cumene, terephthalic acid, etc.).
- **Ammonia**, **methanol** and **hydrogen**[4] mainly resulting from natural gas reforming. Ammonia is the basis of a high share of the fertilizers used worldwide, methanol is mainly used for fuels, and hydrogen is a reagent to produce ammonia and methanol and appears today as a potential key-element to decarbonize many sectors as a vector for energy transportation and storage.

Direct CO_2 emissions from the production of seven primary chemicals[5] (mentioned above, excluding butadiene and hydrogen) amounted to 880 $MtCO_2$ in 2018, a nearly 4% increase from the previous year, which was driven by growth in production.



Note: GHG emissions for olefins in this figure represent that of the steam cracking process. Ammonia is presented on a different axis on the right.

FIGURE 3: GLOBAL GHG EMISSIONS AND PRODUCTION VOLUME OF MAIN CHEMICALS, 2010 (8)

Hydrogen is a specific chemical used as input for the production of several primary chemicals, notably as an energy vector for transportation, and also as an energy storage and for the desulphurization of petroleum products in refineries. The production of hydrogen was over 70Mt of pure hydrogen in 2018 (10) but due to its high expected role in the energy transition its production is expected to skyrocket to 550 Mt of pure hydrogen by 2050 (11).

Inorganic chemistry refers to the chemical transformation of mineral raw material. It produces a wide range of products. Due to high emissions intensity and volumes of production, **chlorine** has the highest overall

[3] Various processes can be used to obtain some of these primary chemicals, the main ones are described here.

[4] In this report, "hydrogen" is used to refer to hydrogen gas H_2 (not the isolated H atom).

[5] Ammonia, ethylene, propylene, BTX, methanol.

associated emissions within inorganic chemistry with around 106 $MtCO_2e$[6]. It is used as a raw material to obtain a large range of chemicals and products, amongst which is polyvinyl chloride (PVC), one of the most common polymers. The other main inorganic chemicals (12) are **caustic soda**, **carbon black**, **titanium dioxide**, **silicon**, **soda ash** and **sulfuric acid**.

These inorganic chemicals are either carbon intensive, produced in very large amounts, or both. Other inorganic chemicals may be produced in large amounts or may have high carbon intensities, but are not accounted for as the primary chemicals on which the ACT Chemicals Methodology relies because they are derived from one of the primary chemicals mentioned above, and as such are not directly produced through the processing of fossil resources or minerals.

On the one hand, two of the main inorganic chemicals identified are produced in large amounts: the global annual production of sulfuric acid is more than 200 Mt (13), and that of soda ash is over 50 Mt (14). Both have relatively low carbon intensities of around 0.2-1 tCO_2e/t (15). On the other hand, the other main inorganic chemicals (carbon black (16), titanium dioxide (17) and silicon (18)**)** have lower production volumes, with global production of around 10 Mt. However, these have high carbon intensities of around 10 tCO_2e/t each.

ACTIVITIES INCLUDED IN THE SCOPE OF THE SECTOR

Since the entire chemicals sector relies on these several primary chemicals and since they are extremely carbon intensive (covering more than two thirds of the direct emissions of the entire sector), they are given a particular focus in the ACT methodology.

Hence, the ACT methodology focuses on **companies producing at least one of the following chemicals (corresponding to the 'upstream chemistry' from** Figure 2**)**:

- Ethylene*
- Propylene*
- Butadiene
- BTX* (Benzene, Toluene, Xylenes)
- Methanol*
- Hydrogen*
- Ammonia*
- Chlorine*
- Caustic soda
- Carbon black
- Titanium dioxide
- Silicon
- Soda ash
- Sulfuric acid

(*): sectoral pathway available to use the Sectoral Decarbonization Approach (SDA).

In order to be assessed, companies shall disclose the share of their scope 1+2 emissions attributable to each primary chemical*, referred as P*, for which a sectoral pathway is available. Scope 1+2 emissions for other chemicals they produce shall be aggregated. If the company does not have details on the split of its scope 1+2 emissions per chemical, then its overall scope 1+2 emissions will be used for a simpler assessment (poor data quality being reflected in the ACT narrative scoring).

[6] A corrective ratio has been applied since the DECHEMA study considers a global electricity carbon footprint of 558 gCO_2/kWh, whereas the most recent value (2019) obtained from IEA is 475 gCO_2/kWh.

Example: If the assessed company exclusively produces two products P1 and P2, then it shall inform the share of emissions induced by each of the products. If the process is the same for both products, then the weight share per product (X% for P1 and Y% for P2, with X%+Y%=100%) can be used as a proxy for the allocation of emissions.

If the company is eligible (i.e., it produces at least one of the main chemicals mentioned above), the whole company portfolio of products is assessed thanks to two GHG emissions allocation methods: the **Sectoral Decarbonation Approach** (SDA) when possible, or the **Absolute Contraction Approach** (ACA) otherwise[7].

NACE CODES

Companies which activity falls into one of the NACE codes below may be in scope of the methodology if it produces at least one of the chemicals listed above:

- Manufacture of industrial gases [NACE – 20.11]
- Manufacture of dyes and pigments [NACE – 20.12]
- Manufacture of other inorganic basic chemicals [NACE – 20.13]
- Manufacture of other organic basic chemicals [NACE – 20.14]
- Manufacture of fertilizers and nitrogen compounds [NACE – 20.15]
- Manufacture of plastics in primary forms [NACE – 20.16]
- Manufacture of pesticides and other agrochemical products [NACE – 20.20]

The following activities, which are related to the chemicals value chain, are **not included** in the scope of the ACT methodology for this sector:

- Synthetic rubber fabrication [NACE – 20.17]
- Paint fabrication [NACE – 20.30]
- Soap and cleaner products fabrication [NACE – 20.41]
- Perfume and other beauty products fabrication [NACE – 20.42]
- Explosive products fabrication [NACE – 20.51]
- Adhesive products fabrication [NACE – 20.52]
- Essential oil fabrication [NACE – 20.53]
- Other chemical products fabrication [NACE – 20.59]
- Artificial fibers and synthetics fabrication [NACE – 20.60]
- Manufacturing of refined petroleum products [NACE – 19.20]
- Manufacture of basic pharmaceutical products and pharmaceutical preparations [NACE – 21]
- Manufacturing of rubber and plastics products [NACE – 22]
- Mining and quarrying [NACE – 05-09]
- All manufacturing NACE codes except for those mentioned

RATIONALE FOR ACTIVITIES NOT INCLUDED

The scope of the methodology is defined to focus on companies which are the highest emitters but also have the most potential levers to reduce the emissions of the chemicals sector. As a result, the following activities are not included in the ACT Chemicals Methodology:

- NACE – 19.20, *Manufacturing of refined petroleum products* is partly covered by the ACT Oil & Gas Methodology for what accounts for energy outputs of the oil & gas industry, the other products can be accounted for using the ACT Generic Methodology. Indeed, refined petroleum products are not part of the chemicals industry.
- NACE – 20.30 to 20.60: the ACT Chemicals Methodology only focuses on the most material activities regarding GHG emissions. The manufacture of these downstream chemical products does not

[7] See Section 6.1 for more details.

represent a high share of the sector's GHG emissions. The ACT Generic Methodology can be used to assess the production of these downstream chemicals.

- NACE – 21, *Manufacture of basic pharmaceutical products and pharmaceutical preparations*, are excluded due to their low share of sectoral emissions[8] and to the high variety of products and processes (which would require multiple specific decarbonization pathways).
- NACE – 22, *Manufacturing of rubber and plastics products*, as such activities are more related to engineering than to the chemicals sector.

Extraction and mining of raw materials are covered by other ACT methodologies (i.e., ACT Oil & Gas and ACT Generic). As much as separating these activities from the rest of the chemicals sector is acknowledged to be difficult, mining activities are not covered because the processes are extremely different to chemical production processes.

[8] Pharmaceuticals industry globally emits every year about 52 MtCO2e (https://www.logmore.com/post/pharma-industry-carbon-footprint), i.e., 3-4% of the chemicals industry emissions.

4. Boundaries

4.1. REPORTING BOUNDARIES

In order to cover relevant emission sources and to facilitate the data collection on the companies' side, the ACT methodology focuses on the main sources of GHG emissions throughout the value chain.

TYPES OF GREENHOUSE GAS CONSIDERED

The chemicals sector emits different kinds of greenhouse gas. In 2010, CO_2 accounted for over three quarters of the overall chemicals sector emissions on a global scale (see Table 2). As technologies and practices reducing the emissions of powerful GHGs are spreading across the globe, this ratio is likely to keep increasing: in the EU, CO_2 now accounts for over 95% of the sectoral emissions (19). As a consequence, CO_2 is the most important contributor that should be captured by the ACT methodology.

TABLE 2 : WEIGHT OF THE DIFFERENT GHGS IN THE CHEMICALS SECTOR'S EMISSIONS, SOURCE: IPCC 5TH REPORT (20)

Greenhouse Gas	2010 Emissions Mt CO_2e	Share (%)
CO_2	1159	76%
HFC	207	14%
N_2O	140	9%
SF_6	12	1%
CH_4	5	< 1%

The literature review did not reveal a robust and globally accepted sectoral benchmark for the non-CO_2 emissions of the chemicals sector. As a consequence, the emissions reduction pathways calculated thanks to the SDA will only cover CO_2 emissions. When the ACA is applied, all relevant non-CO_2 emissions will be considered.

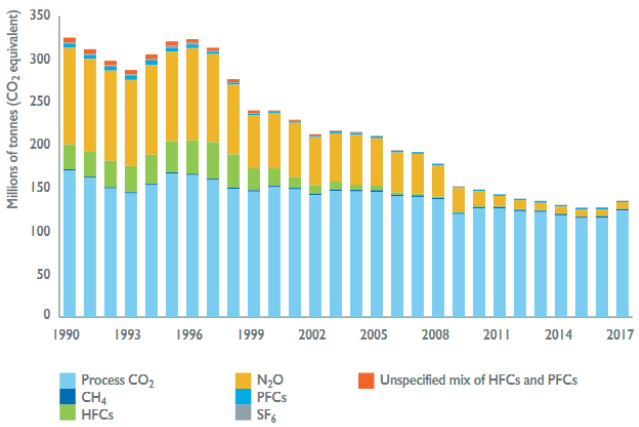
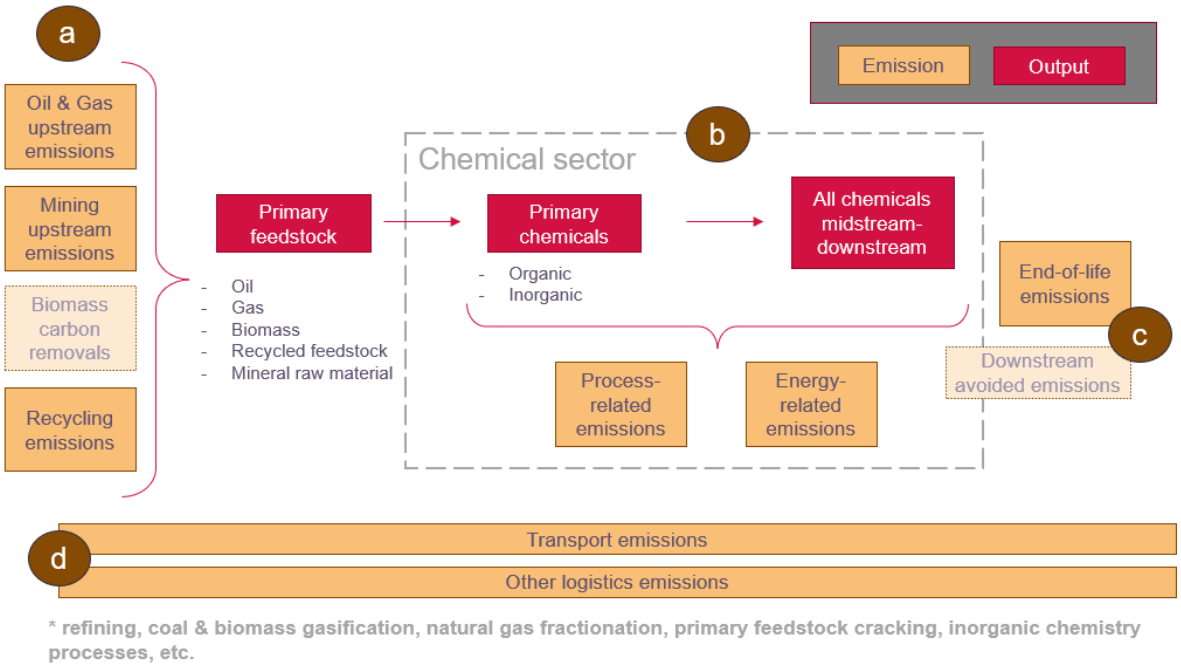


FIGURE 4: HISTORIC EMISSIONS FOR ALL GHG FOR THE EU28 CHEMICALS SECTOR. (19)

EMISSION ALLOCATION AMONG CHEMICALS

For processes leading to various chemicals, the allocation of scope 1+2 emissions is inspired by the European Commission's Joint Research Centre (JRC) work (15), meaning that these emissions are distributed considering the weight of chemicals produced.

DESCRIPTION OF THE EMISSIONS



* refining, coal & biomass gasification, natural gas fractionation, primary feedstock cracking, inorganic chemistry processes, etc.

FIGURE 5: EMISSIONS WITHIN THE CHEMICALS SECTOR

Four broad categories of emissions can be distinguished:

1. **Upstream**: the upstream emissions from feedstock production result from the production of the primary feedstocks that enter the chemicals sector (considering both organic and inorganic chemistry): oil, gas, coal, biomass, raw elements from mining activities, or secondary raw material. Those upstream emissions are very different depending on the type of primary feedstock and the technical route selected to produce it:
    - *Oil & Gas upstream emissions* cover the emissions resulting from exploration, production and supply of fossil hydrocarbons, including the methane leakage associated.
    - *Mining upstream emissions* cover the emissions due to the mining sector to generate and possibly already partially process the raw materials it supplies. The mining subsectors considered here relate, but are not limited, to coal mining and mining of basic components of inorganic chemistry.
    - *Biomass carbon removals* relate to the negative emissions the bio-sourced carbon sinks can foster. As the biomass grows, it contributes to capture and stock carbon from the atmosphere into the biomass. The rate of carbon absorption depends on complex processes that evolve over time, but also whether the biomass is sustainably grown or not.
    - *Recycling emissions* are the direct emissions related to the mechanical or chemical processes that transform end-use products or intermediary products into secondary raw materials that can be fed as feedstock for the chemicals sector.
2. **Within the chemicals sector**, what corresponds to scope 1+2 emissions is:
    - *Energy-related emissions* come from fuel combustion for heat, steam and cooling generation as well as electricity consumption throughout the company activity.

- *Process-related emissions* are specific to the chemicals sector as they emerge from the very chemical reactions the company carries out throughout its activities. For instance, in steam methane reforming followed by water-gas shift, CO_2 is naturally formed from the overall chemical reaction: $CH_4 + 2\ H_2O$ à $CO_2 + 4\ H_2$. Note that chemical processes may also use CO_2 as a feedstock triggering negative emissions.

Two cases are to be differentiated:

- *The emissions linked to the production of primary chemicals (the first elements of the chemicals sector value chain), for which the feedstocks are elements gotten outside of the value chain*
- *The emissions linked to the production of midstream-downstream chemicals, for which the feedstocks are the primary chemicals*

3. Downstream

- *End-of-life emissions:* When end-use products are manufactured and delivered at the end of the value chain, they can cause direct or indirect *End-of-life emissions*. For instance, nitrogenous fertilizers, derived from ammonia, are responsible for nitrous oxide (N_2O, a greenhouse gas exhibiting a high Global Warming Potential) emissions once used in agriculture.
- *Avoided emissions* (21)[9]: The chemicals sector can also enable *Avoided emissions* further down the value chain. Those are not emissions *per se* but they represent a "positive" climate impact. Avoided emissions are related to the use-phase of a product (good or service) and are estimated by comparison to a baseline. For instance, a new additive in tires can decrease the fuel consumption of a vehicle: compared to the case where it does not exist, the additive enables fuel savings (thus reduced GHG emissions) while the car is used.

4. Logistics

- *Transport emissions* are scope 3 emissions occurring all along the value chain from the freight emissions to transport the feedstock, chemicals and end-use products from one place to another.
- *Other logistics emissions* cover all other kind of logistics emissions that can occur within the value chain, such as refrigeration needs (e.g., for the transport of ammonia).

SETTING THE BOUNDARIES

Two different cases are to be differentiated:

1. Emissions that are **included** in the boundaries of ACT Chemicals Methodology
2. Emissions that are **excluded** from the boundaries of ACT Chemicals Methodology.

To assess a company in the ACT methodology for the chemicals sector, Table 3 summarizes the categories of emissions that will be taken into account:

[9] WRI - Estimating and reporting the comparative emissions impacts of products – 2019: "The greenhouse gas (GHG) emissions impact of a product (good or service), relative to the situation where that product does not exist. The differences may be either negative or positive. Positive differences are frequently called avoided emissions…"

TABLE 3: EMISSION BOUNDARIES OF THE ACT CHEMICALS METHODOLOGY

Upstream emissions	Feedstock production	Included (1)
Chemicals sector scope 1 & 2 emissions	Energy-related emissions	Included (1)
	Process-related emissions	Included (1)
Logistics emissions	Transport emissions	Excluded
	Other logistic emissions	Excluded
Downstream emissions	End-of-life emissions	Included (2)
	Avoided emissions	Included (2)

(1): The emissions can be assessed and compared with a quantitative emissions reduction pathway (see Section 1376.1 for more details).

(2): These emissions will be assessed directly or indirectly, but will not be compared to a quantitative emissions reduction pathway.

4.2. RATIONALE

Inclusion/exclusion relates to the boundaries of emissions reduction pathways that are used within the ACT Chemicals Methodology (see Table 3).

a. Inclusion of the feedstock production upstream emissions

Low-carbon feedstock alternative was identified as a powerful lever to reduce the overall footprint of the chemicals sector, by substituting carbon-intensive fossil feedstock (oil, gas and coal) with bio-sourced or other relevant alternative feedstocks. The choice of feedstock is considered in the ACT assessment.

However, the emission factor of the bio-sourced feedstock largely depends on the carbon removal potential of the biomass. International standards recommend to account for carbon sinks separately, and exclude emissions from bio-sourced feedstock from carbon inventories (ISO 14064-1 standard, GHG Protocol, BEGES, etc.). Furthermore, there is currently no unanimously recognized point of reference for biogenic emissions. As a result, carbon removals from biomass will be considered separately from other emission sources, and will be assessed in separate indicators.

As sectoral decarbonization pathways for these feedstocks do not exist, a company's emissions from the production of other non-biomass feedstocks (recycled feedstock, fossil feedstock and inorganic feedstock) will be compared to an absolute contraction benchmark (see section 6.1 for more details). Besides, all the feedstock production emissions will be considered within the ACT assessment through various indicators assessing the share of the different feedstock used.

b. Inclusion of the chemicals sector scope 1+2 emissions

Emissions resulting from the players' own processes shall obviously be included, as the company has direct levers to reduce them. These emissions are:

- The process-based emissions (from chemical reactions, other emissions ensuing from the processes, etc.); and
- The energy-related emissions:
  - direct energy-related emissions with heat, cooling and steam generation.[10]
  - indirect with electricity consumption or other energy consumption.

Most of the emissions for the chemicals sector come from the production of primary chemicals: the sole production of ammonia, ethylene, propylene, BTX and methanol account for 60% of the whole sector emissions (4). With the addition of chlorine and hydrogen generation, almost 70% of the sector's emissions that come from chemical upstream activities, processing primary feedstock into 'primary' chemicals , are covered.

A company's scope 1+2 emissions will be used to calculate an emissions intensity per product which will be compared when possible to a specific emissions intensity reduction benchmark, otherwise absolute emissions are compared to an absolute contraction benchmark (see Section 6.1 for more details).

c. Exclusion of the downstream emissions

From a methodology perspective, avoided emissions cannot be added to "real" emissions. Because there is currently no internationally recognized standard addressing calculation of avoided emissions, these are not directly taken into account in the ACT assessment[11]. However, 'enabling activities'[12] are acknowledged within Module 9: *Business model*. Besides, the ACT narrative score will assess the motivation and credibility of communications and claims from companies regarding avoided emissions (but not the performance itself).

End-of-life emissions highly depend on the chemicals and end-use products considered. Some products may have significant end-of-life emissions (such as nitrous fertilizers generating nitrous monoxide while used in agriculture), while some others do not emit any GHG emissions during their end-of-life. It is then relevant to consider these emissions qualitatively or quantitatively at some point in the ACT assessment. This may be challenging as a wide typology of products and usages exist.

For companies producing primary chemicals, the emissions reduction pathway (when available, see section 3.2) is obtained thanks to scenarios that do not cover these scope 3 emissions[13], hence downstream emissions will not be quantitatively calculated. Besides, while they represent a significant share of GHG emissions throughout the value chain, downstream emissions are not widely assessed by chemical companies. For instance, the main standard for GHG accounting in the chemicals sector indicates that the accounting of emissions from the processing of sold products is not mandatory, "since reliable figures are difficult to obtain due to the diverse application and customer structure" (22). The consideration of these emissions will be made throughout the ACT assessment with various qualitative indicators.

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[10] When operated directly by the company, transportation activities also fall into scope 1+2 emissions. Since they do not represent a significant share, they are not taken into account in ACT Chemicals Methodology.

[11] See ACT technical note on this topic (publication end of April 2021)

[12] Definition of **enabling activities** from the EU taxonomy: "Economic activities that, by provision of their products or services, enable a substantial contribution to be made in other activities. For example, an economic activity that manufactures a component that improves the environmental performance of another activity."

[13] See Section 6.1 for more details about low-carbon pathways used to assess companies.

d. Exclusion of the logistics emissions

Emissions from the transport and logistics emissions are insignificant compared to the feedstock and process emissions in the chemicals sector. A literature review carried out for the ACT Chemicals Methodology highlighted that the emissions from transport and logistics are usually not taken into account in this sector. LCA studies about primary chemicals for which the emissions resulting from transport are quantified indicate that they represent less than 1% of the whole emissions for chlorine and ammonia (23) and less than 5% for ethylene (24), which backs the assumption that the share of emissions from transport is negligible and can be excluded from the boundaries.

Some transport emissions of the initial feedstocks (oil, gas, coal, biomass, secondary raw material) are often not distinguished from the upstream emissions in LCA studies. In the case of biomass, the transport distance and weight involved can be quite significant. However, this information will be taken into account through indicators looking at upstream emissions (all emissions required to bring the primary feedstock to the chemicals sector).

Considering these low emission levels and the limited levers a chemical company may have on the transport and logistics emissions all along the value chain, these emissions will not be covered in the ACT assessment boundaries.

5. Construction of the data infrastructure

5.1. DATA SOURCES

In order to carry out a company level assessment, many data points need to be gathered by sourcing from various locations. Principally, ACT relies on the voluntary provision of data by the participating companies. Besides, external data sources are consulted where this would streamline the process, ensure fairness, and provide additional value for checking, validation and preparation of the assessment narrative.

The low-carbon scenarios used as benchmarks for the quantitative indicators come from external sources and are detailed in the section 6.1. They may need to be updated in the future, according to the latest methodological developments of the scenarios.

5.2. COMPANY DATA REQUEST

The data request will be presented to companies in a comprehensive data collection format. The following data will be requested (some data being relevant to specific chemicals only):

Data requested to the company
GHG emissions (on scopes defined in the quantitative indicators from the modules 1, 2 and 4) per primary chemicals and per scope
Activity data
Reduction targets (absolute and intensity)
Low-Carbon CAPEX
Data related to energy management, including electricity and heat
R&D spending in low-carbon technologies
Low-carbon Patenting Activity
Share of low-carbon / alternative feedstocks
Yield of inorganic chemistry processes and monitoring
Environmental policy and details regarding governance

Management incentives
Scenario testing
Consideration of internal carbon pricing
List of environmental/CSR contract clauses in purchasing & suppliers' selection process
List of initiatives implemented to influence suppliers to reduce their GHG emissions, green purchase policy or track record, supplier code of conduct
Client policy
List of initiatives implemented to influence client behaviour to reduce their GHG emissions
Company policy on engagement with associations, alliances, coalitions or thinktanks
Position of the company on significant climate policies (public statements, etc.)
List and turnover or invested capital (or other financial KPI) of activities in new businesses related to low-carbon business models
Current position and action plan of the company towards the identified low-carbon business models

5.3. PERFORMANCE INDICATORS

The performance indicators have been conceived following the main principles described in Table 1 from the "Principles" section of the methodology.

Note about maturity matrices:

ACT methodologies use maturity matrices which are scaled on five levels, from "Basic" (lowest level) to "Low-carbon aligned" (highest level). Each level is associated with a score, as highlighted in Table 4 below. Some performance indicators are based on maturity matrices with a single question (or "subdimension"), whereas other indicators are based on multi-subdimension matrices. In the latter case, each subdimension is associated with a weighting which is taken into account to calculate the overall indicator score.

TABLE 4: ACT MATURITY MATRICES LEVELS AND ASSOCIATED SCORES

Evaluation level	Basic	Standard	Advanced	Next practice	Low-carbon aligned
Score	0	25%	50%	75%	100%

Table 5 gives an overview of the Key Performance Indicators used in the ACT Chemicals Methodology. For further information (weight and rationale) for each indicator, see section 6.3.

TABLE 5: KEY PERFORMANCE INDICATORS OF ACT CHEMICALS SECTOR ASSESSMENT (SHOWING WHETHER INDICATOR RELATES TO PAST, PRESENT, FUTURE)

			Past	Present	Future
		1.TARGETS	CH 1.4 Historic ambition and company performance		
				CH 1.1 & CH 1.2 Alignment of scope 1+2 and scope 3 upstream emissions reduction targets CH 1.3 Time horizon of targets	
Core business performance	Investment	2. MATERIAL INVESTMENT	CH 2.1 Trend in past – Scope 1+2 emissions	CH 2.2 Trend in future - Scope 1+2 emissions CH 2.3 Locked-in emissions	
			CH 2.4 Low-carbon, mitigation and carbon removal technologies CAPEX share		
			CH 2.5 Energy management		
		3. INTANGIBLE INVESTMENT	CH 3.1 R&D spending in low-carbon, mitigation and carbon removal technologies CH 3.2 Company low-carbon patenting activity		
		4 SOLD PRODUCT PERFORMANCE	CH 4.1 Trend in past – Scope 3 upstream emissions	CH 4.3 Low-carbon Hydrogen as a feedstock CH 4.4 Alternative feedstocks for petrochemical-based products CH 4.5 Inorganic chemistry yield & valorization	
				CH 4.2 Trend in future - Scope 3 upstream emissions	
		5. MANAGEMENT		CH 5.1 Oversight of climate change issues CH 5.2 Climate change oversight capability CH 5.4 Climate change management incentives CH 5.6 Carbon pricing integration	CH 5.3 Low-carbon transition plan CH 5.5 Climate change scenario testing
Influence		6. SUPPLIER		CH 6.1 Strategy to influence suppliers to reduce their GHG emissions CH 6.2 Activities to influence suppliers to reduce their GHG emissions	
		7. CLIENT		CH 7.1 Strategy to influence customer behavior to reduce their GHG emissions CH 7.2 Activities to influence customer behavior to reduce their GHG emissions	
		8. POLICY ENGAGEMENT		CH 8.1 Company policy on engagement with associations, alliances, coalitions or thinktanks CH 8.2 Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions CH 8.3 Position on significant climate policies	
		9. BUSINESS MODEL		CH 9.1 Integration of the low-carbon economy in current and future business models	

TARGETS (WEIGHTING: 15%)

- **CH 1.1 ALIGNMENT OF SCOPE 1+2 EMISSIONS REDUCTION TARGETS**

DESCRIPTION & REQUIREMENTS

CH 1.1 ALIGNMENT OF SCOPE 1+2 EMISSIONS REDUCTION TARGETS

SHORT DESCRIPTION OF INDICATOR

A measure of the alignment of the company's scope 1+2 GHG emissions reduction targets with their low-carbon benchmark pathway. The indicator will compare the trend of company's target pathway to the trend of company's benchmark and thus identify the gap between both pathways at the target year, which is expressed as the company's commitment gap.

DATA REQUIREMENTS

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

- Targets information for each relevant scope 1+2 GHG emissions sources (target year, emissions reduction between reporting year and target year, target coverage). A single target should be considered for each chemical. If the company has set various targets for a given chemical, the one with the longest time horizon is preferred.
- Base year, emissions at base year

CDP Questionnaire 2023 mapping to this indicator:

- C4.1a
- C4.1b

External sources of data used for the analysis of this indicator are:

- Low-carbon scenario - background scenario data (IEA ETP 2020)

The benchmark indicators involved are:

TARGET TYPE	PRODUCT TYPE	METRIC	BENCHMARK
Scope 1+2 intensity emissions	Primary chemicals P* with available sectoral pathway (SDA)	tCO_2 / t primary chemical	IEA ETP 2020 - SDS

Scope 1+2 absolute emissions	Other chemicals (ACA)	tCO_2e	WB-2˚C - SBTi

- "tCO_2" corresponds to the emission of CO_2 related to the scope 1+2 of the company. The emissions are gross emissions, except for the case where CCS or CCU is implemented within operational scope and thus reduces the emissions released into the atmosphere.
- 'tCO₂e" corresponds to the emission of CO_2 equivalent related to the scope 1+2 of the company. The emissions are gross emissions, except for the case where CCS or CCU is implemented within operational scope and thus reduces the emissions released into the atmosphere.
- "t primary chemical" corresponds to the mass of chemicals produced in tons.

If the CO_2 emissions from operated joint ventures (JVs) are reported in the scope 1+2 by the company, they should be reported in this indicator as well.

How the assessment will be done

The analysis has two dimensions.

- Dimension 1 assesses the alignment of the company's near-term targets. Any target where the target year ≤ reporting year + 10 can be included in this dimension.
- Dimension 2 assesses the alignment of a company's long-term targets. Any target for which the target year > reporting year + 10 can be included in this dimension.
- The scoring rationale and calculation are the same for both dimensions.

The analysis is based on a trend ratio between the company's direct emissions target and the company benchmark. Trends are calculated between reporting year and the longest time horizon of the target.

The company's target pathway is the decarbonization over time, defined by the company's scope 1+2 emissions reduction target. To calculate it, a straight line is drawn between the starting point of the analysis and the company's target endpoint. The company benchmark pathway is the company-specific scope 1+2 emissions low-carbon benchmark pathway.

The company achieves the maximum score if the company's target pathway and the company benchmark pathway are aligned (commitment gap = 0) and also if the targets are covering most of the company's direct emissions at reporting year.

Please note that CCS or CCU projects are accounted for also if performed by another actor than the company assessed, for instance when CO_2 resulting from a chemical process is transferred to another company that will ensure its storage or reutilisation. As a consequence, the scope 1+2 emissions intensities of the company can be reduced from the GHG emissions that are captured and stored in a permanent way.

CALCULATION OF SCORE:

1) Trend ratio

The score is calculated by dividing the company engagement of reduction by the specific benchmark emissions reduction between the reporting year and the target year through the trend ratio:

$$Trend\ ratio = \frac{Company's\ target\ trend}{Benchmark\ pathway\ trend} = \frac{E_C(Y_T) - E_C(Y_R)}{E_B(Y_T) - E_B(Y_R)}$$

Where:

- $E_C(Y_T)$ is the company scope 1+2 emissions (absolute and intensity) at target year
- $E_C(Y_R)$ is the company scope 1+2 emissions (absolute and intensity) at reporting year
- $E_B(Y_T)$ is the benchmark scope 1+2 emissions (absolute and intensity) at target year
- $E_B(Y_R)$ is the benchmark scope 1+2 emissions (absolute and intensity) at reporting year

The commitment gap of the company is equal to (1- trend ratio). Thus, when the company's target pathway is aligned with the company's benchmark, the trend ratio is equal to 1 and the commitment gap is 0 (see Figure 6).

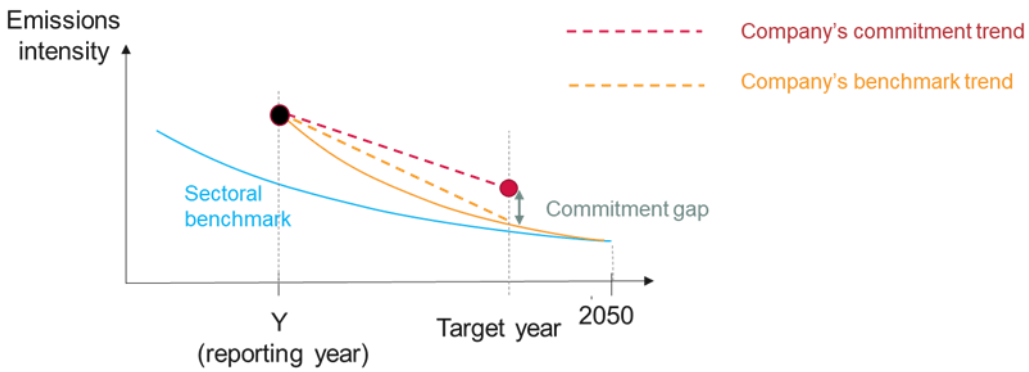


FIGURE 6: TREND RATIO AND COMMITMENT GAP (EXAMPLE WHERE SECTORAL PATHWAY IS AVAILABLE)

2) Final Score

The final score assigned to the indicator is calculated as follows:

Conditions	Score
$Company's\ target\ trend > 0$ Increase in company emissions (absolute or intensity)	0%
$Company's\ target\ trend \leq 0$ $0 \leq trend\ ratio < 1$ Decrease in company emissions (absolute r intensity) but company's commitment does not go beyond the company's benchmark ambition	$Trend\ ratio \times 100\%$
$Company's\ target\ trend < 0$	

$trend\ ratio \geq 1$ Decrease in company emissions (absolute or intensity) and company's commitment equals or exceeds the company's benchmark ambition	100%
$Company's\ target\ trend \leq 0\ and\ E_C(Y_R) < E_B(Y_T)$ No increase in company emissions (absolute or intensity) and company's emissions (absolute or intensity) is already below the company's benchmark ambition for the target year	100%

Targets that do not cover > 95% of direct emissions are not preferred in the calculations. If only such targets are available, then the score will be adjusted downwards in proportion with % coverage. If the target coverage of total company emissions at reporting year (C_{Yr}) represents less than 95%, the final score is equal to:

Final Score = Score x Target coverage of total company emissions (C_{Yr}))

If the company has set several targets, various cases can be encountered, depending on the availability of a sectoral emissions reduction pathway(s). The scoring rules are described in Appendix 11.3.

The final score for each dimension is given as the average score for all targets assessed within the timescale for each dimension. The two dimensions both account for 50% of the indicator.

RATIONALE

CH 1.1 ALIGNMENT OF SCOPE 1+2 EMISSIONS REDUCTION TARGETS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

Emissions reduction targets related to the scope 1+2 are included in the ACT Chemicals Methodology for the following reasons:

- Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.

- Targets are one of the few metrics that can predict a company's long-term plan 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.
- For the upstream part of the sector, direct emissions represent the highest share of emissions (1.4 $GtCO_2$ from direct emissions in the chemicals industry in 2019).

SCORING RATIONALE:

Targets are quantitatively interpreted and directly compared to a low-carbon emissions reduction pathway built from the company's current level of emissions at reporting year and converging toward the 2050 value, in the case where sectoral or sub-sectoral benchmark is available. Contraction of absolute emissions might be used to plot the emissions reduction pathway otherwise (leading to a time horizon that might differ from 2050).

Comparing the trends gives a direct measure of the commitment gap of the company. It was chosen for its relative simplicity in interpretation and powerful message.

The indicator is split into two dimensions to account for the importance of a company having targets which are aligned not just in the long-term but also in the near-term. The Science Based Targets initiative's Net Zero Standard requires companies to set both near-term and long-term science-based targets which are in line with 1.5-degree pathways. The justification for having both near- and long-term targets is explained in the Net Zero Standard: "Near-term targets galvanize the action required for significant emissions reductions to be achieved by around 2030. Near-term emissions reductions are critical to not exceeding the global emissions budget and are not interchangeable with long-term targets. […] Long-term targets drive economy-wide alignment and long-term business planning to reach the level of global emissions reductions needed to meet climate goals based on science." (12) The recent report by the United Nations Secretary-General's High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities (HLEG) also recommends setting both near-term and long-term targets (13).

NB: In previous ACT methodologies, the calculation was based on the difference between the company's target and the company benchmark 5 years after the reporting year. The analysis is now based on the difference between the company's target and the company benchmark at the target year (also in line with the SBT approach). The previous version assumed that the emissions reduction would be linear between reporting year and reporting year + 5, which could affect the result as the low-carbon pathway is not linear, the new version avoids this assumption by using directly data at target year.

DESCRIPTION & REQUIREMENTS

CH 1.2 ALIGNMENT OF SCOPE 3 UPSTREAM EMISSIONS REDUCTION TARGETS

SHORT DESCRIPTION OF INDICATOR

A measure of the alignment of the company's scope 3 upstream GHG emissions reduction targets with their low-carbon benchmark pathway. The indicator will compare the trend of company's target pathway to the trend of company's benchmark and thus identify the gap between both pathways at the target year, which is expressed as the company's commitment gap.

DATA REQUIREMENTS

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

- Targets information for each relevant scope 3 upstream GHG emissions sources (target year, emissions reduction between reporting year and target year, coverage). GHG emissions shall encompass at least:
  - Emissions from the production of feedstock
- Base year, emissions at base year

CDP Questionnaire 2023 mapping to this indicator:

- C4.1a
- C4.1b

The benchmark indicators involved are:

TARGET TYPE	BENCHMARK TYPE	METRIC	BENCHMARK
Scope 3 absolute upstream emissions	ACA	tCO_2e	WB-2˚C - SBTi

- "tCO_2e" corresponds to the emission of CO_2 equivalent related to the scope 3 upstream of the company. The emissions are gross emissions.

How the assessment will be done

The analysis is based on a trend ratio between the company's scope 3 upstream emissions target and the company benchmark. Trends are calculated between reporting year and the longest time horizon of the target.

The indicator is split into two dimensions with the same calculation as indicator 1.1 Alignment of scope 1+2 emissions reduction targets.

If the company has set several targets, various cases can be encountered, depending on the availability of a sectoral emissions reduction pathway(s). The scoring rules are described in Appendix 11.3.

Rationale

CH 1.2 Alignment of scope 3 upstream emissions reduction targets

Rationale of the indicator

Relevance of the indicator:

Emissions reduction targets related to the scope 3 upstream are included in the ACT Chemicals assessment for the following reasons:

- Targets are an indicator of corporate commitment to reduce emissions, and are a meaningful metric of the company's internal planning towards the transition.
- 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.
- The chemical companies cover a large range of activities in the sector, they take responsibility for the climate impact of chemical products at several points in the economic chain. The upstream of chemicals represents a high share of the sector's GHG emissions, mainly from the production of feedstock. Besides, the upstream part of the value chain is where most of decarbonization levers are, which explains why a dedicated target should be set for this source of emissions.
- As for the downstream part of the sector, while it represents a high share of emissions, the high diversity of downstream processes or use of the primary chemicals prevents companies from properly assessing the associated indirect GHG emissions.

Scoring rationale:

As per indicator 1.1 Alignment of scope 1+2 emissions reduction targets

- **CH 1.3 Time horizon of targets**

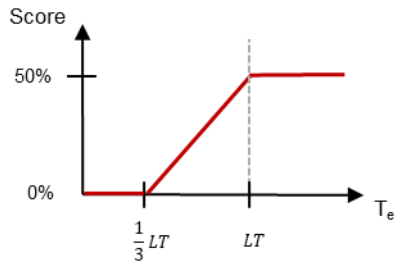
Description & Requirements	**CH 1.3 Time horizon of targets**
Short description of indicator	A measure of the time horizon of company targets. The ideal set of targets is forward-looking enough to include a long-time horizon that includes the majority of a company's asset lifetimes, but also includes short-term targets that incentivize action in the present.
Data requirements	The relevant data for this indicator are: ♦ Per target: Target year, and scopes or emissions sources covered by the target. Please include all company targets (target with the longest time horizon and all intermediate targets). CDP Questionnaire 2023 mapping to this indicator: ♦ C4.1a ♦ C4.1b
How the assessment will be done	The analysis has two dimensions: ♦ A comparison of: (a) the longest time horizon of the company's targets, and (b) the long-term point fixed by the ACT assessment methodology. ♦ 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 a relevant time horizon for the sector (LT) defined as 30 years after the reporting year which corresponds to a typical lifetime of assets in the chemicals sector (6). The company's target endpoint (T_e) is equal to the longest time horizon among the company's targets, minus the reporting year: $$T_e = Longest\ target\ time\ horizon - reporting\ year$$

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

$$Horizon\ gap = LT - T_e$$

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

HORIZON GAP	SCORE
$\boldsymbol{T_e} > LT$	50%
$\mathbf{33\%} * \boldsymbol{LT} < \boldsymbol{T_e}$ <Lt	$75\% * \frac{T_e}{LT} - 25\%$
$\boldsymbol{T_e} \leq \mathbf{33\%} * \boldsymbol{LT}$	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 to the following scoring table:

Intermediate target gap length	Score
All the gaps until T_e are equal or less than 5 years	50%
All the gaps until 80% of T_e are equal or less than 5 years	40%
All the gaps until 60% of T_e are equal or less than 5 years	30%

All the gaps until 40% of T_e are equal or less than 5 years	20%
All the gaps until 20% of T_e are equal or less than 5 years	10%
All the gaps of 5 years or less do not reach 20% of T_e or there is no such gaps disclosed by the company	0%

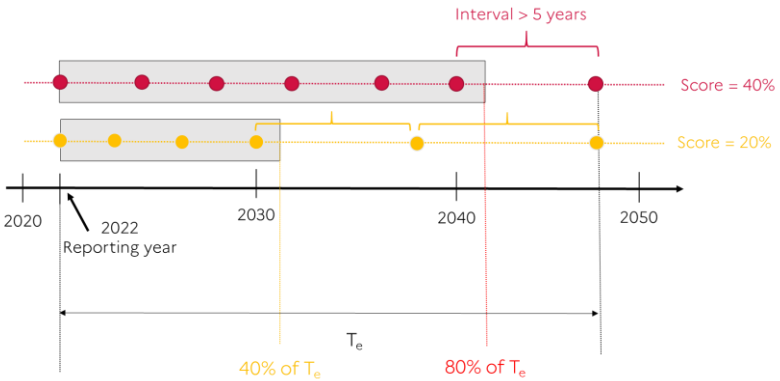


FIGURE 7 : EXAMPLES OF HORIZONS OF INTERMEDIATE TARGETS SET BY THE COMPANY AND CORRESPONDING SCORES ON DIMENSION 2 OF THE INDICATOR 1.4

AGGREGATED SCORE: DIMENSION 1: 50%, DIMENSION 2: 50%

FOR ALL CALCULATIONS:

- Targets that do not cover > 95% of emissions are not preferred in the calculations. If only such targets are available, then the score will be adjusted downwards in proportion with % coverage.

Rationale	**CH 1.3 Time horizons of targets**
Rationale of the indicator	**Relevance of the indicator:** The time horizon of targets is included in the ACT Chemicals Methodology for the following reasons: ♦ The target endpoint is an indicator of how forward-looking the company's transition strategy is. ♦ Aside from communicating long-term commitments, short-term action needs to be incentivized. This is why short time intervals between targets are needed. A 5-year interval is seen as a suitable interval to ensure company is taking enough action, holding itself accountable by measuring progress every 5 years. ♦ The very long expected lifetime of chemicals infrastructure means that chemical companies 'commit' a large amount of carbon emissions into the future through the assets owned today, which requires targets that have time horizons which align with this reality.

- **CH 1.4 Achievement of previous and current targets**

Description & Requirements	**CH 1.4 Achievement of previous and current targets**
Short description of indicator	A measure of the company's historic target achievements and current progress towards active emissions 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 relevant data for this indicator are: For each target set in the past 10 years: ♦ Base year ♦ Start year ♦ Target year ♦ Percentage of reduction target from base year in absolute emissions ♦ Percentage of reduction target achieved in absolute emissions ♦ Percentage of reduction target from base year in emissions intensity

- Percentage of reduction target achieved in emissions intensity
- Percentage of emissions covered by the targets
- Emissions of the company on the year the target was set

CDP Questionnaire 2023 mapping to this indicator:

- C4.1a
- C4.1b

How the assessment will be done

For the performance score, this indicator is assessed on two dimensions, whereby companies achieve the maximum score if:

Dimension 1: The company has achieved all previous emissions reduction targets with a target year in the past 10 years. If all past targets are indeed achieved, the highest score is obtained. If not, the achievement ratio a is calculated as follows:

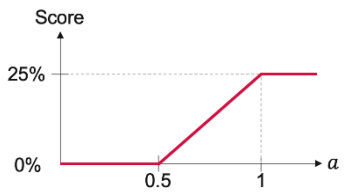
$$a = \frac{E(t_{ref}) - E(t_{horizon})}{E(t_{ref}) - T(t_{horizon})}$$

Where:

- $E(t_{ref})$ is the level of emissions of the company on the year the target was set
- $T(t_{horizon})$ is the target the company set (a given level of emission at a given horizon year, now past)
- $E(t_{horizon})$ is the effective level of emission reached by the company on the year of horizon of the target

A threshold is set for scoring at 0.5: if the company has achieved less than 50% of its own past target, it shall receive a zero score.

If the company has several past targets over the last 10 years, the ratio a shall be calculated for each target, and the average of all a ratio shall be kept for scoring. Below you can find a table summarizing the scoring for the first dimension of the indicator.

Achievement ratio	Score	
$a \geq 1$	25%	
0.5 < a< 1	25%*(2*a-1)	
a ≤ 0.5	0%	

DIMENSION 2: The company is currently on track to meet an existing emissions reduction target. The assessment is based on the progress ratio p:

$$p = \frac{a}{\%\ time}$$

a being defined in dimension 1 and the past time ratio $\%\ time$ defined as follows:

$$\%\ time = \frac{t_{ref} - t_{reporting}}{t_{ref} - t_{horizon}}$$

Where

- t_{ref} is the year during which the target was set
- $t_{reporting}$ is the reporting year
- $t_{horizon}$ is the year of horizon of the target

The highest score is attained if p ≥ 1. A percentage score is assigned for any value between 0 and 1.

Progress ratio	Score
$p \geq 1$	100%
$p < 1$	p (%)

Aggregated score - Dimension 1: 25%, Dimension 2: 75%

The two dimensions' scores are added to form the indicator score. Below you can find an example of an emissions intensity curve compared to the targets set by the company for this specific intensity. The indicator is also applicable for absolute emissions targets set.

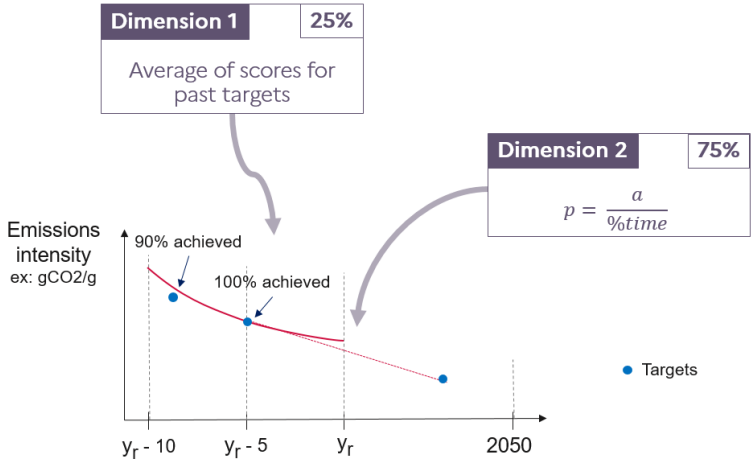


FIGURE 8: CALCULATION OF THE ACHIEVEMENT OF PREVIOUS TARGET INDICATOR

For all calculations:

- Companies which 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. Their score for this indicator is based on dimension 2.
- Targets that do not cover >95% of the company's GHG emissions scope are not preferred in the calculation of dimension 2, but are not penalized, as other indicators already penalize for not having a large coverage in the target.
- If the company has multiple targets in different scopes that can be assessed according to the above criteria, then the score is 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 has only a low weight in the final performance score. This information is also qualitatively assessed in the narrative analysis, which will take another look at the following dimensions:

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

RATIONALE

CH 1.4 ACHIEVEMENT OF PREVIOUS AND CURRENT TARGETS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

The historic target ambition and company performance is included in the ACT Chemicals Methodology 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 emissions reduction targets. Dimension 1 of this indicator adds credibility to any company claim to commit to a science-based reduction pathway.
- 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 past 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 past 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, which reflects how well or not the company is currently on track to reach its existing emissions reduction target. As far as the degree of completion is equal or higher than expected, the maximum score is obtained. If the degree of completion is lower than expected, then the score is as impacted as the gap between reality and expectancies is high too. This way, staying on track of initial objectives is rewarded.

MATERIAL INVESTMENT (WEIGHTING: 10-32%)

- **CH 2.1 Trend in past - Scope 1+2 emissions**

Description & Requirements

CH 2.1 Trend in past - Scope 1+2 emissions

Short description of indicator

A measure of the alignment of the company's recent emissions for scope 1+2, with that of their decarbonization pathway. The indicator will compare the gradient of this trend over a 5-year period to the reporting year (reporting year minus 5 years) with the decarbonization pathway trend over a 5-year period after the reporting year.

Data requirements

The relevant data for this indicator are:

- Emissions intensity and activity at reporting year and Y-5 and other information if necessary (geography, etc.) regarding material investment

  OR
- Total direct emissions and activity at reporting year and Y-5.

CDP Questionnaire 2023 mapping to this indicator:

- C6.1
- C6.3
- C6.10
- C7.3c
- C-CH9.3a

The benchmark indicators involved are:

TRENDS	PRODUCT TYPE	METRIC	BENCHMARK
Scope 1+2 intensity emissions	Primary chemicals P* with available sectoral pathway (SDA)	tCO_2 / t primary chemical	IEA ETP 2020
Scope 1+2 absolute emissions	Other chemicals (ACA)	tCO_2e	WB-2˚C - SBTi

- "tCO_2" corresponds to the emission of CO_2 related to the scope 1+2 of the company. The emissions are gross emissions, except for the case where CCS or CCU is implemented within operational scope and thus reduces the emissions released into the atmosphere.
- 'tCO$_2$e" corresponds to the emission of CO_2 equivalent related to the scope 1+2 of the company. The emissions are gross emissions, except for the case where CCS or CCU is implemented within operational scope and thus reduces the emissions released into the atmosphere.
- "t primary chemical" corresponds to the mass of chemicals supplied in tons.

If the CO_2 emissions from operated joint ventures (JVs) are reported in the scope 1+2 by the company, they should be reported in this indicator as well.

HOW THE ASSESSMENT WILL BE DONE

The emissions linked to the primary chemicals (P*) for which a sectoral pathway is available are assessed using the sectoral decarbonisation approach (SDA) allocation method. The emissions linked to the other chemicals from the company's portfolio are assessed using the absolute contraction approach (ACA) allocation method. These assessments are then respectively weighted based on the share of absolute emissions from the company's portfolio.

If the company does not disclose information relating to distinct emissions from primary chemicals P* and others, then the total absolute emissions are assessed using the ACA allocation method. Such a lack of data availability is then penalized when calculating the ACT narrative score.

- When a sectoral pathway is available to use the Sectoral Decarbonization Approach (SDA):

The analysis is based on the comparison between the company's recent (reporting year minus 5 years) emissions intensity trend gradient (CR'_{S12}) and the company's decarbonization pathway trend gradient (CB'_{S12}) in the short-term (reporting year plus 5 years). The emissions intensity of the company at the reporting year (CEI_Y) and the sectoral benchmark value of emissions intensity in 2050 (SB_{2050}) are also considered to calculate the company's score.

CR'_{S12} is the gradient of the linear trend-line of the company's recent scope 1+2 emissions intensity (kgCO_2/ton) over time (CR_{S12}).

CB'_{S12} is the gradient of the linear trend-line of the company benchmark pathway for emissions intensity (kgCO_2/ton) (CB_{S12}). See in section 6.1 Quantitative benchmarks used for the indicators for details on the calculation of the company specific decarbonization pathway.

The difference between CR'_{S12} and CB'_{S12} will be measured by their ratio (r_{S12}). This is the scope 1+2 emissions Transition ratio, which is calculated by the following equation, with the symbol ′ used to denote gradients:

$$r_{S12} = \frac{CR'_{S12}}{CB'_{S12}}$$

- When no SDA is available for the chemical:

No sectoral pathway is available, the ACA method is then used (see section 3.2), The calculation is the same to get r_{S12} values, however note that when using ACA there is no SB_{2050} point to refer to.

CALCULATION OF SCORE:

When available, the Sectoral Decarbonization Approach (SDA, see section 6.1) is used.

Four different cases are to be taken into consideration:

- Case #1: CR'_{S1+2} is positive → Score = 0 (whatever the r_{S1+2} and CEI_Y values)
- Case #2: CR'_{S1+2} is negative and $0 < r_{S1+2} < 1$ and CEI_Y is higher than SB_{2050} → Score = r_{S1+2} (expressed as a percentage)
- Case #3: CR'_{S1+2} is negative and $r_{S1+2} \geq 1$ and CEI_Y is higher than SB_{2050} → Score = 100 %
- Case #4: CR'_{S1+2} is negative and CEI_Y is lower than SB_{2050} → Score = 100 % (whatever the r_{S1+2} value)

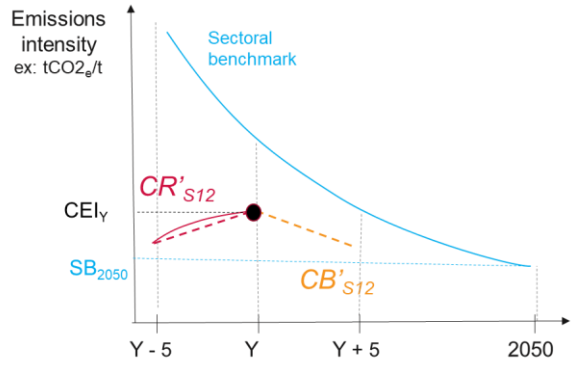
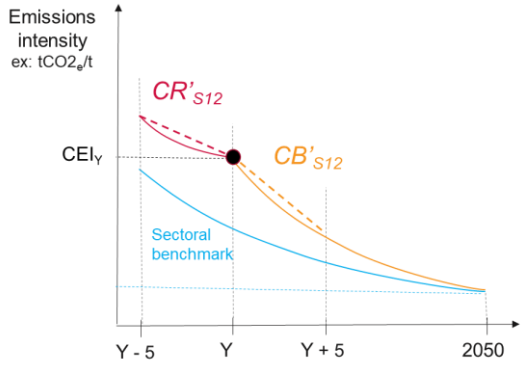
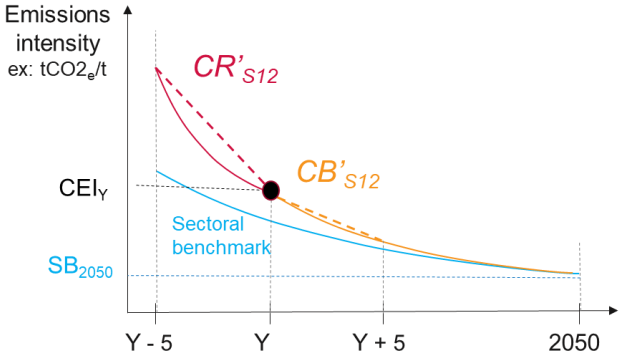
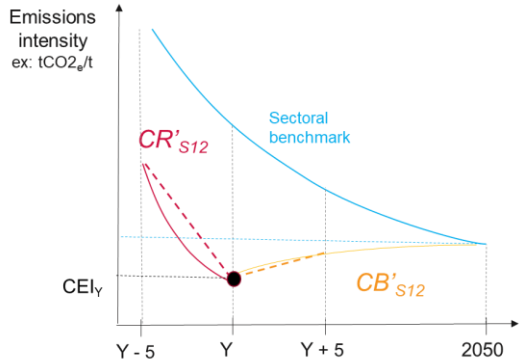
Case #1	Case #2
	
$CR'_{S12} > 0$ Whatever the r_{S12} value Whatever the CEI_Y value	$CR'_{S12} < 0$ $0 < r_{S12} < 1$ $CEI_Y > SB_{2050}$
Score = 0	**Score = r_{S12} (%)**
Case #3	Case #4
	
$CR'_{S12} < 0$ $r_{S12} \geq 1$ $CEI_Y > SB_{2050}$	$CR'_{S12} < 0$ $CEI_Y < SB_{2050}$ whatever the r_{S12} value
Score = 100 %	**Score = 100 %**

FIGURE 9: CASES ENCOUNTERED FOR THE TRANSITION RATIO

When the SDA is not available, the Absolute Contraction Approach (ACA, see section 6.1) is used.

- Case #1: CR'_{S1+2} is positive → Score = 0
- Case #2: CR'_{S1+2} is negative and $0 < r_{S1+2} < 1$ → Score = r_{S1+2} (expressed as a percentage)
- Case #3: CR'_{S1+2} is negative and $r_{S1+2} \geq 1$ → Score = 100 %

If the company produces several chemicals, various cases can be encountered, depending on the availability of a sectoral emissions reduction pathway(s). The scoring rules are described in Appendix 11.3.

RATIONALE

CH 2.1 TREND IN PAST – SCOPE 1+2 EMISSIONS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR

Trend in past indicator is included in the ACT Chemicals Methodology for the following reasons:

- The trend in past emissions intensity shows the speed at which the company has been reducing its emissions intensity over the recent past. Comparing this to the decarbonization pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- While ACT aims to be as future-oriented as possible, it nevertheless does not want to solely rely on projections of the future, in a way that would make the analysis too vulnerable to the uncertainty of those projections. Therefore, this measure, along with projected emissions intensity and absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future.
- This indicator is future-relevant by providing information on the organizational capability to meet emissions reduction that is aligned with the benchmark. This indicator adds credibility to any company whose past emissions intensity were aligned with their historic benchmark and whose past carbon budget did not exceed the sectoral carbon budget.

SCORING RATIONALE

While ‘gap type’ scoring is preferred for any indicator where possible, this indicator looks at past emissions and would therefore require a different baseline in order to generate a gap method. Consequently, ‘trend type’ scoring is preferred here. Another 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 generated from the resulting ratio.

- **CH 2.2 Trend in future - Scope 1+2 emissions**

Description & Requirements	**CH 2.2 Trend in future - Scope 1+2 emissions**
Short description of indicator	A measure of the alignment of the company's future emissions for scope 1+2, with that of their decarbonization pathway. The indicator will compare the gradient of this trend over a 5-year period following the reporting year (reporting year plus 5 years) with the decarbonization pathway trend over a 5-year period after the reporting year.
Data requirements	The relevant data for this indicator are: ♦ Emissions intensity at reporting year and Y+5, other information if necessary (geography, etc.), regarding material investment OR ♦ Total direct emissions at reporting year and Y+5 CDP Questionnaire 2023 mapping to this indicator: ♦ C6.1 ♦ C6.3 ♦ C6.10 ♦ C7.3c ♦ C-CH9.3a ♦ Future emissions data is not collected by CDP Future emission should be estimated from company assets and their expected produced activity. If sufficient information is not available to estimate future emissions intensity from company assets then the company's emissions intensity is considered to be constant over the period RY to RY+5. The benchmark indicators involved are:

TRENDS	PRODUCT TYPE	METRIC	BENCHMARK
Scope 1+2 intensity emissions	Primary chemicals P* with available sectoral pathway (SDA)	tCO_2 / t primary chemical	IEA ETP 2020
Scope 1+2 absolute emissions	Other chemicals (ACA)	tCO_2e	WB-2˚C - SBTi

- "tCO_2" corresponds to the emission of CO_2 related to the scope 1+2 of the company. The emissions are gross emissions, except for the case where CCS or CCU is implemented within operational scope and thus reduces the emissions released into the atmosphere.
- "t primary chemical" corresponds to the mass of chemicals supplied in tons.

If the CO_2 emissions from operated joint ventures (JVs) are reported in the scope 1+2 by the company, they should be reported in this indicator as well.

Same rules than those from indicator 2.1 apply, regarding the emissions linked to primary chemicals P* and other chemicals.

HOW THE ASSESSMENT WILL BE DONE

The analysis is based on the Future Action ratio (A_{future}) which represents the ratio between the company's future (reporting year plus 5 years) emissions from material investment trend gradient and the company's future benchmark (reporting year plus 5 year) emission trend gradient. Figure 10 illustrates the case for companies for which there exists an emissions intensity benchmark.

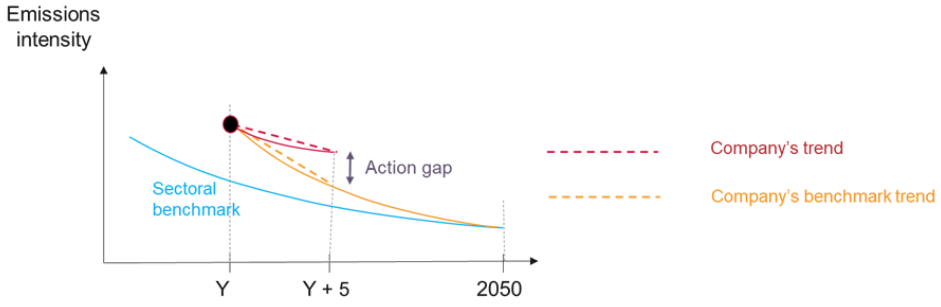


FIGURE 10: COMPARISON OF TREND IN FUTURE EMISSIONS AND TREND IN COMPANY'S BENCHMARK (EXAMPLE WHERE SECTORAL PATHWAY IS AVAILABLE)

CALCULATION OF SCORE:

Future Action ratio (A_{future}) is calculated by dividing the company's future emission from material investment trend (between reporting year and reporting year plus 5 years) and the future benchmark emission (between reporting year and reporting year plus 5 years):

$$A_{future} = \frac{E_c(Y_R) - E_c(Y_{R+5})}{E_B(Y_R) - E_B(Y_{R+5})}$$

where $E_c(Y_R)$ is the company emission at reporting year, $E_c(Y_{R+5})$ is the company emission at reporting year plus 5 years, $E_B(Y_R)$ is the benchmark emission at reporting year and $E_B(Y_{R+5})$ is the benchmark emission at reporting year plus 5 years.

The action gap of the company is equal to $(1 - A_{future})$. Thus, when the company's future emissions pathway is aligned on the company's benchmark, the Future Action ratio is equal to 1 and the action gap is 0.

The final score assigned to the indicator is calculated as follows (see appendix 0 for a graphic illustration of the different cases):

Conditions	Score
$Company's\ future\ trend > 0$ Increase in company emissions	0%
$Company's\ future\ trend \leq 0$ et $E_C(Y_R) > E_B(Y_{R+5})$ $0 \leq A_{future} \leq 1$ Decrease in company emissions but company's pathway does not go beyond the company's benchmark ambition	$A_{future} \times 100\%$
$Company's\ future\ trend < 0$ $A_{future} > 1$	100%

Decrease in company emissions and company's pathway equals or exceeds the company's benchmark ambition	
$Company's\ future\ trend \leq 0\ and\ E_C(Y_R) \leq E_B(Y_{R+5})$ No increase in company emissions and company's emissions is already below the company's benchmark ambition for year+5.	100%

If the company produces several chemicals, various cases can be encountered, depending on the availability of a sectoral emissions reduction pathway(s). The scoring rules are described in Appendix 11.3.

RATIONALE

CH 2.2 TREND IN FUTURE - SCOPE 1+2 EMISSIONS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR

Trends in future emissions from material investment are included in the ACT Chemicals Methodology for the following reasons:

- The trend shows the speed at which the company needs to reduce its emissions for the coming years. Comparing this to the low-carbon benchmark pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- ACT aims to be future-oriented. Therefore, this particular indicator, with projected emissions, forms part of a holistic view of company emissions performance in the past, present, and future.

SCORING RATIONALE

Comparing the trends gives a direct measure of the future action gap of the company. It was chosen for its relative simplicity in interpretation; it is aligned with most of the other forward-looking indicators. Indeed, the indicator looks at a fixed point in the future and assesses the capacity of the company to deploy a range of low-carbon assets in the short term.

DESCRIPTION & REQUIREMENTS

CH 2.3 EMISSIONS LOCKED-IN FROM MATERIAL INVESTMENT

SHORT DESCRIPTION OF INDICATOR

Measure of the company's cumulative GHG emissions implied by the company's installed and planned assets over a 15-years period from the reporting year. These locked-in emissions are compared to a theoretical portfolio with a similar locked-in activity per year and benchmark emissions.

DATA REQUIREMENTS

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

- For all existing and planned assets (for the next 15 years): Asset name, Geographic Location (country level), Plant type, Technology, Fuel mix, Status, Total capacity (ton), Active capacity (ton), Emissions factor (metric tonnes CO_2e/t chemical), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%)

CDP Questionnaire 2023 mapping to this indicator:

- C7.3b
- C7.6b

In case of difficulties for the company to provide these pieces of information, the ACT framework may mobilize 3rd party databases to provide an estimate of these production data series, aggregated by chemicals and company.

Company Assets

1. Production plants at the date of reporting
2. Under development plants at the date of reporting

HOW THE ASSESSMENT WILL BE DONE

The analysis is based on the ratio between the company's installed and planned emissions for the 15 years after the reporting year $LE_F(y_r + 15)$, and the emissions budget entailed by the company's carbon budget B(t) over the same period of time.

$LE_F(t)$ is calculated as the total cumulative emissions implied by the lifetimes of currently active and confirmed planned assets that are going to be commissioned soon. If unknown, the commissioning year of projects is estimated from the project status (e.g., bidding process, construction, etc.) and data on typical project periods by plant type.

$LE_F(y_r + 15)$ is calculated as the company's locked-in carbon emissions, up to reporting year + 15 years, 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 CA_G, multiplied by activity A_G:

$$LE_F(t) = \int_{from\ the\ reporting\ ear}^{t} A_G * CA_G$$

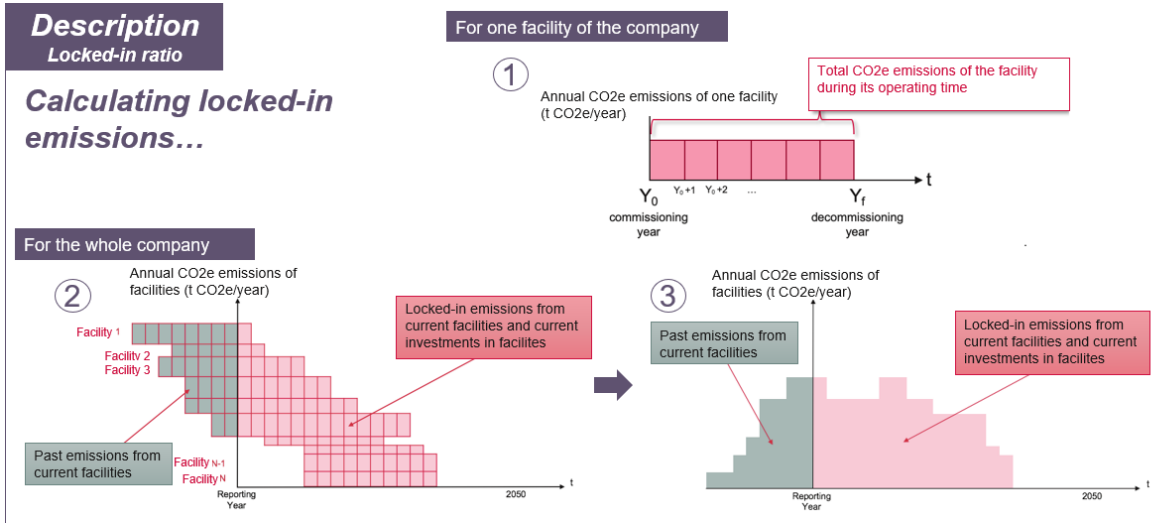


FIGURE 11 : COMPUTING LOCKED-IN EMISSIONS FROM FACILITY

$B(y_r + 15)$ is calculated as the company's carbon budget up to reporting year + 15 years, which is derived by taking the area under the absolute emissions reduction curve. This curve is derived from the company benchmark pathway ($CB_{Scopes12}$) by multiplying it by the projected activity A_P for the company:

$$B(t) = \int_{the\ reporting\ year}^{t} A_P * CB_{Scope12}$$

The company's benchmark is calculated from the company's current emissions at reporting year and the level of carbon emissions defined by the sectoral benchmark presented in section. The carbon budget is illustrated in Figure 12 below.

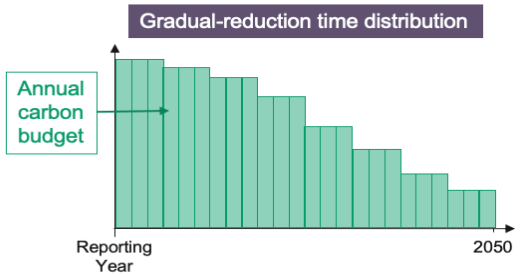


FIGURE 12 : CARBON BUDGET DERIVED FROM THE COMPANY'S BENCHMARK

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

The locked-in ratio (r_{LB}) is illustrated in Figure 13 and calculated as follows:

$$r_{LB}(t) = \frac{LE_F(t)}{B(t)}$$

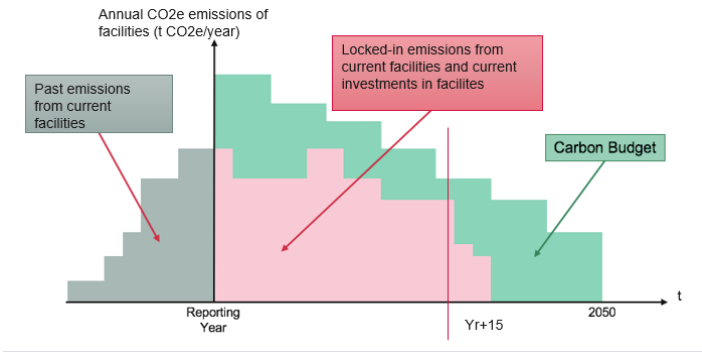


FIGURE 13 : ILLUSTRATION OF THE LOCKED-IN RATIO

To be able to give a score regarding the amount of carbon budget consumed, the level of activity performed with the existing and planned assets needs to be taken into account. Therefore, in a similar way to locked-in emissions, the level of activity that the company is able to perform thanks to the existing and planned assets, per year. It is called the secured activity and is illustrated in Figure 14.

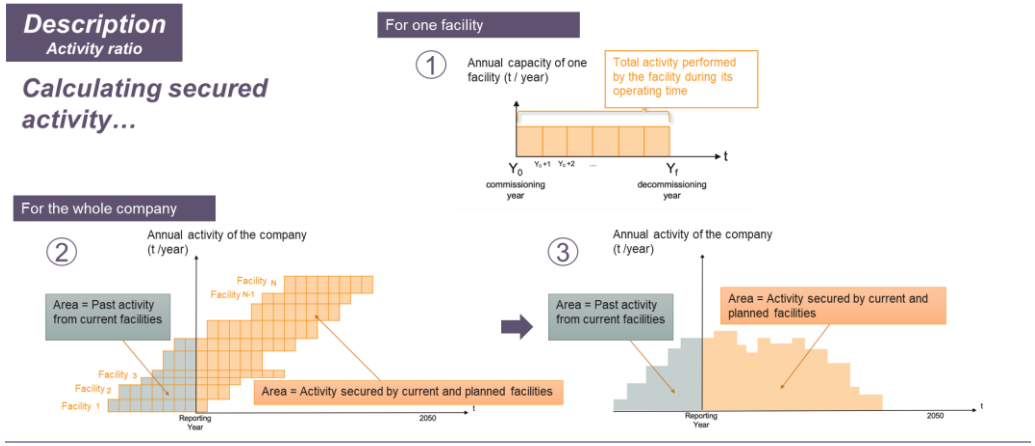


FIGURE 14 : SECURED ACTIVITY BY THE COMPANY

The secured activity is compared to the level of activity projected by the company up to reporting year + 15 years. If the company does not have any projections or not up to reporting year + 15 years, it will be considered that its market share will remain constant and its activity will evolve at the same rate as the sector and sectoral projection of activity are used. The company's projected activity is illustrated in Figure 15.

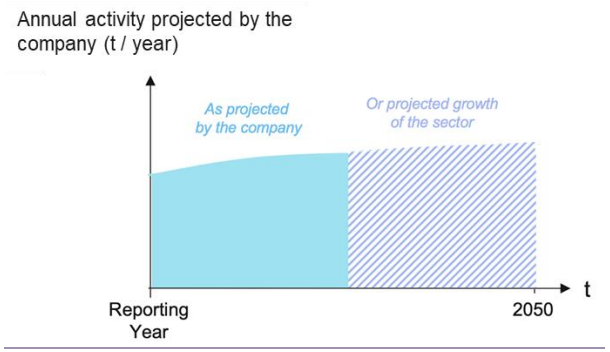


FIGURE 15 : PROJECTED ACTIVITY

The secured activity ratio $r_{SA}(y_r + 15)$ compares the secured activity up to $(y_r + 15)$ with the projected activity up to $(y_r + 15)$. It is illustrated in Figure 16.

$$r_{SA}(y_r + 15) = \frac{A_S(y_r + 15)}{A_P(y_r + 15)}$$

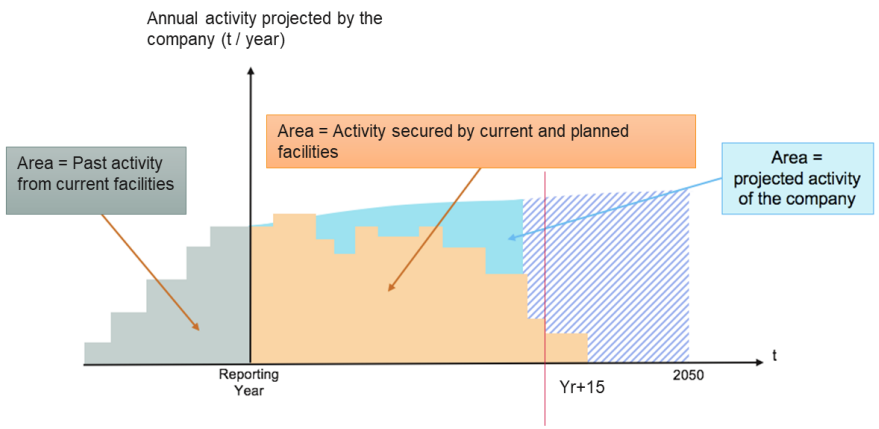


FIGURE 16 : SECURED ACTIVITY RATIO

CALCULATION OF THE SCORE:

r_{SA} is used as a threshold value for the scoring:

$r_{SA} < 1$: More investments will be needed	
Value of r_{LB}	**Score**
$r_{LB} \leq r_{SA}$	100%
$r_{SA} < r_{LB} < 1.5$	$\frac{r_{LB}-1.5}{r_{SA}-1.5}$
$r_{LB} \geq 1.5$	0%

This means that if the company has planned its activity and its locked-in emissions are lower than the carbon budget, it gets 100%, but if the locked-in emissions exceed by more than 50% its carbon budget, it gets 0%.

The case $r_{SA} > 1$ is unlikely to happen as the company is unlikely to have existing or planned assets able to meet or exceed the projection of activity until $(y_r + 15)$.

If the company produces several chemicals, various cases can be encountered, depending on the availability of a sectoral emissions reduction pathway(s). The scoring rules are described in Appendix 11.3

RATIONALE

CH 2.3 EMISSIONS LOCKED-IN FROM MATERIAL INVESTMENT

RELEVANCE OF THE INDICATOR:

RATIONALE OF THE INDICATOR

Locked-in emissions are included in the ACT Chemicals Methodology for the following reasons:

- Absolute GHG emissions over time are the most relevant measure of emissions performance for assessing a company's contribution to global warming. Furthermore, the concept of locked-in emissions allows a judgement to be made about the company's outlook in more distant time periods than ones of the investment plans.
- Analysing a company's locked-in emissions alongside science-based carbon budgets also introduces the means to scrutinise the potential cost of inaction, including the possibility of stranded assets.
- Examining absolute emissions, along with recent and short-term emissions intensity trends, forms part of a holistic view of a company's emissions performance in the past, present, and future.
- The approach using the secured-activity ratio is a coherence check between the company's ambition for emissions reduction, and its investments (and the inevitable emissions associated). It shows the leeway for future investments and alerts companies to the cost of inaction and the risk of stranded assets.

SCORING RATIONALE

The data for this indicator is taken from the asset dataset: currently active plants, new plants and modernization / retrofit plans that are 'in the pipeline' (which can be estimated to become active in the short-term).

When a plant reaches the end of its estimated lifetime, no replacement is assumed because these decisions have not been made yet. Chemical plants are not often decommissioned but rather modernized with new important equipment, so the lifetime of the asset is assumed to be the average lifetime of the process equipment, which is around 30 years.

Hence, the locked-in emissions calculated are the locked-in emissions of committed (existing and under development) plants only. The indicator describes the proportion of the company's budget (calculated from the reporting year for 15 years ahead) that will be used up by committed activity. Companies that are projected to exceed their carbon budgets are at risk of being left with stranded assets.

NOTE ON CALCULATING LE_F AND B:

Where data on plant emissions intensity or lifetime is unavailable at the asset level, default factors are applied.

- **CH 2.4 LOW-CARBON, MITIGATION CARBON REMOVAL TECHNOLOGIES CAPEX SHARE**

DESCRIPTION & REQUIREMENTS	**CH 2.4 LOW-CARBON, MITIGATION AND CARBON REMOVAL TECHNOLOGIES CAPEX SHARE**
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's planned CAPEX, i.e., investment by the company, for the next three years in low-carbon, mitigation and carbon removal technologies with its low carbon scenario pathway. The indicator score the gap between the company's planned low-carbon CAPEX share and its decarbonisation pathway.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ Share of CAPEX in low-carbon and mitigation technologies (M$/M$) planned for the next 3 years ♦ Share of CAPEX set on investments in carbon removal technologies (CCS, CCU, CDR) (in M$/M$) planned for the next 3 years CDP Questionnaire 2023 mapping to this indicator: ♦ C3.5b
HOW THE ASSESSMENT WILL BE DONE	The score for this indicator is proportional to the company's share of planned CAPEX in low-carbon, carbon removal and mitigation technologies. No sectoral benchmark specific to the chemicals sector has been found. In order to set the threshold corresponding to the maximum score for this indicator, the benchmarks that have been defined for the ACT Oil & Gas Methodology are used. Thanks to data from the Sustainable Development Scenario (2020), it has been calculated that the sum of the required low-carbon investments for the Fuel and Power sector leads to a share of low carbon investments of 49%. Similarly, according to several global energy-economy models, the required

investments dedicated to CDR and CCS/CCUS technologies are set as 5% of the total CAPEX expenses for the oil & gas sector. Therefore, the benchmark for low carbon, mitigation and carbon removal technologies (CB_{LCT}) is set at 54%.

The assessment is based on the ratio between the company's planned CAPEX share in Low carbon, mitigation and carbon removal technologies (S_{LCT}) and the company benchmark (CB_{LCT}).

$$CAPEX\ Ratio = \frac{S_{LCT}}{CB_{LCT}}$$

The score for this indicator is taken as the average of scores for each year between reporting year and reporting year +3. For each year, the score is equal to:

- The CAPEX ratio if the ratio is lower than 1
- 1 if the CAPEX ratio is higher than 1 (the company share of low-carbon CAPEX is higher than the benchmark).

Defining 'Low-carbon technologies':

Low-carbon technologies are technologies that produce final products with a lower carbon content. They encompass:

- Technologies enabling the incorporation of secondary raw material or bio-based feedstock in the chemical products;
- Technologies substantially reducing the carbon content of the chemical product;
- Technologies that substantially reduce the energy consumption or GHG emissions of clients.

To be considered a low-carbon technology, the technology must meet the criteria defined by the EU Green Taxonomy, which defines low-carbon technologies as resulting in substantial GHG emissions reductions in other sectors of the economy, provided that product-related emissions are at least the level of best available techniques (25).

Defining 'Mitigation technologies':

Mitigation technologies are technologies that reduce the carbon footprint of the operations of the chemical activities. This includes:

- Energy efficiency technologies
- Technologies to prevent methane, CFC and HFC leakage during the process
- Any other technology that helps reduce the carbon footprint of operations – to be checked by the analyst.

To be considered a mitigation technology, the technology must meet the criteria defined by the EU Green Taxonomy, which defines:

"An economic activity shall be considered to contribute substantially to climate change mitigation where that activity substantially contributes to the stabilization of greenhouse gas concentrations in the atmosphere at a level which prevents dangerous anthropogenic interference with the climate system by avoiding or reducing greenhouse gas emissions or enhancing greenhouse gas removals through any of the following means, including through process or product innovation, consistent with the long term temperature goal of the Paris Agreement." (25)

Defining 'Carbon removal technologies':

Carbon removal technologies are technologies able to capture in a non-reversible way the carbon dioxide for storage or usage.

For further inputs on technologies that can be considered low-carbon and mitigation technologies, see the Best Available Techniques (BATs) from the "Energy efficiency and GHG emissions: Prospective scenarios for the Chemical and Petrochemical Industry" document by the JRC (15) and the "Low-carbon energy and feedstock for the European chemicals industry" by DECHEMA (8).

Rationale

CH 2.4 Low-carbon, mitigation and carbon removal technologies CAPEX share

Rationale of the indicator

Relevance of the indicator:

Investment planning related to the company's low-carbon and mitigation technologies and carbon removal technologies CAPEX are included in the ACT Chemicals Methodology as CAPEX planning is an indicator of corporate commitment to a low-carbon transition, and is a meaningful metric of the company's internal planning towards the transition.

Although this indicator may be based on a specific ratio in other ACT methodologies, no benchmarks are available for this sector. Therefore, it has been decided to align on the one defined in the ACT Oil & Gas Methodology. Achieving the low-carbon transition will be the most challenging for the oil & gas sector, compared to other sectors, since the use of fossil fuels is the most significant global source of emissions. It can thus be reasonably stated that the level of investments dedicated to low-carbon, mitigation and carbon removal technologies should not be higher for the chemicals sector compared to the oil & gas sector. Taking the same values to build this benchmark is the best proxy that was found.

DESCRIPTION & REQUIREMENTS

CH 2.5 ENERGY MANAGEMENT

SHORT DESCRIPTION OF INDICATOR

A measure of the company's energy management actions in the reporting year. The indicator will evaluate the implementation of global recommendations to decarbonize the assets consuming energy.

DATA REQUIREMENTS

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

- Energy demand in Coal, Oil, Natural gas, Electricity, Imported heat, Hydrogen, Bioenergy and other renewable energy for the last five years and the next five years.
- For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology, Fuel mix, Status, Total capacity (ton), Active capacity (ton), Emissions factor (metric tons CO_2e/t chemical), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%)
- Energy consumption targets
- Action plan regarding energy management
- Share of certified renewable energy (Renewable Energy Certificate, Power Purchase Agreement, etc.)
- % of consumed electricity per source, at corporate level (in reporting year)

CDP Questionnaire 2023 mapping to this indicator:

- C8.2
- C8.2a
- C-CH8.2a
- C8.2c
- C8.2d
- C8.2e

How the assessment will be done

This indicator is based on three dimensions.

DIMENSION 1 – ENERGY-RELATED POLICY

To be ready for the transition to a low-carbon economy, chemical companies need to plan and carry out energy management to reduce GHG emissions of their assets (especially chlorine and hydrogen producers regarding electricity management).

The maturity matrix used for the assessment is the following:

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	0%	25%	50%	75%	100%	
Has the company taken actions to reduce energy consumption during the past 5 years?	There are no reported actions	Actions have been taken and the energy consumption has been reduced by 5%	Actions have been taken and the energy consumption has been reduced by 10%	Actions have been taken and the energy consumption has been reduced by 20%	Actions have been taken and the energy consumption has been reduced by 30%	***25%***
Does the company plan to take actions to reduce energy consumption in the next five years?	There are no reported actions planned	Actions are planned to reduce energy consumption by 5%	Actions are planned to reduce energy consumption by 10%	Actions are planned to reduce energy consumption by 20%	Actions are planned to reduce energy consumption by 30%	***25%***
Is the action plan robust enough?	No roadmap and resources allocated to this objective		Roadmap set		Public target, financial resources and detailed roadmap set	***20%***
Does the company source its energy from low-carbon sources?	No knowledge of carbon content of energy used	25% of energy consumption used is low-carbon as defined by the EU taxonomy	50% of energy consumption used is low-carbon as defined by the EU taxonomy	75% of energy consumption used is low-carbon as defined by the EU taxonomy	90% of energy consumption used is low-carbon as defined by the EU taxonomy	***30%***

Calculation of score:

A company that is placed in the 'Low-carbon aligned' category receives the maximum score. Companies that are at lower levels receive a partial score, with 0 points awarded for having no engagement at all. If the company use several types of energy for the production of heat, steam or power, the consolidation of the scores assigned to each type of energy will be based on the share of energy consumption.

DIMENSION 2 – CONTRIBUTION TO LOW-CARBON ELECTRICITY GENERATION

This dimension aims at assessing the company's contribution to the development of low-carbon electricity generation capacity.

The sources of electricity have been classified according to the company's level of commitment. The company shall disclose, at the corporate level, the share (in %) of electricity consumed coming from these different sources in the reporting year.

Only the consumed electricity that fulfils the following criterion is accepted for the reported share of EAC, CPPA and on-site self-generation: the carbon content of the produced electricity shall not exceed 100 gCO_2e/kWh on a Life-Cycle Analysis (LCA) (25). In the specific case of on-site electricity generation with bioenergy, please refer to the sustainability criteria defined in dimension 3.

Level of commitment	What are the mechanisms used by the company to consume low-carbon electricity?	% of electricity consumed from the source at corporate level (in reporting year)	Associated score
1 (no commitment)	Electricity consumed by the company with no certification + Electricity consumed by the company that is self-generated with assets that do not fulfil the criteria above		***0%***
2	Electricity consumed by the company that is certified with Energy Attribute Certificates (EAC)		***25%***
3	Electricity consumed by the company originating from Corporate Power Purchase Agreements (CPPA) with grid transfers		***75%***
4 (strong commitment)	Electricity consumed by the company originating from Corporate Power Purchase Agreements (CPPA) with no grid transfers (direct line) + Electricity consumed by the company that is self-generated with assets that do fulfil the criteria above		***100%***

Energy attribute certificate is a generic name for mechanisms that electronically document and track the production, trade/distribution and consumption of renewable energy. For example:

- North American REC Tracking Systems
- European Energy Certificate System Guarantee of Origin (EECS-GO)
- Renewable Energy Guarantees of Origin (REGOs) in the UK
- The International REC Standard (I-REC Standard)
- Tradable Instruments for Global Renewables (TIGRs

Calculation of the score

The final score for this subdimension is obtained by applying the SUMPRODUCT function on the share (in %) of the consumed electricity for each source multiplied by the associated score for this source. For example, if a company purchases 30% of its electricity through a CPPA and the rest has no certification, the final score will be calculated as follows: 70% x 0% + 30% x 75% = 22.5%.

DIMENSION 3 – CONTRIBUTION TO DECARBONIZE HEAT GENERATION ASSETS

The following maturity matrix aims at assessing the company's effort in the decarbonization of two important energy vectors used by the chemicals sector: heat and steam. Low-carbon technologies considered for heat and steam generation at low-medium temperature (0-400°C) are available and include biomass boiler, electric boiler, hydrogen boiler, heat pump, geothermal heat, and waste heat (from own assets or external assets). This dimension is complementary to the company's strategy in investing in electrification.

The thresholds of this maturity matrix below have been developed using the projection elaborated by the IEA for its latest "Net-zero by 2050" to align heat generation on the relevant decarbonization trajectory from 2020 to reach net-zero at the World level in 2050 (26). As steam technologies are similar to heat technologies, steam has been added to the maturity matrix.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***
What is the share of the consumed heat and steam (purchased or produced) that has been produced with a low-carbon aligned technology* (list below)	40% or less of the consumed heat and steam relies on low-carbon aligned technologies	From 40% up to 50% of the consumed heat and steam relies on low-carbon aligned technologies	From 50% up to 60% of the consumed heat and steam relies on low-carbon aligned technologies	From 60% up to 75% of the consumed heat and steam relies on low-carbon aligned technologies	Above 75% of the consumed heat and steam relies on low-carbon aligned technologies

*List of low-carbon aligned heat and steam technologies:

- biomass boiler (only if the biofuels and bioliquids are considered sustainable by the ACT Chemicals Methodology* - see below)
- electric boiler (only if the GHG emissions intensity of the electricity consumed by sites using electric boilers is below 100 gCO_2e/kWh or if the electricity is produced by owned biomass-based energy production assets with biomass sources and bioliquids considered as sustainable by the ACT Chemicals Methodology)
- hydrogen boiler (only if the GHG emissions intensity of the hydrogen consumed by sites using hydrogen boilers is below $3tCO_2e/tH_2$)
- heat pump (only if the GHG emissions intensity of the electricity consumed by sites using heat pumps is below 100 gCO_2e/kWh or if the electricity is produced by owned biomass-based energy production assets with biomass sources and bioliquids considered as sustainable by the ACT Chemicals Methodology)
- geothermal heat
- waste heat (from own assets or external assets)

It is essential to ensure the sustainability of biomass and biofuels to avoid deforestation and to promote best practices in forest management and biomass use.

Biofuels and bioliquids are considered sustainable by the ACT Chemicals methodology if they meet one of the following criteria:

1. Biofuels that enable biomass-based energy production systems to demonstrate at least 80% of emission savings compared to fossil fuels alternatives (based on the criteria defined in the EU taxonomy for sustainable activities (27)) following the methodology outlined in the directive 2018/2001 (also called ‘REDII’) (28). The following list is made up of biofuels for biomass-based energy production systems from Annex VI in RED II meeting this criterion:
    - Wood chips from sustainable forest residues (as defined in 3.) or from industry residues with a transport distance until the company’s site below 2,500 km
    - Woodchips from short rotation coppice (Poplar – Fertilised or not fertilized) with a transport distance until the company’s site below 500 km if used to produce electricity or below 2,500 km if used to produce heat
    - Wood briquette and pellet categories below which have been manufactured using electricity and heat from a CHP fed with pre-dried woodchips:
        - Wood briquettes or pellets from sustainable forest residues (as defined in 3.)
        - Wood briquettes or pellets from wood industry residues

- Wood briquettes or pellets from short rotation coppice (eucalyptus) with a transport distance until the company's site below 10,000 km (only if used to produce heat)
- Wood briquettes or pellets from short rotation coppice (poplar – fertilised) with a transport distance until the company's site below 500 km if used to produce electricity or below 10,000 km if used to produce heat

2. Biofuels and bioliquids derived from wood industry wastes. This includes sawdust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin waste and tall oil[14].
3. Biofuels derived from sustainable forestry residues. This includes treetops, branches, pre-commercial thinning, leaves and needles except for coarse wood debris (which include snags, standing dead trees and high stumps) and low stumps. The latter two are not accepted as sustainable based on the latest study from the JRC (21).
4. Biofuels certified under a scheme that ensures their sustainability. Ideally, certification schemes should be members of the International Social and Environmental Accreditation and Labelling (ISEAL), as these standards undergo rigorous checks including multistakeholder engagement, and as such tend to be the strongest (29). Some examples of such certification schemes are the Sustainable Biomass Program (SBP) and International Sustainability and Carbon Certification (ISCC). Other examples, including those that are not ISEAL members, can be found on pp. 12-13 of the CDP Technical Note: Biofuels (29).

Stemwood has been withdrawn from the list based on the latest study carried out by JRC (21) where they highlight that it is not possible to make assessments in a generic way regarding the impact of stemwood used for bioenergy purposes. Additionally, it should be considered that forestry residues such as slash, leaves and needles are considered sustainable biomass only if harvested below a sustainable landscape threshold (21) which can vary from one forest to another.

AGGREGATE SCORE – DIMENSION 1: 1/3, DIMENSION 2: 1/3, DIMENSION 3: 1/3.

[14] This list is extracted from the RED II Recast directive - Directive (EU) 2018/2001) - Annex IX ,Part A

RATIONALE

CH 2.5 ENERGY MANAGEMENT

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

The chemicals sector is known to be the biggest energy consumer amongst the heavy industries, followed by iron & steel and cement. A large majority of the GHG emissions arising from the sector is related to energy use. It is thus important to ensure that companies are working on reducing their energy consumption on one side and on decarbonizing their energy sources (either produced or bought).

Dimension 1:

In this dimension, elements are captured related to the company's policy regarding its energy consumption. The two levers mentioned above, i.e., consumption reduction and decarbonization of energy sources, are assessed.

Dimension 2:

Electricity consumption represents a significant share of GHG emissions of the sector. Furthermore, the production of some primary chemicals is highly electricity-intensive, namely electrolysis processes used to produce hydrogen or chlorine, amongst others. Finally, electrification of various processes is identified as an important lever to decarbonize the sector.

As a consequence, companies should be rewarded when:

- Reducing emissions intensity of self-generated electricity
- Purchasing electricity with energy attribute certificates (EAC)
- Purchasing low-carbon electricity through a CPPA with Energy attribute certificate
- Directly investing in additional low-carbon electricity generation

Additional low-carbon electricity generation assets will be needed in every country, even in countries with already low-carbon electricity mix. As big electricity consumers, companies shall contribute to enabling more low-carbon electricity generation assets to be connected to the grid, by direct or indirect investment, if they do not self-produce their own low-carbon electricity.

The criterion to define low-carbon electricity was chosen because it is now rather widely used in ambitious climate frameworks, such as the EU taxonomy (27) and Climate Bond taxonomy (30). This criterion can evolve in further updates of the methodology.

Dimension 3:

Heat and steam are two important energy vectors in the chemicals sector that need to be decarbonized.

SCORING RATIONALE

The three dimensions of this indicator are equally weighted to reflect the importance of all topics:

- Energy-related policy of the company, the chemicals sector being the most energy-intensive heavy industry
- Low-carbon electricity generation is a big decarbonization lever, all sectoral scenarios highlight the importance of electrification and consumption of low-carbon electricity to produce chemicals and more widely other materials
- Heat is also a significant source of energy consumed by the chemicals sector, it is thus of prime importance to get it from low-carbon sources

INTANGIBLE INVESTMENT (WEIGHTING: 10%)

- **CH 3.1 R&D SPENDING IN LOW-CARBON, MITIGATION AND CARBON REMOVAL TECHNOLOGIES**

DESCRIPTION & REQUIREMENTS

CH 3.1 R&D SPENDING IN LOW-CARBON, MITIGATION AND CARBON REMOVAL TECHNOLOGIES

SHORT DESCRIPTION OF INDICATOR

A measure of the ratio of R&D costs/investments in low-carbon, mitigation and carbon removal technologies. The indicator identifies the ratio between the company's R&D investment in low-carbon, mitigation and carbon removal technologies and total R&D investments.

DATA REQUIREMENTS

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

- R&D costs/investments in low-carbon, mitigation and carbon removal technologies of the company.
- Total R&D costs/investments of the company

CDP Questionnaire 2023 mapping to this indicator:

- C C-CH9.6a

HOW THE ASSESSMENT WILL BE DONE

R&D INVESTMENT SHARE

The assessment is based on the ratio of the company's 'average annual R&D expenditure on low-carbon, mitigation and carbon removal technologies' to the company's 'average total annual capital expenditure in R&D'. The average expenditures are calculated over the three years prior to the ACT assessment.

See Module 2.4 for the definition of low-carbon, mitigation and carbon removal technologies.

Final Score

The score for this indicator is proportional to the company's share of planned low-carbon, carbon removal and mitigation technologies R&D expenditures. Thus, a company having 54% of its R&D spending devoted to low-carbon, carbon removal and mitigation technologies will score 100% while a company that does not invest any of its R&D spending in these technologies will score 0%.

Rationale

CH 3.1 R&D spending in low-carbon, mitigation and carbon removal technologies

Rationale of the indicator

Relevance of the indicator:

R&D spending in low-carbon technologies is included in the ACT Chemicals assessment for the following reasons:

- To enable the transition, sectors with heavy reliance on technology require the development of low-carbon solutions to replace their currently high-emitting production systems.
- R&D is one of the main proactive actions to develop these technologies, since many are not yet mature.
- R&D is also one of the main tools to reduce the costs of a technology in order to increase its market penetration.
- Aside from technology, companies can also invest in R&D on operational practices to optimize the carbon impact where they have direct responsibility.
- Lastly, the R&D investment of a company into non-mature technologies and practices allows for direct insight into the company's commitment to alternative technologies that may not currently be part of its main business model.

Scoring rationale

There is no science-based benchmark identified as of 2022 for the share of R&D expenses in low-carbon, mitigation and carbon removal technologies for the chemicals sector. As a proxy, it is proposed to use as a default value the same benchmark as the one used for the share of CAPEX in these technologies.

See Module 2.4 for the construction of the benchmark.

Relevance of the indicator's 3-year timescale

In order to prevent the calculated score from being too dependent on the conjuncture in the year of the ACT assessment, the average annual expenditure over the previous three years is adopted.

- **CH 3.2 Company Low-carbon Patenting Activity**

Description & Requirements

CH 3.2 Company low-carbon patenting activity

Short description of indicator

A measure of the company patenting activity related to low-carbon technologies. The indicator identifies the ratio between the company's patent activity for the last 5 years and average patenting activity linked to climate change of the sector.

Data requirements

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

- Patenting activity in climate change mitigation technologies of the company over the last 5 years.
- Total patenting activity of the company over the last 5 years

CDP Questionnaire 2023 mapping to this indicator:

- None

How the assessment will be done

Past low-carbon patents activity ratio

The assessment is based on the ratio of the company's patenting activity dedicated to climate change mitigation technologies over the last 5 years to the company's total patenting activity over the same span of time. If the company is developing open-source patents or makes them publicly available, this should be positively reflected in the ACT narrative score.

Defining Climate Change Mitigation Technologies Patents :

The indicator focuses on patents that mitigate climate change. The European Patent Office (EPO) and the US Patent and Trademark Office (USPTO) have developed a dedicated patent classification scheme (Cooperative Patent Classification – CPC) which details patents for climate change mitigation or technologies:

- Y02B – CCMTs related to buildings
- Y02C – Capture, storage, sequestration or disposal of greenhouse gases
- Y02E – Reduction of greenhouse gas emissions, related to energy generation, transmission or distribution

- Y02P – CCMTs relating to production in energy-intensive industries
- Y02T – CCMTs related to transportation
- Y02W – CCMTs related to wastewater treatment or waste management

(EPO, 2017)

Final Score

The ratio 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 Climate Change Mitigation Technologies (CCMTs) patenting activity.

The matrix is provided below:

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the share of patents in climate change mitigation technologies (CCMTs) compared to the total patent activity over the last 5 years?	The share of CCMTs patents is below 20% of total patents	The share of CCMTs patents is between 21% and 40% of total patents	The share of CCMTs patents is between 41% and 60% of total patents	The share of CCMTs patents is between 61% and 80% of total patents	The share of CCMTs patents is above 80% of total patents	***80%***
Are the technologies patented in open source?	No, they are not		Yes, some are		Yes, 100% are	***20%***

Rationale

CH 3.2 Company Low-carbon Patenting Activity

Rationale of the indicator

Relevance of the indicator

The indicator on CCMTs patenting activity is complementary to the one dedicated to R&D in low-carbon technologies, as it monitors the technology diffusion whereas R&D expenditures monitor the technology development. It is included in this ACT Chemicals Methodology for the following reasons:

- To enable the transition, sectors with heavy reliance on technology require the development of low-carbon solutions to replace their currently high-emitting production systems.
- Patent data are commensurable because patents are based on an objective standard (OECD 2015)
- Patent data measure intermediate outputs of an inventive process, whereas R&D data expenditures measure the input (OECD 2015)
- Patent data can be disaggregated into specific technological fields (OECD 2015)

Relevance of the indicator's 5-year time horizon

Patent applications are typically disclosed 18 months after their filing date (OECD 2015). To avoid the effects of this "publication lag" and smooth the ratio used for the assessment, the indicator monitors the last 5 years of the company's patenting activity.

SOLD PRODUCT PERFORMANCE (WEIGHTING: 2-24%)

- **CH 4.1 Trend in past- Scope 3 upstream emissions**

Description & Requirements

CH 4.1 Trend in past – Scope 3 upstream emissions

Short description of indicator

A measure of the alignment of the company's past purchased product absolute emissions trend with its low-carbon benchmark pathway. The indicator will compare the gradient of this trend over a 5-year period to the reporting year (reporting year minus 5 years) with the low-carbon benchmark pathway trend over a 5-year period after the reporting year.

Data requirements

The relevant data for this indicator are:

- Sold product absolute emissions and activity at reporting year and Y-5. Absolute emissions shall encompass at least:
  - Emissions from the production of feedstock (scope 3 upstream)

When not directly available, emissions can be estimated from secondary data and default modelling parameters (such as the ADEME Base Carbone).

CDP Questionnaire 2023 mapping to this indicator:

- C6.5
- C6.5a
- C-CH7.8

The benchmark indicators involved are:

TRENDS	BENCHMARK TYPE	METRIC	BENCHMARK
Scope 3 upstream absolute emissions	ACA	tCO_2e	WB-2˚C – SBTi

- "tCO_2e" corresponds to the emission of CO_2 equivalent related to the scope 3 upstream of the company. The emissions are gross emissions.

HOW THE ASSESSMENT WILL BE DONE

To calculate this indicator, the company must report its past upstream emissions over the 5 years before the reporting year. Upstream emissions cover the emissions from the manufacture of feedstocks. These emissions shall be reported for:

- All primary chemicals produced by the company
- All chemicals and products that are bought by the company

The analysis is based on the comparison between the company's recent (reporting year minus 5 years) scope 3 upstream absolute emissions trend gradient (CR'_{S12}) and the company's decarbonization pathway trend gradient (CB'_{S12}) in the short-term (reporting year plus 5 years).

CR'_{S3} is the gradient of the linear trend-line of the company's recent scope 3 upstream absolute emissions (tCO_2e) over time (CR_{S3}).

CB'_{S3} is the gradient of the linear trend-line of the company benchmark pathway for absolute emissions (tCO_2e) (CB_{S3}). See in section 6.1 Quantitative benchmarks used for the indicators for details on the calculation of the company-specific decarbonization pathway.

The difference between CR'_{S3} and CB'_{S3} will be measured by their ratio (r_{S12}). This is the scope 3 upstream emissions Transition ratio, which is calculated by the following equation, with the symbol 'used to denote gradients:

$$R_{S3} = \frac{CR'_{S3}}{CB'_{S3}}$$

CALCULATION OF SCORE:

The Absolute Contraction Approach (ACA, see section 6.1) is used.

- Case #1: CR'_{S3} is positive → Score = 0
- Case #2: CR'_{S3} is negative and $0 < R_{S3} < 1$ → Score = R_{S3} (expressed as a percentage)
- Case #3: CR'_{S3} is negative and $R_{S3} \geq 1$ → Score = 100 %

RATIONALE

CH 4.1 TREND IN PAST – SCOPE 3 UPSTREAM EMISSIONS

Rationale of the indicator

Relevance of the indicator

Trend in past is included in the ACT Chemicals Methodology for the following reasons:

- The trend shows the speed at which the company has been reducing its absolute emissions over the recent past. Comparing this to the low-carbon transition pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- While ACT aims to be as future-oriented, it nevertheless does not want to solely rely on projections of the future, in a way that would make the analysis too vulnerable to the uncertainty of those projections.

Most of the emissions attributable to chemicals companies come from the upstream part of the value chain (manufacture of feedstocks). Besides, most of the levers of chemicals companies regarding their scope 3 are relative to the feedstock they use. They can significantly reduce their upstream emissions by selecting their feedstocks.

Scoring rationale

While 'gap type' scoring is preferred for any indicator where possible, this indicator looks at past emissions and would therefore require a different baseline in order to generate a gap method. Consequently, 'trend type' scoring is preferred here. Another 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 generated from the resulting ratio.

• CH 4.2 Trend in future – Scope 3 upstream emissions

Description & Requirements

CH 4.2 Trend in future – Scope 3 product upstream emissions

Short description of indicator

A measure of the alignment of the company's future sold or purchased product absolute emissions trend with its low-carbon benchmark pathway. The indicator will compare the gradient of this trend with the low-carbon benchmark pathway trend over a 5-year period after the reporting year.

Data requirements

The relevant data for this indicator are:

- Sold product absolute emissions and activity at reporting year and projected for Y+5. Absolute emissions shall encompass at least:
  - Emissions from the production of feedstock (scope 3 upstream)

When not directly available, emissions can be estimated from secondary data and default modelling parameters (such as the ADEME Base Carbone).

CDP Questionnaire 2023 mapping to this indicator:

- C6.5
- Future emissions data is not collected by CDP

The benchmark indicators involved are:

TRENDS	BENCHMARK TYPE	METRIC	BENCHMARK
Scope 3 absolute upstream emissions	ACA	tCO_2e	WB-2˚C – SBTi

- "tCO_2e" corresponds to the emission of CO_2 equivalent related to the scope 3 upstream of the company. The emissions are gross emissions.

How the assessment will be done

To calculate this indicator, the company must report its future upstream emissions up to the 5 years after the reporting year. Upstream emissions cover the emissions from the manufacture of feedstocks. These emissions shall be reported for:

- All primary chemicals produced by the company
- All chemicals and products that are bought by the company

The analysis is based on the Future Action ratio (A_{future}) which represents the ratio between the company's future (reporting year plus 5 years) emissions from sold product performance trend gradient and the company's future benchmark (reporting year plus 5 years) emission trend gradient.

CALCULATION OF SCORE:

Future Action ratio (A_{future}) is calculated by dividing the company's future emission from sold product performance trend (between reporting year and reporting year plus 5 years) and the future benchmark emission (between reporting year and reporting year plus 5 years):

$$A_{future} = \frac{E_c(Y_R) - E_c(Y_{R+5})}{E_B(Y_R) - E_B(Y_{R+5})}$$

where $E_c(Y_R)$ represents the company upstream scope 3 absolute emissions at reporting year, $E_c(Y_{R+5})$ represents the company upstream scope 3 absolute emissions at reporting year plus 5 years, $E_B(Y_R)$ is the benchmark emission at reporting year and $E_B(Y_{R+5})$ is the benchmark emission at reporting year plus 5 years.

The action gap of the company is equal to $(1 - A_{future})$. Thus, when the company's future emissions pathway is aligned with the company's benchmark, the Future Action ratio is equal to 1 and the action gap is 0.

The final score assigned to the indicator is calculated as follows (see 0 for a graphic illustration of the different cases):

Conditions	Score
$Company's\ future\ trend > 0$ Increase in company emissions	0%
$Company's\ future\ trend \leq 0$ et $E_C(Y_R) > E_B(Y_{R+5})$ $0 \leq A_{future} \leq 1$ Decrease in company emissions but company's pathway does not go beyond the company's benchmark ambition	$A_{future} \times 100\%$
$Company's\ future\ trend < 0$ $A_{future} > 1$	100%

Decrease in company emissions and company's pathway equals or exceeds the company's benchmark ambition	
$Company's\ future\ trend \leq 0\ and\ E_C(Y_R) \leq E_B(Y_{R+5})$ No increase in company emissions and company's emissions is already below the company's benchmark ambition for year+5.	100%

RATIONALE **CH 4.2 TREND IN FUTURE – SCOPE 3 UPSTREAM EMISSIONS**

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR

Trends in future products specific performance are included in the ACT Chemicals Methodology for the following reasons:

- The trend shows the speed at which the company needs to reduce its absolute emissions in the coming years. Comparing this to the low-carbon benchmark pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- ACT aims to be future-oriented. Therefore, this particular indicator, with projected absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future.

Most of the emissions attributable to chemicals companies come from the upstream part of the value chain (manufacture of feedstocks). Besides, most of the levers of chemicals companies regarding their scope 3 are relative to the feedstock they use. They can significantly reduce their upstream emissions by selecting their feedstocks.

SCORING RATIONALE

Comparing the trends gives a direct measure of the future action gap of the company. It was chosen for its relative simplicity in interpretation; it is aligned with most of the other forward-looking indicators. Indeed, the indicator looks at a fixed point in the future and assesses the capacity of the company to deploy a range of low-carbon products in the short term.

Description & Requirements

CH 4.3 Low-carbon Hydrogen as a feedstock

Short description of indicator

The indicator aims at assessing the alignment of the feedstock used for hydrogen-based chemicals (ammonia, methanol) production to a below 2°C scenario.

Data requirements

The relevant data for this indicator is the share of ammonia and methanol produced from electrolysis-based hydrogen.

CDP Questionnaire 2023 mapping to this indicator:

- C-CH8.3b

How the assessment will be done

The share of low-carbon feedstock will be compared to the maturity matrix developed to guide the scoring and a higher score will be allocated for companies witha higher share of electrolysis-based hydrogen as feedstock for the production of ammonia and methanol.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	0%	25%	50%	75%	100%	
What is the share of ammonia produced with electrolysis-based hydrogen?	The share of ammonia produced with electrolysis-based hydrogen is below 5% of total weight of ammonia produced	The share of ammonia produced with electrolysis-based hydrogen is below 15% of total weight of ammonia produced	The share of ammonia produced with electrolysis-based hydrogen is below 30% of total weight of ammonia produced	The share of ammonia produced with electrolysis-based hydrogen is below 50% of total weight of ammonia produced	The share of ammonia produced with electrolysis-based hydrogen is above 50% of total weight of ammonia produced	**50% x ($A_a/(A_a+A_m)$) ***
What is the share of methanol produced with electrolysis-based hydrogen?	The share of methanol produced with electrolysis-based hydrogen is below 10% of total weight of methanol produced	The share of methanol produced with electrolysis-based hydrogen is below 25% of total weight of methanol produced	The share of methanol produced with electrolysis-based hydrogen is below 45% of total weight of methanol produced	The share of methanol produced with electrolysis-based hydrogen is below 75% of total weight of methanol produced	The share of methanol produced with electrolysis-based hydrogen is above 75% of total weight of methanol produced	**50% x ($A_m/(A_a+A_m)$) ***

Out of the hydrogen produced through electrolysis, what is the share that comes from low-carbon[15] electricity sources?	Less than 25% or unknown	25% to 49%	50% to 70%	71% to 90%	More than 90%	**50%**

*A_m = Amount of produced Methanol (tons) reported by company

A_a = Amount of produced Ammonia (tons) reported by company

RATIONALE

CH 4.3 LOW-CARBON HYDROGEN AS A FEEDSTOCK

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR

The indicator aims at addressing the specific cases of ammonia and methanol production.

Regarding ammonia, almost 100% (31) of hydrogen used as an input for the production of ammonia through the Haber-Bosch process today comes from fossil fuels. As decarbonizing ammonia production cannot be performed without de-fossilizing its feedstock, this indicator accounts for the share of feedstock derived from electrolysis for its lower carbon content.

Regarding methanol; almost all hydrogen used as an input for the production of methanol today comes from fossil fuels (32). As decarbonizing methanol production cannot be performed without de-fossilizing its feedstock, this indicator accounts for the share of feedstock derived from electrolysis for its lower carbon content.

- Note that other feedstocks are possible to reduce the carbon footprint of the chemical production – these will be recognized under other indicators (such as CH 2.2, 4.1, 4.2, etc.).

SCORING RATIONALE

The Clean Technology Scenario for Europe (4) was used as a benchmark to provide the low-carbon aligned threshold of the maturity matrix.

[15] See indicator 2.5 Energy management to get criteria defining electricity as low-carbon

DESCRIPTION & REQUIREMENTS

CH 4.4 ALTERNATIVE FEEDSTOCKS FOR PETROCHEMICAL-BASED PRODUCTS

SHORT DESCRIPTION OF INDICATOR

The indicator aims at assessing alternative sources of feedstocks for chemicals production relying on fossil fuel feedstocks, namely:

- HVC (ethylene, propylene, butadiene, BTX)
- Carbon Black

DATA REQUIREMENTS

- Share of bio-based content within the products sold (by weight) at Y

CDP Questionnaire 2023 mapping to this indicator:

  - C-CH8.3b

- Share of chemicals produced thanks to methanol-to-olefins (MTO) and methanol-to-aromatics (MTA) processes (by weight) at Y

HOW THE ASSESSMENT WILL BE DONE

This indicator is based on two dimensions, related to the share of alternative ways to produce HVC to avoid conventional routes based on fossil-fuel feedstocks.

DIMENSION 1 – BIO-BASED FEEDSTOCK

The share of bio-based products and sourcing certification will be compared to the maturity matrix developed to guide the scoring. A greater number of points will be allocated for companies indicating a higher level of maturity, which means a higher share of bio-based production and sourcing certification.

DEFINING BIO-BASED CONTENT:

- Bio-based feedstock is eligible if it is produced from the advanced feedstock listed in Part A of Annex IX of Directive (EU) 2018/2001.

- The company assessed shall provide elements of proof regarding the provenance of its bio-sourced feedstock (including if the company purchases intermediate chemical products with a percentage of bio-based content incorporated upstream in the value chain)
- The analyst will check the robustness of the certifications provided

DEFINING STANDARDS CERTIFYING THE SUSTAINABLE SOURCING OF BIO-BASED FEEDSTOCK:

- A list of international certification schemes that demonstrate compliance with the sustainability criteria for biofuels and biomass as set by the Renewable Energy Directive (EU) 2018/2001 is available at the following link: https://ec.europa.eu/energy/topics/renewable-energy/biofuels/voluntary-schemes_en.
- The analyst will check the robustness of the certifications provided.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	0%	25%	50%	75%	100%	
What is the share of production from bio-based feedstock (% of weight)?	The share of production from bio-based feedstock is below 1% of total weight of products produced	The share of production from bio-based feedstock is below 2% of total weight of products produced	The share of production from bio-based feedstock is below 3% of total weight of products produced	The share of production from bio-based feedstock is below 4% of total weight of products produced	The share of production from bio-based feedstock is above 4% of total weight of products produced	***50%***
Is the sustainable sourcing of the bio-based feedstock purchased by the company certified?	Less than **25%** of bio-based feedstock purchased by the company is certified by an international standard	The sustainable sourcing of **25% to 49%** of bio-based feedstock purchased by the company is certified by an international standard	The sustainable sourcing of **50% to 70%** of bio-based feedstock purchased by the company is certified by an international standard	The sustainable sourcing of **71% to 90%** of bio-based feedstock purchased by the company is certified by an international standard	The sustainable sourcing of **91% to 100%** of bio-based feedstock purchased by the company is certified by an international standard	***50%***

DIMENSION 2 – METHANOL-BASED PROCESSES (NOT APPLICABLE FOR BUTADIENE[16] AND CARBON BLACK)

The share of HVC resulting from methanol-to-olefins (MTO) and methanol-to-aromatics (MTA) processes, as well as the type of feedstock and energy used to feed the processes, will be compared to the maturity matrix developed to guide the scoring. A greater number of points will be allocated for companies indicating a higher level of maturity, which means a higher share of HVC resulting from MTO/MTA processes and low-carbon feedstock and energy.

MTO/MTA PROCESSES:

Methanol-to-olefins (MTO) and methanol-to-aromatics (MTA) are two families of processes that propose an interesting alternative for ethylene/propylene and BTX production, respectively, compared to conventional routes relying on fossil-fuel feedstocks. These processes have been identified by ShareAction as the most reliable way to produce HVC with limited related GHG emissions (33).

Three parameters are important to consider to ensure that MTO/MTA processes produce HVC with a lower GHG intensity compared to conventional routes (8):

- Low-carbon hydrogen as a feedstock
- CO_2 which is captured and reused as a feedstock
- Low-carbon sources of energy to run the MTO/MTA processes

[16] Butadiene can be obtained using ethanol as a feedstock, but the dedicated processes are far less mature than MTO/MTA ones. (63)

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the share of production of ethylene/propylene and BTX based on MTO and MTA processes?	The share of production resulting from MTO/MTA processes is below 1% of total weight of products	The share of production resulting from MTO/MTA processes is below 2% of total weight of products	The share of production resulting from MTO/MTA processes is below 3% of total weight of products	The share of production resulting from MTO/MTA processes is below 4% of total weight of products	The share of production resulting from MTO/MTA processes is above 4% of total weight of products	***50%***
What are the hydrogen[17] and CO_2 production routes and are the MTO/MTA processes fed with low-carbon electricity[18]?	-	Methanol production: low-carbon hydrogen is used or CO_2 is captured and reused	Methanol production: low-carbon hydrogen is used + CO_2 is captured and reused	Methanol production: low-carbon hydrogen is used + CO_2 is captured and reused MTO/MTA processes: run by at least 50% low-carbon energy electricity	Methanol production: low-carbon hydrogen is used + CO_2 is captured and reused MTO/MTA processes: run by at least 90% low-carbon energy electricity	***50%***

AGGREGATE SCORE – DIMENSION 1: 1/2, DIMENSION 2: 1/2.

Since all companies cannot be expected to use various processes, the assessed company can choose to be evaluated either against dimension 1 or 2. This is possible only for producers of ethylene, propylene and BTX. Companies producing butadiene or carbon black have to be assessed against dimension 1.

When only one dimension is used, then the score obtained gives the total score of the indicator 4.4. Otherwise, when the two dimensions are used, the respective scores are equally weighted (50%/50%).

[17] Hydrogen can be considered as "low-carbon" if it follows the EU taxonomy criteria. See section 3.10 Manufacture of hydrogen from delegated act (2021).

[18] See indicator 2.5 Energy management to get criteria defining electricity as low-carbon

CH 4.4 ALTERNATIVE FEEDSTOCKS FOR PETROCHEMICAL-BASED PRODUCTS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR

Moving away from fossil fuels as feedstocks to feed the chemicals value chain is identified as a strong lever to decarbonize the sector. Indeed, the carbon that is embedded in the chemicals resulting from fossil fuels will at some point be released into the atmosphere. Finding new sources of carbon is essential and the main solutions so far are related to bio-based feedstocks and methanol resulting from low-carbon hydrogen and reused carbon dioxide.

- Sourcing in a sustainable way and incorporating bio-based material within products can prove more energy-intensive than the conventional fossil-based technological route. This increase in energy consumption and associated GHG emissions, whether within the company's perimeter or upstream, will not be fully captured by this indicator – it will however be reflected in the company's scope 3 upstream emissions in indicators 1.2, 4.1 and 4.2 and in the company's scope 1+2 emissions in indicators 1.1, 2.1 and 2.2.

Chemical recycling technologies, which allow HVC to be produced from plastics, are not considered here. This is because these technologies are not mature enough yet and the emissions intensity of such processes may exceed those from conventional production routes, due to huge energy demand. Related activities are however mentioned in Module 9 (Business model) and can be rewarded if relevant.

SCORING RATIONALE

For bio-based feedstocks in HVC production, the Clean Technology Scenario for Europe (4) was used as a benchmark to provide the low-carbon aligned threshold of the maturity matrix. The same scale is applied to carbon black since no related scenario has been found to date.

For HVC production based on MTO/MTA processes, the Clean Technology Scenario for World (4) was used as a benchmark to provide the low-carbon aligned threshold of the maturity matrix.

- **CH 4.5 Inorganic chemistry yield & valorisation**

Description & Requirements	**CH 4.5 Inorganic chemistry yield & valorisation**
Short description of indicator	An analysis of how the company identifies its feedstock(s), monitors the yield of the chemical reactions involved in the processes and valorises the by-product(s) (if any). The indicator is specific to the production of the following primary chemicals: ♦ Caustic soda ♦ Chlorine ♦ Silicon ♦ Soda ash ♦ Sulfuric acid ♦ Titanium dioxide
Data requirements	The relevant data for this indicator are: ♦ Nature of feedstock(s) ♦ Process yield at Y ♦ Share of valorised by-products at Y CDP Questionnaire 2023 mapping to this indicator: ♦ None
How the assessment will be done	The assessment is based on various parameters that highlight how the company is trying to optimize the way feedstocks are used. **Calculation of score:** The yield and share of valorised by-products 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 yield in comparison to the theoretical yield and higher share of by-products valorised. The matrix is provided below:

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting**
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Has the company identified and compared all feedstocks necessary for its production?	No		Various sources of feedstock are identified but none of them have been discarded due to environmental criteria		Various sources of feedstock are identified and some of them have been discarded, choices being guided by the environmental impact of these sources	***25%***
Is the company able to compare its process yield of the chemical reaction against the theoretical one?	No	Yes, the gap between the two values is significant (more than 50%)	Yes, the gap between the two values is reasonable (less than 30%)	Yes, the gap between the two values is reasonable (less than 20%)	Yes, the gap between the two values is reasonable (less than 10%) (or equal to the yield of identified BATs for the considered product)	***25%***
Is the process yield of the chemical reaction monitored?	No		The yield is monitored, remedial actions are planned and taken if needed		The yield is continuously monitored, remedial actions are planned and taken if needed Efforts are made to continuously try to improve the yield	***25%***
Are by-products valorized? *	No	Partially valorized (less than 25%)	Partially valorized (between 25% and 50%)	Highly valorized (between 50% and 90%)	Nearly entirely valorized (more than 90%)	***25%***

(*): Applicable only for Chlorine, Caustic soda and Sulfuric acid productions.

(**): in the case where the question related to by-products is not considered, then the weighting is equally distributed to the three remaining questions, with a sub-score of 1/3 each.

Rationale

CH 4.5 Inorganic chemistry yield & valorisation

Rationale of the indicator

Relevance of the indicator:

This indicator aims at offering a way of assessing how well the feedstocks are used for inorganic chemistry. It is not relevant to consider “bio-based” (or renewable) feedstock, as for organic chemistry here. Furthermore, recyclability is highly limited (when not impossible) for inorganic products. Still, it is relevant to have a look at inorganic feedstocks, namely mineral ores and salts/brines (air not being taken into account), at least for two reasons. First, they are not renewable and thus available in finite quantities. Secondly, these feedstocks are obtained thanks to various operations (including mining, physical treatment, etc.) that often have a significant impact, either as a source of pollution and/or demanding significant amounts of energy to be run.

The choice of feedstock(s), monitoring of the yield and the valorisation of by-products by the company are included in the ACT Chemicals Methodology for the following reasons:

- In many cases, various feedstocks (i.e., different mineral ores or salts/brines) can be used to ensure the production of a primary chemical. Some are known to enable more efficient chemical reactions and should therefore be valorised.
- The comparison of the yield against a theoretical yield assesses whether a company takes action to avoid waste and therefore limit its consumption of raw materials. It is also important to ensure that the process does not see its efficiency decrease significantly over time.
- The valorisation of by-products promotes the effective use of raw resources. Besides, it enables the development of new market segments to add value to a product or service

Scoring rationale

As there is no quantitative benchmark for the expected yield or the valorisation of by-products, the best way to assess the performance in this indicator is to use a maturity matrix. Since none of the addressed topics are considered more important than the others, the weightings are equally distributed.

Management (Weighting: 12%)

- **CH 5.1 Oversight of climate change issues**

Description & Requirements	**CH 5.1 Oversight of climate change issues**
Short description of indicator	The company discloses that responsibility for climate change mitigation within the company lies at the highest level of decision-making within the company structure.
Data requirements	The relevant data for this indicator are: ♦ Details on where is the highest level of direct responsibility for climate change within the organization ♦ Position of the individual or name of the committee with this responsibility and outline their expertise regarding climate change and the low-carbon transition CDP 2023 Questionnaire mapping to this indicator: ♦ C1.1 ♦ C1.1a ♦ C1.2 External sources of data may also be used for the analysis of this indicator.
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 position at which climate change is managed within the company structure is determined from the company data submission and accompanying evidence. For small companies, or for cases in which the corporate structure does not match the structure of the maturity matrix, the assessor should assign a score based on the company's specific hierarchy (i.e., if responsibility for climate change mitigation lies at the highest level of decision-making within the organization, award "Low-carbon aligned". If responsibility lies one level below the highest level, award "Next practice", etc.).

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the position of the employee/ committee with highest responsibility for climate change mitigation issues?	**No one in charge of climate change issues**	**Level 4 (see guidance)***	**Level 3 (see guidance)***	**Level 2 (see guidance)***	**Level 1 (see guidance)***	***100%***

* Further guidance for each level of seniority is given below:
    - Level 1
        - Highest level of accountability or decision-making within the organization, with responsibility for overall organizational or corporate strategic direction.
        - Examples: Board, sub-set of the Board, Chief Executive Officer (CEO)
    - Level 2
        - Person/committee that is one step in the corporate structure from the highest level of decision-making of the organization (i.e. reports to or is accountable to Level 1). Inputs into organizational strategy but does not make decisions on it. May have responsibility and accountability for business unit strategy formation and implementation of one or more business units.
        - Examples: Vice President, Director, other C-Suite officer (e.g., Chief Financial Officer (CFO), Chief Procurement Officer (CPO), Chief Risk Officer (CRO), Chief Operating Officer (COO), Chief Sustainability Officer (CSO), etc.), other committee appointed by the Board
    - Level 3
        - Person/committee that is two steps in the corporate structure from the highest level of decision-making of the organization. May have responsibility and accountability for business unit strategy formation and implementation for one business unit.
        - Examples: Manager, Senior Manager
    - Level 4
        - Person/committee that is three or more steps in the corporate structure from the highest level of decision-making of the organization. No responsibility or accountability for business unit strategy development.
        - Examples: Officer, Senior Officer

Rationale	**CH 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 chemicals 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.

- **CH 5.2 Climate change oversight capability**

Description & Requirements	**CH 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 consumption drivers that can disrupt current business. This expertise is used by the individual or committee to inform high-level decision-making within the company.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ Position of the individual or name of the committee with this responsibility and outline their expertise regarding climate change and the low-carbon transition CDP Questionnaire 2023 mapping to this indicator: ♦ C1.1 ♦ C1.1a ♦ C1.1d ♦ C1.2 External sources of data may also be used for the analysis of this indicator.

How the assessment will be done

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

The analyst determines if the company has expertise as evidenced through a named expert biography outlining capabilities. A cross check is performed against 5.1 on the highest responsibility for climate change, the expertise should exist at the level identified. To be awarded Low-carbon aligned, the company must provide examples of how the individual or committee's expertise has informed strategic investment planning and/or decision-making processes.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Does the individual or committee with oversight of climate change issues (as reported in indicator 5.1) have relevant climate change- and low-carbon transition-related expertise*?	The employee/committee does not meet any of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 1 of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 2 of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 3 or more of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 3 or more of the characteristics of climate change- and low-carbon transition-related expertise*. Expertise systematically informs strategic investment planning/decision-making processes.	***100%***

* "Characteristics of climate change- and low-carbon transition-related expertise" include:
  - Academic/professional qualification related to climate change and the low-carbon transition, including an understanding of the impacts and risks, and the solutions to implement (e.g., Bachelors, Masters, Doctorate, professional certification, diploma, etc.)
    - A purely energy-related background with no relationship to climate change and the low-carbon transition is not enough to qualify as expertise.

- Recent (i.e., within last 10 years) professional experience related to climate change and the low-carbon transition (e.g., previous employment in climate change/low-carbon transition-related role, or with a climate change/low-carbon transition-related organisation, etc.)
- Recent (i.e., within last 10 years)/active membership of organisation(s) driving corporate knowledge and action on climate change and the low-carbon transition (e.g., World Business Council For Sustainable Development, Solar Energy Industry Association, etc.)
- Technical knowledge related to climate change and the low-carbon transition, evidenced through recently (i.e., within last 10 years) published outputs written by the individual/committee (e.g., statements, reports, etc.)

- **CH 5.3 Low-carbon transition plan**

Description & Requirements	**CH 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 questions comprising the information request that are relevant to this indicator are: ♦ Details on the organization's low-carbon transition plan CDP 2023 Questionnaire mapping to this indicator: ♦ C3.1 ♦ C3.3 ♦ C3.4 External sources of data may also be used for the analysis of this indicator.
How the assessment will be done	From the 2021 CDP Transition Plans discussion paper: "A climate transition plan is a time-bound action plan that clearly outlines how an organization will achieve its strategy to pivot its existing assets, operations, and entire business model towards a trajectory that aligns with the latest and most ambitious climate science recommendations, i.e., halving greenhouse gas (GHG) emissions by 2030 and reaching net-zero by 2050 at the latest, thereby limiting global warming to 1.5°C." (34). Other initiatives also develop their own definition, which are quite similar (IFRS – International Financial Reporting Standards, TCFD – Task Force on Climate-Related Financial

Disclosures, EFRAG – European Financial Reporting Advisory Group, TPT – UK Transition Plan Task Force, GFANZ – Glasgow Financial Alliance for Net Zero).

The analyst evaluates 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 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.

Among the best practice elements identified to date are:

- The plan includes financial projections
- The plan should include cost estimates or other assessments of financial viability as part of its preparation
- The description of the major changes to the business is comprehensive, consistent, aligned with other indicators
- Quantitative estimates 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
- Potential "shocks" or stressors (sudden adverse changes) have been taken into consideration
- Relevant region-specific considerations are included
- The 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
- The plan's measure of success is quantitative
- The description of relevant testing/analysis that influenced the transition plan is included
- The plan is consistent with reporting against other ACT indicators
- The scope should cover all business units / operations and the rest of the value chain (upstream and downstream). The plan should cover the short, medium and long terms. From now or the near future <5 years, until at least 2035 and preferably beyond (2050)
- The plan contains details of actions the company realistically expects to implement (and these actions are relevant and realistic)
- The plan is approved at the strategic level within the organisation
- Discussions about the potential impacts of a low-carbon transition on the current business have been included
- The company has a publicly-acknowledged science-based target (SBT)

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Measure of success	No measure of success		At least one measure of success which is fully SMART* and contains both qualitative and		More than one measure of success. All measures of success are fully SMART*, contain	***100%/9***

			quantitative elements.		both qualitative and quantitative elements, and are aligned with a low-carbon scenario.	
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 quantified in some 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 financial changes to the business over all timescales is comprehensive and aligned with other indicators. The transition plan is integrated into the overall business strategy of the organization and linked to the profit and loss statement.	***100%/9***
Short-term actions (recent past up to reporting year + 5 years)	Contains no discussion of short-term actions.		Contains examples of short-term actions the company expects to implement. .		Contains detailed descriptions of relevant and achievable short-term actions the company expects to implement to make the transition a reality.	***100%/9***
Long-term actions and vision (from reporting year + 5 years onwards)	Contains no discussion of long-term actions or vision.		Contains descriptions of long-term actions the company expects to implement to make the transition a reality.		Contains descriptions of long-term actions the company expects to implement to make the transition a reality.	***100%/9***

					Contains a vision of what the far-future company could look like in terms of physical assets and business model.	
Scope	Scope of transition plan is not defined.	Transition plan applies only to specific business units / operations (representing less than 50% of company's GHG emissions).	Transition plan applies only to specific business units / operations (representing more than 50% of company's GHG emissions).	Transition plan applies to all business units / operations,	Transition plan applies to all business units / operations and the rest of the value chain (upstream and downstream). Any exclusions from the plan must not be material to the organization in terms of GHG emissions.	***100%/9***
Implementation of results of scenario testing	The results of the company's scenario testing (as assessed in Indicator 5.5 – Scenario testing) have not informed the development of the company's transition plan.				The results of the company's scenario testing (as assessed in Indicator 5.5 – Scenario testing) have informed the development of the company's transition plan.	***100%/9***
Transition plan timescale†	Covers only short term, from reporting year until (RY + 3 years)	Covers only short and medium term, from reporting year until (RY + 4 to 10 years)	Covers short, medium and long term, from reporting year until (RY + 11 to 20 years)	Covers short, medium and long term, from reporting year until (RY + 21 years to 2049)	Covers short, medium and long term, from reporting year until 2050 or beyond	***100%/9***

Review and update process	No transition plan review and update process is in place.	Commitment to review and update transition plan, but no defined timescale or process.	Commitment to review and update transition plan, with either a defined timescale or process.	Commitment to review and update transition plan less often than every 5 years, with a defined process.	Commitment to review and update transition plan at least every 5 years for continuous relevancy and efficacy, with a defined process.	***100%/9***
Progress reporting process	No transition plan progress reporting process is in place.	Commitment to report progress against the transition plan and any material changes, but no defined timescale or stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes, with either a defined timescale or stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes less often than annually, with a defined stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes annually, with a defined stakeholder feedback process (e.g., shareholders and AGMs).	***100%/9***

∗ A measure of success is considered "fully SMART" if it meets each of the following SMART elements (35):

1. Specific: the measure of success is explicit, with no room for misinterpretation.
2. Measurable: the measure of success is measurable, and it will be clear when it has been achieved.
3. Achievable: the measure of success is stretching and ambitious, but not so much that it is unachievable.
4. Relevant: the measure of success contributes to the organisation's overall objectives, and complements other measures of success.
5. Time-bound: the measure of success has a set deadline.

† Companies aiming to achieve their low-carbon transition (e.g., reach net-zero emissions) any year before 2050 and maintain or improve this low-carbon state beyond this specified year, should score Low-carbon aligned. This indicator aims to penalize companies whose transition plans are neither sufficiently long-term, nor sufficiently ambitious (i.e., do not contain a net-zero commitment).

RATIONALE

CH 5.3 LOW-CARBON TRANSITION PLAN

RATIONALE OF THE INDICATOR

The chemicals sector will require substantial changes 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.

- **CH 5.4 Climate change management incentives**

Description & Requirements	**CH 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 financial incentives for the management of climate change issues as defined by a series of relevant indicators.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ IS5.D: Whether the company provides incentives for the management of climate change issues, including the attainment of targets? ♦ IS5.E: Details on the incentives provided for the management of climate change issues CDP 2023 Questionnaire mapping to this indicator: ♦ C1.3 ♦ C1.3a External sources of data may also be used for the analysis of this indicator.
How the assessment will be done	The analyst verifies if the company has compensation incentives set for senior executive compensation and/or bonuses, that directly and routinely reward specific, measurable reductions of tons of carbon emitted by the company in the preceding year and/or the future attainment of emissions reduction targets, or other metrics related to the company's low-carbon transition plan. For small companies, or for cases in which the corporate structure does not match the structure of the maturity matrix, the assessor should assign a score based on the company's specific hierarchy (i.e., if climate change management incentives are awarded to the highest level of decision-making within the organization, award "Low-carbon aligned". If incentives are available one level below the highest level, award "Next practice", etc.).

Note: the wording of the “What is the type of incentive” is based on the Executive Compensation Guidebook for Climate Transition developed by Willis Towers Watson, in partnership with the Climate Governance Initiative, a project in collaboration with the World Economic Forum (36).

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Who is entitled to benefit?	Any other answer	Level 4 (see guidance)*	Level 3 (see guidance)*	Level 2 (see guidance)*	Level 1 (see guidance)*	***50%***
What is the type of incentive?	No incentives	The company has introduced climate metrics (key performance indicators (KPIs)), including metrics related to GHG emissions reductions, within annual bonuses (or other short-term incentive plans).		The company has introduced climate metrics (key performance indicators (KPIs)), including metrics related to GHG emissions reductions, within its long-term incentive plan (likely to include equity in the company).	The company has introduced climate metrics, (key performance indicators (KPIs)), including metrics related to GHG emissions reductions, within its long-term incentive plan (likely to include equity in the company). This plan aligns with the timescale and content of the company’s transition plan and emissions reduction targets.	***50%***

- Further guidance for each level of seniority is given below:
  - Level 1
    - Highest level of accountability or decision-making within the organization, with responsibility for overall organizational or corporate strategic direction.
    - Examples: Board, sub-set of the Board, Chief Executive Officer (CEO)
  - Level 2
    - Person/committee that is one step in the corporate structure from the highest level of decision-making of the organization (i.e. reports to or is accountable to Level 1). Inputs into organizational strategy but does not make decisions on it. May have responsibility and accountability for business unit strategy formation and implementation of one or more business units.
    - Examples: Vice President, Director, other C-Suite officer (e.g., Chief Financial Officer (CFO), Chief Procurement Officer (CPO), Chief Risk Officer (CRO), Chief Operating Officer (COO), Chief Sustainability Officer (CSO), etc.), other committee appointed by the Board
  - Level 3
    - Person/committee that is two steps in the corporate structure from the highest level of decision-making of the organization. May have responsibility and accountability for business unit strategy formation and implementation for one business unit.
    - Examples: Manager, Senior Manager
  - Level 4
    - Person/committee that is three or more steps in the corporate structure from the highest level of decision-making of the organization. No responsibility or accountability for business unit strategy development.
    - Examples: Officer, Senior Officer

RATIONALE

CH 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.

Description & Requirements	CH 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 questions comprising the information request that are relevant to this indicator are: ♦ Details on the organization's climate change scenario testing ♦ Consideration of risk types in organization's climate-related risk assessments ♦ Details of risks identified with the potential to have a substantive financial or strategic impact on business CDP 2023 Questionnaire mapping to this indicator: ♦ C2.3a ♦ C3.2 ♦ C3.2a ♦ C3.2b
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 is allocated for elements indicating a higher level of maturity. Best-practice elements to be identified in the test/analysis include: ♦ full coverage of the company's boundaries ♦ timescale from present to long-term (2035-2050) ♦ results are expressed in value-at-risk or other financial terms ♦ multivariate: a range of different changes in conditions are considered together ♦ changes in conditions are specific to a low-carbon climate scenario ♦ climate change conditions are combined with other likely future changes in operating conditions over the timescale chosen

Question	Basic	Standard	Advanced	Next practice	Low carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the scope of the scenario testing?	Scope of scenario testing is not defined.	Scenario testing applies only to specific business units / operations (representing less than 50% of company's GHG emissions).	Scenario testing applies only to specific business units / operations (representing more than 50% of company's GHG emissions).	Scenario testing applies to all business units / operations,	Scenario testing applies to all business units / operations and the rest of the value chain (upstream and downstream). Any exclusions from the plan must not be material to the organization in terms of GHG emissions.	***25%***
What is the timescale of the scenario testing?	Covers only short term, from reporting year until (RY + 3 years).	Covers only short and medium term, from reporting year until (RY + 4 to 10 years).	Covers short, medium and long term, from reporting year until (RY + 11 to 20 years).	Covers short, medium and long term, from reporting year until (RY + 21 years to 2049).	Covers short, medium and long term, from reporting year until 2050 or beyond.	***20%***
Does the company assess the materiality of climate-related risks/opportunities*?	The materiality of climate-related risks/opportunities* is not assessed.	The materiality of 1 category of climate-related risks/opportunities* is assessed.	The materiality of 2 categories of climate-related risks/opportunities* is assessed.	The materiality of 3 categories of climate-related risks/opportunities* is assessed.	The materiality of 4 categories of climate-related risks/opportunities* is assessed.	***12.5%***
How many scenarios are considered?	No scenarios are considered.	Considers 1 scenario.	Considers 2 scenarios.		Considers 3 or more scenarios, including a low-carbon economy scenario.	***12.5%***
What parameters/ass	Considers 1-2 different		Considers 3-4 parameters/assumptions		Considers 5 or more parameters/ass	***17.5%***

umptions are considered?	parameters/assumptions.		together (multivariate)		umptions together, related to changing climate conditions in combination with changes in operating conditions .	
Are the results† expressed in qualitative/ quantitative/ financial terms?	No results available	Expressed only in qualitative terms	Expressed in qualitative and quantitative terms	Expressed in qualitative, quantitative and financial terms	Expressed in qualitative, quantitative and financial terms and results are translated into value-at-risk	***12.5%***

* Climate-related risk categories (37):
    1. Market and Technology shifts
    2. Reputation
    3. Policy and Legal
    4. Physical Risks

† Results of scenario analysis should be presented as business impacts which can include (37):
    - Earnings – what conclusions does the organization draw about impact on earnings and how does it express that impact (e.g., as EBITDA (earnings before interest, taxes, depreciation and amortization), EBITDA margins, EBITDA contribution, dividends)?
    - Costs – what conclusions does the organization draw about the implications for its operating/production costs and their development over time?
    - Revenues – what conclusions does the organization draw about the implications for the revenues from its key commodities/ products/ services and their development over time?
    - Assets – what are the implications for asset values of various scenarios?
    - Capital Allocation/ investments – what are the implications for capex and other investments?
    - Timing – what conclusions does the organization draw about development of costs, revenues and earnings across time (e.g., 5/10/20 year)?

RATIONALE **CH 5.5 CLIMATE CHANGE SCENARIO TESTING**

Rationale of the indicator

Economic changes predicted to occur due to climate change could have a number of consequences for the chemicals sector, including increased costs, a dramatically changed operating environment and major disruptions to the business. There are a variety of ways of analysing 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 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.

- **CH 5.6 Internal carbon pricing integration**

Description & Requirements

CH 5.6 Internal carbon pricing integration

Short description of indicator

Setting an internal carbon price to evaluate the impact of transition to a low-carbon economy on the current and projected business model and/or business strategy, with the results reported to the board or c-suite, the business strategy revised where necessary.

Data requirements

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

- Existence and coverage of an internal carbon price
- Reviewing coverage/process of the internal carbon price
- Value of the internal carbon price

CDP 2023 Questionnaire mapping to this indicator:

- C11.1
- C11.1a
- C11.1b
- C11.1c

- C11.1d

How the assessment will be done

The analyst evaluates the evidence of the integration of an internal carbon price. 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:

- The carbon price value is aligned with a low-carbon scenario
- The Internal Carbon Price (ITC) covers direct and indirect emissions of the company
- The ITC is regularly reviewed
- The ITC is integrated in all strategic decisions

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the role of the Internal Carbon Price (ITC) in the business plan?	No ITC	The ITC is considered when creating the business plan but is not further considered for ongoing decision-making	The ITC is integrated in the financial scenario of the business plan and is further considered for ongoing (but not strategic) decision-making	The ITC is integrated in the financial scenario of the business plan and is further considered for all ongoing strategic decision-making	The ITC value is aligned with a low-carbon scenario used in the methodology, is integrated in the financial scenario of the business plan and is further considered for all ongoing strategic decision-making	***25%***
What is the coverage of the ITC?	No ITC	ITC partially covers CO_2 scope 1+2 emissions	ITC covers all CO_2 scope 1+2 emissions	ITC covers all CO_2 scope 1+2 emissions, and scope 3 emissions that are relevant to the sector or company	ITC covers all relevant greenhouse gas (GHG) scope 1+2 emissions, and scope 3 emissions that are relevant to the sector or company	***25%***

What is the value of the ITC?*	No ITC	ITC value is lower than external carbon pricing (set by government in which the company is located)	ITC value is equal to external carbon pricing (set by government in which the company is located)	ITC value is higher than external carbon pricing (set by government in which the company is located)	ITC value is higher than external carbon pricing (set by government in which the company is located) AND arises from or is aligned with a low-carbon scenario	***25%***
How is the monitoring and evaluation done?	No ITC	The company has no plan to regularly review the ITC	The company has a plan to regularly review the ITC and implements that plan		The company has a plan to regularly review the ITC against quantified key performance indicators and implements that plan	***25%***

(*): In the case where no ITC is set by the government of the considered country, the reference is set at US$60/t$CO_2$. This value is the average of the US$40-80/t$CO_2$ range that has been estimated (for 2020) in order to stick to the Paris temperature target (38). This value is supposed to increase over time and will be reconsidered when the ACT Chemicals Methodology is revised.

RATIONALE

CH 5.6 INTERNAL CARBON PRICING INTEGRATION

RATIONALE OF THE INDICATOR

Carbon pricing is a way to analyse the potential impacts of climate-related changes on the business, both risks and opportunities. Investors are increasingly calling for the setting of an internal price on carbon to enable companies to calculate the value-at-risk that climate change could pose to the business. The maturity matrix was developed based on recommendations from the “How to guide to corporate internal carbon pricing” document (39).

SUPPLIER ENGAGEMENT (WEIGHTING: 10%)

- **CH 6.1 Strategy to influence suppliers to reduce their GHG emissions**

Description & Requirements	**CH 6.1 Strategy to influence suppliers to reduce their GHG emissions**
Short description of indicator	The company has a strategy, ideally governed by policy and integrated into business decision making, to influence, enable, or otherwise shift suppliers' choices and behaviour in order to reduce suppliers' GHG emissions.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ Methods of supplier engagement, strategy to prioritizing supplier engagements and measures of success, especially for companies purchasing alumina and/or primary from suppliers ♦ Proportion of total procurement spend and/or supplier-related scope 3 emissions covered by the strategy ♦ Data on suppliers' GHG emissions and climate change strategies ♦ Key procurement templates (e.g., New supplier contracts, Supplier Code of Conduct, RFI/RFPs (request for information / proposal), Supplier self-assessments, Performance cards CDP 2023 Questionnaire mapping to this indicator: ♦ C12.1a ♦ C12.2 ♦ C12.2a External sources of data may also be used for the analysis of this indicator.
How the assessment will be done	The assessment will assign a maturity score based on the company's formalized, written strategy regarding its engagement with its suppliers, expressed in a maturity matrix. A company that is placed in the 'Low-carbon aligned' category will receive the maximum score. A company which is at a lower level will receive a partial score, with 0 points awarded for having no engagement at all.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the scope of the supplier engagement strategy?	No strategy applied to any suppliers.	Strategy applied to up to 30% of total procurement spend OR up to 30% of supplier-related scope 3 emissions.	Strategy applied to 31-60% of total procurement spend OR 31-60% of supplier-related scope 3 emissions.	Strategy applied to 61-90% of total procurement spend OR 61-90% of supplier-related scope 3 emissions.	Strategy applied to over 90% of total procurement spend OR over 90% of supplier-related scope 3 emissions.	***30%***
To what extent are GHG emissions reduction requirements integrated in engagement with suppliers?	No emissions reduction requirement included in key procurement templates.*	Unquantified emissions reduction requirement included in key procurement templates.*	Quantified emissions reduction requirement included in key procurement templates* but the supplier is not required to report progress to the company.	Quantified emissions reduction target included in key procurement templates* and the supplier is required to report progress to the company.	Quantified, science-based emissions reduction target (that is aligned with the sector/industry pathway) included in key procurement templates* and the supplier is required to report progress to the company.	***20%***
To what extent are other low-carbon transition-related requirements/recommendations† integrated in engagement with suppliers?	No other low-carbon transition-related requirements/recommendations† included in key procurement templates.*				1 or more other low-carbon transition-related requirements/recommendations† included in key procurement templates.*	***5%***

To what extent are suppliers required to publicly report on their GHG emissions and other low-carbon transition-related requirements/recommendations?	No requirement included in key procurement templates* for suppliers to publicly report on their GHG emissions or other low-carbon transition-related requirements/recommendations.		Requirement included in key procurement templates* for suppliers to publicly report on their GHG emissions but not any other low-carbon transition-related requirements/recommendations.		Requirement included in key procurement templates* for suppliers to publicly report on their GHG emissions and other low-carbon transition-related requirements/recommendations.	***5%***
Are GHG emissions reduction/reporting requirements included in selection of new suppliers, renewal of contract with existing suppliers, neither or both?	Requirements included in NEITHER the selection of new suppliers NOR renewal of contracts with existing suppliers.		Requirements included in EITHER the selection of new suppliers OR renewal of contracts with existing suppliers.		Requirements included in BOTH the selection of new suppliers AND renewal of contracts with existing suppliers.	***5%***
How does the company respond to supplier non-compliance with GHG emissions reduction requirements?	No response to supplier non-compliance.		Company retains/suspends/sanctions and engages non-compliant suppliers, but does not exclude those that fail to show significant improvement after the period of engagement.	.	Company retains/suspends/sanctions and engages non-compliant suppliers, and permanently excludes those that fail to show significant improvement after the period of engagement.	***5%***

What action levers‡ are embedded in the company's strategy to engage suppliers?	No action levers‡ embedded in strategy.	Strategy includes action lever(s) from one of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.‡	Strategy includes action levers from two of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.‡	Strategy includes action levers from all of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.‡	Strategy includes action levers from all of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.‡ Strategy includes regular audits of the supplier by the company or a representative.	***30%***

∗ "Key procurement templates" include but are not limited to (40):
- New supplier contracts
- Supplier Code of Conduct
- RFI/RFPs
- Supplier self-assessments
- Performance cards

† "Other low-carbon transition-related requirements/recommendations" refers to key aspects of a supplier's low-carbon transition, beyond emissions reductions and targets, that companies can engage them on. These may not be specific requirements, but can be general/high-level recommendations. These aspects can include performance indicators from any ACT performance modules, such as:
- Intangible investment
  - For example, the company recommends that its suppliers increase their R&D spend in low-carbon technologies.
- Management
  - For example, the company requires its suppliers to conduct climate change scenario testing.
- Policy engagement
  - For example, the company only selects suppliers not opposed to relevant climate policies.
- Business model
  - For example, the company engages with its suppliers to develop new, low-carbon business models.
- Any other relevant low-carbon transition-related requirement/recommendation

‡ Action levers must be embedded in a strategy document, and not be presented as examples of past/present actions/initiatives (such examples should be scored in indicator 6.2). “Action levers” include, but are not limited to, the following examples, which are grouped into three engagement types (sources: 2022 CDP climate change questionnaire C12.1a (41), (42)):

1. Information collection (understanding supplier behaviour)
    - Collect climate change and carbon information at least annually from suppliers
2. Engagement & incentivization (changing supplier behaviour)
    - Run an engagement campaign to educate suppliers about climate change/GHG emissions reductions/science-based targets/other low-carbon transition-related topics such as scenario testing, policy engagement, etc.
    - Provide climate-related training, support, and best practices
    - Directly work with suppliers on climate-related topics, such as defining common GHG emission reduction plans (i.e., both companies commit to reduce together X tCO2e), or exploring corporate renewable energy sourcing mechanisms
    - Climate change performance is featured in supplier awards scheme
    - Offer financial incentives for suppliers who contribute to reducing the company’s operational emissions (Scopes 1 & 2)
    - Offer financial incentives for suppliers who contribute to reducing the company’s downstream emissions (Scopes 3)
    - Offer financial incentives for suppliers who contribute to reducing the company’s upstream emissions (Scopes 3)
    - Offer financial incentives for suppliers who increase the share of renewable energy in their total energy mix
3. Innovation & collaboration (changing markets)
    - Run a campaign to encourage innovation to reduce climate impacts on products and services
    - Collaborate with suppliers on innovative low-carbon business models/R&D projects (providing resources – experts, financial support, building, laboratories etc.)

RATIONALE

CH 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 Chemicals assessment for the following reasons:

1. Given their size and their decision-making power in the value chain, integrated companies have the ability to influence the strategy and performance of suppliers regarding climate.
2. The upstream segment represents a high source of emissions throughout the value chain (>60% of the total GHG emissions (43) of the chemicals value chain) and should be engaged. The weight of this indicator depends on the position of the company in the value chain and whether it has influence on its suppliers.

3. 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 within 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.

- **CH 6.2 Activities to influence suppliers to reduce their GHG emissions**

Description & Requirements	**CH 6.2 Activities to influence suppliers to reduce their GHG emissions**
Short description of indicator	This indicator assesses the extent to which the company implements activities and initiatives that help, influence or otherwise enable suppliers to reduce their GHG emissions. The indicator aims to be a holistic measure of these activities and initiatives, with evidence of implementation and outcomes in the value chain across all products/services.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ List of initiatives implemented to influence suppliers to reduce their GHG emissions CDP 2021 Questionnaire mapping to this indicator: ♦ C12.1a ♦ C12.2 ♦ C12.2a External sources of data may also be used for the analysis of this indicator.
How the assessment will be done	The assessment will assign a maturity score based on the company's demonstration of recent and current activities and initiatives with its suppliers, expressed in a maturity matrix. A company that is placed in the 'Low-carbon aligned' category will receive the maximum score. A company which is at a lower level will receive a partial score, with 0 points awarded for having no engagement at all.

This maturity matrix is indicative but does not show all possible options that can result in a particular score. The company's responses will be scrutinized by the analyst and then placed on the level in the matrix where the analyst deems it most appropriate.

Question	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score		***0%***	***25%***	***50%***	***75%***	***100%***	
What action levers* does the company use in practice to engage suppliers?	*Action levers* used in practice*	No evidence of action levers* used in practice.	Evidence of company using action lever(s) from ONE of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.*	Evidence of company using action levers from TWO of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.*	Evidence of company using action levers from ALL of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.*	Evidence of company using action levers from ALL of the three engagement types (Information collection, Engagement & Incentivisation, Innovation & collaboration) used.* Regular audits of the supplier by the company or a representative.	***30%***

What is the scope of the recent and current activities in supplier engagement?	*Scope*	No suppliers engaged.	Suppliers engaged represent up to 30% of total procurement spend OR up to 30% of supplier-related scope 3 emissions.	Suppliers engaged represent 31-60% of total procurement spend OR 31-60% of supplier-related scope 3 emissions.	Suppliers engaged represent 61-90% of total procurement spend OR 61-90% of supplier-related scope 3 emissions.	Suppliers engaged represent over 90% of total procurement spend OR over 90% of supplier-related scope 3 emissions.	***40%***
How impactful has the company's supplier engagement been?	*Impact of engagement*†	No evidence of impact† of action levers used.	Some action levers used have qualitative evidence of impact†.	Almost all action levers used have qualitative evidence of impact†.	Some action levers used have quantitative evidence of impact†.	Almost all action levers used have qualitative and quantitative evidence of impact†.	***30%***

∗ Action levers must be presented as examples of past/present actions/initiatives, and not be theoretical/embedded in a strategy document (such examples should be scored in indicator 6.1). "Action levers" include, but are not limited to, the following examples, which are grouped into three engagement types (sources: 2022 CDP climate change questionnaire C12.1a (41), (42)):

1. Information collection (understanding supplier behaviour)
    - Collect climate change and carbon information at least annually from suppliers
2. Engagement & incentivization (changing supplier behaviour)
    - Run an engagement campaign to educate suppliers about climate change/GHG emissions reductions/science-based targets/other low-carbon transition-related topics such as scenario testing, policy engagement, etc.
    - Provide climate-related training, support, and best practices
    - Directly work with suppliers on climate-related topics, such as defining common GHG emission reduction plans (i.e., both companies commit to reduce together X tCO2e), or exploring corporate renewable energy sourcing mechanisms
    - Climate change performance is featured in supplier awards scheme
    - Offer financial incentives for suppliers who reduce your operational emissions (Scopes 1 & 2)
    - Offer financial incentives for suppliers who reduce your downstream emissions (Scopes 3)
    - Offer financial incentives for suppliers who reduce your upstream emissions (Scopes 3)

        - Offer financial incentives for suppliers who increase the share of renewable energy in their total energy mix
    3. Innovation & collaboration (changing markets)
        - Run a campaign to encourage innovation to reduce climate impacts on products and services
        - Collaborate with suppliers on innovative low-carbon business models/R&D projects (providing resources – experts, financial support, building, laboratories etc.)

† The metric used to measure impact depends on the action lever the metric refers to. Examples of "evidence of impact" might include, but are not limited to:
    - Qualitative example: Feedback from suppliers saying that they appreciate and will use this new knowledge to start their journey on the low-carbon transition
    - Quantitative example: Engaged suppliers have reduced their annual GHG emissions by X%
    - Quantitative example: The percentage of engaged suppliers setting science-based targets has increased annually by X%
    - Quantitative example: The percentage of engaged suppliers conducting scenario testing has increased annually by X%

RATIONALE

CH 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 Chemicals assessment for the following reasons:

1. Given their size and their decision-making power in the value chain, integrated companies have the ability to influence the strategy and performance of suppliers regarding climate.
2. The upstream segment represents a high source of emissions throughout the value chain (>60% GHG emissions of the chemicals value chain) and should be engaged. However, the weight of this indicator depends on the position of the company in the value chain and whether it has influence on its suppliers.
3. 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 all the activities related to Supplier Engagement.

CLIENT ENGAGEMENT (WEIGHTING: 4%)

- **CH 7.1 Strategy to influence customers to reduce their GHG emissions**

Description & Requirements	**CH 7.1 Strategy to influence customers to reduce their GHG emissions**
Short description of indicator	The company has a strategy, ideally governed by policy and integrated into business decision making, to influence, enable, or otherwise shift clients' (i.e. customers') choices and behaviour in order to reduce clients' GHG emissions.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ Customer engagement strategy ♦ % of customers CDP 2023 Questionnaire mapping to this indicator: ♦ C12.1b External sources of data may also be used for the analysis of this indicator.
How the assessment will be done	The assessment will assign a maturity score based on the company's formalized, written strategy regarding its engagement with its customers, expressed in a maturity matrix. A company that is placed in the 'Low-carbon aligned' category will receive the maximum score. A company which is at a lower level will receive a partial score, with 0 points awarded for having no engagement at all. This maturity matrix is indicative but does not show all possible options that can result in a particular score. The company's responses will be scrutinized by the analyst and then placed on the level in the matrix where the analyst deems it most appropriate.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the scope of the client engagement strategy?	No strategy applied to any clients.	Strategy applied to up to 30% of revenues OR up to 30% of client-related scope 3 emissions.	Strategy applied to 31-60% of revenues OR 31-60% of client-related scope 3 emissions.	Strategy applied to 61-90% of revenues OR 61-90% of client-related scope 3 emissions.	Strategy applied to over 90% of revenues OR over 90% of client-related scope 3 emissions.	***30%***
To what extent are GHG emissions reduction targets integrated in client engagement strategy?	GHG emissions reduction targets not included in client engagement strategy.		Unquantified GHG emissions reduction target(s) included in client engagement strategy.		Quantified GHG emissions reduction target(s) included in client engagement strategy.	***30%***
To what extent are other low-carbon transition-related recommendations* integrated in client engagement strategy?	No other low-carbon transition-related recommendations* included in client engagement strategy.				1 or more other low-carbon transition-related recommendations* included in client engagement strategy.	***10%***
What action levers† are embedded in the company's strategy to encourage clients to reduce their emissions?	No action levers† embedded in strategy.	Strategy includes action lever(s) from one of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation, Customer motivation via marketing and choice architecture)†. .	Strategy includes action lever(s) from two of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation, Customer motivation via marketing and choice architecture)†.	Strategy includes action lever(s) from three of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation, Customer motivation via marketing and choice architecture)†.	Strategy includes action lever(s) from all four of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation, Customer motivation via marketing and choice architecture)†.	***30%***

* “Other low-carbon transition-related recommendations” refers to key aspects of a client’s low-carbon transition, beyond emissions reductions and targets, that companies can engage them on. These aspects can include performance indicators from any ACT performance modules, such as:
    - Intangible investment
        - For example, the company recommends that its clients increase their R&D spend in low-carbon technologies.
    - Management
        - For example, the company encourages its clients to conduct climate change scenario testing.
    - Policy engagement
        - For example, the company encourages its clients to support relevant climate policies.
    - Business model
        - For example, the company engages with its clients to develop new, low-carbon business models.

† Action levers must be embedded in a strategy document, and not be presented as examples of past/present actions/initiatives (such examples should be scored in indicator 7.2). “Action levers” include but are not limited to the following individual action levers, which are grouped into four engagement types (sources: 2022 CDP climate change questionnaire C12.1a (41), (44):
    - Education/information sharing
        - Run an engagement campaign to educate customers about the quantified climate change impacts of (using) your products, goods, and/or services
            - E.g., highlight that the low-carbon product answers to the purchasing rules of the client
            - E.g., promote the low-carbon product highlighting that their client could use it to answer the purchasing rules of their own clients (e.g., low-carbon aluminium to produce a car door).
        - Share environmental information (e.g., quantified GHG emissions) about your products and relevant certification schemes (i.e., Energy STAR)
        - Provide documents and tools
    - Collaboration & innovation
        - Run a campaign to encourage innovation to reduce climate change impacts
        - Collaborate with downstream segments of the value chain to foster circular end-of-life treatment of products and downstream logistic efficiency
        - Organize multi-party working group with meetings taking place at least annually
    - Compensation
        - Provide rebates for environmentally friend actions
    - Customer motivation via marketing and choice architecture (“nudging”)
        - Design marketing campaigns/choice architecture aiming to indirectly encourage customers to reduce their emissions

RATIONALE

CH 7.1 STRATEGY TO INFLUENCE CUSTOMERS TO REDUCE THEIR GHG EMISSIONS

RATIONALE OF THE INDICATOR

Relevance of the indicator

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

1. Given their size and their decision-making power in the value chain, integrated companies have the ability to influence the strategy and performance of clients regarding climate.
2. The downstream segment represents less emissions but is not to be neglected and should be engaged. The weight of this indicator depends on the position of the company in the value chain and whether it has influence on its clients.

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 client engagement and assess them together towards a single score for all the activities related to Client Engagement.

- **CH 7.2 Activities to influence customers to reduce their GHG emissions**

Description & Requirements

CH 7.2 Activities to influence customers to reduce their GHG emissions

Short description of indicator

This indicator assesses the extent to which the company implements activities and initiatives that help, influence or otherwise enable clients to reduce their GHG emissions. The indicator aims to be a holistic measure of these activities and initiatives, with evidence of implementation and outcomes in the value chain across all products/services.

Data requirements

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

- Activities to influence clients GHG emissions
- % of products/services

CDP 2023 Questionnaire mapping to this indicator:

- C12.1b

External sources of data may also be used for the analysis of this indicator.

How the assessment will be done

The assessment will assign a maturity score based on the company's demonstration of recent and current activities and initiatives with its clients, expressed in a maturity matrix.

A company that is placed in the 'Low-carbon aligned' category will receive the maximum score. A company which is at a lower level will receive a partial score, with 0 points awarded for having no engagement at all.

This maturity matrix is indicative but does not show all possible options that can result in a particular score. The company's responses will be scrutinized by the analyst and then placed on the level in the matrix where the analyst deems it most appropriate.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What action levers* does the company use in practice to encourage clients to reduce their emissions?	No evidence of action levers* used in practice.	Evidence of company responding only to customer demand for more low-carbon products without attempting to change the existing customer demand towards low-carbon alternatives.	Evidence of company using action lever(s) from ONE of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation; Customer motivation via marketing and choice architecture).*	Evidence of company using action lever(s) from TWO of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation; Customer motivation via marketing and choice architecture).*	Evidence of company using action lever(s) from AT LEAST THREE of the four engagement types (Education/information sharing; Collaboration & innovation; Compensation; Customer motivation via marketing and choice architecture).*	***30%***
What is the scope of the recent and current activities in client engagement?	No clients engaged.	Clients engaged represent up to 30% of revenues OR up to 30% of client-related scope 3 emissions.	Clients engaged represent 31-60% of revenues OR 31-60% of client-related scope 3 emissions.	Clients engaged represent 61-90% of revenues OR 61-90% of client-related scope 3 emissions.	Clients engaged represent over 90% of revenues OR over 90% of client-related scope 3 emissions.	***40%***

How impactful has the company's client engagement been?	No evidence of impact† of action levers used.	Some action levers used have qualitative evidence of impact†.	Almost all action levers used have qualitative evidence of impact†.	Some action levers used have quantitative evidence of impact†.	Almost all action levers used have qualitative and quantitative evidence of impact†.	***30%***

* Action levers must be presented as examples of past/present actions/initiatives, and not be theoretical/embedded in a strategy document (such examples should be scored in indicator 7.1). "Action levers" include but are not limited to the following individual action levers, which are grouped into four engagement types (sources: 2022 CDP climate change questionnaire C12.1a (41), (44):
    - Education/information sharing
        1. Run an engagement campaign to educate customers about the climate change impacts of (using) your products, goods, and/or services
            - E.g., highlight that the low-carbon product answers to the purchasing rules of the client
            - E.g., promote the low-carbon product highlighting that their client could use it to answer the purchasing rules of their own clients (e.g., low-carbon aluminium to produce a car door).
        2. Share information about your products and relevant certification schemes (i.e., Energy STAR)
        3. Provide documents and tools
    - Collaboration & innovation
        1. Run a campaign to encourage innovation to reduce climate change impacts
        2. Collaborate with downstream segments of the value chain to foster circular end-of-life treatment of products and downstream logistic efficiency
        3. Organize multi-party working group with meetings taking place at least annually
    - Compensation
        1. Provide rebates for environmentally friend actions
    - Customer motivation via marketing and choice architecture ("nudging")
        1. Design marketing campaigns/choice architecture aiming to indirectly encourage customers to reduce their emissions

† The metric used to measure impact depends on the action lever the metric refers to. Examples of "evidence of impact" might include, but are not limited to:
    - Qualitative example: Feedback from clients saying that they appreciate and will use this new knowledge to start their journey on the low-carbon transition
    - Quantitative example: Evidence that engaged clients have reduced their use-phase GHG emissions by X%

RATIONALE

CH 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 Chemicals assessment for the following reasons:

1. Given their size and their decision-making power in the value chain, integrated companies have the ability to influence the strategy and performance of clients regarding climate.
2. The downstream segment represents less emissions but is not to be neglected and should be engaged. The weight of this indicator depends on the position of the company in the value chain and whether it has influence on its clients.

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 client engagement and assess them together towards a single score for all the activities related to Client Engagement.

POLICY ENGAGEMENT (WEIGHTING: 5%)

- **CH 8.1 Company policy on engagement with associations, alliances, coalitions or thinktanks**

Description & Requirements	**CH 8.1 Company policy on engagement with associations, alliances, coalitions or thinktanks**
Short description of indicator	The company has a policy on what action to take when associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support are found to be opposing “climate-friendly” policies.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ The company shall disclose if it has a policy to govern action when associations, alliances, coalitions or thinktanks supported take positions on legislation that could hinder progress on transition to a low-carbon economy, and if this policy is public ♦ If it has a policy as outlined at first point, the company shall describe this policy ♦ The company should attach supporting documentation, if this exists, giving evidence CDP 2023 Questionnaire mapping to this indicator: ♦ C12.3b External sources of data may also be used for the analysis of this indicator.

How the assessment will be done

The analyst will evaluate the description and evidence of the policy on associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support 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 to be identified in the test/analysis include:

- A publicly available policy is in place
- The scope of the policy covers the entire company and its activities, and all associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support. (Consideration should be given as to whether these associations, alliances, coalitions and thinktanks in turn are members of or otherwise support other such organisations that have climate-negative activities or positions).
- The policy sets out what action is to be taken in the case of inconsistencies
- Action includes option to terminate membership of the associations, alliances, coalitions or thinktanks
- Action includes option of publicly opposing or actively countering the association, alliance, coalition or thinktank's position
- Responsibility for oversight of the policy lies at top level of the organization, and implementation lies at senior management level
- There is a process to monitor and review association, alliance, coalition and thinktank positions

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weightings
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the scope covered by the engagement policy? Is the policy publicly available?	Does not cover the entire company (including all of its subsidiaries and business areas, and all operational jurisdictions, i.e., entities within its reporting boundary) or all associations, alliances and coalitions of which it is a member. Is not publicly available.	Does not cover the entire company (including all of its subsidiaries and business areas, and all operational jurisdictions, i.e., entities within its reporting boundary) or all associations, alliances and coalitions of which it is a member. Is publicly available.	Covers the entire company (including all of its subsidiaries and business areas, and all operational jurisdictions, i.e., entities within its reporting boundary), and all associations, alliances and coalitions of which it is a member. Is not publicly available		Covers the entire company (including all of its subsidiaries and business areas, and all operational jurisdictions, i.e., entities within its reporting boundary), and all associations, alliances and coalitions of which it is a member. Is publicly available	***40%***

Does the company have a review process of associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support?	No process to monitor and review association, alliance, coalition and thinktank climate policy positions exists.	A process to monitor and review association, alliance, coalition and thinktank climate policy positions exists. The process is not necessarily implemented.	A process to monitor and review association, alliance, coalition and thinktank climate policy positions exists. The process is implemented, but responsibility for oversight of the process lies below Level 1*, and implementation of the process lies below Level 3*.	A process to monitor and review association, alliance, coalition and thinktank climate policy positions exists. EITHER responsibility for oversight of the process lies at Level 1*, OR implementation of the process lies at Level 3 or above*.	A process to monitor and review association, alliance, coalition and thinktank climate policy positions exists. Responsibility for oversight of the process lies at Level 1*, AND implementation of the process lies at Level 3 or above*.	***40%***
Does the company have an action plan addressing what action to take when associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support are found to be opposing "climate-friendly" policies?†	No action plan exists.	Action plan sets out which actions are to be taken when associations, alliances, coalitions or thinktanks are found to be opposing "climate-friendly" policies. Action plan does not include any of the actions listed†.	Action plan includes making public statements challenging associations, alliances, coalitions and thinktanks*. Does not include either of the other actions listed†.	Action plan includes engaging with associations, alliances, coalitions or thinktanks to change their position†. May include making public statements, but does not include withdrawing funding for/suspending or ending membership†.	Action plan includes withdrawing funding for/suspending or ending membership of the association, alliance, coalition or thinktank*. May include both other actions listed†.	***20%***

- Further guidance for each level of seniority is given below:
  - Level 1
    - Highest level of accountability or decision-making within the organization, with responsibility for overall organizational or corporate strategic direction.
    - Examples: Board, sub-set of the Board, Chief Executive Officer (CEO)

- Level 2
  - Person/committee that is one step in the corporate structure from the highest level of decision-making of the organization (i.e. reports to or is accountable to Level 1). Inputs into organizational strategy but does not make decisions on it. May have responsibility and accountability for business unit strategy formation and implementation of one or more business units.
  - Examples: Vice President, Director, other C-Suite officer (e.g., Chief Financial Officer (CFO), Chief Procurement Officer (CPO), Chief Risk Officer (CRO), Chief Operating Officer (COO), Chief Sustainability Officer (CSO), etc.), other committee appointed by the Board
- Level 3
  - Person/committee that is two steps in the corporate structure from the highest level of decision-making of the organization. May have responsibility and accountability for business unit strategy formation and implementation for one business unit.
  - Examples: Manager, Senior Manager
- Level 4
  - Person/committee that is three or more steps in the corporate structure from the highest level of decision-making of the organization. No responsibility or accountability for business unit strategy development.
  - Examples: Officer, Senior Officer

† Actions a company can take when associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support are found to be opposing "climate-friendly" policies follow a hierarchy of severity, as follows (source: (45), (46)):

1. Making public statements challenging associations, alliances, coalitions and thinktanks
   - For example, the company speaks out, publicly distancing itself from statements or lobbying against climate policy by associations, alliances, coalitions or thinktanks of which it is a member or to which it provides support. The company explains how these statements or lobbying are inconsistent with its own emission reduction goals and with its support for climate policy.
2. Engaging with associations, alliances, coalitions or thinktanks to change their position.
   - For example, the company works to end lobbying against climate policy through transparent and time-bound engagement with those organizations.
3. Withdrawing funding for/suspending or ending membership of the association, alliance, coalition or thinktank.
   - For example, where attempts to change an association's position prove ineffective or insufficient, the company discontinues its membership or withdraws funding from the association.

Rationale

CH 8.1 Company policy on engagement with associations, alliances, coalitions or thinktanks

Rationale of the indicator

Industry associations, alliances, coalitions or thinktanks are key instruments by which companies can indirectly influence policy on climate. Thus, when associations, alliances, coalitions or thinktanks take positions, which are negative for climate, companies need to take action to ensure that this negative influence is countered or minimized.

This indicator is consistent with ACT philosophy and common to the other sectoral methodologies.

- **CH 8.2 Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions**

Description & Requirements	**CH 8.2 Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions**
Short description of indicator	The company is not on the Board of, providing funding beyond membership to, or otherwise supporting any associations, alliances, coalitions or thinktanks that have climate-negative activities or positions.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ The company shall disclose if (yes or no) it is on the board of any associations, alliances, coalitions or thinktanks or provides funding beyond membership ♦ If yes, the reporter shall provide details of those associations, alliances, coalitions or thinktanks that are likely to take a position on climate change legislation ♦ The company should attach supporting documentation, if this exists, giving evidence CDP 2023 Questionnaire mapping to this indicator: ♦ C12.3b ♦ C12.3c External sources of data may also be used for the analysis of this indicator: ♦ InfluenceMap (47) ♦ RepRisk database (48) ♦ Climate Action 100+ (49) ♦ Ellen Macarthur Foundation (50) ♦ press news ♦ EP100 – Climate Group (51) ♦ Low-carbon Technology Partnerships initiative (52)

How the assessment will be done

The list of associations, alliances, coalitions and thinktanks declared in the CDP data and other external sources relating to the company is assessed against a list of associations, alliances, coalitions and thinktanks that have climate-negative activities or positions (InfluenceMap is usually used for this (47)). (Consideration should be given as to whether these associations, alliances, coalitions and thinktanks in turn are members of or otherwise support other such organisations that have climate-negative activities or positions.) Such activities or positions could include lobbying against climate policies and practices. The results will be compared to any policy described in 8.1 ("Company policy on engagement with associations, alliances, coalitions or thinktanks").

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Does the company support associations, alliances, coalitions or thinktanks that have climate negative activities/positions?	The company is on the board or provides funding beyond membership to associations, alliances, coalitions and/or thinktanks that have climate – negative activities or positions		The company is not on the board or providing funding beyond membership of any associations, alliances, coalitions or thinktanks that have climate-negative activities or positions. Company can be member.		The company is not a member of or providing funding for any associations, alliances, coalitions or thinktanks that have climate-negative activities or positions	***100%***

Rationale

CH 8.2 Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions

Rationale of the indicator

Associations, alliances, coalitions or thinktanks are key instruments by which companies can indirectly influence policy on climate. Participating in associations, alliances, coalitions or thinktanks which actively lobby against climate-positive legislation is hence, 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.

- **CH 8.3 Position on significant climate policies**

Description & Requirements	**CH 8.3 Position on significant climate policies**
Short description of indicator	The company is not opposed to any significant climate-relevant policies and/or supports climate-friendly policies.
Data requirements	The questions comprising the information request that are relevant to this indicator are: ♦ The company should attach supporting documentation, if this exists, giving evidence ♦ The company shall disclose details of the issues on which it has been directly engaging with policy makers and its proposed legislative solution CDP 2023 Questionnaire mapping to this indicator: ♦ C12.3a External sources of data may also be used for the analysis of this indicator: ♦ InfluenceMap (47) ♦ RepRisk database (48) ♦ Climate Action 100+ (49) ♦ Ellen Macarthur Foundation (50) ♦ press news ♦ EP100 – Climate Group (51) ♦ Low-carbon Technology Partnerships initiative (52)
How the assessment will be done	The analyst evaluates the description and evidence of the company's position on relevant climate policies (see Module rationale for the description of 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 are 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.

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
What is the position of the company on significant climate policies?	Direct opposition to climate policies (including where third-party claims are found).	No reported direct opposition to climate policies.	Publicly supports significant climate policies.	Publicly supports significant climate policies. Publicly commits to international low-carbon commitments, such as the Paris Agreement.	Publicly supports significant climate policies. Publicly commits to international low-carbon commitments, such as the Paris Agreement. Actively participates in/leads sectoral/cross-sectoral initiatives against climate change*.	***60%***
Does the company have a monitoring and review process to ensure that its policy positions are consistent with the goals of the Paris Agreement?	No monitoring and review process to ensure that the company's policy positions are consistent with the goals of the Paris Agreement exists.	A monitoring and review process to ensure that the company's policy positions are consistent with the goals of the Paris Agreement exists. The process is not necessarily implemented.	A monitoring and review process to ensure that the company's policy positions are consistent with the goals of the Paris Agreement exists. The process is implemented, but oversight of the process lies below board level, and implementation of the process lies below senior management level.	A monitoring and review process to ensure that the company's policy positions are consistent with the goals of the Paris Agreement exists. EITHER oversight of the process lies at board level, OR implementation of the process lies at senior management level.	A monitoring and review process to ensure that the company's policy positions are consistent with the goals of the Paris Agreement exists. Oversight of the process lies at board level, AND implementation of the process lies at senior management level.	***40%***

- Examples of sectoral/cross-sectoral initiatives against climate change given below:
  - Non-exhaustive list of sectoral initiatives on the low-carbon transition of chemicals sector:
    - IEA, The Future of Petrochemicals
    - IEA, The Future of Hydrogen
    - IEA, Energy Technology Perspectives
    - DECHEMA, Roadmap Chemie 2050
  - Non-exhaustive list of cross-sectoral initiatives on the low-carbon transition of the economy:
    - Science Based Targets initiative (SBTi)
    - Leadership Group for Industry Transition (LeadIT)
    - Mission Possible Partnership (MPP)

RATIONALE

CH 8.3 POSITION ON SIGNIFICANT CLIMATE POLICIES

RATIONALE OF THE INDICATOR

Private and public stakeholders of the chemicals sectors have been developing initiatives about sustainable 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.

BUSINESS MODEL (WEIGHTING: 10%)

Preliminary notes:

The chemicals sector encompasses a huge diversity of company profiles and activities. The scope of this methodology focuses on a list of 'primary chemicals' which are the foundation of the entire value chain and are responsible for a large share of the sectoral GHG emissions. Module 4, 'Sold product performance', is mainly dedicated to these primary chemicals. In Module 9 all activities, products and services proposed by companies, are assessed. As an example, an integrated company proposing High-Value Chemicals (HVCs) and various derivatives (among others, a potential large range of polymers) will be evaluated through its entire portfolio and its strategy to participate in the low-carbon transition of the sector.

The analysis is based on the business activities proposed by the company. 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.

In order for companies to align with the sectoral expectations to ensure a low-carbon future, 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. The company descriptions and evidence are compared to the maturity matrix developed to guide the scoring. A greater number of points is allocated to elements indicating a higher level of maturity.

Question	Basic	Advanced	Low-carbon aligned	Weighting
Associated score	***0%***	***50%***	***100%***	
Profitability of business model	Not estimated or in a very early stage of development (research or conception stage)	Mature business model but not profitable or in a development stage (prototype / demonstration or test)	Mature and profitable business model	***25%***
Size of business model	Not 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%***

Growth potential of business model	Not 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%***
Deployment schedule of business model	Not scheduled	Deployment scheduled with a 2-year horizon or less	Deployment scheduled with a 2-year horizon or more	***25%***

The minimum requirement for points to be awarded is that some level of exploration has begun into of one or more of the relevant business areas covered by the following indicator. 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.

The **score obtained in Module 9** is defined thanks to the result coming from **the highest-scoring business model** among those listed by the company.

DESCRIPTION & REQUIREMENTS

CH 9.1 INTEGRATION OF THE LOW-CARBON ECONOMY IN CURRENT AND FUTURE BUSINESS MODELS

SHORT DESCRIPTION OF INDICATOR

The company is actively developing activities for a low-carbon future by demonstrating its application of low-carbon business model pathways. The future business model pathways are:

1. Business activities that aim at supporting/switching to low-carbon processes
2. Business activities supporting the development of low-carbon products portfolio
3. Business activities around the circular economy
4. Business activities that enable other actors to decarbonize their activities

DATA REQUIREMENTS

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

- Description of business activity, Stage of development, Activity timeframe, Indicator of business size (over activity timeframe), Business size, What are your future plans for this activity? What is your deployment timeframe? How do you manage this business plan deployment?

Regarding financial KPIs, which might be highly strategic and confidential, the company may be asked to indicate ranges of numbers instead of specific data.

CDP 2023 Questionnaire mapping to this indicator:

- C2.4
- C2.4a
- C4.3
- C4.3a
- C4.3b
- C4.5
- C4.5a
- C-CH9.6

- C-CH9.6a

External sources of data may also be used for the analysis of this indicator.

HOW THE ASSESSMENT WILL BE DONE

The analysis is based on the company's degree of activity in one of the 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.

- **Business activities that aim at supporting/switching to low-carbon processes**

  a. Direct use of low-carbon electricity to produce heat/steam to replace fossil fuels as a source of energy
  b. Implementation of BATs (Best Available Technologies) to make processes as efficient as possible
  c. Implementation of CCS and CCU technologies to enable storing or reusing the CO_2 resulting from processes[19]

- **Business activities supporting the development of low-carbon products portfolio**

  a. Avoiding the use of fossil fuels as a feedstock (e.g., thanks to recycled or bio-based alternatives) to produce primary chemicals
  b. Building a portfolio that results from the use of low-carbon primary chemicals as feedstocks for derivatives / downstream products
  c. Giving up products which are known to have a bad environmental impact (even if market opportunities still exist)
  d. Building a portfolio that results from the use of low-carbon primary chemicals as feedstocks for derivatives / downstream products

- **Business activities around the circular economy**

  a. Activities dedicated to the mechanical or chemical recycling of chemicals and/or end products from the chemicals value chain (e.g., polymers and plastic-based products).
  b. Collaboration with other actors to allow circularity of products from the sector
  c. Services for clients in order to optimize the use of products / extend the duration of use
  d. Industrial symbiosis, i.e., synergies between industries (heat/waste exchanges as an example)

[19] As mentioned in Article 10 - Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020

- **Business activities that enable other actors to decarbonize their activities**[20]

  a. Manufacture of equipment for the production and use of hydrogen
  b. Manufacture of other low-carbon technologies
  c. Storage of hydrogen
  d. Transport of CO_2
  e. Close to market research, development and innovation
  f. Research, development and innovation for direct air capture of CO_2

RATIONALE

CH 9.1 INTEGRATION OF THE LOW-CARBON ECONOMY IN CURRENT AND FUTURE BUSINESS MODELS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

In addition to developing sustainable 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 allow 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 integrated chemicals business model.

The biggest challenge the sector faces is to cease using fossil fuels, either as a source of energy to run processes or as a feedstock when it comes to petrochemistry. Low-carbon / renewable alternatives are needed to ensure that the sector can enter a low-carbon world.

A problem lying in the nature of a large range of chemicals is related to the emissions that are released during the use phase (e.g., fertilizers) or end of life (e.g., plastics) of many products. This is why drastic choices need to be made about the nature of the products that are manufactured within the sector and about the efforts that are needed to ensure the circularity of products.

The chemicals sector is also seen as a strong enabler for others to activate their low-carbon transition. The most impactful lever is believed to be the production of green hydrogen (resulting from electrolysis powered by renewable electricity) that can be dedicated to ammonia and methanol production. These primary chemicals can either be used as an energy carrier or an alternative feedstock to replace fossil fuels.

[20] List based on Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council

SCORING RATIONALE:

Usually, ACT methodologies propose a breakdown of Module 9 with various performance indicators, meaning that any assessed company is expected to demonstrate elements related to all these indicators to try to reach maximum score. Such a way of scoring is challenging when considering the chemicals sector because the huge diversity of products and activities makes it impossible to expect that all companies activate the same levers to participate in the sectoral low-carbon transition.

This is why, as already seen in the ACT Electric Utilities Methodology, Module 9 from ACT Chemicals proposes a single indicator which includes various business model categories. The score obtained for Module 9 is defined by the one obtained for the best identified business model among the one(s) described by the assessed company.

It is important to note that this alternative way of scoring Module 9 generally leads to higher scores than the ones usually seen in ACT assessments coming from other sectoral methodologies. **The analyst shall be very attentive** to the elements reported by the assessed company to make sure that they highlight **a true motivation to participate in the low-carbon transition of the sector**.

Example 1: products that results from alternative feedstocks should replace others based on fossil fuels feedstocks. Developing a range of low-carbon products without modifying the rest of the portfolio (meaning keeping on producing highly intensive products) cannot be considered as a relevant business model that should be rewarded.

Example 2: actions related to energy efficiency / switching energy sources must highlight that the assessed company is proactively looking to lower the impact of its production as much as possible. Measures taken to follow regulation updates or motivated by economic reasons cannot be rewarded.

Useful resources:

(8) *Dechema – Low-carbon energy and feedstock for the European industry – 2017*

(4) *IEA – The Future of Petrochemicals – 2018*

(22) *IRENA – Reaching zero with renewables – 2020*

(33) *Share Action – Slow Reactions / Chemical companies must transform in a low-carbon world – 2021*

6. Assessment

6.1 SECTOR BENCHMARK

DESCRIPTION OF THE BENCHMARK

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

As a consequence, low-carbon scenarios used for the benchmark are well below 2°C (WB2°C) scenarios or 1.5°C scenarios.

Every company shall be benchmarked according to an acceptable and credible benchmark that aligns with the spatial boundary of the methodology.

Companies producing only primary chemicals (Ethylene, Propylene, Ammonia, Methanol, BTX, Chlorine and Hydrogen) are evaluated according to chemical-specific benchmarks. Other companies are evaluated according to both chemical-specific benchmarks and generic benchmarks as per the share of primary chemicals mentioned above and other chemicals produced.

REFERENCE PATHWAY CLASSIFICATION

A reference pathway defines the emissions intensity (tCO_2/t) pathway for a given chemical or the absolute carbon emissions (tCO_2) trajectory for the general sector.

For the chemicals sector, two types of pathways are considered:

- Specific pathways for some of the primary chemicals for which such a pathway is available (e.g., pathway related to ammonia production, see section 6.1 below).
- A generic pathway for all other chemicals.

AVAILABLE REFERENCE PATHWAYS

The chosen scenario for the evaluation of primary chemicals production is the Sustainable Development Scenario (SDS) from the International Energy Agency (IEA) Energy Technology Perspectives (ETP) 2020 document (6).

The scenario forecasts the production volume for the following main primary chemicals: HVC[21] (Ethylene, Propylene, BTX), Methanol, Ammonia, and the evolution of the chemicals sector scope 1+2 emissions. The pathways are developed using the following assumptions:

[21] In this work, HVC does not encompass butadiene.

- Primary chemicals account for around 60% of the total direct CO_2 emissions in the chemicals sector, ammonia being the largest source contributing to 49% of the primary chemicals' CO_2 emissions, followed by HVC with 27% of these emissions and methanol which represents 24% of the primary chemicals emissions (4). These shares are assumed to be constant over time.
- HVC have the same emissions intensity as they are usually by-produced.
- Electricity and heat emissions factors are assumed to be the same given that most heat is produced in cogeneration.
- Primary chemicals account for 15% of scope 2 emissions in base year (2019). This share evolves as the share of electricity in the energy mix of the sector under the SDS does.

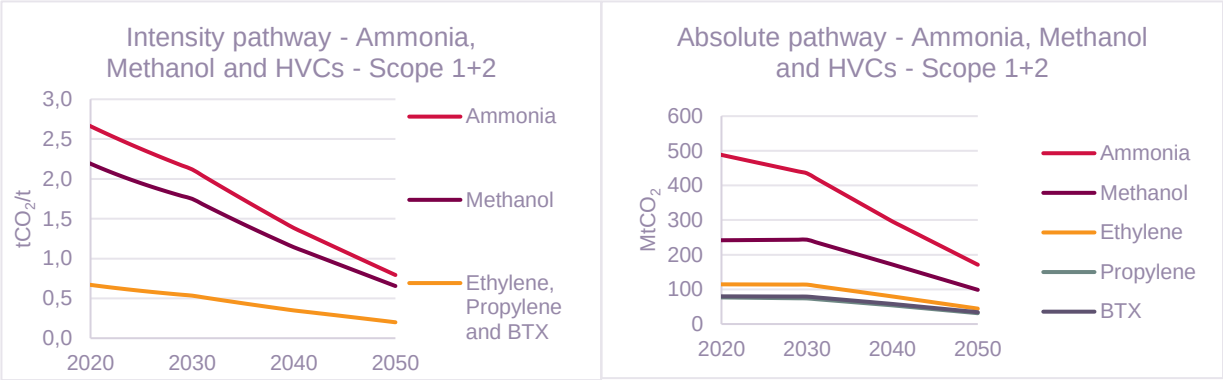


FIGURE 17 : CARBON EMISSIONS PATHWAYS FOR AMMONIA, METHANOL AND BTX

As for Chlorine, it is assumed that 2.45 MWh of electricity is needed per ton of chlorine. This value is the threshold set by the European Commission in the EU Taxonomy for the chlorine production activity to be considered an activity contributing to the transition to a low-carbon economy, it is thus conservative. It is assumed that this energy consumption will not change over time and apply the electricity production emissions intensity pathway forecasted by the IEA ETP 2020 to the value. Indeed, the chlor-alkali process has been undergoing improvements for decades and it is consequently assumed that its process energy intensity will not undergo any more major reductions.

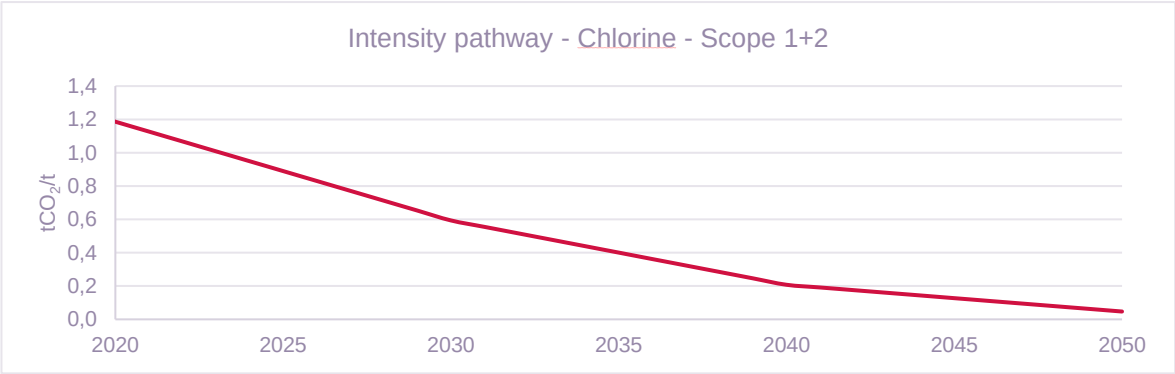


FIGURE 18 : EMISSIONS INTENSITY PATHWAY FOR CHLORINE

The Hydrogen pathway comes from the global hydrogen production by technology forecasted by the IEA in the SDS scenario. Three routes have been identified for the production of hydrogen:

- Electrolysis

- Fossil feedstock cracking
- Fossil feedstock cracking and associated with CCU or CCS

The electrolysis-based hydrogen pathway is based on the global electricity production pathway similarly to the chlorine pathway. Fossil-based hydrogen is assumed to be produced 75% from natural gas and 25% from coal (10). This share is assumed to be constant over time. For the fossil + CCU/CCS based hydrogen it is assumed that the capture rate of CCU/CCS is 90%.

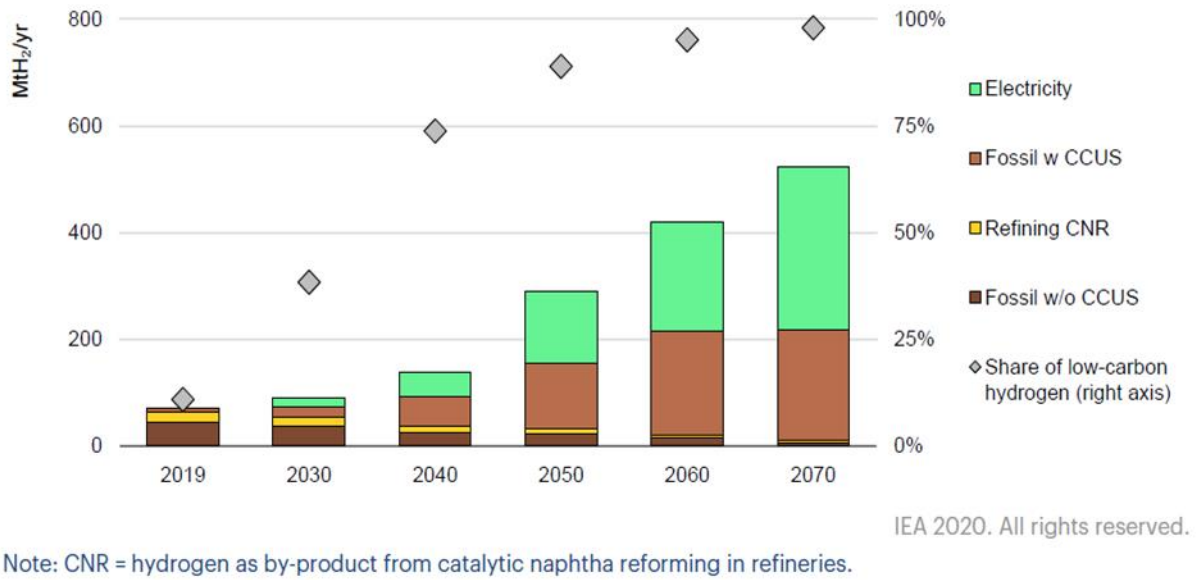


FIGURE 19 : GLOBAL HYDROGEN PRODUCTION BY TECHNOLOGY IN THE SUSTAINABLE DEVELOPMENT SCENARIO, 2019-2070, IEA ETP 2020

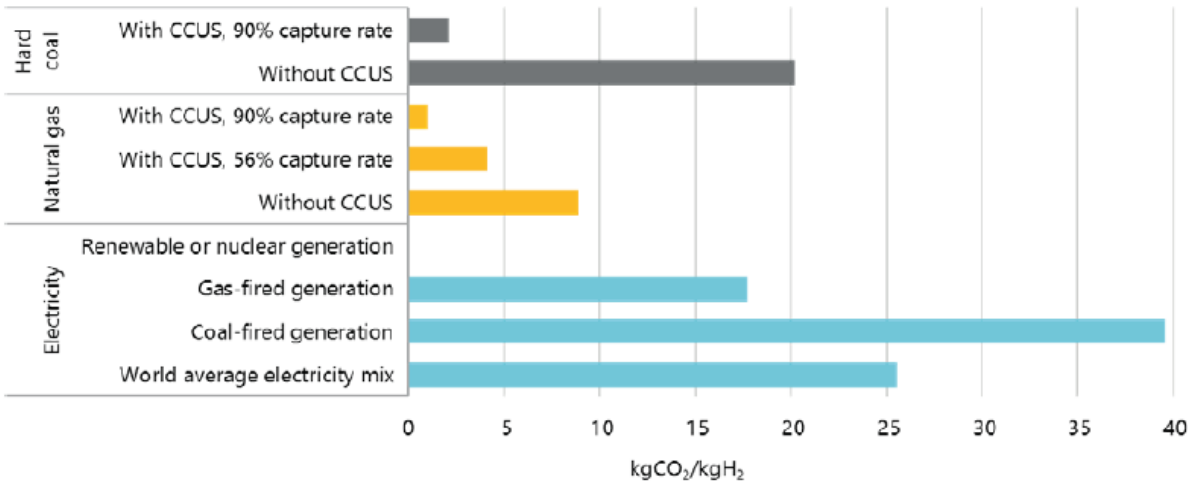


FIGURE 20 : EMISSIONS INTENSITY OF HYDROGEN PRODUCTION, IEA ETP 2020

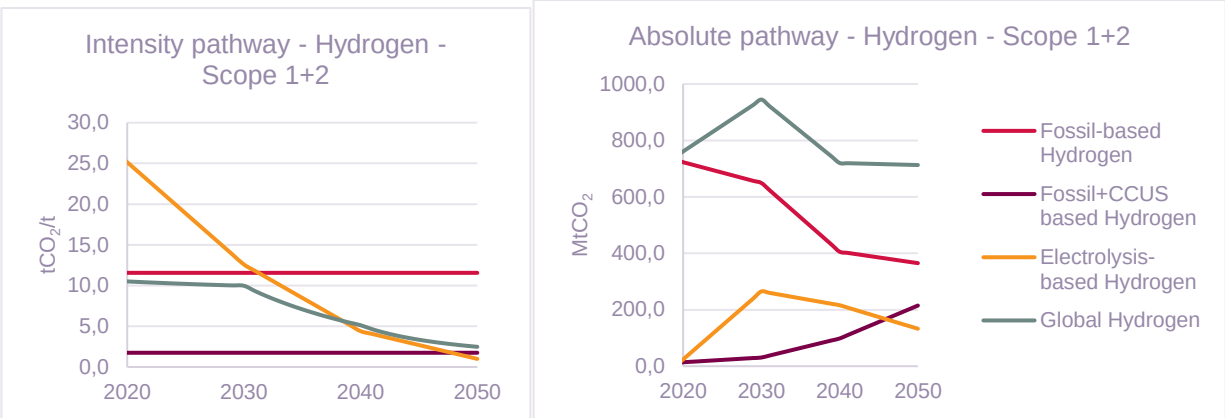


FIGURE 21 : CARBON EMISSIONS PATHWAYS FOR HYDROGEN

The benchmarks presented above for the primary chemicals are scope 1+2 emissions benchmarks that will be used for indicators CH 1.1, 2.1, 2.2. They will not be used for assessment of scope 3 upstream emissions (under CH 1.2, CH 4.1, CH 4.2). Indeed, when considering the production of primary chemicals, scope 3 emissions are marginal compared to scope 1+2 emissions.

These primary chemicals-related low-carbon scenarios allow pathways to be built at the company level. To do so, the Sectoral Decarbonization Approach (SDA, see Glossary) allocation method is used.

When no such pathway is available, the SDA is not applicable. This is the case for the following primary chemicals (see section 3.2): butadiene, caustic soda, carbon black, titanium dioxide, silicon, soda ash, sulfuric acid. It has been decided to assess emissions related to these chemicals using the Absolute Contraction Approach (ACA, see Glossary) allocation method[22]. The pathways resulting from the use of the SDA allocation method are aligned with a “well-below 2°C” level of ambition, since they are based on the SDS from IEA – ETP 2020. Consequently, to align with the same ambition, the rate of annual decrease of absolute emissions that is needed is -2.5% (calculated thanks to a linear variation)[23]. The contraction approach provides the company with the amount of absolute CO_2e emissions that it cannot exceed[24].

The SBTI’s guidance on the use of the ACA with a “well-below 2°C” level of ambition mandates a 2.5% decrease per year specifically for the period 2020-2035. For the purposes of an ACT assessment, it may be necessary to assess a target with a target year beyond 2035, requiring a longer-term pathway. Therefore, for a target with a target year beyond 2035, ACT requires a 2.5% reduction from the base year to the target year. This is expected to match (and in some cases exceed) the ambition required by the well-below 2°C scenario .The same ACA allocation method and benchmark is used for scope 3 upstream emissions.

[22] Both SDA and ACA have been developed by the Science Based Targets initiative (SBTi). See *SBTi - Foundations of Science-based Target Setting - 2019*

[23] Up to date SBTi criteria ask for a 1.5°C level of ambition when setting reduction targets, corresponding to a decrease linear rate of -4.2%. However here, it is preferred to stick to a “well-below 2°C” level of ambition to ensure consistency between all pathways that are used within the ACT Chemicals methodology.

[24] The ACA allows to include non CO_2 gases in the calculations, such as CH_4, N_2O, etc.

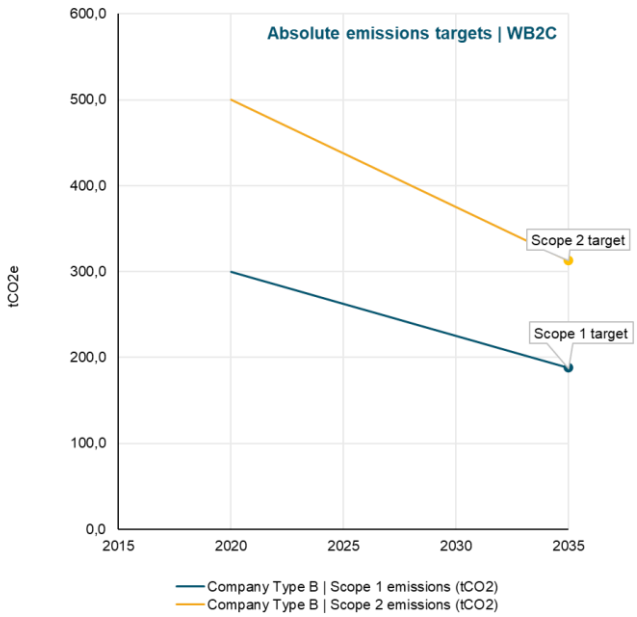


FIGURE 22: ILLUSTRATION OF ABSOLUTE CONTRACTION APPROACH FOR SCOPE 1 AND SCOPE 2 EMISSIONS

Benchmark	Indicator relevance	Source
Benchmarks for scope 1+2 GHG intensity	CH 1.1 / CH 2.1 / CH 2.2	Sustainable Development Scenario – IEA – ETP 2020 (when SDA is applied) WB-2˚C – SBTi – Foundations of Science-based Target Setting 2019 (when ACA is applied)
Benchmarks for scope 3 upstream absolute emissions	CH 1.2 / CH 4.1 / CH 4.2	WB-2˚C – SBTi
Benchmark for locked-in emissions	CH 2.3	Sustainable Development Scenario – IEA – ETP 2020
Benchmark for the share of CAPEX and R&D share in low-carbon, mitigation and carbon removal technologies	CH 2.4 – 3.1	Sustainable Development Scenario – IEA – WEO 2020
Low-carbon electricity	CH 2.5	EU taxonomy and Climate Bond taxonomy
Benchmark for the low-carbon hydrogen as a feedstock	CH 4.3	Clean Technology Scenario – IEA – The Future of Petrochemicals
Benchmark for the alternative feedstocks for **petrochemical-based products**	CH 4.4	Clean Technology Scenario – IEA – The Future of Petrochemicals
Management benchmark	CH 5 (Module)	TCFD

6.2. OTHER QUANTITATIVE BENCHMARKS USED FOR INDICATORS

Benchmark for the CAPEX Low-carbon & mitigation technologies

Low-carbon & mitigation technologies are the ones meeting the mitigation criteria of the EU Green Taxonomy. The list of eligible products will be detailed in an appendix and is set to be updated with the further development of this taxonomy.

Benchmark for R&D in Low-carbon & mitigation technologies

A taxonomy has been established by the OECD (53) in order to quantify the patents in environment-related technologies. It can be used to measure environmental innovation, if restricted to climate change mitigation technologies. It is based on the seven following categories:

- Environmental management
- Water-related adaptation technologies
- Biodiversity protection & ecosystem health
- Climate change mitigation related to energy
- CCS or CCU of GHG
- Climate change mitigation related to transportation
- Climate change mitigation related to building

The categories of this taxonomy used for the ACT Chemicals Methodology are the ones related to climate change mitigation (climate change mitigation related to energy, transportation and building) and CCS or CCU of GHG.

Benchmark for Company patenting activity in low-carbon & mitigation technologies

The European Patent Office (EPO) and the US Patent and Trademark Office (USPTO) have developed a dedicated patent classification scheme which details patents for climate change mitigation or technologies (54):

- Y02B – CCMTs related to buildings
- Y02C – Capture, storage, sequestration or disposal of greenhouse gases
- Y02E – Reduction of greenhouse gas emissions, related to energy generation, transmission or distribution
- Y02P – CCMTs relating to production in energy intensive industries
- Y02T – CCMTs related to transportation
- Y02W – CCMTs related to wastewater treatment or waste management

This classification is used for the ACT Chemicals Methodology.

6.3. WEIGHTINGS

WEIGHTINGS PER INDICATOR

The weightings have been designed according to the specificities of the type of chemicals produced by the companies. This aims at reflecting the strategic stakes which are different from one chemical company to another. Hence the weighting is dynamic and adapted to the heterogeneity of chemical companies.

For the sake of the dynamic weighting, companies will have to disclose the share of their scope 1 & 2 emissions attributable to each of their products:

Variable	Share of scope 1 & 2 emissions attributable to:
A	Ethylene
B	Propylene
C	Butadiene
D	BTX (Benzene, Toluene, Xylenes)
E	Carbon black
F	Hydrogen
G	Ammonia
H	Methanol
I	Caustic soda
J	Chlorine
K	Silicon
L	Soda ash
M	Sulfuric acid
N	Titanium dioxide
Z	Other chemicals

And the share of its emissions between scope 1 & 2 emissions and scope 3 upstream emissions with the variables:

O = Scope 1 & 2 emissions / (Scope 1 & 2 emissions + scope 3 upstream emissions)[25]

P = Scope 3 upstream emissions / (Scope 1 & 2 emissions + scope 3 upstream emissions)

[25] Refer to Section 4 to get more details about emissions boundaries, for instance rationale about exclusion of Scope 3 downstream emissions.

Two equations shall be verified:

- A+B+C+D+E+F+G+H+I+J+K+L+M+N+Z = 100% (sum of the shares in scope 1+2 emissions related to all products within the company portfolio)
- O+P = 100% (sum of scope 1+2 and scope 3 upstream emissions, taken into account in this methodology)

CH	Module	Indicator	Module weight	Indicator weight
1.1	**Targets**	Alignment of scope 1+2 emissions reduction targets	15%	10% x O
1.2		Alignment of scope 3 upstream emissions reduction targets		10% x P
1.3		Time horizon of targets		3%
1.4		Historic Target Ambition and Company Performance		2%
2.1	**Material Investment**	Trend in past – Scope 1+2 emissions	10% + O x 22%	2% + O x 2%
2.2		Trend in future – Scope 1+2 emissions		2% + O x 4%
2.3		Locked-in emissions		2% + O x 3%
2.4		Low-carbon, mitigation and carbon removal technologies CAPEX share		2% + O x 5%
2.5		Energy management		2% + O x 8%
3.1	**Intangible Investment**	R&D spending in low-carbon, mitigation and carbon removal technologies	10%	7%
3.2		Company low-carbon patenting activity		3%
4.1	**Sold Product Performance**	Trend in past – Scope 3 upstream emissions	2% + P x 22%	1% + (8% + 2.5% x (Z+F)) x P
4.2		Trend in future – Scope 3 upstream emissions		1% + (9% + 2.5% x (Z+F)) x P
4.3		Low-carbon hydrogen as a feedstock		(G+H) x 5% x P
4.4		Alternative feedstocks for petrochemical-based products		(A+B+C+D+E) x 5% x P
4.5		Inorganic chemistry yield & valorisation		(I+J+K+L+M+N) x 5% x P
5.1	**Management**	Oversight of climate change issues	12%	3%
5.2		Climate change oversight capability		3%
5.3		Low-carbon transition plan		2%
5.4		Climate change management incentives		1%
5.5		Climate change scenario testing		1%
5.6		Carbon pricing integration		2%
6.1	**Supplier**	Strategy to influence suppliers to reduce their GHG emissions	10%	5%
6.2		Activities to influence suppliers to reduce their GHG emissions		5%
7.1	**Client**	Strategy to influence customer behavior to reduce their GHG emissions	4%	2%
7.2		Activities to influence consumer behavior to reduce their GHG emissions		2%
8.1	**Policy engagement**	Company policy on engagement with associations, alliances, coalitions or thinktanks	5%	1%
8.2		Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions		2%
8.3		Position on significant climate policies		2%
9.1	**Business model**		10%	
Overall			**100%**	**100%**

RATIONALE

The selection of weightings for both the modules and the individual indicators was guided by a set of principles (see the ACT Framework document for more information (1)). These principles helped define the weighting scheme of the modules and 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 about 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.

Module	Weighting	Rationale
1. Targets	15%	Fixed weight across all sectors
2. Material Investment	10-32%	Owned assets (production infrastructure) represent the highest source of emissions for most of primary chemicals.
3. Intangible Investment	10%	R&D investments for low-carbon innovation are crucial for the value chain
4. Sold Product Performance	2-24%	Indirect emissions (from feedstock or use of products) have a different materiality.
5. Management	12%	Fixed weight across all sectors
6. Supplier	10%	Lower influence on the suppliers midstream/upstream as partly integrated
7. Client	4%	Little leverage on clients
8. Policy engagement	5%	Average weight compared to the other sectors
9. Business Model	10%	Fixed weight across all sectors
	100%	

6.4. DATA REQUEST

Table 6 introduces the list of information that will be requested to companies through a questionnaire, as well as the corresponding modules.

TABLE 6: DATA REQUEST PER MODULE

Description of the data requested to the company	List of all data points required	Module relevance	CDP 2023 Questionnaire mapping
General information about the company and the data availability	General description and introduction to your organization	General	C0.1 C-CH0.7
	The start and end date for which data is reported		C0.2
	The countries/regions 1 to N for which data will be provided.		C0.3 C7.2 C7.5
	The currency in which the response is submitted		C0.4
	The boundary you are using for your scope 1+2 GHG inventory		C0.5
	Attach the latest relevant company reports. Add rows to the table as required		C12.4
	Any sources (e.g., facilities, specific GHGs, activities, geographies, etc.) of scope 1 and scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?		C6.4
	Details of the sources of scope 1 and scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure. Add columns to the table as required		C6.4a
	Do you have emissions intensities data from your suppliers that will be used to calculate a part of your scope 3?		/
Past targets set with a past target year and current targets	• Base year • Start year • Target year • Percentage of reduction target from base year in absolute emissions • Percentage of reduction target achieved in absolute emissions • Percentage of reduction target from base year in emissions intensity • Percentage of reduction target achieved in emissions intensity • Percentage of scope 1+2 emissions covered by the targets • Absolute scope 1+2 emissions of the company on the year the target was set • Absolute scope 3 upstream	Module 1	C4.1a C4.1b

Volume produced and emissions	Total volume produced per chemical (Mt)	Module 2	C-CH9.3a C6.1 C6.3 C6.5 C6.10
	• Associated scope 1+2 emissions to each chemical ($MtCO_2$) at years Y and Y-5 and Y+5. Split process and energy related emissions		
	Scope 3 upstream emissions associated with each chemical: Split raw material production (mandatory) and transport related emissions	Module 4	
	Scope 1+2 emissions intensity per chemical (tCO_2/t chemical) at years Y, Y-5 and Y+5.	Module 2	
	Scope 1+2 emissions intensity of suppliers and clients if available (tCO_2/t chemical)		
Assets	Existing and planned assets (for the next 15 years) : • Name • Location • Plant type • Fuel mix • Capacity • Emission factor • Year of commissioning • Expected lifetime • Decommissioning or modernization year • Ownership stake • Share attributable to reporting boundary	Module 2	/
CAPEX	Share in low-carbon and mitigation technologies planned for the next 5 year	Module 2	C3.5b
	Share in carbon removal technologies planned for the next 5 years		
R&D and patents	Costs/investments in low-carbon, mitigation and carbon removal technologies	Module 3	C-CH9.6a
	Total R&D cost/investments of the company		
	Patenting activity in climate change mitigation technologies over the last 5 years		
	Total patenting activity over the last 5 years		
Product	If ammonia is produced, share of ammonia produced from electrolysis-based hydrogen	Module 4	C-CH8.3b
	If methanol is produced, share of methanol produced from electrolysis-based hydrogen		
	If HVC / carbon black are produced, share of bio-based feedstocks		
	If HVC (except butadiene) are produced, share of MTO/MTA based production		
	Energy demand per energy type		
Energy	Energy consumption targets	Module 2	C8.2 C8.2a C-CH8.2a C8.2c C8.2d C8.2e
	Action plan regarding energy management		
	Share of certified renewable energy (Renewable Energy Certificate, Power Purchase Agreement)		
Management	• Climate change management incentives • Position of the highest level of direct responsibility for climate change within the organization	Module 5	C1.1 C1.1a C1.1d

	• Climate change expertise of the highest level of direct responsibility for climate change		C1.2 C.3 C1.3a
Transition plan	• Details on the plan • Internal carbon pricing integration	Module 5	C3.1 C3.3 C3.4 C11.1 C11.1a C11.1b C11.1c C11.1d
Scenario testing	• Details on the scenario testing • Risks considered and identified	Module 5	C2.3a C3.2 C3.2a C3.2b
Suppliers	• List of environmental/CSR contract clauses in purchasing & suppliers' selection process • List of initiatives implemented to influence suppliers to reduce their GHG emissions, green purchase policy or track record, supplier code of conduct	Module 6	C12.1a C12.2 C12.2a
Clients	• Strategy to influence customers to reduce their GHG emissions • List of initiatives implemented to influence client behavior to reduce their GHG emissions	Module 7	C12.1b
Company policy on engagement with associations, alliances, coalitions or thinktanks	• Company policy on engagement with associations, alliances, coalitions or thinktanks • Associations, alliances, coalitions and thinktanks supported do not have climate-negative activities or positions • Position on significant climate policies	Module 8	C12.3a C12.3b C12.3b
Business model	• Business activities that aim at supporting/switching to low-carbon processes • Business activities supporting the development of low-carbon products portfolio • Business activities around the circular economy • Business activities that enable other actors to decarbonize their activities For each : • Description of business activity • Stage of development (incl. profitability) • Exploration type • List and turnover or invested capital (or other financial KPI) of activities in new businesses related to low-carbon business models • Current position and action plan of the company towards the identified low-carbon business models • What are your future plans for this activity? • Maturity of the targeted market	Module 9	C2.4 C2.4a C4.3 C4.3a C4.3b C4.5 C4.5a C-CH9.6 C-CH9.6a

7. Rating

The ACT rating shall comprise:

- **A performance score**
- **A narrative score**
- **A trend score**

These pieces of information shall be represented within the ACT rating as follows:

a. **Performance score** as a number from 1 (lowest) to 20 (highest)
b. **Narrative score** as a letter from E (lowest) to A (highest)
c. **Trend score** as either "+" for improving, "-" for worsening, or "=" for stable.

In some situations, trend scoring may reveal itself to be unfeasible depending on data availability. In this case, it should be replaced with a "?".

The highest rating is thus represented as "20A=", the lowest as "1E=" and the midpoint as "10C=". The highest score for each part of the ACT rating is explained below:

- 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.

TABLE 7: LOWEST, HIGHEST AND MIDPOINT FOR EACH ACT SCORE TYPE

Low scores	Mid scores	High scores
1,E,-	10,C,=	20,A,+

Each company assessed using an ACT methodology receives not only an ACT rating but a commentary on their performance across the three aspects of the rating. This gives a nuanced picture of the company's strengths and weaknesses. Detailed information on the ACT rating is available in the ACT Framework document (1).

7.1. PERFORMANCE SCORING

Performance scoring shall be performed in compliance with the ACT Framework (1). Considering the characteristics of the chemicals sector, all the modules of ACT Framework are integrated in the analysis. The scoring will depend on the type of company assessed. Indeed, the weighting scheme depends on the product mix of the companies. No other additional sector-specific issues that impact the scoring split for the companies of the sector has been identified to date.

A detailed description of the performance indicators and their weightings for the chemicals sector is presented in section 6.3.

Figure 23 shows an example of the disaggregation of the performance score of a company by each module score.

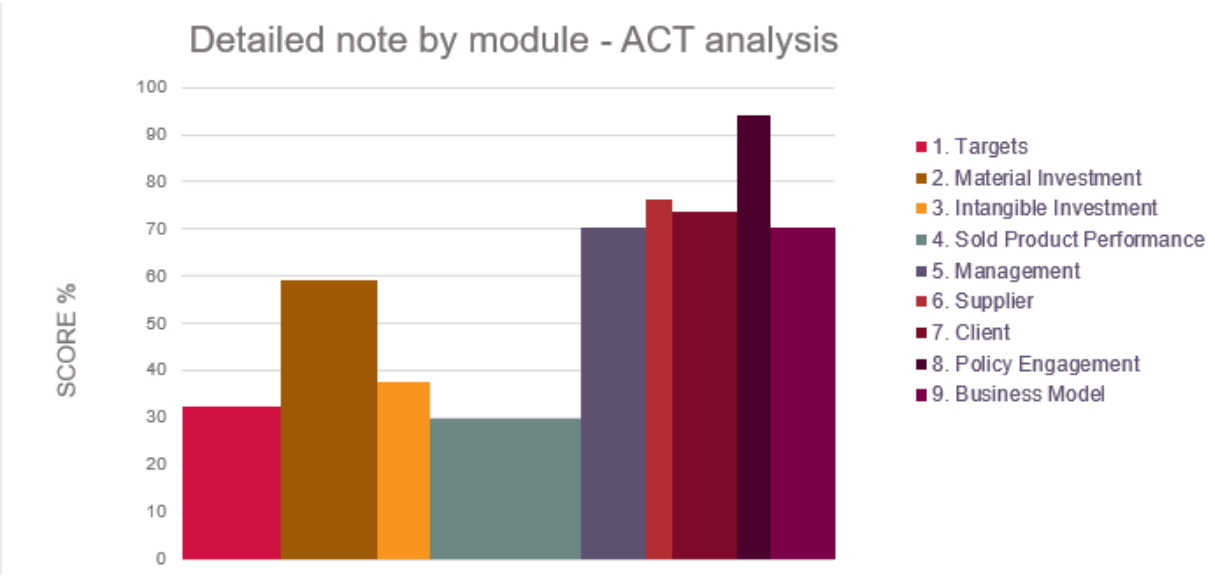


FIGURE 23 – EXAMPLE OF SCORING FOR THE PERFORMANCE SCORE

7.2. NARRATIVE SCORING

Narrative scoring shall be performed in compliance with the ACT Framework (1). No sector-specific issue that impacts the analysis scoring for the companies of the sector has been identified to date. The narrative scoring evaluates the business model and strategy, consistency and credibility and reputation of the company regarding climate change and the risks it is facing. Depending on these criteria every indicator is relevant for the assessment. As examples, Module 8 “Policy engagement” is relevant for the reputation and credibility of the company regarding climate change, Modules 3 and 5 “Intangible investment” and “Material investment” are relevant for the consistency evaluation, Modules 1 and 9 “Targets” and “Business model” are relevant for the business model and strategy assessment of the company, Modules 4 and 5, “Sold product performance” and “Management” are relevant for the assessment of how the company faces transition and physical risks.

7.3. TREND SCORING

Scoring shall be performed in compliance with the ACT Framework (1).

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

Table 8 below includes an overview of which indicators/data points could possibly have valuable information about future trend.

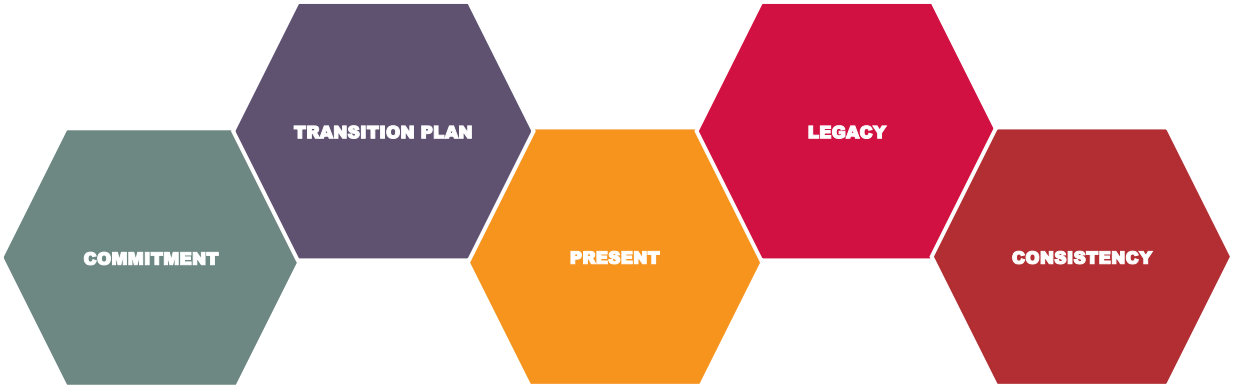
TABLE 8 : RELEVANT PERFORMANCE INDICATORS FOR TRENDS IDENTIFICATION

MODULE	INDICATOR
Targets	CH 1.1 Alignment of scope 1+2 emissions reduction targets
	CH 1.2 Alignment of scope 3 upstream emissions reduction targets
	CH 1.3 Time horizon of targets
Material Investment	CH 2.2 Trend in future – Scope 1+2 emissions
	CH 2.3 Locked-in emissions
Sold Product Performance	CH 4.2 Trend in future – Scope 3 upstream emissions
Management	CH 5.3 Low-carbon transition plan
	CH 5.5 Climate change scenario testing
	CH 5.6 Internal carbon pricing integration
Business model	CH 9.1 Integration of the low-carbon economy in current and future business models

8. Aligned state

Figure 24 presents the response of a low-carbon aligned company of the sector to the 5 questions of ACT:

- What is the company planning to do? [Commitment]
- How is the company planning to get there? [Transition Plan]
- What is the company doing at present? [Present]
- What has the company done in the recent past? [Legacy]
- How do all of these plans and actions fit together? [Consistency]



1	2	3	4	5
The company has set science-based emissions reduction targets on the major segments of its value chain. These objectives are aligned with a relevant time horizon which reflects the lifetime of the company, its products and services.	The company understands where in the value chain the majority of its embedded emissions are. Therefore, the company discloses a transition plan that details operational steps to achieve its objectives.	Current strategies and actions aim at reducing operational emissions and leveraging the company's market position to drive change across the value chain from upstream to downstream activities.	Clear evidence of reducing operational emissions, and a strong track record of successful intervention in the value chain that highlight the company's ability and willingness to enact change beyond its direct emissions.	The company's targets, transition plan, present and past actions show a consistent willingness to achieve the goals of the transition. The company operates as the intersection between clients and suppliers to address all relevant emissions in the value chain and holds its due place in the circular economy.

FIGURE 24: ALIGNED STATE FOR COMPANIES

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10. Glossary

2 degrees (2°C)	A political agreement was reached at COP21 on limiting global warming to 2°C above the pre-industrial level. A 2°C scenario (or 2°C pathway) is a scenario (or pathway) compatible with limiting global warming to 2°C above the pre-industrial level.
ACA	Absolute Contraction Approach. "The absolute contraction approach is a method for companies to set emissions reduction targets that are aligned with the global, annual emissions reduction rate that is required to meet 1.5˚C or WB2˚C." See *Foundations of Science-based Target Setting* from SBTi (55).
ACT	The Assessing low-Carbon Transition (ACT) initiative was jointly developed by ADEME and CDP. ACT assesses how ready an organization is to transition to a low-carbon world using a future-oriented, sector-specific methodology (56).
Action gap	In relation to emissions performance and reduction, the action gap is the difference between what a given company has done in the past plus what it is doing now, and what has to be done. For example, companies with large action gaps have done relatively little in the past, and their current actions point to continuation of past practices.
Activity data	Activity data are defined as data on the magnitude of human activity resulting in emissions or removals taking place during a given period of time.
ADEME	Agence de la Transition Ecologique; The French Agency for Ecological Transition (57).
Alignment	The ACT project seeks to gather information that will be consolidated into a rating that is intended to provide a general metric of the 2-degree alignment of a given company. The wider goal is to provide companies specific feedback on their general alignment with 2-degrees in the short and long term.
Analyst	Person in charge of the ACT assessment.
Assess	Under the ACT project, to evaluate and determine the low-carbon alignment of a given company. The ACT assessment and rating will be based on consideration of a range of indicators. Indicators may be reported directly from companies. Indicators may also be calculated, modelled or otherwise derived from different data sources supplied by the company. The ACT project will measure 3 gaps (Commitment, Horizon and Action gaps – defined in this glossary) in the GHG emissions performance of companies. This model closely follows the assessment framework

	presented above. It starts with the future, with the goals companies want to achieve, followed by their plans, current actions and past actions.
Asset	An item of property owned by a company, regarded as having value and available to meet debts, commitments, or legacies. Tangible assets include 1) fixed assets, such as machinery and buildings, and 2) current assets, such as inventory. Intangible assets are nonphysical such as patents, trademarks, copyrights, goodwill and brand value.
Barrier	A circumstance or obstacle preventing progress (e.g., lacking information on supplier emissions and hotspots can be a barrier to companies managing and reducing their upstream indirect emissions).
Base year	According to the GHG Protocol and ISO14064-1, a base year is “a historic datum (a specific year or an average over multiple years) against which a company’s emissions are tracked over time”. Setting a base year is an essential GHG accounting step that a company must take to be able to observe trends in its emissions information (58)
Benchmark	A standard, pathway or point of reference against which things may be compared. In the case of pathways for sector methodologies, a sector benchmark is a low-carbon pathway for the sector average value of the emissions intensity indicator(s) driving the sector performance. A company’s benchmark is a pathway for the company value of the same indicator(s) that starts at the company performance for the reporting year and converges towards the sector benchmark in 2050 in case of a Sectoral Decarbonization Approach (SDA), based on a principle of convergence of emissions intensity.
Board	Also called the “Board of Directors” or “Executive Board”; the group of persons appointed with joint responsibility for directing and overseeing the affairs of a company.
Business model	A plan for the successful operation of a business, identifying sources of revenue, the intended client base, products, and details of financing. Under ACT, evidence of the business model shall be taken from a range of specific financial metrics relevant to the sector and a conclusion made on its alignment with low-carbon transition and consistency with the other performance indicators reported.
Business-as-usual	No proactive action taken for change. In the context of the ACT methodology, the business-as-usual pathway is constant from the initial year onwards. In general, the initial year – which is the first year of the pathway/series – is the reporting year (targets indicators) or the reporting year minus 5 years (performance indicators).

Capacity (power)	In relation to power generation, nameplate capacity is the power output number, usually expressed in megawatts (MW), and registered with authorities for classifying the power output of a power station.
Capital expenditure	Money spent by a business or organization on acquiring or maintaining fixed assets, such as land, buildings, and equipment.
Carbon Capture and Storage (CCS)	The process of trapping carbon dioxide produced by burning fossil fuels or other chemical or biological process and storing it in such a way that it is unable to affect the atmosphere.
Carbon offsets	Carbon offsets are avoidance of GHG emissions or GHG suppressions made by a company, sector or economy to compensate for emissions made elsewhere in the economy, where the marginal cost of decarbonization proves to be lower.
CDP	Formerly the "Carbon Disclosure Project", CDP is an international, not-for-profit organization providing the only global system for companies and cities to measure, disclose, manage and share vital environmental information. CDP works with market forces, including 827 institutional investors with assets of over US$100 trillion, to motivate companies to disclose their impacts on the environment and natural resources and take action to reduce them. More than 5,500 companies worldwide disclosed environmental information through CDP in 2015. CDP now holds the largest collection globally of primary climate change, water and forest risk commodities information and puts these insights at the heart of strategic business, investment and policy decisions (59).
Climate change	A change in climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is, in addition to natural climate variability, observed over comparable time periods (60)
Commitment gap	In relation to emissions performance, the difference between what a company needs to do and what it says it will do.
Company	A commercial business.
Company pathway	A company's past emissions intensity performance pathway up until the present.

Company target pathway	The emissions intensity performance pathway that the company has committed to follow from the initial year on until a future year, for which it has set a performance target.
Confidential information	Any non-public information pertaining to a company's business.
Conservative-ness	A principle of the ACT project; whenever the use of assumptions is required, the assumption shall err on the side of achieving 2-degrees maximum.
Consistency	A principle of the ACT project; whenever time series data is used, it should be comparable over time. In addition to internal consistency of the indicators reported by the company, data reported against indicators shall be consistent with other information about the company and its business model and strategy found elsewhere. The analyst shall consider specific, pre-determined pairs of data points and check that these give a consistent measure of performance when measured together.
COP21	The 2015 United Nations Climate Change Conference, held in Paris, France from 30 November to 12 December 2015.
Cracker	Plant where cracking is done. Cracking is the process by which long chain hydrocarbons are broken into simpler molecules.
Data	Facts and statistics collected together for reference and analysis (e.g., the data points requested from companies for assessment under the ACT project indicators).
Decarbonization	A complete or near-complete reduction of greenhouse gas emissions over time (e.g., decarbonization in the electric utilities sector by an increased share of low-carbon power generation sources, as well as emissions mitigating technologies like Carbon Capture and Storage (CCS)).
Emissions	The GHG Protocol defines direct GHG emissions as emissions from sources that are owned or controlled by the reporting entity, and indirect GHG emissions as emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity (58).
Energy	Power derived from the utilization of physical or chemical resources, especially to provide light and heat or to work machines.

Fossil fuel	A natural fuel such as coal, oil or gas, formed in the geological past from the remains of living organisms.
Future	A period of time following the current moment; time regarded as still to come.
Greenhouse gas (GHG)	Greenhouse gas (e.g., carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and three groups of fluorinated gases (sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs)) which are the major anthropogenic GHGs and are regulated under the Kyoto Protocol. Nitrogen trifluoride (NF_3) is now considered a potent contributor to climate change and is therefore mandated to be included in national inventories under the United Nations Framework Convention on Climate Change (UNFCCC).
Guidance	Documentation defining standards or expectations that are part of a rule or requirement.
Horizon Gap	In relation to emissions performance, the difference between the average lifetime of a company's production assets (particularly carbon intensive) and the time-horizon of its commitments. Companies with large asset-lives and small-time horizons do not look far enough into the future to properly consider a transition plan.
Incentive	A thing, for example money, that motivates or encourages someone to do something (e.g., a monetary incentive for company board members to set emissions reduction targets).
Indicator	An indicator is a quantitative or qualitative piece of information that, in the context of the ACT project, can provide insight on a company's current and future ability to reduce its emissions intensity. In the ACT project, 3 fundamental types of indicators can be considered: ♦ Key performance indicators (KPIs); ♦ Key narrative indicators (KNIs); and ♦ Key asset indicators (KAIs).
Intensity (emissions)	♦ The average emissions rate of a given pollutant from a given source relative to the intensity of a specific activity; for example, grams of carbon dioxide released per MWh of energy produced by a power plant.
Intervention	Methods available to companies to influence and manage emissions in their value chain, both upstream and downstream, which are out of their direct control (e.g., a retail company may use consumer education as an intervention to influence consumer product choices in a way that reduces emissions from the use of sold products).

Lifetime	The duration of a thing's existence or usefulness (e.g., a physical asset such as a power plant).
Long-term	Occurring over or relating to a long period of time; under ACT this is taken to mean until the year 2050. The ACT project seeks to enable the evaluation of the long-term performance of a given company while simultaneously providing insights into short- and medium-term outcomes in alignment with the long-term.
Low-carbon benchmark pathway	Benchmark pathway (See 'Benchmark')
Low-carbon scenario (or pathway)	A low-carbon scenario (or pathway) is a 2°C scenario, a well-below 2°C scenario or a scenario with higher decarbonization ambition.
Low-carbon solution	A low-carbon solution (e.g., energy, technology, process, product, service, etc.) is a solution whose development will contribute to the low-carbon transition.
Low-carbon transition	The low-carbon transition is the transition of the economy according to a low-carbon scenario.
Manufacture	Making objects on a large-scale using machinery.
Maturity matrix	A maturity matrix is essentially a "checklist", the purpose of which is to evaluate how well advanced a particular process, program or technology is according to specific definitions.
Maturity progression	An analysis tool used in the ACT project that allows both the maturity and development over time to be considered with regards to how effective or advanced a particular intervention is.
Mitigation (emissions)	The action of reducing the severity of something (e.g., climate change mitigation through absolute GHG emissions reductions)
Model	A program designed to simulate what might or what did happen in a situation (e.g., climate models are systems of differential equations based on the basic laws of physics, fluid motion, and chemistry that are applied through a 3-dimensional grid simulation of the planet Earth).

Pathway (emissions)	A way of achieving a specified result; a course of action (e.g., an emissions reduction pathway).
Performance	Measurement of outcomes and results.
Plan	A detailed proposal for doing or achieving something.
Point	A mark or unit of scoring awarded for success or performance.
Power	Energy that is produced by mechanical, electrical, or other means and used to operate a device (e.g., electrical energy supplied to an area, building, etc.).
Power generation	The process of generating electric power from other sources of primary energy.
Primary chemical	The chemicals considered as primary in the ACT Chemicals Methodology are: Ethylene, Propylene, Butadiene, BTX, Ammonia, Methanol, Chlorine, Hydrogen, Caustic soda, Carbon black, Titanium dioxide, Silicon, Soda ash, Sulfuric acid. See section 3.2.
Primary energy	Primary energy is an energy form found in nature that has not been subjected to any conversion or transformation process. It is energy contained in raw fuels, and other forms of energy received as input to a system. Primary energy can be non-renewable or renewable.
Progress ratio	An indicator of target progress, calculated by normalizing the target time percentage completeness by the target emissions or renewable energy percentage completeness.
Relevant / Relevance	In relation to information, the most relevant information (core business and stakeholders) to assess low-carbon transition.
Renewable energy	Energy from a source that is not depleted when used, such as wind or solar power.
Reporting year	Year under consideration.

Research and Development (R&D)	A general term for activities in connection with innovation; in industry; for example, this could be considered work directed towards the innovation, introduction, and improvement of products and processes.
Scenario	The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) presents the results of an extensive climate modelling effort to make predictions of changes in the global climate based on a range of development/emissions scenarios (20). Regulation on climate change-related issues may present opportunities for your organization if it is better suited than its competitors to meet those regulations, or more able to help others to do so. Possible scenarios would include a company whose products already meet anticipated standards designed to curb emissions, those whose products will enable its clients to meet mandatory requirements or those companies that provide services assisting others in meeting regulatory requirements.
Scenario analysis	A process of analysing possible future events by considering alternative possible outcomes.
Science-Based Target	To meet the challenges that climate change presents, the world's leading climate scientists and governments agree that it is essential to limit the increase in the global average temperature at below 2°C. Companies making this commitment will be working toward this goal by agreeing to set an emissions reduction target that is aligned with climate science and meets the requirements of the Science-Based Targets initiative ("SBTi").
Scope 1 emissions **Direct GHG emissions and removals**	All direct GHG emissions (58) Category 1 from ISO 14064-1:2018 (61)*: Direct GHG emissions and removals occur from GHG sources or sinks inside organizational boundaries and that are owned or controlled by the* [reporting] *organization. Those sources can be stationary (e.g., heaters,electricity generators, industrial process) or mobile (e.g., vehicles).*
Scope 2 emissions **Indirect GHG emissions from imported energy**	Indirect GHG emissions from consumption of purchased electricity, heat or steam (58) Category 2 from ISO 14064-1:2018 (61): *GHG emissions due to the fuel combustion associated with the production of final energy and utilities, such as electricity, heat, steam, cooling and compressed air* [imported by the reported company]. *It excludes all upstream emissions (from cradle to power plant gate) associated with fuel, emissions due to the construction of the power plant, and emissions allocated to transport and distribution losses.*
Scope 3 emissions **Indirect GHG**	Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-

EMISSIONS	related activities (e.g., T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc. (58). Scope 3 also encompass the emissions related to the use of sold-products. ISO 14064-1:2018 (61): *GHG emission that is a consequence of an organization's operations and activities, but that arises from GHG sources that are not owned or controlled by the* [reporting] *organization. These emissions occur generally in the upstream and/or downstream chain.* *Category 3: indirect GHG emissions from transportation* *Category 4: Indirect GHG emissions from products used by an organization* *Category 5: Indirect GHG emissions associated with the use of products from* *the organization* *Category 6: Indirect GHG emissions from other sources*
SECTOR	A classification of companies with similar business activities, e.g., automotive manufacturers, power producers, retailers, etc.
SECTORAL DECARBONIZATION APPROACH (SDA)	To help businesses set targets compatible with 2-degree climate change scenarios, SBTi developed the Sectoral Decarbonization Approach (SDA). The SDA takes a sector-level approach and employs scientific insight to determine the least-cost pathways of mitigation.
SHORT-TERM	Occurring in or relating to a relatively short period of time in the future.
STRATEGY	A plan of action designed to achieve a long-term or overall aim. In business, this is the means by which a company sets out to achieve its desired objectives; long-term business planning.
STRESS TEST	A test designed to assess how well a system functions when subjected to greater than normal amounts of stress or pressure (e.g., a financial stress test to see if an oil & gas company can withstand a low oil price).
SUPPLIER	A person or entity that is the source for goods or services (e.g., a company that provides engine components to an automotive manufacturing company).
TARGET	A quantifiable goal (e.g., to reduce GHG emissions). ♦ The following are examples of absolute targets: → metric tonnes CO_2e or % reduction from base year → metric tonnes CO_2e or % reduction in product use phase relative to base year → metric tonnes CO_2e or % reduction in supply chain relative to base year ♦ The following are examples of intensity targets:

	→ metric tonnes CO_2e or % reduction per passenger. Kilometre (also per km; per nautical mile) relative to base year → metric tonnes CO_2e or % reduction per square foot relative to base metric tonnes CO_2e or % reduction per MWh
Technology	The application of scientific knowledge for practical purposes, especially in industry (e.g., low-carbon power generation technologies such as wind and solar power, in the electric power generation sector).
Trade association	Trade associations (sometimes also referred to as industry associations) are an association of people or companies in a particular business or trade, organized to promote their common interests. Their relevance in this context is that they present an "industry voice" to governments to influence their policy development. The majority of organizations are members of multiple trade associations, many of which take a position on climate change and actively engage with policymakers on the development of policy and legislation on behalf of their members. It is acknowledged that in many cases companies are passive members of trade associations and therefore do not actively take part in their work on climate change (62).
Transition	The process or a period of changing from one state or condition to another (e.g., from an economic system and society largely dependent on fossil fuel-based energy, to one that depends only on low-carbon energy).
Trend	A general direction in which something (e.g., GHG emissions) is developing or changing.
Verifiable / Verifiability	To prove the truth of, as by evidence or testimony; confirm; substantiate. Under the ACT project, the data required for the assessment shall be verified or verifiable.
Weighting	The allowance or adjustment made in order to take account of special circumstances or compensate for a distorting factor.

11. Appendix

11.1. TWG MEMBERS

The ACT Chemicals Methodology has been developed with inputs and feedbacks of the Technical Working Group, which met five times over the course of the development phase.

TABLE 9: LIST OF TWG MEMBERS

Organisation	Name
ADEME	Marlène Dresch, Julie Georges, Yann Rosetti
Agora Energiewende	Oliver Sartor
Borealis	Bertrand Walle
Cabot Corporation	Gordon Reynolds
Candriam	Arnaud Peythieu
CDP	Alice De Palma
Climate Check	Patrick Hardy
DECHEMA	Florian Ausfelder
Deloitte	Joel Neave, Julien Paulou
ECO2 Initiative	Rémi Marcus
Firmenich	William Gischlar
France Chimie	Sylvain Le Net
Grantham Institute	Gbemi Oluleye
Icare	Tony Jugan, Nikolaos Kordevas, Olivier Polidori
INC@CNRS	Jean-François Gérard
Inovyn	Cyril Menard
International Energy Agency	Peter Levi
JRC	Jose Moya
JRC (previously)	Aikaterini Boulamanti
Kemira Chemicals	Mark Wenclawiak
Mosaic Company	Natali Archibee
Nippon Paint Holding	Yuji Matsushita
Sabara	Giovanna Cappellano
SBTi	Nate Aden, Kylee Chang

Synthos	Norbert Eichler
Vencorex	Philippe Barbeau
Welya SAS	Olivier Pons Y Moll
Yara	Susan Giles
Yygdrasill	Yves Lenain

11.2. VOLUNTEER COMPANIES INVOLVED IN THE ROADTEST

TABLE 10: LIST OF VOLUNTEER COMPANIES INVOLVED IN THE ROADTEST

COMPANIES
Air Liquide
AGC Chemicals
Yara
Ecos
Kemira
Nippon Paint
Cabot Corporation
Tronox
Plastic Energy
Huntsman
Firmenich
Grupo Sabara
Elkem

11.3. SCORING RULES FOR INDICATORS USING EMISSIONS REDUCTION PATHWAYS, WHEN VARIOUS CHEMICALS ARE PRODUCED

The following indicators from the ACT Chemicals methodology are based on assessments using sectoral/global emissions reduction pathways:

- CH1.1 Alignment of scope 1+2 emissions reduction targets
- CH1.2 Alignment of scope 3 upstream emissions reduction targets
- CH 2.1 Trend in past – Scope 1+2 emissions
- CH 2.2 Trend in future – Scope 1+2 emissions
- CH 2.3 Locked-in emissions
- CH 4.1 Trend in past – Scope 3 upstream emissions
- CH 4.2 Trend in future – Scope 3 upstream emissions

Indicators CH1.2, CH4.1 and CH4.2 assess scope 3 upstream emissions using the ACA allocation method only (contraction of absolute emissions). For these indicators, the emissions related to the feedstock production of all chemicals from the company's portfolio are summed. It is then a simple process to assess and score the summed scope 3 upstream emissions using the ACA allocation method. If the scope 3 upstream emissions coverage is lower than 67% (meaning that significant sources of emissions linked to some feedstock production are not covered), a corrective factor – corresponding to the emissions coverage – is applied to score the indicators. Insufficient emissions coverage also negatively impacts the ACT narrative score assessment.

Indicators CH1.1, CH2.1, CH2.2, and CH2.3 assess scope 1+2 emissions using either the SDA (convergence of emissions intensity) or the ACA (contraction of absolute emissions) allocation methods. Table 11 shows the various cases that can be encountered for indicator CH1.1, and associated scoring rules.

Similar reasoning is applied to score indicators CH2.1, CH2.2, and CH2.3 (focusing on emissions trends and locked-in emissions). The assessment of these indicators relies on the breakdown of the company's scope 1+2 emissions per chemical. If such a split is not available, the ACA allocation method is used to assess the overall company's scope 1+2 emissions – in such case, the ACT narrative score will be negatively impacted to reflect poor data quality.

TABLE 11: SCORING RULES FOR INDICATOR CH1.1 FOR ASSESSMENTS WITH VARIOUS CHEMICALS

Various cases where the assessed company is producing various chemicals	Produced chemicals are all covered by the SDA allocation method (sectoral pathway available)	None of the produced chemicals are covered by the SDA allocation method (no sectoral pathway available)	Some produced chemicals are covered by the SDA allocation method (sectoral pathway available), and some are not
Case 1 A unique target is set for a specific chemical	Use SDA allocation method to assess the specific target The scope 1+2 emissions coverage of the target is taken into account to calculate the score	Use ACA allocation method to assess the specific target The scope 1+2 emissions coverage of the target is taken into account to calculate the score	Use either the SDA or ACA allocation method (depending on sectoral pathway availability) to assess the specific target The scope 1+2 emissions coverage of the target is taken into account to calculate the score
Case 2 Various targets are set for specific chemicals	Use SDA allocation method to individually assess the specific targets Indicator score = average of individual assessments, weighted with the respective share of scope 1+2 absolute emissions (considering emissions coverage of individual targets compared to overall company's emissions) If these shares are not available, use ACA allocation method on overall company's scope 1+2 emissions	Use ACA allocation method to individually assess the specific targets Indicator score = average of individual assessments, weighted with the respective share of scope 1+2 absolute emissions (considering emissions coverage of individual targets compared to overall company's emissions) If these shares are not available, use ACA allocation method on overall company's scope 1+2 emissions	Use either the SDA or ACA allocation method (depending on sectoral pathway availability) to assess the specific targets Indicator score = average of individual assessments, weighted with the respective share of scope 1+2 absolute emissions (considering emissions coverage of individual targets compared to overall company's emissions) If these shares are not available, use ACA allocation method on overall company's scope 1+2 emissions
Case 3 A unique target is set for all produced chemicals	Use ACA allocation method to assess the global target	Use ACA allocation method to assess the target	Use ACA allocation method to assess the target
Case 4 A target is/Various targets are set for specific chemical(s), and another target is set for all produced chemicals	Assess specific target(s) as per Case 1 Assess global target as per Case 3 Final score is taken as the higher one	Assess specific target(s) as per Case 1 Assess global target as per Case 3 Final score is taken as the higher one	Assess specific target(s) as per Case 1 Assess global target as per Case 3 Final score is taken as the higher one

11.4. ILLUSTRATIVE GRAPHS FOR TREND IN FUTURE EMISSIONS INTENSITY INDICATORS

Illustration of the different cases when the Sectoral Decarbonisation Approach allocation method is used(based on emissions intensity).

- **CASE 1**

Conditions	Score
$Company's\ trend > 0$ Increase in company emissions intensity	0%

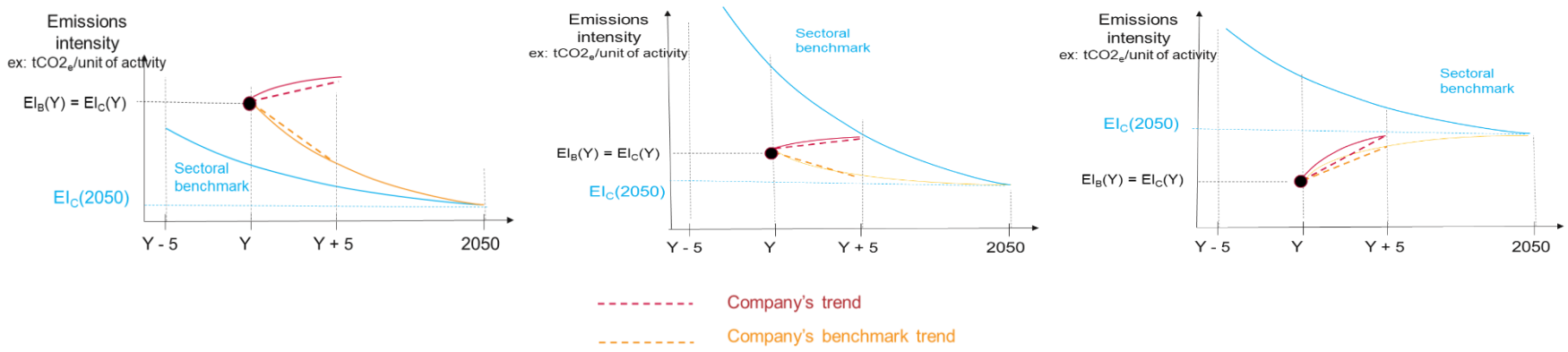

FIGURE 25: TREND RATIO - CASE 1

- **CASE 2**

Conditions	Score
$Company's\ trend \leq 0$ and $E_C(Y_R) \geq E_B(2050)$ $0 \leq trend\ ratio \leq 1$ Decrease in company emissions intensity but company's pathway does not go beyond the company's benchmark ambition	$Trend\ ratio \times 100\%$

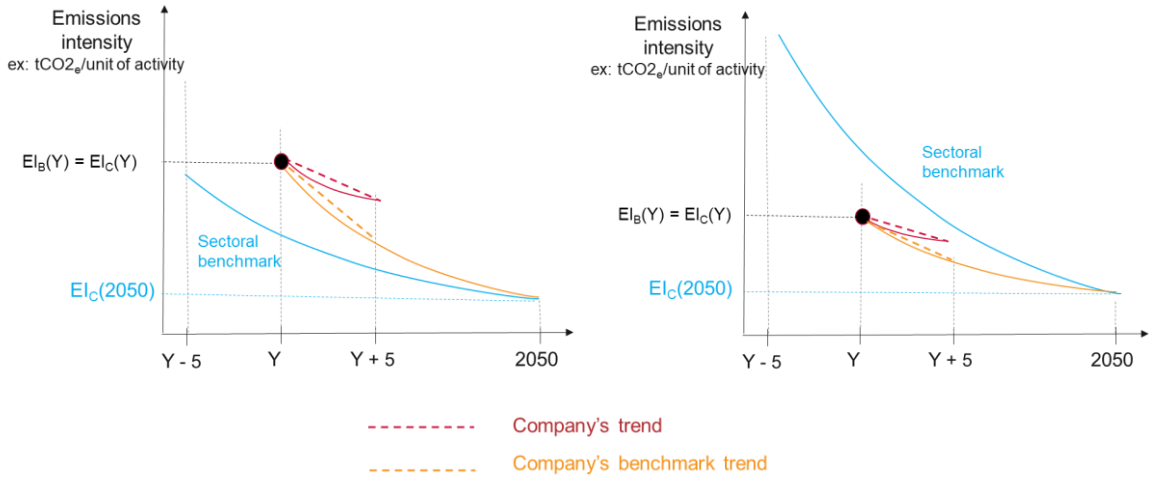

FIGURE 26: TREND RATIO - CASE 2

- **CASE 3**

Conditions	Score
$Company's\ trend < 0$ $trend\ ratio > 1$ Decrease in company emissions intensity and company's pathway equals or exceeds the company's benchmark ambition	100%

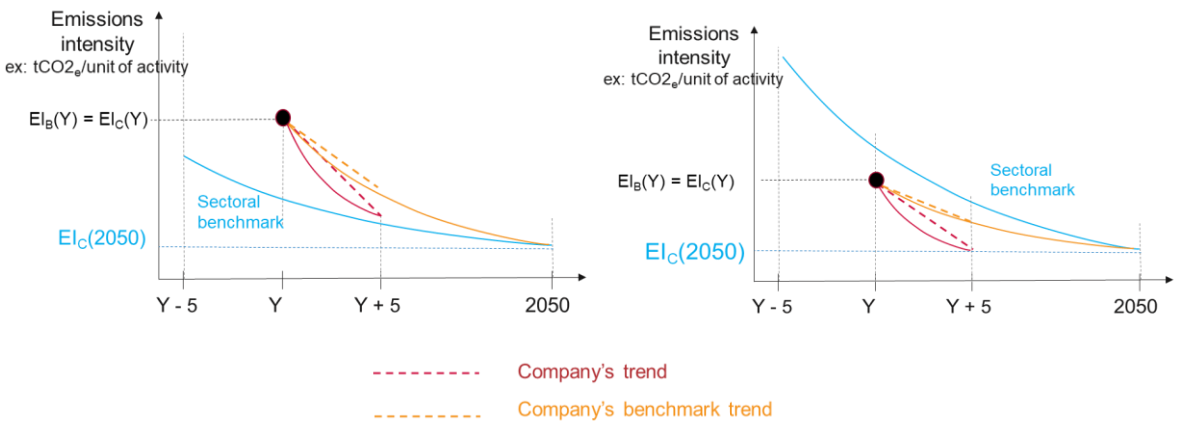

FIGURE 27: TREND RATIO - CASE 3

- **CASE 4**

Conditions	Score
$Company's\ target\ trend \leq 0\ and\ E_C(Y_R) \leq E_B(2050)$ No increase in company emissions intensity and company's emissions intensity is already below the company's benchmark ambition for 2050	100%

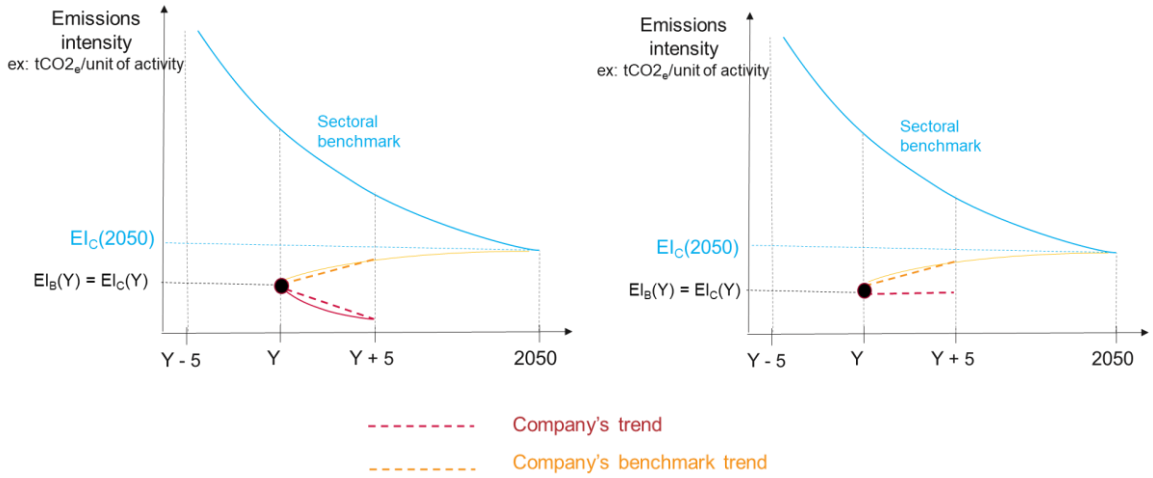

FIGURE 28: TREND RATIO - CASE 4