For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Oil & Gas

12% of human-caused greenhouse gas emissions come from oil & gas.[1]
What does the **oil & gas sector** need to do?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Does the company place restrictions on investing in the exploration of new greenfield sites?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?
- Does the company's net zero strategy consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change/biofuel production/offsetting?

Resilience

- Has the company analyzed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analyzed the resilience of its business model in – and alignment to – climate scenarios? Including the IEA's net zero by 2050 scenario?

Targets

- Does the company have a target for material scope 3 emissions?
- Does the company have a green revenue target?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. customers, finance sector, strategic R&D partnerships, sector initiatives etc)?[5]
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. with carbon pricing)?

Red lines

- Has the company committed to net-zero operational emissions?
- Does the company have time-bound methane reduction/zero flaring targets?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. LGIM, based off McKinsey (2019), IEA (2020)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance. These targets should include both absolute and intensity targets, and for Integrated oil & gas companies, we expect separate medium- and long-term emission targets for their upstream business.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., Managed decline of oil and gas production; restrict oil sands; responsible divestments; investments in CCUS, hydrogen, renewables, EV charging, biofuels etc.
5. E.g., The Oil & Gas Methane Partnership 2.0

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[6] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Direct impacts could result from exploration and development: oil spills, ocean noise, alien species, water extraction etc. Indirectly – through financing of poor offsetting practices and the production of biofuels.

Company levers

- Managed decline for upstream business
- Shift to lower-carbon product mix
- Electrification and renewables in pursuit of net zero operational emissions
- Methane reductions possible at no net cost
- Blending hydrogen / biomethane in gas grid
- Installing EV charging in petrol stations

Government policies

- Stable and higher carbon prices
- Removal of subsidies
- Strengthened flaring and venting regulation
- Zero-emissions transport/heat/power standards
- Waste collection and recycling standards
- Development of low-carbon infrastructure
- Standards for biofuels and hydrogen

Challenges

Scope 3 accounting uncertainty

Price volatility

Loss of revenues and market share

Technology costs

Lack of infrastructure

Policy uncertainty

Behavioural barriers to "managed decline"

Opportunities

Portfolio diversification

Growth in non-combustion uses of fossil fuels (e.g. petrochemicals)

Attracting talent and maintaining social license to operate

What is needed?

Company leadership

Commitment to 'ex-growth' for upstream oil and gas

Pursuing diversification

Research and innovation

CCUS

Lower-temperature refining catalysts

Green hydrogen

Consumer behavior

Changes in energy use and transport habits: ride-sharing, working from home

6. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's purchased goods, supply chain, employee travel etc

'Scope 1'

Direct GHG emissions from operations, including from energy-intensive extraction and refining processes, methane leaks, venting and flaring

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions, primarily from the use of final products (e.g. burning gas for power and oil for transport)

Sources: LGIM, based off McKinsey (2019), IEA (2020)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Employment and tax revenues from oil and gas

Consumers' sensitivity to fuel costs

Need to retrain workforce

Physical risk impacts

Disruption from extreme weather events (e.g. storms and flooding for coastal facilities, water scarcity in water-intensive processes, melting permafrost affecting pipelines)

For more information and to see how companies are rated

Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)

Climate Impact Pledge score

Investment Stewardship

Important information
Source: LGIM as at August 2022. The value of an investment and any income taken from it is not guaranteed and can go down as well as up, you may not get back the amount you originally invested. The above information does not constitute a recommendation to buy or sell any security.

For educational purposes only. Unless otherwise stated, references herein to "LGIM", "we" and "us" are meant to capture the global conglomerate that includes Legal & General Investment Management Ltd. (a U.K. FCA authorized adviser), LGIM International Limited (a U.S. SEC registered investment adviser and U.K. FCA authorized adviser), Legal & General Investment Management America, Inc. (a U.S. SEC registered investment adviser) and Legal & General Investment Management Asia Limited (a Hong Kong SFC registered adviser). The LGIM Stewardship Team acts on behalf of all such locally authorized entities.

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For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Steel

7% of human-caused greenhouse gas emissions come from the production of iron and steel.[1]
What does the **steel sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments the company intends to take to reach net zero, and the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?

Resilience

- Has the company analyzed the physical climate risks to its assets and operations and evidenced measures to manage these?
- Has the company analyzed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have a target to grow the production of/revenue from low/zero-carbon steel?
- Does the company have targets to increase production rates of recycled steel?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. customers, finance sector, strategic R&D partnerships, sector initiatives).
- How is the company supporting the development of international certification standards for 'green steel' production and committing to adhere to those standards?
- Is the company advocating for meaningful policy action, including from regulators, to meet global net zero targets (e.g., carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if the lobbying activities of these associations are not in line with the Paris Agreement?

1. IEA (2017) Energy Technology Perspectives
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., scrap electric arc furnace (EAF) processes, enhancing efficiency of production processes and final products, low-emission direct reduced iron (DRI)-EAF capacity (including hydrogen based), CCS/CCUS, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

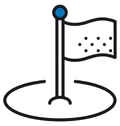
Sector-specific considerations: Indirect impacts could result from upstream mining activities. Direct impacts from the manufacturing process include: water use, wastewater discharge and other pollutants.

Company levers

- Growing consumer demand for low-carbon steel
- Circularity
- Energy efficiency
- Alternative reductants in primary production
- Increased secondary production and improved demand management
- Carbon capture and storage

Government policies

- Carbon pricing and taxation (and border adjustments)
- Green steel minimum standards and labels across the value chain
- Low-carbon public procurement
- Incentives for hydrogen infrastructure
- Increased recycling and support for circular design



Challenges

'Carbon leakage' and competitiveness

High costs of new technologies and infrastructure in low-margin industry

Availability of low-cost renewable energy/ biomass reductants/ green hydrogen

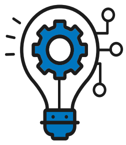
Carbon capture and storage

Opportunities

Steel as key enabler of emissions reductions (e.g. light-weighting, production of wind turbines); increased partnerships across sectors

High recycling potential

Green-hydrogen-based iron production



What is needed?

Company leadership

Investment and R&D for net zero across value chain

Research and innovation

Electrolysis: low-temperature ('electrowinning') and high-temperature (using molten oxides)

Consumer behavior

Willingness to pay for low-carbon products

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. to produce steel for planes, or fossil fuels)

'Scope 1'

Direct GHG emissions from operations, primarily from burning fuel for propulsion

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions, primarily from use of transported products

Source: UNEP (2019)

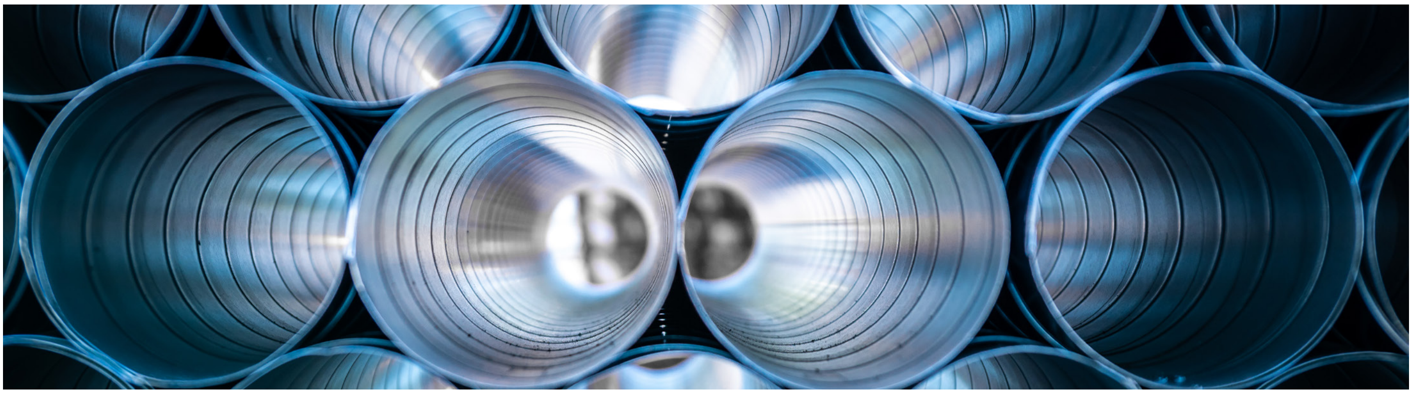
'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to production facilities from extreme weather

Water availability



For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Multi-utilities

c.25% of human-caused greenhouse gas emissions come from the power generation and water utilities sectors.[1]
What does the **multi-utilities sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does any use of offsetting consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?

Resilience

- Has the company analyzed the physical climate risks, including water scarcity, to its assets and operations, and evidenced measures to manage these?
- Has the company analyzed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net zero by 2050 scenario?

Targets

- Does the company have a target to reduce leakage?
- Does the company have targets related to the use and roll out of low/zero-carbon fuels/technologies?
- For a company involved in the generation of electricity, has it committed to produce carbon-free electricity by 2035 in advanced economies, and by 2040 globally?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g., demand management; engaging with property developers; strategic R&D partnerships, sector initiatives,etc)?[5]
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g., carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its material scope 3 emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

* The applicability of the expectations varies depending on companies' business models

1. Victor, Geels & Sharpe (2019) ; Water UK (2021)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., Demand reduction techniques; energy efficiency measures; use of heat pumps, hydrogen, biofuels and/or heat networks; leakage reduction, etc.
5. E.g., The Oil & Gas Methane Partnership 2.0.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[6] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Direct impacts could result from the poor management of water resources and unsustainable abstraction, utility infrastructure and pollution. Indirect impacts could result from upstream gas extraction and the financing of poor offsetting practices.

Company levers

- Actions to prevent leakage from infrastructure
- Demand reduction through more efficient water use
- Energy efficiency in homes
- Low/zero carbon fuels/technologies
- Improvements/retrofitting of pipe infrastructure to accommodate hydrogen

Government policies

- Carbon pricing and taxation (and border adjustments)
- Grants to increase the uptake of energy efficiency measures and the use of heat pumps in homes
- Incentives for hydrogen infrastructure
- Increased recycling and support for circular design for water use
- Regulation on monitoring and managing gas leakages

Challenges

Much existing gas infrastructure is not adaptable to hydrogen

High costs of new technologies (e.g. heat pumps)

Incentivizing public to upgrade housing stock

Regional nuances in decarbonization solutions

Opportunities

Long-run cost savings on energy and water bills

High recycling potential

New market development for heat pumps and green hydrogen production and distribution

New market development for distribution of CO2 to CCUS sites

What is needed?

Company leadership

Eliminating leakages and deploying low/zero carbon alternative fuels/technologies immediately

Research and innovation

Low-cost heat pumps

Efficiency measures for gas and water

Potential use of hydrogen and/or heat networks

Consumer behavior

Willingness to insulate homes, reduce demand for water and switch heating source to low/zero carbon alternatives

6. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. extraction of gas that is distributed by a gas utility company)

'Scope 1'

Direct GHG emissions from operations (e.g. transportation/ distribution of water/gas)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions, including from the use of a company's products (e.g. gas supplied to customers)

Source: Victor, Geels & Sharpe (2019); Water UK (2021)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model

Physical risk impacts

Grid damage from extreme weather

Spikes in energy demand from cooling and heating as a result of extreme weather

Water scarcity/availability

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

LGIM

Net zero: Logistics

c.8.5% global greenhouse gas emissions are attributed to logistics (comprising air, rail, sea and road freight).[1]

What does the **logistics sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company increasingly offering low-carbon services?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's net-zero strategy consider the potential impacts and dependencies on biodiversity - for example, in relation to land-use change (e.g., from biofuel production and offsetting)?

Resilience

- Has the company analysed the physical climate risks to its assets and operations, and provided evidence of planned measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net zero by 2050 scenario?

Targets

- Does the company have time-bound targets to transition to low carbon fleets?
- Does the company have a target to increase revenue from low/zero-carbon logistics offering?
- Targets to reduce other non-carbon GHG emissions such as Sox and Nox?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. suppliers, customers, strategic R&D partnerships, sector initiatives)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. ITF, Transport Outlook (2019).
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., rollout and adoption of low carbon fuels (including SAFs, advanced biofuels and synthetic fuels for air an ocean fright); fleet optimisation, efficiency, and electrification for road and rail freight; warehouses and facilities powered by renewables; new aircraft technologies that can improve efficiency as well as reduce emissions and fuel use, and alternative propulsion technologies; etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

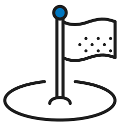
Sector-specific considerations: Indirect impacts could result from the use of biofuels and infrastructure, and direct impacts from the use of vehicles and polluting emissions.

Company levers

- Sustainable aviation fuels (SAF) including advanced biofuels and synthetic fuels
- Fleet optimisation and electrification
- Renewables
- Energy efficiency
- Hydrogen and ammonia fuels

Government policies

- Carbon pricing and taxation
- Support for renewables and hydrogen infrastructure
- Policy coordination between international regulators, airports, ports, and transport operators to boost freight consolidation
- Regulation of sustainable aviation fuels (including biofuels)
- Tightening/enforcing energy efficiency standards and low/zero-carbon fuel mandates



Challenges

Price of current technologies

Battery range and density

Fragmented industry structure

Lack of robust policies

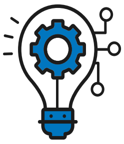
EV charging infrastructure

Energy storage to create zero carbon rail stations

Hydrogen and ammonia

Opportunities

Growing consumer demand to reduce transport-related product emissions



What is needed?

Company leadership

Companies transforming their freight fleets to zero carbon

Research and innovation

Reducing costs of electrolysis

Synthetic fuels

Carbon capture and storage

Battery storage

Consumer behavior

Demand for products with reduced transport emissions

Modal shifts in transport

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (contracted transportation, etc.)

'Scope 1'

Direct GHG emissions from operations/ company facilities (transportation related, warehouses, etc.)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions (transportation and distribution, etc.)

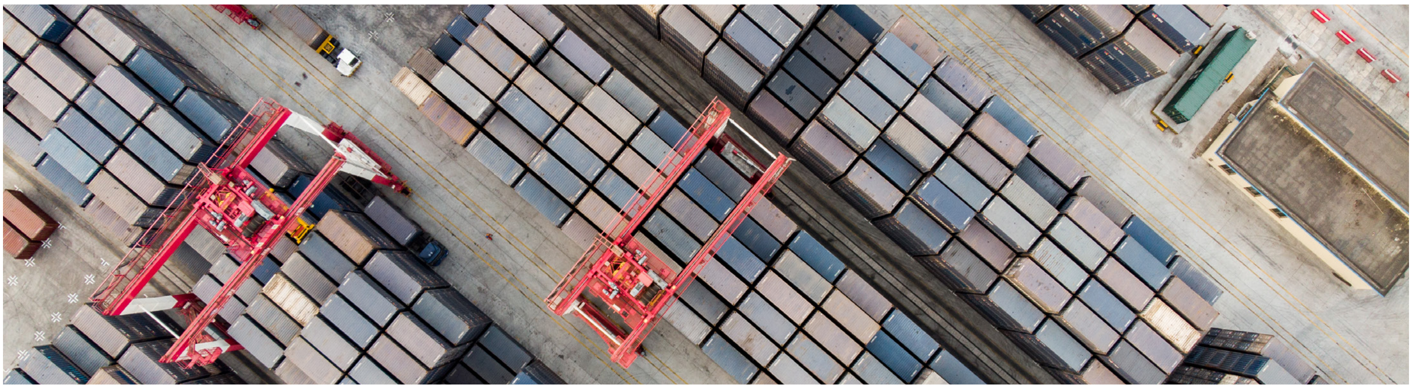
Source: Logistics UK (2022)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to global transport routes, supply chains (including sustainable aviation fuel production) and hubs from extreme weather



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[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Apparel

8% of human-caused greenhouse gas emissions come from the production and transport of clothing and footwear.[1]
What does the **apparel sector** need to do?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company offering recycling collection for sold products? What share of collected garments are recycled versus being disposed of?
- Does the company ensure traceability of fibres and compliance with zero-deforestation principles?
- Is executive remuneration aligned with the company's short- and/or medium-term emissions targets, as set out in the net-zero transition plan?
- Does the company's net zero strategy consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change/ cotton agriculture/ supply chain deforestation?

Resilience

- Has the company analysed the physical climate risks to its value chain, including water scarcity, and evidenced measures to manage these?
- Has the company analysed the resilience of its business model in – and its alignment to – climate scenarios? Including the IEA's net zero by 2050 scenario?

Targets

- Does the company have targets to switch to 100% renewable energy and low carbon transportation across its operations and supply chain?
- Does the company have targets to grow production of / revenue from low-carbon garments?
- Does the company have targets to optimise its water usage and to improve material circularity?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. customers, suppliers, strategic R&D partnerships, sector initiatives etc)
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its material scope 3 emissions?
- Does the company have a comprehensive zero deforestation policy?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

* The applicability of the expectations varies depending on companies' business models

1. Quantis (2018)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., energy efficiency and a shift to renewable energy, smart approaches for fibre and fabric recycling, maximise material efficiency and minimise production/ manufacturing waste through innovations in design and cutting processes, offer repair and refurbishment service, source from organic/regenerative producers.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and any appropriate mitigation actions.

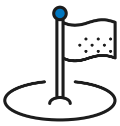
Sector-specific considerations: A direct impact could result from material preparation and processing (water pollution from dyeing). Indirectly – through raw material production (cotton agriculture) and end of life treatment (waste disposal and microplastics)

Company levers

- Circularity / Recycling
- Low-carbon materials and logistics
- Energy efficiency
- Deployment of renewables to power operations

Government policies

- Carbon pricing
- Increased roll-out of renewables, particularly in emerging markets
- Low-cost financing for energy efficiency measures
- Waste, recycling and energy use standards for apparel and other consumer goods (e.g. washing machines)
- Supply chain certifications
- Policies to eliminate deforestation from the supply chain



Challenges

Consumer behaviour and growth of global middle class

Lack of low-carbon electricity and heat

Competitive market and fragmented supply chain

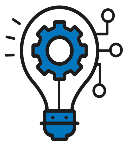
Traceability of materials

Opportunities

Growing consumer demand for sustainable fashion

Sustainable organic material production

Improved brand image and reduced reputational risk through better supply chain management



What is needed?

Company leadership

Investments to tackle emissions across the entire value chain

Commitment to alternative materials

Research and innovation

Circular business models (with regenerative materials, material efficiency, recycling)

Consumer behavior

Shift away from 'fast fashion'

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. cultivation, production, dyeing and finishing of raw materials)

'Scope 1'

Direct GHG emissions from owned and operated retail and distribution facilities

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions from transport, use and disposal of products (e.g. washing, drying, recycling, incinerating)

Source: UNEP (2019)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model.

Manufacturing efficiencies and reduced demand for fast fashion can result in unemployment

Physical risk impacts

Disruption to supply chain and production

Water scarcity

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Glass

c.3% of global greenhouse gas emissions associated with materials production come from glass.[1]
What does the **glass sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company developing low-carbon products?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?

Resilience

- Has the company analysed the physical climate risks to its assets and operations, and evidenced measures to manage these?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net zero by 2050 scenario?

Targets

- Does the company have targets to increase the electrification of heat furnaces and renewable energy uptake?
- Does the company have targets to increase recycling rates of glass (cullet) and improve circularity?
- Does the company have a target to grow the production of/revenue from low/zero-carbon glass?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. suppliers, customers, utilities sector, strategic R&D partnerships, sector initiatives)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g., carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. UNEP (2019)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., increase productivity of cullet electric heat furnace processes though R&D, green hydrogen, waste heat recovery measures, increase cullet use and alternative raw materials, CCS/CCUS, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Indirect impacts could result from aggregate extraction from marine and riverine ecosystems, and direct impacts from the manufacturing process, including water use and the discharge of wastewater and other pollutants.

Company levers

- Growing consumer demand for low-carbon glass
- Circularity
- Re-melting cullet
- Renewable energy
- Alternative raw materials in primary production
- Green hydrogen
- Carbon capture and storage

Government policies

- Carbon pricing and taxation (and border adjustments)
- Green glass standards
- Low-carbon public procurement
- Incentives for hydrogen infrastructure
- Increased recycling and boosting collection infrastructure
- Renewable energy policies and incentives

Challenges

High cost of new technologies and infrastructure in low- margin industry

Availability of low-cost renewable energy/ green hydrogen

Carbon capture and storage

Availability of cullet

Opportunities

Glass as key enabler of emissions reductions (e.g. double glazing and glass wool insulation, solar PV, filament glass for wind turbines, EVs)

Increased partnerships across sectors

High recycling potential

What is needed?

Company leadership

Investment and R&D for net-zero production/ manufacturing of cullet at large scale

Research and innovation

Low-carbon primary production technologies such as calcinated and alternative raw materials

Increase the productive capacity of electric furnaces for large scale glass melting

Hydrogen powered furnace

CCUS

Consumer behavior

Willingness to pay for low-carbon products

Recycling culture

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. during extraction and transportation of silica sand and limestone)

'Scope 1'

Direct GHG emissions from operations (e.g. fossil fuels combustion, heating used in melting process)

'Scope 2'

Indirect GHG emissions from purchased electricity

'Scope 3' Downstream

Other **indirect** GHG emissions (e.g. from transporting finished products)

Source: British Glass (2021)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to production facilities from extreme weather

Water availability

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Forestry and Paper & Pulp

12.5% of net anthropogenic greenhouse gas emissions come from land use and forestry.[1]

What does the **forestry and paper & pulp sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Does the company calculate and disclose its recycling capacity and the percentage of recycled inputs?
- Does the company incorporate nature-based solutions[5] into its strategy?
- Is the company disclosing the level of traceability of its commodities across its supply chain?
- What is the percentage of commodities purchased or developed in line with no-deforestation principles?
- Is executive remuneration aligned with short-and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's net-zero strategy consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change, sustainable forestry practices, and the incorporation of nature-based solutions?

Resilience

- Has the company analysed the physical climate risks to its operations and value chain, including water scarcity, and provided evidence of planned measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets to increase the share of production from recycled fibre and improve the circularity of products?
- Does the company have an operational net-zero target?
- Does the company have targets to scale up and grow revenue from low-carbon, sustainably sourced forest products?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. suppliers, customers, utilities sector, strategic R&D partnerships, sector initiatives)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g., carbon pricing)?

Red lines

- Does the company have a zero-deforestation and no-land-conversion commitment and policy?
- Does the company disclose its material scope 3 emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

* The applicability of the expectations varies depending on companies' business models

1. Roe et al., (2019)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., Increase the use of alternative energy sources such as renewables or black liquor; introduce practices to enhance carbon sequestration capacity and resilience such as fire prevention measures, afforestation, advanced silviculture techniques; improve energy efficiency measures (such as precision forestry, automation, combined heat and power (CHP) systems, recovery boilers); promote circular bioeconomy; bioenergy with carbon capture and storage/ utilization (BECCS/U); etc.
5. Actions to protect, sustainably manage and restore natural or modified ecosystems, that address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (WBCSD, 2021).

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

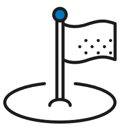
Sector-specific considerations: Direct impacts could result from unsustainable forestry practices causing loss of native species, forest degradation and habitat disruption. Indirect impacts could result from timber processing and associated operations.

Company levers

- Renewables
- Energy and material efficiency
- Recovery and reuse of biological resources
- Circularity
- Climate-positive land use (silviculture)
- Product innovation

Government policies

- Carbon pricing and taxation
- Support for renewables
- Policies that avoid carbon lock-in and incentivize low-carbon technologies (e.g. economic incentives to replace or upgrade emission-intensive technologies or infrastructure)
- Strengthen disclosure rules and their applicability to the forest sector, in line with TCFD, to reward more sustainable companies
- Improve forest governance to prevent illegal logging and trade
- Encourage reforestation and afforestation of degraded areas



Challenges

Price of current technologies and deployment at scale

High investment costs and commercial viability of breakthrough technologies

Carbon capture and storage

Forest monitoring and data collection difficult due to remote regions

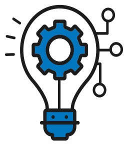
Opportunities

Forestry as key enabler of emissions reductions (e.g. net zero buildings)

Can complement or partially substitute emissions intensive materials such as steel, cement, or plastic

High recyclability

Bringing wood-based alternatives to new markets and increasing uptake in traditional markets



What is needed?

Company leadership

Prioritise recycling and re-use of fibre, promote sustainable management of forests, and invest in R&D to advance silvicuture techniques ensuring climate adaptation

Research and innovation

New drying technologies

Integrated biorefinery

Bioenergy with carbon capture and storage/ utilisation (BECCS/U)

Consumer behavior

Demand for products with reduced emissions and which are recycled or sourced from sustainably managed forests

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. purchased goods and services, transportation and distribution, etc.)

'Scope 1'

Direct GHG emissions from operations/ company facilities (processing activities and manufacturing)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions (e.g. processing of sold products such as pulp to container board, etc.)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to production facilities from extreme weather (e.g. forest fires, droughts, flooding, pest outbreaks)

Water availability

Source: WBCSD (2021)

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Insurance

48% of global financial assets are in banking and insurance, which have a significant climate impact through their associated emissions.[1]
What does the **insurance sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3, including insurance-associated and financed emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the explicit criteria for restricting financing to non-1.5°C-aligned activities, including the underwriting and financing of thermal coal, oil, gas and deforestation activities?
- To what extent is the company providing insurance, reinsurance and finance for climate solutions and products and services to accelerate the decarbonization of hard-to-abate sectors?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?

Resilience

- Has the company analyzed the resilience of its business model in – and its alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets to grow investments/underwriting in relation to 'low/zero-carbon' financial and insurance products and services where there is clear alignment with the existing business model?

Collaboration

- How is the company working to encourage emission reductions in the real economy through climate-aware financing and engagement with clients?
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. carbon pricing)?

Red lines

- Does the company have restrictions around financing /investing in thermal coal, including new thermal coal projects?
- Does the company disclose its scope 3 emissions associated with its financed and insurance-associated emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. FSB (2021), data as at end-2018
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance and additional PCAF requirements/standards.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[4] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

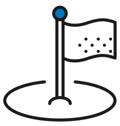
Sector-specific considerations: Indirect impacts could result from an insurer's role in enabling activities through risk management, underwriting and investing practices.

Company levers

- Transitioning away from underwriting and investing in high-carbon activities
- Building climate considerations into risk management frameworks to reduce and reprice carbon exposure
- Climate risk disclosure
- Increasing intermediation of capital into low-carbon activities
- Climate-supportive products and advisory services; customer education

Government policies

- Carbon pricing
- Capital requirements and stress-testing aligned with rising carbon risks
- Mandatory climate change disclosures



Challenges

Data and compatibility with risk frameworks

Mismatch of timings, incentives, maturity of investments

Regulatory divergence and competing priorities

Political and counterparty risk

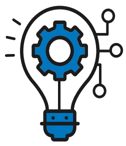
Fungible, fragmented sources of capital

Opportunities

Anticipating - and benefiting from - future policy and regulatory action on climate

Growth in demand for sustainable insurance products

Improved reputation and stronger relationships with customers/ governments



What is needed?

Company leadership

Alignment of investments/ financing with net-zero global trajectory, with targets for portfolio emissions increasing in stringency over time

Research and innovation

Investment innovation to allow capital flows at scale into low-carbon solutions, including collaboration with regulators and development agencies

Consumer behavior

Growing market for sustainable/ low-carbon financial products

4. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain, employee travel etc.

'Scope 1'

Direct GHG emissions from companies' operations, including facilities and vehicles

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions from insurance and investments.

Sources: FSB (2021), data as at end-2018

'Just Transition' considerations

Potential implications for employees, supply chain, customers and communities from the transition to a lower-carbon business model.

High premiums for insuring assets in high-risk areas (due to climate change), impacting affordability

Physical risk impacts

Direct risks in property investments and insurance as changing climate could make certain areas uninsurable

Indirect climate impacts on demographics and insurance liabilities

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

Important information
Source: LGIM as at August 2022. The value of an investment and any income taken from it is not guaranteed and can go down as well as up, you may not get back the amount you originally invested. The above information does not constitute a recommendation to buy or sell any security.

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For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Banks

48% of global financial assets are in banking and insurance, which have a significant climate impact through their associated emissions.[1] What does the **banking sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3, including financed emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the explicit criteria for restricting financing to non-1.5°C-aligned activities, including the financing of thermal coal, oil, gas and deforestation activities?
- What is the company's approach to carbon credits in the accounting of financed emissions, and does it include a commitment to limit its use to residual emissions only?
- To what extent is the company providing finance for climate solutions and products and services to accelerate the decarbonization of hard-to-abate sectors?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?

Resilience

- Has the company analyzed the physical climate risks to its financed emissions and evidenced measures to manage these?
- Has the company analyzed the resilience of its business model in – and its alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets to grow revenue in relation to 'low/zero-carbon' financial products and services where there is clear alignment with the existing business model?

Collaboration

- How is the company working to encourage emission reductions in the real economy through climate-aware financing and engagement with clients?
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. carbon pricing)?

Red lines

- Does the company have restrictions around financing/investing in thermal coal, including new thermal coal projects?
- Does the company disclose its scope 3 emissions associated with its financed emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. FSB (2021), data as at end-2018
2. Aiming to cover all high-risk sectors, across all material business segments. A high-risk sector is defined by TPI's list of coverage as: oil & gas; coal mining; airlines and shipping; autos; steel; aluminium, diversified mining; paper; cement; and food.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[4] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Indirect impacts could result from lending, investing and project financing activities. Financial flows harmful to biodiversity range across all sectors with negative influences on their operating environments.

Company levers

- Transitioning away from financing high-carbon activities
- Building climate considerations into risk management frameworks to reduce and reprice carbon exposure
- Climate risk disclosure
- Increasing intermediation of capital into low-carbon activities
- Climate-supportive products and advisory services; customer education

Government policies

- Carbon pricing
- Capital requirements and stress-testing aligned with rising carbon risks
- Mandatory climate change disclosures

Challenges

Data and compatibility with risk frameworks

Mismatch of timings, incentives, maturity of investments

Regulatory divergence and competing priorities

Political and counterparty risk

Fungible, fragmented sources of capital

Opportunities

Anticipating - and benefiting from - future policy and regulatory action on climate

Growth in demand for sustainable banking products

Improved reputation and stronger relationships with customers/ governments

What is needed?

Company leadership

Alignment of investments/ financing with net-zero global trajectory, with targets for financed emissions increasing in stringency over time

Research and innovation

Investment innovation to allow capital flows at scale into low-carbon solutions, including collaboration with regulators and development agencies

Consumer behavior

Growing market for sustainable/ low-carbon financial products

4. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain, employee travel etc.

'Scope 1'

Direct GHG emissions from companies' operations, including facilities and vehicles

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions from lending, investment and advisory activities

Sources: FSB (2021), data as at end-2018

'Just Transition' considerations

Potential implications for employees, supply chain, customers and communities from the transition to a lower-carbon business model

Ending financing in certain sectors creates risk of job losses; increased need to finance emerging markets and technologies

Physical risk impacts

Direct risks in property investments and project financing

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

Net zero: Aluminium

c.5% of global greenhouse gas emissions associated with materials production come from aluminium.[1]
What does the **aluminium sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?

Resilience

- Has the company analyzed the physical climate risks to its assets and operations, including water scarcity, and evidenced measures to manage these?
- Has the company analyzed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net zero by 2050 scenario?

Targets

- Does the company have targets to increase renewable electricity uptake and, where relevant, phase out the use/sourcing of coal-fired power generation?
- Does the company have targets to increase recycling rates of aluminium scrap and improve circularity?
- Does the company have a target to grow the production of/revenue from low/zero-carbon aluminium?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. suppliers, customers, utilities sector, strategic R&D partnerships, sector initiatives)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g., carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. UNEP (2019)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., increase access to, and use of, renewable electricity; green hydrogen; CCUS (for both thermal energy and chemical process emissions); increase use of scrap; R&D of low-carbon primary production technologies such as inert anodes, electric boilers for low and mid-range heat processes, and mechanical vapour recompression; etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Impacts could result from bauxite mining activities. Direct impacts from the manufacturing process include water use and the discharge of wastewater and other pollutants.

Company levers

- Growing consumer demand for low-carbon aluminium
- Circularity
- Renewable energy
- Alternative reductants in primary production
- Green hydrogen
- Carbon capture and storage

Government policies

- Carbon pricing and taxation (and border adjustments)
- Green aluminium frameworks and labels across the value chain
- Low-carbon public procurement
- Incentives for hydrogen infrastructure
- Increased recycling and support for circular design
- Jurisdictional renewable energy policies and incentives

Challenges

High cost of new technologies and infrastructure in a low-margin industry

Availability of low-cost renewable energy/ green hydrogen

Carbon capture and storage

Opportunities

Aluminium as a key enabler of emissions reductions (e.g. lightweight material for EVs, production of solar PV)

Increased partnerships across sectors

High recycling potential

What is needed?

Company leadership

Reduce emissions from primary and recycled production through investment in new technologies and adopt measures to decarbonize the power supply and help integrate variable renewables into the electricity grid

Research and innovation

Low-carbon primary production technologies such as inert anodes

Novel technologies for heat, steam and zero-carbon smelting

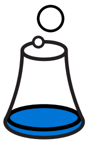
Consumer behavior

Willingness to pay for low-carbon products

Increase scrap collection, sorting and recycling

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions



'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. during the extraction and transportation of bauxite)

'Scope 1'

Direct GHG emissions from operations (e.g. refining and smelting process)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions (e.g. from transporting finished products)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to production facilities from extreme weather

Water availability

Source: WEF (2020)- Aluminium for Climate

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

For directors of companies which issue securities on public markets. Capital at risk.

LGIM

Net zero: Tech and Telecoms

2% of human-caused greenhouse gas emissions come from information technology and communications.[1]

What does the **tech and telecoms sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company developing low-carbon products and to what extent do these provide climate solutions and help to reduce customers' GHG emissions?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?

Resilience

- Has the company analysed the physical climate risks to its assets and operations, including water scarcity, and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets to increase renewable energy uptake?
- Does the company have targets to increase recycled/zero-carbon materials and improve the circularity of products?
- Does the company have targets to optimise its water usage?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. customers, suppliers, utilities sector, strategic R&D partnerships, sector initiatives etc.)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its material Scope 3 emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. Malmodin and Lunden (2018)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., improving energy efficiency in networks and buildings; increasing access to, and use of, renewable electricity; improving environmental sustainability and circularity of mobile devices and equipment; using mobile connectivity to reduce carbon emissions through smart technologies R&D; alignment of M&A activity with net zero objectives, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Direct impacts could result from building communication networks and the supporting infrastructure. Indirect impacts could result from the raw material extraction needed for hardware, disposal of electronic waste, and creation of hazardous waste.

Company levers

- Renewable energy and storage
- Energy efficiency
- Low-carbon transport
- Recycling and re-use
- Water efficiency

Government policies

- Carbon pricing
- Regulation to decarbonize power grids
- Energy and water efficiency standards
- Reduced waste/increased recycling and refurbishment
- Supply chain standards and monitoring
- Procurement legislation

Challenges

Global growth in data and internet demand outpacing decarbonization of power

Location and size of data centers, use of on-site fossil fuel power

Over-reliance on renewable energy 'credits'

Opportunities

Onsite renewable energy generation

Cost reductions from energy efficiency and fixed-price power

Digital solutions can drive the decarbonization of other sectors ('smart' offices, manufacturing etc)

What is needed?

Company leadership

Companies adopting ambitious targets for their power supply and building resilience of operational infrastructure (offices, data centres, etc)

Research and innovation

Battery storage

Artificial intelligence and the internet-of-things

Consumer behavior

Demand for sustainable digital solutions

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. extraction of metals and rare earths for semiconductors etc)

'Scope 1'

Direct GHG emissions from owned and operated facilities, company vehicles, on-site diesel generators etc

'Scope 2'

Indirect GHG emissions from purchased energy to power operations and data centres

'Scope 3' Downstream

Other **indirect** GHG emissions from product distribution and transportation, consumer use/ disposal of devices

Sources: Malmodin and Lunden (2018)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

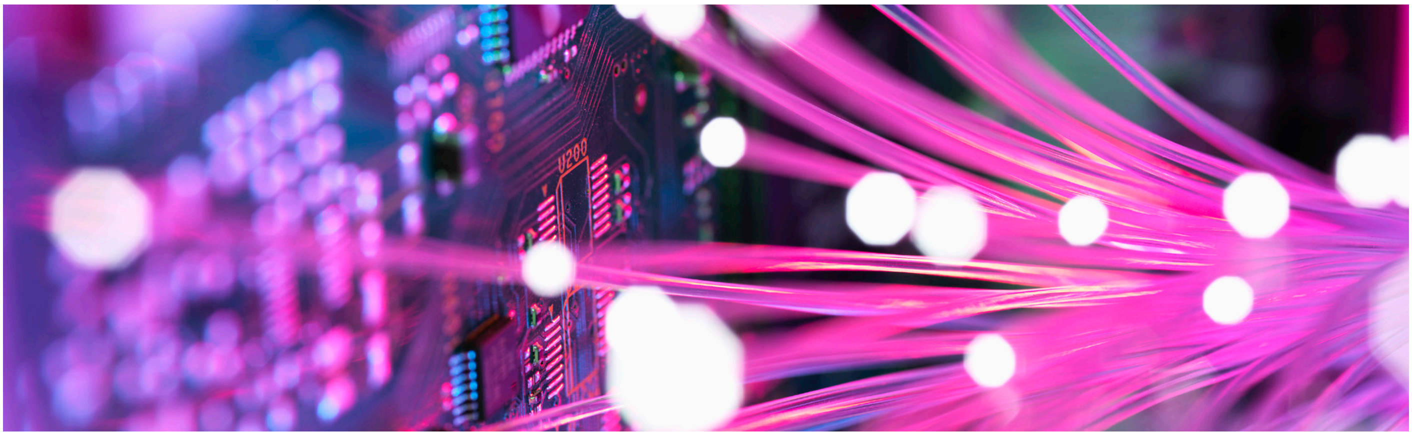
Workers' rights in supply chain

The impact of automation

Physical risk impacts

Disruption to operations from extreme weather

Energy usage for cooling data centres expected to increase



For more information and to see how companies are rated

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[Climate Impact Pledge score]

[Investment Stewardship]

Important information
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For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Buildings

17% of human-caused greenhouse gas emissions come from buildings and construction.[1]

What does the **buildings sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2] As part of scope 3, has the company included embodied carbon emissions?
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Does the company integrate energy efficiency management practices across existing and new assets?
- Is the company calculating and disclosing embodied carbon emissions and does it have a strategy to maximise the lifetime of current embodied carbon?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's net zero strategy and the use of any offsetting consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change, specifically deforestation?

Resilience

- Has the company analysed the physical climate risks to its portfolio and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?
- What is the percentage of net-zero carbon buildings within the company's portfolio?

Targets

- Does the company have targets for the use of low/zero carbon construction materials and to improve circularity (increased recycling or re-use of demolished materials)?
- Does the company have targets to optimise properties' water usage?
- Does the company have targets to utilise onsite and/or offsite renewable energy?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. with tenants, material manufacturers, construction firms, sector initiatives, etc.)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company disclose its property portfolio's operational emissions, and has it set a reduction target for them?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

* The applicability of the expectations vary depending on companies' business models

1. LGIM based off IEA (2019), UNEP (2019)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., capex allocated to green buildings; integration of low carbon materials such as cross-laminated timber, recycled concrete, green steel, clinker free/ low- carbon cement; increased renewable energy uptake; new builds capable of operating with zero emissions; green leases and differentiated pricing.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Direct impacts could result from the destruction of natural habitats. Indirect impacts could result from upstream extraction, the manufacturing of building materials, and the financing of poor offsetting practices.

Company levers

- Construction innovation for low-carbon new buildings
- Owners retrofitting existing building stock
- Decarbonization of power and heat
- Renewables and energy efficiency
- Heat pumps, district heating, biomethane and hydrogen blends
- Recycling and waste treatment
- Meeting consumer demand for sustainable living

Government policies

- Carbon pricing
- Building codes, energy and carbon standards
- Low-carbon public procurement
- Incentives for low-carbon heat and power
- Increased waste collection and recycling

Challenges

Higher costs for lower-carbon materials

Availability of hydrogen and other low-carbon heat and power sources

Behavioural barriers and conflicting incentives between owners and occupants

Policy coordination

Opportunities

Resilience to climate risks

Energy decentralisation

Lower energy bills

Improved tenant satisfaction

'Green-collar' jobs and urban regeneration

What is needed?

Company leadership

Investment and R&D across building life-cycle

Net-zero targets for building owners and developers

Research and innovation

Deep retrofitting models for housing and commercial property

Decarbonizing steel & cement to reduce embodied carbon

Consumer behavior

Net-zero public and private procurement

Aligning incentives between costs borne by owners and beneficiaries

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's purchased goods and supply chain, employee travel etc.

'Scope 1'

Direct GHG emissions from operations including the use of diesel and gas to power trucks and appliances and fugitive methane from coal mining

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions from the processing and use of a company's products (e.g. burning coal to produce steel or generate power)

'Just Transition' considerations

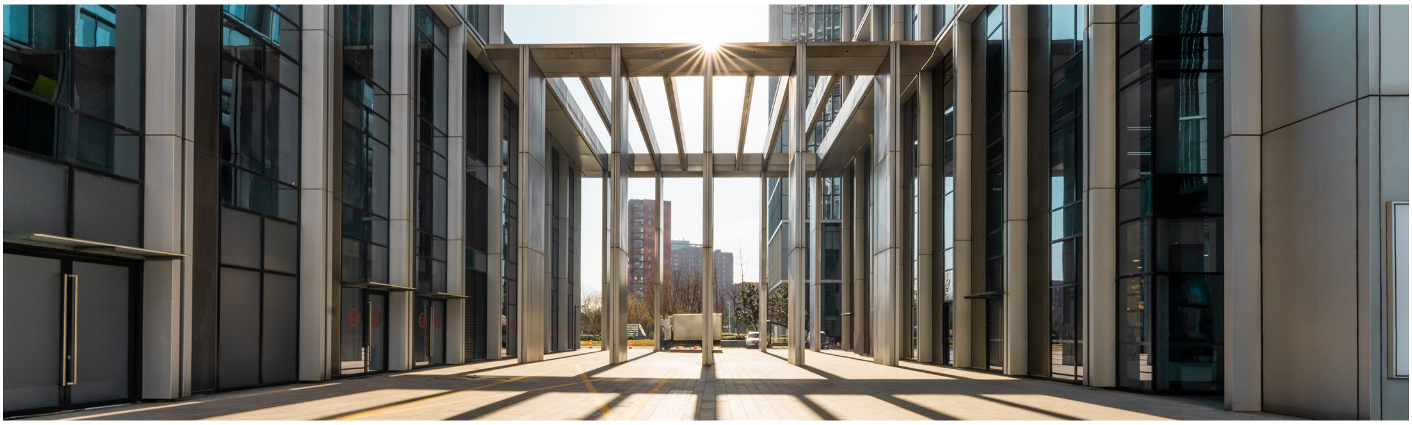
The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Physical risk impacts

High vulnerability to extreme weather; costly adaptations

Potentially uninsurable buildings in certain areas

Sources: LGIM based off IEA (2019), UNEP (2019); UK Green Building Council



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For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Mining

4-7% of human-caused greenhouse gas emissions come from mining sector operations.[1]

What does the **mining sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Does the company place restrictions on investing in the opening of new coal mines?
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?
- Does any use of offsetting consider the potential impacts and dependencies on biodiversity - for example, in relation to land-use/ land-use change?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have a target for material scope 3 emissions?
- Does the company have targets in relation to energy transition commodities?
- Has the company set targets in relation to its collaborative efforts across its value chain?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. customers, finance sector, strategic R&D partnerships, sector initiatives etc.)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Has the company committed to net-zero operational emissions?
- Does the company disclose its downstream scope 3 emissions?
- Is the company planning to increase thermal coal capacity?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. McKinsey (2020). Range in operational emissions depends on treatment of warming potential of methane
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., emission reductions due to efficiency improvements, use of renewable electricity, decrease in fossil fuel sales, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: Direct impacts result from habitat removal, ground water extraction, infrastructure corridors, waste disposal, air quality and alien species.

Company levers

- Shifting commodity mix to accelerate the energy transition
- Electrification and automation to reduce emissions from operations
- Phasing out thermal coal
- Increased recycling of metals
- Partnerships with vendors and customers

Government policies

- Higher and more widely applied carbon prices
- Carbon border adjustment
- Fugitive methane regulation
- Policies to retrain workforce
- Policies to encourage low-carbon infrastructure

Challenges

Scope 3 accounting uncertainty

Loss of hydrocarbon revenues

Costs and complexity of technologies

Lack of infrastructure

Limited recycling and scrap availability

Young age for some high-carbon industrial facilities

Opportunities

Key enabler of the low-carbon transition (raw materials for renewables, batteries, EVs etc.)

Meet increasing electricity demand with new, low-carbon electricity supply methods

Cost reductions

Increased safety and efficiency

What is needed?

Company leadership

Taking responsibility for supporting decarbonization across the full company value chain

Research and innovation

New smelting techniques

Green hydrogen

Carbon capture and storage

Low-carbon processing

Consumer behavior

Increased demand for renewables and low-carbon materials and parts

Demand reduction for thermal coal

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's purchased goods and supply chain, employee travel etc.

'Scope 1'

Direct GHG emissions from operations including the use of diesel and gas to power trucks and appliances and fugitive methane from coal mining

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions from the processing and use of a company's products (e.g. burning coal to produce steel or generate power)

Source: McKinsey (2020). Range in operational emissions depends on treatment of warming potential of methane

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model.

Maintaining social licence to operate/ community rights

Significant local employer

Physical risk impacts

Water scarcity

Heatwaves and flooding can take mines offline and disrupt supply chains

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Net zero: Electric utilities

25% of human-caused greenhouse gas emissions come from power generation.[1] What does the **electric utilities sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and the contribution of each to meeting its targets?[4]
- Are there restrictions on investing in new thermal coal power plants and extending the capacity/lifespan of existing coal fleets?
- Is executive remuneration aligned with the short- and/or medium-term emission targets, as set in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?
- Does the company's net zero strategy consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change/ biofuel production/ offsetting?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and its alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have a commitment to produce carbon-free electricity by 2035 in advanced economies, and by 2040 globally?
- Does the company have targets to reduce other (non-carbon) pollutants?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. demand management, appliance efficiency, engaging with property developers, strategic R&D partnerships etc.)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a target for phasing out unabated coal by 2030 in advanced economies, and 2040 globally?
- Does the company have a target to reduce its material scope 3 emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. Victor, Geels & Sharpe (2019).
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., reducing electricity generation from the use of fossil-fuels, increasing investment in renewable generation, demand side flexibility (inc. smart charging EVs), interconnections, storage, and network infrastructure.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

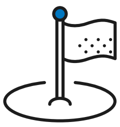
Sector-specific considerations: Direct impacts could result from building utility infrastructure, significant water use, damming and waste disposal. Indirect impacts could result from financing of poor offsetting practices, the use of biofuels, and upstream fossil fuel extraction.

Company levers

- Renewable energy
- Hydrogen/biomethane into gas grids
- Battery storage
- Demand response software
- Fossil fuel phase-out
- Combined heat and power (CHP)

Government policies

- Country-wide electrification and emission plans
- Investments in grid and interconnections
- Market reform and pricing (including carbon price) to encourage demand-led flexibility and decentralisation
- Support for a 'Just Transition'
- Air quality and emission standards



Challenges

Storage and variability

Infrastructure and markets designed around old, centralised model

Lack of interconnection

Public attitudes

Opportunities

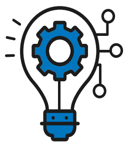
Reduced costs for retail and corporate consumers

Power market reform and decentralisation

Energy independence

Carbon capture and storage (CCS) potentially combined with bioenergy

Improved health and air quality



What is needed?

Company leadership

Investments for an orderly and swift transition

Technology adoption

Research and innovation

Software

Combined heat and power

CCS

Consumer behaviour

Growing demand for clean power from retail and corporate customers

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's purchased goods and services (e.g. steel used in gas and wind turbines)

'Scope 1'

Direct GHG emissions from company's operations (e.g. generation of electricity, transport of gas etc.)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions from the use of company's products (e.g. gas supplied to customers)

Source: Victor, Geels & Sharpe (2019)

'Just Transition' considerations

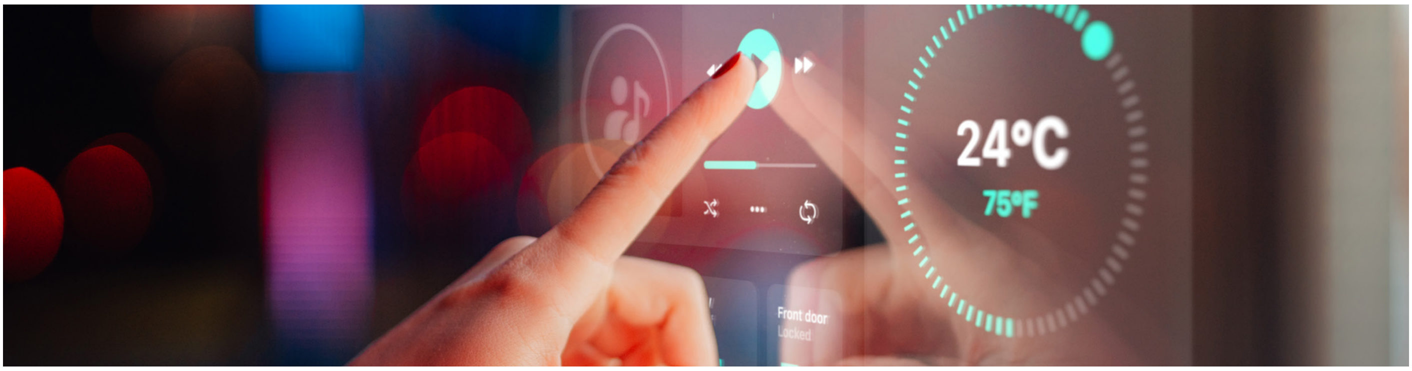
Potential implications for employees, supply chain, customers and communities from the transition to a lower-carbon business model

Localised employment amid a shifting energy system

Physical risk impacts

Grid damage from extreme weather

Spikes in energy demand from cooling and heating as a result of extreme weather



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Net zero: Cement

5-6% of human-caused greenhouse gas emissions come from the production of cement.[1]
What does the **cement sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company developing low-carbon products?
- Is executive remuneration aligned with the company's short- and/or medium-term emissions targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?
- Does any use of offsetting consider the potential impacts and dependencies on biodiversity - for example, in relation to land-use/ land-use change?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios? Including the IEA's net zero by 2050 scenario?

Targets

- Does the company have targets to optimise its water usage?
- Does the company have targets to grow production of/revenue from low-carbon products?
- Does the company have quantified targets to reduce its clincker-to-cement ratio?
- Does the company have targets to reduce other airborne pollutants[5] from cement manufacturing?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. with customers, finance sector, strategic R&D partnerships, sector initiatives etc).
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. UNEP (2019)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., clinker alternatives, thermal energy efficiency measures, renewable electrification of cement kilns, green hydrogen, CCS/CCUS, etc.
5. E.g., SOx, NOx, particulate matter (PM).

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

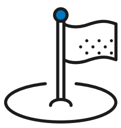
Sector-specific considerations: A direct impact associated with quarrying activities, such as land clearance, pollution, alteration of hydro-geological systems, noise and vibrations from blasting.

Company levers

- Alternative building technologies (carbon-cured concrete, 3D printing)
- Clinker substitution and optimisation of clinker usage
- Energy efficiency
- Renewable energy and waste heat recovery
- Alternative fuels
- Carbon capture and storage
- Design improvements and alternative material

Government policies

- Carbon pricing
- Policies to reduce embodied carbon
- Product and design standards
- Increased recycling and materials efficiency
- Subsidy reform
- Biofuel regulation



Challenges

Clinker production results in unavoidable CO2 emissions; limited substitutes

Costs of technological improvements and alternative materials

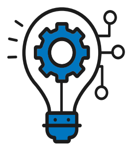
Costs of sustainable biofuels and zero-carbon electricity

Lack of scalable carbon capture

Opportunities

New business models as industry shifts from cement manufacture to sustainable construction solutions

Cost savings from fuel and energy efficiency



What is needed?

Company leadership

Investment and R&D for net zero across building life cycle

Research and innovation

Carbon capture and storage

Clinker alternatives

Electrification of cement kilns

Consumer behavior

Developers and public sector customers setting targets for reducing embodied emissions

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. extraction, production and transportation of purchased clinker and raw materials)

'Scope 1'

Direct GHG emissions from operations (e.g. production of clinker, burning fossil fuels for kilns)

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions from the transportation and distribution of products, and processing of sold products (e.g. turning cement into concrete or mortar)

Source: UNEP (2019)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model.

Impacts of carbon costs on affordability of housing

Physical risk impacts

Disruption to production facilities and supply chains from extreme weather

Water scarcity

For more information and to see how companies are rated

[Climate Impact Pledge 2022 - Net zero: going beyond ambition (lgima.com)]

[Climate Impact Pledge score]

[Investment Stewardship]

Important information
Source: LGIM as at August 2022. The value of an investment and any income taken from it is not guaranteed and can go down as well as up, you may not get back the amount you originally invested. The above information does not constitute a recommendation to buy or sell any security.

For directors of companies which issue securities on public markets. Capital at risk.

LGIM

Net zero: Chemicals

7% of human-caused greenhouse gas emissions come from the operations of the chemicals sector [1]

What does the **chemicals sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is the company developing low-carbon products?
- Is executive remuneration aligned with the company's short- and/or medium-term emissions targets, as set out in the net-zero transition plan?

Resilience

- Has the company analyzed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analyzed the resilience of its business model in – and alignment to – climate scenarios? Including the IEA's net zero by 2050 scenario?

Targets

- Does the company have targets to electrify its energy consumption, and for that electricity to come from renewable sources?
- Does the company have a target to switch to emission-neutral feedstocks?[5]
- Does the company have a target to increase recycled plastic feedstocks?[6]
- Does the company have targets to reduce other airborne pollutants (i.e. NOx, SOx)?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. customers, utilities sector, strategic R&D partnerships, sector initiatives etc).
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Has the company committed to calculate and disclose its material Scope 3 emissions?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if the lobbying activities of these associations are not in line with the Paris Agreement?

* The applicability of the expectations varies depending on companies' business models

1. IEA, DECHEMA, ICCA (2013)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., emissions neutral feedstocks, renewable electrification, green hydrogen, circular economy, etc.
5. E.g., green hydrogen-based feedstocks- green ammonia (for agrochemicals), and green methanol (for polymers & HVCs).
6. For companies involved in the manufacturing of polymers and HVCs.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

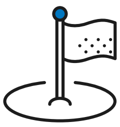
Sector-specific considerations: Pollution, including from chemicals, is one of the primary drivers of biodiversity loss. Direct impacts could result from manufacturing and polluting effluent. Indirectly – from the use and disposal of chemical products.

Company levers

- Plastic alternatives
- Collaboration and research and development (R&D) across value chain
- Changes to raw materials and feedstocks, including use of biogenic materials
- Decarbonization of power and heat
- Energy and resource efficiency
- Recycling and waste treatment

Government policies

- Carbon pricing
- Support for renewables
- R&D assistance for alternative process (including cost reductions in green electricity)
- Increased waste collection and recycling
- Policies to encourage decentralised energy production and circular economy



Challenges

Competitiveness

High costs of feedstocks (e.g. biomass) and electricity requirements for low-carbon processes

Commercialisation of new technology

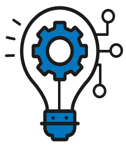
Carbon capture and storage

Opportunities

Key enabler of the low-carbon transition (catalysts, cathodes, light-weight materials)

Efficiencies and new production methods

Circular economy and partnerships



What is needed?

Company leadership

Investment to reduce costs and energy requirements of low-carbon alternatives

Research and innovation

Electricity-based processes

Alternative materials

Downstream pathways

Consumer behavior

Demand for sustainable materials

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from companies' purchased goods and supply chain (highly reliant on oil and gas feedstocks)

'Scope 1'

Direct GHG emissions from energy-intensive operations, including ammonia and steam cracking

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions from the processing and use of a company's products (e.g. planet-warming fluorocarbons)

Sources: IEA, DECHEMA, ICCA (2013)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Alternatives to fertilisers/plastics may raise costs of food and other key commodities

Physical risk impacts

Disruption to global food supply

Weather-caused accidents (leaks, fires, explosions)

Water scarcity

For more information and to see how companies are rated

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LGIM

Net zero: Road transport

12% of human-caused greenhouse gas emissions come from road transport.[1] What does the **automobile sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments embedded in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's decarbonization strategy address and incorporate the impact of the Just Transition?
- Does the company's net zero strategy consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change/ biofuel production?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and its alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets to improve life-cycle emissions/the circularity of products, particularly with batteries?
- Does the company have targets related to the use and roll-out of low/zero-carbon fuels/vehicles/ technologies?
- Does the company have a commitment to reach 100% zero emission new car and van sales by 2035 in advanced economies, and by 2040 globally?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions (e.g. strategic R&D partnerships, charging infrastructure providers, financing, sector initiatives etc.)?
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero emissions target, covering all of the scopes of material emissions, including the phasing out of ICE vehicles?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

1. HSBC (2019), based off IEA, EDGAR, Global Carbon Project
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., Phase-out of Internal Combustion Engine (ICE) vehicles, uptake of electric vehicles (EVs)/plug-in hybrid electric vehicles (PHEVs)/fuel cell electric vehicles (FCEV)s/biofuel vehicles, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

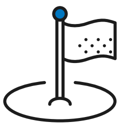
Sector-specific considerations: Indirect impacts could result from raw-material extraction, polluting emissions and the use of biofuels. Directly - from the manufacturing process.

Company levers

- Electrification and battery storage
- Charging infrastructure
- Fuel economy and biofuel blending
- Digitalisation
- Hydrogen
- Decentralisation of energy
- Automation/self-driving
- Ride-sharing

Government policies

- Phasing out sales of internal combustion engine vehicles (ICE)
- Carbon pricing
- Subsidy reform and R&D assistance
- Emissions and efficiency standards
- Congestion charges and public transport
- Scrappage schemes
- Government procurement



Challenges

Charging infrastructure and 'range anxiety'

Limited alternatives for heavy-goods vehicles (HGVs)

Potential raw material bottlenecks

Costs of green hydrogen production

Consumer choice and time lag for vehicle switch

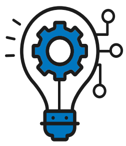
Opportunities

Growing demand for passenger vehicles

Fuel cells

'Mobility as a service' as new business model; synergies with IT and power sector

Increased efficiency and safety from digitalisation and automation



What is needed?

Company leadership

Investment and R&D for net zero across vehicle life-cycle

Research and innovation

Fuel cells and hydrogen infrastructure

Advancement in battery cells

Demand management

Consumer behavior

Optimizing vehicle usage

Modal shift in transport

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. extraction of metals)

'Scope 1'

Direct GHG emissions from the vehicle manufacturing process

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions, primarily from consumers' use of fuel when driving

Sources: HSBC (2019), based off IEA, EDGAR, Global Carbon Project

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Affordability of transport

Labour rights in battery value chain

Physical risk impacts

Disruption to production facilities and supply chains from extreme weather

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For directors of companies which issue securities on public markets. Capital at risk.

Net zero: Food

25% of human-caused greenhouse gas emissions come from agriculture, forestry and other land use[1]

What does the **food sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties as they develop?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Does the company have a regenerative agriculture programme in place?
- Is the company disclosing the level of traceability of 'forest risk commodities' across its supply chain?
- What is the percentage of commodities purchased in line with no-deforestation principles?
- What is the percentage of food that is diverted/rejected/wasted vs recovered/repurposed?
- Is executive remuneration aligned with the company's short- and/or medium-term emissions targets, as set out in the net-zero transition plan?
- Does the company's net zero strategy and the use of any offsetting consider the potential impacts and dependencies on biodiversity – for example, in relation to land-use change?

Resilience

- Has the company analysed the physical climate risks to its supply chain and evidenced measures to manage them?
- Product portfolio: How much revenue is derived from animal protein, particularly beef?

Targets

- Does the company have targets to grow revenue from low-carbon/alternative protein products?
- Does the company have targets to reduce or eliminate food loss or waste?
- Does the company have targets to reduce non-CO2 emissions, such as methane and nitrous oxide, and to phase out hydrofluorocarbons (HFCs) from refrigeration along the supply chain?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. with customers, suppliers, strategic R&D partnerships, sector initiatives etc).
- Is the company advocating meaningful policy action, including from regulators, to meet global net-zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have comprehensive zero-deforestation and no-land-conversion procurement policies?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if these are not aligned with a 1.5°C scenario?

*The applicability of the expectations varies depending on companies' business models

1. IPCC (2018)
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., investing in innovation and product development of plant-based and alternative proteins, introduction of technologies to reduce food waste.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: The global food system is the primary driver of biodiversity loss. Impacts could result from habitat clearance for farmland, soil degradation, monoculture environments, overexploitation of species, and widespread pollution.

Company levers

- Reducing animal protein production and promoting plant-based alternatives to reduce land, water and emissions footprint
- Regenerative agriculture
- Lower emission farming practices
- Supply chain monitoring and traceability
- Waste management (animal waste, water, packaging)
- Natural refrigerants
- Consumer education

Government policies

- Farming standards
- Subsidy reform
- Soil restoration
- No deforestation
- Mandatory supply chain certification and traceability
- Local supply chain
- Waste reduction
- Taxation (including carbon pricing)

Challenges

Increasing production without additional land

Crop yield slowdown and soil loss, while reducing fertiliser use

Methane emissions

Lack of supply chain transparency

Dietary shifts

Food and packaging waste and food loss

Opportunities

Growing market for alternative proteins and healthy food options

Cost savings from low-carbon equipment

Reducing public health risks

Improved productivity

What is needed?

Company leadership

Investments in new products and tackling emissions across supply chain, with clear commitments to net zero

Research and innovation

Protein alternatives

Packaging and waste

Regenerative agricultural practices

Consumer behavior

Consumers adopting plant-based alternatives

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from companies' purchased goods and supply chain (highly reliant on oil and gas feedstocks)

'Scope 1'

Direct GHG emissions from energy-intensive operations, including ammonia and steam cracking

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Indirect GHG emissions from the processing and use of a company's products (e.g. planet-warming fluorocarbons)

Sources: IEA, DECHEMA, ICCA (2013)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Alternatives to fertilisers/plastics may raise costs of food and other key commodities

Physical risk impacts

Disruption to global food supply

Weather-caused accidents (leaks, fires, explosions)

Water scarcity

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LGIM

Net zero: Airlines

3% of global CO2 emissions (related to fossil fuel combustion) come from airlines.[1]
What does the **airline sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company's net zero strategy consider the potential impacts and dependencies on biodiversity that result from related land-use change (e.g. from biofuel production and/or offsetting)?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets related to the use and roll out of low/zero-carbon fuels/technologies and the alignment of its fleets with climate objectives?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. with airports, the finance sector, strategic R&D partnerships, sector initiatives)
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if the lobbying activities of these associations are not in line with the Paris Agreement?

1. IEA, Tracking Aviation (2020).
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., sustainable aviation fuels (SAF), including advanced biofuels and synthetic fuels, new aircraft technologies that can improve efficiency as well as reduce emissions and fuel use, and alternative propulsion technologies.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: A direct impact could result from the degradation of habitats, airport expansion, disruption to bird 'flyways,' the spread of alien species, or noise and light pollution. The financing of poor offsetting practices and the use of biofuels could have an indirect effect.

Company levers

- Sustainable aviation fuels (SAF) including advanced biofuels and synthetic fuels
- Batteries for short-haul journeys
- Air traffic management for more direct routes and less taxiing
- Energy efficiency

Government policies

- Carbon pricing and taxation
- Support for renewables
- Policy coordination between international regulators, airports and transport operators
- Regulation of sustainable aviation fuels (including biofuels)
- Tightening/enforcing energy efficiency standards and low/zero-carbon fuel mandates

Challenges

Price of current technologies

Battery range and density

Fragmented industry structure

Lack of robust policies

Opportunities

Growing consumer demand to reduce 'food miles' and other transport-related product emissions

Promoting sustainable biofuels

What is needed?

Company leadership

Companies investing in available decarbonization technologies

Logistics companies adopting stringent targets for air freight

Research and innovation

Reducing costs of electrolysis

Synthetic fuels

Carbon capture and storage

Battery storage

Consumer behavior

Demand for products with reduced transport emissions

Modal shifts in transport due to 'flight-shaming'

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. to produce steel for planes, or fossil fuels)

'Scope 1'

Direct GHG emissions from operations, primarily from burning fuel for propulsion

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions, primarily from use of transported products

Source: UNEP (2019)

'Just Transition' considerations

The potential implications for employees, the supply chain, customers and communities from the transition to a lower-carbon business model

Possibility of carbon taxes being passed on to passengers

Physical risk impacts

Disruption to global transport routes, supply chains (including sustainable aviation fuel production) and hubs from extreme weather

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LGIM

Net zero: Shipping

2% of global energy-related CO2 emissions come from shipping.[1] What does the **shipping sector** need to do to reach net zero?

LGIM will vote and implement investment sanctions against companies falling short of our climate expectations. LGIM expects companies' boards to oversee and publicly disclose answers to the following:

Net-zero commitment

- Does the company have a comprehensive target for net zero by 2050 or earlier, covering scopes 1, 2 and material scope 3 emissions?[2]
- Has the company made a commitment to certify/certified this target with the SBTi or other external independent parties?
- Does the company have a net-zero transition plan that includes short- and medium-term targets?[3]

Strategy

- What are the actions and investments involved in the company's plan to reach net zero, and what is the contribution of each action towards meeting its targets?[4]
- Is executive remuneration aligned with the company's short- and/or medium-term emission targets, as set out in the net-zero transition plan?
- Does the company have a time-bound plan in place to transform its fleet to zero-emission vessels?

Resilience

- Has the company analysed the physical climate risks to its assets and operations and evidenced measures to manage them?
- Has the company analysed the resilience of its business model in – and alignment to – climate scenarios, including the IEA's net-zero by 2050 scenario?

Targets

- Does the company have targets related to the use and roll out of low/zero-carbon fuels/technologies and the alignment of its fleets with climate objectives?

Collaboration

- How is the company working collaboratively across its value chain to reduce emissions? (e.g. with ports, customers, the finance sector, strategic R&D partnerships, sector initiatives)
- Is the company advocating meaningful policy action, including from regulators, to meet global net zero targets (e.g. with carbon pricing)?

Red lines

- Does the company have a net-zero operational emissions target?
- Does the company disclose its climate-related lobbying activities, including trade association memberships, and explain the action it will take if the lobbying activities of these associations are not in line with the Paris Agreement?

1. IEA, international shipping report (2021).
2. Aiming to cover all segments of the business, as articulated within the GHG protocol guidance.
3. Short-term refers to 2022 - 2025, medium-term 2026-2035 and long-term 2036-2050.
4. E.g., operational and energy efficiency improvements, use of wind-assistance technologies, investments in biofuels, batteries, hydrogen, green methanol, ammonia, etc.

Further areas for company consideration

Biodiversity expectations

Why? The climate and nature crises are inextricably linked.[5] Net zero requires both emission avoidance and sequestration. Functioning natural systems are essential to this but increasingly vulnerable due to climate change.

LGIM's expectations: An assessment of the impacts and dependencies on nature and biodiversity, and appropriate mitigation actions.

Sector-specific considerations: A direct impact could result from port expansion, exhaust emissions and eutrophication, spills, ocean noise, vessel strikes and physical damage from anchorage. The financing of poor offsetting practices could have an indirect effect.

Company levers

- Sustainable biofuels
- Ammonia, hydrogen fuels
- Vessel design
- Wind-assisted propulsion for ships
- Slower ship cruising speeds
- Energy efficiency

Government policies

- Carbon pricing and taxation (including at refuelling points)
- Support for renewables
- Policy coordination between international regulators, ports and transport operators
- Regulation of biofuels
- Tightening/enforcing energy efficiency standards and low/zero-carbon fuel mandates

Challenges

The cost and readiness of new technologies

Fragmented industry structure

Lack of robust policies

Opportunities

Growing consumer demand to reduce 'food miles' and other transport-related product emissions

Promoting sustainable biofuels

Using ammonia- or hydrogen-based fuels

What is needed?

Company leadership

Companies investing in available decarbonization technologies

Logistics companies adopting stringent targets for freight

Research and innovation

Synthetic fuels

Carbon capture and storage

Battery storage

Consumer behavior

Demand for products with reduced transport emissions

5. UN IPCC-IPEBS, Biodiversity and Climate Change workshop report (2021)

Sources of emissions

'Scope 3' Upstream

Indirect GHG emissions from a company's supply chain (e.g. to produce steel for ships, or fossil fuels)

'Scope 1'

Direct GHG emissions from operations, primarily from burning fuel to power auxiliary engines and boilers

'Scope 2'

Indirect GHG emissions from purchased energy

'Scope 3' Downstream

Other **indirect** GHG emissions, primarily from use of transported products (e.g. burning oil from tankers)

Source: UNEP (2019)

'Just Transition' considerations

Potential implications for employees, supply chain, customers, and communities from the transition to a lower-carbon business model

Physical risk impacts

Disruption to production facilities from extreme weather

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