Avoided emissions

June 27th , 2024

Welcome! Meet the speakers

Melissa PEREZ
Head of Sales and Advocacy
Carbon4 Finance

Rodrigo BARANNA
Senior Manager, Head of Carbon Neutrality Practice
Carbone 4 - NZI

Pierre-Etienne BONJEAN
Head of Methodologies and Research
Carbon4 Finance

Lucie MAUZE
Climate and Biodiversity Data Sales
Carbon4 Finance

Agenda

The ecosystem of the Carbone 4 group

carbone4

carbone4 consulting

- Corporate Strategy
- Decarbonisation and adaptation

carbone4 conseil

carbon4 finance

- Climate and biodiversity data
- Web platform & data flow

carbon4 finance

carbone4 académie

- 100% online training
- Low-carbon transformation of organizations

carbone4 académie

MyCO2 carbone4

- Interactive outreach
- Grand public

IF Initiative

- Corporate Strategy and Planetary Boundaries
- Collaborative R&D

17 years **190+** employees

Agenda

The Net Zero Initiative

Avril 2020

A framework for collective carbon neutrality
Net Zero Initiative

2020

Two very different understandings of carbon neutrality currently coexist

Carbon neutrality
as science defines it

"Carbon neutral planet"
"Carbon neutral France"
"Carbon neutral territory"
…

What link?
What consistency?

"Carbon neutrality"
as the private sector defines it

"Carbon neutral company"
"Carbon neutral product"
…

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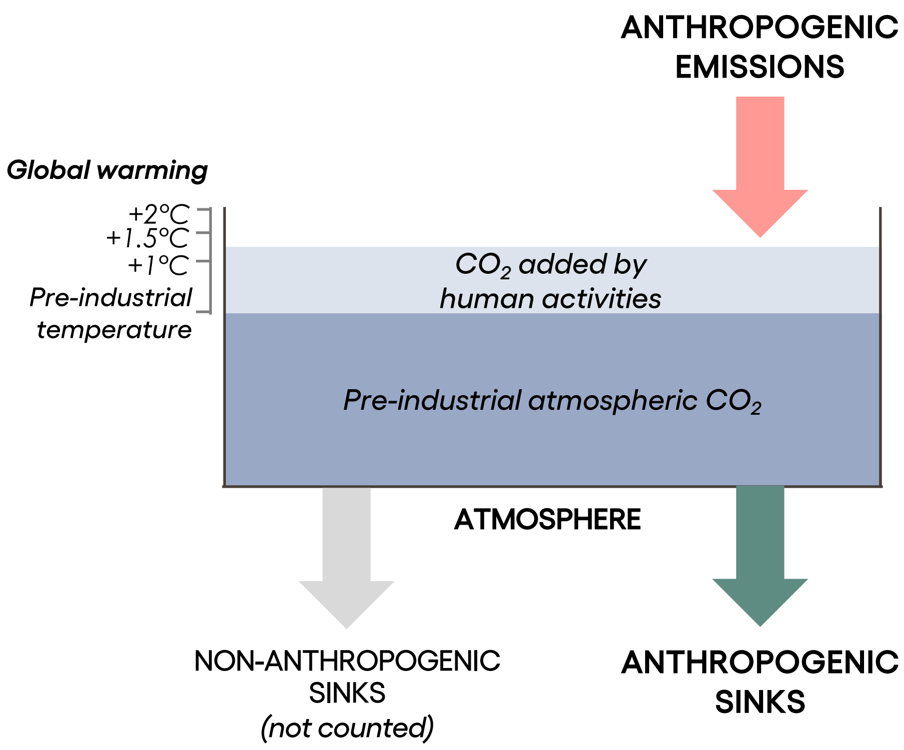
Climate science very clearly defines what global net zero means



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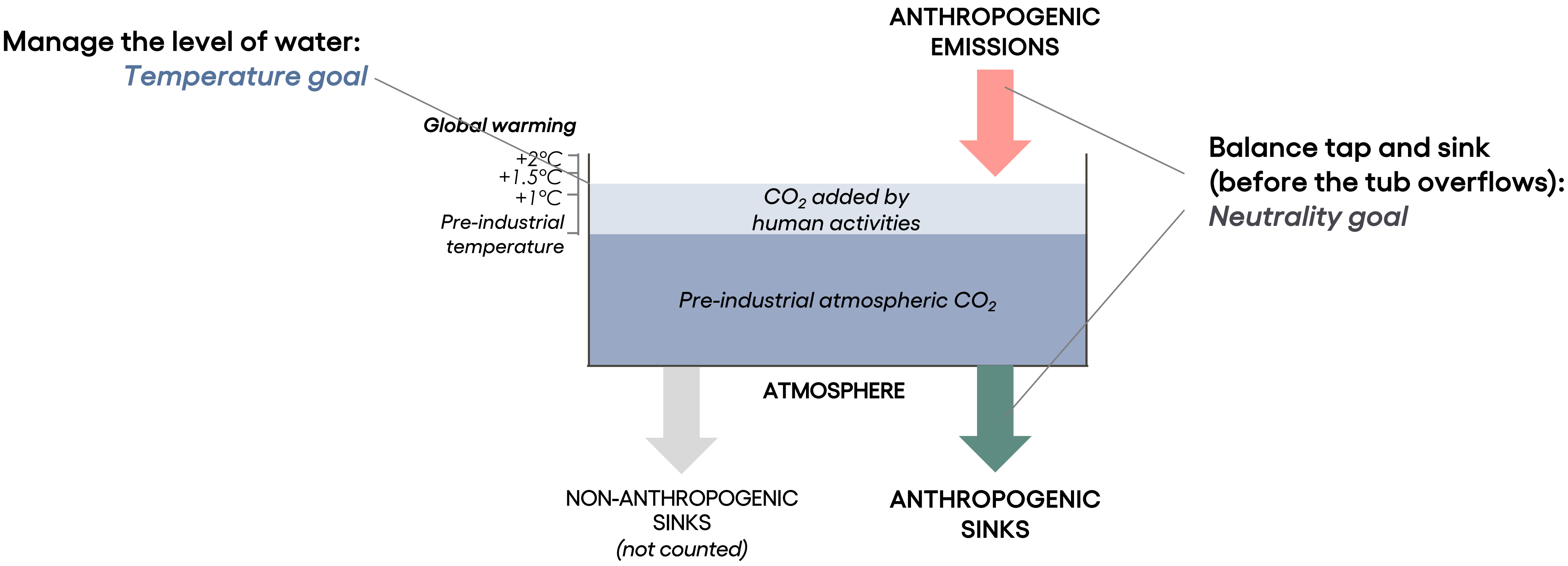
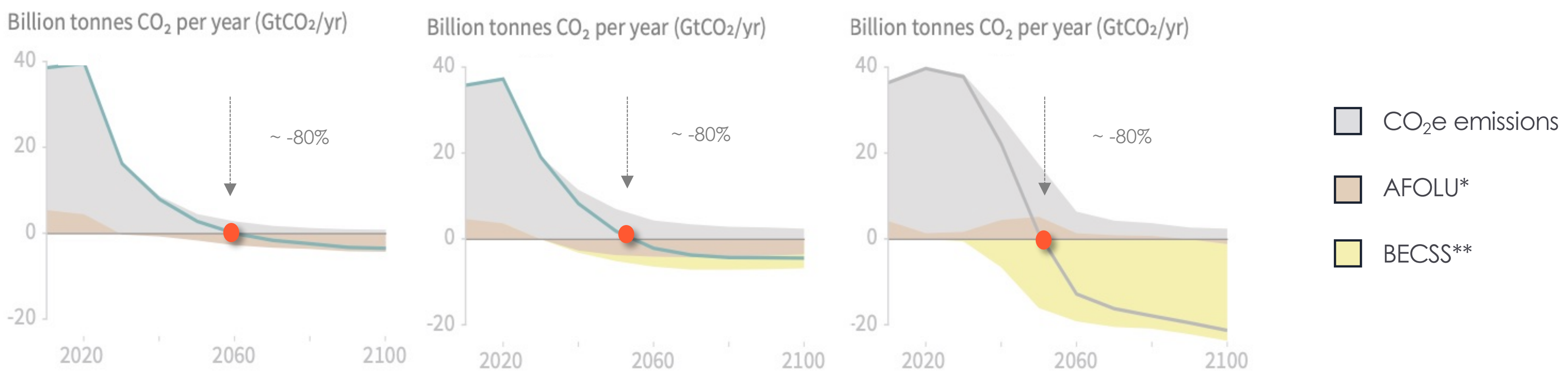


Different pathways to achieve global carbon neutrality, emissions reduction is the priority!

IPCC scenarios for achieving global carbon neutrality



Source: IPCC, AR5
*AFOLU = Agriculture, Forestry and Other Land Use
**BECSS = Biomass Energy and Carbon Sequestration and Storage

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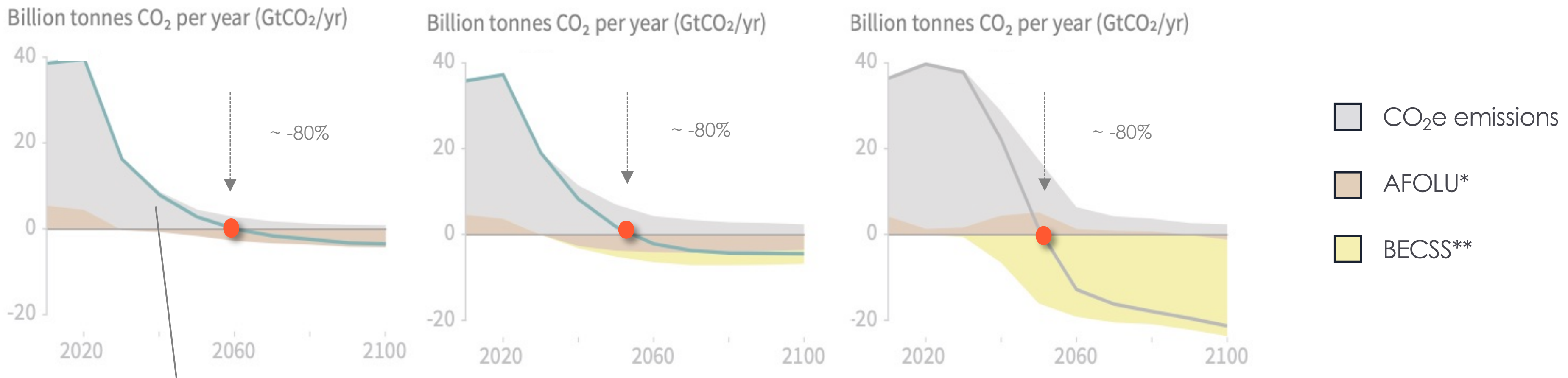

80% of emissions reduction is required in all the scenarios.

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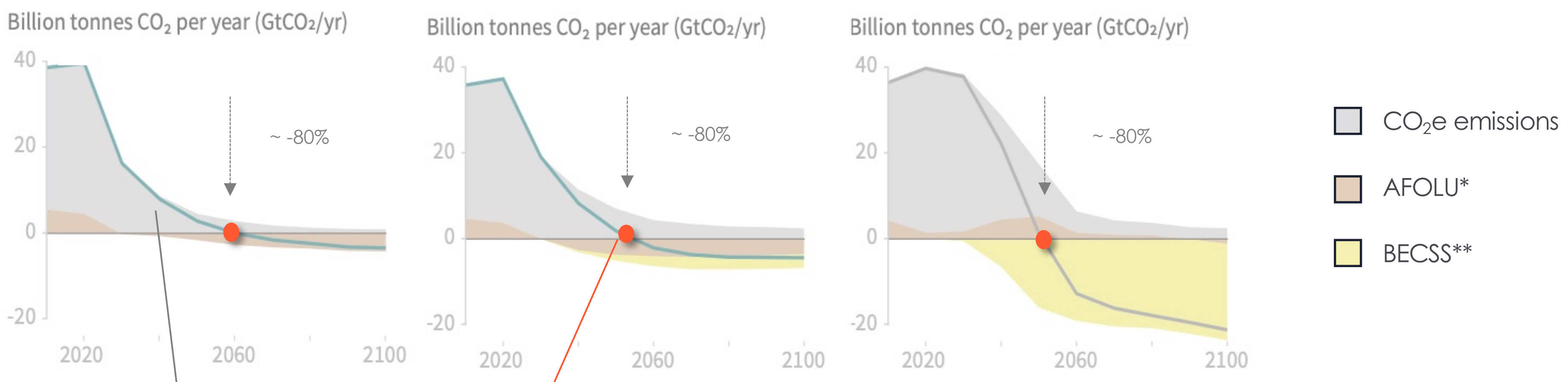

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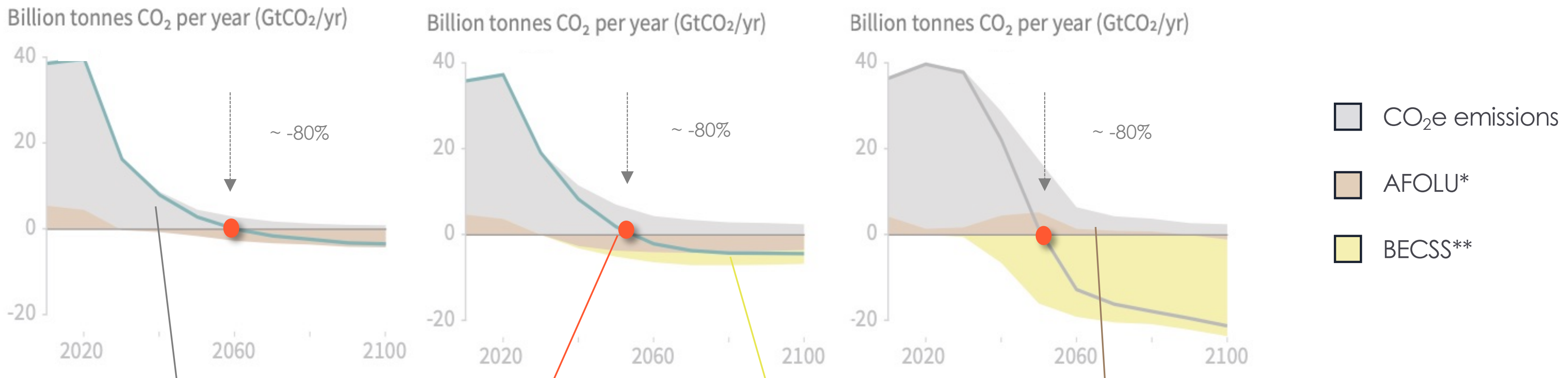

80% of emissions reduction is required in all the scenarios.

Carbon neutrality must be reached by 2050 in all the scenarios.

Technological sinks are expensive and still in development, **rapid reduction is therefore a priority.**

Natural sinks are limited and can act as sources of emissions. Rapid reduction is a priority.

Source: IPCC, AR5
*AFOLU = Agriculture, Forestry and Other Land Use
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Two very different understandings of carbon neutrality currently coexist

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The "carbon neutrality of companies" is based today on the use of "carbon offsetting" and on the triad "Measure, reduce, compensate"

“Carbon neutrality”
as the private sector defines it

=

“Measure”

“Reduce”

“Compensate”

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Critique of each of the term

"Measure" →	Perimeter often incomplete
"Reduce" →	Ambition often insufficient
"Compensate" →	Cognitive bias of buyers: temptation to do nothing to reduce at home

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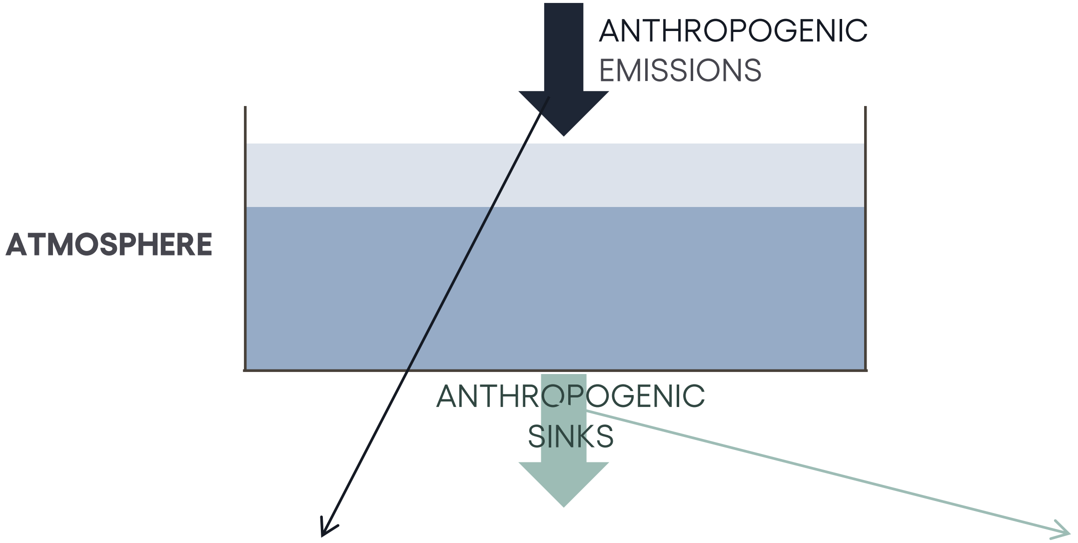
Critique of the general notion of "neutral company"

- The "**zero**" hides the company's emissions
- It is not reasonable **to imply that the problem is already solved**, let alone by others
- The word "**neutrality" is already taken by science** to mean something very different
- The concept is **not universalizable**

We need to reach global net zero by 2050.

How should organizations contribute to this collective goal?

How to reconnect the company action with the objective of global carbon neutrality?



The two levers for reaching global net zero	**REDUCE GLOBAL EMISSIONS**		**DEVELOPP SINKS**
Actions at the scale of companies	A/ Reduce the company's emissions	B/ Reduce others' emissions	C/ Remove CO_2 from the atmosphere
Colonial group	Carbon footprint	Avoided emissions	Direct or indirect removals

How organizations can contribute to net zero: The Net Zero Initiative dashboard.

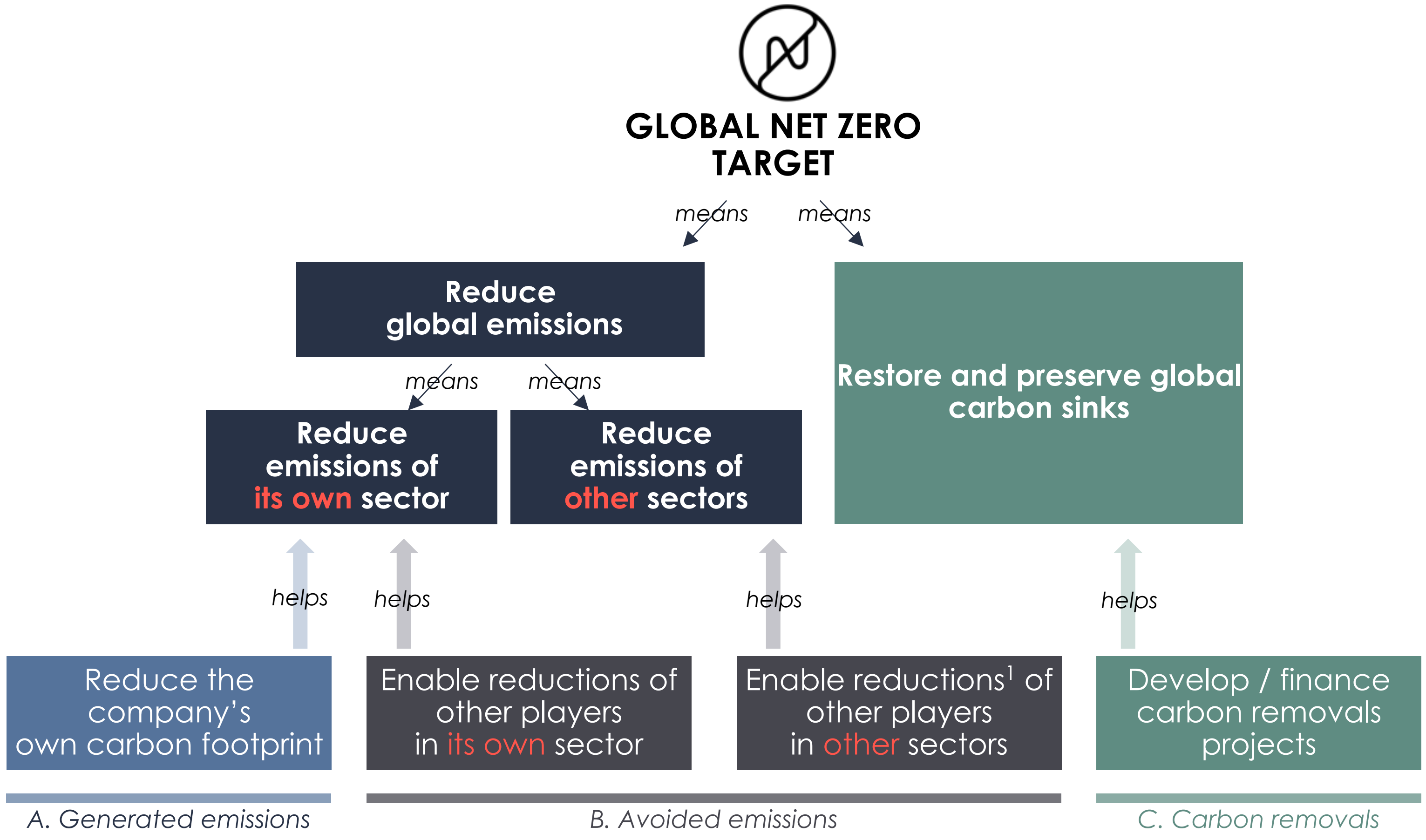
The two levers for reaching global net zero		GLOBAL DECREASE IN EMISSIONS		GLOBAL INCREASE OF CARBON REMOVALS
Actions at the scale of companies		**Pillar A.** Company's emissions reduction *(decarbonization)*	**Pillar B.** Company's contribution to reducing emissions of others	**Pillar C.** Company's contribution to carbon sinks development
Inside the company's value chain	Company's own operations	**Reduction of direct emissions** *(scope 1)*	-	**Direct removals** *(company's own removals)*
	Upstream and downstream	**Reduction of indirect emissions** *(scopes 2+3)*	**Contribution to decarbonizing the company's customers**	**Indirect removals** *(removals inside the value chain)*
Outside of the company's value chain		-	**Reduce others' emissions through the financing of reduction/avoidance projects**	**Removals through the financing of removals projects**

What role should an organization play in the global net zero effort?

Companies must reduce their emissions, but not only

On a global scale,
society must cut emissions and develop carbon sinks

From an organization point of view,
the company must contribute to the global goal by reducing its carbon footprint, enabling other players (in or out of its sector) to decarbonize, and participating in the global carbon sink development effort



1. Or removals, in the case of an IT solution directly improving a carbon sink.

The Net Zero Initiative

2020

2021

Avril 2020

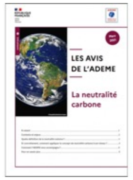
A framework for collective carbon neutrality

Net Zero Initiative

Avril 2021

Opinion on carbon neutrality

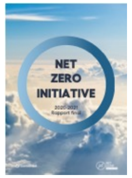
ADEME



Juillet 2021

The Net Zero guidance

Net Zero Initiative



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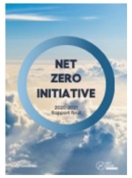

Juin 2022

Le Pillar B guide

Net Zero Initiative

Proposition d'un nouvel indicateur climat

Net Zero Initiative

2020 | **2021** | **2022**

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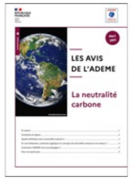

Avril 2021

The 10 Principles for Ambitious corporate action

Net Zero Initiative

The Net Zero Initiative

2020 | 2021 | 2022 | 2023

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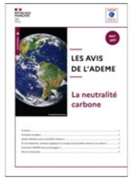

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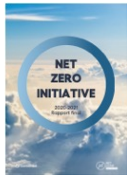

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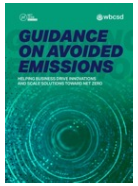
Mars 2023

Guidance on avoided emissions
WBCSD - NZI



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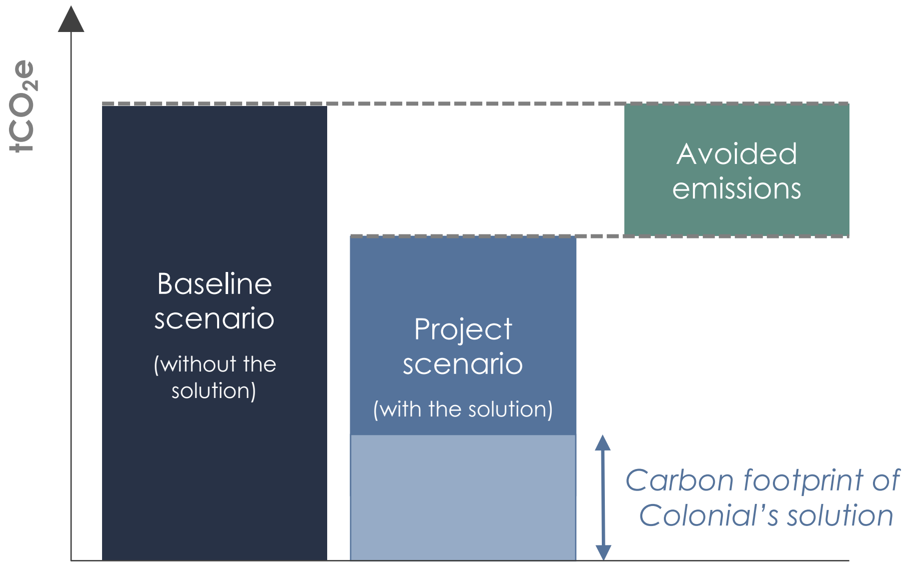
	Upstream and downstream	**Reduction of indirect emissions** *(scopes 2+3)*	**Focus of the *"Pillar B guide"* and *"Guidance on avoided emissions"*** **Contribution to decarbonizing the company's customers**	**Indirect removals** *(removals inside the value chain)*
Outside of the company's value chain		-	**Reduce others' emissions through the financing of reduction/avoidance projects**	**Removals through the financing of removals projects**

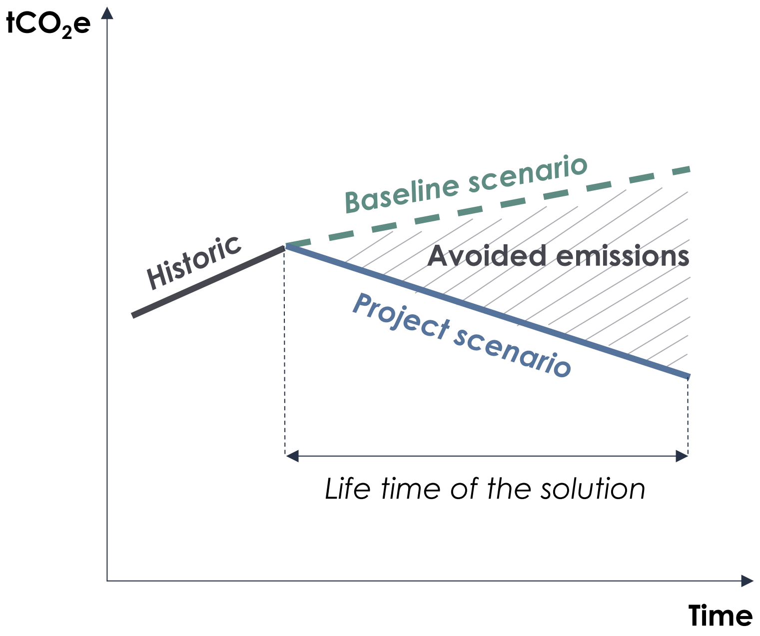
Methodology focus | Avoided emissions analysis: a comparison between two scenarios

- Avoided emissions are **an indicator of the positive impact** a solution or activity may have on GHG emissions. It is a conventional comparison of induced emissions between two scenarios:
  - The baseline scenario describes what would have happened in absence of the project, it needs to be **as realistic as possible**.
    How much greenhouse gases would be emitted in a situation where the project does not exist?

  - The project scenario describes the situation with the project.
    How much greenhouse gases would be emitted in a situation where the project is implemented?



Calculation principle of avoided emissions



- The avoided emissions can be negative. We then talked about **added emissions**.

Avoided emissions depend not only on the carbon performance of the solution studied, but also on the context in which the solution is sold

Solution X
Installing a wind farm to produce low-carbon electricity

Solution X, Context 1
Installing a wind farm to produce low-carbon electricity in France

Solution X, Context 2
Installing a wind farm to produce low carbon electricity in Germany

The amount of emissions avoided by a given solution depends on the context in which it is used.
In this example, the solution will avoid more emissions in context 2 than in context 1, because the electricity produced in Germany is more carbon intensive than in France.

Agenda

1. Introduction
2. Presentation of the NZI and key principles
3. **Presentation of Carbon4 Finance**
4. Presentation of Carbon4 Finance's avoided emissions methodology
5. Q&A

carbon4 | finance

A climate and Biodiversity data provider specialized in metrics for the financial sector

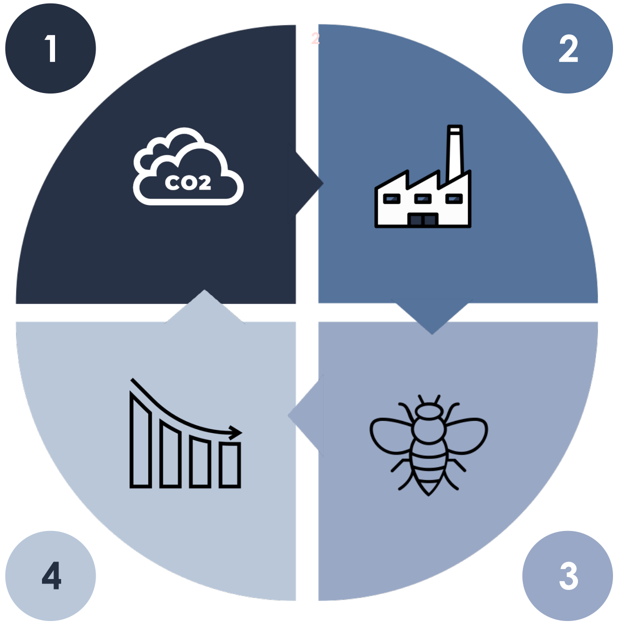
Our services

Assessment of transition risks (CIA)

Carbon footprint
Scope 1, 2 & 3
Emission Savings
Climate scenario alignment

Web platform & Datafeed

Issuer Analysis
Portfolio performance



Assessment of physical risks (CRIS)

7 climate Hazards
3 IPCC Scenarios
2 time-horizons

Assessment of Biodiversity risks and Impacts (BIA-GBS™)

MSA.Km2
Scope 1, 2 & 3
10 Terrestrial and Aquatic pressures

Our approach

An innovative bottom-up technology

An international coverage (c. 420 000 instruments, corporate, green bonds and sovereign) on 42 000 entities

25 analysts, each specialized in each of the 75 specific sectors

A multi-sector approach
Listed and unlisted Assets

Climate

carbone4 | conseil

carbon impact analytics

climate risk impact screening

Biodiversity

CDC BIODIVERSITÉ | Caisse des Dépôts GROUPE

GBS GLOBAL BIODIVERSITY SCORE

biodiversity impact analytics

How to access the data?

- Pedagogical & friendly platform
- SFTP (secured flow transfer protocol) directly into client's systems
- Expert's support and research papers

A comprehensive service offering with common methodological principles for all asset classes

	Listed corporates (equities & bonds)	Sovereign bonds	Green bonds	Loans	Private equity	Real estate	Infrastructure
Transition risks	carbon impact analytics				carbon4 private equity	carbon4 real estate	CIARA
Physical risks	climate risk impact screening			climate risk impact screening customized			
Biodiversity risks and impacts	biodiversity impact analytics GBS GLOBAL BIODIVERSITY SCORE			biodiversity impact analytics customized		GBS GLOBAL BIODIVERSITY SCORE CDC BIODIVERSITÉ	

Common methodological principles for all asset classes: bottom-up logic, measurement of Scope 3 emissions and saved emissions, qualitative forward-looking assessment, etc.

carbon4 | finance - ***Climate & Biodiversity data provider*** *specialized in metrics for the financial sector – Banks, Index providers, Asset Owners and Asset Managers*

Our clients

Asset Managers

Caisse des Dépôts Groupe, Amundi Asset Management, Rothschild & Co Asset Management, CFM, Edmond de Rothschild Asset Management, La Banque Postale Asset Management, EDF Invest, Montaigne Capital, Man, ISALT, La Française Investing Together, Crédit Mutuel Equity, Candriam A New York Life Investments Company, Ofi Asset Management, Dôm Finance, Goodvest, Sanso Investment Solutions, Eiffel Investment Group, Oddo BHF, Atlanti Asset Management, Jupiter Asset Management, Cofidis, Russell Investments, William Blair, Vontobel, Federal Finance Gestion, HSBC, AXA Investment Managers, Ostrum Asset Management, Mirova Responsible Investing, SwissLife Asset Managers, La Financière de l'Échiquier, Phitrust Impact Investors

Asset Owners

BNP Paribas Cardif, AG2R La Mondiale, Allianz, MGP, MACSF, Malakoff Humanis, MAIF, Harmonie mutuelle, Tutélaire Mutuelle Humaniste, Assurances Crédit Mutuel, SOGECAP, Groupe VYV, CNP Assurances, SCOR, BPCE Assurances

Banks & platform

Groupe BPCE, ING, Natixis Beyond Banking, bpifrance, Banque Hottinguer, Crédit Mutuel, Societe Generale, beobank, Targo Bank, Groupe Crédit Coopératif, Deutsche Bundesbank Eurosystem, European Central Bank Eurosystem

Index Providers & Partnerships

WWF, Euronext, SGX, Weefin, Rift, Sequantis, AFD Agence Française de Développement, Finance for Biodiversity Pledge, PositiveMoney, Oxfam

Agenda

CIA: a methodology based on induced/avoided emissions and a dynamic assessment of a company climate performance

CIA Sectoral Rating

1 (best) to 15 (worst)

Past performance

Evolution over the last 5 years

Raw data (N-5)

- Induced emissions (scope 1,2&3)
- Reduced and **avoided emissions** (scope 1,2&3)
- Physical flows (MWh, ton cement, ton of oil equivalent, ...)

Reference indicators
(depending on sectors)

Carbon Impact Ratio $\frac{\text{tCO2e saved}}{\text{tCO2e induced}}$ **OR** **Intensity** (ex: tCO_2e/MWh, tCO_2/ton cement, tCO_2/toe...)

1 (best) to 15 (worst)

Current performance

Performance relative to sector peers

Raw data (N)

- Induced emissions (scope 1,2&3)
- Reduced and **avoided emissions** (scope 1,2&3)
- Physical flows (MWh, ton cement, ton of oil equivalent, ...)

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1 (best) to 15 (worst)

Future performance

Forward-looking analysis

Overall strategy
Business model, risk assessment

Investments
R&D, CAPEX

Scope 1&2 reduction target
Comparison against sectoral Scenarios

Scope 3 reduction target
Comparison against sectoral Scenarios

Governance (1/3)
Top management involvement

Governance (2/3)
Training on climate change

Governance (3/3)
Incentives to reach environmental goals

CIA 4 key methodological drivers

- **Bottom-up approach** for more information, data precision, comparability, and qualitative analysis
  In-depth assessment of portfolio constituents, followed by aggregation at the portfolio level

- **Value chain assessment including scope 1, 2 and 3 emissions,** to shed light on the "real" carbon dependency of assets
  Sector-specific analysis with focus on high-stakes sectors and elimination of double counting

- **Assessment of emissions savings**: going beyond carbon footprinting to measure contribution and steer investments towards assets best positioned for the low-carbon transition

- **Forward-looking analysis**: where are your assets headed?
  Rating system comparing company strategy, targets, and investments to 2-degree scenarios and sectoral benchmarks

carbon impact analytics

Report on carbon impact and best practices

Stock-pick and manage investments within a sector (best-in-class) and between sectors

Enhance dialogue with portfolio constituents

Carbon accounting basis

➤ Accounting for scope 1, 2 and 3 emissions is the only way to capture climate challenges in a comprehensive way:

Upstream activities

« Upstream Scope 3 »

Upstream freight

Travel
Business travel
Employee commuting

Capital assets (fixed assets: buildings, vehicles, IT equipment …)

Purchases (Purchase of goods and services)

Company's activities

« Scopes 1 & 2 »

Company's vehicle fleet

Buildings
Fossil fuels consumption
Electricity consumption
Refrigerant gas leakages

Downstream activities

« Downstream Scope 3 »

Customer and visitor travel

Downstream freight

Use of sold products

End-of-life
Of sold products
Waste produced

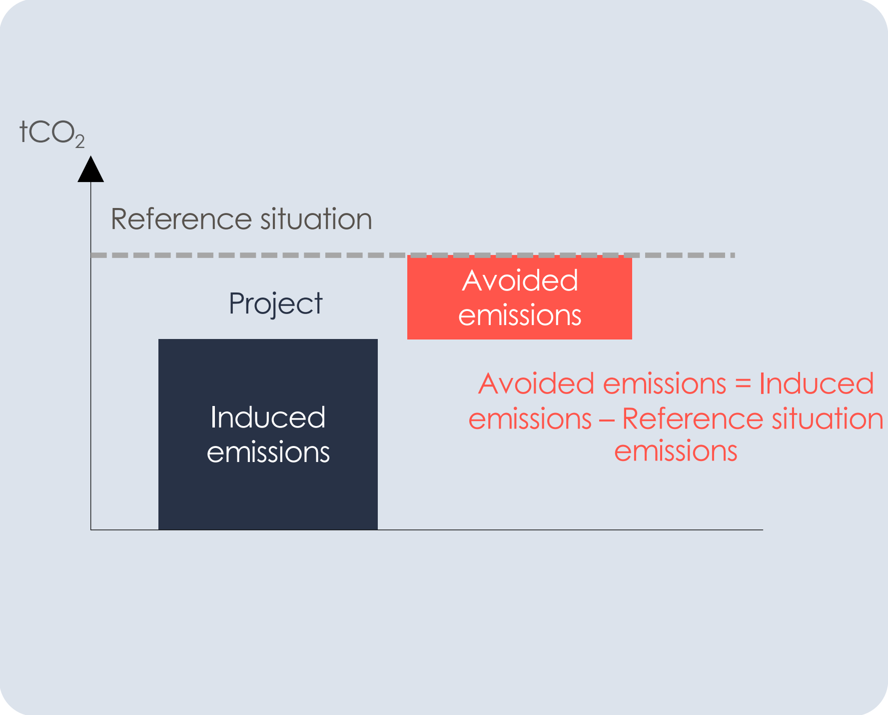
Methodology and sources used are based on the Greenhouse Gas Protocol, developed by the WRI and the WBCSD.

What are avoided emissions assessed?

Rationale: replacement of the emissions that would have occurred without the company's activities. 2 ways of "avoiding" emissions for companies :

1) **Comparison with a reference scenario**
   - Difference between a company's absolute emissions and a reference situation
     - e.g.: IEA 2°C trajectory for power production's carbon intensity: a company avoids emissions if there is a positive gain between the induced emissions of the company on the one hand, and the baseline sectoral emissions scenario on the other hand.

2) **Substitution by low-carbon solutions**
   - Carbon intensities of two products are different, in tCO_2e per functional unit
     - e.g.: replacement of the fleet by more efficient vehicles, use of biofuel without deforestation compared to petroleum-based fuel, etc...



Please note while computing avoided emissions

Avoided emissions give a more complete picture of the company's carbon impact…

- **Assessing the value chain:** we will consider all relevant aspects of a product life cycle.
- **Sectoral approach:** each economic sector has its own set of scenario and indicators for comparison.

… however, avoided emissions are subject to specificities.

- **Not deductible from induced emissions:** avoided emissions are virtual indicators that do not cancel out induced emissions.
- **Not applicable to all sectors:** two conditions must be met:
  - there must be a science-based reference scenario;
  - sector must be able to contribute to the low-carbon transition.
- In most cases, avoided emissions do not only concern the year of the analysis but **the entire lifecycle of the company's products.**

General principal for added value

- The added value is an **accounting indicator** that accounts for a company's share in the value of a product. Its calculation will enable to **isolate and attribute responsibility for Scope 3 emissions to an actor in the value chain**, typically in the case of equipment manufacturers (transport, energy, industry).
- In the CIA methodology, we calculate the added value using the **value of total production minus the cost of intermediate inputs purchased from an external company**. Intermediate inputs are goods and services (including energy, raw materials, semi-finished goods and services purchased from all external sources) that are used in the production process to produce other goods or services rather than for final consumption.
- The added value is calculated at the enterprise level, even for enterprises with a wide range of activities.
- Usually, in corporate reporting, a company reports its downstream Scope 3 emissions using the GHG Protocol methodology, which allocates 100% of Use of Sold Products Scope 3 emissions to the Company.
    - The CIA methodology applies a Value Chain approach: Scope 3 emissions are weighted by the value added attributed to each step of the value chain, leading to a slightly lower result, which reflects more precisely the transition risk of the company.
    - We believe this value chain approach better reflects the transition risk of the company.

Double counting within the value chain, for a given product category

	Company A	Company B	Company C
	Purchases 0€ / **Revenues** 100€	**Purchases** 100€ / **Revenues** 300€	**Purchases** 300€ / **Revenues** 1,000€
	Added value A = 100€ **R - P**	*Added value B = 200€* **R - P**	*Added value C = 700€* **R - P**
Share in total added value	100/1,000 = 10%	200/1,000 = 20%	700/1,000 = 70%

500 tCO_2e (Scope 3)

Linked to the use of the product

Scope 3 emissions allocated to **Company B**

$$\frac{500\ tCO_2e}{1{,}000€} \times 200€ = 500\ tCO_2e \times 20\% = 100\ tCO_2e$$

$\frac{500\ tCO_2e}{1{,}000€}$	×	200€	=	500 tCO_2e	×	20%	=	100 tCO_2e
EF designed by C4 consultants		*Added value*		*Total Scope 3 emissions linked to product category*		*Share in total added value*		

Use case – A company within the energy equipment sector

Elec' Maker Inc.

Avoided emissions calculation - Electricity Generation Equipment
Baseline scenarios and lifetime

- **Methodology**: Avoided emissions generated when the carbon intensity of the electricity produced with the sold equipment outperforms the carbon intensity of the electricity produced by the world current power generation assets.
- **Baseline scenario** is based on the RTS (reference technology scenario) from the IEA, 2020.
- **Lifetime** depends on technology / infrastructure used for electricity generation, e.g.:
  - Solar PV: 25 years
  - Wind: 25 years
  - Gas: 30 years
  - Nuclear: 60 years

Upstream activities
« Upstream Scope 3 »

Company's activities
« Scopes 1 & 2 »

Downstream activities
« Downstream Scope 3 »

$$\underbrace{\text{Average carbon intensity of the company's equipment } (tCO_2e/MWh) - \text{Current carbon intensity } (tCO_2e/MWh)}_{<0} \times \text{MWh produced}$$

Calculating avoided emissions

Using capacity installed from the company's data

Elec' Maker Inc.

Calculating avoided Scope 3 emissions – electricity production equipment

1. **Total electricity production** 835,839,780 MWh = **Annual capacity installed during the year** 16,594 MW × **Load Factor** 23% × **365 days** × **24 hours** × **Installation lifetime** 25 years

Operational key figures

Order intake (bnEUR)	11.6	12.7	13.8	10.6	8.9
Order intake (MW)	13,896	17,249	17,877	14,214	11,176
Order backlog – wind turbines (bnEUR)	18.1	19.0	16.0	11.9	8.8
Order backlog – wind turbines (MW)	21,984	24,630	20,974	15,646	11,492
Order backlog – service (bnEUR)	29.2	23.9	17.8	14.3	12.1
Produced and shipped wind turbines (MW)	17,845	17,055	12,618	10,676	11,237
Produced and shipped wind turbines (number)	4,456	5,239	4,185	3,729	4,241
Deliveries (MW)	16,594	17,212	12,884	10,847	8,779

Elec' Maker Inc. Annual Report

2. **Energy production over lifetime allocated to actor** 234,035,138 MWh = **Total energy production** 835,839,780 MWh × **% value added by the producer** 28%

3. **Avoided emissions** -57,xxx,xxx tCO_2e = **% new installations that replace existing installations** *44% (IEA)* × [**Induced emissions - Downstream Scope 3 Direct Emissions** 0 tCO_2e - **Energy production over lifetime allocated to actor** 234,035,138 MWh × **Emission factor replaced capacity** *XYZ tCO_2e/MWh*]

Differences between Carbon4 Finance and Elec' Maker Inc.

Methodologies for avoided emissions

Elec' Maker Inc. methodology

Products
CO_2e avoided is to be understood as the volume of emissions avoided by using the wind turbines as source, compared to the average level of CO_2e impact involved in electricity generation.

Expected CO_2e avoided over the lifetime of the MW produced and shipped during the period is calculated on the basis of the wind turbines (MW) produced and shipped during the reporting period, a capacity factor of 34 percent in 2020, an expected lifetime of 21 years, and the latest updated standard factor of global average carbon emissions for electricity from the International Energy Agency (2021), at present 477 grams of CO_2e per kWh.

Annual CO_2e avoided by the total aggregated installed fleet is calculated on the basis of total annual installed capacity (MW) and global average CO_2e emissions avoided per year of operation. The total CO_2e avoided is an aggregation of each year since 1981, accounting for decommissioned turbines, based on an estimate of the average lifetime of a turbine.

Elec' Maker Inc.'s Sustainability Report

Carbon4 Finance methodology

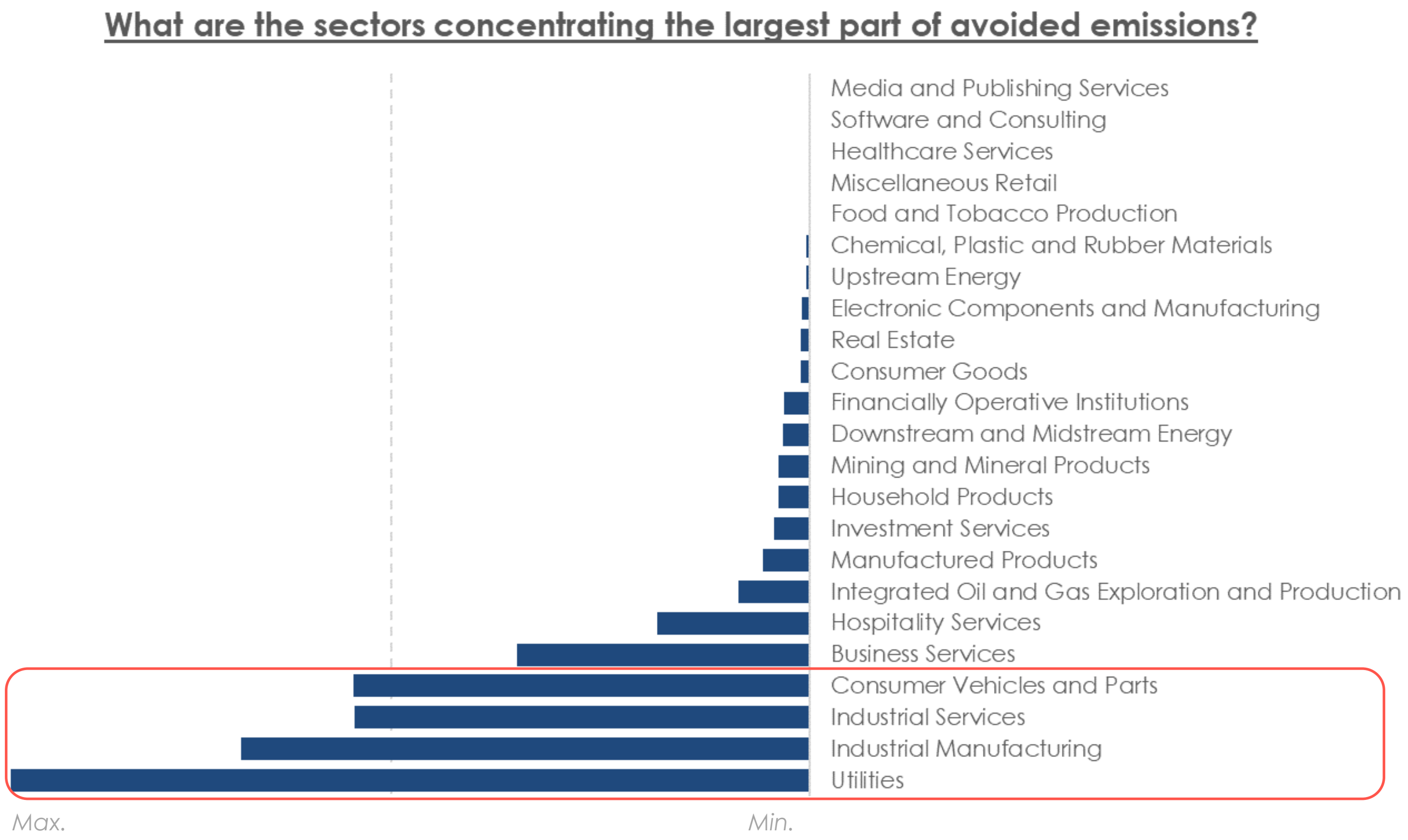
- **Load factor:** 23%
- **Lifetime:** 25 years
- **Average carbon intensity**: XYZ gCO_2e/MWh

→ **with these variables, results are comparable between C4F and Elec' Maker Inc.'s methodologies.**

Carbon4 Finance's methodology differs on two aspects:

- **Added value** (28%): we isolate and attribute responsibility for Scope 3 emissions to an actor in the value chain
- **Replacement rate** (44%): we consider that only 44% of Elec' Maker Inc.'s installations sold will replace the existing park, the others will be used to meet the "new" demand and therefore do not generate avoided emissions (conservative approach, we have no reference situation for the new installations, so we consider that there are no avoided emissions).

Top / bottom avoided emissions sectors



Average levels of avoided emissions per company per sector (no unit, source: Carbon4 Finance)

- The **Utilities** sector is concentrating most of the avoided emissions, with companies operating in the following domains (non-exhaustive):
  - Production of electricity
  - Water collection, treatment and supply
  - Distribution of gaseous fuels through mains

- For the other sectors, we can see some illustrative examples of activities (non-exhaustive):
  - **Industrial Manufacturing**
    - Manufacture of steam generators, except central heating hot water boilers
    - Manufacture of electric motors, generators and transformers
  - **Industrial Services**
    - Construction of utility projects for electricity and telecommunications
    - Passenger rail transport, interurban

Agenda

1. Introduction
2. Presentation of the NZI and key principles
3. Presentation of Carbon4 Finance
4. Presentation of Carbon4 Finance’s avoided emissions methodology
5. **Q&A**

Any question?

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Contact: sales@carbon4finance.com

54 rue de Clichy 75 009 Paris

+33 (0)1 87 44 84 99

www.carbon4finance.com