PORTFOLIO ALIGNMENT METHODOLOGY

SOCIETE GENERALE

CONTENTS

KEY CROSS-SECTORAL CONCEPTS

OUR GLOBAL ECONOMY IS FUELLED BY ENERGY, AND ACTING ON ENERGY TRANSITION IS A PRIORITY

We are a leading energy bank embracing the broad and deep transformation of our energy systems to drive our transition.

Energy use flows through all sectors

The energy sector is the main source of greenhouse gas emissions. Energy-related CO_2 emissions account for around 75% of global CO_2 emissions. However, most of these emissions do not come from the upstream segments of the energy value chain, but from energy consumption in the various economic sectors: industry, transport and real estate. Some primary energy sources, like natural gas, are also used as raw materials in some sectors, such as hydrogen or plastic production. All economic sectors depend on energy sources either as a direct combustion fuel, for heat or for electricity production. As energy is essential to all economic activities, acting on energy is the most powerful decarbonisation lever for all sectors.

The transformation of our energy system will drive decarbonisation

The energy sector is undergoing a transformation towards a more decentralised and lower-carbon model. Distributed generation has been made possible by technology developments in renewable energy, low-carbon vehicles and batteries. The IEA projects 38% of renewables in the power mix in 2027[1]. Solar PV and wind costs are becoming more competitive with fossil fuels each year. They decreased by at least 55% between 2015 and 2022 depending on the technology whereas the energy crisis highlighted the volatility of fossil fuels-based generation costs which spiked in 2022[2]. Today, companies across sectors can produce low-carbon energy for themselves or others, thus contributing to each other's decarbonisation. This decentralisation is offering more opportunities to source competitive low-carbon energies.

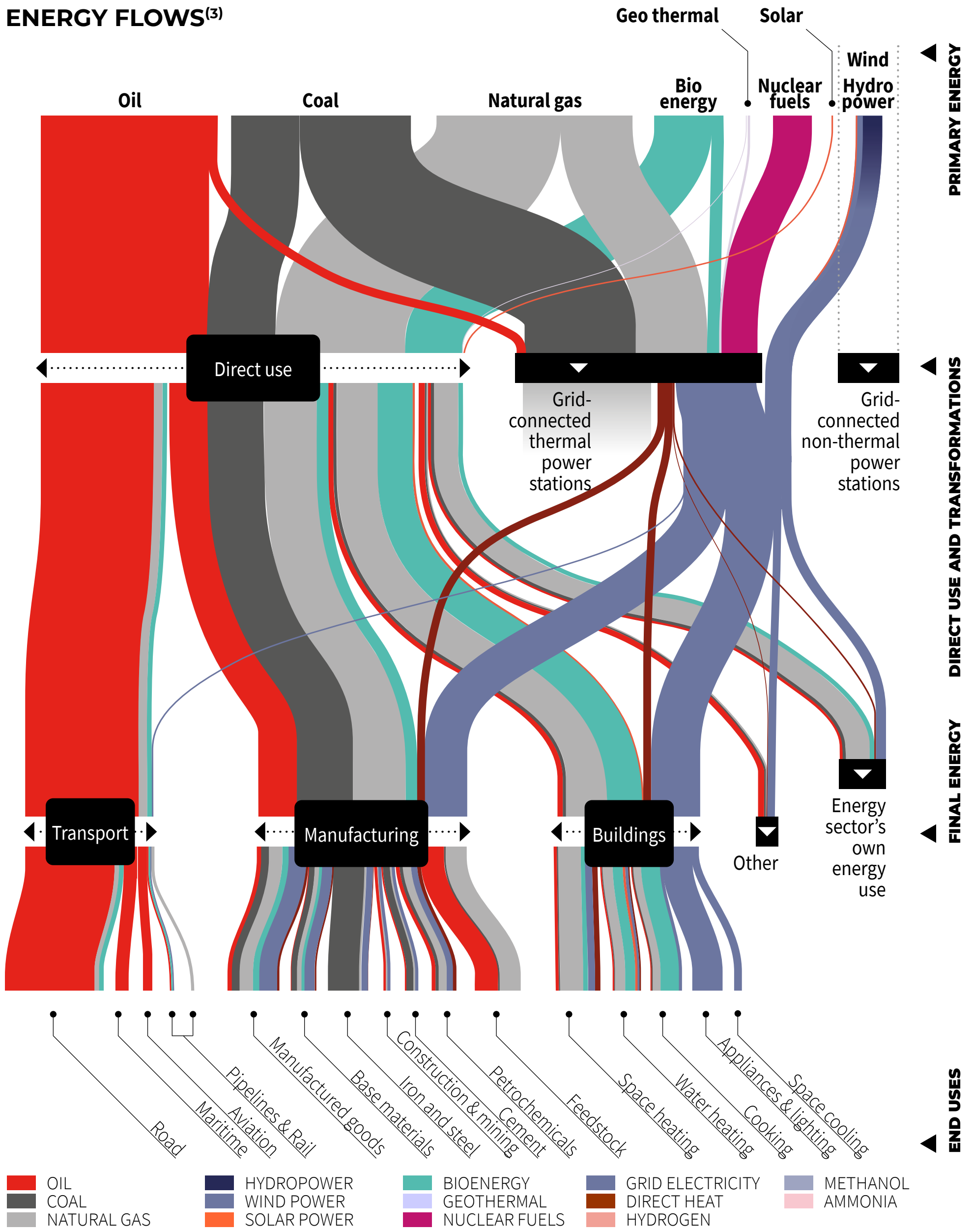
Societe Generale has built unique expertise and a track record on energy systems across its different business units

Production – We support the deployment of renewable power assets across regions and innovate low-carbon fuels like hydrogen.

Distribution – Infrastructure being the backbone of the energy transition, we finance the reinforcement of power grids, and leverage our different business lines to foster the development of new energy infrastructure like EV recharging networks.

Consumption – We develop innovative financing solutions to decarbonise the energy supply of our customers, such as solar rooftop assets for corporate clients, energy retrofit for real estate players.

ENERGY FLOWS[3]



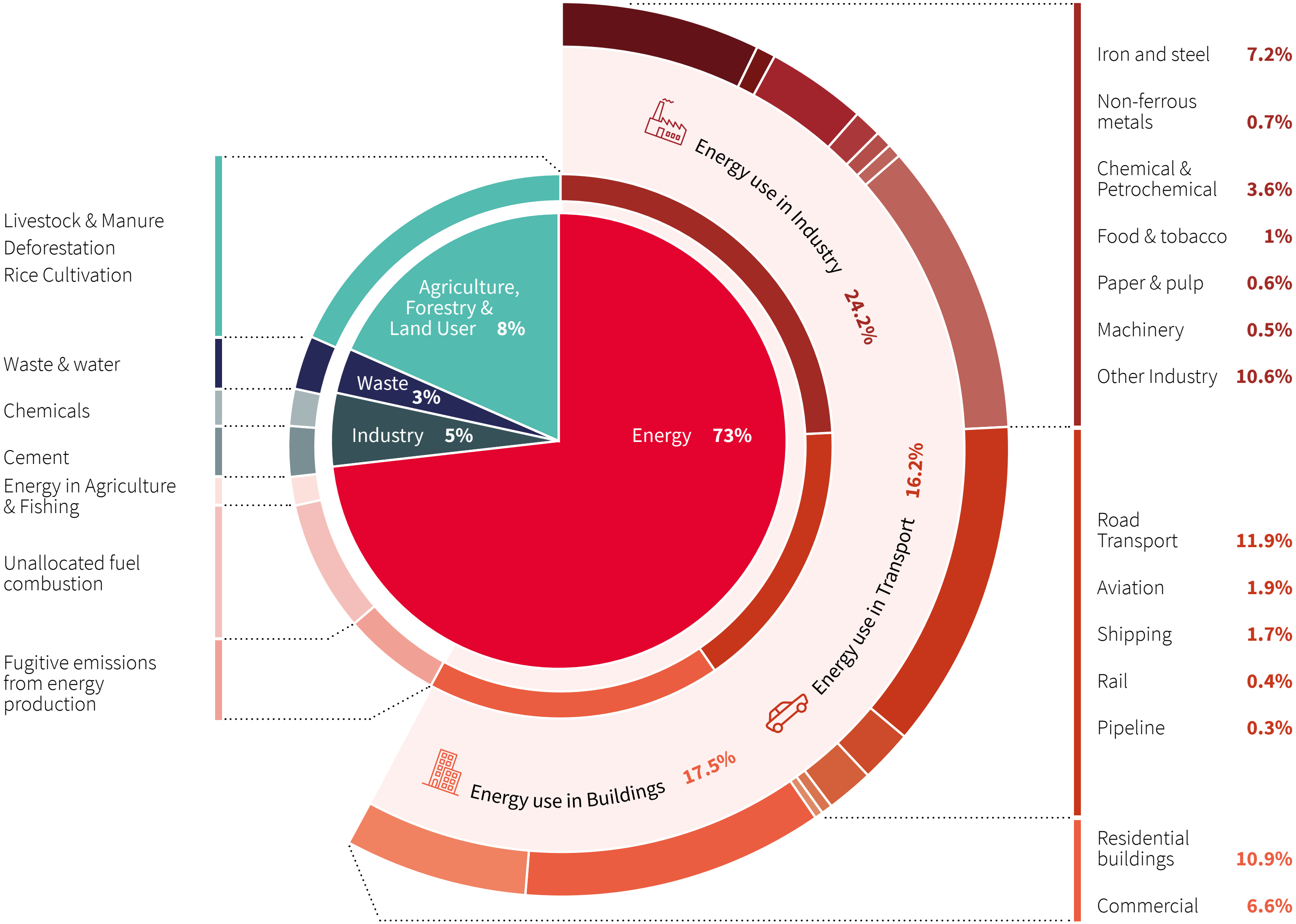
(1) IEA, Renewables 2022. (2) IRENA, Renewable Power Generation Costs in 2022. (3) 2020.

A SYSTEM-BASED APPROACH IS NEEDED TO TRANSITION TO A LOW CARBON ECONOMY

Energy systems are at the core of our economies.
Building sustainable energy models will be key to enabling a global transition potential.

Almost 75% of global CO_2 emissions are related to energy.

Energy-related CO_2 emissions reached 36.8 Gt in 2022[1]. As most CO_2 emissions come from the use of fossil energy sources, which is spread across sectors, they are distributed across the different value chains consuming these energy sources.



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(1) *IEA, CO_2 emissions in 2022. Source: https://ourworldindata.org/ghg-emissions-by-sector*

ALL SECTORS ARE INTERTWINED, AND SO ARE THEIR TRANSITION PATHS

We focus our cross-industry expertise on decarbonisation and use an integrated approach when working with our clients on their transition.

All economic sectors are interconnected and interdependent.

They provide services and products to one another, share challenges but also solutions. For those reasons, it is important to look at the economy as an intricate multidimensional system, understand each sector's dependencies before setting associated targets.

As illustrated in the figure opposite, materials are exchanged across all the economic sectors. No industry is isolated but rather all sectors are pieces of larger value chains.

The primary economic sector provides raw materials to both industry and utility companies who convert resources into final goods and commodities, followed by the tertiary sector of the economy offering services.

But all those sectors are also dependent on each other from the bottom to the top: the utility sector manages everyone's waste, industry provides the extractive industry with equipment, and those upstream sectors need transportation, buildings and financial services.

A value chain-driven approach highlights the potential transition nodes (hard-to-abate emissions, potential negative impacts of transition on biodiversity…) that need to be addressed considering this system as a whole.

Their transition paths are equally intertwined. As an example, how can we imagine the decarbonisation of the telecommunications and electronics sectors without the transition of the mining sector which supplies them critical minerals and drives innovation in recycling?

We foster a transversal and cross-sectoral approach in our organisation.

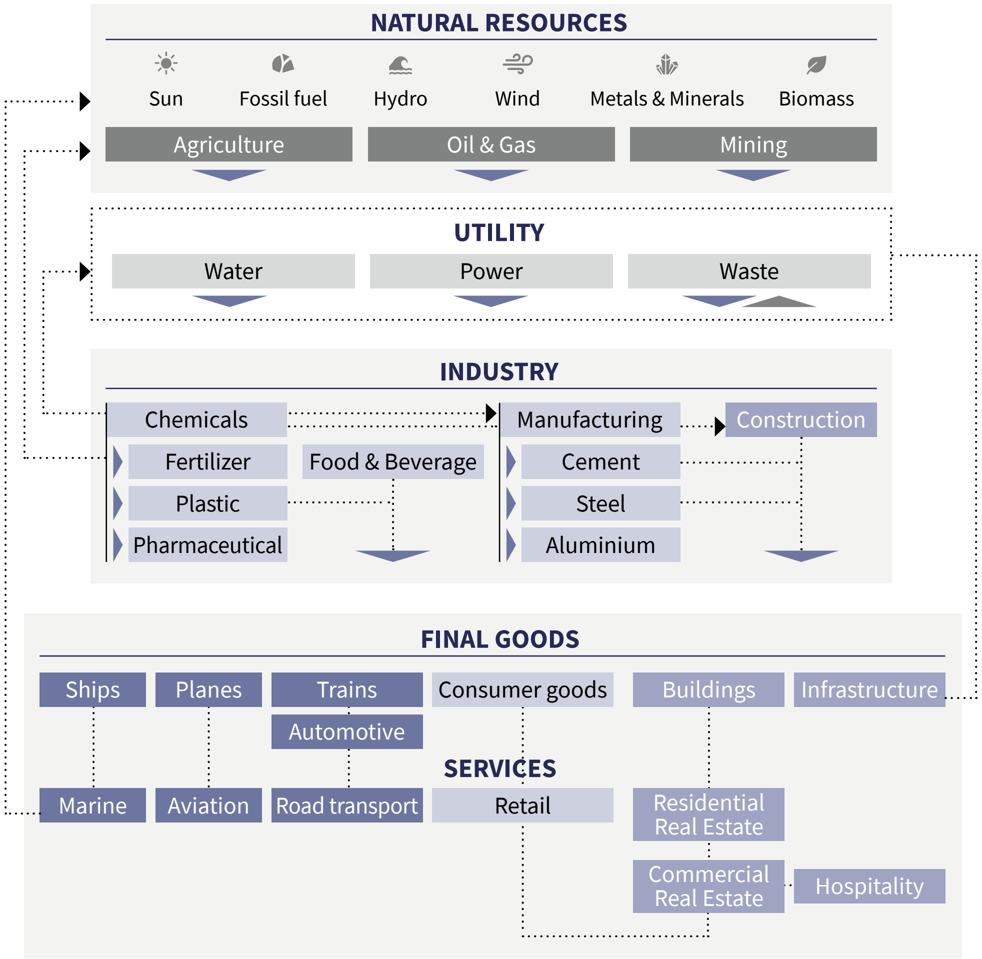
At Societe Generale, we are convinced that embracing this holistic perspective is key to helping our clients wishing to decarbonize their business activities. In 2021, Societe Generale launched a transformation program, "the Shift" to reshape its organisation and steer its business efforts to better understand the transition of such value chains. Multiple cross-region and cross-business lines workstreams were launched to cover strategic value chains, transversal technologies and new businesses.

Carbon emissions from one sector impact the carbon footprint of all other sectors in its value chain.

Using a value chain approach ensures that emissions reduction efforts are not limited to the own activity of a company (scopes 1 & 2) but extend to the entire life-cycle of a product (scope 3), upstream to downstream. As each company's scopes 1 & 2 are another company's scope 3, everyone needs to play their part[1].

Adopting a value chain approach also ensures that efforts to reduce emissions in one sector do not lead to increased emissions in another.

MATERIAL FLOWS ACROSS THE ECONOMIC SECTORS



All stakeholders must be aligned and incentivised to contribute to decarbonisation efforts. As an example, our shipping teams explore the transition of the entire shipping value chain, where port managers, fuel suppliers (energy companies) and innovative digital companies make the choice to contribute to it.

(1) *GHG Protocol scopes definition to be found in Appendix.*

TO ENGAGE ON DECARBONISATION PATHWAYS, CORPORATES CAN ACT ON SIX TRANSITION LEVERS

We support our clients in their definition of decarbonisation pathways considering sectoral specificities.

Sobriety and circularity

Optimising material uses and promoting reuse/recycling will be a key decarbonisation lever for hard-to-abate sectors. Multiple environmental and social elements call for more circularity and lower primary material consumption. The ability of consumers to freely adapt their behaviour can play a decisive role in advancing sobriety. (e.g. preference for train over plane, second-hand fashion market), and some corporates develop service-based business models to adapt to such change.

Energy efficiency

Energy efficiency measures can be implemented at scale quite quickly in all sectors. Indeed, most technologies already exist (e.g. more efficient electrical appliances) and digital technologies (e.g. sensors) can foster their development.

Against a backdrop of rising energy prices, these energy efficiency measures enable companies to control their costs and become more competitive.

Fuel switch

Decarbonising the energy supply of all economic sectors using renewable fuels, gases and electricity represents a relatively easy decarbonisation lever for most companies.
This is particularly true for electricity, given the cost competitiveness of renewable energy technologies. Biofuels are alternatives for transportation and biogas can replace coal and natural gas in manufacturing sectors.

Carbon Capture, Usage & Storage

CCUS technologies are a relevant decarbonisation technology for some hard-to-abate sectors with high emissions from their industrial processes.

CCUS technologies are not commercially available today and scenarios forecast a global scale up of these technologies from 2030 onwards.

Diversification

Diversification refers to the development of new business activities (products, services) with a lower carbon footprint and the development of solutions to decarbonise other sectors. It is relevant to most sectors, as their transition will not take place without an overhaul of their business activities. Automakers involved in electric vehicle (EV) manufacturing and the deployment of EV recharging infrastructure are good examples of such a strategy.

Exit and closure

The closure of emissive activities/assets will be needed in sectors that are not compatible with climate transition scenarios.
Some companies can decide to exit some markets while developing low-carbon alternatives in parallel.

TRANSVERSAL LOW-CARBON SOLUTIONS WILL HELP ACCELERATE CLIMATE TRANSITION

Scaling-up transversal low-carbon and carbon removal solutions will be key to reaching decarbonization targets even in hard-to-abate sectors.

Energy efficiency

Energy efficiency measures consist in reducing the consumption of energy to provide the same service/ product: more energy efficient equipment, improved thermal insulation, etc.

Energy efficiency is called the 'first fuel' of the energy transition, being the quickest and most cost-effective CO_2 mitigation option – and helping users reduce their energy bills and strengthening energy security.

It is the largest single measure to avoid energy demand in the IEA NZE Scenario by 2050.

Biofuels/ E-Fuels

Biofuels and e-fuels are particularly important to decarbonise heavy mobility and the industry.

Biofuels are made from biomass or organic waste. They include ethanol, biodiesel or biogas.

E-fuels, also known as synthetic fuels, are made from low-carbon hydrogen and captured carbon dioxide.

They include e-methane, e-kerosene and e-methanol. Biofuels production needs to reach over 10 EJ by 2030 in the IEA NZE scenario, 40% of which will have to be from waste and non-food crops.

Low-Carbon Hydrogen (H_2)

Over 99% of the current hydrogen production comes from natural gas ('grey hydrogen'). Several low-carbon production pathways are being developed: water electrolysis with renewable power ('green'), natural gas reforming with CCUS ('blue').

Low-carbon H_2 can replace fossil fuels in heavy industry and transportation (heavy truck, shipping) and offer energy storage capacity to power grid.

Scaling-up low-carbon H_2 requires huge renewable power capacities, the development of CCUS technologies and innovation across industry/ sector applications.

Nature Based Solutions

Nature Based Solutions (NBS) are actions contributing to the sequestration of carbon via natural reactions.

They include reforestation, regenerative agriculture, mangrove protection, and many more.

NBS offer other benefits than just removing carbon, they contribute to biodiversity conservation, protection against natural disasters or economic development.

NBS projects are cited in different climate transition scenarios, including in the IEA scenarios, which include them in the carbon removal approaches.

Carbon capture, Utilisation & Storage (CCUS)

CCUS encompass technologies used to capture CO_2 from industrial fumes and either store it underground or use it as feedstock.

The IEA NZE scenario requires 1.2 Gt CO_2 per year to be sequestrated. Around 40 CCUS commercial facilities are already in operation[1].

Over 500 projects are in various stages of development across the CCUS value chain, but the 50 new capture facilities announced for 2030 will only sequestrate 125 $MtCO_2$ per year.

Transversal decarbonisation solutions are key enablers to decarbonize harder-to-abate sectors.

All sectors are different and have specific characteristics and requirements that affect the suitability of certain decarbonisation solutions. For example, some industrial sectors involve high-temperature processes that may necessitate the use of hydrogen instead of solar or geothermal heat. Others, like cement, have intrinsic carbon emissions linked to industrial processes with limited to no alternatives. CCUS technologies will be a necessity for them.

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(1) *IEA, Tracking clean energy progress 2023.*

INTEGRATING NEW CHALLENGES RAISED BY THE ENERGY TRANSITION

The deployment of low-carbon technology necessitates new materials to redesign global supply chains.
This is particularly meaningful for metals and we integrate these challenges into our energy transition approach.

Being aware of the global manufacturing challenges.

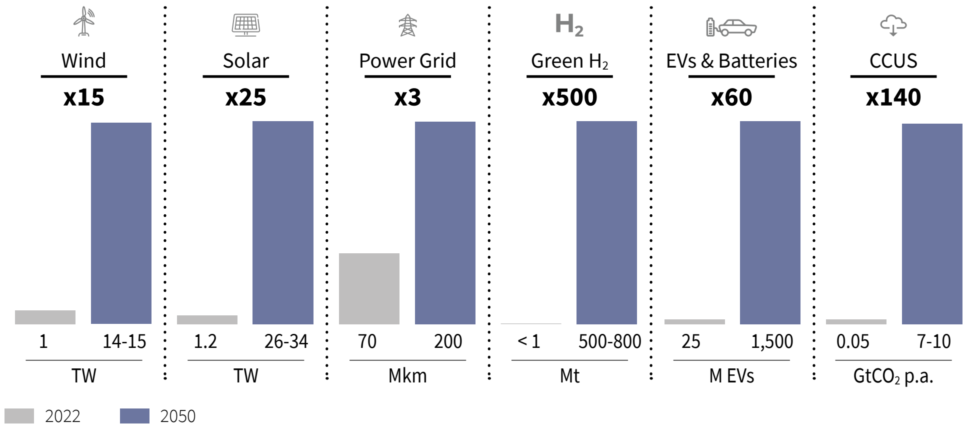
Low-carbon technologies rely on critical materials and the development of manufacturing supply chains enabling their global deployment. The resources and minerals required vary depending on the technology (e.g. copper and aluminium for electricity networks and electricity-related technologies, rare earths for wind turbines and EV motors).

The transition to clean energy systems is creating a surge in demand for these minerals, with potential challenges due to limited access. Critical material reserves and clean energy production capacities are concentrated in specific geographic areas[1]. This creates a risk of potential soaring of material prices, competition between clean energy systems and global supply chain disruptions. Clean energy transition challenges lie in the ability to ramp up supply and develop sustainable manufacturing chains to establish a reliable system able to meet the demands of the energy transition[2].

Supporting the development of clean energy supply chains.

Being a leading bank for metals, we grasp the criticality of developing sustainable and reliable supply chains for low-carbon technologies. We support our mining clients in developing their activities by offering innovative financing products.

SCALE-UP OF CLEAN ENERGY TECHNOLOGIES NEEDED TO ACHIEVE NET-ZERO EMISSIONS BY 2050 ACCORDING TO THE ENERGY TRANSITION COMMISSION[3]



CRITICAL MINERAL NEEDS FOR CLEAN ENERGY TECHNOLOGIES[4]

	Copper	Cobalt	Nickel	Lithium	Rare earths	Zinc	PGM[5]	Aluminium
Solar PV	High	Low	Low	Low	Low	Low	Low	High
Wind	High	Low	Moderate	Low	High	High	Low	Moderate
Hydro	Moderate	Low	Low	Low	Low	Moderate	Low	Moderate
Electricity networks	High	Low	Low	Low	Low	Low	Low	High
Electric vehicles	High	High	High	High	High	Low	Low	High
Battery storage	High	High	High	High	High	Low	Low	High
Hydrogen	Low	Low	High	Low	Moderate	Low	High	Moderate

● High need ● Moderate need ● Low need

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(1) *IEA, Special report on Solar PV global supply chain, 2022.*
(2) *IRENA, Critical materials for the energy transition: Rare earth elements, 2022.*
(3) *Energy Transition Commission, Material and Resource Requirements for the Energy Transition, 2023.*
(4) *IEA, Mineral requirements for clean energy transition, 2021.*
(5) *PGM: Platinum Group Metals.*

ALIGNMENT METHODOLOGY

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Coal is the largest emitter of energy-related CO_2e[*], accounting for 42% of emissions in 2022[1], and the largest source of electricity generation worldwide, accounting for 36% of global generation in 2022[2]. Reaching IEA's NZE Scenario implies a drastic reduction in coal consumption by 2050.

Sector overview

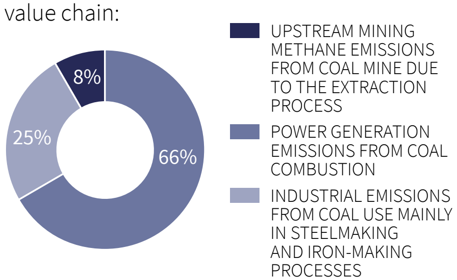
Coal supplied 36% of global electricity generation in 2022 (thermal coal) and plays a crucial role in iron and steel production industries (metallurgical coal).

The IEA NZE Scenario forecasts a sharp decrease in coal use, with a 44% reduction between 2022 and 2030 driven by the transition of power generation systems (increasing renewable power outputs) and an additional 85% reduction between 2030 and 2050 driven by low-carbon technology deployment in the industry and faster coal-to-power displacement[3][4].

However, coal consumption increased in 2021 and 2022[5], due to strong demand for power generation in developing economies and the switch from gas to coal in the context of the global energy crisis.

Emission sources[5][6]

CO_2e emissions are spread across the coal value chain:

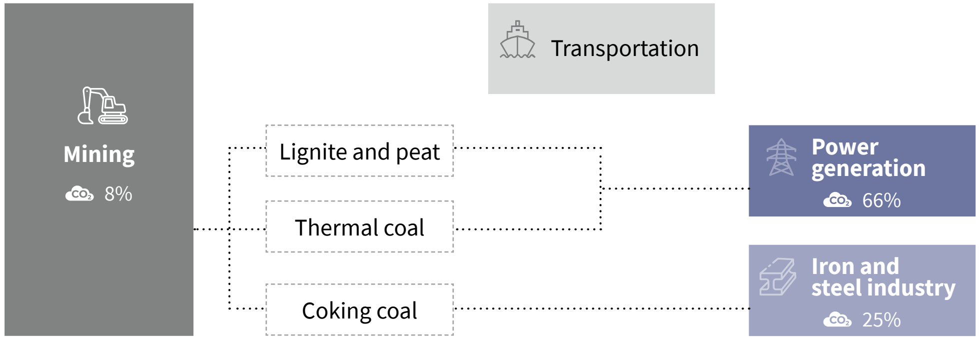


Decarbonisation levers[7]

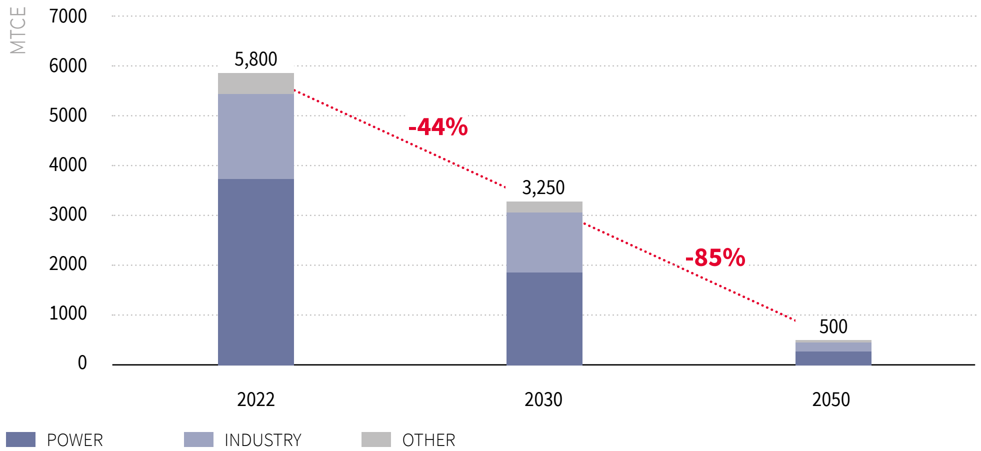
Closure and exit: power generation emissions can be reduced by using mature low-carbon alternatives[**], and by gradually displacing baseload coal-fired power plants. According to the IEA NZE Scenario, coal demand for power generation could be reduced by 92% between 2022 and 2050. However, this incurs multiple socio-economic challenges for coal-dependent economies. As there are limited alternatives to coal in iron and steel processes for the moment, coal demand from the industry is forecast to fall from 2030 onwards, when less mature technologies are scaled in the industrial processes of the steel and iron industries. Thermal coal demand will thus decrease by 50% by 2030 while metallurgical coal demand will decrease by 30% in IEA's NZE Scenario.

CCUS: the IEA estimates that half of coal mine methane emissions could be abated with existing technologies. On-site capture and use of methane via degasification or ventilation systems could additionally increase energy recovery for heat production or small-scale power generation. Residual emissions in the steel & iron industry can be addressed with CCUS technologies. However, the installation of CCUS units on coal-fired power plants can be challenged by comparison with low-carbon solutions in the power sector.

GLOBAL COAL EMISSIONS ALONG THE VALUE CHAIN (% OF TOTAL COAL EMISSIONS, 2021)[5][6]



THERMAL AND METALLURGICAL COAL DEMAND BY SECTOR IN IEA'S NZE SCENARIO[5]



(1) *IEA, CO_2 emissions in 2022.* **(2)** *IEA, Coal.* **(3)** *IEA, Net Zero by 2050.* **(4)** *IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach.* **(5)** *IEA, Coal in Net Zero Transitions.* **(6)** *IEA, World Energy Outlook 2022.* **(7)** *IEA, Strategies to reduce emissions from coal supply.* **(*)** *Energy-related emissions refer to emissions from energy combustion and industrial processes.* **(**)** *E.g. solar, wind, hydro.*

2. SUPPORTING THE PHASE-OUT OF THERMAL COAL

Thermal coal policy

- Back in 2016, Societe Generale announced that it would not provide any new financing dedicated to coal mining or coal-fired power plant projects.
- In 2019, Societe Generale published a long-term objective to progressively reduce its exposure to thermal coal to zero by 2030 in the EU and OECD countries and by 2040 elsewhere.
- In 2020, the Group published an updated Thermal Coal Sector Policy[1], further amended in 2025 to provide updates and clarifications, detailing concrete actions taken in support of its long-term objective:
  - First, the Group began by stopping to provide products and services to the most exposed companies (i.e. for which thermal coal accounts for more than 25% of revenue), which have not made commitments to exit the thermal coal sector. The Group has also strengthened the criteria for all other clients and prospects;
  - Secondly, starting from the end of 2021, Societe Generale decided to stop providing new financial products and services to any company with mining or power thermal coal assets which is a thermal coal developing company or has not communicated a transition plan aligned with the 2030/2040 thermal coal phase out objectives of Societe Generale.
- The Group has been engaging with clients that have a transition plan and are still active in the sector to ensure their exit from thermal coal is ongoing. The Group wants to accompany those clients who are diversifying into renewable energies (power companies) or minerals critical to the energy transition (mining companies).

(1) *Societe Generale, Thermal Coal sector policy.*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The Oil & Gas (O&G) sector accounts for more than 50% of energy-related GHG emissions[1][2]. 75% of these emissions are indirect emissions from the end use of O&G products.

Sector overview[3][4][5][6]

The Oil & Gas (O&G) sector faces a strategic challenge as energy transition and economic development create a simultaneous need to supply both low-carbon and affordable energy. The IEA forecasts two phases in O&G production evolution:

- Before 2030: consumption increases, supported by the strong energy demand of emerging economies and increasing use for non-energy purposes (e.g. in the petrochemical industry)[7];
- After 2030: oil and gas consumption decreases as energy generation processes switch to renewable sources and low carbon mobility solutions continue to ramp-up.

O&G companies face increasing transition risks: more competitive alternative low-carbon technologies, clients' preference and greater willingness to pay for low-carbon energies, growing political and regulatory pressure, and stricter climate-related expectations from investors and lenders. In the mid- to long-term, some O&G assets could become stranded. Anticipating the sector's transition is necessary for O&G companies and investors to reduce their risks and ensure a fair transition for the workers and communities relying on these activities.

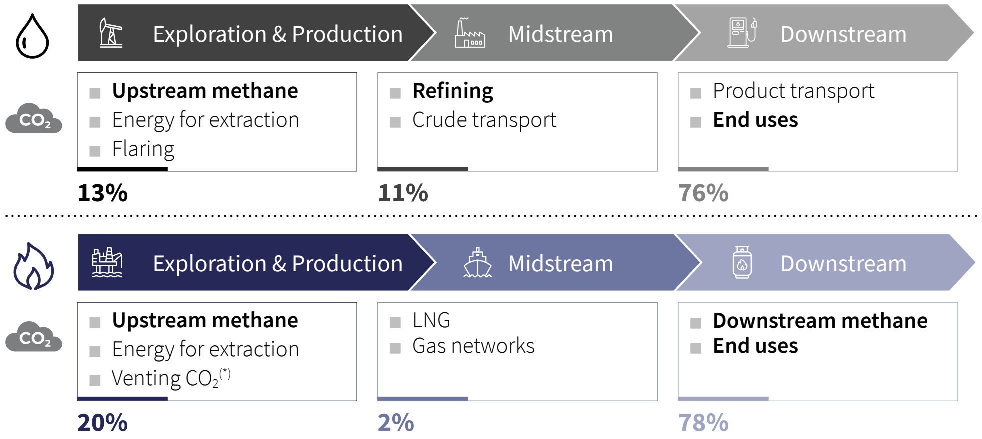
Facing those risks, O&G companies can leverage their know-how to seize energy transition opportunities in other sectors (e.g. power, transportation), and direct their fossil fuel production towards non-energy uses (e.g. petrochemical industry). In 2018, around 14% of oil production and 8% of gas production was used as petrochemical feedstock[8]. With economic development, demand for petrochemical products increases, creating a shift in refinery outputs from energy products such as gasoline and diesel towards petrochemical feedstock such as naphtha or ethane. The IEA NZE Scenario forecasts an increase in petrochemical feedstock production share in refineries from 20% in 2020 to almost 60% in 2050[3].

Emissions sources[2][8][10]

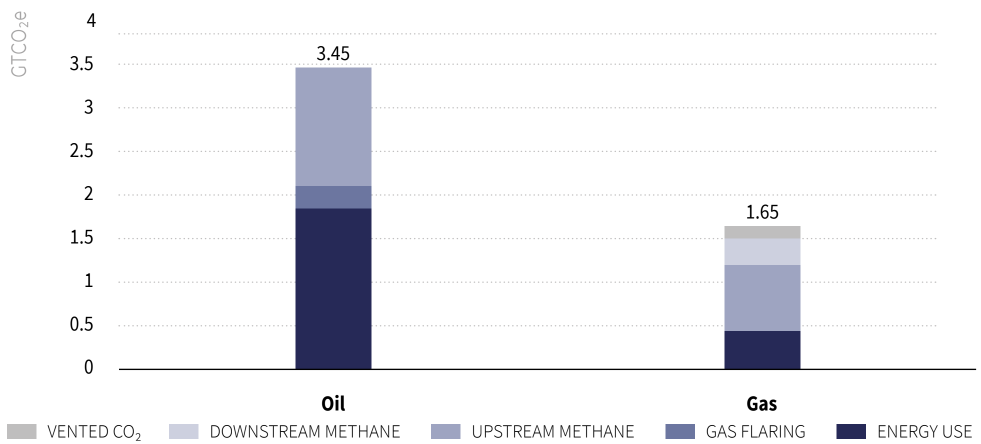
Around 75% of the O&G industry emissions come from end uses downstream of the value chain such as passenger cars, aviation and industry (scope 3 emissions).

The remaining 25% come from upstream exploration and production activities, industrial processes and logistics (scope 1 & 2 emissions). They are linked to methane emissions from production and transportation[10], flaring, operation of upstream facilities, and CO_2 emissions from gas liquefaction. Methane emissions from oil and gas operation accounted for 47% of total oil and gas operations' emissions in 2022[6].

DISTRIBUTION OF GHG EMISSIONS ALONG THE OIL & GAS VALUE CHAINS[6]



SPECTRUM OF GLOBAL SCOPE 1 AND 2 EMISSIONS FROM OIL & GAS OPERATIONS (2022)[9]



(1) *IEA, Oil Report, 2023.* **(2)** *IEA, CO_2 emissions in 2022.* **(3)** *IEA, Net Zero by 2050 report.* **(4)** *IEA, World Energy Outlook, 2022.* **(5)** *UNEP, Sectoral risks for the Oil and Gas sector, 2023.* **(6)** *IEA, The Oil and Gas Industry in Energy Transitions, 2020.* **(7)** *S&P, Petrochemical Feedstocks, 2022.* **(8)** *IEA, World Energy Outlook, 2018.* **(9)** *IEA, Emissions from oil and gas operations in Net Zero Transitions, 2023.* **(10)** *IPCC guidelines for GHG inventories, 2019.* **(*)** *Venting CO_2: CO_2 removed from gas to avoid its solidification during gas liquefaction.*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The transition of Oil & Gas (O&G) companies will mostly be related to their capacity to progressively switch from O&G to low-carbon energy-based business activities. Many of them can leverage potential synergies to diversify their activities.

Decarbonisation levers[1][2][3]

O&G companies can act on different levers:

Energy efficiency: direct GHG emissions (scope 1 & 2) can be reduced through specific actions:

- Tackling methane emissions and stopping routine gas flaring;
- Implementing energy efficiency measures for O&G extraction, refining and logistics.

Diversification: the reduction of a company's scope 3 emissions (larger scope) will necessitate the development of low-carbon energy/power products and solutions for their final clients:

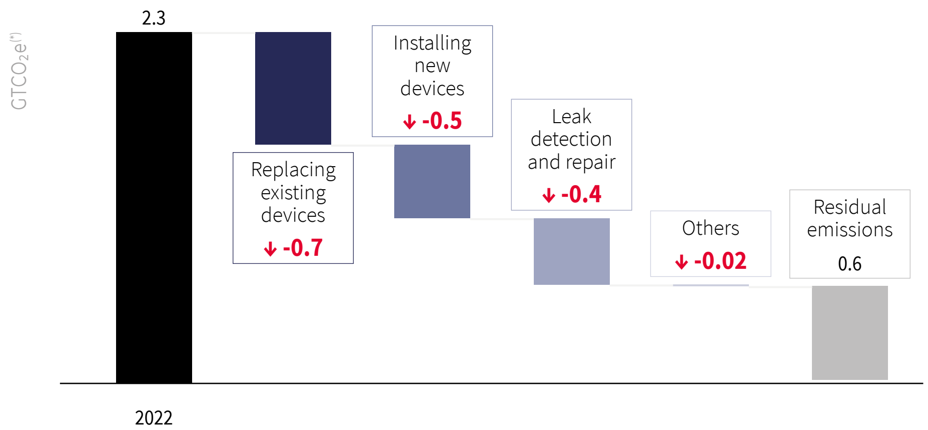
- Renewable fuels like biofuels, biogas and low-carbon hydrogen to address the low-carbon energy needs of their clients;
- Diversification across the power value chain to seize the electrification megatrend. This involves the development of both large-scale power assets (on/offshore wind, solar) and distributed power generation;
- Some companies have started to work on carbon capture technologies, leveraging their industrial know-how and financial capabilities.

O&G companies can participate in the energy transition by leveraging their energy market expertise, existing client portfolios and financial capacity to develop low-carbon energies and carbon/energy service offers for their end clients[4].

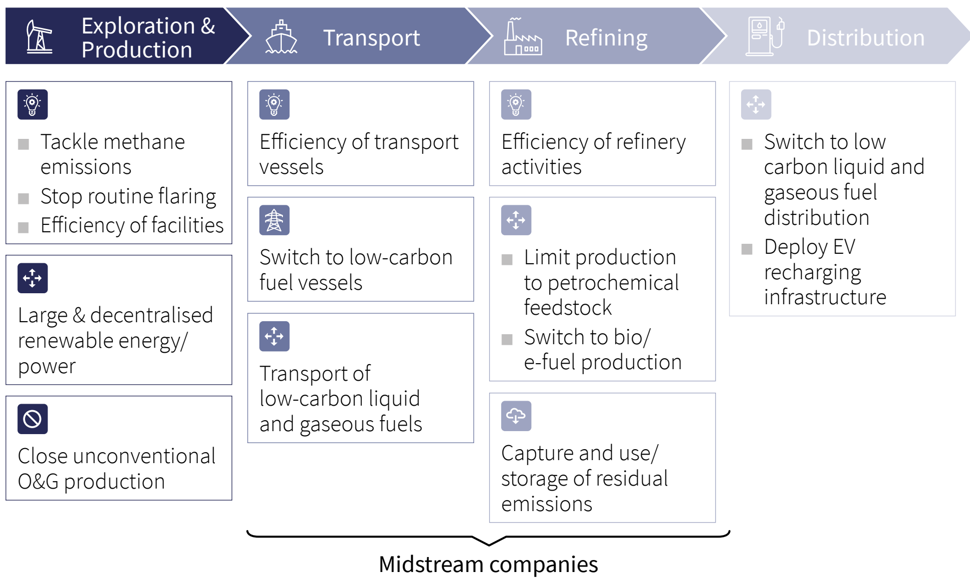
Along the O&G value chain, companies have specific decarbonisation levers and synergies they can employ to reduce their scope 3 emissions:

- Upstream exploration and production companies possess infrastructure and engineering capabilities to develop offshore wind power generation capacity;
- Midstream and distribution companies can leverage their transport infrastructure to distribute low-carbon liquid and gaseous fuels such as biomethane and hydrogen;
- Refining companies can use biofeedstock and waste to produce biofuels and petrochemical products. They can also use energy efficiency measures and low carbon hydrogen to reduce their operational emissions and potentially integrate CCUS capacities to tackle residual emissions.

GLOBAL METHANE EMISSIONS AND POTENTIAL SAVINGS BY OPERATIONS[5][6][7]



DECARBONISATION LEVERS FOR OIL & GAS COMPANIES ALONG THE VALUE CHAIN[8]



(1) IEA, Net Zero by 2050 report. (2) IEA, World Energy Outlook, 2022. (3) IEA, World Energy Outlook, 2018. (4) IEA, The Oil and Gas Industry in Energy Transitions, 2020. (5) IPCC guidelines for GHG inventories, 2019. (6) IEA, Marginal abatement cost curve for Oil and Gas-related methane emissions. (7) IEA, Methane emissions from Oil & Gas operations. (8) Blunomy analysis. (*) Global Warming potential (100-year horizon) = 29.8 taken from the IPCC Sixth Assessment Report.

2. ALIGNING OIL & GAS ABSOLUTE EMISSIONS

O&G production is expected to decrease in an NZE economy; in this context, the use of an intensity metric to align our portfolio could be misleading as the intensity could improve whereas actual emissions have in fact risen due to O&G production increases. Using an absolute metric (scope 1, 2 and 3 end-use) on the other hand, corresponds to a clear ambition to reduce the total carbon output on the entire value chain.

Scope

SECTOR BOUNDARY

Upstream, midstream and downstream O&G companies

Upstream refers to exploration, development and production.
Midstream activities relate to transport, storage, liquefaction and export terminals of oil, natural gas or LNG.
Downstream generally consists of refining and distribution activities.

EMISSIONS SCOPE

The indicator covers scopes 1, 2 & 3 end-use (category 11) for producing companies and scopes 1 & 2 emissions for midstream and downstream companies. Scope 3 end-use emissions are generated from the combustion of fossil fuels extracted by a producing company.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PCAF

SCENARIO

IEA Net Zero by 2050

METRICS

Absolute emission metric: tCO_2e

Portfolio emissions (tCO_2e

$$= \sum_{\text{Company}} \left(\text{Company scope 1 \& 2 emissions } (tCO_2e) \times \frac{\text{Bank financing (€)}}{\text{Company Equity \& Debt (€)}} \right)$$

$$+ \sum_{\text{Upstream Company}} \left(\text{Company scope 3 emissions } (tCO_2e) \times \frac{\text{Bank financing (€)}}{\text{Company Equity \& Debt (€)}} \right)$$

KEY ASSUMPTIONS AND LIMITATIONS

Inconsistency of data availability for Methane (CH_4) emissions within operational scopes.

3. ALIGNING UPSTREAM OIL & GAS

The amount of financing granted to a sector is the easiest metric to understand. To tackle the O&G sector quickly and effectively, we decided to gradually reduce our exposure to the sector, setting an intermediate milestone for 2025, to demonstrate we are acting now, irrespective of the energy source (oil or gas).

Scope

SECTOR BOUNDARY

Oil & Gas Producers (Upstream)

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PACTA methodology for Banks

SCENARIO

IEA Net Zero by 2050

METRICS

Exposure

KEY ASSUMPTIONS AND LIMITATIONS

Floating Production Storage and Offloading (FPSOs) are out of scope since they have marginal influence over investment decisions to exploit new resources or pursue new strategic options.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Power generation accounts for 42% of energy-related global CO_2 emissions. Electrification being a major decarbonisation lever for many energy-intensive sectors, the decarbonisation of power generation and the transformation of power systems are crucial to meet net-zero objectives.

Sector overview

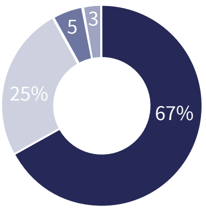
Electrification is undoubtedly a major trend in the energy transition. It will gradually become the backbone of our energy systems, as it is a powerful lever for decarbonisation in all sectors (transport, building and industry). The IEA NZE Scenario forecasts global electricity generation to increase by two-and-a-half-times from 2022 to 2050[1], driven by several factors:

- Population and economic growth;
- Electrification of end uses especially in industry (e.g. use of electric arc furnaces for steel manufacturing), and transport (EVs);
- Expansion of hydrogen production via electrolysis (renewable power + water).

This projected increase in power consumption takes into account energy efficiency improvements, thus limiting final energy consumption to 53% of what it would have been in 2050 without energy efficiency measures[2].

Emissions sources[3][4][5]

In 2022, electricity generation accounted for 42% of energy-related emissions, among which:



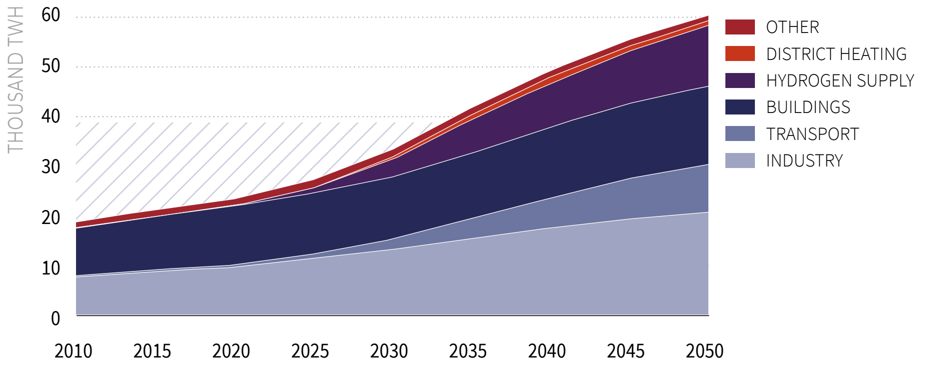
Emissions from the power sector have increased between 2020 and 2022 due to a rise in power demand in developing countries and the switching from gas-to-coal. However, the emission intensity of electricity decreased by 6% between 2000 and 2022. Also, wind and solar generation growth met 80% of the increase in global electricity demand in 2022. EMBER, an energy think tank, projected clean power generation growth was due to exceed demand growth in 2023 (with new production capacity being used for peak production) resulting in a fall in fossil generation and a decrease in global power generation emissions[6].

Decarbonisation levers

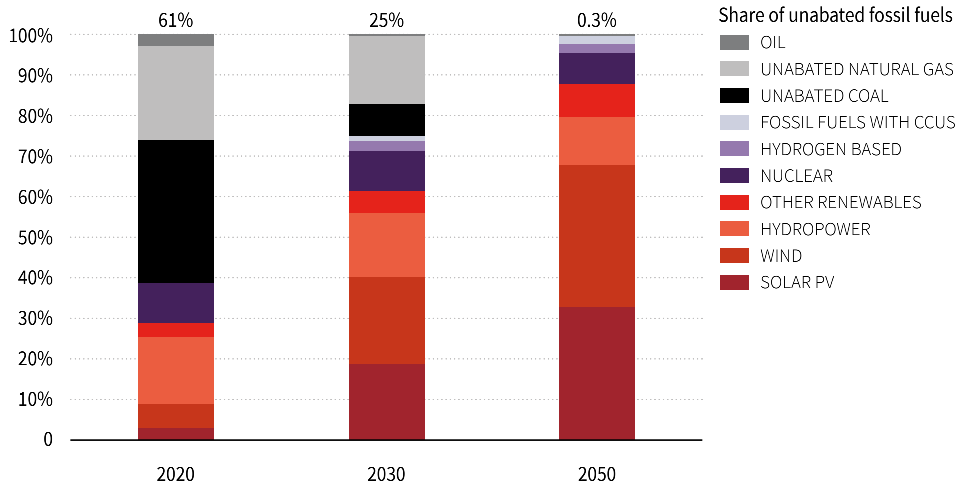
Wind and Solar generation: wind and solar share in global electricity production increased by 2 percentage points in 2022, reaching 12% of global production[7]. IEA's NZE Scenario forecasts electricity production from wind and solar technologies at around 70% of global production in 2050[2]. These renewables offer low-cost electricity production alternatives. Therefore, they benefit from broad political support and strong momentum in the installation of renewable capacity (+9% per year between 2015 and 2022[8][9]).

Low carbon generation and infrastructure development: IEA's NZE Scenario relies on additional production capacities from nuclear and hydropower, as well as storage capacity development and infrastructure modernisation to support the electrification of end uses and related electricity demand growth while ensuring grid stability and flexibility[9].

ELECTRICITY DEMAND BY SECTOR IN IEA'S NZE SCENARIO[3]



DISTRIBUTION OF POWER GENERATION TECHNOLOGIES IN GLOBAL PRODUCTION IN IEA'S NZE SCENARIO (%)[3]



1) *IEA, CO_2 emissions in 2022.* **(2)** *IEA, Net Zero by 2050.* **(3)** *EMBER, Electricity Data Explorer.* **(4)** *Our World in Data, Global CO_2 emissions.* **(5)** *IEA, World Energy Outlook, 2022.* **(6)** *EMBER, Global Electricity Review, 2023.* **(7)** *IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach.* **(8)** *IRENA, Renewable Energy Capacity Statistics, 2023.* **(9)** *IEA, Tracking clean energy progress, 2023*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The decarbonisation of the power generation mix poses multiple challenges, including the intermittency of renewable power generation and the availability of critical minerals necessary for scaling up low-carbon technologies.

Challenges

Electricity is a major pillar in the IEA NZE Scenario. The decarbonisation of the power sector will be necessary for achieving significant emissions reductions. This will be principally achieved through the displacement of fossil fuel power generation by low-carbon power generation, mostly renewables, complemented by actions addressing the strong growth in demand for electricity[(1)].

However, the deployment of low-carbon power generation capacities comes with challenges:

- The intermittency of renewables, impacting energy security and power grid balance;
- The need to develop supply chains for renewable power generation technologies.

This increase in power consumption includes energy efficiency improvements, limiting the final energy consumption to 53% of what it would be without energy efficiency measures in 2050[(3)].

Renewable intermittency: overcoming this challenge requires a diversification of the power mix with network and interconnection development ensuring electricity security and grid stability in a fast-growing renewable electricity mix. To address electricity demand growth and align with the IEA NZE Scenario, annual investment in power grids must double by 2030 to reach over USD 700 bn[(2)].

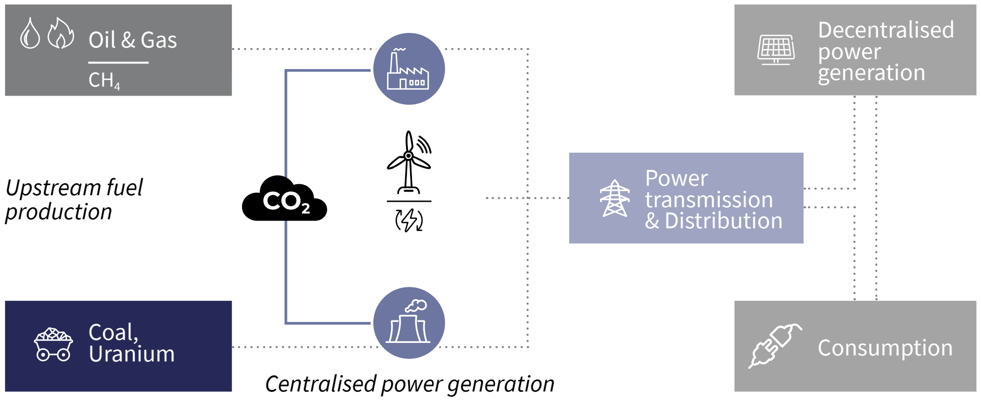
The IEA NZE Scenario identifies two additional levers to reduce disruption risks to the power system and grid imbalance:

- Pairing renewable power generation assets with short – and long-term stationary storage systems (battery, hydropower/ hydrogen). Battery systems must be scaled up to align with the massive deployment of renewables and electrification in the NZE Scenario;
- Supporting behavioural change and demand side response to smooth peaks in electricity demand. Public policies must be adapted to enable the introduction of such measures.

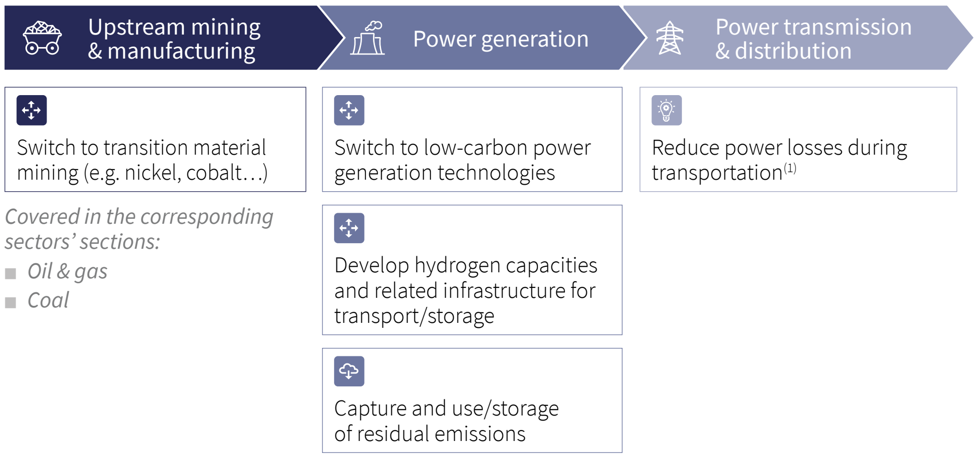
Supply chain development: the growth of low-carbon power generation technologies will put a strain on the entire supply chain with knock-on effects up to the extraction of raw materials (e.g. copper), limited access to reserves and competition among end uses (e.g. electric mobility). This will create challenges for the energy transition[(3)].

The concentration of equipment manufacturing (e.g. solar modules) amid growing geopolitical tensions increases the risk of supply chain disruption. Upstream suppliers and power generation companies are expected to support the development of sustainable and reliable supply chains for low-carbon generation equipment to ensure continuous growth in line with IEA's NZE Scenario[(4)].

POWER SECTOR VALUE CHAIN AND EMISSIONS MATERIALITY[(5)]



DECARBONISATION LEVERS FOR POWER COMPANIES ALONG THE VALUE CHAIN[(5)]



(1) IEA, Net Zero by 2050. (2) IEA, Tracking clean energy progress, 2023. (3) IEA, Mineral requirements for clean energy transition, 2021. (4) IEA, Special report on Solar PV global supply chain, 2022. (5) Blunomy analysis.

2. ALIGNING POWER

As power generation is expected to grow due to increasing demands for electricity and transitioning away from fossil fuel generation to low-carbon sources, a target in intensity has been set to support the decarbonisation of this sector.

Scope

SECTOR BOUNDARY

The scope of this portfolio focuses on counterparties active in the power generation segment as they represent most emissions within the power sector. Clients producing electricity from waste treatment are also included. The list is based on sectoral classification and internal knowledge.

EMISSIONS SCOPE

The indicator covers scopes 1 & 2 emissions for electricity producers. These are the emissions generated from the combustion of fossil fuels to generate electricity and the purchase of electricity, heating and cooling for the company's own needs. Scope 3 emissions are not covered as they are minimal in the overall power generation lifecycle.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PACTA methodology for Banks

SCENARIO

IEA Net Zero by 2050

METRICS

The indicator is based on an emissions intensity metric which allows for the monitoring of GHG emissions per unit of electricity generated expressed in gCO_2e/kWh.

$$\frac{\textit{Scope 1 \& Scope 2 emissions } (gCO_2e)}{\textit{Power production (kWh)}}$$

KEY ASSUMPTIONS AND LIMITATIONS

The model focused on the three most emissive CO_2 technologies: Coal, Oil and Gas. Renewable energies and nuclear are considered Zero-CO_2 emitters.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The cement sector accounts for 7% of global anthropogenic CO_2 emissions, emission levels comparable to those of India[1]. The cement sector's carbon intensity should decrease from 0.58 tCO_2 per tonne in 2022 to 0.47 tCO_2 per tonne produced by 2030, in line with the IEA NZE Scenario[2].

Sector overview

Cement is one of the main constituents of concrete, with few substitutes. With demand driven by urbanisation and infrastructure development (mainly in developing countries), cement demand is set to increase by 45% by 2050[3]. This makes it all the more important to decarbonise its production.

Emissions sources[3]

Cement is a hard-to-abate sector, with around 90% of the cement industry's emissions being direct, linked to the production of clinker.

- 50% – 60% of emissions are inextricably linked to cement manufacturing;
- The chemical reaction of limestone decomposition used to produce clinker, the main component of cement, results in the production of CO_2 during the process. These emissions are hard to abate as there is no viable alternative to the calcination of limestone for clinker production;
- 30% – 40% of emissions come from the combustion of fossil fuels to reach the temperature needed for this reaction to occur (> 1,400 °C);
- The remaining emissions come directly or indirectly from other activities including quarrying & transport, grinding & preparation of raw materials, cooling and mixing and construction.

Decarbonisation levers[1][2][4]

The IEA NZE Scenario identified several decarbonisation levers for the cement sector:

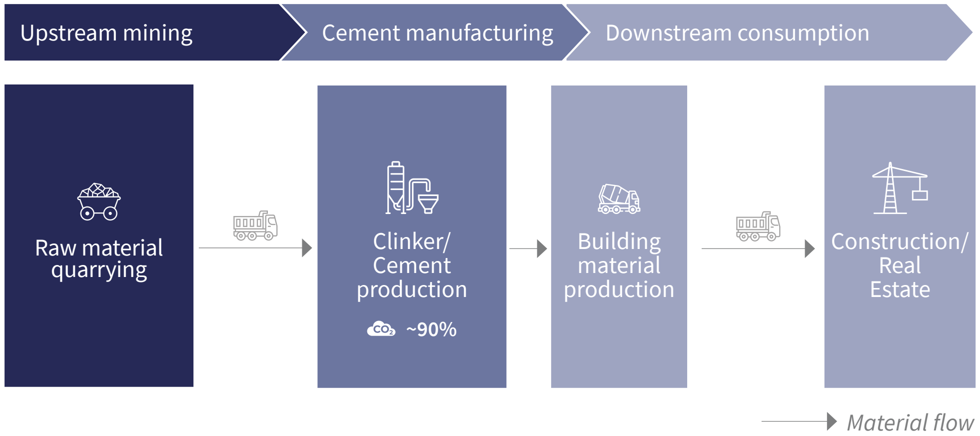
- Efficiency in construction and concrete manufacturing, limiting cement demand;
- Greater energy efficiency in cement production plants;
- Production of cement made with lower clinker content, particularly driven by small operators;
- Use of alternative fuels[*] in cement production, reducing fossil fuel combustion;
- Use of CCUS technologies to abate the remaining emissions, a solution favored by historical manufacturers.

The remaining emissions are tackled through the global decarbonisation of the power sector, and CO_2 recarbonation[**] according to various sectoral scenarios.

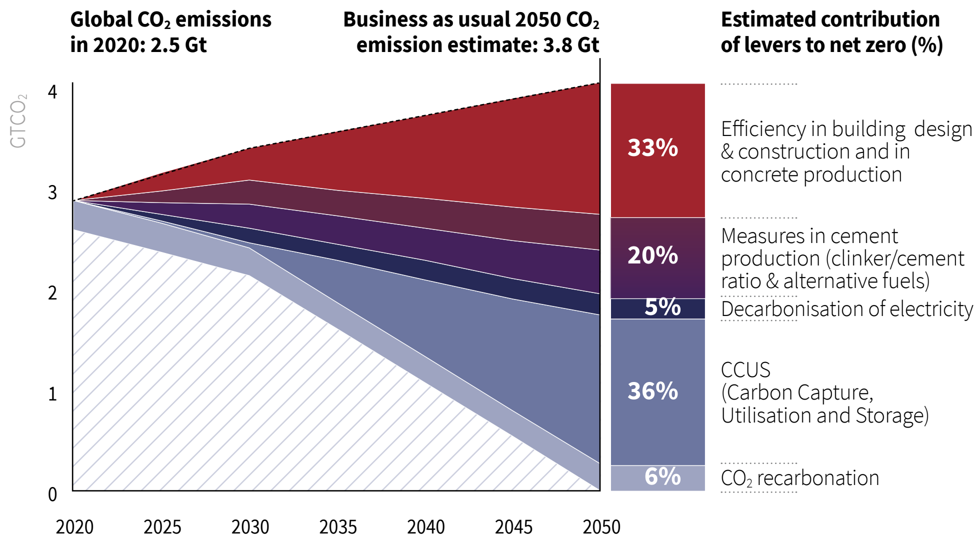
Due to technology maturity levels, net zero scenarios define a decarbonisation timeline relying on evolving technologies[4]:

- By 2030, production processes, energy efficiency improvement, fossil fuels reduction and clinker/cement ratio reduction will be critical;
- By 2050, CCUS will be essential for reducing emissions intrinsic to cement production. CCUS will require R&D investment before being deployed commercially after 2030.

CEMENT SECTOR'S VALUE CHAIN AND EMISSIONS MATERIALITY[5]



CONTRIBUTION OF DECARBONISATION LEVERS TO MEET NET-ZERO OBJECTIVES[***][4] (2020–2050)



(1) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach. **(2)** IEA, Net Zero by 2050 report. **(3)** World Economic Forum, Net-Zero Industry Tracker, 2022. **(4)** Global Cement and Concrete Association, Getting to net zero. **(5)** Blunomy analysis. **(*)** Alternative fuels are derived from non-primary materials i.e. waste or by-products; it can be biomass, fossil or mixed (fossil and biomass) alternative fuels. **(**)** Recarbonation is the process of CO_2 uptake by concrete. **(***)** GCCA decarbonisation pathway also considers the concrete sector, which represents a minor share of the cement/concrete sector.

2. ALIGNING CEMENT

The cement sector's decarbonisation requires improving energy and material efficiency, using low-emissions fuels and investing in new technologies.

Scope

SECTOR BOUNDARY

Cement manufacturing companies
The scope of this portfolio focuses on counterparties active in the cement manufacturing segment which is the most material within the cement value chain.

EMISSIONS SCOPE

The indicator covers scope 1 & 2 emissions for cement manufacturers. These are the emissions generated from thermal combustion to produce clinker, electricity generation for the kiln, and the grinding and blending of materials. Scope 1 emissions are measured on a gross basis. This includes emissions from the burning of substitution fuels such as different types of waste (e.g., old tires, grease, organic solvents, painted wood) as part of the calcination process.

FINANCING ACTIVITIES

All loan-related products are included.
General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PACTA methodology for Banks

The portfolio intensity is calculated by weighting each counterparties' respective intensity by their exposure in the portfolio.

SCENARIO

IEA's NZE Scenario
As the IEA NZE Scenario does not provide sector-specific scope 2 pathways, the Group uses the scope 2 decarbonisation pathway developed by SBTi in consultation with the IEA.

METRICS

Emission intensity metric: kg CO_2e/t cement

$$\frac{\textit{Scope 1 \& Scope 2 emissions (kgCO}_2\textit{e)}}{\textit{Cement production (t cement)}}$$

KEY ASSUMPTIONS AND LIMITATIONS

The IEA NZE scenario and the data from Asset Impact are expressed in tonnes of cement produced. However, company-reported data, taken from CDP disclosures, are expressed in tonnes of cement equivalent or tonnes of cementitious products. The difference between the metrics is expected to be small, and no adjustments have been made. In addition, the data provided by Asset Impact excludes non-CO_2 greenhouse gases; however, the exclusion has minimal impact given that CO_2 is the most material greenhouse gas for the sector.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The steel sector represents 7% of energy-related CO_2 emissions[1]. According to the IEA NZE Scenario[2], the carbon intensity of the sector must decrease by 24% by 2030 compared to 2022.

Sector overview

Steel is an essential resource in many sectors including construction, automotive, shipping, aviation, machinery and consumer goods. Population growth and economic development in emerging countries drive steel demand. The World Economic Forum projects global steel demand to rise by 30%[*] by 2050[3]. Steel is also a key component of low-carbon technologies (e.g. wind turbines).

Emission sources

Steelmaking emissions are linked to fuel consumption and iron reduction processes. Three production routes exist and present different emission profiles:

- Blast Furnace – Basic Oxygen Furnace (BF-BOF), relying on coal and coke for energy and process purposes;
- Direct Reduced Iron – Electric Arc Furnace (DRI-EAF), relying on natural gas or coal and electricity;
- EAF-Scrap, a secondary EAF production route using scrap metal as an input and relying on electricity.

Decarbonisation levers[4][5][6][7][8]

The IEA NZE Scenario and industrial roadmaps identify three levers to reduce the steel industry's emissions:

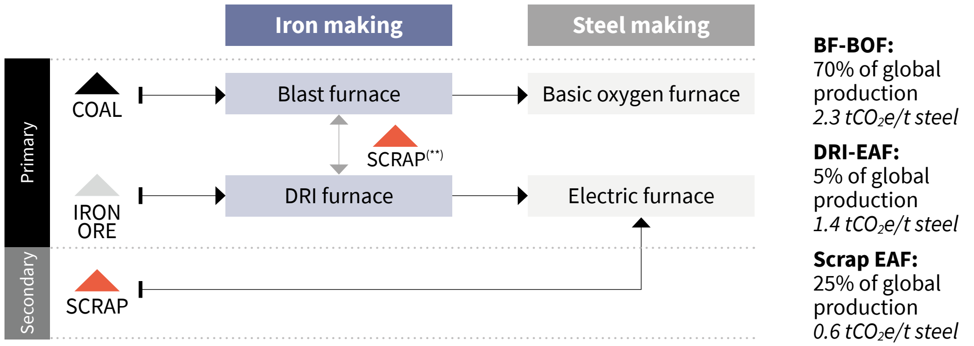
- Reduction of steel primary production through material efficiency and scrap use;
- Diversification of production processes towards less CO_2-intensive routes;
- Scaling of carbon capture technologies to tackle residual emissions.

Resource efficiency and circularity: the IEA forecasts that material efficiency in steel-dependent sectors (e.g. manufacturing of lighter vehicles in the automotive industry) could reduce demand by around 20% by 2050[4]. Change in material inputs with scrap use and secondary steel production are also essential for the transition of steel-consuming industries.

Fuel or process switch: primary steel production will be required to meet 60% of steel needs by 2050[3]. Diversification of production routes towards less carbon-intensive ones, switching from coal to other reducing agents such as hydrogen can reduce the steel's industry carbon footprint. Technological innovation and hydrogen-based production routes, for which project announcements are increasing, will be crucial to unlock the potential of so-called 'green steel'.

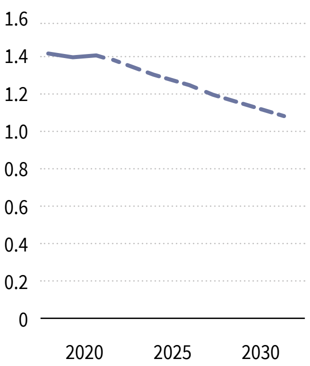
CCUS: this technology is seen as a complement to the deployment of low-carbon production routes. However, they will play a limited role in decarbonising the steel sector before 2030 but will be scaled up thereafter onwards.

STEELMAKING PROCESSES AND ASSOCIATED CO_2 EMISSIONS[3][8]



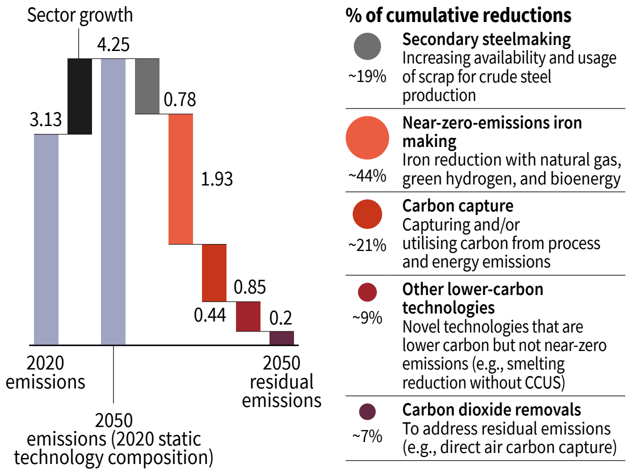
DIRECT CO_2 INTENSITY (TCO_2/TSTEEL)[1]

OF THE IRON AND STEEL SECTOR IN THE IEA NET ZERO SCENARIO, 2020-2030



ANNUAL CO_2 EMISSIONS (SCOPE 1 & 2)[6]

REDUCTION PER DECARBONISATION LEVER (GT CO_2) IN THE MISSION POSSIBLE PARTNERSHIP STEEL SCENARIO, 2020 - 2050[6]



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(1) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach. (2) IEA, Iron and Steel. (3) World Economic Forum, Net-Zero Industry Tracker, 2022. (4) IEA, Net Zero by 2050, 2021. (5) IEA, Iron and Steel Technology Roadmap, 2020. (6) Mission Possible Partnership – Making Net-Zero Steel Possible. (7) OECD, Assessing steel decarbonisation progress, 2022. (8) IEA, Energy Technology Perspectives, 2020. (*) In the IEA NZE Scenario, considering material efficiency measures, steel demand grows by 12% by 2050. (**) Scrap represents 15–25% of metallic input for primary path production.

2. ALIGNING STEEL

Given the various decarbonisation levers applicable to the sector, we set our target using the Sustainable STEEL Principles alignment score to adequately address primary and secondary steel pathways.

Scope

SECTOR BOUNDARY

Steel manufacturing companies
The Sustainable STEEL Principles (SSP) define an in-scope counterparty as an entity that (i) produces a minimum of 250 kilotons p.a. of crude steel at group-level and

(ii) generates 20% or more of total revenues through crude steelmaking activities at group-level.

Societe Generale applied the thresholds recommended by the SSP. Client eligibility and inclusion in the alignment score calculation was ultimately confirmed by its presence in the CRU database which assured the availability of data for that client.

EMISSIONS SCOPE

For the steel sector, a fixed-boundary system as per the SSP is used covering scopes 1, 2 and a portion of scope 3 emissions, depending on the level of vertical integration (specifically category 1 and 10). These are the emissions generated from raw material preparation, ironmaking, steelmaking, and auxiliary processes. Emissions from upstream (i.e., iron and coal mining) and downstream activities (i.e., beyond coating) are not covered by the indicator and the Scenario benchmark because they represent a relatively small portion of total steel sector emissions.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

Sustainable STEEL Principles (recognised as a valid methodological framework by NZBA).

SCENARIO

IEA's NZE Scenario

METRICS

Portfolio Alignment Score as defined by the SSP.
The alignment score distinguishes the primary and the secondary steel pathways and evaluates a borrower's alignment against two 1.5°C Scenarios (the IEA NZE Scenario and the Mission Possible Partnership's Technology Moratorium Scenario - MPP TM).

- A score of zero or below zero means that a company is aligned with the IEA NZE and MPP Scenarios;
- A score between zero and one means that it is aligned with the MPP TM Scenario only; and
- A score above one means that it is misaligned with a 1.5°C scenario.

KEY ASSUMPTIONS AND LIMITATIONS

The definition of the client scope is complex as identifying clients which actually produce crude steel is not evident given the varying degrees of integration and diversification of players along the value chain.
Data quality remains a challenge and the calculation of the score is very sensitive to the scrap share and intensity assumptions. As such, restatements might be necessary in the coming years to refine the scope, data and calculations.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Aluminium is a highly energy-intensive material, but it is critical for the energy transition. The IEA NZE Scenario forecasts a rising demand for aluminium to support low-carbon technology deployment[1]. Decarbonising its production will thus be key to reaching climate objectives.

Sector overview

Aluminium is used in multiple industries: construction, transport, power infrastructure, machinery and packaging. Several clean energy technologies also rely on aluminium[2]:

- Solar PV – As technology now stands, there is - and will be – no solar power without aluminium, which accounts for over 85% of solar PV technologies[3];
- Electric vehicles - for lighter vehicle design and battery storage;
- Electricity networks and infrastructure.

Demand for aluminium is thus forecast to increase by 80% by 2050[4]. Due to the limited availability of aluminium scrap, secondary production cannot meet the demand. Primary aluminium will still be needed to meet almost 50% of aluminium demand in 2050[4].

Emissions sources

Aluminium manufacturing is a highly emissive process with three main sources of emissions[5]:

- Thermal energy consumption for refining, accounting for ~10% of emissions;
- Electricity consumption for electrolysis[6], accounting for ~62% of emissions;
- Direct emissions during the electrolysis process due to the disintegration of carbon-based anodes, accounting for ~9% of emissions.

Decarbonisation levers

Four main levers exist[7]:

- Circularity: material efficiency and recycling;
- Energy (electricity and thermal energy) decarbonisation;
- Process emissions mitigation;
- CCUS.

Circularity: Global scrap collection rates are high (around 75% for end-of-life scrap[8]) but improving recycling channels will help reduce the need of primary supply and associated emissions. Some pure players are leading the market development through partnerships with aluminium consumers.

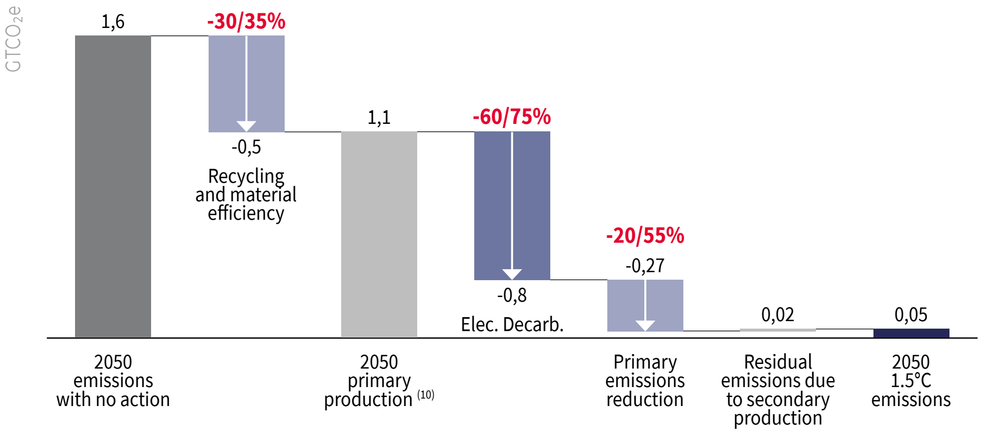
Energy decarbonisation: Decarbonising the power used for electrolysis is the main decarbonisation lever with the potential to cut 60%-75% of primary production emissions according to industrial scenarios. The ability to activate this lever is dependent on the electricity mix of the country in which the aluminium is produced. But some players also invest in captive power production capacity, particularly in Asia and in the Middle-East.

The full decarbonisation of aluminium smelting requires additional technology to be upscaled[9]:

- Developing inert anodes limiting direct electrolysis process emissions;
- Implementing CCUS technologies for residual emissions (although more difficult than in sectors like cement); and
- Switching boilers & calciners to electricity or green hydrogen.

DIRECT AND INDIRECT EMISSION INTENSITY OF GLOBAL PRIMARY ALUMINIUM PRODUCTION (2021, TCO_2E/T)[5]

CONTRIBUTION OF DECARBONISATION LEVERS TOWARDS IEA'S NET ZERO SCENARIO[7]



(1) IEA, Net Zero by 2050 report. (2) IEA, Mineral Requirements for clean energy transitions. (3) World Bank, Competitiveness of Global Aluminium Supply chain under carbon pricing scenarios for Solar PV, 2023. (4) World Economic Forum, Net Zero Industry Tracker, 2022. (5) International Aluminium Institute, Greenhouse Gas Emissions Intensity, 2022. (6) Aluminium production is dominated by China (57% of 2021 production), resulting in a high carbon intensity of electricity used for electrolysis at a global level. (7) International Aluminium Institute, Aluminium Sector Greenhouse Gas Pathways to 2050, 2021. (8) IEA, Aluminium report. (9) IEA, Aluminium report. (10) 2050 Primary production represents the Aluminium sector's emissions in a scenario with scrap production aligned with IEA's Net Zero Scenario, but CO_2 intensity at 2018 levels.

2. ALIGNING ALUMINIUM

The carbon intensity of production is the most commonly used metric for target setting today and will help steer the aluminium portfolio towards net zero. This indicator is calculated for the aluminium producers in Societe Generale's portfolio according to the fixed-boundary system of the Sustainable Aluminium Finance Framework

Scope

SECTOR BOUNDARY

The Sustainable Aluminium Finance Framework ("SAFF") defines an in-scope counterparty as an entity that produces (i) a minimum of 250 kilotonnes p.a. of cast primary or recycled aluminium, or optionally, (ii) 250 kilotonnes p.a. of shaped aluminium products & generates 50% of revenue from the sale of shaped products.

Societe Generale has only included producers of primary aluminium given its limited exposure to recycling or semi-fabrication clients.

EMISSIONS SCOPE

Scopes 1, 2 & 3 upstream emissions are included in the boundary as defined by the SAFF fixed boundary system for primary and recycled production. This includes emissions associated with the extraction of fuels for process heat, the generation of electricity (including the extraction of fuels to generate this electricity) and the production of ancillary materials. Exclusions consist of scrap sorting and scrap pre-treatment related to recycling, transport and semi-fabrication.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PACTA methodology for Banks
The portfolio intensity is calculated by weighting each counterparties' respective intensity by their exposure in the portfolio.

SCENARIO

Two roadmaps are used in tandem for primary production as proposed by the SAFF: (i) **International Aluminium Institute (IAI) 1.5°C Scenario:** a top-down scenario which covers the entire aluminium value chain from mining through semi-fabrication and includes most scope 3 emissions. (ii) **MPP Aluminium Sector Transition Strategy (MPP STS):** a bottom-up model covering the refining, smelting, and anode production processes related to primary aluminium production. The **IEA NZE Scenario** for the aluminium sector is not the most relevant as the IEA only covers the sector's direct emissions (scope 1) and does not address electricity-related emissions (scope 2).

METRICS

Emission intensity in tonnes of CO_2 equivalent per tonne of aluminium produced: (tCO_2e/tAl). As a participant of the SAFF development, Societe Generale is assessing the possibility of using the SAFF alignment score in the future.

KEY ASSUMPTIONS AND LIMITATIONS

The intensity indicator does not consider the wide range of intensities within the sector, nor the strong correlation between an aluminium producer's intensity and the intensity of the power grid in its country of operation. This indicator is also volatile for banks as their portfolios evolve over time and the weight of their exposure to the highly different intensities found across the sector changes, thus impacting its average intensity.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The automotive sector (cars and vans) represented 10% of energy-related global CO_2 emissions in 2022[(1)].
Alignment with climate objectives requires a reduction of 42% of the sector's CO_2 emissions from 2022 to 2030[(1)].

Sector overview

The IEA NZE Scenario forecasts an increase in the global passenger car fleet of more than 60% by 2050, reaching close to 2 billion vehicles[(2)].

Governments will work towards all sales of new cars and vans being zero emission by 2040 or earlier, or by no later than 2035 in leading markets. It will create a policy pressure on automotive markets to develop the manufacturing of low-carbon technology (BEV, PHEV, FCEV[(*)]) vehicles[(3)].

The IEA NZE Scenario requires a 100% share of low-carbon technology[(**)] in new vehicle sales by 2050[(2)].

Emission sources[(4)(5)(6)]

Light-duty vehicle emissions comprise:

- "Well-to-Wheel" emissions including:
  - "Well-to-tank" emissions linked to upstream fuel production – Fuel Supply;
  - "Tank-to-wheel" emissions linked to fossil fuel combustion – Tailpipe.
- Manufacturing emissions linked to the material production and manufacture of vehicles.

"Well-to-Wheel" emissions: internal combustion engine vehicles' emissions mostly come from fuel supply and combustion, accounting for 65%-80% of total life-cycle emissions.

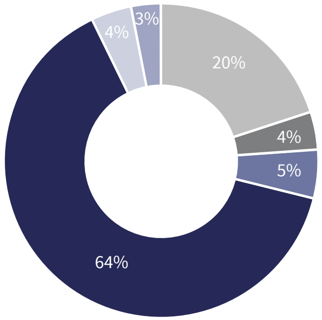
Battery and fuel cell electric vehicles have different emission profiles, as they have no "tank-to-wheel" emissions linked to fuel combustion. However, they generate indirect emissions linked to the generation of electricity that powers the vehicle. Thus, their carbon footprint varies depending on the electricity mix in their geography of use.

Manufacturing emissions: the remaining emissions from the automotive sector are linked to the production and maintenance of the vehicles themselves. This encompasses the manufacturing of vehicles by car manufacturers and the manufacturing of batteries in giga factories. These emissions depend on the propulsion technology:

- For internal combustion engine vehicles, they represent around 10% of total life-cycle emissions;
- For electric vehicles, they represent between 40 and 50% of total life-cycle emissions.

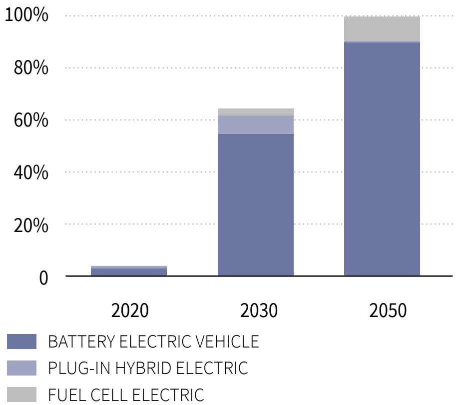
These emissions come from the manufacturing of components and production of raw materials (e.g. steel, aluminium, other metals and plastics). As such, reducing the carbon footprint of the supply chain is key to further reducing light-duty vehicles' emissions by 2050.

BREAKDOWN OF INTERNAL COMBUSTION ENGINE VEHICLES' EMISSIONS[(4)] (%)

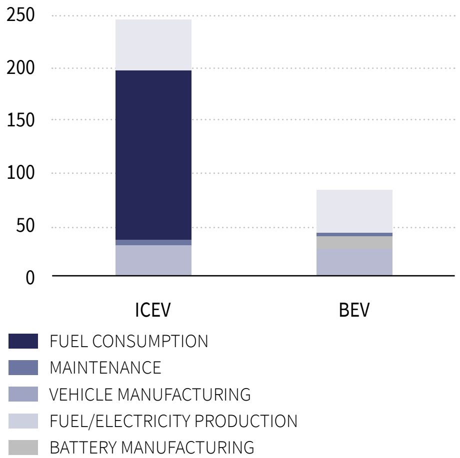


BREAKDOWN OF INTERNAL COMBUSTION ENGINE AND BATTERY ELECTRIC VEHICLES' EMISSIONS AND SHARE OF LOW-CARBON VEHICLES SALES EVOLUTION IN THE NZE SCENARIO[(2)]

Share of low-carbon technology vehicles sales (% of total sales)[(5)]



Emission intensity of ICEV[(***)] and BEV[(6)] registered in Europe (2021, gCO_2e/km)



(1) *IEA, Cars and Vans.* **(2)** *IEA, Net Zero by 2050.* **(3)** *IEA, EV outlook 2023.* **(4)** *McKinsey, The zero-carbon car.* **(5)** *IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach.*
(6) *International council on clean transportation.* **(*)** *BEV: Battery Electric Vehicle// PHEV: Plug-in Hybrid Electric Vehicle// FCEV: Fuel Cell Electric Vehicle.* **(**)** *Low-carbon technology vehicles are defined as vehicles with low to zero tank-to-wheel emissions. They rely on electric propulsion.* **(***)** *ICEV: Internal Combustion Engine Vehicle.*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The transition towards electric vehicles is key to decarbonising the automotive sector.
Car manufacturers are at a centre stage and must adapt not only their production but also their full supply chain.

Decarbonisation levers[(1)(2)(3)(4)(5)]

The IEA NZE Scenario relies on three main decarbonisation levers for the automotive sector:

- Technology transition towards electric mobility (EVs, FCEVs);
- Improvements in energy efficiency;
- Behavioural changes.

Energy switch: technology transition towards electric mobility reduces demand for fossil fuels. In the IEA NZE Scenario, the share of EVs in total new vehicles' sales reaches 100% in 2050[(1)]. Nevertheless, this transition must be supported by the decarbonisation of the power generation system via the massive deployment of renewable generation sources. Additionally, charging infrastructure development is necessary to foster e-mobility – particularly for light-passenger vehicles. Globally, the stock of new charging points has been growing at a rate of 47% per year between 2015 and 2022[(2)]. The IEA 2023 Scenario update upgrades the role of EVs, reflecting the significant increase of EV sales pushed by policy support and the scale up of manufacturing supply chains. However, biogas and low-carbon hydrogen will play smaller roles in the near and longer terms due to limited accessible resource base and competition for end-uses[(3)].

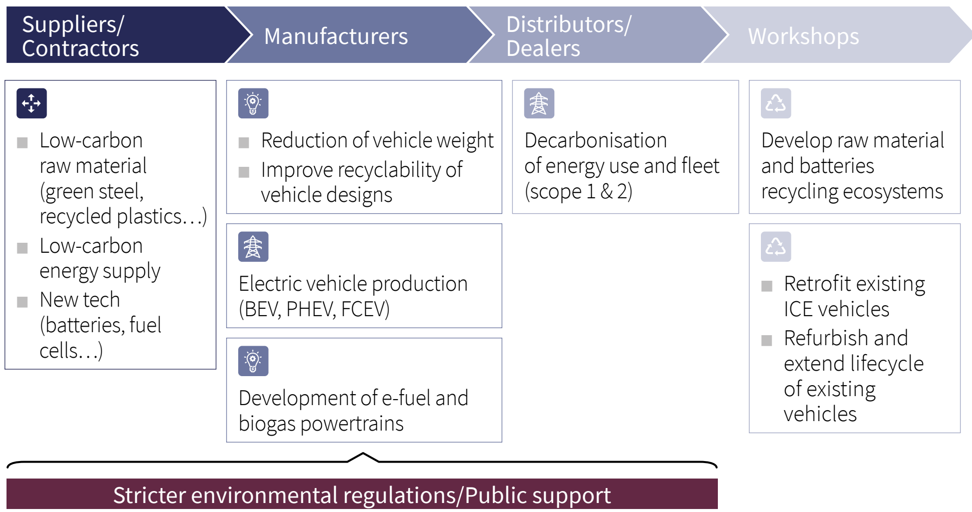
Energy efficiency: lighter vehicles consume less fuel or electricity over the same distance, improving the fuel efficiency. In the IEA NZE Scenario, fuel efficiency represents a 41% energy consumption reduction lever between 2020 and 2050. However, the share of heavy vehicles and SUVs in total sales continues to increase in Europe by around 2% per year[(4)].

behavioural changes are actions that energy consumers can take to reduce or eliminate unnecessary or wasteful energy consumption, for example walking, cycling or taking public transportation instead of driving. Changes in behavior depend not only on individual choices, but also on systemic factors such as the availability of infrastructure such as bicycle lanes, public transportation or high-speed rail.

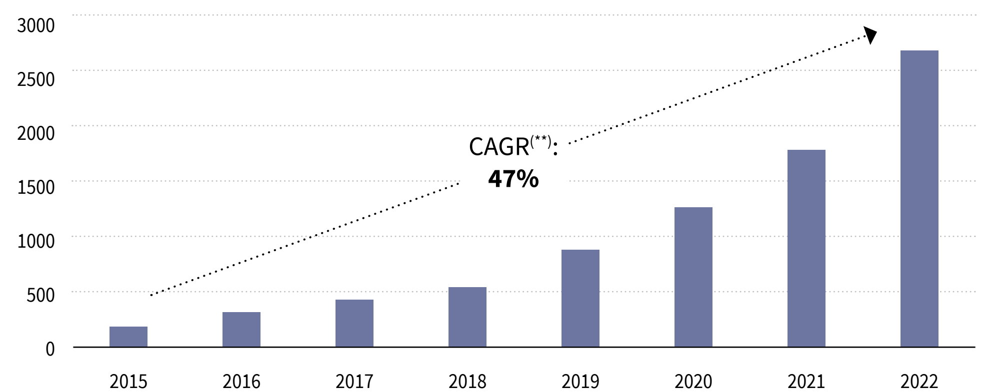
Along the automotive value chain, companies have specific levers to reduce their carbon intensity:

- Car manufacturers are expected to adapt their production lines to produce EVs. They have a specific role to play as changes in car production will have a knock-on effect up and down the value chain, increasing demand for low-carbon fuels and reducing the share of ICEVs in total sales. They can also increase the energy efficiency of the sector with lighter vehicles (design optimisation, switch from steel to aluminium);
- Fuel suppliers should produce low-carbon liquid fuels along with the supply infrastructure. They also can contribute to the large-scale deployment of EV recharging infrastructure and even renewable energy generation capacity to power the infrastructure.

DECARBONISATION LEVERS FOR AUTOMOTIVE PLAYERS ALONG THE VALUE CHAIN[(4)]



PUBLICLY AVAILABLE LIGHT-DUTY VEHICLE CHARGING POINTS[(4)] (GLOBAL, THOUSANDS, 2015–2022)[(*)]



(1) IEA, Net Zero by 2050. (2) IEA, EV outlook 2023. (3) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach. (4) IEA, Cars and Vans. (5) International council on clean transportation, 2021. (*) Based on IEA's country submission.
(**) CAGR: Compound Annual Growth Rate.

2. ALIGNING AUTOMOTIVE

Societe Generale's strategy focuses, for the time being, on the vehicle usage phase, which represents more than two thirds of the greenhouse gases emitted over the full life-cycle of ICE vehicles. The emissions scope will likely evolve in the coming years to encompass upstream emissions as the materiality of these emissions increases and dedicated pathways become available.

Scope

SECTOR BOUNDARY

Car manufacturers and their financial captives, with a focus on light-duty vehicles such as cars, vans and light trucks are included. The upstream (e.g., suppliers) and downstream (e.g., dealers) parts of the value chain are excluded.

Consumer Finance and Ayvens are treated separately and are not included in the boundary.

EMISSIONS SCOPE

The indicator covers scope 3 end-use emissions (category 11) for automotive manufacturers. These are the emissions generated during the combustion of the fuels by vehicles (i.e., tank-to-wheel). The metric excludes, to date:

- Scopes 1 & 2 emissions from automotive manufacturers;
- All other scope 3 emissions occurring upstream or downstream of the automotive manufacturer's value chain;
- Upstream emissions related to fuel production and distribution, as well as electricity generation for electric vehicles (i.e., well-to-tank).

The scope of emissions might evolve should data and pathways become available.

FINANCING ACTIVITIES

All loan-related products are included.
General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

PACTA methodology for Banks

SCENARIO

IEA's NZE Scenario
Currently, the IEA only provides a pathway for tailpipe emissions intensities (in gCO_2/v-km) with a focus on the stock of vehicles on the road. Societe Generale's target is based on a different metric, the average emissions intensity of new cars sold in a given year. In the absence of a similar metric provided by the IEA to benchmark our target, we compared it with the IEA trajectory between 2020 and 2030 (-47% vs. -51% for Societe Generale's target). We will review our target in the coming years, should the IEA disclose a benchmark based on annual vehicle sales.

METRICS

Emission intensity metric: gCO_2e/v-km, the portfolio is aggregated on an exposure-weighted approach

$$\frac{\textit{Scope 3 end-use emissions } (gCO_2e)}{\textit{Vehicle — kilometres } (v - km)}$$

KEY ASSUMPTIONS AND LIMITATIONS

Finding reliable data on car manufacturers' average fleet intensity is key to this exercise. A comparative review of different data providers and company disclosure showed that emissions intensity figures can vary by 20-30% depending on the source. The local norms and calculation methods specific to each market make it difficult to have a transparent and homogenous assessment.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Accounting for over 80% of the world's trade[*], the shipping sector contributes to 2–3% of global emissions[1]. A shift to alternative fuels will be necessary to fully decarbonise the sector. It should achieve a 7% annual decline of emissions between 2022 and 2050 to be in line with IEA's NZE Scenario[5], on the entire value chain.

Sector overview[1][3][4]

The shipping sector's emissions could more than double by 2050 as globalisation continues to drive shipping demand, reaching 1.7 $GtCO_2$ in 2050 in IEA's Reference Technology Scenario if no technological progress is achieved. The initial strategy of the International Maritime Organisation (IMO) has been strengthened in July 2023, calling for: a strengthening of the requirements on ships' efficiency design and fuel use and a reduction of the international shipping well-to-wake emissions by at least 70% and striving for 80% by 2040, compared to 2008's emission levels with ambition to reach net-zero GHG emission by or around 2050. Shipping, as an efficient freight transport mode with low carbon intensity at 6 gCO_2/ton-km[***][8], also holds the potential to contribute to decarbonising the overall transportation sector and reducing the logistics-related emissions of multiple sectors.

Emission sources[1][2]

International shipping by commercial ships including bulk carriers, container ships and tankers are the key carbon emitters in the sector given their scale of operations which accounts for approximately 85% of the global fleet. The sector's carbon footprint is materially tied to its reliance on carbon intensity oil-based marine fuels (e.g., heavy/light fuel oil, diesel/ gas oil) and other fossil fuels (LNG) which cover more than 99% of its total energy demand.

Decarbonisation levers[4][5][6]

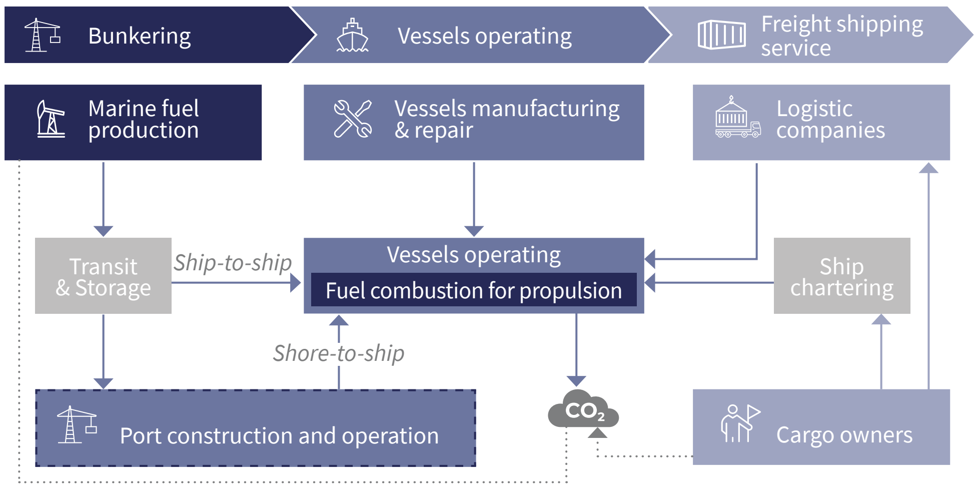
From now to 2030:

- Optimisation of operational and energy efficiency is the most mature decarbonisation solution (e.g. high efficiency propeller, waste-heat recovery system, slow steaming, route and loading optimisation, etc.);
- Switching to low-carbon fuels such as ammonia or methanol as a primary low-emissions fuel, other biofuels or hydrogen, may play a limited part due to their relatively high costs despite their ability to contribute to major emissions reductions, but other low carbon production means have the potential for scaling up[**].

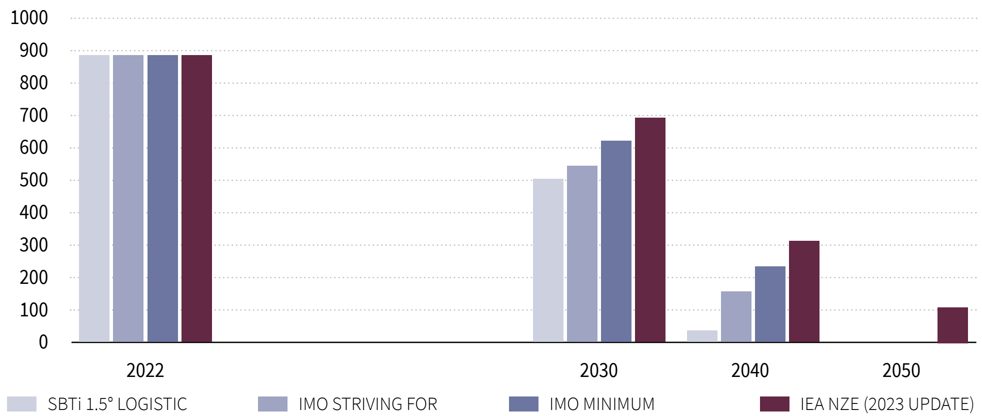
From 2030 and after:

- According to the IEA Scenario, more than 80% of the energy will be provided by low-carbon fuels, including ammonia, hydrogen and biofuels (including bio-LNG and bio-methanol);
- Scaling-up low-carbon fuel production and infrastructure faces challenges as competition with other sectors (e.g. aviation) is likely. Due to a limited number of low-carbon solutions, this sector is one of the few sectors alongside Aviation that does not achieve zero emissions by 2050 in the NZE.

SHIPPING SECTOR'S VALUE CHAIN[9]



COMPARISON OF EMISSION REDUCTION TRAJECTORIES[7] (Mt CO_2)



(1) IEA, International Shipping. (2) IEA, Net Zero By 2050. (3) IMO, Revised GHG reduction strategy for global shipping adopted, 2023. (4) IMO, Energy Efficiency of Ships, Fuel Report, 2022. (5) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach, 2023. (6) SBTi, Science Based Target Setting for the Maritime Transport Sector, 2023. (7) IMO, SBTi, IEA NZE. (8) MIT Climate Portal, Freight Transportation. (9) Blunomy analysis. (*) In terms of freight transport volume. (**) Other low-carbon production means are under development such as wind propulsion. (***) Relative to aviation at 512 gCO_2/ton-km and road freight at 83 gCO_2/ton-km.

2. ALIGNING SHIPPING

As a signatory of the Poseidon Principles, Societe Generale is committed to implementing a trajectory aligned with net-zero GHG emissions by 2050.

Scope

SECTOR BOUNDARY

The boundaries are derived from The Poseidon Principles (« PP ») asset based definition which:

- Includes: Cargo and Ferry vessels of 5,000 gross tonnage and above, under the purview of the IMO, and with an established climate trajectory; and
- Excludes: Cruise, Military ships, submarines, inland waterway vessels, and vessels used for production as well as construction.

However, this initial alignment exercise differs from the PP in that it does not include Cruise vessels.

EMISSIONS SCOPE

The indicator covers scope 1 and scope 3 category 3 emissions (i.e., well-to-wake emissions, or the "full lifecycle") for shipowners as per the IMO 2023 Scenarios. These are the emissions generated during: operational activities (i.e., scope 1, or tank-to-wake emissions for shipowners) from fuel combustion on board of a vessel; upstream activities (i.e., scope 3 category 3, or well-to-tank emissions for shipowners) including extraction, cultivation, production, processing, storage, transport and bunkering of fuels.

FINANCING ACTIVITIES

- **Included:** credit products and financings secured by a vessel mortgage or a title over the vessel;
- **Excluded:** general corporate purpose loans.

Methodology

CALCULATION METHODOLOGY

Poseidon Principles (recognised as a valid methodological framework by the NZBA): a carbon intensity metric, the **Annual Efficiency Ratio ("AER")**, that corresponds to the grams of CO_2e emitted divided by the distance travelled by the vessel and normalized by its deadweight or gross tonnage (DWT or GT). An AER is the computation of the operational energy efficiency in real conditions of a specific vessel, AER is reported in **unit grams of CO_2 equivalent per tonne-mile** (gCO_2/dwt-nm).

SCENARIO

2023 International Maritime Organisation (IMO) Striving For Scenario. The Group selected this reference Scenario because the IEA NZE Scenario does not provide granularity of assets and is not compatible with the PP.

METRICS

Portfolio Alignment Score as defined by the PP: the alignment score compares the annual carbon intensity of a vessel with its decarbonisation trajectory defined by the Scenario for the same point in time, a positive alignment score means a vessel is misaligned (above the decarbonisation trajectory); where a negative or zero score means a vessel is aligned (on or below the decarbonisation trajectory).

KEY ASSUMPTIONS AND LIMITATIONS

The IMO Striving For trajectory is an approved industry trajectory, supported by the UN and the member states of the IMO.
The 2030 target assumes a constant portfolio mix and is, in intensity, more ambitious than the IMO SF scenario.
The AER metric is not well suited to cruise vessels strongly penalizing them by the application of the existing formula.
If amendments or corrective factors are secured, Societe Generale may expand its alignment perimeter to include cruise vessels.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

The aviation sector contributed to 2% of global energy-related CO_2 emissions in 2022[1].
Given the forecast increase in aviation demand, new technologies and behavioural changes are needed to align with 1.5°C trajectories.

Sector overview

After increasing at an average of 2.3% per year from 1990 to 2019, CO_2 emissions from aviation fell by 40% between 2019 and 2020 during the Covid-19 pandemic. In 2022, aviation emissions rose to reach nearly 80% of the pre-pandemic peak in 2019.

Between 2024 and 2050, aviation growth rates are expected to be of about 3% per year. The air traffic growth, especially in emerging markets and developing economies, underlines the need to develop low-carbon technologies over the next decades. While it is recognized as a hard-to-abate sector, member states of the International Civil Aviation Organization (ICAO) agreed in October 2022 on a long-term aspirational goal of net-zero carbon dioxide emissions from aviation by 2050.

Additionally, airlines have, through IATA, their international trade association, collectively committed in 2021 to fly net zero by 2050.

Emission sources[3][4]

Aircraft rely on energy-dense liquid fuels with few available renewable alternatives. Aircraft's well-to-wake emissions can be distributed between two main categories:

- Production and distribution of jet fuel, accounting for 16% of total emissions;
- Combustion of jet fuel during flights, accounting for 84% of total emissions.

Decarbonisation levers[2][4][5][6]

Given the strong growth in demand forecasts resulting from rising global GDP, decarbonising the aviation sector is increasingly crucial to achieve climate neutrality by 2050. The industry can:

- Improve energy efficiency by technical measures (including aircraft design and propulsion system) and by operational measures (including load factor and routing optimization);
- Switch to low-carbon fuels (SAF, i.e. biokerosene or e-kerosene);
- Disruptive technology (including electric and hydrogen-powered aircraft);
- Offset residual emissions via Carbon Dioxide Removals (CDR).

In addition, the IEA identifies behavioural changes that reduce overall demand as a key decarbonisation lever. Without behavioural changes, aviation activity in 2030 would be nearly 20% higher.

Energy efficiency: average aircraft energy efficiency improvements were 1.5%/y between 2010 and 2019. Measures like operational airline management and fleet renewal could also contribute to reducing the final energy demand of aviation by up to 48% in 2050[2].

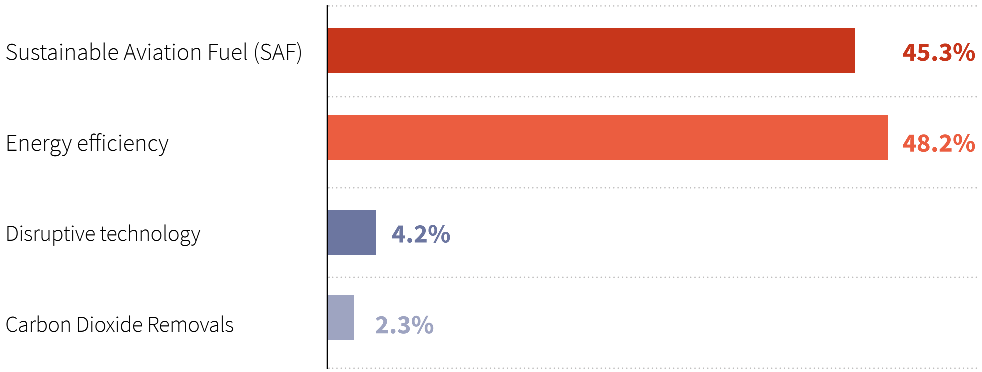
Low-carbon fuels: sustainable aviation fuels (SAF) are the only viable reduction lever for long-haul flights. However, most technologies are not mature yet and will not be available at a commercial scale before 2030. Multiple challenges remain such as the lack of bioresources and green H2 to scale up production, and competition among end users.

Still, ambitious regulations and investment, especially in Europe, support the development of these fuels.

Disruptive technology: due to their limited payload capacity in the short-term, hydrogen and battery-electric aircraft will only contribute to carbon emissions reductions for the short-haul segment.

AVIATION VALUE CHAIN[7]

CONTRIBUTION OF DECARBONISATION LEVERS TO ALIGN WITH A 1.5°C PATHWAY ACCORDING TO MPP PRU'S SCENARIO[2]



(1) IEA, Aviation report. (2) Mission Possible Partnership Prudent, Making Net Zero Aviation Possible. (3) CarbonBrief, Calculating the true climate impact of aviation emissions. (4) Ademe, Scénario de transition du secteur aérien, 2022 (5) IATA, Fly Net Zero. (6) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach. (7) Blunomy analysis.

2. ALIGNING AVIATION

As a founder and initial user of the Pegasus Guidelines, Societe Generale actively contributes to the design and implementation of robust methodologies to measure and monitor the alignment of its Aviation portfolio with a 1.5°C roadmap.

Scope

SECTOR BOUNDARY

The boundary relies on the Pegasus Guidelines definition which includes commercial aviation, inclusive of all passenger, belly freight and dedicated cargo traffic.

Clients owning or operating aircraft for commercial purposes are included.

EMISSIONS SCOPE

The indicator covers scope 1 and scope 3 category 3 emissions (i.e., well-to-wake emissions, or the "full lifecycle") for aircraft owners (inclusive of all emissions associated with the production, distribution and combustion of jet fuel). This approach allows for direct life-cycle accounting for SAF and is consistent with current Science Based Targets Initiative (SBTi) and NZBA guidance.
Airport building emissions, aircraft manufacturing emissions, and ground handling emissions are not included.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included.

Methodology

CALCULATION METHODOLOGY

Pegasus Guidelines: a portfolio level emissions intensity metric for commercial aviation in line with SBTi guidance. The emissions intensity is measured in grams of CO_2e emitted by each relevant group of aircraft normalized by a traffic metric in the form of revenue tonne kilometres (RTKs). Emissions intensities are adjusted for SAF purchases, then aggregated based on exposure to compute a portfolio level value.

SCENARIO

Mission Possible Partnership Prudent (MPP PRU) Scenario: a bottom-up 1.5°C aligned roadmap to reach net zero emissions by 2050. The Group selected this reference Scenario because the IEA NZE Scenario does not include disaggregated values for passenger and cargo operations and does not cover the same emission scope (tank-to-wake vs. well-to-wake in the MPP PRU Scenario)

METRICS

Emission intensity in grams of CO_2 equivalent per revenue tonne kilometers (gCO_2e/RTK). The incorporation of RTKs ensures all major payload types are encompassed, including emissions resulting from belly freight and dedicated cargo traffic.

KEY ASSUMPTIONS AND LIMITATIONS

Emission intensities data are provided, for the worldwide aircraft fleet, by third-party, independent external sources, certified under RMI Pegasus Guidelines. The 2030 target is in line with MPP PRU 1.5°C trajectory, based on constant portfolio composition between passenger and cargo aircraft (those categories having different emission intensities profiles).

(1) *1.5°C Scenario based on Mission Possible Partnership Prudent trajectory ("MPP PRU") adjusted with SG's current portfolio composition.*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

CO_2 emissions from buildings operations reached an all-time high of around 10 $GtCO_2$ in 2021. Aligning with the 1.5°C Scenario requires deep systemic changes including stronger energy efficiency policies and building codes as well as a scale up of investment in the sector.

Sector overview

The building sector was responsible for ~37% of CO_2 emissions and 34% of energy demand globally in 2021.

Global floor area in the building sector is expected to increase by 55% between 2022 and 2050 according to IEA's NZE Scenario. 80% of floor area development will take place in emerging economies.[1]

The building sector is currently "not on-track" with the NZE Scenario, according to the IEA, as building operational emissions reached an all-time high in 2021, 5% above the 2020 levels and 2% above the 2019 pre-pandemic levels.

In order to be aligned with the NZE Scenario, emissions must fall by 9% per year on average until 2030, more than halving by the end of the decade.

Global annual investment levels needed to reach the 2030 NZE Scenario will require a cumulated investment in energy efficiency of at least USD 3.8 trillion between 2023 to 2030.

Regulatory landscape

Energy efficiency and clean buildings policies continue to expand globally, but will have to go further to achieve compliance with the IEA NZE Scenario.

The IEA states that *"stronger policy support such as minimum performance standards and building energy codes will be required to put the buildings sector on track with the Net Zero Emissions by 2050 Scenario".*

In the EU in particular, the Renovation Wave[2] strategy was published in 2020 as part of the European Green Deal. It contains regulatory, financing and enabling measures to double the annual energy renovation rate of buildings by 2030 and to foster deep renovation.

This includes the revision of the Energy Performance of Buildings Directive (EPBD) which was formally adopted by the Parliament on the 12th of March 2024. Under the EPBD, Member States are mandated to define energy performance standards and a long-term renovation strategy to support the renovation of residential and non-residential buildings in their country. The EPBD also calls for the gradual introduction of minimum energy performance standards to trigger the renovation of the worst performing buildings.[3]

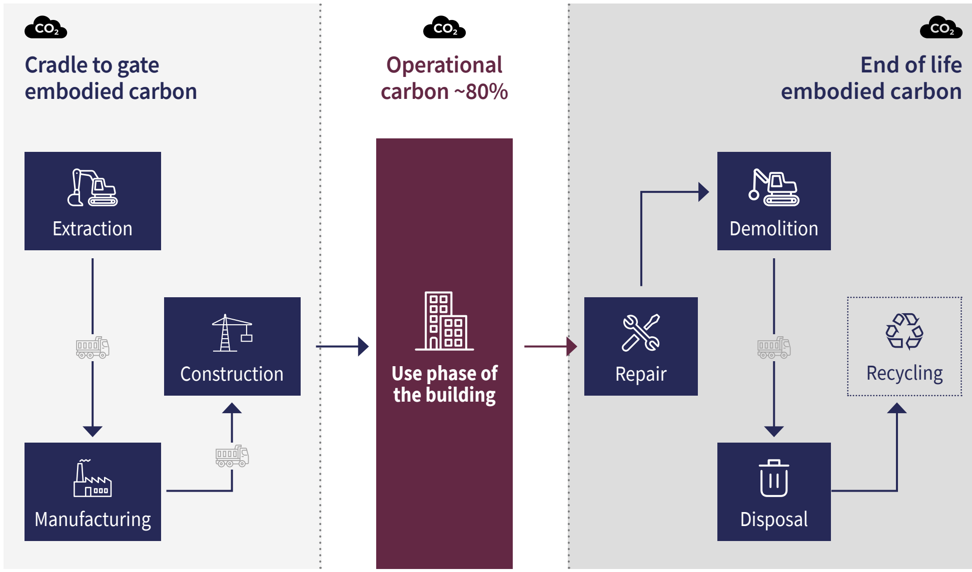
While the EU is at the forefront in terms of ESG regulation, in the US, cities and states are also active. In Asia, we observe national strategies rather than a coordinated regional strategy. Australia is currently working on a local taxonomy.

Emission sources

Around 80% of the building sector's emissions are operational emissions from energy consumption for space heating, water heating, cooking, cooling, and electric appliances. The remaining are embodied emissions which include upstream emissions linked to building materials and construction.

In the commercial real estate sector, the emission intensity and breakdown is highly dependent on the type of commercial activities undertaken (office, retail, etc.).

BUILDINGS' LIFE CYCLE EMISSIONS[4]



(1) IEA, Buildings. (2) European Commission, Renovation Wave. (3) European Commission, EPBD. (4) Copyright 2021, Carbon Leadership Forum.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

This decade is crucial for implementing the measures required to achieve the NZE Scenario. Energy efficiency and the phasing out of fossil fuels will be key decarbonisation drivers.

Decarbonisation levers(1)(2)(3)(4)

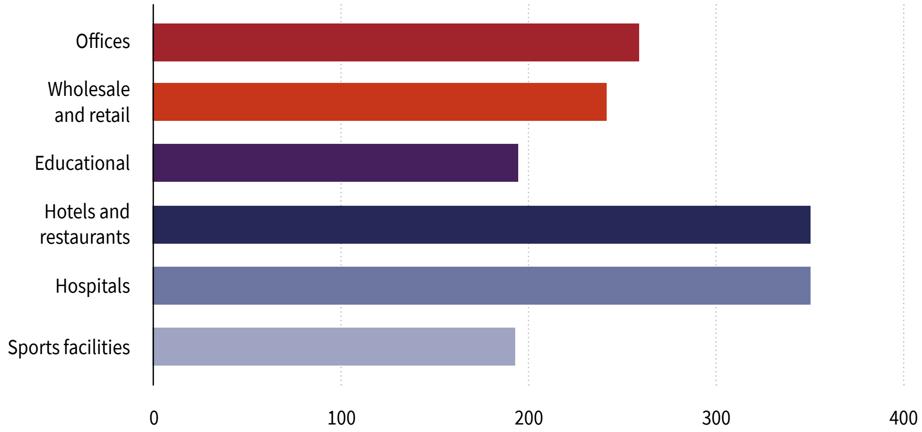
Four main challenges lie ahead for decarbonising the commercial real estate sector:

- **Massive deployment of best-in-class building management practices.** Building management practices and technologies such as building automation and smart energy management systems can lead to up to 35% energy savings at a very competitive cost;
- **Increasing the pace of the energy renovation of the existing building stock.** Since today's buildings will represent around 80% of the total building stock in 2050, ramping up the renovation rate will be essential for reaching net zero by 2050;
- **Scaling-up deep renovation.** The IEA estimates that retrofitting 20% of the existing building stock to a zero-carbon-ready level by 2030 through deep renovation will be necessary to reach the NZE Scenario. This means achieving an annual deep renovation rate of 2.5% from now until 2030 and beyond. Currently, the annual renovation rate is 1%, most of which are shallow renovations;
- **Ensuring new buildings are as energy efficient as possible.** New buildings will be operating over the next decades and will not likely undergo significant renovations before 2050. Therefore, they will need to already be aligned with net-zero scenario requirements at construction. Minimum performance standards and building energy codes therefore need to be implemented and strengthened across countries.

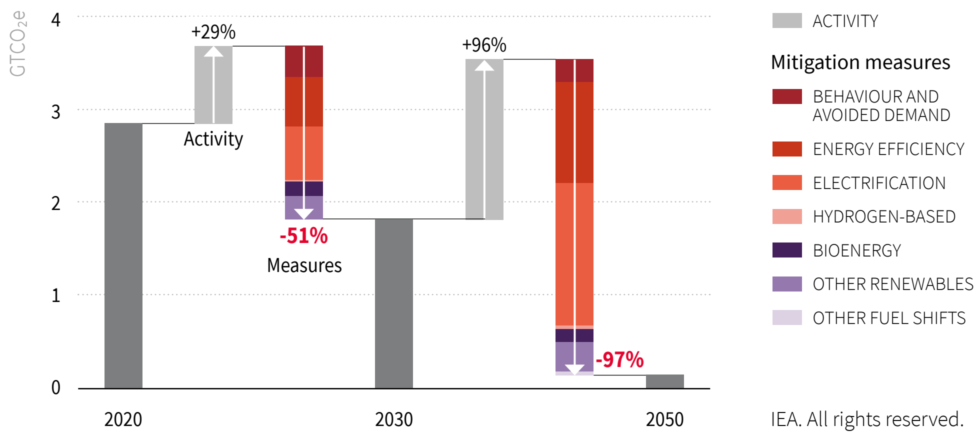
Two main levers are identified in the NZE Scenario to reduce the building sector's operational emissions:

- **Energy efficiency** which includes behavioural changes, improved building insulation, energy-efficient appliances and material-efficient building design, in addition to digitalisation and efficient energy management;
- **Fuel switch** which includes electrification (e.g. through heat pumps) and the switch to renewable sources. In the NZE Scenario, fossil fuels reach 2% of final energy consumption in 2050 while the electricity consumption's share increases from 33% in 2020 to 66%.

ENERGY INTENSITY OF COMMERCIAL BUILDINGS BY BUILDING TYPE(5) (KWH/M²/Y)



DIRECT CO_2 EMISSIONS REDUCTIONS BY MITIGATION MEASURE IN BUILDINGS IN THE IEA NZE SCENARIO(1)



(1) IEA, Net Zero by 2050. (2) IEA, Buildings. (3) WBCSD, Net-Zero Buildings.
(4) IEA, Net Zero Roadmap: A global Pathway to Keep the 1.5°C Goal in Reach.
(5) UNEP, Global status report for building and construction, 2022.

2. ALIGNING COMMERCIAL REAL ESTATE

Societe Generale has set an intensity target for the commercial real estate sector covering building operational emissions and aligned with the CRREM Scenario.

Scope

SECTOR BOUNDARY

Societe Generale's commercial real estate activities encompass many types of financing, asset classes, geographies and clients. However, the initial portfolio alignment scope is limited to the financing of real estate for professional investors as identified by the Q4 2022 ACPR Survey of Real Estate Professionals.

Buildings where the building owner/investor leases, uses, or operates the property to conduct income generating activities are included in the boundary. This includes offices, warehouses, industrial buildings, hotels, retail, healthcare, student accommodations as well as residential multifamily properties.

EMISSIONS SCOPE

The scope is limited to the operational phase of the building i.e. scope 1 emissions (e.g., use of natural gas or heating oil for heating purposes) and indirect scope 2 emissions (linked to electricity usage or district heating). Emissions are based on a whole building approach i.e. including tenants' consumption. Embodied emissions released during the lifecycle of building materials (including extraction, manufacturing, transport, construction, and disposal) are excluded due to limited data availability.

FINANCING ACTIVITIES

All loan-related products are included.

General purpose and dedicated loans are included. Market products, in particular CMBS, are excluded.

Methodology

CALCULATION METHODOLOGY

Portfolio weight approach:

$$\textit{Portfolio Emission Intensity} = \frac{\sum_n \textit{Emission Intensity}_n \times \textit{Financing}_n}{\sum_n \textit{Financing}_n}$$

Where n stands for credit loan whether secured or unsecured

SCENARIO

CRREM v2.02

The Carbon Risk Real Estate Monitor's Second Version provides scenarios by geography and asset type. The Group selected this reference scenario because the IEA NZE Scenario does not provide country or asset type specific pathways. However, the CRREM is consistent with the IEA NZE Scenario.

METRICS

Emission intensity metric: $kgCO_2e/m^2/an$

$$\frac{\textit{Scope 1 \& Scope 2 emissions } (kgCO_2e)}{\textit{Surface area } (m^2)}$$

KEY ASSUMPTIONS AND LIMITATIONS

Currently, there is limited data available on the actual energy and emissions performance of clients and assets in Societe Generale's portfolio. Energy Performance Certificates are currently being collected; however, in the meantime, and in the absence of a mature data provider for this sector, proxies from CRREM were used to estimate Societe Generale's baseline. The proxies are based on country and asset type distribution.

(1) *2022 baseline was estimated based on proxies applied to Societe Generale portfolio distribution by country and asset type.* **(2)** *2030 target is reliant on portfolio mix and shall be adapted accordingly with the corresponding CRREM targets in case of a change of mix. Based on the current portfolio mix (asset type and country), it translates into a target of 18 $kgCO_2$ e/m^2. Our ability to reach the target by 2030 will be highly dependent on new rules and incentives from policy makers, as well as more homogenized energy efficiency standards.*

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Operational emissions in the building sector accounted for **26% of global emissions in 2022** according to the IEA. The Net Zero Scenario considers that the building sector floor area will increase by around 20% from 2021 to 2030. More than 80% of floor area development will take place in emerging and developing economies.

Sector overview

The sector is not on track with the IEA NZE Scenario and the gap between the actual climate performance of the sector and the decarbonisation pathway is widening (from 6.6 points in 2019 to 9.0 points in 2021).

In the NZE pathway, the residential building sector does not fully reach Zero-emissions by 2050. Residual emissions may remain and will be balanced by carbon sinks and other offsetting measures.

The key 2030 milestones are:

- To decrease by 25% the energy consumption in buildings compared with 2021, and by 40% the use of fossil fuel;
- To have all new buildings and 20% of the existing building stock zero-carbon-ready.

Regulatory landscape

To boost the energy performance of buildings, the EU has established a legislative framework that includes the **Energy Performance of Buildings Directive** and the **Energy Efficiency Directive**, both revised in 2023. The directives promote policies that will help:

- Achieve a highly energy efficient and decarbonised building stock by 2050;
- Create a stable environment for investment decisions;
- Enable consumers and businesses to make more informed choices to save energy and money.

In France, many incentives and regulations have also been adopted such as:

- The RE2020 regulation imposing strict environmental limits for the performance of new buildings;
- Incentives (tax credit, interest-free loans, subsidies) for homeowners undertaking energy-efficient renovations;
- The ban on buy-to-let properties with a low energy efficiency.

Emission sources

Around 80% of the building sector's emissions are operational emissions coming from the building use phase. These emissions are split between direct emissions (scope 1, from on-site fossil fuel combustion) and indirect emissions (scope 2, purchased energy), accounting respectively for about 30% and 70% of total operational emissions.

Remaining emissions are embodied emissions (scope 3) which refer to emissions generated to produce, maintain and dispose of a building. These emissions are currently estimated at an average share of 20-25% of a building's life cycle emissions but can represent up to 50% for high efficiency buildings.

Decarbonisation levers

Two main levers are identified in the NZE Scenario to reduce the building sector's operational emissions:

- **Energy efficiency** which includes behavioural changes, improved building insulation, energy-efficient appliances and material-efficient building design, in addition to digitalisation and efficient energy management;
- **Fuel switch** which includes electrification (e.g. through heat pumps) and the switch to renewable sources. To get on track with the NZE Scenario, the global heat pump stock would need to cover at least 20% of global heating needs vs. 10% in 2022.

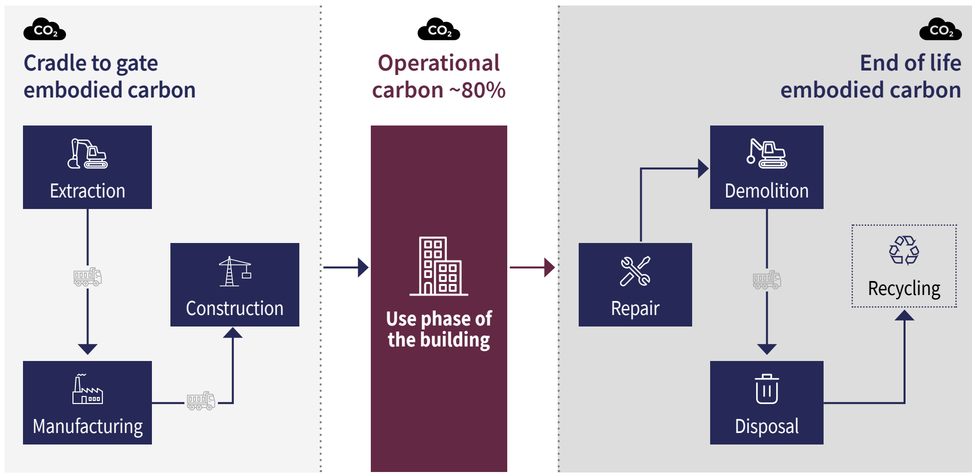
Other levers include:

- The development of **onsite renewables-based energy system** (solar water heaters, photovoltaic panels…);
- **Bio design and cooling consumptions of dwellings** via the installation of large bay windows to the south and construction of roof overhangs.

The decarbonisation of the real estate sector faces strong challenges, among which:

- the **financial resource capacity** of residential owners and the existence of split incentives between owners and tenants;
- the **poor quality of** access, consistency, and robustness of **data** on energy performance and carbon intensity of buildings;
- the potential **limited capacity in the construction industry** to face a major wave of buildings retrofit.

BUILDINGS' LIFE CYCLE EMISSIONS ***(Blunomy Analysis)***



2. ALIGNING RESIDENTIAL REAL ESTATE

While displaying its baseline for Residential Real Estate, Societe Generale has not yet set a public target for 2030 due to data availability and high dependency on public policies. Besides, setting exclusion criteria for residential owners could dramatically impact financial inclusion of millions of households. Nevertheless, Societe Generale is strongly committed to contributing to the decarbonisation of the sector by monitoring the carbon intensity of its portfolio, developing innovative financing solutions and promoting energy renovation.

Scope

SECTOR BOUNDARY

The baseline calculation covers:

- **Building types:** Single family and multi-family buildings;
- **Financial scope:** Housing Loans;
- **Geographical scope:** France (excluding the Private banking division due to data availability).

EMISSIONS SCOPE

The indicator covers scope 1 and 2 emissions of buildings. These emissions are generated during the operational phase of the building, e.g., use of fuels for heating purposes, electricity, or district heating.
The metric excludes embodied emissions associated with materials and construction processes due to limited data availability.

FINANCING ACTIVITIES

Perimeter of activity is linked to “Pillar 3: template 2: Banking book – Climate change transition risk”: loan collateralized by immovable residential property or guaranteed by Credit Logement.

Methodology

CALCULATION METHODOLOGY

Portfolio weight approach:

$$\textit{Portfolio Emission Intensity} = \frac{\sum_n \textit{Emission Intensity}_n \times \textit{Financing}_n}{\sum_n \textit{Financing}_n}$$

*Where **n** stands for credit loan wheter secured or unsecured*

METRICS

Emission intensity metric: $kgCO_2e/m^2/an$

$$\frac{\textit{Scope 1 \& Scope 2 emissions } (kgCO_2e)}{\textit{Surface area } (m^2)}$$

KEY ASSUMPTIONS AND LIMITATIONS

Energy Performance Certificates (EPC) are currently being collected for housing loans in Societe Generale portfolio. For this initial exercise, the baseline was calculated by matching the addresses of Societe Generale housing loans with the French national Energy Performance Certificate database. About 56% of total in-scope exposure were matched with the database; the rest was estimated based on proxies. As such, the accuracy of the baseline is, at this stage, limited. The baseline will be restated, if necessary, in the future once more accurate data is available.
The calculation does not take into account the surface area of the assets. Methodological evolutions are currently being considered.

1. SECTOR DYNAMICS

DECARBONISATION LEVERS (see page 6)

Population growth puts food security at risk, and climate change poses new challenges for the agricultural sector. Accounting for 22%[1] of global GHG emissions in 2020 according to the FAO[2], the sector is expected to find decarbonisation pathways to create a sustainable food future and preserve nature capital.

Sector overview

The world's population is set to increase over the course of the 21st century, reaching over 9 billion by 2050[3]. To meet food demand, livestock production is expected to increase by 35% between 2020 and 2050, and the area harvested for crop production by 10% between 2020 and 2050. With 27% of global jobs relying on agriculture, designing a sustainable model is critical to ensuring a fair transition[4].

Emission sources

In 2020, global agriculture and related land use emissions accounted for 10.4 $GtCO_2e$, i.e. 22% of global GHG emissions including land use change and forestry[5]. Most of the sector's emissions (2/3rd) occur upstream and are commonly referred to as "FLAG" (Forestry, Land and Agriculture) emissions. Those emissions come from three main sources:

- **Livestock** (40% of FLAG emissions), mostly linked to meat (67%) and dairy (30%) production;
- **Deforestation and land conversion** (39% of FLAG emissions), caused by specific commodities (incl. cattle, palm oil and soy) in particular geographies (incl. South America, Indonesia, Malaysia, Western Africa);
- **Farming practices** (21% of FLAG emissions).

According to the World Resources Institute, global emissions linked to agriculture could reach 15 $GtCO_2e$ in 2050, increasing by 43% compared to 2020[6].

Beyond carbon emissions, agriculture has various impacts on biodiversity, soil & water pollution and water availability. At the same time, our food system is totally based on these natural elements that climate change is jeopardising. Continuing to produce high-quality nutrients within the planetary boundaries will be the sector's main challenge in the coming decades[7][8].

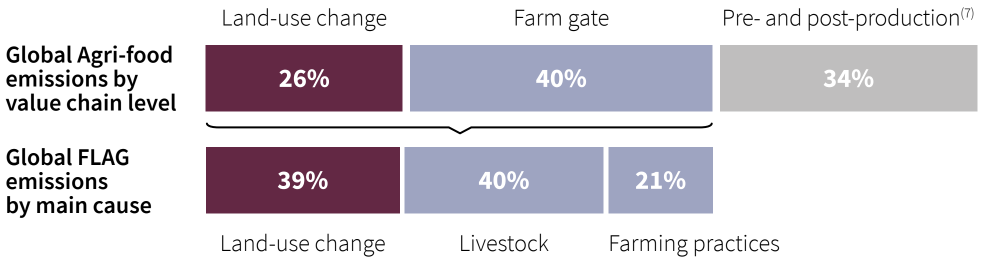
Decarbonisation levers[5]

The agriculture sector is made of multiple sub-sectors, each with its own specificities, geographical issues and mitigation levers. The SBTi FLAG pathway categorizes mitigation levers into seven priority areas:

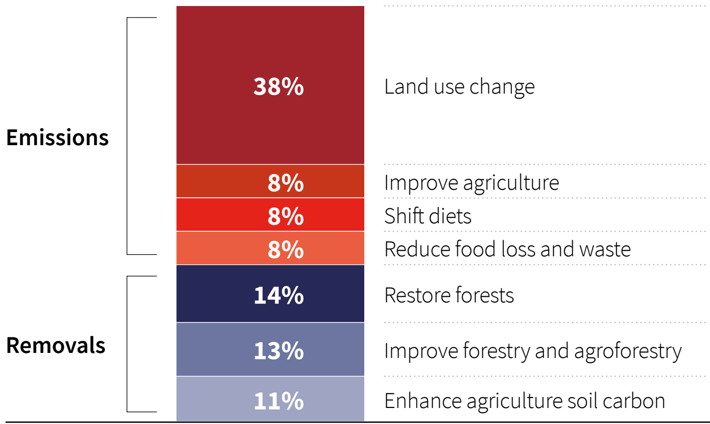
- Reduce land-use change;
- Improve agriculture;
- Shift diets;
- Reduce food loss and waste;
- Restore forests;
- Improve sustainable forest management (SFM) and agroforestry;
- Enhance agriculture soil carbon.

These categories represent a viable mitigation target (sum of emission reductions and removals) for the land sector of approximately 12 $GtCO_2e$/yr in 2050. For livestock, specifically (dairy and meat production), mitigation measures include:

1. **Reducing methane emissions from enteric fermentation and improving productivity** (improving feed and nutrition, animal healthcare, animal genetic resources and breeding…).
2. **Restoring the quality of pastures and increasing soil carbon**, by improving grazing mobility and pasture species, and by growing trees on pastureland (silvopastoralism).
3. **Leveraging circular economy and bioenergy** (recycling organic waste into feed ration or bioenergy, using manure to replace chemical fertilizers…).
4. **Managing on-farm energy use and sourcing renewable energy** (e.g., solar photovoltaic).
5. **Diversifying to alternative proteins** (e.g., plant-based dairy products or meat).



LAND-BASED MITIGATION OPPORTUNITIES (12 $GTCO_2E$/YR IN 2050)[5]



Adapted from Roe et al., 2019.

(1) *This figure encompasses the emissions from within the farm gate and from associated land use and land change activities.* (2) FAOSTAT Emission Database. (3) United Nations, World Population Prospects, 2022. (4) World Bank Data. (5) Forest, Land and Agriculture (FLAG) Science-based target-setting guidance. (6) World Resources Institute, Creating a sustainable food future, 2019. (7) IPCC, Climate Change and Land, 2020. (8) FAO, Challenges and opportunities for agrifood systems, 2022.

2. ALIGNING AGRICULTURE

Because of the sector's fragmentation, the lack of robust granular data and mature methodologies for the banking sector, Societe Generale decided to strengthen its action on the sector without setting a public emissions-based target at this stage.

Societe Generale's portfolio

To address the sector's alignment, Societe Generale started by analyzing its portfolio and by identifying key value chain segments and commodities.

Two main components of Societe Generale portfolio stand out for the agri-food sector in the short term:

- **Livestock:** the dairy commodity appears as the most material commodity in Societe Generale's portfolio;
- **Deforestation and land-conversion:** Societe Generale works with clients exposed to commodities linked to deforestation and land-conversion (incl. soy, beef, palm oil, coffee, cocoa, rubber, timber).

Barriers to aligning agriculture

Societe Generale has not set a public emissions-based target for this sector to date. This is due to several factors:

- **Companies in the agri-food sector are diversified** (around various commodities) and generally manufacture or sell a multitude of products;
- **Each commodity has its own challenges,** levers and the relevant strategies are very local-specific;
- **Methodologies and scenarios are still nascent.** Agriculture is not covered by the IEA NZE Scenario. SBTi published its FLAG guidance introducing a common framework and 1.5°C emission reduction pathways.

However, this methodology is designed for the industry and is not easily applicable for financial institutions. Also, scenarios do not allow yet to take into account important decarbonisation levers such as the diversification of players towards plant-based alternatives for dairy and meat activities;

- **Data availability is still limited** (there is no external data provider and few clients disclose emissions and activity data, let alone by commodity).

Societe Generale's action

Despite these challenges outside of the bank's control, the Group decided to strengthen its action where its portfolio's impact is most material and to support the transition of the sector around the following main pillars:

- **Monitor client progress** and **carry out client engagement initiatives**;
- **Monitor the reduction of the carbon intensity of the dairy value chain** with regular reporting of progress to the management;
- **Strengthen the Group's agriculture policy on deforestation and conversion**, which will be updated in 2024 (see box below);
- **Keep on monitoring data availability and industry best practices** regarding the setting of emission-based targets.

Industrial agriculture and forestry sector policy

The Group is willing to remain a value-adding partner to its clients operating in these sectors, while ensuring that such support is provided in a responsible and considered manner.

Curbing deforestation and land conversion associated to soft commodities is one of the key objectives of the policy:

- Corporate clients active in **palm oil and South American soy and cattle sectors** - as producers, traders or first transformers – are required to be i) committed to deforestation- and conversion-free activities, ii) committed to establish and systematize traceability throughout their supply chain and iii) able to report progress annually on traceability.

In a continuous improvement process, the policy has been updated by the end of 2024, with the aim to:

- **Set more stringent criteria on clients active on the above-mentioned commodities;**
- **Extend the scope of commodities requiring attention as regards deforestation with new evaluation criteria on clients active in cocoa, coffee, rubber and timber.**

DISCLAIMER

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Existing calculation methodology presents significant challenges in terms of consistency, adoptability by industry players, and replicability across sectors. In an effort to tend towards a more market-accepted and consistent way of measuring and reporting emissions, regulatory guidance and requirements have evolved in recent years.

These document is still under development and is expected to stabilise over time.
As methodologies evolve and data improve, the Group will continue to review the impact on reported baseline which may lead to refining of calculations over time.

The definitions and technical terms used and not defined herein have the meanings assigned to them in the universal registration document of Societe Generale.

SOCIETE GENERALE

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