



Additional sector guidance **Oil and gas**

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SICS® industry:
Oil and gas (EM.4)

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T N
F D Taskforce on Nature-related
Financial Disclosures



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1. Introduction

1.1. The purpose of this guidance

In September 2023, the TNFD published its recommendations for disclosure of nature-related issues and supporting implementation guidance. This document provides sector-specific additional guidance for the oil and gas sector, covering:

- The assessment of nature-related issues using the TNFD's LEAP approach (Section 2); and
- The disclosure of sector-specific metrics in line with the TNFD's recommended approach to metrics (Section 3).

The TNFD's [Guidance on the identification and assessment of nature-related issues](#):

[The LEAP approach](#) is designed as an iterative process – across business locations and business lines – in line with established risk management processes and corporate reporting cycles. Organisations may choose to start with a narrow scope for a LEAP assessment, and gradually expand the scope of the assessment as they gain experience and insight.

The TNFD recognises that there can be significant differences across sectors for corporates applying the LEAP approach. It has published this additional guidance with significant input from a range of knowledge partners and market participants, to help oil and gas sector participants apply the LEAP approach to their context. The overall structure of the LEAP approach is set out in Figure 1. This guidance follows that structure and Table 1 sets out the elements of LEAP for which this document provides additional guidance.

The Taskforce also recognises that investors and other stakeholders require quantitative information to compare performance and nature-related issues within sectors. To facilitate that sector-level analysis, this guidance also includes:

- Guidance on the application of the core global disclosure indicators and metrics to the oil and gas sector (Section 3.1); and
- Core and additional sector disclosure indicators and metrics (Sections 3.2 and 3.3).

Figure 2 provides an overview of the TNFD disclosure measurement architecture and where indicators and metrics are listed in the [TNFD Recommendations](#) and relevant sector guidance.

Figure 1: The TNFD approach for identification and assessment of nature-related issues – LEAP

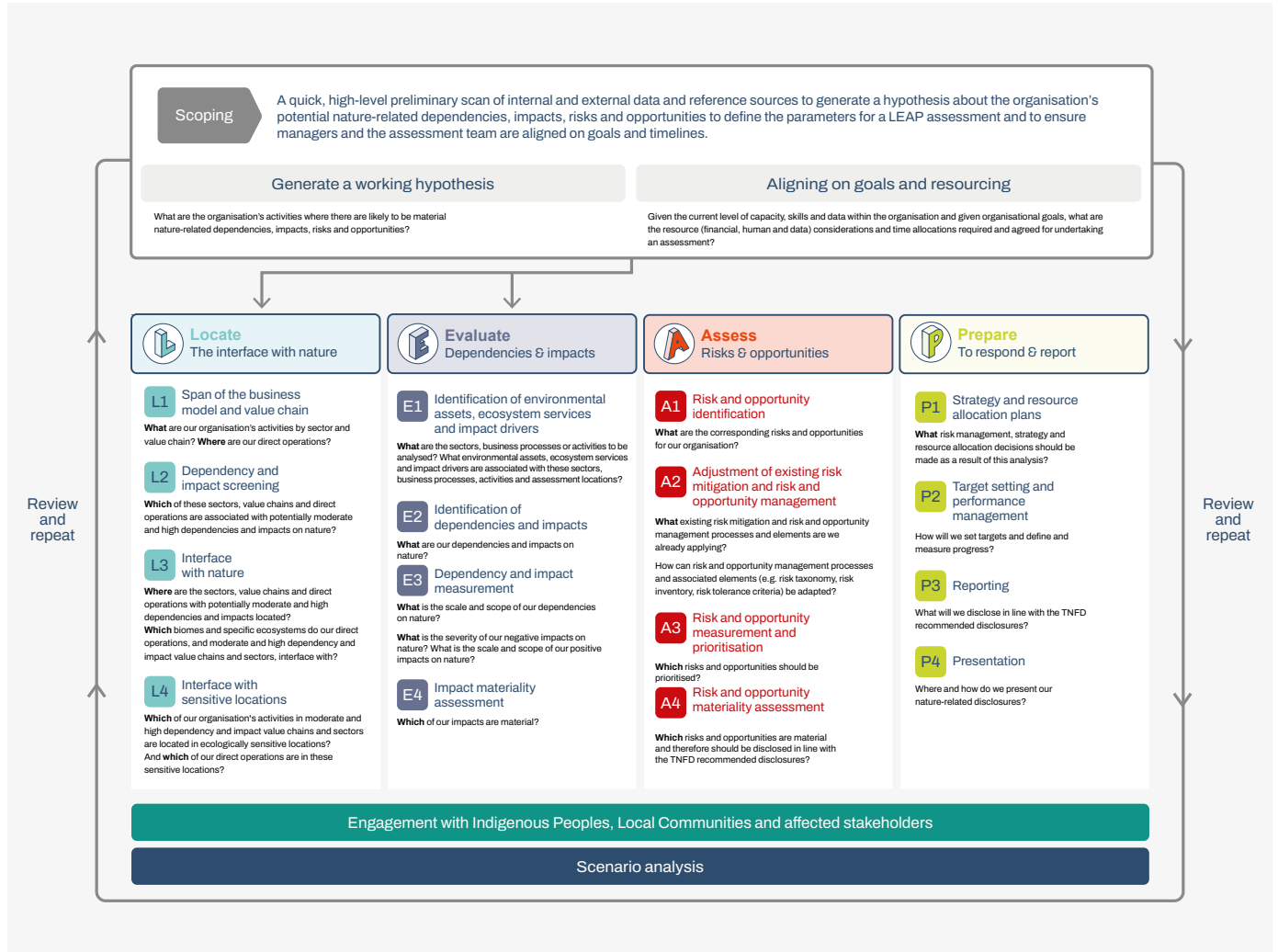
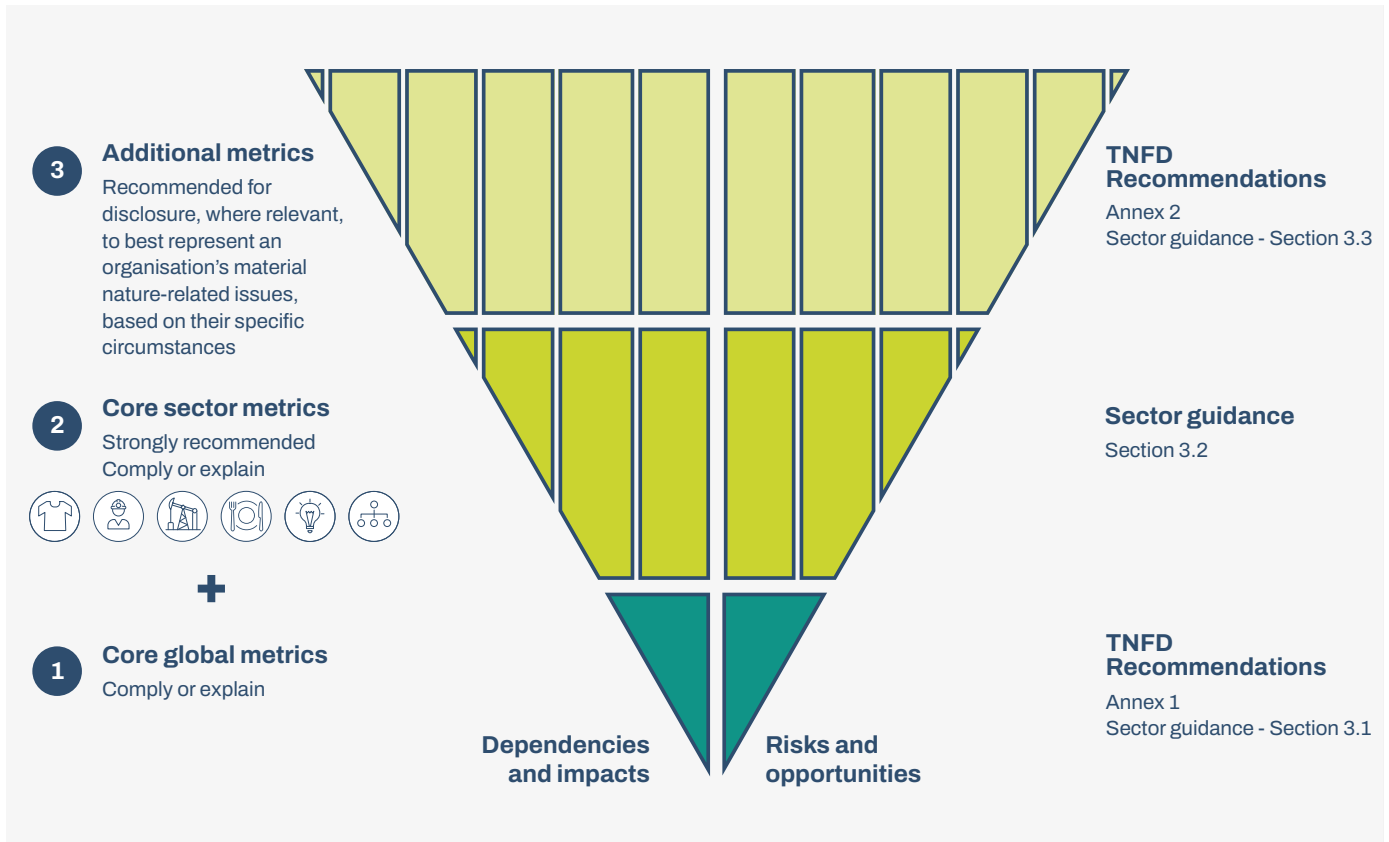


Figure 2: TNFD disclosure metrics architecture signposted to metrics lists



The guidance in Section 3 on the application of the TNFD core global metrics for this sector, as well as the core and additional sector metrics outlined expand on the disclosure indicators and metrics outlined in Annexes 1 and 2 of the [TNFD Recommendations](#). The TNFD has incorporated and sought to build on existing industry standards and disclosure metrics wherever possible to build on current data collection and reporting practices and minimise additional assessment and reporting costs.

1.2. Audience for this guidance

This guidance is intended to support the nature-related assessment and disclosure needs of organisations with business models or value chains in the Sustainable Industry Classification System® (SICS®) oil and gas industries (Box 1).¹ These are referred to as ‘oil and gas sector organisations’ in this guidance.

1 SASB (2018) [SASB’s Sustainable Industry Classification System \(SICS\)](#).



Box 1: SICS® industries in the scope of this guidance document

- Oil & Gas – Exploration & Production (EM-EP)
- Oil & Gas – Midstream (EM-MD)
- Oil & Gas – Refining & Marketing (EM-RM)
- Oil & Gas – Services (EM-SV)

The examples provided in this guidance for the oil and gas sector are intended to be illustrative. They are not exhaustive, universally applicable or recommended by the TNFD as examples of measures for all entities within the industry. Each company's context, location and nature-related interactions are unique. The TNFD encourages all companies to consult additional relevant sources, including scientific references and relevant industry standards or best practice guides, and conduct thorough assessments to identify and assess nature-related dependencies, impacts, risks, and opportunities specific to their operations and value chains. This guidance aims to support, not replace, a tailored assessment, which will be necessary for each entity.

This guidance is a supplement to the TNFD's [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#) and should be read in conjunction with that guidance.

Table 1: Areas of LEAP with additional guidance for the oil and gas sector in this guidance document

Scoping	✓
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L1		E1	✓	A1	✓	P1	✓
L2	✓	E2	✓	A2		P2	✓
L3	✓	E3		A3		P3	
L4		E4		A4		P4	



2. Sector-specific LEAP assessment guidance

2.1. Scoping a LEAP assessment

Working hypothesis generation:

What are the organisation's activities where there are likely to be material nature-related dependencies, impacts, risks and opportunities?

Goals and resourcing alignment:

Given the current level of capacity, skills and data within the organisation and given organisational goals, what are the resource (financial, human and data) considerations and time allocations required and agreed for undertaking an assessment?

Table 2 illustrates a non-exhaustive list of the typical business activities across the oil and gas sector value chain. There will be material dependencies, impacts, risks and opportunities across oil and gas sector activities, and sectors further up and down the value chain. These will vary depending on the organisation's specific activities. Organisations may find it useful to refer to the [ENCORE](#) tool, the [GRI Sector Standard for Oil and Gas \(GRI 11\)](#), [Ipieca](#) guidance, and the [Oil & Gas – Exploration & Production SASB Standard](#) when determining the business activities where there are likely to be material nature-related issues.

There are strong connections between the oil and gas sector and other heavy industry sectors, such as steel, cement and hydraulic engineering. Oil and gas service companies will be involved in the construction and service or maintenance of the machinery that is used for activities such as extraction and depend on raw materials (e.g. to produce drill bits). Oil and gas organisations should refer to the relevant [TNFD sector guidance](#) (e.g. for metals and mining) where business activities interface with other sectors.

Organisations should also consider that there may be shared ownership of assets along the value chain and that many assets in the oil and gas sector may be located offshore.



Table 2: Typical business activities in the value chain of organisations in the oil and gas sector

Typical area of the value chain	Oil and gas business activity	Business activity
Upstream (supply chain)	Supply chain sourcing	Key suppliers to the oil and gas industry, in terms of materials, equipment and services. Examples include but are not limited to: drilling and exploration equipment, metals and mining, pipe and valve manufacturing, chemicals suppliers, Engineering, Procurement and Construction (EPC) firms and utilities.
Direct operations	Exploration (Upstream)	Surveying of resources, including aerial surveys, seismic testing and exploratory drilling.
	Development (Upstream)	Design, planning and construction of oil and gas fields, including processing and worker facilities.
	Production (Upstream)	Extraction of oil and gas from onshore or offshore reserves and separation of oil, gas and water (e.g. oil sands mining).
Direct operations	Refining (Midstream)	Refining of oil into petroleum products for use as fuels and as feedstocks for chemicals.
	Processing (Midstream)	Processing gas into pipe-quality natural gas and natural gas liquids (including Liquefied Natural Gas (LNG)) involving also the removal of hydrocarbons and fluids.
	Transportation (Midstream)	Marine and land transportation of oil and gas (including LNG).
	Storage and pipelines (Midstream)	Distribution and storage of oil and gas in tanks and marine vessels and distribution via marine and land-based pipelines.
Downstream (customers)	Sales and marketing (Downstream)	Selling of oil and gas products for the purpose of, for example, fuels, gas for retail use, and inputs in the production of specialty chemicals, petrochemicals and polymers.
End of life	Closure and rehabilitation (End of life)	Closure, decommissioning, dismantling, removal, disposal or modification of assets, facilities and sites.

Source: GRI (2021) GRI 11: Oil and gas sector 2021. Ipieca (2020) Environmental management in the upstream oil and gas industry.



The terms upstream and downstream value chains here refer respectively to activities associated with suppliers and linked to the sale, use and end of life of products produced by the company, in line with the [TNFD glossary](#). This is distinct from the oil and gas upstream, midstream and downstream subsectors, all of which sit within the direct operations of the sector under the TNFD definitions (Table 3). Organisations using TNFD guidance should interpret upstream and downstream using the TNFD value chain definitions.

Table 3: Value chain definitions

TNFD definition	Oil and gas activities
Upstream: All activities associated with suppliers, such as sourcing of commodities or goods and the transportation of commodities to facilities.	
Direct operations: All activities and sites over which a company has operational or financial control.	<p>Upstream oil and gas: Activities related to the location, exploration and extraction of oil and gas.</p> <p>Midstream oil and gas: Activities related to the transportation, storage, refining and processing of oil and gas products.</p> <p>Downstream: Activities related to the sales and marketing of products derived from oil and gas.</p>
Downstream: All activities that are linked to the sale of products and services produced by the company. This includes the use and reuse of the product and its end of life, including recovery, recycling and final disposal.	

Decommissioning and closure

The scoping phase should also consider the inclusion of decommissioning activities and decommission facilities. Oil and gas facilities, if not properly managed, can leave a lasting environmental footprint even after they cease operations. This can manifest as soil and water contamination, alterations to landforms, and disruptions to biodiversity and wildlife. Closure processes can also have enduring consequences for local communities. Inadequate facility closure and site rehabilitation can render the land unsuitable for other productive uses, posing health and safety risks due to contamination or the presence of hazardous materials.

Decommissioning and dismantling offshore structures present unique challenges due to their size, weight and remote locations. In certain instances, structures are left in place



after decommissioning, which can result in issues such as marine pollution from corrosion, ecosystem changes, damage to fishing equipment and hazards to shipping navigation.²

Equally, facility closure on owned or leased land can present an opportunity for site restoration and regeneration.

The imperative to reduce greenhouse gas emissions and transition to a low-carbon economy is anticipated to lead to more frequent facility closures, highlighting the importance of considering the nature-related dependencies, impacts, risks and opportunities associated across the full life cycle of a facility, including post closure.

Value chain considerations when scoping

Oil and gas sector organisations may operate across many different sites and have many different suppliers and consumers across their value chains with significant potential nature-related dependencies and impacts. Oil and gas organisations may therefore choose to start with a narrow scope to create a manageable starting point, such as a small number of high priority sites and areas of the value chain where material nature-related dependencies, impacts, risks and opportunities are most likely to arise. The LEAP approach is designed as an iterative process in line with established risk management processes and corporate reporting cycles, and organisations should look to expand the breadth and depth of the assessment over time as they gain experience and maturity in applying the process. Further guidance is available in the [TNFD guidance on value chains](#).

² GRI (2021) [GRI 11: Oil and gas sector 2021](#).



2.2. Locate the organisation's interface with nature

This section provides additional guidance to help oil and gas sector organisations with the Locate phase of the LEAP approach.

L1: Span of the business model and value chain

Guiding questions:

What are our organisation's activities by sector, value chain and geography?

Where are our direct operations?

Refer to the Scoping section in this document for additional sector-specific information.

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

L2: Dependency and impact screening

Guiding question:

Which of these sectors, value chains and direct operations are associated with potentially moderate and high dependencies and impacts on nature?

Tables 4a, 4b, 5a and 5b present examples of impact drivers and ecosystem services that are typically relevant to the oil and gas sector. These tables can be used to help screen an organisation's value chain activities for potentially moderate and high impacts and dependencies on nature.

Table 4a: Materiality ratings of ecosystem services the oil and gas sector typically depends on (based on 2018-2023 version of ENCORE)

Ecosystem service category	Ecosystem service	Mining ^a	Equipment and services	Exploration	Production	Refining	Storage and transportation	Gas distribution and retail
Direct physical inputs	Groundwater	High	Medium		Low	Low		
	Surface water	High	Medium		Low	Low–medium ^b		
Enabling production processes	Ventilation		Low					
	Water flow maintenance	High	Medium					Low
	Water quality		Low			Low		Low
Mitigating direct impacts	Bioremediation				Low	Low		
	Mediation of sensory impacts		Medium					
	Dilution by atmosphere and ecosystems		Low					
	Filtration		Low		Low	Low		Low
Protecting from disruption	Climate regulation	High	Low	Medium	Low	Low	Medium	Medium
	Flood and storm protection		Medium	Low	Low	Medium	Medium	Medium
	Mass stabilisation and erosion control		Low	Low	Low	Low	High	High

Notes

- a. Mining currently includes mining of coal and consumable fuels. Other supply chain elements have not been assessed.
- b. The refining process depends heavily on water.

■ Indicates that WBCSD members' views deviated from ENCORE.

Only ecosystem services for which data is provided are shown. The ecosystem service classification used by the source of this table differs from the classification used by other TNFD guidance ([UN SEEA](#)). A correspondence mapping across these classifications is available from [UN SEEA](#).

Source: WBCSD (2023) [Roadmap to nature positive: Foundations for energy system](#); 2018-2023 version of the [ENCORE knowledge base](#).

Table 4b: Materiality ratings of ecosystem services the oil and gas sector typically depends on (based on 2024 version of ENCORE)

	ISIC group/class	Extraction of crude petroleum	Extraction of natural gas	Support activities for petroleum and natural gas extraction	Manufacture of refined petroleum products	Manufacture of gas; distribution of gaseous fuels through mains
Provisioning services	Genetic material	N/A	N/A	Very low	N/A	N/A
	Water supply	Medium	Low	Medium	Low	Very low
	Other provisioning services	N/A	N/A	N/A	N/A	N/A
	Biomass provisioning	N/A	N/A	N/A	N/A	N/A
Regulating & maintenance services	Global climate regulation	High	High	Low	Very low	Very low
	Solid waste remediation	Low	Low	Low	Low	Low
	Soil and sediment retention	Low	Low	Medium	Medium	Low
	Water purification	Very low	Very low	Very low	High	Medium
	Soil quality regulation	N/A	N/A	N/A	N/A	N/A
	Other regulating and maintenance service	Medium	Medium	Very low	Low	N/A
	Biological control	N/A	N/A	Very low	N/A	N/A
	Air Filtration	Very low	Very low	Very low	Very low	Very low
	Flood mitigation	High	High	Low	Medium	Very low
	Nursery population and habitat maintenance	N/A	N/A	N/A	N/A	N/A

	ISIC group/class	Extraction of crude petroleum	Extraction of natural gas	Support activities for petroleum and natural gas extraction	Manufacture of refined petroleum products	Manufacture of gas; distribution of gaseous fuels through mains
Regulating & maintenance services continued	Noise attenuation	Very low	Very low	Very low	Very low	Very low
	Other regulating and maintenance service	Low	Low	Very low	N/A	N/A
	Local (micro and meso) climate regulation	Low	Low	Very low	Low	Low
	Pollination	N/A	N/A	N/A	N/A	N/A
	Storm mitigation	Low	Low	Very low	Medium	Very low
	Water flow regulation	Medium	Medium	Medium	Medium	Very low
	Rainfall pattern regulation	ND	ND	High	N/A	Medium
Cultural services		N/A	N/A	N/A	N/A	N/A

N/A = Non-applicable

ND = No data

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (Unpublished, Expected 2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. Available at: <https://encorenature.org>. DOI: <https://doi.org/10.34892/dz3x-y059>.

Table 5a: Materiality ratings for impact drivers typically relevant for the oil and gas sector (based on 2018-2023 version of ENCORE)

Drivers of nature change	Impact drivers	Mining ^a	Supply chain and sourcing ^b	Equipment and services	Exploration	Production	Refining	Storage and transport	Gas distribution and retail
Land, freshwater and ocean use change	Land ecosystem use	Very high	Medium		High	High	High ^e	High	High
	Freshwater ecosystem use	High	Medium		High	High		High	
	Ocean ecosystem use	High–Very high ^c	High		Medium	Very high		High	High
Climate change	GHG emissions	High	Very high	High	High	High	High	High	High
Pollution/pollution removal	Non-GHG air pollutants	High	Medium	Medium	High	High	High	High ⁱ	
	Water pollutants	High	Medium	High	High	High	Variable ^f	Variable ⁱ	
	Soil pollutants	High	Medium	High	High	High	Variable ^f	Low	
	Solid waste	High	Medium	High	High	High	^g		Medium
	Disturbances	High	High	Medium	High	High	^h	Variable ^k	
Resource use/replenishment	Water use	Very high	High	High	Very high ^d	Very high ^d	Very high	High	
Invasive alien species introduction/removal	Introduction of invasive alien species	Medium					Low	Variable ^k	



Notes

- a. Mining here covers extraction of coal and consumable fuels.
- b. Other than mining, this covers sourcing of equipment and material used for direct operations.
- c. If applicable to the company's value chain, the rating should consider deep-sea mining as an emerging issue related to raw materials for the energy transition.
- d. Depending on the exploration and drilling method, more or less water is used. Company specificity applies.
- e. Refineries have a significant land footprint.
- f. Can be very high in the case of spillages or leaks.
- g. To be measured. Oil and gas production also generates solid wastes (oil sludge, spent catalysts, etc.).
- h. To be measured. Refineries are more likely to cause greater noise/light disturbances than exploration/production facilities as they are usually much more concentrated facilities.
- i. Shipping is one of the main sources of particulate emissions due to heavy oil use.
- j. Water pollutants are very high especially in cases of leakage or oil spills from shipping.
- k. High or very high, especially from shipping.

■ Indicates that WBCSD members' views deviated from ENCORE.

Source: WBCSD (2023) [Roadmap to nature positive: Foundations for energy system](#); 2018-2023 version of the [ENCORE knowledge base](#).

Table 5b: Materiality ratings for impact drivers typically relevant for the oil and gas sector (based on 2024 version of ENCORE)

	ISIC group/class	Extraction of crude petroleum	Extraction of natural gas	Support activities for petroleum and natural gas extraction	Manufacture of refined petroleum products	Manufacture of gas; distribution of gaseous fuels through mains
Land, freshwater and ocean use change	Area of land use	Low	Low	Low	Low	Medium
	Area of freshwater use	Very high	High	Medium	N/A	Medium
	Area of seabed use	Very high	High	Medium	N/A	N/A
Climate change	Emissions of GHG	High	High	Medium	Medium	High
Pollution/pollution removal	Disturbances (e.g noise, light)	Very high	High	Very high	Very high	Medium
	Emissions of non-GHG air pollutants	Medium	High	Medium	High	Medium
	Emissions of toxic soil and water pollutants	Very high	High	Very high	Very high	Very high
	Emissions of nutrient soil and water pollutants	N/A	N/A	N/A	N/A	N/A
	Generation and release of solid waste	Low	Medium	Low	Medium	Low
Resource use/replenishment	Other biotic resource extraction (e.g. fish, timber)	N/A	N/A	N/A	N/A	N/A
	Other abiotic resource extraction	N/A	N/A	N/A	N/A	N/A
	Volume of water use	Low	Medium	Low	Low	Low
Invasive alien species introduction/removal	Introduction of invasive species	Low	Very low	Very low	N/A	N/A

N/A = Non-applicable. ND = No data

Source: ENCORE Partners (Global Canopy, UNEP FI, and UNEP-WCMC) (Unpublished, Expected 2024). ENCORE: Exploring Natural Capital Opportunities, Risks and Exposure. Cambridge, UK: the ENCORE Partners. Available at: <https://encorenature.org>. DOI: <https://doi.org/10.34892/dz3x-y059>.



L3

L3: Interface with nature

Guiding questions:

Where are the sectors, value chains and direct operations with potentially moderate and high dependencies and impacts located?

Which biomes and specific ecosystems do our direct operations, moderate and high dependency and impact value chains and sectors, interface with?

When identifying locations that contain operations with potentially moderate and high dependencies and impacts, organisations should include locations:

- Where significant operational incidents have previously occurred;
- With high level of risk regarding asset integrity and critical incident management (including tailing facilities with oil sand mining activities);
- With activities within or in proximity to Indigenous territories such as Indigenous and Community Conserved Areas (ICCAs);
- With proved or probable reserves in or near Indigenous land, ICCAs, or areas of conflict;
- Associated with decommissioning particularly those that may be difficult or expensive to manage from an environmental perspective;
- Protected through avoidance measures or offset measures; and
- Restored through on-site restoration measures or offset measures.

When identifying locations upstream and downstream, organisations should consider that network assets such as gas pipelines for distribution and transportation can cover long distances. It is important to consider pipelines and other linear assets as lines and not as individual points. When pipelines are hundreds of kilometres long, they often travel through several biomes and many ecosystems, which may have varying ecosystem integrity, importance for biodiversity and water risks.

Organisations should review all applicable biomes connected to their specific interfaces with nature across their value chains and associated activities where significant dependencies and impacts on those biomes exist.

Organisations may also refer to the [TNFD biome guidance](#) for further guidance when analysing their interfaces with biomes.

L4

L4: Interface with sensitive locations

Guiding questions:

For our organisation's activities in moderate and high dependency and impact value chains and sectors, which of these are in ecologically sensitive locations?

Which of our direct operations are in sensitive locations?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).



2.3. Evaluate dependencies and impacts on nature

This section provides additional guidance to help oil and gas sector organisations with the Evaluate phase of the LEAP approach.

E1 E1: Identification of environmental assets, ecosystem services and impact drivers

Guiding questions:

What are the sectors, business processes or activities to be analysed?

What environmental assets, ecosystem services and impact drivers are associated with these sectors, business process, activities and assessment locations?

Guidance for components E1 and E2 is provided together under E2.

E2 E2: Identification of dependencies and impacts

Guiding question:

What are our dependencies and impacts on nature?

Dependencies

Table 6 provides illustrative examples of ecosystem services on which oil and gas sector organisations may depend. Organisations are encouraged to draw from this non-exhaustive list and those listed in Table 5, along with other sources and internal assessments to understand their dependencies on nature. [Ipieca's Ecosystem services guidance: Biodiversity and ecosystem services checklists](#) also provides a useful reference source for oil and gas sector organisations.

Table 6: Examples of dependency pathways for the oil and gas sector

Business activity	Ecosystem service	Illustrative example
Transportation (Midstream)	Soil and sediment retention	Effective soil and sediment retention reduces the erosion of soil and the risk of landslides, which can support transportation infrastructures via pipelines of oil and gas.
Production (Upstream)	Global climate regulation	A stable climate reduces the frequency and severity of extreme weather events, such as hurricanes, which can disrupt offshore and coastal operations.
Production (Upstream) Processing (Midstream)	Water supply	Water supply is essential for various oil and gas operations, including hydraulic fracturing, processing and cooling. For example, in hydraulic fracturing, water is mixed with sand and chemicals and injected at high pressure into formations to create small fractures of rocks.
Production (Upstream)	Water flow regulation	Water flow regulation by ecosystems, such as wetlands, is critical for managing the quantity and timing of water availability for oil and gas operations and plays a key role in natural water purification processes, which can help in the treatment of wastewater from oil and gas activities before its release or reuse.
Storage (Midstream)	Solid waste remediation/dilution by ecosystems	Ecosystems such as wetlands filter and break down unplanned contaminants that may leak or be discharged from pipeline systems and storage tanks.
Transportation, Storage (Midstream)	Storm and flood protection	Coastal and riparian ecosystems help mitigate the impacts of storms and flooding on critical infrastructure like pipelines and storage facilities.
Sales and marketing (Downstream)	Air filtration	Urban green spaces and other vegetated areas help absorb pollutants and improve air quality, which is crucial for maintaining the health of urban populations and reducing the societal and environmental impacts of emissions related to the combustion of fossil fuels.

Impacts

Oil and gas operations exert various pressures on their surrounding environments, leading to both immediate and long-term impacts on nature. These impacts can be direct, indirect and cumulative, and often extend far beyond the operational sites and geographical boundaries of direct activities.³

Organisations should seek to understand their areas of influence, noting that the size of the area may vary, depending on the nature of its activities and/or assets, and on the biome. When an organisation's area of influence overlaps with those of other organisations, cumulative impacts should also be considered. These will allow an organisation to map the type and scope of the area affected and depended on by the operations as well as the need for engagement with other stakeholders.

Fossil fuel extraction often takes place in regions with high levels of biodiversity and conservation importance, potentially leading to the loss and degradation of natural habitats, which affects associated species. Oil and gas activities can also lead to animal mortality, habitat fragmentation and conversion, and the introduction of invasive species and pathogens. These effects can, in turn, limit the availability and quality of ecosystem services, affecting the wellbeing and livelihoods of Indigenous Peoples, Local Communities and stakeholders.

When identifying impacts, organisations in the oil and gas sector should consider the non-exhaustive list presented in Table 7. These impact drivers are particularly pronounced when oil and gas activities affect protected areas or regions of high biodiversity significance. Organisations may find it useful to refer to TCFD recommendations and the relevant GRI and SASB Standards for additional guidance.⁴

³ Refer to guidance on area of influence in the [TNFD guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

⁴ TCFD (2017) [Recommendations of the Task Force on Climate-related Financial Disclosures](#); GRI (2021) [GRI 11: Oil and gas sector 2021](#); [Oil & Gas – Exploration & Production SASB Standard \(version 2023-12\)](#).

Table 7: Examples of impact pathways for the oil and gas sector

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Land/water/ocean use change	Land ecosystem use	Production Development	<p>Site preparation for construction and surface mining, and upstream production. This includes seismic testing, drilling, asset and facility construction, infrastructure development, pipeline installation and road building.</p> <p>Fires from unplanned events.</p> <p>New access routes fragmenting the habitat and facilitating increased access from other sectors. The depletion of easily accessible oil and gas resources drives this access further into remote areas.</p>	<p>Direct reduction in ecosystem extent.</p> <p>Disruptions to ecosystems and ecological functions due to this reduced extent, degradation and fragmentation.</p> <p>Direct mortality of species.</p> <p>Habitat fragmentation undermining feeding and reproduction patterns.</p> <p>Depletion of carbon sinks, contributing to climate change.</p>
	Freshwater ecosystem use	Exploration Production Refining	Occupation and depletion of freshwater habitats as part of exploration, production and refining and upstream activities.	<p>Reduction in space, disruption to ecological corridors, fragmentation and changes to hydrological and hydraulic characteristics of the ecosystem can lead to displacement of local flora and fauna.</p> <p>Changes to water quality due to intentional or unintentional release of water and sediment, as well as spills and leaks.</p>
	Ocean ecosystem use	Exploration Development Production	Offshore construction, deep sea mining, drilling and footings of offshore structures.	<p>Change in and destruction of marine and seabed habitats.</p> <p>Reduced water quality due to increased suspended sediments and subsequent deposition, as well as spills, leaks and wastewater releases.</p> <p>Changes in coastal processes due to the presence of infrastructure.</p>

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Climate change	GHG emissions	All activities	The sector’s activities and use of oil and gas products contribute substantially to the release of carbon dioxide (CO ₂) and methane (CH ₄). Other GHGs stemming from oil and gas activities include ethane (C ₂ H ₆), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF ₆) and nitrogen trifluoride (NF ₃).	See TCFD, GRI and SASB Standards. ⁵
Pollution/pollution removal	All pollutants	Production Transport and distribution	Spills to the environment and critical incidents, encompassing events like the loss of control or containment of hydrocarbons, well blowouts, explosions, fires, unforeseen plant disruptions and shutdowns, and failures of tailings dams in operations linked to oil sands. These can occur as a result of undetected equipment failures, or during the transport of oil and gas by sea, road, rail or pipelines.	Spills to the environment and critical incidents can have significant negative repercussions for workers, local communities, the environment and the assets of organisations. These incidents extend beyond fatalities and injuries, often leading to the contamination of air, soil and water. Critical incidents can trigger degradation in ecosystems and habitats, as well as a significant loss of animal life. The resulting impacts can disrupt other economic activities reliant on these environmental assets, such as fishing and agriculture, thereby affecting livelihoods and jeopardising food safety and security.

⁵ TCFD (2017) Recommendations of the Task Force on Climate-related Financial Disclosures; GRI (2021) [GRI 11: Oil and gas sector 2021](#); SASB (2023) [Oil & Gas Exploration and Production Standard](#).

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Non-GHG air pollutants	Production Refining Processing	<p>The oil and gas sector, and the combustion of oil and gas, are significant sources of air pollutants, including sulphur oxides (SO_x), nitrogen oxides (NO_x), particulate matter (PM), volatile organic compounds (VOCs) and hazardous air pollutants (HAP) like benzene and hydrogen sulphide.</p> <p>Heavy vehicle movements and stockpiling of ore, waste rock and products in direct operations and upstream mining and supply chain sourcing activities are associated with dust lift-off.</p> <p>Upstream mining activities:</p> <ul style="list-style-type: none"> • Fly rock, dust particles and toxic fumes due to blasting; • Release of air toxins through stacks during processing and refining; and • Localised atmospheric release of cyanide (a toxic compound used in metal leaching and susceptible to vaporisation). 	The emissions disrupt the supply of clean air and lead to adverse health effects, especially for vulnerable populations. Emissions of NO _x and SO _x can alter the chemistry of water bodies, leading to negative impacts on terrestrial and aquatic life – decreased animal and vegetation growth, yield and immunity – and contribute to acid rain and ocean acidification.

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Water pollutants	Production Transport and distribution Refining Processing	<p>Produced water and process wastewater typically contain hydrocarbons, chemicals or other hazardous substances. Upstream activities can see leaching of acidified wastewater or water containing high concentrations of heavy metals and other toxic chemicals (e.g. sulphuric acid, cyanide, mercury, arsenic).</p> <p>Water pollution can occur through water discharge, drilling waste disposal, spills and leaks from storage sites, pipelines and motor transport. It can also occur through the injection of drilling fluids into wells and the flowback from hydraulic fracturing, leading to the seepage of contaminants and groundwater pollution. Brine storage dams can be associated with groundwater pollution. In offshore operations, drilling fluids may be discharged into water bodies or oceans, depending on regulations and alternative outlets.</p> <p>Inadequate treatment of water discharges, oil spills resulting from transportation accidents, pipeline ruptures, seepage, failures of oil sands tailings dams, or depositing and sedimentation of materials and substances used in manufacturing can also cause water pollution.</p>	These activities have the potential to affect the quality of surface water, groundwater and seawater. This increases toxicity in aquatic habitats, resulting in long-term consequences for ecosystems and biodiversity, as well as adverse effects on human health, development and food security.

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Water pollutants	Production Refining Transport and distribution Storage	<p>Produced water and process wastewater typically contain hydrocarbons, chemicals or other hazardous substances. Upstream activities can see leaching of acidified wastewater or water containing high concentrations of heavy metals and other toxic chemicals (e.g. sulphuric acid, cyanide, mercury, arsenic).</p> <p>Water pollution can occur through water discharge, drilling waste disposal, spills and leaks from storage sites, pipelines and motor transport. It can also occur through the injection of drilling fluids into wells and the flowback from hydraulic fracturing, leading to the seepage of contaminants and groundwater pollution. Brine storage dams can be associated with groundwater pollution. In offshore operations, drilling fluids may be discharged into water bodies or oceans, depending on regulations and alternative outlets.</p> <p>Inadequate treatment of water discharges, oil spills resulting from transportation accidents, pipeline ruptures, seepage, failures of oil sands tailings dams, or depositing and sedimentation of materials and substances used in manufacturing can also cause water pollution.</p>	These activities have the potential to affect the quality of surface water, groundwater and seawater. This increases toxicity in aquatic habitats, resulting in long-term consequences for ecosystems and biodiversity, as well as adverse effects on human health, development and food security.

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Soil pollutants	Production Storage	<p>Storage or leaks of hazardous materials can directly contribute to soil pollution. Upstream, mining activities can contribute to dust clouds and mineral deposition.</p> <p>Cleared land leads to increased susceptibility to soil erosion. Upstream, stockpiles and rock dumps can also contribute to erosion.</p>	Soil may become unsuitable for native vegetation due to the pollution.

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Solid waste	<p>Exploration and production</p> <p>Processing</p> <p>Refining</p> <p>Closure and rehabilitation</p>	<p>Oil and gas operations typically generate significant volumes of waste, including hazardous materials.</p> <p>The primary waste sources stem from the extraction and processing of oil and gas, comprising drilling muds, cuttings, scale and sludges. These waste streams may contain chemical additives, hydrocarbons, metals, naturally occurring radioactive material (NORM) and salts.</p> <p>Tailings from oil sands mining contain large quantities of hazardous waste including hydrocarbons and heavy metals. Tailings ponds carry risk of leaching, leaks and dam failures, polluting the surrounding environment and groundwater.</p> <p>Other waste products include tyres, containers and unused hazardous materials.</p> <p>Closure and rehabilitation activities involve disposal of hazardous substances and materials from decommissioned structures and equipment.</p> <p>Additional common waste products from oil and gas activities encompass waste oils, construction debris and domestic and office waste.</p>	<p>Waste products can introduce contaminants into soil, surface water, groundwater and seawater. This can alter the soil and water chemical balances and geomorphological environment structure.</p> <p>This can adversely affect plant and animal species, as well as human health. It can lead to loss of land productivity and erosion. It can also affect sedimentation and groundwater flows.</p> <p>Drilling cutting can accumulate and affect terrestrial and marine benthic organisms, resulting in growth inhibition, mortality and smothering. The disposal of drilling waste in underground injection wells can trigger seismic activity or lead to groundwater contamination.</p> <p>The extent of these impacts is influenced by the organisation’s waste management practices, regulatory oversight, and the availability of nearby recovery and disposal facilities.</p>

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Pollution/ pollution removal	Disturbances	Exploration and production Transport and distribution	Seismic blasting, night lighting, traffic movements, extraction and production activities can all result in noise and light pollution.	Disturbance to local species, affecting their migratory, feeding and breeding routes and habits.
Resource use/ replenishment	Water use	Exploration and production Refining Processing	<p>Activities upstream and in the exploration, production and refining stages all use water as part of their processes.</p> <p>The extraction and processing phases of the oil and gas sector are the most water intensive. The volume of water required varies by extraction method, local geological conditions and the extent of processing needed. Certain methods, such as hydraulic fracturing and oil sands mining, are particularly water intensive. The amount of water extracted for specific activities also hinges on an organisation’s capacity to substitute freshwater, the required water quality, recycling infrastructure and the characteristics of local water resources.</p>	Water use can lead to dewatering of aquifers and depletion of other water sources, especially in arid and drought-prone areas, where many of the world’s oil and gas reserves are located. This can lead to reduced water flow and increased drought severity and frequency. This affects the supply of water to other users – households, fishing, aquaculture and agriculture – and to nature.
Resource use/ replenishment	Other resource use	Upstream	This includes upstream mining of minerals required for the energy transition.	Human presence to extract these minerals results in a variety of impacts on nature. Refer to the TNFD Metals and mining guidance .

Driver of nature change	Impact driver	Activity (not exhaustive)	Description of the impact driver	Environmental assets and ecosystem services affected
Invasive species introduction/removal	Introduction of invasive alien species	Transportation and distribution	Vehicles, equipment and plants can all carry invasive species, as can reclamation programmes that import contaminated soils.	Change in structure and function of ecological communities due to cumulative impacts.
Social impacts	<p>Displacement of communities for new asset construction or transportation routes.</p> <p>Worsening health of surrounding local communities due to air, soil and water pollutants.</p> <p>Worsening living areas and conditions of local communities, also affecting their economic and working conditions.</p> <p>Increase in local conflicts.</p> <p>Disruption and/or damage to local sacred areas.</p> <p>Possible violation of human rights and use of child labour.</p>			

Source: Adapted from WBCSD (2023) [Roadmap to nature positive: Foundations for energy system.](#)



E3 E3: Dependency and impact measurement

Guiding questions:

What is the scale and scope of our dependencies on nature?

What is the severity of our negative impacts on nature? What is the scale and scope of our positive impacts on nature?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

E4 E4: Impact materiality assessment

Guiding question:

Which of the identified impacts are material?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).



2.4. Assess nature-related risks and opportunities

A1: Risk and opportunity identification

Guiding question:

What are the corresponding risks and opportunities for our organisation?

Table 8 and Table 9 provide illustrative examples for the oil and gas sector of nature-related risks and opportunities. Additional consideration should be given to the potential risks and opportunities associated with decommissioning, particularly those that may be difficult or expensive to manage from an environmental perspective. This may require the development of comprehensive closure plans, rehabilitation plans and other measures to mitigate the negative impacts of decommissioning.

Table 8: Illustrative nature-related risks for the oil and gas sector

Risk category	Illustrative risks for the oil and gas sector	Impact driver/ ecosystem service associated
Physical		
Acute	<p>Operational and business interruptions caused by landslides as a result of declining soil stability that may damage infrastructure.</p> <p>Damages to infrastructure and interruption of business activities deriving from wildfires, tropical cyclones, extreme heat and other extreme weather events damaging infrastructure or interrupting business activities.</p> <p>Increased risk of damage and business interruption from floods and storms if protective terrestrial ecosystems are degraded.</p>	<p>Soil and sediment retention</p> <p>Climate change</p> <p>Storm/flood mitigation</p>
Chronic	<p>Disruption of operation because of increasing cost of water management and control as a result of declining water supply, possibly caused by the organisation’s activities and those of others in the watershed, as well as by climate change.</p> <p>Increased sourcing costs due to chronic changes in the state of nature affecting commodities’ costs. For example, increasing incidence of pests can reduce the availability of high-quality commodities like timber, increasing costs for the construction of drilling rigs, access platforms, etc.</p>	<p>Water supply/water use</p> <p>Biological control</p> <p>Biomass provisioning</p>



Risk category	Illustrative risks for the oil and gas sector	Impact driver/ ecosystem service associated
Transition		
Policy	<p>Loss of revenues and project delay potentially caused by limited access to reserves due to new or more stringent regulations associated with the oil and gas sector.</p> <p>For example, oil and gas companies may face restrictions on offshore drilling in certain areas due to newly implemented marine conservation laws aimed at protecting endangered marine species. This could lead to a significant reduction in accessible reserves, forcing the company to delay projects and lose potential revenue.</p>	<p>Ocean-use change/ land-use change</p> <p>Water/soil pollution</p>
Technology	<p>Loss of business driven by obsolescence as more environmentally sustainable and safer drilling technologies are developed. For instance, the shift from traditional drilling to advanced water-based drilling fluids that minimise soil and groundwater contamination could alter some competitive dynamics within the industry. Companies not adopting these advanced fluids might lose more contracts or face challenges, especially in regions with strict environmental protection laws.</p>	<p>Water/soil pollution</p>
Market	<p>Loss of market value due to stranded assets unable to operate (blocked) as a result of changes in freshwater availability or climate change, making some facilities unviable.</p> <p>Loss of productivity driven by changes in the environmental conditions, such as increased soil erosion or sedimentation due to deforestation upstream, which could lead to the degradation of reservoir quality. Oil companies may discover that sedimentation is reducing the porosity and permeability of an onshore oil field, complicating extraction efforts and reducing the field's output, thereby affecting their market position.</p>	<p>Water supply</p> <p>Biomass provisioning</p>
Reputation	<p>Loss of institutional support and stake divestments following negative stakeholder perception on oil and gas impacts on nature. For example, potential negative impacts of seismic testing on marine life could lead to public backlash. This could result in divestments from institutional investors, a drop in stock prices, increased scrutiny by environmental regulators, requiring the companies to invest in less invasive exploration technologies, and a loss of brand value.</p>	<p>Soil/water pollution</p> <p>GHG emissions</p> <p>Non-GHG air pollution</p> <p>Land/freshwater/ ocean-use change</p>

Risk category	Illustrative risks for the oil and gas sector	Impact driver/ ecosystem service associated
Liability	Oil and gas companies may face lawsuits, litigation or claims for damage to nature when incidents occur within their operations. For example, oil companies operating in a biodiverse region may face class-action lawsuits from local communities and environmental groups after an oil spill contaminates a major river. The litigations could result in significant financial penalties, mandated costly cleanup operations, and a directive to invest in better pipeline integrity monitoring technologies.	Soil/water pollution

Sources: WBCSD (2023) Roadmap to nature positive: Foundations for energy system; WWF Biodiversity Risk Filter; TNFD Analysis

Table 9: Illustrative nature-related opportunities for the oil and gas sector

Opportunity category	Illustrative opportunities for the oil and gas sector	Impact driver/ ecosystem service associated
Business performance		
Markets	Prevention of financial impacts and operational disruptions through implementation of risk management practices that take into account natural disasters.	Soil and sediment retention Climate change
Resource efficiency	Reduced costs and potential revenue stream from electricity generation deriving from the use of some of the space cleared for solar (e.g. in between tanks in tank farms) and from repurposing of offshore facilities for alternative uses (wind power). Increased productivity deriving from recycling of freshwater and reducing the amount of new freshwater used.	Other provisioning services (renewable resources) Water use
Products and services	Reduced negative nature impacts and creation of revenue stream from recycling and repurposing waste materials from drilling and product operations and converting waste into products such as construction materials or by finding some uses in other industry. Drilling cuttings can be used as alternative aggregate, construction material or cement production (or other civil engineering works). Investment in technologies to process alternative feedstocks like algae or waste oils into biofuel.	Solid waste



Opportunity category	Illustrative opportunities for the oil and gas sector	Impact driver/ ecosystem service associated
Reputational capital	Reputational benefit and higher market value from improved communication and relationships through hiring/engagement of local stakeholders.	N/A
Reputational capital/ markets	<p>Oil and gas companies can positively contribute to the development of environmental regulations by leveraging their expertise to formulate more balanced policies that benefit both the industry and environmental protection. This collaborative approach can enhance companies' reputation with regulators, NGOs and the public, which, in turn, can lead to more favourable market conditions.</p> <p>Strengthened community relations and an enhanced social license to operate, fostering a positive corporate image by prioritising local suppliers for materials and labour, enable oil and gas companies to reduce the negative nature impacts associated with transportation, while also boosting the local economy.</p>	GHG emissions
Capital flows and financing	Oil and gas sector organisations could conduct a thorough evaluation of their assets to identify non-performing or high-risk assets in environmentally sensitive areas. By divesting some of these assets, companies could reallocate capital towards more sustainable and profitable ventures, improving potentially financial health and investor capital flows and financing.	N/A
Sustainability performance		
Sustainable use of natural resources	Implementing advanced freshwater treatment technologies may enable oil companies to reuse water in hydraulic fracturing and cooling processes. This could help to conserve freshwater but also to reduce dependency on local water sources, mitigating the impact on local communities and ecosystems, and promoting sustainable water management practices.	Water supply/use



Opportunity category	Illustrative opportunities for the oil and gas sector	Impact driver/ ecosystem service associated
Ecosystem protection, restoration and regeneration	<p>Enhancement of company reputation, reduction of potential clean-up costs and protection of ecosystems by investing in satellite technology and drone surveillance to monitor environmental changes and detect early signs of oil spills through early warning and monitoring systems. This could allow for quicker responses to environmental accidents, reducing potential damage and supporting the regeneration of affected ecosystems.</p> <p>Habitat restoration and reinstatement – as well as reputational benefit – after clearance and along pipeline routes.</p> <p>Incorporation of Nature-based Solutions (NbS) to reduce risk along easements.</p> <p>Facilitation of compliance effort through the use of offshore facilities to repopulate threatened ecosystems and species (e.g. artificial reefs).</p>	<p>Soil/water pollution</p> <p>Ocean/land/ freshwater use-change</p>

Sources: WBCSD (2023) Roadmap to nature positive: Foundations for energy system; WWF Biodiversity Risk Filter.

A2: Adjustment of existing risk mitigation and risk and opportunity management

Guiding questions:

What existing risk and opportunity management processes and elements are we already applying?

How can risk and opportunity management processes and associated elements (e.g. risk taxonomy, risk inventory, risk tolerance criteria) be adapted?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

A3: Risk and opportunity measurement and prioritisation

Guiding question:

Which risks and opportunities should be prioritised?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

A4: Risk and opportunity materiality assessment

Guiding question:

Which risks and opportunities are material and therefore should be disclosed in line with the TNFD recommended disclosures?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).



2.5. Prepare to respond and report

This section provides additional guidance to help oil and gas sector organisations with the Prepare phase of the LEAP approach.

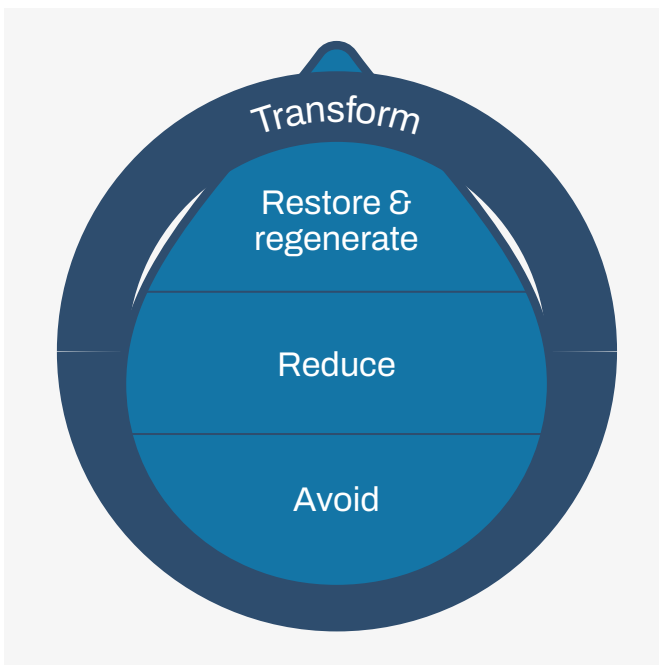
P1: Strategy and resource allocation plans

Guiding question:

What risk management, strategy and resource allocation decisions should be made as a result of this analysis?

Table 10 presents illustrative priority and transformative actions that oil and gas sector organisations may want to consider based on the risks identified in the Assess phase. All actions have been categorised into the corresponding impact driver and classified according to TNFD’s interpretation of SBTN’s AR3T framework (and pending alignment with future development of SBTN’s Step 4 guidance): avoid and reduce negative impacts; restore and regenerate; transformation of business models, products, services, markets and investments; and contributing to needed systemic change inside and outside value chains.

Figure 3: SBTN’s AR3T framework



When making capital allocation, management and strategy decisions, organisations should particularly consider:

- **Decarbonisation and business model evolution:** Organisations may find it useful to refer to the TCFD’s recommendations and the GRI and SASB Standards;⁶
- **Water management:** Early identification of water-related risks offers companies the chance to formulate and execute a sustainable water management strategy. This strategy should adhere to local, national or international regulatory standards and prioritise improvements in water efficiency, the encouragement of water reuse and the use of alternative water sources, including desalinated water and wastewater;⁷
- **Critical incidents and spills to environment:** Organisations in the oil and gas sector can prevent critical incidents with an effective process safety management system. Process safety refers to the systematic application of good design, construction and operating principles to ensure the safe containment of hazardous materials, while also addressing the sources or factors that lead to potential incidents. A process safety management system can also limit impacts associated with critical incidents related to extreme weather events, which are likely to increase in frequency and intensity due to the effects of climate change.⁸

Significant effort and priority should be dedicated to designing operations and employing procedures that prevent spills from occurring in the first instance and improving the efficacy and speed of clean-up operations, should an incident occur.⁹

When incidents occur, response objectives will vary depending on the specific circumstances of the spill. There are certain basic objectives that will guide any response:

- Safeguarding the safety and health of people, including workers, responders and communities;
 - Stopping the source of the spill as quickly as possible;
 - Minimising environmental and community impact;
 - Minimising the risk of oil reaching the shore in offshore scenarios; and
 - Minimising the risk of oil entering watercourses or groundwater in onshore scenarios.¹⁰
- **Decommissioning and closure:** At the conclusion of their commercial operations, organisations are expected to carry out asset closure and site rehabilitation, which can lead to impacts both during and after this process.

6 TCFD (2017) [Recommendations of the Task Force on Climate-related Financial Disclosures](#); GRI (2021) [GRI 11: Oil and gas sector 2021](#); SASB (2023) [Oil & Gas Exploration and Production Standard](#).

7 WBCSD (2023) [Roadmap to nature positive: Foundations for energy system](#).

8 GRI (2021) [GRI 11: Oil and gas sector 2021](#).

9 IPIECA (2019) [Oil spill preparedness and response: An introduction](#).

10 IPIECA (2019) [Oil spill preparedness and response: An introduction](#).

The closure and rehabilitation of oil and gas fields typically encompass actions like the removal and proper disposal of hazardous substances and chemicals, the sealing or plugging of abandoned wells, the dismantling of structures with materials either being reused, recycled or disposed of appropriately. Additionally, it involves the management of waste, addressing issues related to the quality of surface water and groundwater resulting from spills and leaks, and the restoration of land to a condition or economic value comparable to its pre-development state. In the case of oil sands mining, this process also involves the management of tailings ponds.

Technological solutions aimed at repurposing or extending the life of assets after production ceases, such as repurposing pipelines for carbon dioxide (CO₂) storage or low-carbon fuel transport, are currently under exploration. However, their effectiveness and economic viability are yet to be fully demonstrated.

To proactively address potential impacts, the planning for closure must be initiated during the project's early phases. Failure to designate responsible parties and allocate funds can result in closed oil and gas facilities creating enduring environmental challenges and imposing financial burdens on communities and governments.¹¹

- **Use of materials:** The choice and volume of materials employed by organisations in the oil and gas sector can reflect their reliance on natural resources and the impact on resource availability. The specific environmental consequences hinge on how the organisation sources, utilises and disposes of these materials.

Within the sector, a substantial portion of material use is associated with oil and gas extraction, development, production and processing activities. Materials like concrete, cement, steel and various metals are vital for the construction of offshore platforms, onshore facilities, and for the equipment and infrastructure essential for oil and gas extraction, processing and transportation (including items like valves, tubing and pipelines). Additionally, significant quantities of chemicals are employed during drilling and well completion processes.

The oil and gas sector can adopt practices that enhance material efficiency, whether by leveraging its considerable purchasing power to promote the responsible production of materials or by implementing circularity initiatives aimed at reusing or recycling materials from decommissioned structures, such as steel and concrete.¹²

¹¹ GRI (2021) [GRI 11: Oil and gas sector 2021](#).

¹² GRI (2021) [GRI 11: Oil and gas sector 2021](#).

Table 10: Illustrative priority and transformative actions for the oil and gas sector

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Land, freshwater and ocean use change	Exploration, development	For new developments, avoid all protected areas, internationally recognised areas and critical habitat (including but not limited to Natura 2000 sites or geography-specific equivalent network or standard).	EU Article 6(4) Habitats Directive 92/43/ EEC SBTN Targets GBF – Target 3					
	Exploration, development, production	For new developments, avoid natural habitat and commit to net gain (not no net loss) when avoidance not practicable. Focus development in modified habitat and commit to net gain/ restoration.	GBF – Targets 1, 2, 3, 4 IFC SD 6					
	Exploration, development, production	For new developments and all operating sites, restore and regenerate nature by introducing innovative and nature-based solutions and implement habitat restoration and reinstatement after clearance/ decommissioning.	GBF – Targets 2, 3, 11, 12 SDG 15					
	Development, refining, processing	Research or fund innovative ways to reduce the negative impact of the operating process by collaborating with peers or research institutes.	GBF – Target 11					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Climate change	Production, Refining, Processing	Invest in building and site resilience (e.g. thermal comfort with natural shading, green-roofs passive heating and cooling).	GBF Target 8					
	Production, refining, processing, transportation	Reduce operational and transport greenhouse gas emissions.	TCFD Paris Agreement					
Pollution/pollution removal	Closure and rehabilitation	Recycle end-of-life and/or abandoned facilities to restore and regenerate the site to avoid, prevent and reduce air, water and soil pollution generated by discarded facilities.	GBF – Target 7 SDG 6					
	Production, refining, processing, transportation	For new and operating sites, implement operational anti-pollution measures and monitoring plans, including but not limited to operational prevention and control plans (e.g. noise impact mitigation).	GBF – Target 7					
	Production, refining, processing	Take effective legal, policy and administrative measures to reduce pollution and waste risks and avoid introducing any harmful levels of pollutants to biodiversity and ecosystem functions and services. This includes but is not limited to excessive nutrients, hazardous chemicals and spills.	GBF – Target 7 SDG 12					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Pollution/ pollution removal	Exploration, development, production, refining, processing	For all new and operating sites, avoid construction, maintenance and production in/during breeding, nesting, migrating, resting areas and seasons of key and threatened local species.	GBF – Target 4					
	Production, refining, processing	For operating sites, minimise negative impacts on threatened species and restore and regenerate local genetic diversity.	GBF – Targets 4, 5, 6					
	Exploration, development, production, refining, processing, storage	For all sites, reduce disturbances (e.g. light and noise), especially in already-existing, highly-sensitive operational sites.	GBF – Targets 4, 5, 6					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Resource use/ replenishment	Production, refining, processing	For operating sites, reduce water use in times of scarcity and implement sustainable water management that may include but not be limited to periodic water risk assessment and minimisation of freshwater withdrawals in water-stressed areas or during drought periods (accounting for company-specific available data).	GBF Target 11 Water Framework Directive (EU) Integrated Water Resources Management (UNEP) SDG 6					
	Production, refining, processing	For operating sites, implement water replenishment programmes and conservation/restoration of water species affected by water withdrawals.	SDG 6 Net Positive Water Impact – CEO Water Mandate					
Climate change	Production, refining, processing, transportation	Reduce operational and transport greenhouse gas emissions.	TCFD Paris Agreement					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Pollution/ pollution removal	Closure and rehabilitation	Recycle end-of-life and/or abandoned facilities to restore and regenerate the site to avoid, prevent and reduce air, water and soil pollution generated by discarded facilities.	GBF – Target 7 SDG 6					
	Production, refining, processing, transportation	For new and operating sites, implement operational anti-pollution measures and monitoring plans, including but not limited to operational prevention and control plans (e.g. noise impact mitigation).	GBF – Target 7					
	Production, refining, processing	Take effective legal, policy and administrative measures to reduce pollution and waste risks and avoid introducing any harmful levels of pollutants to biodiversity and ecosystem functions and services. This includes but is not limited to excessive nutrients, hazardous chemicals and spills.	GBF – Target 7 SDG 12					
	Exploration, development, production, refining, processing	For all new and operating sites, avoid construction, maintenance and production in/during breeding, nesting, migrating, resting areas and seasons of key and threatened local species.	GBF – Target 4					
	Production, refining, processing	For operating sites, minimise negative impacts on threatened species and restore and regenerate local genetic diversity.	GBF – Targets 4, 5, 6					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
	Exploration, development, production, refining, processing, storage	For all sites, reduce disturbances (e.g. light and noise), especially in already-existing, highly-sensitive operational sites.	GBF – Targets 4, 5, 6					
Resource use/ replenishment	Production, refining, processing	For operating sites, reduce water use in times of scarcity and implement sustainable water management that may include but not be limited to periodic water risk assessment and minimisation of freshwater withdrawals in water-stressed areas, or during drought periods (accounting for company-specific available data).	GBF Target 11 Water Framework Directive (EU) Integrated Water Resources Management (UNEP) SDG 6					
	Production, refining, processing	For operating sites, implement water replenishment programmes and conservation/restoration of water species affected by water withdrawals.	SDG 6 Net Positive Water Impact – CEO Water Mandate					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Resource use/ replenishment	Production, refining, processing	For all operating sites, maximise recovery of process water (e.g. water reuse/recycling, closed loops) by collecting, quantifying and mapping on-the-ground water use and mitigation policies already in place; identify potential regeneration/restoration of areas at higher risk of depletion.	GBF Target 11 Water Framework Directive (EU) CDSB Framework on water-related disclosures SDG 6 International Water Stewardship Standard (AWS)					
	Production, refining, processing	Use innovative, habitat-enhancing, biodiversity-friendly, sustainable materials and solutions (e.g. wind turbines from fabric, turbine reefs) to replace highly negatively impactful material, through collaboration with suppliers.	SDG 12					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
	All	Establish collaboration with Indigenous Peoples, Local Communities and local conservation organisations to continue to monitor habitat restoration processes and implement larger scale conservation and restoration projects in the site area/ region.	GBF – Target 2					
	Production	For raw materials used in high volumes during production, commit to integrating recycled materials in the value chain to reduce and avoid the use of virgin materials.	GBF – Target 8 SDG 12					
Invasive species introduction/ removal	Transportation, exploration, development, production, processing	For operating sites, eliminate invasive alien species by identifying and managing pathways of introduction (e.g. ballast water management, hygiene and maintenance protocols for vehicles, vessels and equipment, and contractors) and restore genetic diversity within and between populations of native, wild and domesticated species.	GBF – Targets 4, 5, 6					
	All	Use site-specific, indigenous and non-invasive species for landscaping and rehabilitation works.	GBF – Targets 4, 5					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Social	All	Involve and employ local expertise through Indigenous Peoples, Local Communities, NGOs and local stakeholders to better understand local ecosystems, assess onsite activities, mitigate risks and impacts for local communities, and build alliances.	SDG 4, 8, 10					
	All	Implement social programmes to promote local livelihoods and education	SDG 4, 8, 10					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Land, freshwater and water ocean use change	Supply sourcing for all activities	Source from suppliers that regularly monitor, assess and transparently disclose their impacts, dependencies and risks on natural capital and biodiversity.	GBF – Targets 2, 3, 15					
	Supply sourcing for all activities	Source and engage with suppliers who commit to no negative impact on UNESCO sites, sensitive or priority habitats.	GBF – Targets 2, 3, 15					
	Decommissioning	Source and engage with suppliers who implement and promote habitat restoration and reinstatement in and around the site – for new and existing sites and/or after clearance/ decommissioning (including ecological corridors).	GBF – Targets 2, 3, 15					
	Supply sourcing for all activities	Develop policies and administrative measures with suppliers to reduce negative impacts on the surrounding natural capital.	GBF – Targets 2, 3, 15					
	Supply sourcing for all activities	Support and engage suppliers to increase understanding of the risks and opportunities of reducing and avoiding negative impacts on natural capital, ecosystem services and biodiversity.	GBF – Targets 2, 3, 15					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Climate change	Supply sourcing for all activities	Source and engage with suppliers with a transparent climate strategy and targets and with clear actions to reduce their GHG emissions.	TCFD Paris Agreement GBF – Target 8					
Pollution/ pollution removal	Supply sourcing for all activities	Prioritise suppliers who have implemented anti-pollution measures, periodically monitor their impact and have a response plan in place.						
	Supply sourcing for production, processing and refining activities	Collaborate and engage with suppliers to develop and implement a circular business model to reduce direct operational waste.	GBF – Targets 14, 15 SDG 12					
	Supply sourcing for all activities	Source and engage with suppliers committed to sustainable production.	GBF – Targets 14, 15 SDG 12					
	Supply sourcing for all activities	Source and engage with suppliers that minimise negative impacts and disturbances during critical reproductive and feeding seasons of key species.	GBF – Targets 14, 15					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Resource use/ replenishment	Supply sourcing for all activities	Adopt third-party certification and traceability procedures for raw materials used in production stage.	GBF – Target 15					
	Supply sourcing for production, processing and refining activities	Prioritise suppliers that have in place sustainable water management plans, minimise freshwater withdrawals and maximise water recovery.	GBF – Targets 11, 14 Water Framework Directive (EU) CDSB Framework on water-related disclosures SDG 6					
	Supply sourcing for all activities	Source commodities only/mostly from ethical and environmentally certified suppliers.	SDG 12					
	Supply sourcing for all activities	Use certified sustainable raw materials and include thorough procurement and traceability processes along the supply chain.						

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Invasive species introduction/removal	Supply sourcing for transportation activities	Prioritise suppliers who measure and monitor invasive alien species and have policies in place to address their introduction.						
Social	Supply sourcing for all activities	Prioritise suppliers who ethically source and produce their products.	GBF – Targets 14, 15					
	Supply sourcing for all activities	Engage with suppliers to be transparent on local livelihood impacts.	GBF – Targets 14, 15					

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Land-use change (Land degradation disrupts ecosystems and ecosystem services, increasing biodiversity loss and habitat fragmentation)	Upstream, Midstream	For new developments, commit to no negative impacts on UNESCO sites, sensitive or priority habitats, Key Biodiversity Areas and High Conservation Value Areas (including but not limited to Natura 2000 sites or geography specific equivalent network or standard).						
		For new developments, avoid sites with threatened species, commit to No Net Biodiversity Loss, limit reducing ecosystem services and functioning (e.g. flood control, water purification), and mitigate negative impacts by restoring and regenerating nature.						
		For new developments and all operating sites, restore and regenerate nature by introducing innovative and nature-based solutions and implement habitat restoration and reinstatement after clearance/ decommissioning.						
		Research or fund innovative ways to reduce the negative impact of the operating process by collaborating with peers or research institutes.						

Driver of nature change	Activity (illustrative)	Priority actions	Global frameworks alignment	SBTN Action Framework (AR3T)				
				Avoid	Reduce	Regenerate	Restore	Transform
Resource use/ replenishment (Significant water use depletes water basins and watersheds, increasing risks to production processes and contributing to ecosystem degradation and drought severity)	Upstream, Midstream	Reduce water use in times of scarcity and implement sustainable water management, which may include but not be limited to periodic water risk assessment and minimisation of freshwater withdrawals in water-stressed areas or during drought periods (accounting for company-specific available data).						
	Midstream	Maximise recovery of process water (e.g. water reuse/ recycling, closed loops) and identify areas at higher risk of depletion for potential regeneration/restoration.						
	Upstream, Midstream	For operating sites, implement water replenishment programmes and conservation/restoration of water species affected by water withdrawals by using innovative technological and nature-based solutions.						
	Supply chain	Collaborate with local conservation organisations to continue to monitor habitat restoration processes and implement larger scale conservation and restoration projects in the site area/region.						

Source: WBCSD (2023) [Roadmap to nature positive: Foundations for energy system](#). Note the table has been adjusted to match the TNFD categorisation of drivers of nature change.

P2 P2: Target setting and performance management

Guiding question:

How will we set targets and define and measure progress?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#), which includes additional guidance on target setting in this component P2.

Organisations may wish to refer to the target-setting methods developed by the Science Based Targets Network and the [summary guidance on SBTN's methods for setting science-based targets for nature](#), which the TNFD has co-developed with the Science Based Targets Network (SBTN).

Relevant standards and frameworks for oil and gas sub-sector targets include, but are not limited to:

- [GRI Sector Standard for Oil and Gas \(GRI 11\)](#);
- [Oil & Gas – Exploration & Production SASB Standard \(version 2023-12\)](#).
- [SBTN](#);
- [TCFD](#);
- [Global Biodiversity Framework](#);
- [CDP](#);
- [SBTi \(Oil and Gas\)](#);
- [WWF: Contextual and Science Based targets for Water](#);
- [CEO Water Mandate: Exploring the case for corporate context-based water target](#); and
- [SDG Goal 6: Clean water and sanitation](#).

When companies are applying the TNFD framework to set targets for methane leak reductions, the TNFD recommends they seek to align with or exceed the [Global Methane Pledge](#).

P3 P3: Reporting

Guiding question:

What will we disclose in line with the TNFD recommended disclosures?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

P4 P4: Presentation

Guiding question:

Where and how do we present our nature-related disclosures?

As for all components, refer to the [Guidance on the identification and assessment of nature-related issues: The LEAP approach](#).

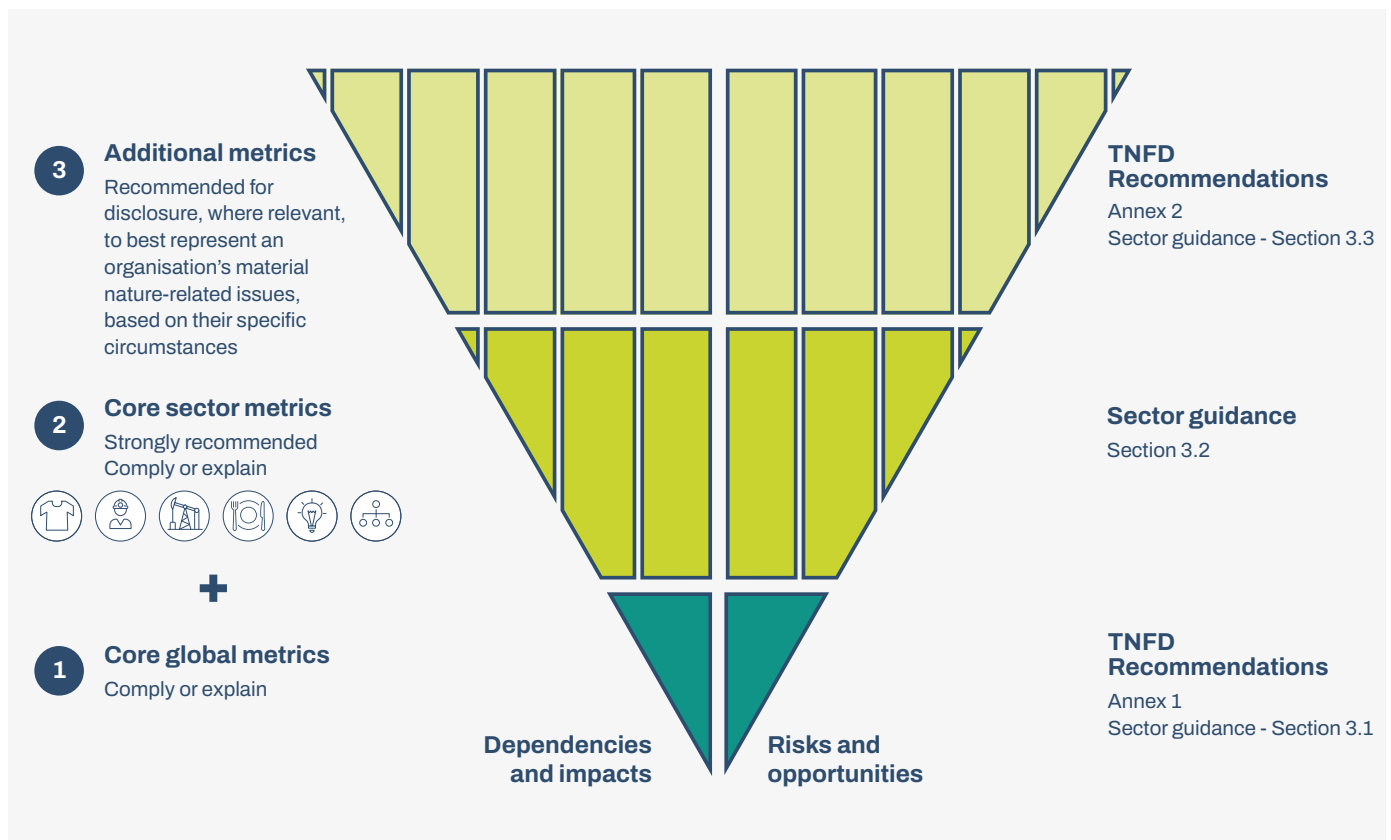
3. Sector-specific disclosure metrics and related guidance – oil and gas

Sector-specific metrics form an important part of the TNFD's measurement architecture (see Figure 4). This reflects the diversity of business models across value chains and their interface with nature across and within sectors. Sector-specific metrics help financial institutions to compare organisations within the same sector, which often face similar nature-related issues.

This section provides the TNFD sector-specific metrics for the oil and gas sector. It includes:

- Guidance on the application of the core global disclosure indicators and metrics to the oil and gas sector (Section 3.1); and
- Core and additional disclosure indicators and metrics for the oil and gas sector (Sections 3.2 and 3.3).

Figure 4: TNFD disclosure measurement architecture



Where available, the TNFD's recommended metrics for disclosure draw from a range of existing standards and frameworks including the IFRS Sustainability Disclosure Standards, Sustainability Accounting Standards Board (SASB) Standards – in particular [Oil & Gas – Exploration & Production](#), GRI standards in particular [GRI 11 for oil and gas](#), the CDP disclosure platform, the Kunming-Montreal Global Biodiversity Framework and other relevant UN frameworks, ESRS and others. A number of organisations, including standard-setting organisations, continue to work on identifying relevant sector-level assessment and reporting metrics. The Taskforce recommends that report preparers stay engaged with year-on-year progress on these developments and implement the latest definitions within their risk management processes and disclosures. The TNFD is working closely with standard-setting organisations and others and will periodically update this guidance on recommended sector metrics for disclosure in line with these ongoing initiatives.

Organisations in the oil and gas sector should refer to Annex 1 of the [TNFD Recommendations](#) for further information on the core global disclosure metrics. As outlined in the TNFD Recommendations, core global disclosure metrics should be reported on a comply or explain basis, with the exception of the placeholder metrics.

Where organisations are unable to report against any of the core global metrics, they should provide a short explanatory statement as to why they have not reported those metrics. An organisation should report on the core global disclosure metrics unless:

- It has not been identified as relevant and material to the organisation, e.g. not relevant to business activities or the location the organisation is operating in, or not found to be a material issue for the organisation; or
- It has been identified as relevant and material, but the organisation is unable to measure it due to limitations with methodologies, access to data or because the information is commercially sensitive. In this case, organisations should explain how they plan to address this in future reporting periods.

Companies should report on the same basis for the core sector disclosure metrics outlined in Section 3.2.

Organisations are also encouraged to draw on the TNFD additional sector disclosure indicators and metrics outlined in Section 3.3 and any other relevant metrics to represent most accurately the organisation's nature-related dependencies, impacts, risks and opportunities.

1 Core global metrics



3.1. Guidance on the application of the core global disclosure metrics

This section provides guidance, where relevant, on how to apply the TNFD core global disclosure metrics in the oil and gas sector. If no further sector specific guidance is provided, organisations should refer to the core global disclosure metrics.

As outlined above, core global disclosure metrics should be reported on a comply or explain basis following the guidance for the oil and gas sector where provided.

For the placeholder indicators on invasive alien species and the state of nature, the TNFD encourages organisations to consider and report against these indicators where possible, but are not expected on a comply or explain basis. There are not yet widely accepted metrics for these indicators, but the Taskforce recognises their importance, and will continue to work with knowledge partners to develop further guidance on these metrics.

Table 11: Guidance on the application of the core global disclosure metrics

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Land/freshwater/ocean-use change	C1.0	Total spatial footprint	Total spatial footprint (km ²) (sum of): <ul style="list-style-type: none"> Total surface area controlled/ managed by the organisation, where the organisation has control (km²); Total disturbed area (km²); and Total rehabilitated/restored area (km²). 	In reporting this core global disclosure metric, the organisation should include: <ul style="list-style-type: none"> Area that is owned, leased and/or operated (e.g. rights-of-way, easements and area concessions) in the exploration, production (drilling, completion or fracturing) and decommissioning phases, as well as recently decommissioned sites or sites being restored. 	SASB Standard (2023) Disclosures EM-SV-160a.1, EM-MD-160a.3

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Land/freshwater/ocean-use change	C1.1	Extent of land/freshwater/ocean-use change	Extent of land/freshwater/ ocean ecosystem use change (km ²) by: <ul style="list-style-type: none"> Type of ecosystem;¹³ and Type of business activity. 	No further sector specific guidance; refer to the core global disclosure metric.	TNFD
Land/freshwater/ocean-use change	C1.1	Extent of land/freshwater/ocean-use change	Extent of land/freshwater/ ocean ecosystem conserved or restored (km ²), split into: <ul style="list-style-type: none"> Voluntary; and Required by statutes or regulations. 	An organisation should report area conserved and restored separately, if data is available.	TNFD
Land/freshwater/ocean-use change	C1.1	Extent of land/freshwater/ocean-use change	Extent of land/freshwater/ ocean ecosystem that is sustainably managed (km ²) by: <ul style="list-style-type: none"> Type of ecosystem;¹⁴ and Type of business activity. 	No further sector specific guidance; refer to the core global disclosure metric.	TNFD
Pollution/pollution removal	C2.0	Pollutants released to soil split by type	Pollutants released to soil (tonnes) by type, referring to sector-specific guidance on types of pollutants.	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

13 When disclosing on ecosystem types, refer to the International Union for Conservation of Nature [Global Ecosystem Typology](#)

14 When disclosing on ecosystem types, refer to the International Union for Conservation of Nature [Global Ecosystem Typology](#)

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Pollution/pollution removal	C2.1	Wastewater discharged	<p>Volume of water discharged (m³), split into:</p> <ul style="list-style-type: none"> • Total; • Freshwater; and • Other.¹⁵ <p>Including:</p> <ul style="list-style-type: none"> • Concentrations of key pollutants in the wastewater discharged, by type of pollutant, referring to sector-specific guidance for types of pollutants; and • Temperature of water discharged, where relevant. 	<p>In reporting this core global disclosure metric, the organisation should include:</p> <ul style="list-style-type: none"> • The volume of produced water and flowback generated. <p>This should be broken down by percentage:</p> <ul style="list-style-type: none"> • Discharged; • Injected; and • Recycled. <p>Pollutants to report under this core global disclosure metric include:</p> <ul style="list-style-type: none"> • Hydrocarbons in both produced water and process wastewater (mg/litre); and • Chemical additives, metals, naturally occurring radioactive material (NORM) and salts. <p>In reporting this core global disclosure metric, the organisation should include the number of incidents of non-compliance associated with water quality permits, standards and regulations. Typical parameters of concern include hydrocarbons (including oil and grease), chemical oxygen demand (COD), biochemical oxygen demand (BOD), sulphides, ammonia, phenols, total suspended solids (TSS) and total dissolved solids (TDS).</p>	GRI 11: Oil and Gas Sector 2021; SASB Standard (2023) Disclosure EM-EP-140a.2

¹⁵ Freshwater: (≤1,000 mg/L Total Dissolved Solids). Other: (>1,000 mg/L Total Dissolved Solids). Reference: [GRI \(2018\) GRI 303-4 Water discharge](#)

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Pollution/pollution removal	C2.2	Waste generation and disposal	<p>Weight of hazardous and non-hazardous waste generated by type (tonnes), referring to sector-specific guidance for types of waste. Weight of hazardous and non-hazardous waste (tonnes) disposed of, split into:</p> <ul style="list-style-type: none"> • Waste incinerated (with and without energy recovery); • Waste sent to landfill; and • Other disposal methods. <p>Weight of hazardous and non-hazardous waste (tonnes) diverted from landfill, split into waste:</p> <ul style="list-style-type: none"> • Reused; • Recycled; and • Other recovery operations. 	<p>In reporting this core global disclosure metric, the organisation should include a breakdown by:</p> <ul style="list-style-type: none"> • Drilling waste (muds and cuttings); • Scale and sludges; and • Tailings. <p>In reporting this core global disclosure metric, the organisation should include:</p> <ul style="list-style-type: none"> • Waste that possesses any of the characteristics contained in Annex III of the Basel Convention, or that is considered to be hazardous by national legislation, including the percentage of transported waste shipped internationally (tonnes). 	GRI 11: Oil and Gas Sector (2021) and GRI 306-3 Waste and Effluents (2016)

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Pollution/pollution removal	C2.3	Plastic pollution	<p>Plastic footprint as measured by total weight (tonnes) of plastics (polymers, durable goods and packaging) used or sold broken down into the raw material content.¹⁶</p> <p>For plastic packaging, percentage of plastics that is:</p> <ul style="list-style-type: none"> • Re-usable; • Compostable; • Technically recyclable; and • Recyclable in practice and at scale. 	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

¹⁶ Raw material content: % of virgin fossil-fuel feedstock; % of post-consumer recycled feedstock; % of post-industrial recycled feedstock; % of virgin renewable feedstock.

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Pollution/pollution removal	C2.4	Non-GHG air pollutants	<p>Non-GHG air pollutants (tonnes) by type:</p> <ul style="list-style-type: none"> • Particulate matter (PM_{2.5} and/or PM₁₀); • Nitrogen oxides (NO₂, NO and NO₃); • Volatile organic compounds (VOC or NMVOC); • Sulphur oxides (SO₂, SO, SO₃, SO_x); and • Ammonia (NH₃). 	<p>Additional pollutants to report under this core global disclosure metric include:</p> <ul style="list-style-type: none"> • Hazardous air pollutants (HAP), such as benzene (C₆H₆), hydrogen sulphide (H₂S) and ozone (O₃). <p>Reporting under this core global disclosure metric should include air emissions released during: production and processing; refining, distribution and storage; flaring and venting; fuel combustion for powering machinery; transportation of supplies and products; evaporation losses; fugitive emissions from equipment leaks and failures; process-safety incidents and events; and fuel combustion by end-users.</p>	GRI 11: Oil and Gas Sector (2021)
Resource use/replenishment	C3.0	Water withdrawal and consumption from areas of water scarcity	Water withdrawal and consumption ¹⁷ (m ³) from areas of water scarcity, including identification of water source. ¹⁸	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

¹⁷ Water consumption is equal to water withdrawal less water discharge. Reference: GRI (2018) [GRI 303-5](#)

¹⁸ Surface water; groundwater; seawater; produced water; third-party water. Reference: GRI (2018) [GRI 303-3](#)

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
Resource use/ replenishment	C3.1	Quantity of high-risk natural commodities sourced from land/ ocean/ freshwater	Quantity of high-risk natural commodities ¹⁹ (tonnes) sourced from land/ocean/ freshwater, split into types, including proportion of total natural commodities.	No further sector specific guidance; refer to the core global disclosure metric.	TNFD
Resource use/ replenishment	C3.1	Quantity of high-risk natural commodities sourced from land/ ocean/ freshwater	Quantity of high-risk natural commodities ²⁰ (tonnes) sourced under a sustainable management plan or certification programme, including proportion of total high-risk natural commodities.	No further sector specific guidance; refer to the core global disclosure metric.	TNFD
Invasive alien species and other	C4.0	Placeholder indicator: Measures against unintentional introduction of invasive alien species (IAS) ²¹	Proportion of high-risk activities operated under appropriate measures to prevent unintentional introduction of IAS, or low-risk designed activities.	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

19 Users should refer to the Science Based Targets Network (SBTN) [High Impact Commodity List \(HICL\)](#), species listed as vulnerable, endangered or critically endangered on the [IUCN red list](#), and species listed in [appendix I, II and III of CITES](#).

20 Users should refer to the Science Based Targets Network (SBTN) [High Impact Commodity List \(HICL\)](#), species listed as vulnerable, endangered or critically endangered on the [IUCN red list](#), and species listed in [appendix I, II and III of CITES](#).

21 Due to the measurement of levels of invasive species for organisations being a developing area, the chosen indicator focuses on whether an appropriate management response is in place for the organisation. The additional sets of metrics contain measurement of the level of invasive species within an area. The TNFD intends to do further work with experts to define 'high-risk activities' and 'low-risk designed activities'.

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
State of nature	C5.0	Placeholder indicator: Ecosystem condition	<p>For those organisations that choose to report on state of nature metrics, the TNFD encourages them to report the following indicators, and to refer to the TNFD additional guidance on measurement of the state of nature in Annex 2 of the LEAP approach:</p> <ul style="list-style-type: none"> • Level of ecosystem condition by type of ecosystem and business activity; • Species extinction risk. <p>There are a number of different measurement options for these indicators. The TNFD does not currently specify one metric as there is no single metric that will capture all relevant dimensions of changes to the state of nature and a consensus is still developing. The TNFD will continue to work with knowledge partners to increase alignment.</p>	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

Driver of nature change/ Other metric category	Metric no.	Core global indicator	Core global metric	Guidance for sector	Source
State of nature	C5.0	Placeholder indicator: Species extinction risk	<p>For those organisations that choose to report on state of nature metrics, the TNFD encourages them to report the following indicators, and to refer to the TNFD additional guidance on measurement of the state of nature in Annex 2 of the LEAP approach:</p> <ul style="list-style-type: none"> • Level of ecosystem condition by type of ecosystem and business activity; • Species extinction risk. <p>There are a number of different measurement options for these indicators. The TNFD does not currently specify one metric as there is no single metric that will capture all relevant dimensions of changes to the state of nature and a consensus is still developing. The TNFD will continue to work with knowledge partners to increase alignment.</p>	No further sector specific guidance; refer to the core global disclosure metric.	TNFD
Climate change		GHG emissions	Refer to IFRS S2 Climate-related Disclosures	No further sector specific guidance; refer to the core global disclosure metric.	TNFD

2 Core sector metrics



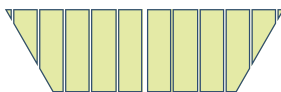
3.2. Core sector disclosure indicators and metrics

The TNFD core sector disclosure metrics for the oil and gas sector are outlined below. These metrics are recommended by the TNFD to be disclosed by all report preparers in the sector on a comply or explain basis.

Table 12: Core sector disclosure indicators and metrics

Metric category	Metric subcategory	Metric no.	Indicator	Core sector metrics	Source
Impact driver	Land/freshwater/ocean-use change	OG.C1.0	Site location in Indigenous territories	Area (km ²) and proportion (%) of land owned or controlled/ managed in Indigenous territories.	TNFD
Impact driver	Pollution/pollution removal	OG.C2.0	Volume of hydrocarbon spills	The number and volume of hydrocarbon spills greater than 1 bbl, volume affecting sensitive locations and volume recovered (bbls).	SASB EM-MD-160a.4

3 Additional metrics



3.3. Additional sector disclosure indicators and metrics

The TNFD additional sector disclosure metrics for the oil and gas sector are outlined below. The TNFD encourages all report preparers in the sector to draw on these and any other relevant metrics where relevant to best represent an organisation’s material nature-related dependencies, impacts, risks and opportunities.

Table 13: Additional sector disclosure indicators and metrics

Metric category	Metric subcategory	Metric no.	Indicator	Core additional metrics	Source
Impact driver	Invasive alien species and other	OG.A4.0	Invasive alien species management	Quantity (number) of invasive alien species identified. Quantity (number) of invasive alien species removal programmes underway. Volume and quantity (number) of invasive alien species removed.	TNFD
Impact driver	Land/freshwater/ocean-use change	OG.A1.0	Operations where Indigenous Peoples are present or affected	Number and area (km ²) of operations where Indigenous Peoples are present or affected by activities of the organisation.	GRI 11.17.3
Impact driver	Land/freshwater/ocean-use change	OG.A1.1	Reserve’s location in proximity to Indigenous territories	The proportion (%) of (1) proved and (2) probable reserves in or near Indigenous territories.	SASB EM-EP-210a.2
Impact driver	Land/freshwater/ocean-use change	OG.A1.2	Reserves in sensitive locations	Proportion (%) of (1) proved and (2) probable reserves in or near sites with protected conservation status or endangered species habitat.	SASB EM-EP-160a.3

Metric category	Metric subcategory	Metric no.	Indicator	Core additional metrics	Source
Impact driver	Land/freshwater/ocean-use change	OG.A1.3	Spatial footprint in or near sites with protected conservation status or endangered species habitat.	Proportion (%) of total spatial footprint in or near sites with protected conservation status or endangered species habitat.	TNFD
Impact driver	Pollution/pollution removal	OG.A2.0	Decommissioned structures	Number of decommissioned structures remaining in place.	GRI 11.7.5
Impact driver	Pollution/pollution removal	OG.A2.1	Decommissioning and associated remediation projects	Quantity (number) of decommissioning and associated remediation projects.	Ipieca ENV-8, A1
Response	Dependency, impact, risk and opportunity management: Changes to nature (dependency and impact): mitigation hierarchy steps	OG.A23.0	Process Safety Events	Number of Tier 1 and Tier 2 process safety events by business activity (e.g. exploration, development, production, closure and rehabilitation, refining, processing, transportation, storage).	GRI 11 (2021)



4. References

GRI (2021) [GRI 11: Oil and gas sector 2021](#).

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