Assessing portfolio alignment to net zero trajectories

Peter Tankov

CREST–ENSAE & Institut Louis Bachelier

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- More restrictive interpretation: alignment of portfolios with the temperature objective (well below 2°C), "warming potential" of portfolios, implied temperature rise (ITR) above the pre-industrial level.
- Formally: temperature alignment assessment = distance of the portfolio with a chosen benchmark trajectory limiting the global average temperature rise to a specified level.

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- Portfolio alignment is not a measure of environmental impact: it remains to be demonstrated that aligning one's portfolio to a climate scenario produces additional impact on emission reduction.
- Portfolio alignment is rather a measure of compatibility of a company's trajectory to a global scenario: I am doing my share.

References

This talk is based on:

- Louis Bachelier Institute report: The Alignment Cookbook: a technical review of methodologies assessing a portfolio's alignment with low-carbon trajectories or temperature goal By J. Raynaud (lead author), S. Voisin, P. Tankov, A. Hilke and A. Pauthier, **July 2020**.
- Louis Bachelier Institute report: The Alignment Cookbook II By J. Raynaud (lead author) and ILB Team, **May 2024**.
- Portfolio Alignment to a 2°C Trajectory: Science or Art? By J. Raynaud, P. Tankov and S. Voisin, **July 2020**.
- Assessing firms' (mis)alignment to net zero targets: the case of the steel sector By T. Barreau, S. Battiston, I. Monasterolo, H. Saleh and P. Tankov (working paper).

Main methodological steps

1. Measure the climate performance, at asset or portfolio level using an appropriate metric;

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The result of step 4 may be expressed in binary form (aligned or not), in physical units (overshoot) or through an ITR metric.

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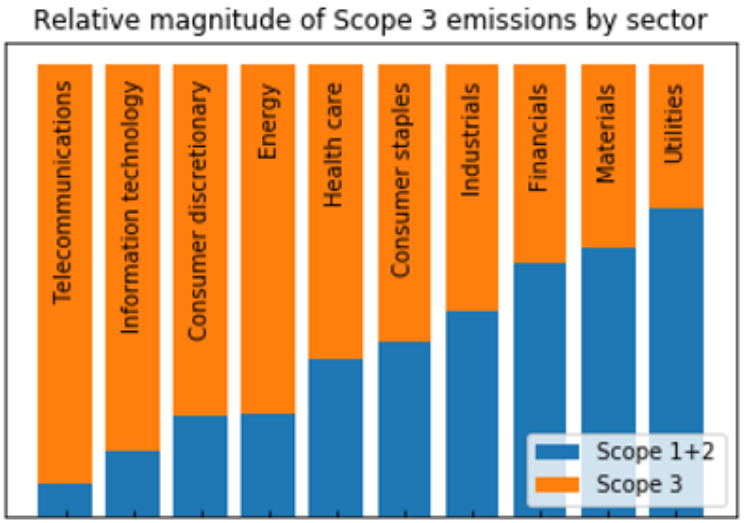
- Technology mix related metrics compare the mix of a portfolio with the mix of a given scenario. This approach is more prescriptive, scenario-dependent, and does not apply to all sectors.
- For forward-looking assessments: different forecasting methods rely on extrapolation based on historical data, macroeconomic trends, stated objectives and targets, or even green patents and R&D expenditure.

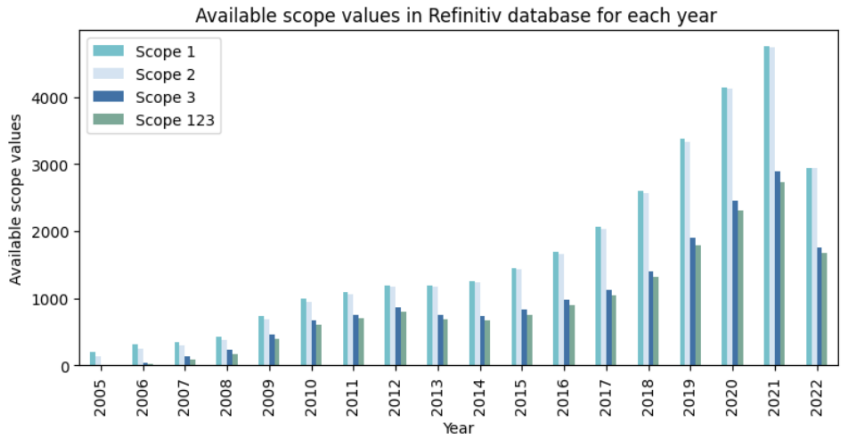
Measuring climate performance: carbon footprint

- absolute emissions or emission intensity per unit of production or revenues
- Scope 1 (direct emissions from the production process), Scope 2 (emissions from the production of energy used) and Scope 3 (upstream and downstream in the value chain)
- Scope 1 and 2 reporting is standardized and common, Scope 3 data remains scarce



Measuring carbon footprint: data sources

- Company-level reporting (via Carbon Disclosure Project)
  - Available through commercial data supplier but a recent initiative aims to build a free public database.
  - Many companies do not report their emissions $\Rightarrow$ estimation from financial indicators
  - Backward-looking



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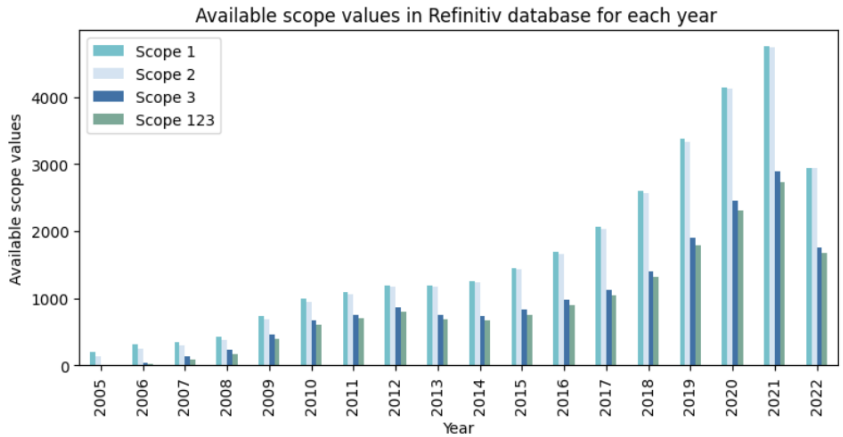

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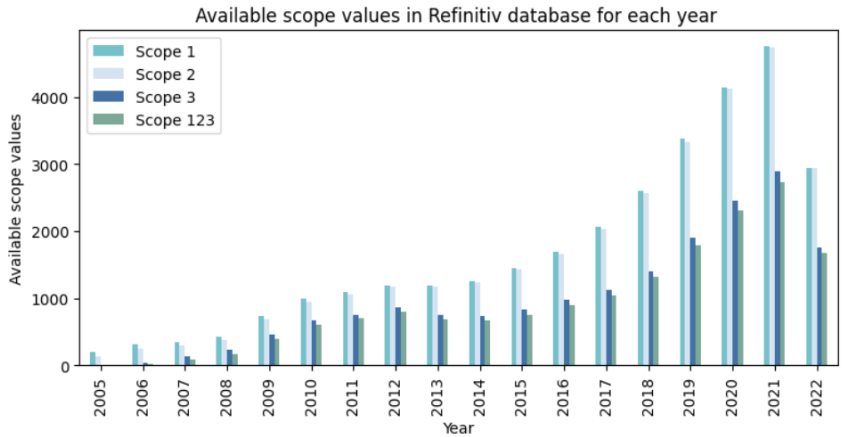

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  ⇒ May be forward-looking but relies on technology-wide emission factors and other estimates
- Real-time estimation from satellite data and remote sensing (Climate Trace): only Scope 1 data

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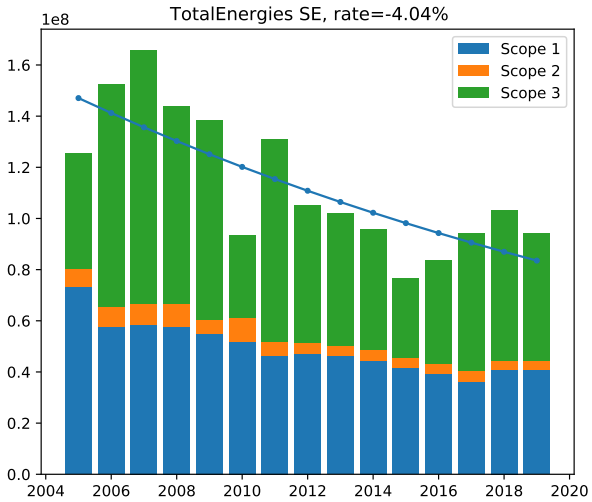
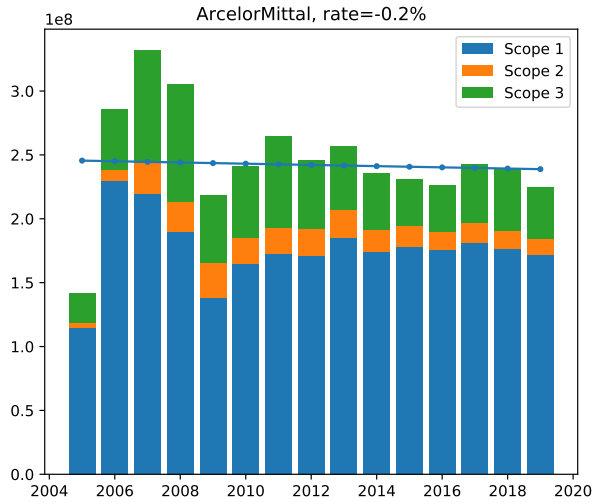
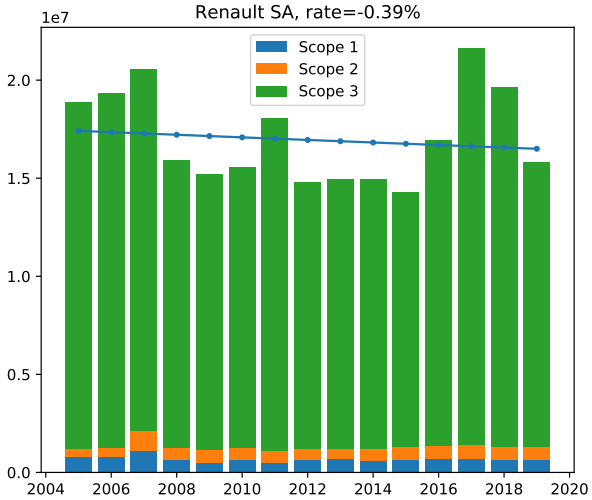
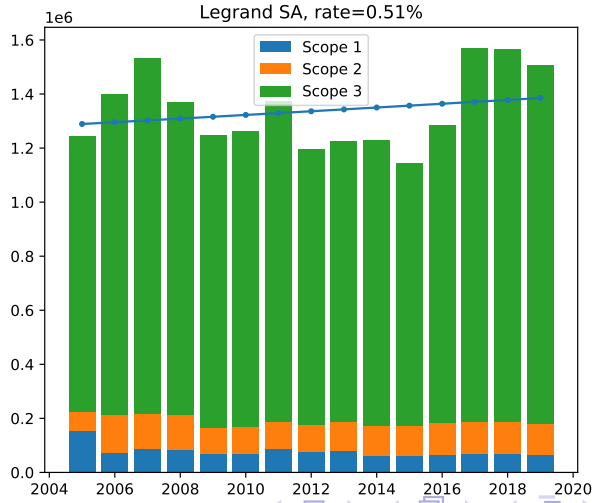
Extrapolating absolute emissions from past data

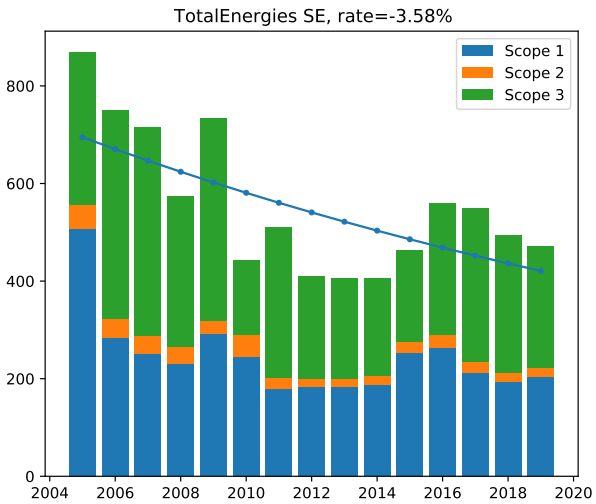


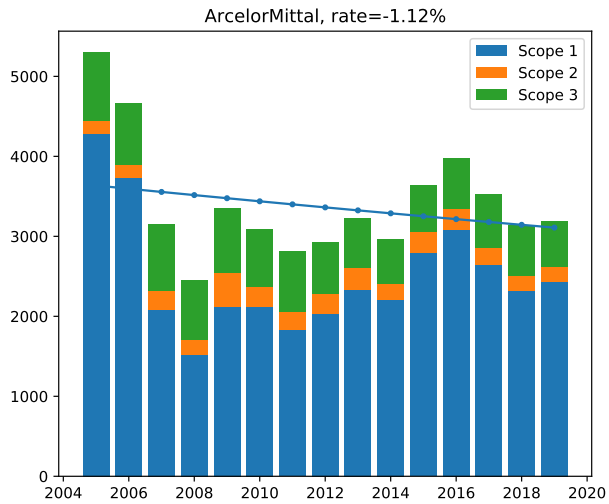


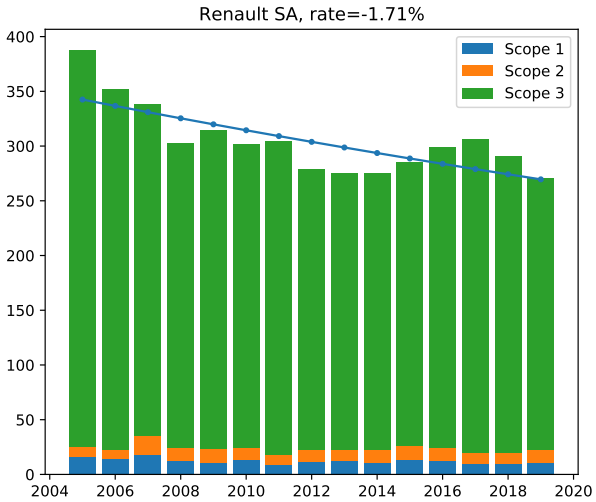


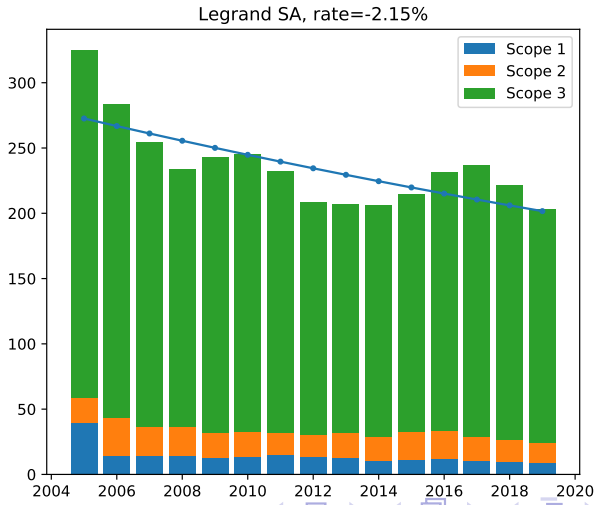


Extrapolating emission intensity from past data









Emission target setting

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- Criteria include ownership boundary, GHG coverage, emission coverage, scope coverage, time frame, renewable electricity etc.
- SBTi targets are split into near-term, long-term and net-zero
- Among the four companies analyzed above, as of Dec 2022
  - ArcelorMittal has a commitment to set a near-term target within 24 months
  - Renault has a near-term target of well-below 2° C
  - Legrand has a near-term target of 1.5° C
  - TotalEnergies has no targets or commitments since SBTi does not work with fossil-fuel companies, but company web page announces a target of reducing Scope 1+2 emissions by 40% between 2015 and 2030

Bottom-up emission estimation

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- Asset-level variables can be projected using data on future plant openings/closures and global and regional trends from scenarios
- Bottom-up estimates could be more stable than top-down estimates, because they are directly related to emitting activities
- We propose a methodology for estimating future company emissions based on asset-level data, applied to the steel sector

Bottom-up emission estimation: steel sector

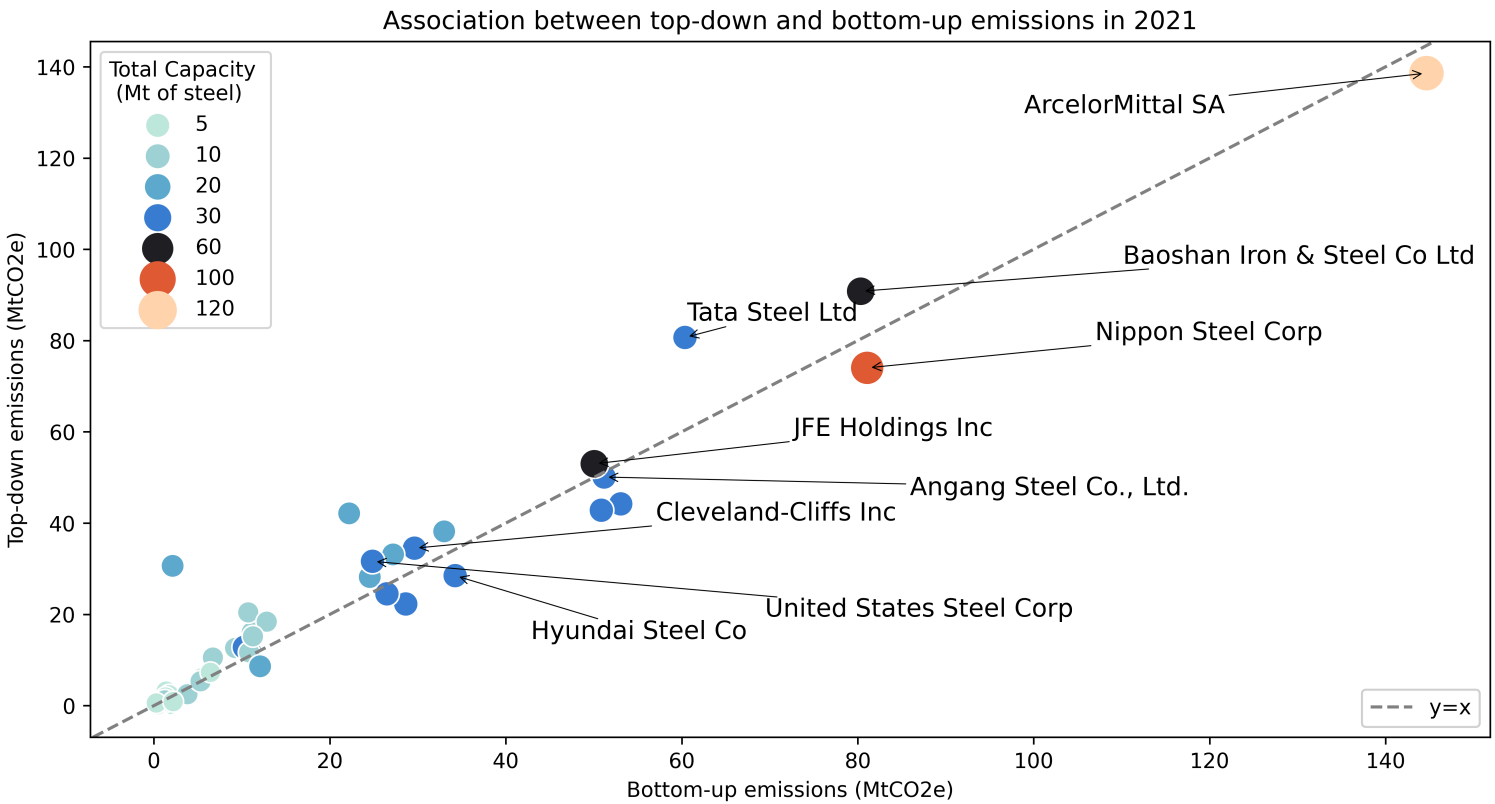
Global Steel Plant Tracker database lists capacity, technology and production for all steel power plants with capacity over 500,000 tons per year (over 94% of total).

Technology	Emission factor
electric	0.67 (t CO2 / t steel)
integrated (BF)	2.32 (t CO2 / t steel)
integrated (DRI)	1.65 (t CO2 / t steel)
mixed or other	2.32 (t CO2 / t steel)

Average emission factors (Scope 1 and 2 of steel plants in GSPT database)

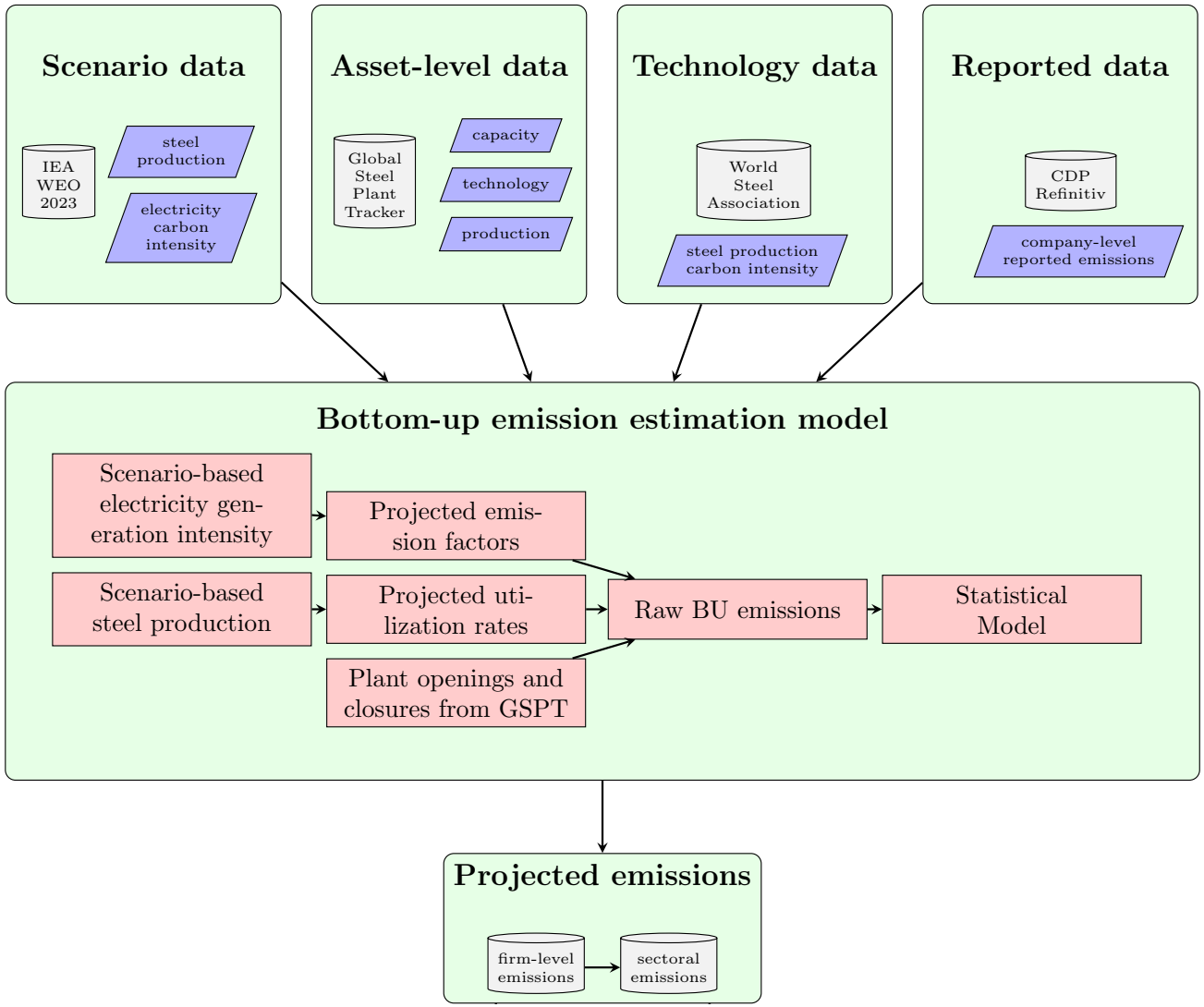
Distribution of steel plants in GSPT database

Bottom-up emission estimation: steel sector

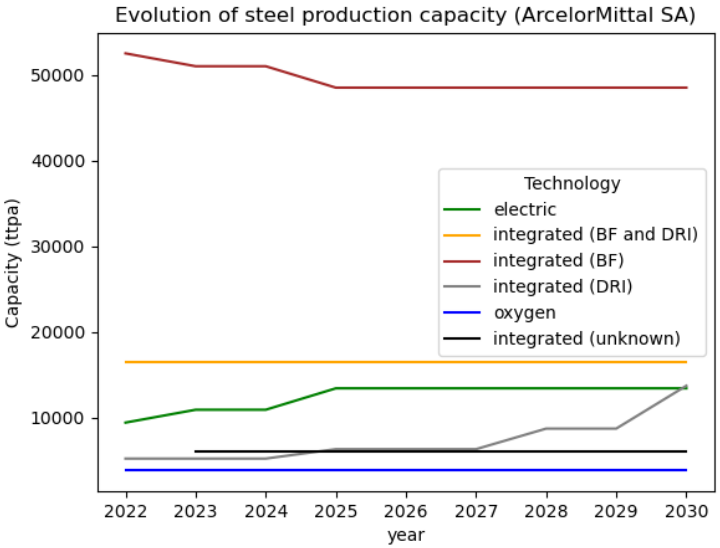


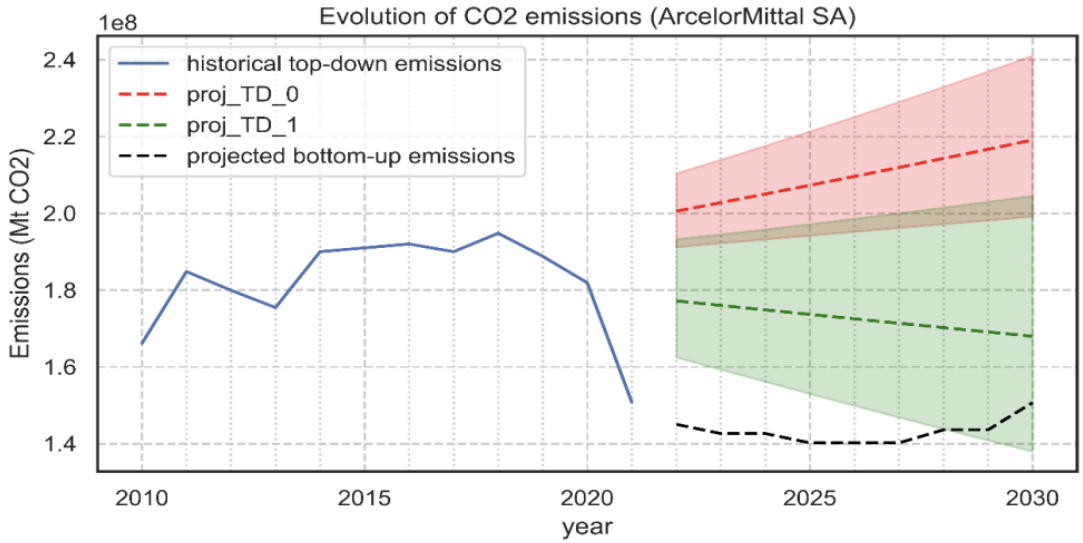
Reported and bottom-up emissions for companies in GSPT database which report to CDP

Bottom-up emission estimation: projections



Bottom-up projections: illustration





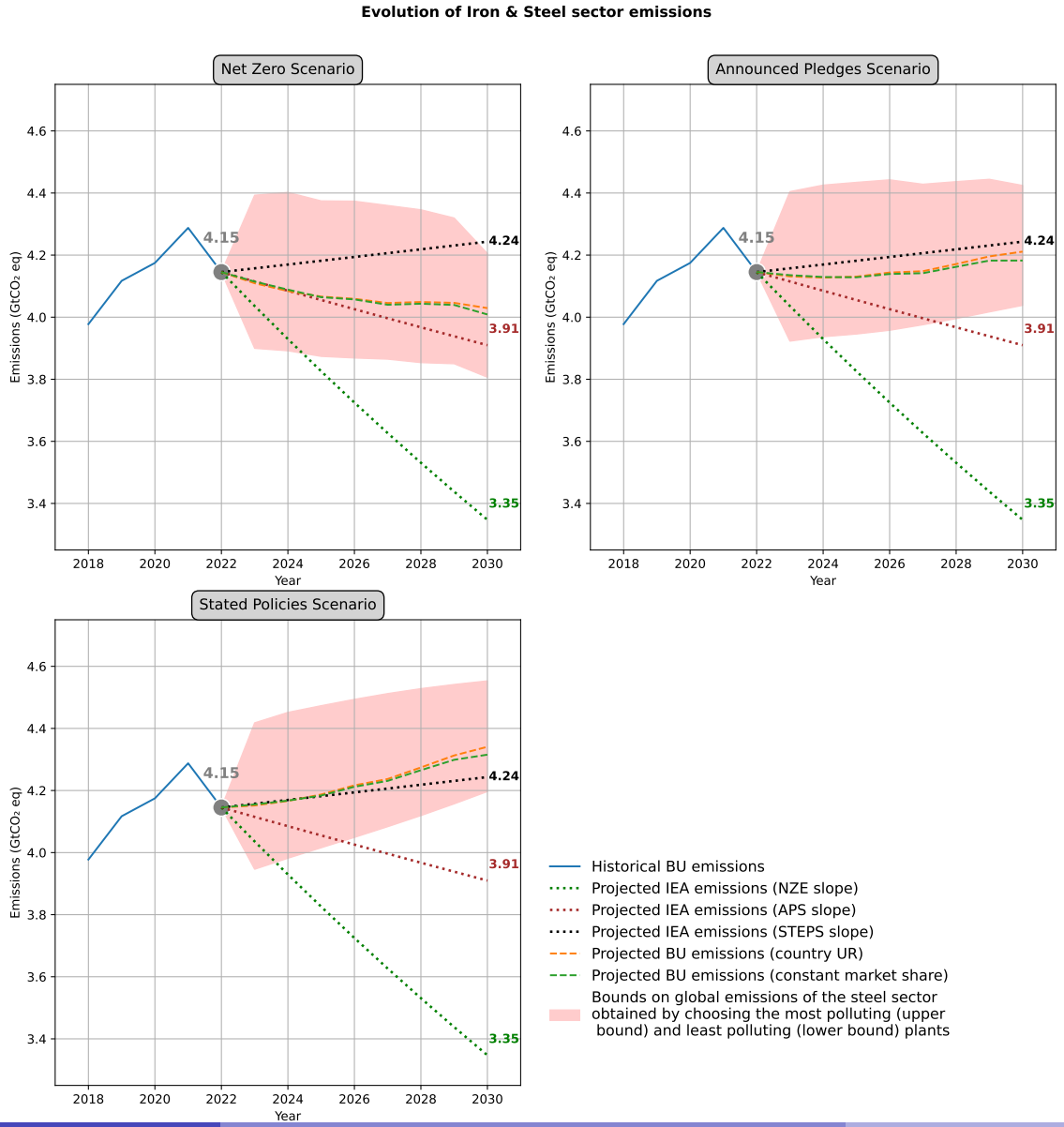
Left: projected evolution of ArcelorMittal steel production capacity by technology (GSPT).

Right: comparison of bottom-up and top-down extrapolations.

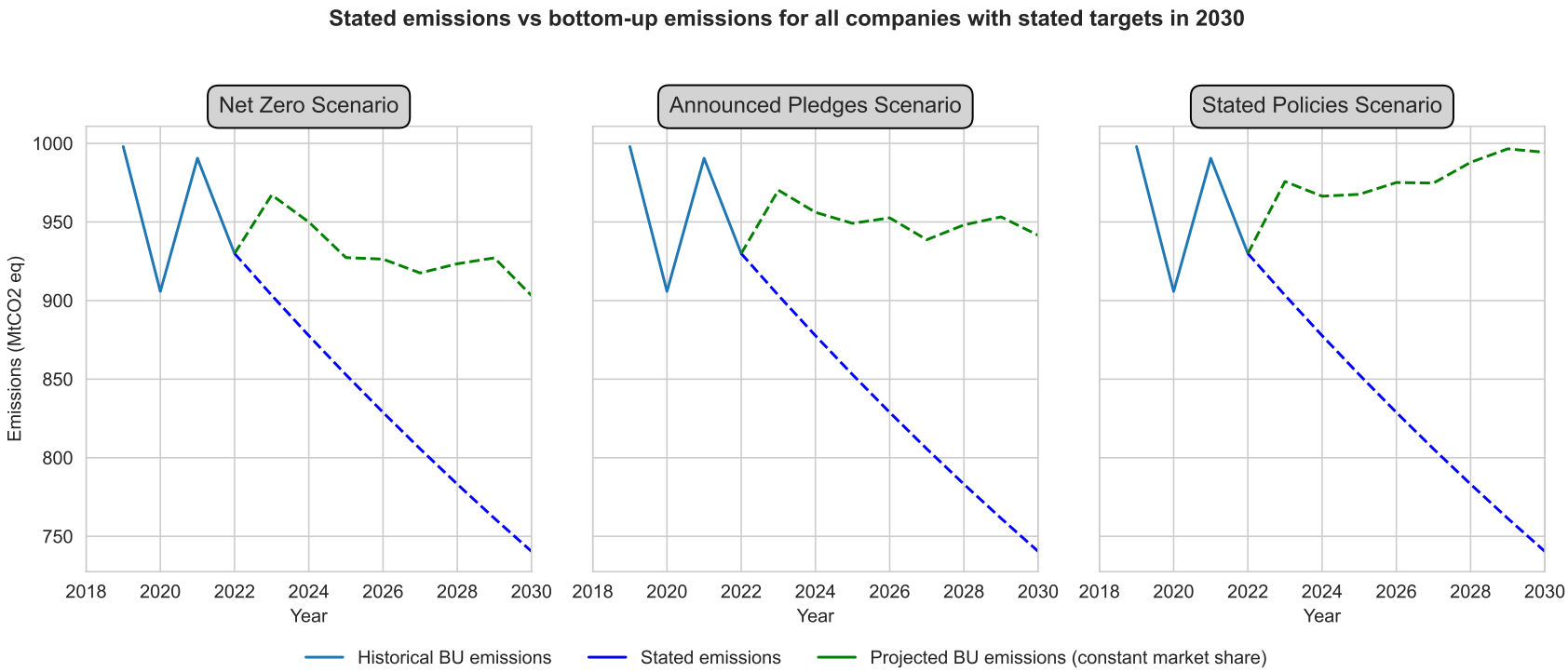
Red line: projected top-down emissions based on train sample 2010-2019.

Green line: projected top-down emissions based on train sample 2012-2021.

Bottom-up emission estimation: results



Are steel companies aligned with their targets?



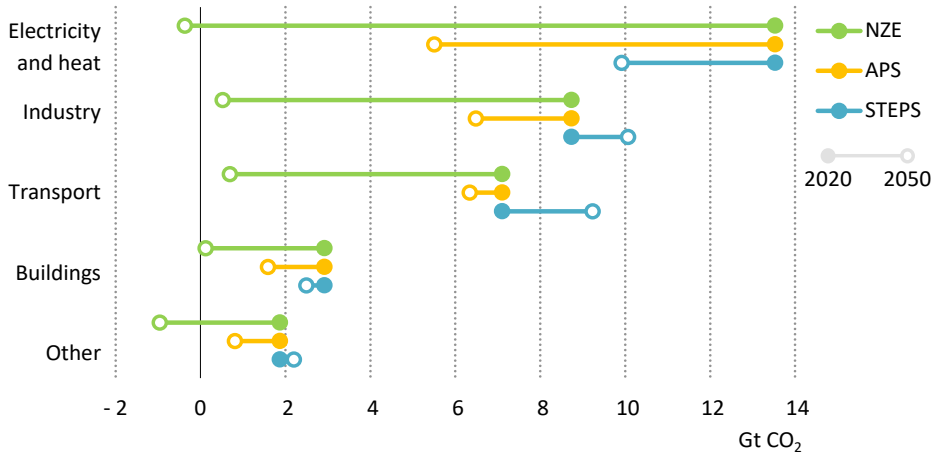
We compare the projected bottom-up emission trajectory for steel sector companies with stated targers to ther aggregate target trajectory under different assumptions on the carbon intensity of electricity production and the utilization rate projections.

Step 2: choice of net zero scenario

- To stop climate warming below 1.5 degrees, carbon neutrality must be achieved in 2050-2060.
- Many countries have net zero engagements of various types and for various horizons.

Country	Year	Status
France	2050	Law
EU	2050	Political agreement
US	2050	Statement of intent
China	2060	Policy position

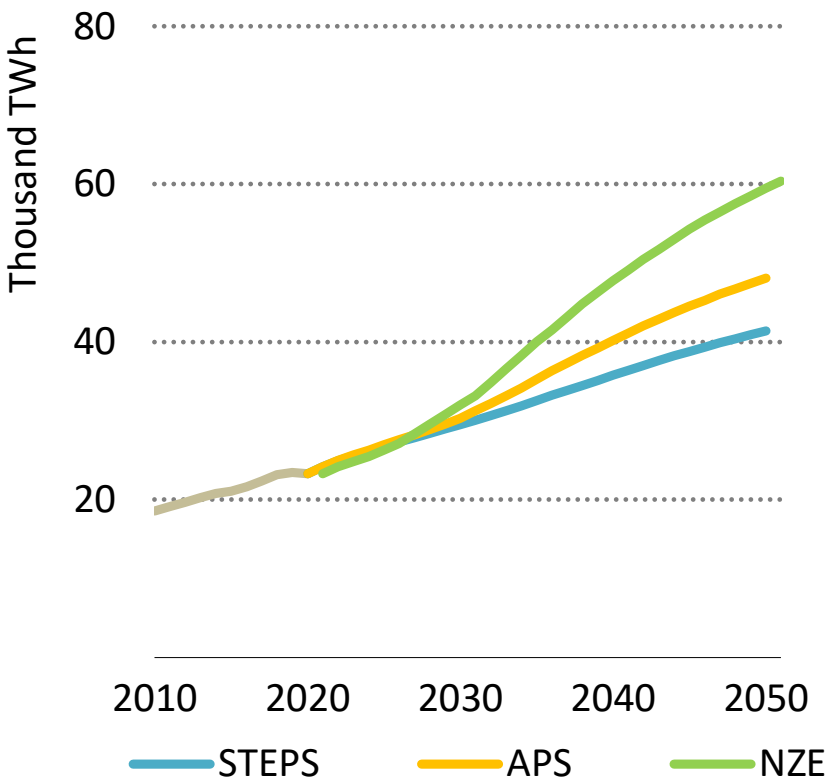
- International organizations are developing net zero scenarios for the energy sector, the most prominent being NZE 2050 scenario by IEA.

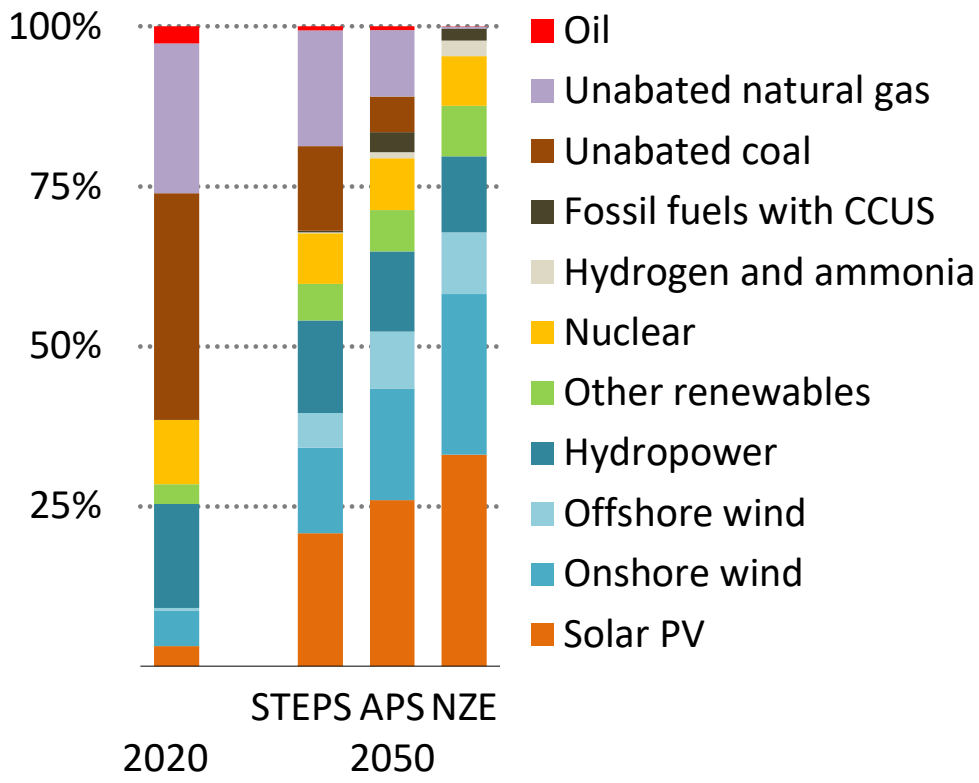


STEPS: Stated Policies Scenario ($\approx 2.6^{\circ}$ in 2100)
APS: Announced Pledges Scenario ($\approx 2.1^{\circ}$ in 2100)

Source: IEA World Energy Outlook 2021

Global electricity demand and generation mix by scenario

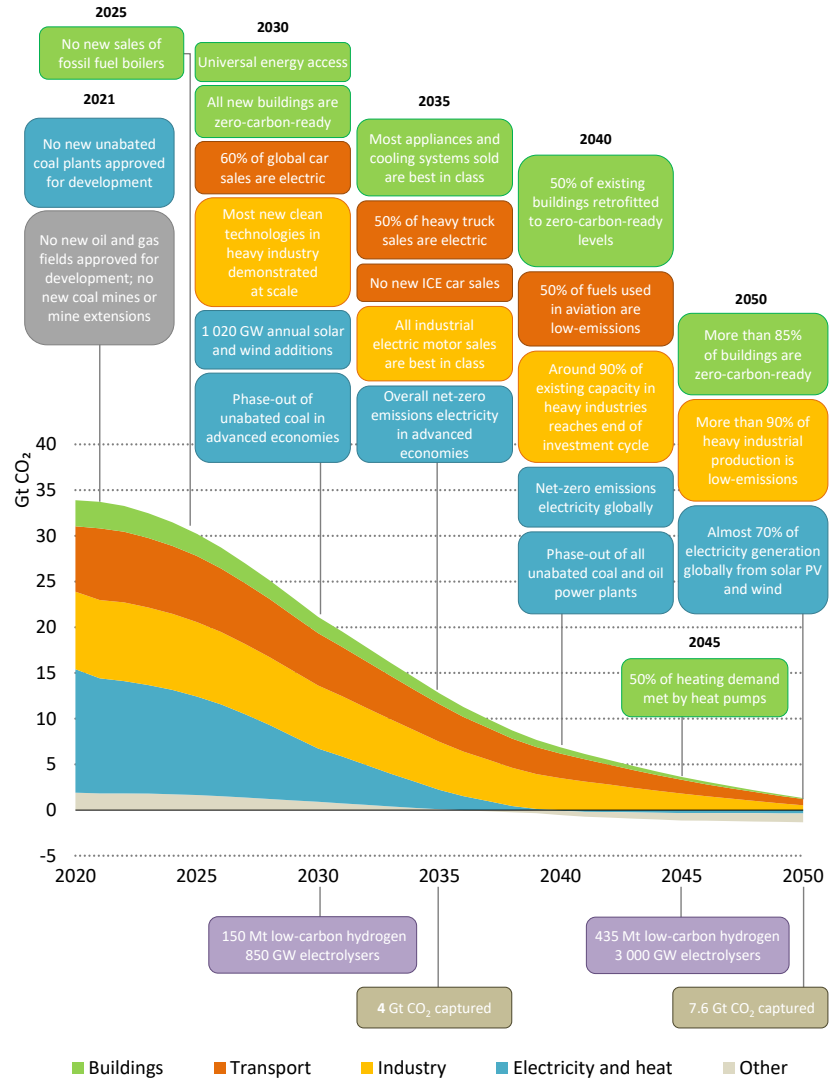




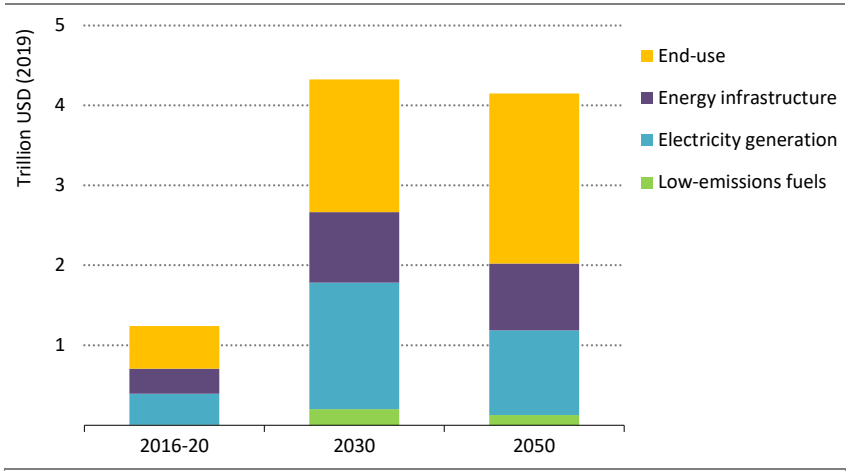
Source: IEA World Energy Outlook 2021

Setting near-term milestones and ramping up investment

Key milestones in the pathway to net zero



Clean energy investment in the net zero pathway



Source: IEA Net Zero by 2050

Step 3: conversion of scenarios to asset-level benchmarks

- Convergence approach (Science-Based Targets Initiative):
  - Absolute CO2 emissions from IEA scenarios are converted into physical CO2 intensity targets per sector (in tons of CO2 per unit of production).
  - Company intensity pathways are computed, assuming all companies in a given sector reduce their emission intensities to a common value by a specific time horizon (2050 or 2060), as dictated by the total CO2 budget for each sector.

$\Rightarrow$ No guarantee that the overall absolute carbon budget is respected.

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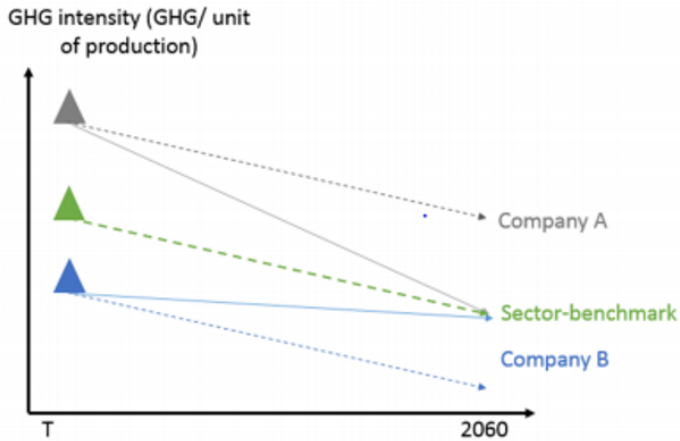
- Contraction approach: all companies in a given sector reduce their absolute emissions at the same rate, irrespective of the initial conditions

  $\Rightarrow$ penalizes virtuous companies who have already transitioned



Dotted lines: contraction; solid lines: convergence

A rigorous approach: fair share

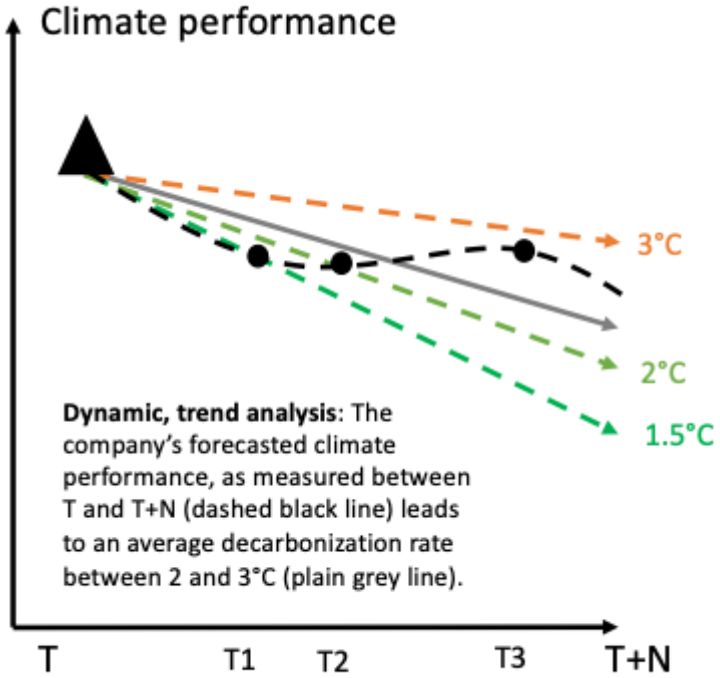
- The fair share approach defines the absolute emission target for i-th company $\widehat{E}_t^i$ by taking into account the difference between the company's and the sector initial carbon intensity:

$$\widehat{E}_t^i = E_0^i \frac{EI_0^S}{EI_0^i} \frac{E_t^S}{E_0^S}$$

- Virtuous companies are not penalized and overall carbon budget is respected.

Step 4: temperature alignment assessment

- To assess the temperature alignment of asset / portfolio: compare its climate performance to temperature benchmark(s), either statically or dynamically.
- The result may be expressed in binary terms (aligned or not), overshoot of CO2 emissions over benchmark and through implied temperature rise metric



Dynamic, trend analysis: The company's forecasted climate performance, as measured between T and T+N (dashed black line) leads to an average decarbonization rate between 2 and 3°C (plain grey line).

Static analysis	Implied temperature (°C)
T1	1.5
T2	2
T3	Nearly 3

Static, gap analysis at Tx: Depending on the year chosen, the climate performance of the company is closest to one benchmark.

Dynamic, cumulative analysis

Cumulated overshoot/ undershoot vs benchmark	Vs 1.5 °C	Vs 2°C	Vs 3 °C
Tons of GHGs/ Technology exposure	10 000	5 000	-7 000

Dynamic, cumulative analysis: The over(undershoot) value is 0 between the 2 and 3°C benchmark. Therefore, the company's implied temperature is between 2 and 3°C.

Aggregating alignment measures at portfolio level

Rigorous approach: aggregate a physical measure, such as CO2 emissions:

$$E^P = \sum_{k=1}^{n} p_k E^k,$$

where E^P are portfolio emissions; E^k are emissions of each company, and p_k is the fraction of the company for which the investor is responsible:

$$\text{For stock holders } p_k = \frac{f^C(V-D)}{V}, \quad \text{for bond holders } p_k = \frac{f^D D}{V},$$

V: firm value, D: debt; f^C and f^D: fractions of capital and debt held by investor.

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For non-physical measures such as portfolio temperature, aggregation protocol is more difficult to define; sometimes portfolio weights are used:

$$T^p = \sum_{k=1}^{n} w_k T^k,$$

where w_k is the fraction of portfolio invested in k-th asset.

Implied temperature rise metric: caveats

ITR metric is easy to communicate to stakeholders: system of equivalency with the international temperature rise limitation objective. However,

Implied temperature rise metric: caveats

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Portfolio alignment: recent evolutions

Key trends since the publication of the Alignment Cookbook (2020)

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Focus on the design of portfolio alignment methodologies

In parallel:

- Multiplication of methodologies distributed by private and public actors
- Multiple levels of analysis: appearance of FI-level methodologies
- Multiple asset classes and financial activities
- Widening of the focus to integrate transition planning elements
- Additional use cases in the context of transition finance

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In particular, we distinguish

- Portfolio-level alignment assessments: over 50 methodologies reviewed
- Financial institution-level alignment assessment: some initiatives available: ACT Finance, TPI Banks
- Consolidated alignment of a group of financial institutions: limited attempts but required to achieve global net zero

Portfolio alignment: perspectives

Towards approaches to assess the consolidated alignment of a group of financial institutions

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- Emissions alignment approach – i.e. aggregating emissions' based targets and data at higher level to compare it with remaining carbon budget.

This is the objective of the ongoing CAPA project at ILB