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Second Party Opinion

Shandong Gold Group Co. Ltd. Green Finance Framework

May 14, 2025

Location: China **Sector:** Metals and Mining

Alignment Summary

Aligned = ✓ Conceptually aligned = ○ Not aligned = ✕

- ✓ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)
- ✓ Green Loan Principles, LMA/LSTA/APLMA, 2023

See Alignment Assessment for more detail.

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Medium green

Activities that represent significant steps towards a low-carbon climate resilient future but will require further improvements to be long-term low-carbon climate resilient solutions.

Our Shades of Green Analytical Approach >

Strengths

Shandong Gold Group Co. Ltd.'s green finance framework tackles the company's most pressing environmental challenges. These include integrating clean energy into its operations, upgrading pollution prevention facilities, and restoring the ecosystems at mined sites.

Weaknesses

Shandong Gold's operations in mining and metals processing may lead to substantial land degradation such as deforestation and natural habitat destruction. Green projects may only marginally address these exposures.

Areas to watch

The framework's eligibility criteria are broad and do not specify quantitative performance indicators for all green eligible projects. This limits insights on the projects' potential benefits.

Shandong Gold is yet to disclose its carbon footprint and develop emission reduction targets. This constrains the credibility of its decarbonization efforts given the energy-intensive nature of its operations. Similarly, the company is yet to systematically measure its operations' and supply chain's exposure to physical climate risks.

Shades of Green Projects Assessment Summary

Over the two years following issuance of the financing, Shandong Gold expects to allocate most of the proceeds to finance new eligible projects in renewable energy, sustainable water and wastewater, as well as sustainable land use. The company has not provided an indicative allocation across green activities listed in the framework.

Based on the project categories' Shades of Green detailed below, the expected allocation of proceeds, and consideration of environmental ambitions reflected in Shandong Gold's Green Finance Framework, we assess the framework Medium green.

Renewable energy	**Dark green**
Purchase of green electricity, installation of solar photovoltaic facilities and wind turbines, and adoption of geothermal energy technology to enhance renewable energy supply	
Sustainable water and wastewater management	**Light green**
Water collection, conservation, treatment, and recycling to reduce wastewater and to manage water contamination risk and water resources	
Environmentally sustainable management of living natural resources and land use	**Medium green**
Ecological restoration of site grounds to enhance regional climate regulation capacity; e.g. restoration of vegetation and natural landscapes, and reforestation and conservation of biodiversity	

See Analysis Of Eligible Projects for more detail.

Issuer Sustainability Context

This section provides an analysis of the issuer's sustainability management and the embeddedness of the financing framework within its overall strategy.

Company Description

Established in 1996, Shandong Gold is a state-owned entity based in Jinan city of China's Shandong province. The company is 70% owned by the Shandong State-owned Assets Supervision and Administration Commission, with 20% owned by Shandong Guohui Investment Holding Group Co. Ltd., and the remaining 10% by Shandong Caixin Assets Operation Co. Ltd.

Shandong Gold primarily engages in gold mining and refining, production and trading of nonferrous metal concentrate, and financial services. The company's gold mining operations span 26 mines across 11 provinces in China, Argentina, Australia, and Ghana.

In 2024, Shandong Gold acquired Osino Resources Corp., a Canadian gold exploration company, which should increase the contribution of overseas mines to the company's total gold output, beyond the 14% recorded in 2023.

In that year, the company generated most of its earnings from gold mining, which accounted for 79% of its gross profit of Chinese renminbi (RMB) 13.8 billion (US$ 1.9 billion). The nonferrous metal concentrate business contributed 11%, with gold refining, non-ferrous metal trading, and financial services accounting for the remaining 13%. Shandong Gold is the second largest gold miner in China, with a gold production of 48.8 tons in 2023.

Shandong Gold's 46%-owned Shandong Gold Mining Co. Ltd., which accounted for 70% of the group's gross profit in 2023, has a dual listing on the Hong Kong and Shanghai stock exchanges.

Material Sustainability Factors

Climate transition risk

Mining and processing of metals are energy intensive, particularly primary metals versus recycled metals. Energy consumption in gold mining mainly occurs in comminution and grinding, which breaks down ore into smaller particles. Moreover, the energy intensity of mining is increasing in many cases as ore grades decline and generally require more processing. The use of certain fossil fuels (such as diesel, coke, and coal) is currently inevitable in the smelting process, as viable alternatives have not yet been commercialized at scale. That said, opportunities exist to decarbonize other parts of the mining process since many steps do not involve the smelter and can be powered by renewable energy. The World Gold Council estimates that 95% of the sector's emissions come from purchased power and fuel combustion. China has national commitments to reach peak carbon emissions before 2030 and achieve carbon neutrality by 2060.

Physical climate risk

Mines typically rely on extensive infrastructure to extract and process resources. Such complexes are highly exposed to acute physical climate risks, especially as extreme weather events, including heatwaves and storms, are becoming more frequent and severe. Over time, both acute and chronic risks may shorten the useful life of infrastructure. Disruption can occur to both the direct operations and throughout the value chain, since mining involves extensive logistics, from the transportation of fuel and equipment to the mining site, to the shipment of resources for further processing or to the end consumers. Unabated climate change could lead to GDP losses of 0.5%-2.3% as early as 2030 for China, according to World Bank estimates. Chinese provinces account for half of the most exposed global spots to extreme weather events by 2050 (source: 2024 XDI Gross Domestic Climate Risk Report). Under a Representative Concentration Pathways 8.5 scenario, Shandong province is ranked 2nd globally in its exposure to aggregated damage risk in 2050.

Biodiversity and resource use

Mining often leads to the transformation of large areas of land at all phases of a mine's life. More specifically, it involves the removal of vegetation and soil, the movement of considerable volumes of rock, the conversion of land plots into waste disposal sites, and sometimes the diversion of watercourses. Gold mining often involves clearing large areas of land, leading to deforestation and habitat loss. Mining operations often require large quantities of water for processing and dust suppression, and cooling machinery. Gold mining, particularly in arid regions, is associated with the depletion of local water resources for nearby communities and ecosystems. China's Biodiversity Conservation Strategy and Action Plan (2023-2030) aims to improve biodiversity conservation. Its focus is on addressing biodiversity losses and sustainable use of biodiversity, along with benefit sharing through 27 priority action plans, with a target to protect and restore 30% of degraded ecosystems on land, inland waters, coasts, and oceans by 2030 (source: China Development Brief). The Ministry of Land and Resources' Work Plan for the Liquidation of Mining Rights in Nature Reserves requires that new mining activities shall not be conducted in protected areas.

Pollution, waste, and recycling

Gold mining releases toxic elements into the air, water, or soil, and utilizes hazardous substances such as mercury, sulfuric acid, arsenic, and lead, especially during smelting and refining. These substances can harm human health and the environment, necessitating strict practices around sourcing, transportation, storage, recycling, and disposal. The industry generates considerable waste, including large volumes of untreated rock and processing residues. Companies store tailings--a mixture of pulverized rock, water, and processing chemicals--in large impoundments until fluids are recycled or evaporate. Wet storage facilities may have leakages, contaminating water, while dry tailings can be major sources of dust until reclaimed, typically with vegetation planted to stabilize the soil. Large-scale incidents, such as tailing dam collapses, can cause severe damage, fatalities, high remediation costs, and reputation loss. China implemented the Measures for the Administration of Environmental Prevention and Control of Tailings Pollution in 2022 to strengthen oversight of tailings facilities. It requires environmental impact assessments, regular monitoring, risk management, and clear responsibility for pollution prevention and remediation. The Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes also requires mining enterprises to use scientific methods to minimize and manage solid wastes such as tailings, coal gangue, and waste rock; it also mandates proper closure of storage sites to prevent ecological damage.

Social Factors

The mining sector's impact on communities is typically pronounced because mine plans often incorporate sizable investments in infrastructure and land disruptions that can affect local living conditions. Mining activities can lead to community backlash, especially when mining sites encroach on natural or agricultural land. The mining industry's hazardous nature poses risks to workers' safety, as the International Labor Organization has highlighted. Safety incidents can result in operational disruptions, lengthy remediation, or even human casualties. This is especially true for low-probability events such as equipment failures. In China, the mining industry is regulated to ensure health through the Mine Safety Law, while safety is regulated under the Law on the Prevention and Control of Occupational Diseases.

Issuer And Context Analysis

The framework's eligible green categories aim to address some of Shandong Gold's material sustainability factors. For instance, renewable energy projects reduce climate transition risks, while sustainable water and wastewater management, and sustainable land use projects mitigate pollution and environmental impacts, as well as manage biodiversity and resource use. Meanwhile, these projects could introduce issues, such as more exposure to physical climate and social risks such as health and safety, and impacts on local communities.

Shandong Gold has increased spending to contain environmental impacts, but lacks specific climate targets or groupwide carbon disclosures. The company reports annually its sustainability performance with reference to the Responsible Gold Mining Principles and has obtained third-party assurance in 2023. Shandong Gold claimed its green investments were RMB220 million in 2023, up 33% from 2021. Investments in eligible green projects will help improve the company's direct emissions, and energy and resource efficiency. However, Shandong Gold is yet to commit to setting any public climate targets. For instance, despite

aiming to align its operations with China's carbon neutrality goal by 2060, the company lacks a detailed plan or timeline to reduce its reliance on fossil fuels.

Shandong Gold has assessed but not disclosed its carbon footprint since 2020. Additionally, while listed subsidiary Shandong Gold Mining reports on scope 1 and 2 emissions, it does not disclose scope 3 emissions, from upstream fuels and equipment used in the mining operations, to downstream processing and transportation. The lack of transparency limits understanding of the ambition of the group's decarbonization efforts.

Shandong Gold has a high exposure to environmental challenges beyond transition, including pollution (such as toxic chemical leaks, acid mine drainage, heavy metal contamination), waste and recycling, biodiversity, and resource use. The company has developed mitigation strategies to alleviate pollution impacts through wastewater treatment and recycling, as well as restoring ecosystem and vegetation of mined sites. Shandong Gold conducts annual inspections of its operating sites to ensure compliance with environmental regulations, such as the Law of the People's Republic of China on Prevention and Control of Water Pollution, Environmental Protection Law of the People's Republic of China, and the Environmental Impact Assessment Law. These inspections cover aspects such as noise, groundwater, soil, and ecological conditions. As of end-2023, 22 mines were included in the National Green Mine List of China. These mines fulfil requirements beyond those of applicable regulations. Assessment indicators include greening and restoration management, resource extraction and processing, utilization of solid wastes and wastewater, energy, air pollutants, noise, as well as technological innovation. Shandong Gold confirmed that none of its mines are in ecologically sensitive or protected areas.

Shandong Gold is yet to systematically assess its mining assets' exposure to physical climate risks. The majority of the company's operations are in Shandong province, which is highly susceptible to rainstorms, heatwaves, typhoons, floods, and droughts. While Shandong Gold relies on project-level feasibility studies, it focuses on standard procedures in China, including weather monitoring, early warning systems, emergency drills, and facility upgrades to mitigate climate impacts. It lacks comprehensive physical risk assessments against future climate scenarios; these assessments are crucial for long-term resilience and strategic planning.

Shandong Gold has introduced measures to address safety risks and community impacts. In 2023, the company invested RMB891 million in safety initiatives and trainings, achieved zero fatalities, and met its "zero accident" goal. Its safety protocols referenced the ISO45001:2018 Occupational Health and Safety Management Systems standards. Shandong Gold has integrated AI-driven technologies to enhance safety hazard monitoring, besides remote-control mining equipment. The company conducts annual assessment of its suppliers' environmental, health, and safety performance, with 65% of its suppliers holding Occupational Health and Safety Assessment Series 18001 certifications in 2023. Shandong Gold also engages in community initiatives, such as rural revitalization, education, infrastructure development, disaster relief, and charitable support. It maintains open communication with the local communities and has not received any local complaints in recent years.

Alignment Assessment

This section provides an analysis of the framework's alignment to Green Bond principles.

Alignment Summary

Aligned = ✓ Conceptually aligned = o Not aligned = ×

- ✓ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)
- ✓ Green Loan Principles, LMA/LSTA/APLMA, 2023

✓ Use of proceeds

All the framework's environmental project categories have a green shade. Shandong Gold commits to allocating the net proceeds from the framework exclusively to eligible green projects. Please refer to the Analysis of Eligible Projects section for more information on our analysis of the environmental benefits of the expected use of proceeds.

✓ Process for project evaluation and selection

The company's Green Financing Working Group (GFWG) comprises representatives from strategic planning, technology and environment, as well as finance. The GFWG will evaluate and select projects annually according to the framework's eligibility criteria. Shortlisted projects will be presented to the board of directors for approval. Shandong Gold will identify and manage potential environmental and social impacts associated with the financed projects based on the conclusions of environmental and social impact assessments (ESIA) aligning with International Finance Corp. (IFC)'s Performance Standards. The framework's exclusion criteria cover nuclear production, fossil fuel production, coal mining, forestry products, weapons and munitions, alcoholic beverages, tobacco, gambling, radioactive materials, forced or child labor, and activities deemed illegal in the host country.

✓ Management of proceeds

The net proceeds will be managed by the company's treasury team, under the GFWG's oversight. Shandong Gold will maintain an internal record to track the allocation of net proceeds. The company commits to replacing projects that cease to comply with the framework's eligibility criteria as soon as practicable. Pending allocation, net proceeds will be held in cash or invested in marketable securities. The framework's exclusion criteria apply to the management of unallocated proceeds.

✓ Reporting

Shandong Gold commits to reporting annually on the allocation of funds and the impact of financed projects until the full allocation of net proceeds. The information will be disclosed in its annual environment, social, and governance report. The allocation reporting will include project descriptions, amount allocated to eligible projects, the balance of the unallocated proceeds, the share of financing and refinancing, and examples of eligible projects subject to confidentiality. Impact reporting will include both the actual environmental impacts of financed projects.

Analysis Of Eligible Projects

This section provides details of our analysis of eligible projects, based on their environmental benefits and risks, using the "Analytical Approach: Shades Of Green Assessments".

Overall Shades of Green assessment

Based on the project category shades of green detailed below, the expected allocation of proceeds, and consideration of environmental ambitions reflected in Shandong Gold's Green Finance Framework, we assess the framework Medium green.

Activities that represent significant steps towards a low-carbon climate resilient future but will require further improvements to be long-term low-carbon climate resilient solutions.

Our Shades of Green Analytical Approach >

Green project categories

Renewable energy

Assessment	Description
Dark green	Investments or expenditures that increase the share of renewable energy in the power system. Examples include purchase of green electricity, installation of solar photovoltaic facilities and wind turbines, and adoption of geothermal energy technology to enhance the company's renewable energy supply.

Analytical considerations

- Renewable energy generation projects enable systemic decarbonization and help address climate change mitigation, provided their embodied carbon emissions, exposure to physical, biodiversity, and land use change risks are well managed. According to the International Energy Agency (IEA), coal still accounts for 61% of China's energy mix, followed by oil (18%), natural gas (8%), while the remaining is from renewables (e.g. wind and solar). China aims to have 80% of its energy mix from sources other than fossil fuels by 2060 and a combined 1,200 GW of solar and wind capacity by 2030 (see China commits to 80% of energy mix from non-fossil fuels by 2060, published Oct. 25, 2021).
- Shandong Gold has stated that projects will mainly include investments in solar, wind, and geothermal facilities to decarbonize its own mining operations. While the company has not established any near-term plans, the sourcing of renewable electricity through physical power purchase agreements (PPAs) is also eligible. The framework excludes projects connected to fossil fuel production or coal mining. It is also positive that fossil-fuel back-up or hybrid generation equipment will not be eligible. Eligible wind, solar, and geothermal projects provide clear climate benefits, and are Dark green solutions to a low-carbon climate resilient future.
- Renewable energy projects generate carbon emissions during their development, construction, installation, and maintenance-- from materials sourcing, manufacturing, transportation, and the eventual decommissioning of equipment. Additionally, the gold mining's value chain poses significant risks, including environmental degradation, resource depletion, and social disruptions. These extend beyond direct operations and pose challenges for fully managing sustainability throughout the sourcing, processing, and supply chain stages. Shandong Gold has stated that it will require suppliers to provide information on the management of the retired equipment in their proposals. Yet, it is unclear how the company will consider the durability, recyclability, and end-of-life management of equipment in its purchasing decisions, beyond compliance. Likewise, the company is not conducting lifecycle analyses.
- Each project will require a third-party feasibility study, as part of the compliance- based environmental and social impact assessment. The study will cover, for instance, management of physical climate risks exposures, and mitigation of

biodiversity, soil, and water impacts. Shandong Gold will prioritize technologies that require less land use (such as rooftop solar panels) and will avoid any ecological sensitive areas. During project planning and decommissioning stages, the company will reserve land for ecological restoration.

Sustainable water and wastewater management

Assessment	Description
Light green	Investment or expenditure on facilities or equipment for water collection, conservation, treatment, and recycling, etc. to reduce wastewater, manage water contamination risk, and contribute to the sustainable management of water resources

Analytical considerations

- Gold mining and refining activities are water-intensive and could strain local water resources. In addition, mining wastewater includes mine water, beneficiation wastewater, and domestic sewage. It contains toxic substances such as cyanide and heavy metals such as arsenic, mercury, and lead. These can degrade water quality and have significant local impacts if released into the environment. Effective management of water pollution is crucial for protecting water resources, and ensuring sustainable economic activity, ecosystems, and public health. That said, wastewater collection, treatment, and recycling systems are generally energy intensive and require the use of chemicals. According to Shandong Gold, eligible projects will include the establishment of a water resources recycling system, where all treated production wastewater will be recycled and reused for mineral processing to ensure no external discharge. Eligible projects will also include the treatment and purification of domestic sewage, which will be reused for irrigation and onsite dust reductions.
- Chemicals used in wastewater treatment generate solid waste and methane emissions. The powering of these systems could be highly energy and emissions intensive. The Light green shade reflects limited information on how Shandong Gold will mitigate the projects' negative environmental impact, such as lifecycle emissions (including the energy efficiency levels of purchased facility and equipment, as well as details of chemicals use), besides meeting local regulatory requirements.
- Shandong Gold has not set quantifiable thresholds for these projects' carbon performance. The company confirmed that eligible facilities and equipment will be mainly powered by electricity but may also include some equipment running on fossil fuel if necessary. The company will prioritize low-carbon technologies to replace fossil-fuel equipment with electric facilities, as well as the use of energy efficient equipment. Still, linkages to ongoing emissions from coal-heavy local grids are possible.
- We have limited information on the management of biodiversity and physical climate risks beyond feasibility studies as part of environmental and social impact assessments, in compliance with local regulatory requirements.

Environmentally sustainable management of living natural resources and land use

Assessment	Description
Medium green	Investments or expenditures on ecological restoration of site grounds to enhance regional climate regulation capacity. Initiatives include restoration of vegetation and natural landscapes, and reforestation and conservation of biodiversity

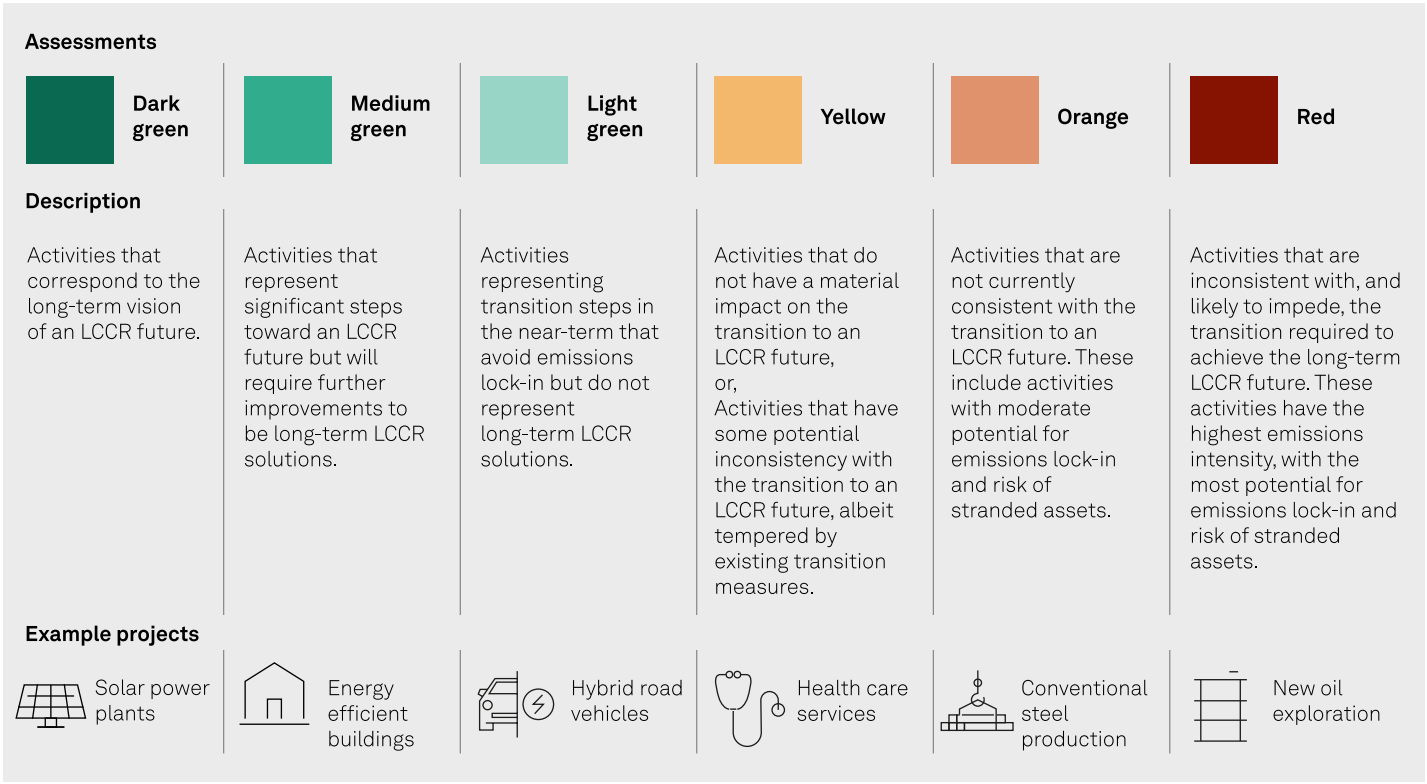
Analytical considerations

- Ecological and biodiversity restoration projects following the end of site operations are typically a legal obligation for mining companies. Eligible projects aim to restore degraded land to its natural state by reintroducing native vegetation, which will protect soil fertility, prevent erosion, and improve water quality. These can also help mitigate species loss and contribute to regional biodiversity and climate resilience. Shandong Gold expects eligible projects to be located in China, to comply with the national standards introduced by the Ministry of Natural Resources in May 2024 for the ecological restoration of mine sites.
- Shandong Gold has confirmed that eligible projects will be solely dedicated to conservation following restoration. This approach is positive from a biodiversity and climate perspective, given its contribution to ecosystem services, such as carbon

sequestration and pollination. It also supports the company's claim that eligible projects aim to maximize biodiversity benefits, and that restoration efforts will not be undermined by future conflicting land uses. However, gold mining generally poses significant biodiversity risks due to direct land conversion and associated pollution. We assess the category as Medium green to reflect the relevance of these nature-based projects and their likely carbon sequestration co-benefits that support a low-carbon climate-resilient future. However, we acknowledge the risks linked to Shandong Gold's involvement in high-impact mining activities, and the limited information related to the management criteria and project selection processes.

- Shandong Gold has developed a green mine construction policy to ensure regulatory compliance with its management of ecological and biodiversity risks, and its mining activities' environmental footprint. The policy aims to align with China's Work Plan For Clearing Mineral Rights in Nature Reserves, to ensure mining activities exclude ecological reserves and protected areas, and to prevent mining-related land conversion in sensitive areas. The policy also focuses on eligible restoration projects on degraded mining sites outside protected zones, to align with the updated national standards set forth above.
- Spending on restoration of sites can also enhance their resilience to physical climate risks. For instance, restored vegetation can improve soil permeability and resilience to surface runoff, mitigating the impacts of severe rainstorms, landslides, and flooding. It can also facilitate rainwater infiltration, replenish groundwater, and stabilize water reserves.

S&P Global Ratings' Shades of Green



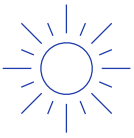
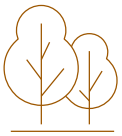
Note: For us to consider use of proceeds aligned with ICMA Principles for a green project, we require project categories directly funded by the financing to be assigned one of the three green Shades.

LCCR--Low-carbon climate resilient. An LCCR future is a future aligned with the Paris Agreement; where the global average temperature increase is held below 2 degrees Celsius (2 C), with efforts to limit it to 1.5 C, above pre-industrial levels, while building resilience to the adverse impact of climate change and achieving sustainable outcomes across both climate and non-climate environmental objectives. Long term and near term--For the purpose of this analysis, we consider the long term to be beyond the middle of the 21st century and the near term to be within the next decade. Emissions lock-in--Where an activity delays or prevents the transition to low-carbon alternatives by perpetuating assets or processes (often fossil fuel use and its corresponding greenhouse gas emissions) that are not aligned with, or cannot adapt to, an LCCR future. Stranded assets--Assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities (as defined by the University of Oxford).

Mapping To The U.N.'s Sustainable Development Goals

Where the financing documentation references the Sustainable Development Goals (SDGs), we consider which SDGs it contributes to. We compare the activities funded by the financing to the International Capital Markets Association (ICMA) SDG mapping and outline the intended linkages within our SPO analysis. Our assessment of SDG mapping does not affect our alignment opinion.

This framework intends to contribute to the following SDGs:

Use of proceeds	SDGs
Renewable Energy	 ***7. Affordable and clean energy**
Sustainable Water and Wastewater Management	 ***6. Clean water and sanitation**
Environmentally Sustainable Management of Living Natural Resources and Land Use	 ***15. Life on land**

*The eligible project categories link to these SDGs in the ICMA mapping.

Related Research

- Analytical Approach: Second Party Opinions, March 6, 2025
- FAQ: Applying Our Integrated Analytical Approach For Second Party Opinions, March 6, 2025
- Analytical Approach: Shades Of Green Assessments, July 27, 2023

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