ACT

Technical note

Assessing low-Carbon Transition

From global carbon budget to company pathways

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IN SHORT...

ACT assesses company's decarbonization strategy and associated transition plan in regard to its decarbonization challenges. To do so, ACT compares, among other things, greenhouse gas emissions targets of companies against theoretical trajectories, which are obtained thanks to allocation methods.

Starting from a global carbon budget, often followed by a breakdown at a sectoral level, these allocation methods allow a definition of a carbon budget and related emissions reductions trajectories at a company level.

ACT preferentially uses the Sectoral Decarbonization Approach (SDA) and the Absolute Contraction Approach (ACA) allocation method when relevant. Nevertheless, ACT has also defined specific approach for agriculture sector to take into consideration the specificities of this sector.

ACT defines theoretical company's carbon budget and trajectories that help as much as possible to contribute to the Paris mitigation goal.

ACT is an initiative dedicated to assess the strategy and low-carbon transition plan of companies. Such assessment requires comparison of the companies' efforts and actions against a minimum level they are expected to be at, as required by the Paris Agreement mitigation goals.

This paper aims at clarifying the way greenhouse gas (GHG) emissions[1] trajectories are defined at the company level within ACT sectoral methodologies.

From global carbon budget to company level emissions trajectories

1/ Global carbon budget – Paris Agreement

Since its very beginning, the ACT initiative aims at **providing a decarbonisation accountability framework to assess companies' climate strategy against the requirements of the Paris**

[1] To lighten the text in this document, 'emissions' refer to GHG emissions.

Agreement. That is to say, regarding mitigation goals (1):

"*Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels…"*

For a number of years now, global climate goals have been translated into temperature objectives, related to the year 2100, the furthest milestone used so far. It is possible to model and predict, within a range of probability, the evolution of the global average temperature based on the amount of anthropogenic GHG that are released into the atmosphere. Consequently, we are more and more speaking of "2°C trajectories", "below 2°C trajectories", "well-below 2°C trajectories" and "1.5°C trajectories" which are pathways to reduce emissions in line with the temperature goal they are named after.

The Paris Agreement mitigation goals put the concept of **global carbon budget** into light, representing the total cumulative emissions that cannot be exceeded across sectors, and is thus defined to try to maintain the temperature below a given level (typically with a probability of 50% or 66%, depending on the uncertainties coming from calculation and modelling). The Intergovernmental Panel on Climate Change (IPCC) gathers the most robust and trusted studies on this topic. A special report, 'Global warming of 1.5°C', was requested after the Paris Agreement was signed and published in 2018. The latest global carbon budgets available are defined in this report, while the next major publication of the IPCC, the sixth 'Assessment report' (AR6), was released in 2021 (2).

2/ From global carbon budget to sectoral scenarios

Once the global carbon budget is defined, the next steps to define decarbonisation pathways are to:

- Plot the global evolution of allowable emissions **over time** while staying within the carbon budget
- **Distribute this carbon budget** between all sectors that are responsible for emissions.

Sectors that are the biggest GHG emitters are identified so the global carbon budget can be distributed between all of them. This work is done by institutions such as the International Energy Agency (IEA) which develops scenarios at a global level. The Joint Research Center (JRC) has also worked on sectoral scenarios at the European level. Institutes such as Dechema, Deloitte, etc., sometimes also contribute to this effort in association with a sectoral association.

ACT systematically reviews sectoral decarbonization pathways available before selecting the most appropriate one as a reference during the methodology development or update process. Few available sectoral pathways meet all required criteria for ACT (global, sector-specific and high level of ambition), but IEA sectoral scenarios are generally the most relevant and are regularly used within ACT assessments to build benchmarks against which companies are compared[2]. The earliest ACT methodologies refer to 2DS (2°C scenario) that was built and presented by the IEA in Energy Technology Perspectives (ETP) 2014. More recent scenarios that correspond to more ambitious trajectories were developed, such as the B2DS (below 2°C) scenario from ETP 2017, or the SDS (Sustainable Development Scenario) from ETP 2020, the most recent. Both B2DS and SDS have been used within the most recent ACT methodologies.

When an ACT methodology is applied during ACT assessment, the available relevant scenarios can be reviewed again at the start of the process. For each ACT assessment, the **scenarios that are identified as the most relevant** shall be used. Some sectoral scenarios are built on a smaller geographic scale, focusing on specific countries or

[2] Nevertheless, ACT has also developed specific trajectories for sectors like agriculture

regions of the world. For instance, France has worked on the 'Stratégie Nationale Bas-Carbone', that is the French Nationally Determined Contribution., which can be considered while assessing French companies, when relevant. An ACT collaboration with the Deep Decarbonization Pathways (DDP) aims at developing Brazilian and Mexican national scenarios related to specific sectors (power generation, cement production, etc.). In some cases, these national / regional options might be more specific and suit the ACT assessment better than global ones.

It is important to **update the scenarios** against which companies are assessed, since more accurate results will be attained with up-to-date figures for the global carbon budget and the related sectoral scenarios. ACT structure is flexible enough to enable such updates.

3/ From sectoral scenarios to company level pathways

From the sector-specific scenario, the next step is to allocate the carbon budget to companies within the sector so they know their respective share. Thus the company can contribute to the global effort needed to meet the Paris Agreement goal requirements accordingly.

Various **allocation methods** have been developed to calculate climate trajectories at the company level. Such trajectories are used to define targets that are referred to as "**science-based**", *if they are in line with the level of decarbonization required to keep global temperature increase below 2°C compared to pre-industrial temperatures, as described in the Assessment Report of the Intergovernmental Panel on Climate Change* (3).

Furthermore, a method should be considered science-based if *for every year the sum of all individual company emissions targets does not exceed the [. . .] total carbon budget* and *when the sum of all company outputs (that is, activity) equals the projected [. . .] output.* (4)

Available allocation methods up-to-date have been listed in a recent study from Bjørn et al. (5) and are exhibited in Table 1 below.

TABLE 1: LIST OF 'SCIENCE-BASED' ALLOCATION METHODS

Method	Acronym	Author	Quick description
Center for Sustainable Organizations' Context-Based Carbon Metric	CSO	Ben & Jerry's McElroy	Relies on the same sharing principles as BT-CSI and C-FACT, but considers every year of a global emission scenario, instead of just the baseline and target years.
British Telecom - Carbon Stabilization Intensity	BT - CSI	Tuppen	Targets for reducing the company's carbon intensity (CO2e per unit of contribution to GDP[3]) are set in line with world targets
Corporate Finance Approach to Climate-stabilizing Targets	C-FACT	Autodesk	Companies should reduce their GHGs in line with scientific and policy climate stabilization targets (85% reduction by 2050 from 2012 levels) but do so proportional to their relative contribution to global GDP[3]

Greenhouse gas emissions per unit of value added	GEVA	Randers	GHG/GDP[3] ratio should annually decrease by 5%
The 3% Solution	/	WWF / CDP	Focus on United State decarbonization plan up to 2020 (out of date since)
Sectoral Decarbonization Approach	SDA	SBTi	Relies on the convergence principle, as it assumes that all companies in a sector will converge towards a common emission intensity in 2050
Absolute Contraction Approach	ACA	SBTi	A unique absolute emissions decrease rate is applied to all actors

Allocation methodologies within ACT assessments

SDA: the preferred allocation method so far

The ACT – Assessing low-Carbon Transition® initiative assesses how ready an organization is to transition to the low-carbon economy using a future-oriented, sector specific methodology.

The ACT initiative has been built on sectoral methodologies. A breakdown at a sectoral level has been identified as the best options to assess companies' strategy to participate to the low-carbon transition, taking into account the specificities and challenges of each sector that is considered.

Consequently, since the beginning of the project, **it has been chosen to use the SDA allocation method** from SBTi (Science-Based Targets initiative), which *is the first method that applies a convergence approach to translate a sectoral pathway derived from a 2°C scenario to set company-specific targets that account for growth and initial performance[4].* (4)

SDA relies on physical production and convergence sharing principles in its application to "homogenous" sectors. (5)

It has to be noted that if SDA can be appropriate for homogeneous sector, it is not the case for heterogeneous ones. Indeed, this method assumes that the carbon intensity reduction of a company converges with the reduction of the whole sector at a similar rate. Therefore, if a sector is heterogeneous and includes products that widely differ in terms of emissions intensity or emission reduction potential (e.g. the Chemical sector which encompasses thousands of products), this approach is not applicable.

One can remember that SDA method is not applicable if

- No sectoral scenario is available
- The considered sector is heterogeneous

ACA: the spare-wheel

When the SDA method is not applicable for the reasons exposed above, an interesting option is to **use the ACA method instead**. As precised within ACT framework: *Contraction of absolute emissions is more appropriate for heterogeneous*

[3] GDP: Gross Domestic Product

[4] At that time (2015), 2°C scenarios were considered.

sectors, for which determining a meaningful measure of intensity is less straightforward. (6)

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 WB-2˚C. (7)

It has been calculated that a company needs to annually decrease its absolute emissions by

- 4.2% if it is to achieve a 1.5°C target
- 2.6% if it is to achieve a WB-2°C target

This method is convenient since **it can be applied to any type of company and it is better suited to heterogeneous sectors**. It is, however, not the most precise option since it is based on global scenarios that do not highlight the sector specificities to be taken into account, as sectoral scenarios do.

This "basic" approach is similar to what ADEME developed in the 2007 version of Bilan Carbone® tool.

What about other 'science-based' methods?

The "3% solution" is no longer applicable since it was designed with a horizon line set on the year 2020. (5)

CSO, BT-CSI, C-FACT and GEVA methods are all integrating economic considerations since inputs include the notion of value added.

As explained by Faria and Labutong, v*alue added-based intensities have the advantage of expressing targets in a way that can be easily calculated by companies and that is homogenous across companies and products. They can be used to check performance against targets across a wide range of different activities/sectors with no further requirements than having basic GHG and financial data already collected by most companies. However, GHG emission intensity per value added is a poor indicator for the most energy intensive companies. This is because financial performance can vary widely dependent on market conditions (e.g. as commodity prices swing in world's markets), while energy consumption and CO2 emissions will not.*

A distinction should also be made between value-added intensities and physical intensities. Value added does not correlate well with emissions as it can grow by decreasing labor costs, raw materials in the market may fluctuate, tax or accounting rules may change – none of which have any intrinsic correlation with GHG emissions. On the other hand, physical intensities can closely correlate with GHG emissions, as physical activity is linked to GHG emissions through production processes and technologies. For this reason, a value-added intensity derived from an economic projection for the global economy does not contain the same level of insight as a physical-intensity mitigation pathway derived from available and prospective technologies, abatement costs, mitigation potential and projected sector physical activity levels. (3)

These rationales justify why the **CT-CSI, the C-FACT, the GEVA and the CSO methods are disregarded within ACT methodologies**, because they are all built on an **allocation by economic contribution**.

Weaknesses of SDA and ACA methods application within ACT methodologies

As explained above, SDA allocation is based on sectoral carbon budgets, which are calculated from a base year. If a company is assessed at a later year (reporting year), there is no guarantee that its emissions between the base and reporting years did not exceed the related carbon budget (at the corporate level). If the latter has been exceeded, a corrective factor needs to be introduced to correctly plot the emissions trajectory the company is to follow from reporting year to end-point year. Otherwise, its carbon budget (calculated between base year and end-point year) will not be respected.

So far, there is no adjustment of carbon budgets within ACT methodologies when the assessment is not done at the base year, but after. This may result in an underestimation of the emissions decrease rate to be followed by the company. This weakness has been pointed out by Rekker et al. in a recent academic paper (8). Nevertheless, the

ACT performance indicator *Past performance* has been enriched with a new dimension, *Alignment of past performance with carbon budget*, in order to (at least partially) overcome this weakness.

The ACA method and resulting annual emissions decrease rates (for 1.5°C and WB-2°C trajectories) have been set in 2019. These rates arise from a batch of selected scenarios considering a global carbon budget (7) and shall be followed, whatever the initial performance (i.e. the annual emissions it emits) of the company is. The major drawback of this allocation method is that it does not acknowledge the past efforts and investments companies have made to engage their low-carbon transition[5]. To compensate this shortage, the alignment of a company's past emissions with its trajectory is assessed using *Trend in past emissions intensity* (which is the first dimension of the performance indicator *Past performance* mentioned above), related to the 'Material Investments' of the company.

A last shortcoming that can be highlighted is the emissions imbalance[6] arising from the mathematical way of calculating emissions trajectories of companies. In their study, Bjørn et al. highlighted that the seven 'science-based' methods exposed in this paper lead to some emissions imbalance, meaning that none of the mathematical constructions of emissions trajectories of a set of companies allow a perfect translation of the carbon budget that they are expected to respect. Regarding this parameter, the SDA method performed nearly as well as the CSO method, both of them outperforming the other five methods tested. It has to be noted that the application of the ACA method in the Bjørn et al. study is misleading since a [2020; 2050] timespan is considered whereas SBTi explicitly specifies that a linear trajectory should not cover more than a 15 years period, i.e. a [2020; 2035] timespan.

ACT goes further than assessing companies targets & performance

The ACT methodology is based on a **complex and robust assessment system**, including three different scores: performance, narrative and trend. The comparison between the level of emissions (expressed either as absolute or intensity) of a company against its benchmark is just a **part of the overall performance score**[7]. However, many other dimensions are also scrutinized and assessed, and any limitations in the quantitative indicators using decarbonization scenarios can be counterbalanced as much as possible in other indicators[8]. A few examples: the relationship with suppliers and clients to reduce emissions, the business model(s) developed, the CAPEX and R&D investments dedicated to low-carbon technologies, etc.

It has to be kept in mind that **ACT assessments are based on a holistic approach** that is not limited to emissions levels only (even if, of course, this parameter is one of its cornerstones). ACT is providing a global vision that includes future emission trajectories and targets, among others. The strategy and transition plan of companies that are considered, encompass various aspects to better judge the consistency of actions, both undertaken and to be taken in the future.

[5] Nor consider new players' growth challenges (e.g. start up, new company…) especially for those who propose enabling decarbonization products.

[6] Emissions imbalance refers to the difference between the time-integrated aggregated 'science-based' targets of the batch of assessed companies and the global allowable emissions.

[7] See ACT framework

[8] ACT indicators besides those relying on the quantification of a carbon reduction trajectory may also need the use of scenario as a reference benchmark. In some cases, this information may not be included in the reference scenario and thus additional scenarios must be considered within the same methodology.

Sources

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