Draft sector guidance
Electric utilities and power generators

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For market consultation and feedback

SASB sectors:
Electric utilities and power generators (IF-EU)

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Taskforce on Nature-related Financial Disclosures

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Draft for consultation

This sector guidance is a draft for consultation with market participants and other interested stakeholders. The Taskforce welcomes feedback provided via the TNFD website by 29 March 2024.

Feedback will be reviewed by the Taskforce and final sector guidance issued by the TNFD by 30 June 2024.

Introduction

The purpose of this guidance

In September 2023, the TNFD published its recommendations for disclosure of nature-related issues. Accompanying those recommendations is a set of additional guidance, including Guidance on the identification and assessment of nature-related issues: The LEAP approach. The TNFD recognises that there can be significant differences across sectors for corporates applying the LEAP approach. It has published this additional guidance to help power and utilities sector participants apply the LEAP approach in 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 recommended sector disclosure metrics for the power and utilities sector, including guidance on the application of the core global disclosure metrics and core and additional sector disclosure indicators and metrics. These complement the disclosure indicators and metrics outlined in Annexes 1 and 2 of the TNFD recommendations.

What this guidance covers

This guidance covers the value chain of organisations in the SASB electric utilities and power generators industry. This guidance, where relevant, is further broken down by power source: coal, gas and other fossil fuels, solar, wind, hydropower and nuclear (Box 1). For simplicity, all organisations in this industry are referred to as 'electric utilities and power generator sector organisations' in this guidance.

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.

Box 1: Power sources in scope of this guidance

Electric utilities and power generators:

- Coal, gas and other fossil fuels;
- Solar power;
- Wind power;
- Hydropower; and
- Nuclear power.

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

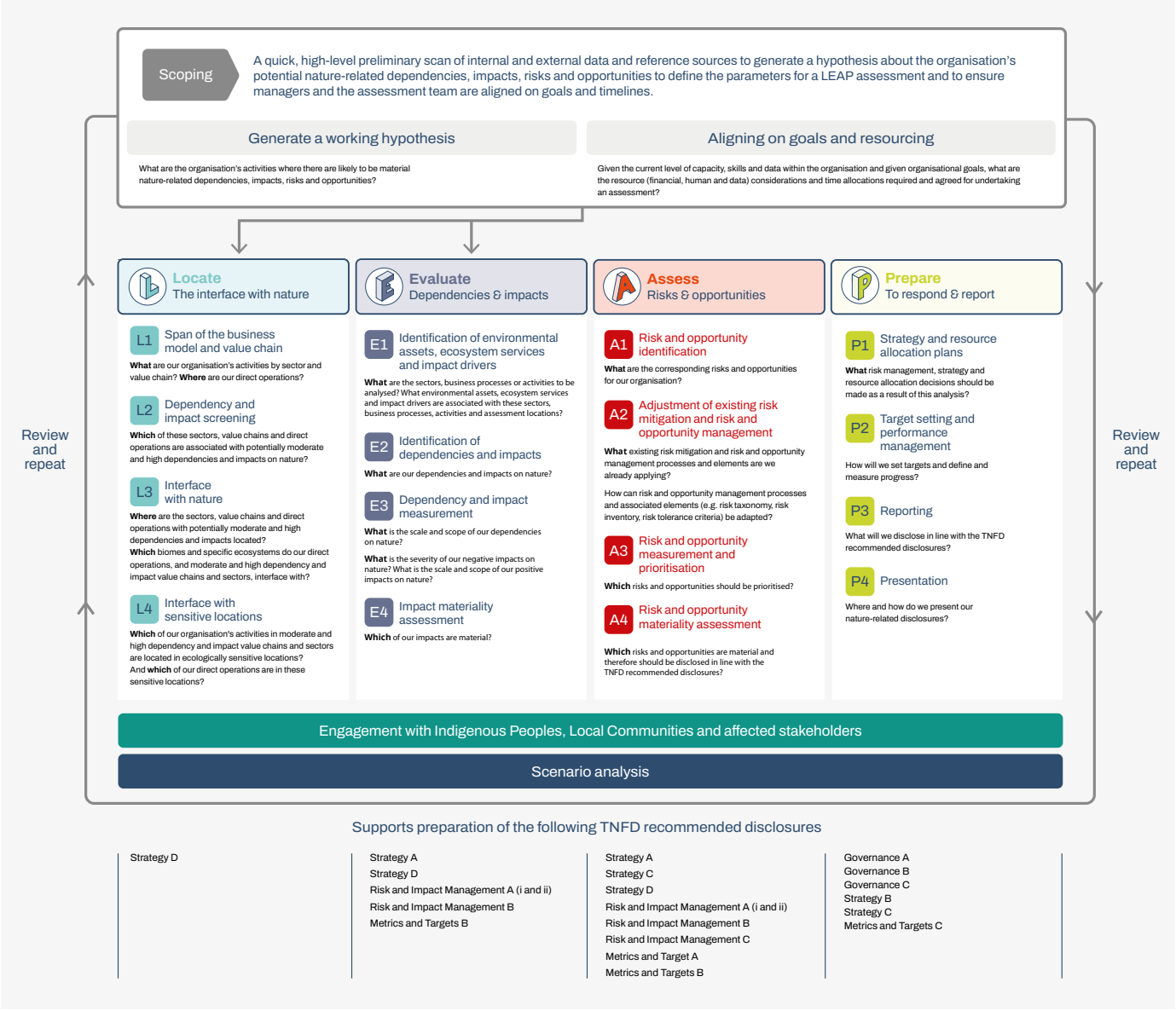


Table 1: Areas of LEAP with additional guidance for the electric utilities and power generators sector

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

Scoping a LEAP assessment

Working hypothesis generation:

What are the organisation's activities where there are likely 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?

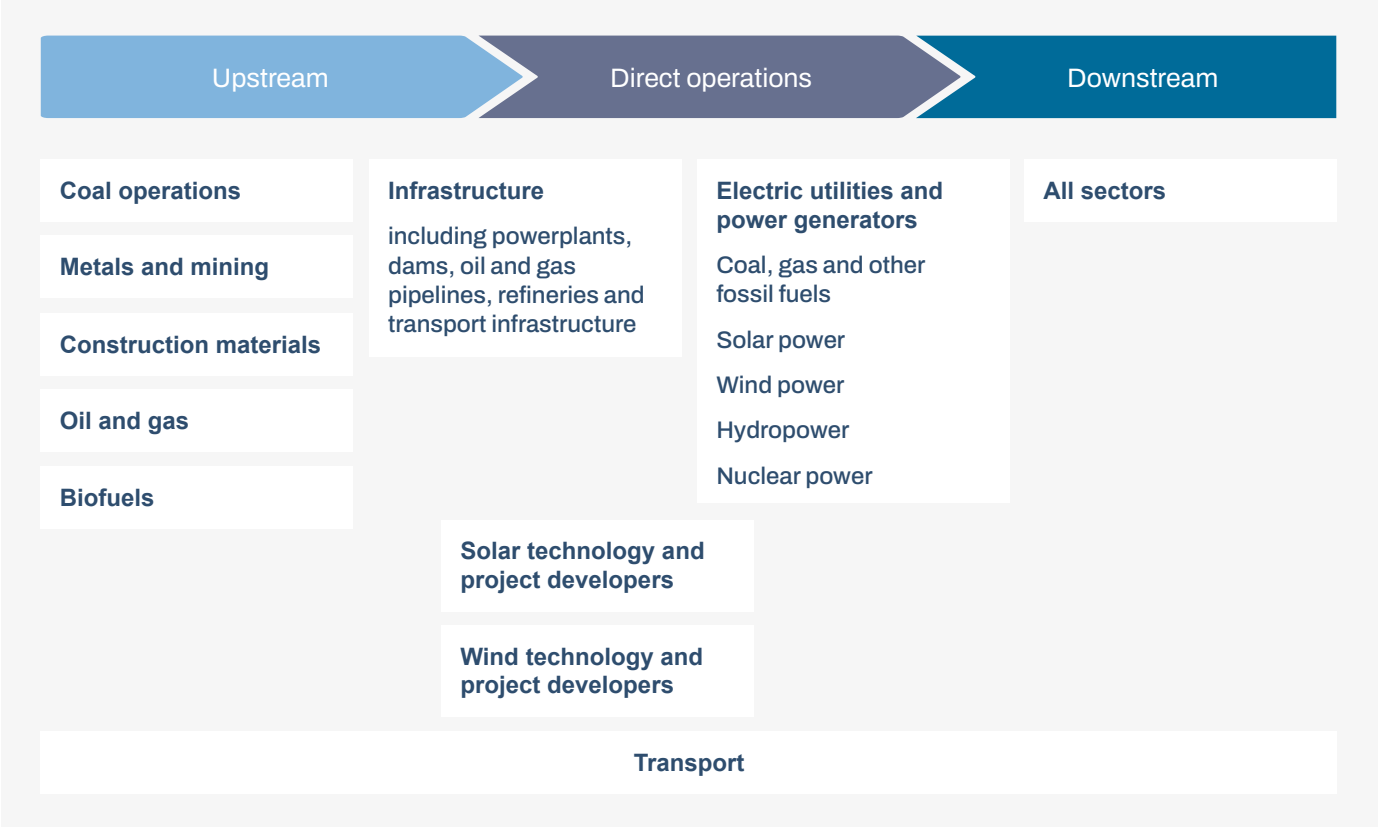
Companies should consider which technologies are within scope for both power sources and assets, for direct operations and across the value chain.

In addition to the cross-sector guidance on the LEAP approach, organisations in the power and utilities industry scoping their assessment should consider:

- Which power generation sources and technologies (e.g. wind, solar, nuclear, coal, oil and gas) are included in their direct operations and upstream and downstream value chains; and
- Which geographies transmission and distribution lines pass through, where readily available, considering the entire length of the line.

Organisations should also refer to the TNFD sector guidance for the oil and gas, metals and mining, and infrastructure sectors, where available, as well as any other relevant sectors in the value chain.

Figure 2: Overview of the electric utilities and power generators value chain



Locate the organisation's interface with nature

This section provides additional guidance to help electric utilities and power generators 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?

Organisations should map out the value chain – direct operations, upstream and downstream – including the technologies used (e.g. wind, solar, nuclear, coal, oil and gas) and commodities required as inputs. This should include:

- Extraction and processing of raw materials like coal, oil, gas and uranium;
- Extraction and processing of metals and minerals required for facility construction and maintenance, energy generation and storage, including steel, aluminium, copper, lithium, zinc, nickel and rare earth elements, and whether these are obtained from recycled sources;
- Construction of facilities and sites;
- Downstream energy users;
- Fuel and commodity transport; and
- Energy facility maintenance and end of life.

Where individual downstream users cannot be identified, organisations may want to consider the distribution of energy usage across sectors for each market where they operate. This will allow initial identification of potentially high dependency or impact downstream activities at the level required in Locate.

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?

In addition to the filters described in the cross-sector LEAP guidance, organisations may want to consider the ratings of different impact drivers and dependencies on ecosystem services for a selection of technologies shown in Table 2 and Table 3.

Table 2: Comparative assessment of the impact drivers of energy types and the potential to mitigate them

	Solar photovoltaics (PV) and Concentrated Solar Power (CSP)	Onshore wind	Offshore wind	Hydropower	Nuclear	Oil and gas	Coal
Land and ocean use change	Medium	Low	Low	High	Medium	Medium	High
Species overexploitation	Low	Low	Low	Medium	Medium	Medium	Medium
Invasive species and disease	Low	Low	Medium	Medium	Medium	High	Medium
Pollution	Low	Low	Low	Medium	Medium	High	Very high
Climate change	Low	Low	Low	Medium	Medium	Very high	Very high
Comparative life cycle results – natural land transformation	Medium	Low	Low	High	Medium	Medium	High
Comparative life cycle results – ecotoxicity	Medium	Low	Low	Low	Medium	High	High
Potential to address project-level impacts	Medium	Medium	Medium	Low	Medium	Low	Low
Potential for achieving nature-positive outcomes	Medium	Medium	Medium	Low	Medium	Low	Not applicable

Note: Impact categories based on the WWF classification from the 2020 Living Planet Report. Relative indicative mitigation potential applies to project-level impacts only, based on a broad literature review.

Source: CLEANaction (2023).

Table 3: Primary ecosystem services depended on by the power and utilities sector

		Nuclear and thermal power stations	Hydropower	Wind	Solar	Electric/nuclear power transmission and distribution
Direct physical inputs	Fibres and other materials					
	Groundwater	Medium	Medium		Very low	
	Surface water	Very high	Very high		Very low	
Enabling production processes	Water flow maintenance	Medium	Very high			
	Water quality	Low	Low			
Mitigating direct impacts	Bioremediation	Very low	Very low			
	Dilution by atmosphere and ecosystems	TBD[1]				
	Filtration	Low	Very low			
Protection from disruption	Global climate regulation	Very low	Very high	Very high	Very high	Medium to high[2]
	Flood and storm protection	Medium	High	Medium	Medium	Very high
	Mass stabilisation and erosion control	Low	High	Medium	Medium	High

Note: The ecosystem service classification used by ENCORE, the source of this table, differs from the classification used by TNFD guidance, based on the UN SEEA. A crosswalk is available from UN SEEA.

Source: ENCORE; WBCSD (2023) Roadmaps to nature positive: Foundations for the energy system.

1 Deviation from ENCORE scoring. Nuclear power plants are dependent on dilution by the atmosphere and ecosystems because of their discharges.

2 Deviation from ENCORE scoring. Electrical power distribution depends on the processes that regulate weather patterns.

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?

Organisations with power lines or other linear infrastructure in their value chains should consider all the biomes that their infrastructure crosses, rather than point coordinates.

Hydropower developers should also refer to the TNFD biome guidance for rivers and streams.

L4: Interface with sensitive locations

Guiding questions:

Which of our organisation's activities in moderate and high dependency and impact value chains and sectors are located in ecologically sensitive locations?

And which of our direct operations are in these sensitive locations?

When considering whether sites are important for biodiversity, organisations should also consider whether the site disrupts a migration route.

High integrity ecosystems and areas of importance for ecosystem services of particular interest could include free-flowing rivers. Only about one third of rivers longer than 1,000km are free-flowing and provide healthy, functional ecosystems, supporting livelihoods.[3]

List of datasets and tools

Table 4 provides a list of tools that organisations in the electrical utilities and power generators sector may find useful for the Locate phase of LEAP, in addition to those listed in the cross-sector LEAP guidance. These are all particularly useful for components L3 and L4 of LEAP.

Organisations should also reference tools in the LEAP guidance and TNFD tools catalogue.

3 CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.

Table 4: Additional tools for organisations in the electrical utilities and power generators sector for the Locate phase of LEAP

Tool name	Description
AVISTEP: the Avian Sensitivity Tool for Energy Planning	Tool for spatial assessment of avian sensitivity in relation to different types of energy infrastructure — wind farms (both on- and offshore), photovoltaic (PV) solar facilities, and overhead power lines. Currently covers India, Nepal, Thailand and Vietnam.
BirdLife Soaring Bird Sensitivity Map	Information on the distribution of soaring bird species across the Mediterranean, Middle East and North Africa.
The Nature Conservancy (TNC) Paris to Practice and Energy Sprawl tools	Visualise the trade-offs between energy, carbon emissions and land use based on the world's projected energy needs.
TNC SiteRight	Assess areas for wind and solar development for biodiversity sensitivity in the USA and India.
World Bank Energy Sector Management Assistance Program rezoning tool	Assesses environmental and socio-economic considerations for solar, onshore and offshore wind energy sites.
TMP Systems and International Rivers Riverscope Tool Future Dams programme TNC Hydropower by Design Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT)	Tools for identifying interfaces of hydropower projects with nature.
Ocean Data Viewer	A suite of global marine biodiversity and ecosystem service datasets made available by international scientific institutions and other organisations to inform decision making.
Important Marine Mammal Areas e-Atlas and database	Highlight priority areas for marine mammal conservation.

Evaluate dependencies and impacts on nature

This section provides additional guidance to help organisations in the electric utilities and power generators sector with the Evaluate phase of the LEAP approach.

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: Identification of dependencies and impacts

Guiding question:

What are our dependencies and impacts on nature?

When considering dependencies and impacts, organisations should consider each technology, value chain segment and commodity separately. Where companies have several sites (e.g. several windfarms or nuclear plants) the cumulative impacts on nature should be considered. While dependencies, impacts, risks and opportunities for individual assets may not appear significant due to the size of some facilities, it is important to consider the potential cumulative pressures on nature, especially when other industries are present in the same area. These cumulative impacts can result in more substantial impacts on nature and public health. At the same time, the impacts of other organisations and industries in the same area might amplify the organisation's own dependencies and risks in that location. Therefore, it is essential for companies to assess these cumulative impacts, to ensure that all stakeholders are aware of the potential impacts of their actions and can take appropriate measures to minimise systemic negative consequences.

Impacts

Table 5 sets out typical impact drivers and impacts for common business practices in this sector.

Beyond the scope of this guidance, upstream raw material extraction and the construction of facilities should be carefully considered. Companies can refer to additional guidance for the mining and metals, infrastructure and real estate sectors, where available.

Table 5: Business activities, impact drivers and potential impacts by technology

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
All				
Land clearance and use, and ocean and freshwater body floor conversion for energy facilities	Land, freshwater and ocean use change	**Land ecosystem use:** With poor siting, more than 10 million hectares of natural lands worldwide (an area the size of Iceland) could be cleared for wind and solar development as countries seek to meet their climate commitments under the Paris Agreement.	Organisations should consider not just the area converted or occupied, but also whether the site itself and any supporting infrastructure fragments any habitats. This land-use change can have knock-on effects on ecosystem services, particularly cultural services.	CLEANaction (2023); GRI G4
General operations	Pollution/pollution removal	**Non-GHG air pollutants:** Significant air emissions might include, but are not limited to, mercury, coal pile dust, ash lagoons or ponds, precipitator dust and reservoir draw down dust.	These emissions can lead to degradation of the quality of the surrounding air and ecosystems. Organisations should consider local air currents to determine which ecosystems might be affected.	
Coal, oil and gas				
Cooling	Resource use/ replenishment	**Water use:** Thermal power plants have substantial water requirements for their routine operating processes, e.g. production of steam and in cooling processes.	This withdrawal can lead to degradation of aquatic habitats and species and a reduction in the water supply for other users.	ENCORE, CDP 2023 water questionnaire W-EU13 on freshwater use
	Pollution/pollution removal	**Water pollutants:** Discharge of warm water.	Thermal plants might cause thermal water pollution and impact aquatic wildlife. Thermal pollution of more than 2°C can occur up to 3km from the discharge point.	

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Other operations	Climate change	**Greenhouse gas emissions:** Thermal power stations can release significant emissions.	See TCFD.	ENCORE
	Pollution/pollution removal	**Non-GHG air pollutants:** Thermal power stations emit sulphur dioxide, nitrogen oxides, particulate matter and carbon monoxide.	These emissions can lead to degradation of the quality of the surrounding air and ecosystems. Organisations should consider local air currents to determine which ecosystems might be affected.	
		Disturbances: Noise and light pollution.	Species can be affected by noise and light pollution during routine operation (e.g. movement of vehicles, and facility lighting).	
	Resource use/ replenishment	**Water use:** Water may be used for processing and consumption, including ash handling and coal cleaning.	This withdrawal can lead to degradation of aquatic habitats and species and a reduction in the water supply for other users.	
Waste	Pollutants/pollution removal	**Solid waste:** Forms of solid waste include resins, sludges and filter media.	The disposal of solid waste can lead to degradation of soil and release of other pollutants into the ecosystem if not well managed.	ENCORE; SASB IF0101-08 and IF0101-09

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Nuclear energy				
Cooling	Land/freshwater/ocean use change	**Freshwater ecosystem use:** Withdrawal of water for cooling.	When water is used for cooling thermal power stations, water withdrawal mechanisms can harm or kill aquatic species.	ENCORE, CDP 2023 W-EU13; Clark, B. (2019)
	Resource use/ replenishment	**Water use:** Nuclear power plants have substantial water requirements for their routine operating processes, e.g. production of steam and in cooling processes.	This withdrawal can lead to degradation of aquatic habitats and species and a reduction in the water supply for other users.	
	Pollutions/pollution removal	**Water pollutants:** Discharge of warm water.	Nuclear plants might cause thermal water pollution, affecting aquatic wildlife. Thermal pollution of more than 2°C can occur up to 3 km from the discharge point.	
Other operations	Invasive species and other	**Disturbances:** Noise and light pollution.	Species can be affected by noise and light pollution during routine operation (e.g. movement of vehicles) and if the facilities are lit.	ENCORE

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Waste	Pollution/pollution removal	**Soil, non-GHG air and water pollutants:** Nuclear accidents.	Even though very rare, the impacts of a nuclear accident severely impact the surrounding environment. The impact of radiation during normal operation is, however, very limited given compliance with regulatory controls. During decommissioning, the impacts are also very limited when waste is well managed. Nuclear power plants can also emit gases and radioactive substances (e.g. CH_{14} and H_3), which pollute vegetation and lead to decreases in soil productivity.	ENCORE; Hvistendahl, M. (2007)
		Solid waste: Nuclear power stations produce various types of solid waste, most importantly hazardous nuclear waste.	Nuclear waste requires careful treatment and storage to minimise potential impacts.	
Wind energy				
Construction	Land/freshwater/ocean use change	**Land and ocean ecosystem use:** Construction of wind farms leads to habitat modification, including fragmentation and degradation, both on land and the sea floor.	Organisations should consider the space between the wind turbines as well as the footprint of the turbines themselves. They should also consider the impact in the context of the condition of the surrounding habitat.	ENCORE; CLEANaction (2023); Galparsoro, I. et al. (2022); Bennun, L. et al. (2021a) Bennun, L. et al. (2021b)
	Pollution/pollution removal	**Disturbances:** Noise pollution and other.	Noise, particularly during construction of offshore facilities, can particularly affect whales, dolphins, sea turtles and some fish species. It can reach up to 80km away from the site in the marine environment during construction. Mammals and sea turtles also face risks of collision with construction and maintenance vessels.	

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Operation	Pollution/pollution removal	**Disturbances:** Noise pollution.	Noise pollution from windfarms during the operation phase is low, but this can affect marine mammals, fish and turtles. Disturbance to breeding and foraging birds has been recorded up to 800m around individual wind turbines.	ENCORE; Galparsoro, I. et al. (2022); Bennun, L. et al. (2021a) Bennun, L. et al. (2021b)
		Disturbances: Collisions.	Individual casualties (injury or death) through collision with turbine blades is common, especially for birds (including vulnerable species groups such as vultures, raptors, bustards, seabirds and many migratory species) and bats (collision and barotrauma). Turbine construction can disrupt birds' breeding and foraging behaviour and, if inappropriately sited, can lead to habitat destruction.	

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Solar energy				
Construction and operation	Land/freshwater/ocean use change	**Land ecosystem use:** Solar energy farms use land, which modifies habitats, contributing to degradation and fragmentation.	The footprint of a typical solar farm is estimated at 22.5-25.9 m^2/GWh. In assessing the impact, organisations should consider the space between the panels, as well as the footprint of the panels themselves, and the condition of the surrounding habitat. Placement on buildings will have much lower impacts than on previously unconverted land.	ENCORE; Bennun, L. et al. (2021a) Bennun, L. et al. (2021b); CLEANaction (2023)
		Freshwater and ocean ecosystem use: This should be considered for floating PV plants.	The impacts of floating solar PV plants are still being understood but may include shading effects from panels, and congregation with possible entanglement, though the likelihood appears low.	
Operation	Resource use/ replenishment	**Water use:** Significant for CSP technology. However, it is rather limited for PV systems.	This withdrawal can lead to degradation of aquatic habitats and species and a reduction in the water supply for other users. This is particularly significant in arid regions. Birds are the species most at risk.	ENCORE; Bennun, L. et al. (2021a) Bennun, L. et al. (2021b); CLEANaction (2023)

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Hydropower				
Initial flooding	Land/freshwater/ocean use change	**Land and freshwater ecosystem use:** Hydropower stations lead to a large increase in freshwater habitat (and loss of terrestrial habitat) upstream and a decrease in freshwater habitat downstream.	Dams have a significant impact on land and freshwater ecosystem use, and a permanent impact during operation, with knock-on effects on ecosystem services (e.g. those provided by wetlands, which can be flooded). This can affect terrestrial plants and animals through displacement and/or mortality, particularly for plants. This can lead to a loss of connectivity and also affect downstream ecosystems due to changes in the flow of water and sediment, with impacts all the way to the delta. Supporting infrastructure such as roads can also contribute to fragmentation and increased human activities in the area. Large dams may affect local communities' access to ecosystem services, including the loss of cultural services due to the change in ecosystem and population transfer because of village flooding, and the loss of provisioning services such as freshwater and fisheries.	ENCORE; Convention on Biological Diversity (2017); CLEANaction (2023)
		Land and freshwater ecosystem use: Dams may lead to habitat fragmentation due to the blockage in the river and the widening of the river into a lake upstream, or waterway modification caused by water retention/ dropping.	This fragmentation particularly affects aquatic species up and downstream that have their movement blocked, with migratory and range-restricted species the priority for assessment.	

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Operation	Land/freshwater/ocean use change	**Freshwater and terrestrial ecosystem use:** Change in water and sediment flows.	Hydropower can lead to sediment alteration, which can result in an increased likelihood of erosion, increased sedimentation or sediment starvation, as well as eutrophication. Hydropower plants can affect the amount of water available within a watershed by affecting water flow. This can in some cases increase the likelihood of downstream drought or increase the water level.	ENCORE; Convention on Biological Diversity. (2017); CDP (2023) W-EU1.2/W-EU1.3; CLEANaction (2023)
	Resource use/ replenishment	**Water use:** Some hydropower projects may lead to diversion of water.	This diversion can result in unsustainable water abstraction. Hydropower stations can significantly reduce water flow, which in some cases can increase the likelihood of drought on a local basis.	
	Climate change	**Greenhouse gas emissions:** Greenhouse gas emissions from water reservoirs contribute to atmospheric pollution.	See TCFD.	
	Pollution/pollution removal	**Water pollutants:** Temperature.	Hydropower projects can lead to water pollution by altering temperature balances, water chemistry, and by leading to increased sedimentation.	

Business activity	Driver of nature change	Impact driver	Impact considerations	Sources
Transmission and distribution				
Construction and operation	Land/freshwater/ocean use change	**Land, freshwater and ocean ecosystem use:** Power lines used to distribute energy contribute to habitat fragmentation (land, marine and/or freshwater) and sub-stations have a local land-use footprint.	This can contribute to habitat degradation and affect species feeding and reproduction patterns.	ENCORE
	Climate change	**Greenhouse gas emissions:** Sulphur hexafluoride emissions from power lines can be significant.	See TCFD.	ENCORE
	Invasive species and other	**Introduction of invasive alien species** as a result of vegetation management under power lines.	Vegetation management under power lines can enhance and improve the dispersal of flora invasive alien species.	
	Pollution/pollution removal	**Disturbances:** Various.	Aerial power lines may lead to bird casualties (collision and electrocution). Transmission infrastructure can restrict wildlife movement. Engines to manage the land disrupts the soil (compaction). Vegetation management under the power lines can lead to animal casualties, including protected and endangered species.	Guil, F. and Pérez-García, J. M. (2022)

Dependencies

Table 3 in the guidance for the Locate phase provides a list of the primary ecosystem services depended on by each technology. Organisations should note that materiality may vary for individual production processes, commodities and geographical contexts.

Electric utilities and power generator sector organisations are highly dependent on several regulating ecosystem services, including mitigation of natural hazards such as floods and storm surges, erosion control, and soil and slope stabilisation. The sector is also heavily dependent on provisioning services such surface water for operational use. The most relevant dependencies will vary by company based on their operations, the technologies used directly and across the value chain, and the specific geographies in which they are located.

Organisations should refer to the other sector guidance documents for upstream and downstream sectors, as well as the biome guidance, for more examples of the ecosystem services that may be present in the locations where the organisation is operating.

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?

No additional sector-specific guidance identified for E3.

E4: Impact materiality assessment

Guiding question:

Which of our impacts are material?

No additional sector-specific guidance identified for E4.

Assess risks and opportunities

This section provides additional guidance to help organisations in the electric utilities and power generators sector with the Assess phase of the LEAP approach.

A1: Risk and opportunity identification

Guiding question:

What are the corresponding risks and opportunities for our organisation?

Electric utilities and power generator organisations should leverage existing risk assessment and risk mitigation processes and standards. Organisations may find it useful to refer to Table 6 and Table 7 for examples of the nature-related risks and associated risk rating for the electric utilities and power generators sector. Table 8 provides nature-related opportunities for the power and utilities sector with illustrative examples. Further examples are also provided by the WBCSD Roadmaps to nature positive: Foundations for the energy system.

Table 6: Nature-related risks for the electric utilities and power generators sector, with illustrative examples

Type	Category	Nature-related risk	Sector examples
Coal, oil and gas	Physical risk	Changes to the supply of natural inputs (provisioning services)	Water supply: Reduced water available for refrigeration processes at thermal plants.
		Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility.
	Transition risk: Reputation	Changes in sentiment towards the organisation/brand due to impacts on nature	Thermal power plants emit a lot of greenhouse gas, air pollutants and water pollutants, which are causing growing concerns among the general population.

Type	Category	Nature-related risk	Sector examples
Hydropower	Physical risk	Changes to the supply of natural inputs (provisioning services)	Water supply: A drought will severely affect the amount of water that can be harnessed by hydropower plants.
		Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility
			Water flow regulation: Vegetation loss increases risks of damage from floods and severe weather events.
Nuclear energy	Physical risk	Changes to the supply of natural inputs (provisioning services)	Water supply: Disruption to supply of water required for refrigeration processes for nuclear plants.
		Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Global climate regulation: Increase in water temperature reduces its cooling properties.
	Transition risk: Reputation	Changes in sentiment towards the organisation/brand due to impacts on nature	Nuclear electricity generation is often associated with reputational issues.
Offshore wind	Physical risk	Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility.

Type	Category	Nature-related risk	Sector examples
Solar	Physical risk	Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility.
	Transition risk: Policy and legal	Changes to legislation/ regulations aimed at achieving nature-positive outcomes/ reducing nature negative outcomes	Legislative changes increasing costs to solar developers and operators.
Transmission and distribution electric lines	Physical risk	Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility.
			Water flow regulation: Vegetation loss increases risks of damage from floods and severe weather events.
	Transition risk: Policy and legal	Changes to legislation/ regulations aimed at achieving nature-positive outcomes/ reducing nature negative outcomes	Legislative changes increasing costs to solar developers and operators.

Type	Category	Nature-related risk	Sector examples
Wind	Physical risk	Changes to regulating and maintenance services	Global climate regulation: Increased tropical cyclones and other extreme weather events, which can damage facilities.
			Global climate regulation: Changes in wind patterns as a result of climate change could affect power output.
			Soil and sediment retention: Weakening of soil systems due to loss of vegetation on slopes, leading to landslides, which may damage the facility.
			Water flow regulation: Vegetation loss increases risks of damage from floods and severe weather events.
	Transition risk: Policy and legal	Changes to legislation/ regulations aimed at achieving nature-positive outcomes/ reducing nature negative outcomes	Legislative changes increasing costs to solar developers and operators.
	Transition risk: Reputation	Changes in sentiment towards the organisation/brand due to impacts on nature	Residents may oppose wind farm development due to impact on landscape, noise and light pollution.

Table 7: Nature-related risks and associated risk rating for the electric utilities and power generators sector

Risk type	Risk category	Indicator	Impact/dependency	Hydropower	Coal, gas, nuclear, oil	Solar, wind
Physical risk	Provisioning services	Water scarcity	Dependency	Very high	Very high	Medium
		Forest productivity and distance to markets	Dependency		High	
		Limited wild flora and fauna availability	Dependency			
		Limited marine fish availability	Dependency			
	Regulating and supporting services – Enabling	Soil condition	Dependency			
		Water condition	Dependency	Medium	Low	Low
		Air condition	Dependency	Very low	Low	Low
		Ecosystem condition	Dependency			
		Pollination	Dependency			
	Regulating and supporting services – Mitigating	Landslides	Dependency	High	High	High
		Fire hazard	Dependency	Medium	Medium	Medium
		Plant/forest/aquatic pests and diseases	Dependency			
		Herbicide resistance	Dependency			
		Extreme heat	Dependency	Medium	High	Medium
		Tropical cyclones	Dependency	High	High	High
	Cultural services	Tourism attractiveness	Dependency			
	Pressures on biodiversity	Land, freshwater and sea use change	Impact	Very high	Very low	Medium
		Tree cover loss	Impact	High	High	Very low
		Invasives	Impact	Low		
		Pollution	Impact	High	Very high	High

Risk type	Risk category	Indicator	Impact/dependency	Hydropower	Coal, gas, nuclear, oil	Solar, wind
Reputational risk	Environmental factors	Protected/conserved areas	Impact	High	Very high	High
		Key biodiversity areas	Impact	Medium	High	Medium
		Other important delineated areas	Impact	High	High	Low
		Ecosystem condition	Impact	High	High	Low
		Range rarity	Impact	Medium	Medium	Medium
	Socioeconomic factors	Indigenous peoples and Local Communities lands and territories	Impact	Very high	Medium	Medium
		Resource scarcity: food, water, air	Impact	Very low	Very low	
		Labour/human rights	Impact	Low	Low	Low
		Financial inequality	Impact	Low	Low	Low
	Additional reputational factors	Media scrutiny	Dependency	Low	Low	Low
		Political situation	Dependency	Medium	Medium	Low
		Sites of international interest	Dependency	Medium	Medium	Low
		Risk preparation	Dependency	Low	Low	Low

Source: WWF Biodiversity Risk Filter

Table 8: Nature-related opportunities for the electric utilities and power generators sector with illustrative examples

Type	Category	Nature-related opportunity	Sector examples
Offshore wind	Reputational capital	Actions that create positive changes in sentiment towards the organisation/brand due to impacts on environmental assets and ecosystem services that benefit society and improve local economic capabilities.	Offshore wind farm creates new reefs, increasing food availability in the vicinity of the installed turbine.
	Ecosystem protection, restoration and regeneration	Indirect restoration, conservation or protection of ecosystems or habitats.	The restriction of trawlers within offshore wind farms in areas where they previously operated can essentially create 'no take zones' over relatively large areas.
Solar	Reputational capital	Actions that create positive changes in sentiment towards the organisation/brand due to impacts on environmental assets and ecosystem services that benefit society and improve local economic capabilities.	Combination of agriculture and solar PV plants (renewable electricity generation).
	Resource efficiency	Transition to processes with reduced negative impacts on nature/increased positive impacts on nature.	The installation of solar panels can be set up in a way that supports local biodiversity, notably pollinators and some specific plants.[4]
			If sufficiently large, solar and wind farms can lead to positive climate consequences for vegetation in the Sahara region.

4 US Department of Energy (n.d.) Innovative solar practices integrated with rural economies and ecosystems.

Type	Category	Nature-related opportunity	Sector examples
Solar	Resource efficiency	Transition to processes with reduced negative impacts on nature/increased positive impacts on nature.	Mature renewable energy technologies such as wind and solar photovoltaics (PV) provide clean and affordable energy solutions with the lowest impacts on nature. Organisations should consider instances where local renewable energy options may be feasible. Depending upon local conditions, bioenergy and low-carbon, low-cost, low-impact hydropower can also provide local renewable energy with relatively low impacts on nature compared with the energy alternatives available. Such renewable energy technologies are also the most affordable energy options and can build resilience, create energy access, alleviate energy poverty and provide greater energy security than fossil fuels.[5]
Wind	Resource efficiency	Transition to processes with reduced negative impacts on nature/increased positive impacts on nature.	If sufficiently large, solar and wind farms can lead to positive climate consequences for vegetation in the Sahara region. A transition to renewable energy focused on wind and solar can result in significantly reduced environmental impacts. These include reduced species impacts and significantly less pollution, ecotoxicity and freshwater impacts overall.[6]
All	Resource efficiency	Transition to processes with reduced negative impacts on nature/increased positive impacts on nature.	Resetting the relationship between energy production and nature by increasing the efficiency of how energy is used and decreasing its demand. This can be achieved through behavioural change and enabling technologies such as 'smart' electricity grids that store and deliver energy more efficiently.[7]

5 CLEANaction (2023) Nature-safe energy: Linking energy and nature to tackle the climate and biodiversity crises.

6 CLEANaction (2023) Nature-safe energy: Linking energy and nature to tackle the climate and biodiversity crises.

7 CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.

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?

No additional sector-specific guidance identified for A2.

A3: Risk and opportunity measurement and prioritisation

Guiding question:

Which risks and opportunities should be prioritised?

No additional sector-specific guidance identified for A3.

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?

No additional sector-specific guidance identified for A4.

Prepare to respond and report

This section provides additional guidance to help electric utilities and power generators 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?

Electric utilities and power generator organisations should refer to existing strategy and resource allocation plans when responding to the identified dependencies, impacts, risks and opportunities. Table 9 provides system-wide and site-level actions that organisations could consider for all technologies in the electric utilities and power generator sector.

Organisations may also find it useful to refer to the management and mitigation strategies for various energy types and infrastructure illustrated in Table 10.

Table 9: Actions for organisations to respond to negative consequences of energy applications

Focus/scale of mitigation	Transform	Avoid	Reduce	Restore and regenerate
Systems change	• Plan for and promote decentralised energy generation systems with distributed renewable energy systems that allow for power line sharing and direct required power stations to areas with low environmental sensitivity. • Withhold finance from renewable projects with high biodiversity impacts. • Promote local employment and new job creation through consistent on-site impact monitoring and management. • Promote citizen engagement to motivate the integration of biodiversity considerations into early energy planning. • Promote studies, knowledge sharing and best practices for better understanding of the interaction between renewable energies and biodiversity. • Promote accelerated decarbonisation through early switching to proven, nature-safe, low-carbon options and ensure low barriers to widespread deployment.	• Foster innovation and new technologies that avoid and reduce impacts. • Prioritise repowering and hybridisation solutions over the conversion of natural land. • Include cumulative impacts of all activities present in the wider project area in the environmental impact assessment (EIA). • Include a life cycle assessment, which applies a standardised method to account for the full range of potential impacts across a project's life cycle. • Apply a circular approach to ensure the highest possible rates of reuse and recycling and put in place mechanisms to ensure ethical sourcing of materials and minerals.	• Establish cross border energy-sharing agreements to drive energy development to areas of maximum yield, while reducing its footprint. • Produce bioenergy from animal and food waste. • Incentivise and subsidise co-use and co-existence solutions such as agrivoltaics.	• Remove relevant dams to restore environmental flows. • Promote investments such as green bonds that can contribute to the protection and restoration of nature. • Use ecosystem-based spatial planning where space for both nature and renewables is designated, and implement holistic marine spatial planning, involving all relevant stakeholders.

Focus/scale of mitigation	Transform	Avoid	Reduce	Restore and regenerate
Site-level mitigation	• Offset residual impacts through investments into projects that restore habitats and avert future losses elsewhere.	• Route linear infrastructure and power lines away from sensitive areas including protected areas, KBAs, ecological corridors, wetlands, vulnerable coastal habitats and forests. • Bury power lines wherever feasible.	• Control influx of people into the operational area of the project and manage associated impacts on biodiversity. • Minimise mineral extraction and supply chain impacts by optimising site-based infrastructure. • Optimise energy yield in modified habitats – including urban areas and artificial features such as dam reservoirs – such as by installing fixed or floating solar PV, or use land in conjunction with other productive uses (e.g. agrivoltaics). • Implement strict protocols to minimise species impacts, such as the risk of collision with birds and bats, and noise pollution.	• Establish clear closure and end-of-life plans, including rehabilitation of temporary facilities and post decommissioning. • Use nature-inclusive design for infrastructure to provide opportunities for natural regeneration (e.g. on offshore wind turbine foundations). • Undertake on-site habitat enhancement, such as reintroducing wildflower meadows for pollinators around wind turbines and solar panels.

Sources: CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises and GRI (2014) GRI G4 Electric utilities sector disclosures.

Table 10: Management and mitigation strategies for potential nature-related impacts and risks associated with different energy types and infrastructure

Type	Management and mitigation strategies
Solar PV: Impacts resulting from land and water use change	There are often opportunities to undertake restoration and enhancement around solar arrays, providing the potential to achieve positive biodiversity outcomes, especially in previously degraded lands. Impacts can be mitigated by placing panels away from particularly sensitive areas and instead prioritising placement on man-made water bodies such as hydropower reservoirs. The direct impacts on water bodies should not be discounted and need continued attention, including through standard environmental reviews. The indirect impacts on flow releases (particularly from hybrid hydro-floating PV plants) can be even more important.
Solar CSP: Impacts from water use	Similar to solar PV, most of the impacts from CSP can be avoided by placing them in previously degraded lands away from sensitive areas. Technological improvements, such as dry-cleaning technologies, can help minimise this impact.
Wind (onshore): Bird and bat mortality	Impacts are difficult to avoid entirely, as turbine locations are tightly linked to wind energy potential. Impacts can be reduced by placing turbines away from important bird areas and migratory routes. On-site mitigation strategies include increasing the visibility of turbine blades, acoustic deterrents and procedures to shut down specific turbines when vulnerable birds are in the area. For bats, stopping turbine blades from operating during low wind speeds can reduce collision risk at a minimal cost to energy generation. A large concentration of wind or solar farms, in combination with other developments, can create barriers for species movement and potentially cause significant cumulative impacts on species' populations.
Wind (offshore): In addition to onshore impacts, offshore impacts on marine mammals resulting from high noise, collision with construction vessels and changes to seafloor.	Construction-related impacts can be minimised by implementing strict construction protocols to reduce noise and temporarily deter sensitive species. The additional risk for ship accidents and subsequent pollution can be mitigated by siting, surveillance and emergency tugs, speed restrictions and optimised shipping routes. Ongoing monitoring and data sharing are key to developing a better understanding of the magnitude of impacts and effectiveness of mitigation measures. Operational impacts and impacts on seafloor habitats can be minimised through careful site selection and as a part of an ecosystem-based marine spatial planning process.

Type	Management and mitigation strategies
Hydropower: Land and water use change, loss of connectivity and changes to water and sediment flow. Increased human access.	Maintaining environmental flows and construction of fish passages can mitigate some of the impacts. Ongoing monitoring is needed to better understand environmental and downstream flow regimes (e.g. concerning hydro peaking). Internationally recognised hydropower sustainability tools designed to provide guidance on how to achieve biodiversity conservation good practice during hydropower development include: • Hydropower Sustainability Guidelines on Good International Industry Practice (HGIIP); • Hydropower Sustainability Assessment Protocol (HSAP); and • Hydropower Sustainability ESG Gap Analysis Tool (HESG). At the watershed or hydrological basin level, organisations should consider collaborative approaches to managing watersheds and reservoirs for multiple uses, such as irrigation, drinking water and ecosystem conservation. Organisations should also consider long-term plans for securing water resources, meeting the needs of both the utility and other stakeholders (e.g. local communities). This includes applying criteria for managing maximum/minimum flow of surface water and volume of ground water and how these are determined and maintained.
Nuclear: Discharge of warm water and impacts of nuclear waste	Deploy management strategy and storage methods for different types of radioactive nuclear waste, including: • Temporary and permanent storage; • Environmental, health and safety impacts of radioactive nuclear waste; and • Security measures according to the applicable management standards/legislative frameworks. Management of nuclear waste using IAEA definitions and protocols. Provisions for decommissioning of nuclear power sites.
Coal/fuel/gas: Acid rain, climate change, radioactive and other contamination, air pollution	Electric utilities should consider strategies such as the installation of pollution control systems and the development and utilisation of power generation methods based on renewable energy and other non-fossil sources such as nuclear, wind, biomass, hydroelectric and solar power, and to help meet demand with demand-side management solutions. These operational strategies include energy use reduction strategies and the shifting of electricity demand to off-peak hours of operation. Deployment of strategies for managing and phasing out high level and low level in-service Polychlorinated biphenyls (PCBs).

Type	Management and mitigation strategies
Energy infrastructure (transmission and distribution lines): Electrocution of birds; materials use	Construction of safe distribution lines that include insulation and appropriate spacing of conductors can address risks to birds when integrated into early design. Collisions with transmission lines can be reduced through the installation of bird flight diverters, bird-safe designs and by burying power lines or routing them to avoid sensitive areas such as wetlands. Attention is required to the habitat conversion caused by a new powerline or access road, since the natural processes are usually permanently altered. The end of life of energy infrastructure and transmission and distribution lines should be considered, with emphasis on recyclability to minimise new resource exploitation and to restore polluted soils.

Sources: CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises and GRI (2014) GRI G4 Electric utilities sector disclosures.

P2: Target setting and performance management

Guiding question:

How will we set targets and define and measure progress?

No additional sector-specific guidance identified for P2.

P3: Reporting

Guiding question:

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

No additional sector-specific guidance identified for P3.

P4: Presentation

Guiding question:

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

No additional sector-specific guidance identified for P4.

Glossary

Sector-specific concepts and definitions are defined in this section. The TNFD glossary will be updated to include these concepts once the electric utilities and power generators sector guidance is finalised, based on market consultation and feedback. Readers are recommended to visit the TNFD glossary for other terms used throughout the document.

Concept	Definitions
Arid ecosystems	Where annual precipitation averages less than 10 inches (25cm) per year. Projects that use land for both agriculture and solar photovoltaic systems. CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.
Barrier effects	The phenomenon by which man-made structures impede the natural movement patterns of wildlife. CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.
Ecotoxicity	Refers to the potential for biological, chemical or physical stressors to affect ecosystems. CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.
Natural habitat	A complex of natural, primarily native or indigenous vegetation, not subject to significant conversion or degradation, the primary purpose of which is to provide habitat for wildlife. CLEANaction (2023) Nature-safe Energy: Linking energy and nature to tackle the climate and biodiversity crises.
Polychlorinated biphenyls (PCBs)	A group of toxic, bioaccumulative and persistent chemicals used as an insulating medium in transformers and capacitors. GRI (2014) GRI G4 Electric utilities sector disclosures.
Radioactive waste	Radioactive nuclear waste includes Low Level Radioactive Waste, Intermediate Level Radioactive Waste and High Level Radioactive Waste. Includes mixed waste (radioactive and hazardous). IAEA (2014) What is radioactive waste?

Concept	Definitions
Thermal discharges	Waste heat from power plant operations released into the environment. This usually refers to water that is pumped from a nearby body for use as condenser cooling water, where it picks up heat and then is discharged back into the water body. The heated water thus adds thermal energy to the water body, which may have an effect on the local ecosystems. GRI (2014) GRI G4 Electric utilities sector disclosures.

Annex 1: Sector-specific metrics – Electric utilities and power generators

Proposed guidance on the application of the core global disclosure metrics

Organisations in the electric utilities and power generators sector should refer to Annex 1 of the TNFD Recommendations for further information on the core global disclosure metrics.

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
Driver of nature change: Climate change				
	GHG emissions	Refer to IFRS S2 Climate-related Disclosure Standard.	No further guidance.	
Driver of nature change: Land/freshwater/ocean-use change				
C1.0	Total spatial footprint	Total spatial footprint (km^2) (sum of): • Total surface area controlled/managed by the organisation, where the organisation has control (km^2); • Total disturbed area (km^2); and • Total rehabilitated/restored area (km^2).	No further guidance.	

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
C1.1	Extent of land/ freshwater/ocean use change	Extent of land/freshwater/ocean ecosystem use change (km^2) by: • Type of ecosystem;[8] and • Type of business activity.	No further guidance.	
		Extent of land/freshwater/ocean ecosystem conserved or restored (km^2), split into: • Voluntary; and • Required by statutes or regulations.	No further guidance.	
		Extent of land/freshwater/ocean ecosystem that is sustainably managed (km^2) by: • Type of ecosystem;[9] and • Type of business activity.	No further guidance.	
Driver of nature change: 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 guidance.	

8 When disclosing on ecosystem types, refer to the International Union for Conservation of Nature Global Ecosystem Typology.

9 When disclosing on ecosystem types, refer to the International Union for Conservation of Nature Global Ecosystem Typology.

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
C2.1	Wastewater discharged	Volume of water discharged (m^3), split into: • Total; • Freshwater; and • Other.[10] Including: • 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.	**Nuclear; Thermal** In reporting the core global disclosure metric, an organisation should include thermal discharges.	TNFD

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

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
C2.2	Waste generation and disposal	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: • Waste incinerated (with and without energy recovery); • Waste sent to landfill; and • Other disposal methods. Weight of hazardous and non-hazardous waste (tonnes) diverted from landfill, split into waste: • Reused; • Recycled; and • Other recovery operations.	No further guidance.	

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
C2.3	Plastic pollution	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.[11] For plastic packaging, percentage of plastics that is: • Reusable; • Compostable; • Technically recyclable; and • Recyclable in practice and at scale.	No further guidance.	

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

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
C2.4	Non-GHG air pollutants	Non-GHG air pollutants (tonnes) by type: • Particulate matter ($PM_{2.5}$ and/or PM_{10}); • Nitrogen oxides (NO_2, NO and NO_3); • Volatile organic compounds (VOC or NMVOC); • Sulphur oxides (SO_2, SO, SO_3, SO_X); and • Ammonia (NH_3).	**Thermal** From the list of pollutants under the core global disclosure metric, an organisation should look to report: • Fine particulate matter ($PM_{2.5}$); • Sulphur dioxide (SO_x); • Nitrogen oxides (NO_x); • Nonmethane volatile organic compounds (NMVOC); and • Ammonia (NH_3). Additional pollutants to report under the core global disclosure metric include: • Heavy metals (HM) as referred to in Annex I of EU Directive 2016/2284; • Coal pile dust; • Emissions from ash lagoons or ponds; • Precipitator dust; and • Reservoir drawdown dust. An organisation should also report: • Emissions of these pollutants per MWh net generation.	Directive (EU) 2016/2284 of the European Parliament and of the Council, GRI EN20

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
Driver of nature change: Resource use/replenishment				
C3.0	Water withdrawal and consumption from areas of water scarcity	Water withdrawal and consumption[12] (m^3) from areas of water scarcity, including identification of water source.[13]	**Nuclear; Thermal** In reporting the core global disclosure metric, an organisation should include: • Water usage for processing, cooling and consumption in powerplants, including use of water in ash handling.	GRI EN8, TNFD
C3.1	Quantity of high-risk natural commodities sourced from land/ ocean/freshwater	Quantity of high-risk natural commodities[14] (tonnes) sourced from land/ocean/ freshwater, split into types, including proportion of total natural commodities.	No further guidance.	
		Quantity of high-risk natural commodities[15] (tonnes) sourced under a sustainable management plan or certification programme, including proportion of total high-risk natural commodities.	No further guidance.	

12 Water consumption is equal to water withdrawal less water discharge. Reference: GRI (2018) GRI 303-5.

13 Surface water; groundwater; seawater; produced water; third-party water. Reference: GRI (2018) GRI 303-3.

14 Users should refer to the Science Based Targets Network (SBTN) High Impact Commodity List (HICL) and indicate what proportion of these commodities represent threatened and CITES listed species.

15 Users should refer to the Science Based Targets Network (SBTN) High Impact Commodity List (HICL) and indicate what proportion of these commodities represent threatened and CITES listed species.

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
Driver of nature change: Invasive alien species and other				
C4.0	Placeholder indicator: Measures against unintentional introduction of invasive alien species (IAS)[16]	Proportion of high-risk activities operated under appropriate measures to prevent unintentional introduction of IAS, or low-risk designed activities.	No further guidance.	

16 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'.

Electric utilities & power generators				
Metric no.	**Core global indicator**	**Core global metric**	**Proposed guidance for this sector**	**Source**
State of nature				
C5.0	Placeholder indicator: Ecosystem condition	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: • Level of ecosystem condition by type of ecosystem and business activity; • Impacts on mean species extinction risk. 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.	No further guidance.	
	Placeholder indicator: Species extinction risk		No further guidance.	

Proposed core sector disclosure indicators and metrics

Metric category	Metric subcategory	Indicator	Proposed core sector disclosure indicator or metric	Source
Impact driver	Land/freshwater/ ocean use change	Environmental flow	**Hydropower** Percentage of environmental/ ecological flow versus total flow.	TNFD
		Sediment	**Hydropower** Quantity of sediment retired.	TNFD
	Pollution/pollution removal	Coal combustion residuals	**Thermal** Amount of coal combustion residuals (CCR) generated. Percentage that is recycled.	SASB IF-EU-150a.1
			Thermal Total number of coal combustion residual (CCR) impoundments, broken down by hazard potential classification and structural integrity assessment.	SASB IF-EU-150a.2
		Nuclear waste storage	**Nuclear** Total amount of nuclear waste permanently and safely stored (e.g. deep underground storage).	TNFD
	Resource use/ replenishment	Heat rate	**Thermal** Heat rate by plant (Btu/kWh).	TNFD
	Other	Species casualties	**Wind** Number of bird and bat casualties.	TNFD

Proposed additional sector disclosure indicators and metrics

There are no proposed additional sector disclosure indicators and metrics for the electric utilities and power generators sector.

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Taskforce on Nature-related Financial Disclosures

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