



WHITE PAPER

Harmonizing Infrastructural Progress with Nature

A Strategic Overview

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Preface

In a rapidly evolving global landscape, the integration of environmental and nature topics within core business practices has become imperative. As we witness significant shifts in societal perspectives, including the adoption of the Kunming-Montreal Global Biodiversity Framework (GBF), there is an undeniable urgency to incorporate biodiversity considerations into both global policies and corporate strategies.

The pursuit of net-zero emissions, while necessary, presents multifaceted challenges, especially when we focus predominantly on decarbonization. Such a narrow approach can inadvertently sideline biodiversity, a key component that holds both environmental and economic implications and becomes mandatory when planning for long-term business resilience. The value of understanding and preserving biodiversity becomes even more pronounced in the context of infrastructure development, a sector that is responsible for 25% of the pressure on biodiversity, causing significant harm to the planet through habitat fragmentation, biodiversity loss, and increased pollution.

In this white paper, we make the case of how nature and infrastructural development can coincide, digging into a case study that exemplifies a forward-thinking approach in the energy sector.

Snam, an Italian energy infrastructure company, emerges as a leading example, showcasing how companies can embed biodiversity at the heart of their strategic vision. By adopting a rigorous scientific approach, such as the Science Based Targets Network (SBTN), and setting ambitious environmental targets, Snam underscores the possibility of harmonious coexistence between energy infrastructure and nature.

I. The Paradigm Shift in Business and Nature

Abstract

In the wake of the Kunming-Montreal GBF, adopted at COP 15 and reaffirmed in COP 28, a significant transformation unfolded in how society interacts with nature. This framework marked a turning point, integrating biodiversity and ecosystem preservation into global policies and business strategies.

As environmental consciousness is growing, regulators and standard setters worldwide have begun to treat biodiversity challenges with the same urgency as climate change. This shift is leading to mandatory regulations in several countries, compelling businesses to incorporate sustainability into their operations.

Progressively, companies are taking the lead, making bold commitments to nature conservation. While implementation poses challenges, these efforts showcase the potential for harmonious coexistence between business success and environmental responsibility.

However, the transition requires a fundamental change in perspective: businesses must move beyond focusing solely on carbon emissions and adopt a holistic approach that considers all aspects of environmental impact.

This broader view of sustainability is crucial for long-term business resilience and success.

1. Kunming-Montreal GBF marked an important turning point for our society's relationship with nature.

The Kunming-Montreal GBF agreement, with the participation of 196 governments, outlined the variety and magnitude of measures required globally to stop and reverse the loss of nature by 2030, an objective often known as achieving a “nature positive” outcome. Nature was also at the heart of the latest [COP28 agenda](#), resulting in several joint statements on climate, nature, and people.

We affirm that there is no path to fully achieve the near- and long-term goals of the Paris Agreement or the 2030 goals and targets of the Kunming-Montreal Global Biodiversity Framework without urgently addressing climate change, biodiversity loss and land degradation together in a coherent, synergetic and holistic manner, in accordance with the best available science.

—UNFCCC COP28 Presidency, CBD COP15 Presidency, chairs of the undersigned partnerships, initiatives and coalitions, and endorsing member countries

The GBF established 23 targets, the most known being the “30x30” target, with the aim to effectively and equitably conserve at least 30% of the Earth by 2030 and calls out the role of businesses in contributing toward a nature-positive world in its requirements.

At COP 28, two main joint statements focusing on nature were acknowledged:

- The increasing and predicted effects of climate change pose a serious threat to biodiversity and the billions of livelihoods reliant on robust ecosystems.
- Ongoing loss and deterioration of natural environments heighten vulnerability to climate change, lead to substantial greenhouse gas emissions, and impede sustainable development.

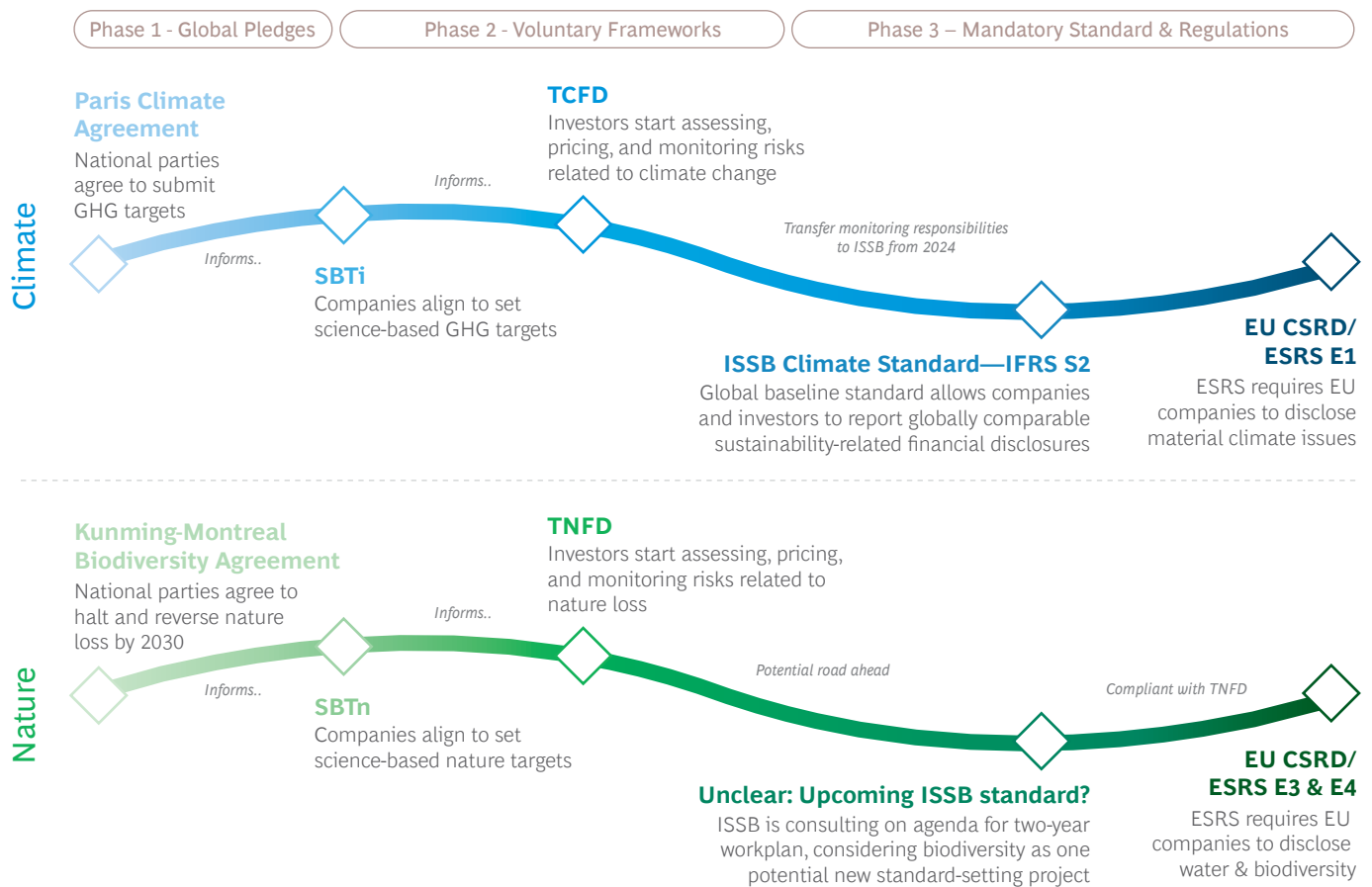
2. Standard setters and regulators are acknowledging nature challenge with a journey similar to climate, making it mandatory for some countries.

International standard setters and regulations have evolved quickly, integrating more and more nature into their disclosure requirements, as it happened with climate; that's the case with the upcoming European Sustainability Reporting Standards, which will require companies operating in the EU to mandatory disclose the sustainability of their value chains, starting in the 2024 fiscal year.

The EU Corporate Sustainability Reporting Directive (CSRD) will require companies to disclose 100+ qualitative and quantitative key performance indicators (KPIs) across multiple ESG (environmental, social, and governance) topics, including climate and biodiversity.

KPI types will include process description, policies, targets, action and transition plans, and potential financial effects.

Exhibit 1 - Climate and Nature standards and frameworks evolution



Source: BCG analysis.

Note: No linear order/development.

3. Leading companies are already making bold commitments regarding nature, though implementation is still challenging.

Companies around the world are already taking commitments on nature, especially regarding deforestation-free supply chains, water use reduction, and agriculture matters—though delivering is still challenging and companies are facing struggles.

Exhibit 2 - Nature initiatives implementation principles



...select impactful initiatives at landscape level, especially for downstream players with limited commodity trading volumes



...engage different actors along the value chain, including farmers, traders, and end customers



...scale pilots and monitor their impact against science-based targets with limited capabilities on the ground



...control costs and find sustainable business models that are not overly dependent on premiums or subsidies

4. Nature can be a source of competitive advantage and key to generating returns and reducing risks.

The private sector will play a critical role in reversing the global decline in biodiversity, —but also primarily because nature supplies us with the fundamental necessities for our survival, namely water, food, and air.

Regardless of positioning, moving quickly to gain value from sustainability is key to generating returns and reducing risks.

First, it lowers the risk of being unable to obtain the natural resources or assets on which a company depends. Second, it lowers the risk of misalignments between companies and their stakeholders, especially when it comes to regulatory requirements.

Exhibit 3 - How to make nature a source of competitive advantage

①

...core to your climate strategy

- Nature overlaps with Climate (e.g., use of nature-based solutions)
- Articulating nature with climate strategy de-risks net-zero pathways

②

...vital for your business resilience

- Significant dependencies on nature across supply chains (e.g., resources, water, genetic resources from biodiversity)
- Increasing risks from nature-based legislation, fines, and taxes

③

...a new source of competitive advantage

- First-mover advantage on ESG (access to capital and talents, better brand image)
- Growing market for sustainable products, new business models unlock value and reduce costs in nature-based value chains

5. Businesses are required to shift away from a narrow carbon tunnel vision and embrace a more holistic approach for business resilience.

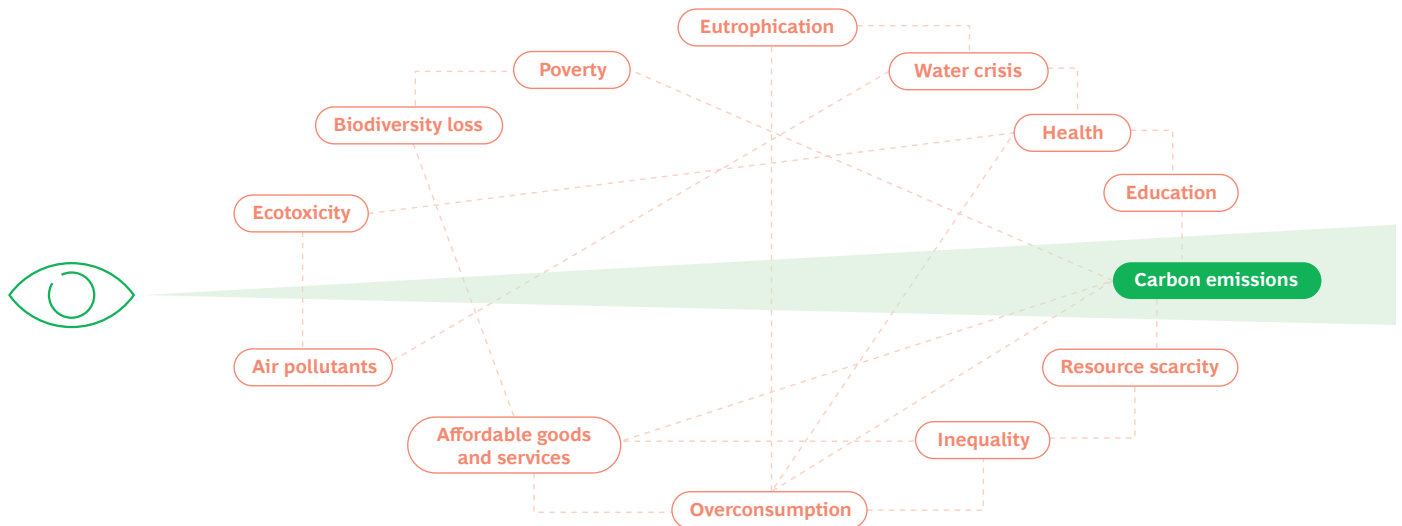
Over the last 10 years, the world has been focusing on the goal of decarbonization, creating a unified language for leaders to address climate change through widely recognized and somewhat consistent targets for reducing emissions. These initiatives have made progress in reducing carbon on a global scale, albeit not as smoothly as desired. However, this intense emphasis on emissions alone has resulted in a phenomenon known as “carbon tunnel vision.”

The carbon tunnel vision approach has led companies to focus their efforts on how to handle the emissions reduction issue, somehow overlooking the role natural resources—strictly intertwined with climate—play in this context.

Companies will need a unified approach that aims at a nature positive strategy and includes not only climate but also all the planetary boundaries that must be addressed in order to ensure a safe, just, and sustainable planet on which no one is left behind.

Exhibit 4 - The Problem with "Carbon Tunnel Vision"

When companies focus exclusively on carbon emissions, they may overlook other pressing environmental concerns.



Source: Adapted from a graphic by Jan Konietzko at the Maastricht Sustainability Institute.

II. Balancing Infrastructure Development with Biodiversity Preservation

Abstract

The ambitious goal of reaching net zero is being conducted during an era when significant infrastructure investments are imperative. And the path to this goal is complex and fraught with challenges.

To date, investment efforts have predominantly focused on decarbonization infrastructure and technologies. While essential in combating climate change, this approach could inadvertently pose high risks to biodiversity, often overlooked in the pursuit of carbon neutrality.

The repercussions of neglecting biodiversity are already evident. The decline in ecosystem functionality is not just an environmental concern but also a substantial economic one, driven by five major factors, or pressures, each contributing to the degradation of the planet's ecosystems, to which infrastructure and energy sectors account for a high share of responsibility.

While infrastructure investments remain critical to societal growth, they will need to integrate biodiversity as a key element of their design strategies.

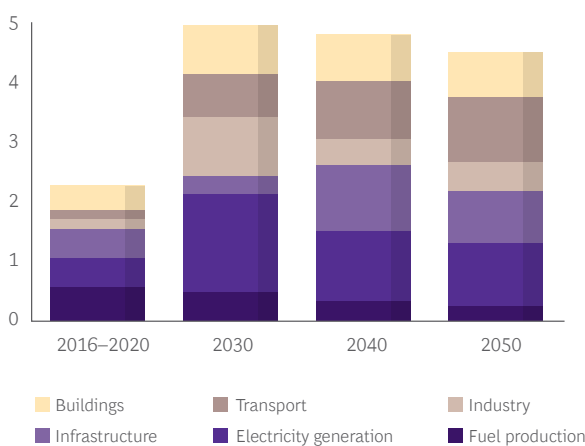
1. Reaching the net-zero ambition will require almost \$5 trillion in investments by 2030, driven mainly by electricity generation and infrastructure development.

The IEA Net Zero Emissions (NZE) scenario showcases how the total annual capital investment in energy will need to rise from around 2.5% of global GDP in recent years to about 4.5% in 2030, with electricity generation raising from \$500 billion to \$160 trillion, followed by an almost doubling of infrastructure investment, driven by electricity grid investments (from \$320 billion today up to \$740 billion by 2030).

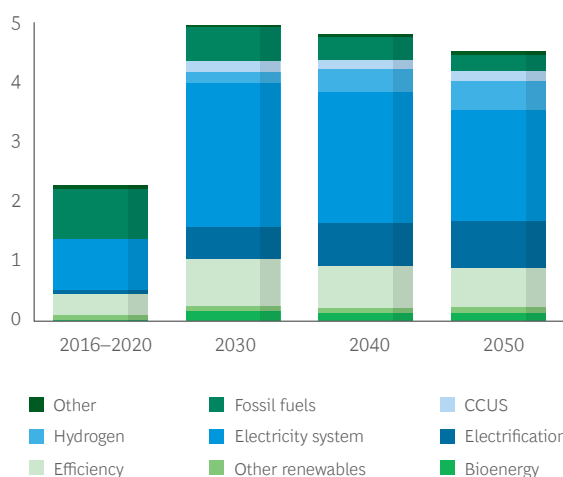
To date, and as per the future outlook, investment efforts have been predominantly focused on decarbonization technologies, posing several risk to biodiversity and unmanaged environmental degradation.

Exhibit 5 - Annual average annual capital investment in the NZE, IEA

By sector



By technology area



Source: Net Zero by 2050, a roadmap for the global energy sector, IEA.

Note: Infrastructure includes electricity networks, public EV charging, CO₂ pipelines and storage facilities, direct air capture and storage facilities, hydrogen refueling stations, and import and export terminals for hydrogen, fossil fuels pipelines, and terminals. End-use efficiency investments are the incremental cost of improving the energy performance of equipment relative to a conventional design. Electricity systems include electricity generation, storage and distribution, and public EV charging. Electrification investments include spending in batteries for vehicles, heat pumps and industrial equipment for electricity-based material production routes.



Because nature is often invisible in the economic choices we make, we have steadily been drawing down our natural capital—without understanding either what it really costs to replace services provided for free by nature or that man-made alternative solutions are sometimes far too expensive for these services to be replaced or substituted” —*The Economics of Ecosystems and Biodiversity, Challenges and responses*

2. The repercussions of neglecting biodiversity are already evident: the decline in ecosystem functionality costs the global economy more than \$5 trillion a year, driven by Five main pressures.

Estimates indicate that total annual ecosystem service value has declined by at least \$5 trillion per year since the late 1990s. That means each year, the world economy forfeits ecosystem services worth about 6% of global GDP, an amount roughly equivalent to the total market value of agriculture, forestry, and fishery output in 2019.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which represents the scientific basis for the nature standard development (such as SBTN), there are **five pressures** primarily responsible for driving biodiversity loss.

Exhibit 6 - Five major factors drive biodiversity loss



Land and sea-use change:

habitat conversion (e.g., deforestation), fragmentation, and degradation through over-intensive use of ecosystems



Direct over-exploitation:

over-exploitation of animals, plants, and ecosystems, e.g., from poaching, unsustainable logging, or overfishing



Climate change:

shifts in temperature, precipitation, and wind flows caused by increased levels of greenhouse gases in atmosphere



Pollution of soil, water and air:

release of harmful substances, e.g., through excessive chemical use, into ecosystems, light and noise pollution



Spread of invasive species¹:

plants, animals, or other non-native organisms entering or expanding into a given habitat

Sources: IPBES (2019); UNEP (2019); BCG analysis.

¹Non-native species propagating rapidly in a new habitat.

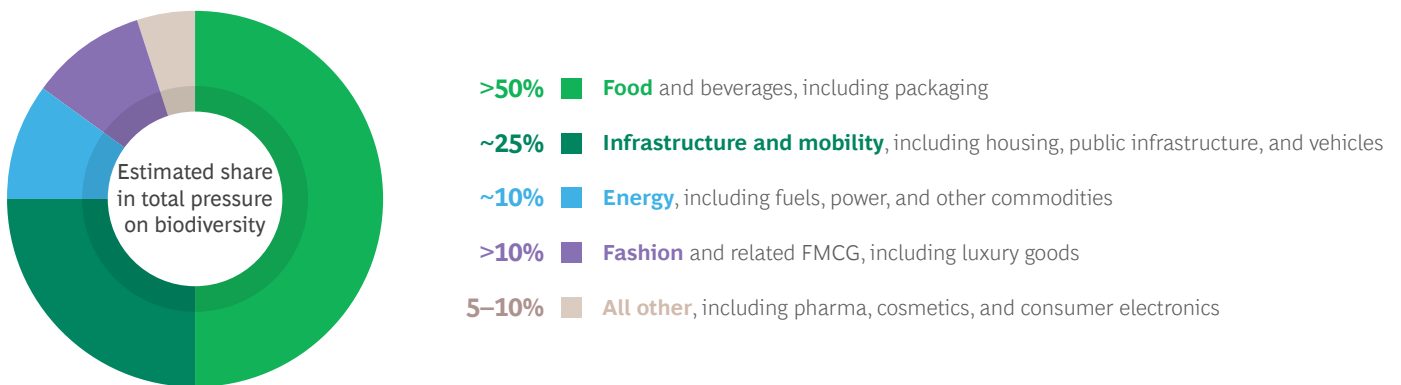
3. Today, the infrastructure sector and the energy sector account for ~35% of pressures in biodiversity.

The infrastructure and energy sectors account for ~35% of pressures in biodiversity, and their development comes with high environmental costs. Moreover, estimates suggest that global expansion of infrastructure and the built environment affects about 29%—or almost a third—of species on the International Union for Conservation of Nature’s (IUCN’s) list of threatened and near threatened species.

Infrastructure can cause significant harms to biodiversity, including the following:

- Destroying or increasing fragmentation of habitat
- Causing biodiversity loss
- Blocking critical wildlife corridors
- Depleting non-renewable resources
- Increasing pollution and direct and indirect greenhouse gas emissions

Exhibit 7 - While Climate lens puts focus on energy, after food, the broader nature lens puts the focus on infrastructure



Source: BCG analysis.

Note: Value chains defined by consumer end products.

4. Several pressures have been identified throughout all the value chain steps, with particular focus on land-use change when it comes to direct operations.

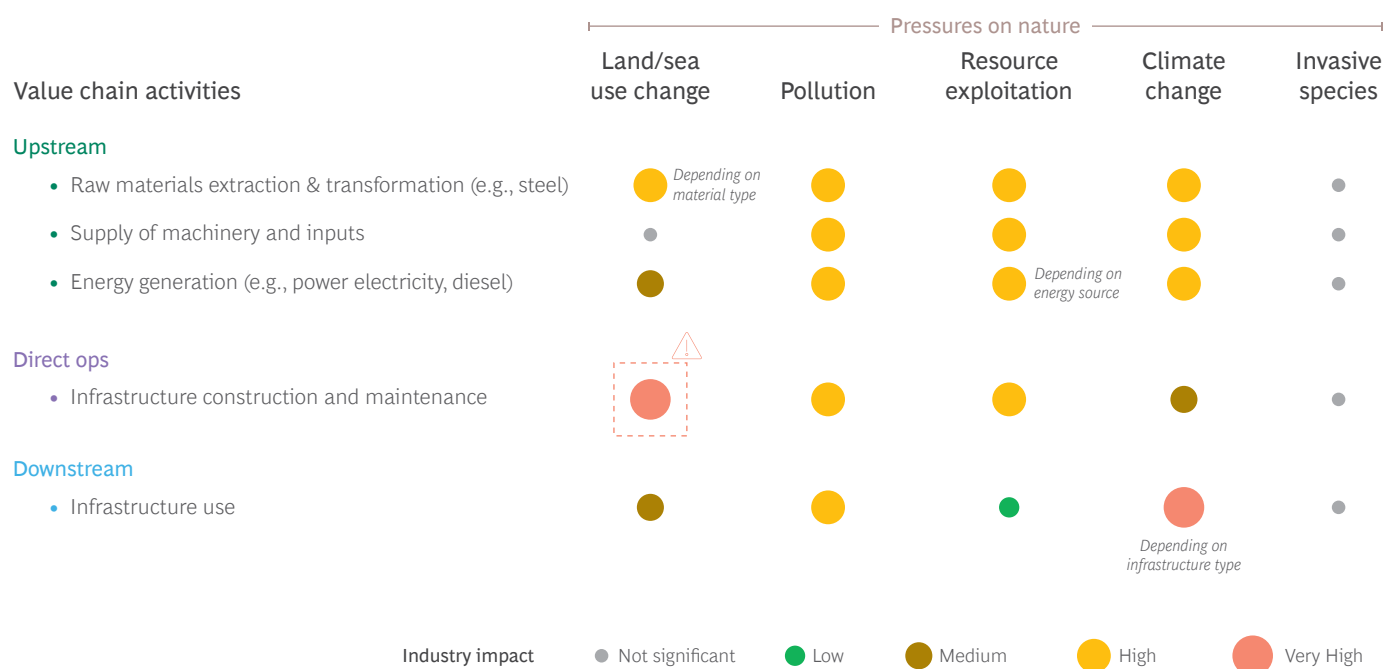
The infrastructure sectors create several pressures on biodiversity along its value chain activities, upstream, however landscape and habitat fragmentation and loss remain the highest impacts when it comes to new infrastructure development.

Indeed, as shown in Exhibit 8, the highest impact is generated on the following:

- Land and sea use change pressure for infrastructure construction and maintenance
- Climate change pressure (such as greenhouse gases) for infrastructure use

While climate change is being typically addressed by company decarbonization strategies, the other areas of material impacts such as land and sea use change represent the dimensions companies should deeply investigate by following a quantitative and science-based approach to identify the main areas of risk to be mitigated.

Exhibit 8 - Infrastructure industry shows very high pressure on land-use change and climate change



Sources: ENCORE, SBTN materiality tool, BCG analysis.

5. As society strides toward the net-zero ambition, it becomes increasingly critical to harmonize infrastructure development with biodiversity preservation.

The infrastructure industry remains a critical growth factor for society, with the United Nations stating that “investments in infrastructure are crucial to achieving sustainable development and empowering communities in many countries.” For it to be not only beneficial but also resilient, companies need to consider the long-term impacts, risks, and trade-offs of its development.

Exhibit 9 - Key strategic elements to be considered when balancing infrastructure development and nature:



Put nature and biodiversity at the heart of design and planning strategies



Leverage approaches beyond avoidance and mitigation of effects, aiming at nature regeneration



Engage with communities and local stakeholders and balance environmental with social needs

Source: BCG analysis.

III. Case study: Snam Pioneering Sustainable Energy Infrastructure and Biodiversity Conservation—Five Lessons Learned



Abstract

Snam's approach to integrating biodiversity into its core operations and strategies exemplifies a forward-thinking model in the energy sector. At the heart of Snam's strategic vision lies a profound dedication to biodiversity. This commitment is not merely a component of its sustainability agenda but also a fundamental aspect of its mission to develop the energy infrastructure of the future. Snam recognizes that its operations are intrinsically linked to the diverse ecosystems and territories it inhabits: with its >30,000 km of pipeline spread across Italy and >1,000 km of new pipeline projects being developed every year, Snam has an impact on many different ecosystems across the country. Therefore, a geo-localized approach for impact measurement, risk assessment, and identification of mitigation actions becomes paramount.

This is why Snam has adopted the SBTN methodology to embrace a scientific approach for its biodiversity journey. The bottom-up assessment of the nature footprint is critical to identify and address key environmental impacts. By rigorously analyzing its interactions with the natural world, Snam was able to pinpoint specific biodiversity areas for improvement and conservation.

Setting ambitious and science-based environmental targets, reaching Zero Net conversion of natural ecosystem already by 2024 and Net Positive Impact on areas at high risk for biodiversity in 2027, Snam is leading the way in demonstrating how energy infrastructure can coexist and positively contribute to the natural capital.

Exhibit 10 - Snam business and value chain activities

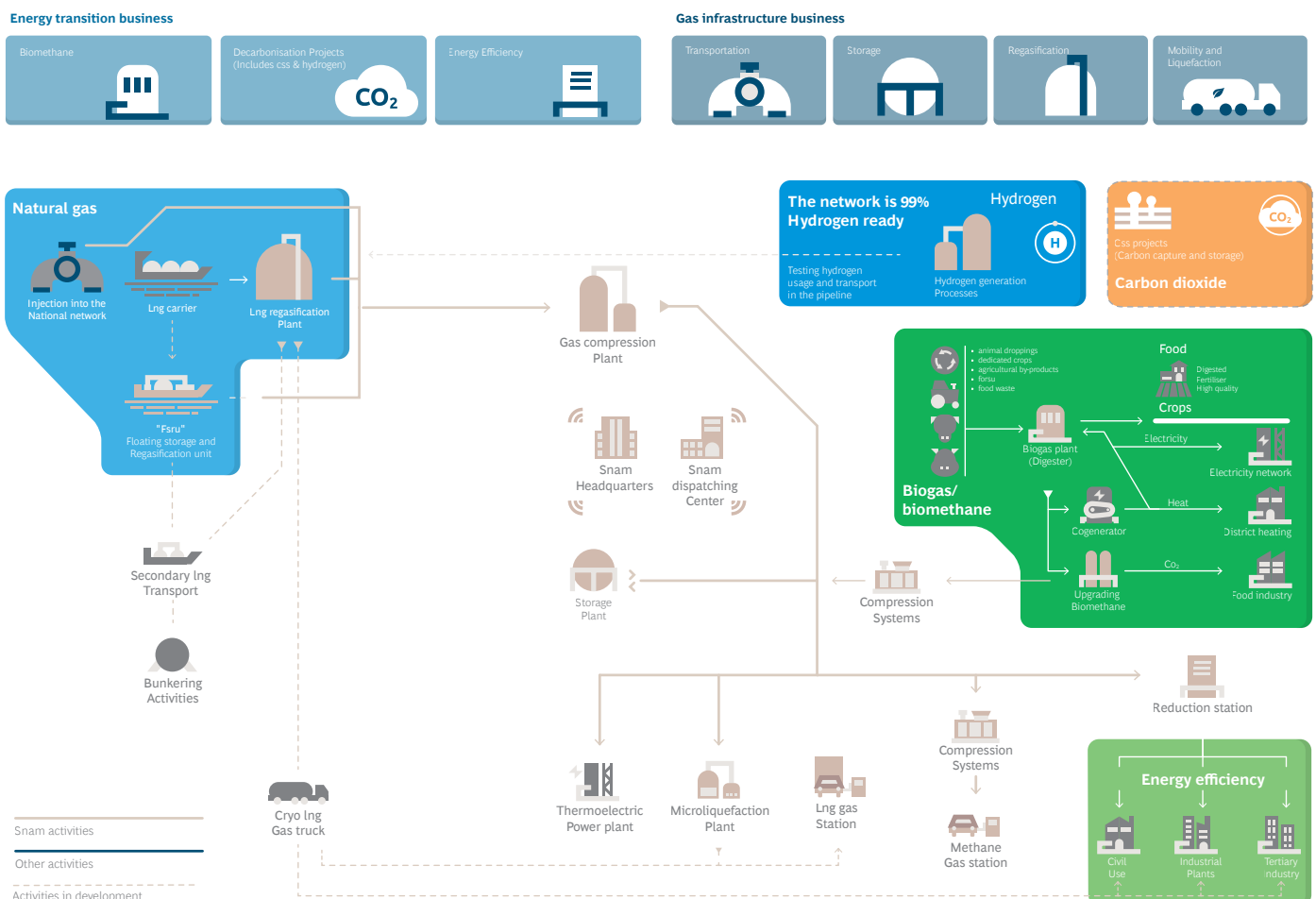


Exhibit 11 - Geographical reach of Snam Italian operations



Note: FSRU = Floating Storage Regasification Unit.

1. Introduction to Snam

Snam is an Italian energy infrastructure company. It is one of Europe's leading operators in the construction and integrated management of natural gas infrastructure, specifically in the areas of transport, storage, and regasification.

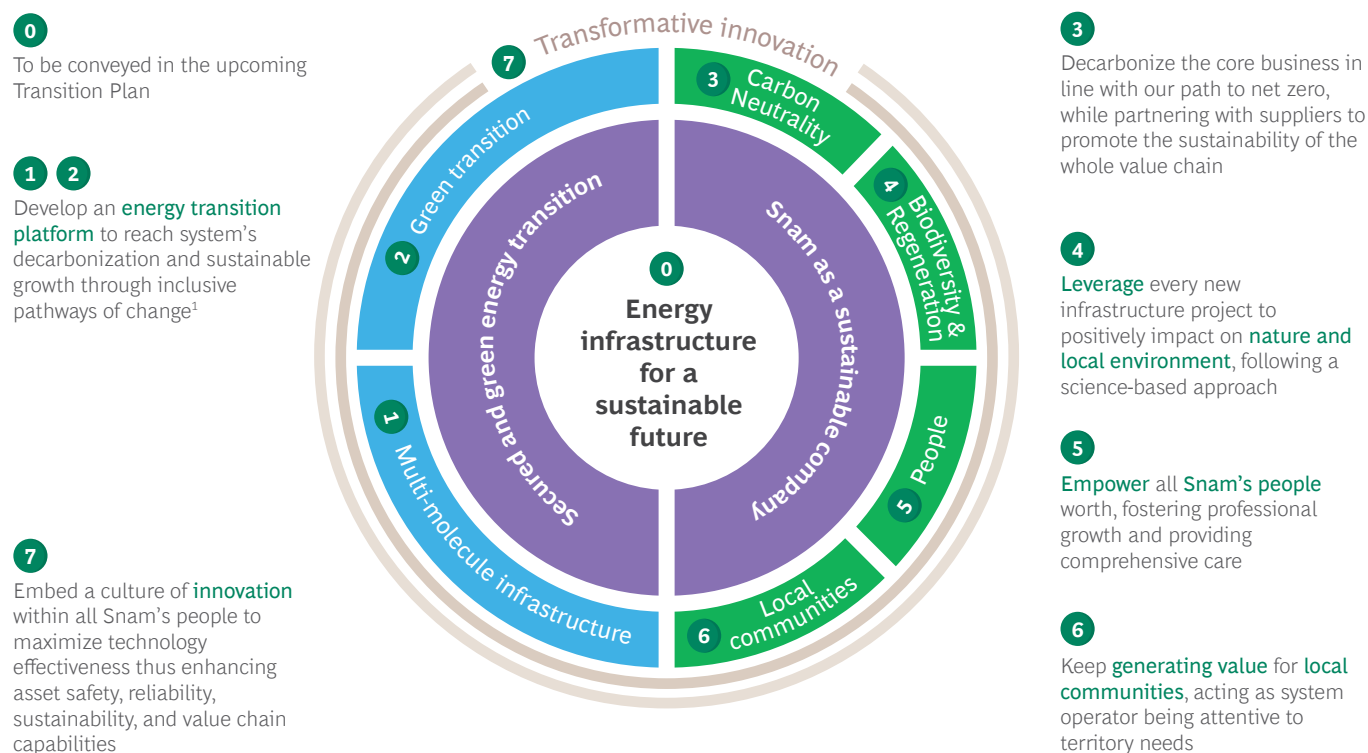
Snam operates in Italy and, through its subsidiaries, Albania (AGSCo, TAP), Austria (TAG, GCA), France (Teréga), Greece (DESFA, TAP), and the United Kingdom (Interconnector UK). It also has strategic agreements in place in several other countries.

The company's primary focus is on the development and maintenance of gas networks and storage facilities, with a strong emphasis on sustainability and innovation.

2. Adoption of SBTN Methodology and Scientific Approach: A Bottom-Up Assessment of a Nature Footprint to Identify Key Impacts

Biodiversity not only sits at the core of Snam's sustainability approach and is key to delivering its ambition of an energy infrastructure of the future, but also has always represented an intrinsic element of how Snam runs its operations, strictly connected with the territories and ecosystems in which it operates that cross the entire country.

Exhibit 12 - All-Round Sustainable Strategy: A 7 Pillars Framework

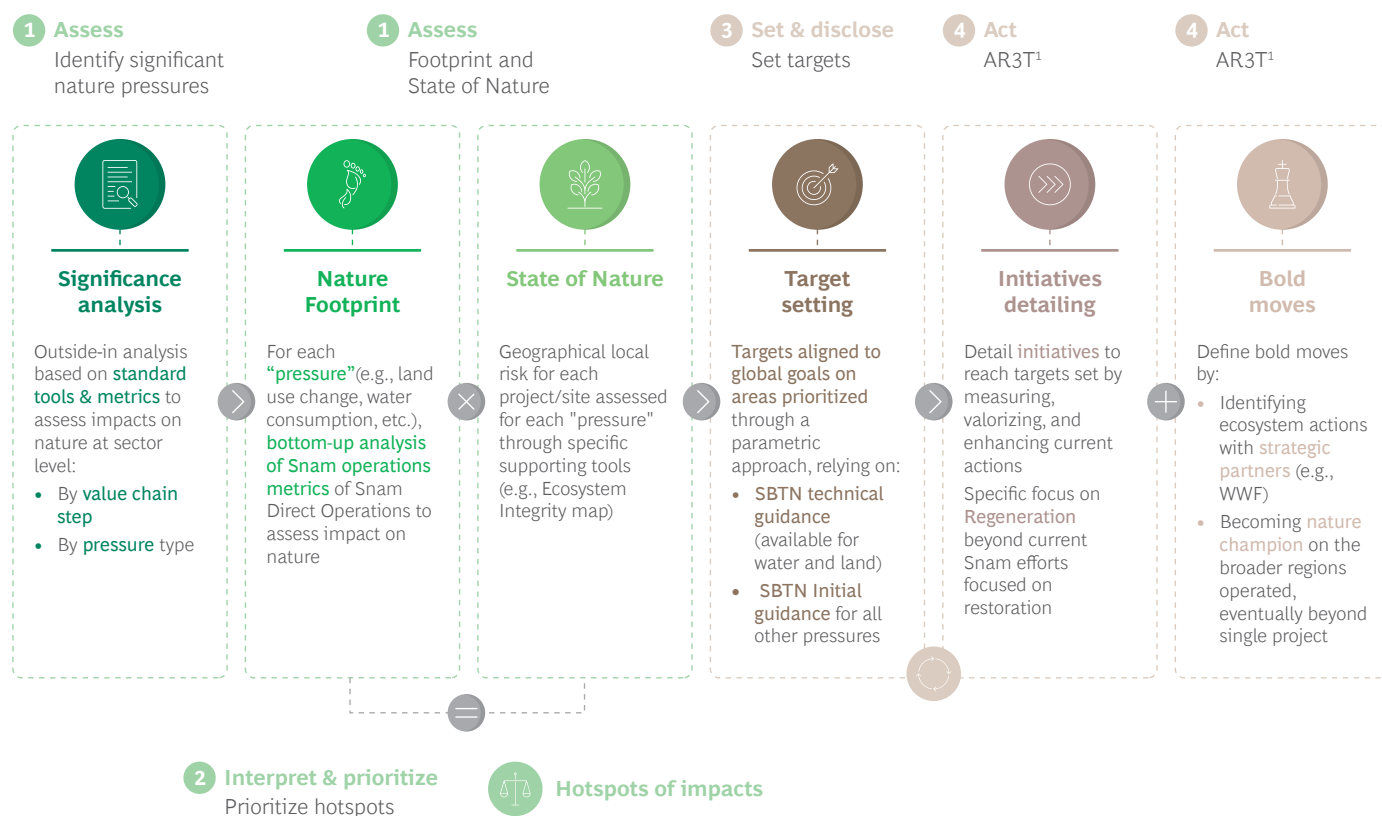


¹Pillars 1 and 2 covered in the Strategic Plan.

To strengthen its biodiversity approach, Snam decided to pioneer a science-based target-setting methodology following SBTN's most recent guidance.

The adoption of the standard allowed Snam to run a bottom-up approach for its nature footprint.

Exhibit 13 - Key steps of a SBTN assessment



Sources: SBTN, BCG analysis.

¹AR3T stands for "Act, Reduce, Restore, Regenerate & Transform" framework.



“

Reducing carbon emissions remains the top priority for a company like Snam, but it is our duty to confront us with all the planetary boundaries: action through the protection of natural capital and biodiversity is a primary opportunity for us to minimize our footprint on the planet and give back something to the communities in which we operate.

Although a large part of our activities are developed underground, the simple “temporary loan” of the surface, however, carries both a duty and an opportunity to make a specific contribution to individual territorial ecosystems that are increasingly threatened by anthropization and climate change.

At Snam, we wanted to build a systemic and science-based to nature approach within a holistic sustainability strategy which is fully integrated with strategic business choices: **Net Conversion by Design.** — *Stefano Venier, CEO Snam*

3. Five Key Lesson Learned from Snam SBTN's Application

- It's crucial to prioritize a "No (Net) Conversion" approach "by design" since the planning phase of an infrastructure project. Instead of solely concentrating on emissions or adhering to local environmental regulations, it's vital to adopt a more holistic design strategy that emphasizes prevention, reduction, and restoration from the outset.
- Employing a science-based method to assess impact is crucial; without it, the risks and effects of mitigation strategies remain ambiguous. A quantitative approach is essential to point out key and concrete priorities.
- Understanding the local context is vital for assessing risk levels, such as pinpointing significant pressures and hotspots. Additionally, it's essential to collaborate with local organizations and scientists to determine actions that will produce tangible results at the community level, tailored to an individual's or entity's footprint.
- While direct operations serve as the foundation, it's also essential to examine both up-stream and potentially downstream processes within the value chain in order to gather a comprehensive understanding of the environmental footprint and tailor effective actions in an informed decision-making manner.
- Technology offers a valuable tool in assessing the environmental footprint within a region, especially for large-scale infrastructures that span vast areas, allowing for extensive and comprehensive measurement.

The Paradigm Shift in Business and Nature

Key sources:

- COP 15: Kunming-Montreal biodiversity agreement (https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7834)
- BCG publication: Moving Beyond Net Zero to Nature Positive (<https://www.bcg.com/publications/2023/moving-beyond-net-zero-to-nature-positive>)
- Why Emerging Markets Need to Prepare for the EU's New Climate and ESG Regulations (<https://www.bcg.com/publications/2023/how-emerging-markets-can-prepare-for-the-new-esg-regulations>)
- The race to a nature-positive future: What every sector needs to do (WEF) (<https://www.weforum.org/agenda/2023/09/every-sector-must-play-their-part-in-contributing-towards-a-nature-positive-future-here-s-how/>)

Balancing Infrastructure Growth with Biodiversity Preservation

Key sources:

- The Biodiversity Crisis Is a Business Crisis (<https://www.bcg.com/publications/2021/biodiversity-loss-business-implications-responses>)
- When infrastructure goes wrong for nature and people (<https://www.worldwildlife.org/stories/when-infrastructure-goes-wrong-for-nature-and-people#:~:text=Any%20infrastructure%20that%20changes%20or,vulnerable%20to%20flooding%20or%20drought>)
- Infrastructure and nature coalition (WEF)
- Biodiversity and Infrastructure: A better nexus? WWF IISD (<https://www.wwf.ch/sites/default/files/doc-2017-11/Final%20WWF%20IISD%20Study-mainstreaming%20biodiversity%20into%20infrastructure%20sector.pdf>)
- A playbook for Nature-positive Infrastructure Development (WWF) (<https://www.worldwildlife.org/publications/a-playbook-for-nature-positive-infrastructure-development>)
- Net Zero by 2050, a roadmap for the Global Energy sector, IEA (<https://www.iea.org/reports/net-zero-by-2050>)

Case study: Snam Pioneering Sustainable Energy Infrastructure and Biodiversity Conservation—Five Lessons Learned

- Snam strategy and case work
- SBTN latest released guidance

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