°CICERO Shades of Green

UPM
Green Finance Framework Second Opinion

November 2, 2020

UPM is a Finnish forestry-based bioindustry company employing elements of circular economy through vertically integrated forestry and production of bio-based products. The company has operations within forestry, pulp and paper mills, sawn mills, biorefineries, biomass CHP, and energy generation facilities in multiple global locations including Finland, Germany, Uruguay, USA and China.

UPM's facilities produce specialty paper products, biofuels, biochemicals, biocomposites, and other drop in substitutes for fossil fuel-based materials, e.g., plastics. Financing under this framework will support UPM's forestry operations, as well as R&D and production of bio-based materials that reduce carbon footprint by substituting away petroleum-based materials (e.g., plastics).

There is a strong focus on ensuring a high environmental standard for their products. All forests are FSC and PEFC certified, and all sourced wood is either FSC or PEFC certified or controlled through Chains of Custody. 83% of products are certified according to relevant criteria including RSB, ISSC, and other relevant national labels.

UPM displays a long-standing and pioneering engagement with environmental- and climate-oriented strategies. UPM has identified multiple environmental targets within each of their business areas, and regularly reports on progress towards these goals. UPM conducts annual climate risk evaluations, and environmental screening is conducted for each project through the UPM Code of Conduct, which involves multiple environmental factors such as energy and resource efficiency, climate impacts, and responsible supply chain sourcing.

We note that UPM takes an impact-driven approach to determine net climate benefits, which may not sufficiently take into account climate risks of fossil fuel related investments. At least 6 of the 53 eligible facilities are powered with a large share of fossil fuels, and these are eligible for financing in the pollution control, energy efficiency and wastewater management categories. OPEX may also include fossil fuel equipment related to sustainable forestry management. However, we note that UPM will prioritise financing for projects in CICERO Dark Green categories, and has committed to a robust plan to fully decarbonise its operations by 2050 at the latest.

Based on the overall assessment of the projects that will be financed under this framework, and governance and transparency considerations, UPM's green bond framework receives a **CICERO Dark Green** shading and a governance score of **Excellent**. To improve the framework, UPM could implement strict screening processes to limit eligibility of fossil fuel based plants for financing, as well as ensuring follow-up of concrete strategies to eliminate the prevalence of fossil fuels in their company activities, by switching to 100% renewable and biogenic fuels.

SHADES OF GREEN

Based on our review, we rate the UPM's green finance framework **CICERO Dark Green.**

Included in the overall shading is an assessment of the governance structure of the green finance framework. CICERO Shades of Green finds the governance procedures in UPM's framework to be **Excellent.**

GREEN BOND PRINCIPLES

Based on this review, this Framework is found in alignment with the principles.

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1 Terms and methodology

This note provides CICERO Shades of Green's (CICERO Green) second opinion of the client's framework dated November 2020. This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. CICERO Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client's policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

Expressing concerns with 'shades of green'

CICERO Green second opinions are graded dark green, medium green or light green, reflecting a broad, qualitative review of the climate and environmental risks and ambitions. The shading methodology aims to provide transparency to investors that seek to understand and act upon potential exposure to climate risks and impacts. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The shades are intended to communicate the following:

CICERO Shades of Green	Examples
Dark green is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated.	Wind energy projects with a strong governance structure that integrates environmental concerns
Medium green is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered.	Bridging technologies such as plug-in hybrid buses
Light green is allocated to projects and solutions that are climate friendly but do not represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them.	Efficiency investments for fossil fuel technologies where clean alternatives are not available
Brown is allocated to projects and solutions that are in opposition to the long-term vision of a low carbon and climate resilient future.	New infrastructure for coal

Sound governance and transparency processes facilitate delivery of the client's climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green financing are carefully considered and reflected in the overall shading. CICERO Green considers four factors in its review of the client's governance processes: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

2 Brief description of UPM's green finance framework and related policies

UPM is a Finnish forest-based bioindustry company focused on sustainability and innovation through the UPM Biofore – Beyond Fossils project. Their operations span multiple business areas: biorefining, bioenergy, raflatac (labelling materials for branding and promotion), specialty papers and communication papers, plywood, and biochemicals, biomedicals and biocomposites. These wood-based products are vertically integrated, employing elements of circular economy to utilize byproducts from UPM's other business activities. Biocomposites and biochemicals are all drop-in substitutes for fossil fuel-based energy and raw materials (e.g., plastics), and will therefore contribute to the future low carbon economy. UPM's forestry activities are primarily located in Finland, Uruguay and USA. UPM's bioindustry business activities have various global locations including, amongst others, Germany, China, and the Netherlands.

In 2019, UPM's environmental investments totalled EUR 16.8 million, mostly in the pulp and paper mills business (98%), with small portions in biofuels (0.4%) and raflatac (0.7%). UPM's operational environmental costs, are mainly attributable to effluent treatment and waste management, and totalled EUR 123 (121) million, including depreciation in 2019. In the coming years, UPM is seeking significant growth in high-value fibre, specialty packaging materials and molecular bioproducts.

Environmental Strategies and Policies

UPM has chosen three action areas on sustainability, in alignment with UPM's commitment to the UN Business Ambition for limiting global warming to 1.5ºC and the Science-Based Targets initiative: (1) Climate-positive forestry, (2) 65% less CO_2 emissions in their own emissions and 30% emission reduction in the supply chain by 2030, and (3) innovate novel products. The commitment is based on a systematic review of opportunities for reducing emissions and involves a robust plan to fully decarbonise their operations by 2050 at the latest. Amongst other measures, the plan includes reducing the carbon intensity of facilities by replacing all oil with biogas, phasing out peat use in Finland, and switching to renewable wind power. It also includes contributing to research and development to further reduce the costs of the low-carbon transition.

In order to achieve these 3 over-arching goals, UPM has identified 36 quantitative 2030 Responsibility Targets within the economic, social and environmental categories, and the progress towards these targets is recorded in the Annual Reports. Each UPM facility also conducts its own annual reporting, transparently recording individual facilities' progress towards the goals. These include reducing fossil CO_2 emissions from own combustion and purchased electricity (Scope 1 and 2) by 65% by 2030, achieving a 70% share of renewable energy, reducing NOx and SO_2 by 20% by 2030, improving energy efficiency annually by 1%. To date, fossil fuel emissions have been reduced by 15% compared to 2015, and NO_x and SO_2 emissions have been reduced by 12%. The renewable energy target of 70% share has been reached. In 2019, the efficiency target was not reached, but it has been reached in previous years. Further 2030 targets focus on other environmental factors such as completely eliminating waste sent to landfills by 2030, ensuring a climate-positive product portfolio, reducing effluent loads and wastewater volumes, and ensuring climate-positive land use in forests including 100% certified wood by 2030 and positive impact on biodiversity.

Overall UPM has calculated that their activities produced a net carbon sink of 100,000 tonnes of CO2 in 2019. Their forestry activities in Finland and Uruguay - note that forests in USA have not yet been counted – totalled a

sink of 4.8 million tonnes in 2019, while Scope 1 and 2 emissions in 2019 were 4.7 million tonnes (accounting for sold UPM certificates of origin for renewable energy). The company is currently operating the Lappeenranta facility in Finland, which integrates a paper mill, chemical pulp mill, sawn mill and a biorefinery producing biofuels. The facility was the first of its kind in the world when it was started in 2015. It runs on 91% biogenic fuels; natural gas is used as a raw material for one of the processes, as well as for auxiliary gas firing. Currently under construction is the Leuna facility in Germany, which is the first industrial scale biorefinery for biochemicals. It will produce next generation biochemicals using bio-based raw materials and residues sourced from its existing operations.

These investments form part of UPM's overarching strategy to shift away from pulp and paper industry towards a lower carbon bioindustry through the Beyond Fossils project. This includes R&D and production of biochemicals, biofuels, biomedicals and other composites to replace the use of plastics in various industrial and consumer applications, as well as the generation of renewable energy. All biocomposites are designed to be 100% recyclable and to reduce environmental impacts from a life-cycle perspective through raw materials and manufacturing processes. 83% of UPM product sales were eligible for ecolabelling, through FSC, PEFC, EU Ecolabel and other national ecolabels. Biofuels are 100% certified with RSB and ICCS certifications from all production sites. Many of the facilities also contain waste management systems, which reduce NO_x and SO_2, amongst others, as well as controlling water pollution. UPM Energy is Finland's second largest electricity producer, with a generating capacity of 1460 MW from its own and co-owned hydropower, nuclear and thermal power plants in Finland. UPM Energy also provides energy management services to improve energy efficiency.

Multiple environmental factors are considered throughout the life cycle of UPM's products and operations. Climate impact assessments are conducted for each project prior to initiation, and climate risk is assessed on an annual basis in collaboration with multiple science research centers. UPM has established screening processes at the site level, which address human rights issues, community relations, local sourcing, and risk assessments and audits for suppliers to ensure implementation of the UPM Code of Conduct. UPM has Nordic Ecolabel Inspection status for its Kaukas, Kaipola, Kymi, Jämsänkoski (SC), Rauma, Nordland, and Plattling paper mills as well as for UPM pulp mills. This label takes into account multiple factors such as recovered fibre use, wood raw material, chemicals, energy use, emissions and waste management.

UPM is one of 41 companies in the world recognised as a Global Compact LEAD Participant since 2016, due to their pioneering efforts with the UN Global Compact Ten Principles and the Sustainable Development Goals. In February 2020, UPM was recognised by the CDP for their actions to mitigate climate risk, prevent deforestation and enhance water stewardship. Additionally, they align with such international agreements as the ILO Declaration on Fundamental Principles and Rights at Work and the OECD Guidelines for Multinational Enterprises. Reports are prepared in accordance with the GRI Standards and the TCFD recommendations have been implemented. UPM has further identified six of the UN Sustainable Development Goals as relevant to their activities, including Goal 6 - Clean water and sanitation, Goal 7 - Affordable and clean energy, Goal 8- Decent work and economic growth, Goal 12 - Responsible consumption and production, Goal 13 - Climate action, and Goal 15 - Life on land.

Use of proceeds

The net proceeds of green financing issued by UPM will be used to finance or re-finance eligible assets and projects that have been selected by UPM in accordance to the Green Financing Framework. Expected investments under this framework will fall under the categories: Sustainable forest management (37%), climate positive products and solutions (23%), pollution prevention and control including waste management (28%), energy efficiency (1%), renewable energy (10%), and water and wastewater management (0.3%). UPM has identified 53 eligible sites for financing. Examples of projects include sustainable certified forests, development of next generation biochemicals

and biocomposites, and water treatment plants. Green assets will qualify without a specific look-back period provided that at the time of issuance they follow the eligibility criteria.

13% of financing under this framework will be OPEX with a look-back period of no longer than 3 years from the time of issuance. This includes fixed internal and external R&D costs within the climate positive products and solutions category, as well as operating expenditures for two of the projects.

Specifically excluded from the framework are investments related to new, fossil fuel related equipment or infrastructure, as well as investments directed at their coal-powered facility in China. However, we note that 6 of the 53 eligible facilities are powered with a majority share of natural gas, and these will be eligible for financing in the pollution control, wastewater management and energy efficiency categories. Certain OPEX in the sustainable forest management category may also include fossil fuel related equipment.

UPM has further specified that financing for projects in CICERO Dark Green shaded categories will be prioritised.

Selection

The selection process is a key governance factor to consider in CICERO Green's assessment. CICERO Green typically looks at how climate and environmental considerations are considered when evaluating whether projects can qualify for green finance funding. The broader the project categories, the more importance CICERO Green places on the governance process.

UPM has established a Green Bond Committee to ensure selected projects are aligned with the criteria for eligible assets. The Committee will meet at least on an annual basis, and whenever there are new issuances. The Committee is comprised of representatives from the management, finance, sustainability and business control departments. The Committee is chaired by the finance representative, and the sustainability representative has vetopower. Representatives from the Committee will propose potential projects, evaluate the eligibility of proposals according to the eligibility criteria. Proposed projects will be subject to an internal review process before final approval, and there are processes in place for potentially controversial projects. A limited assurance will be conducted by a Third Party Audit provider once a year.

UPM's regular policies on sustainability and supply chain materials sourcing will apply for the projects financed under this framework. This includes climate risk and resilience assessments, and adherence to strict supply chain regulations, as well as the ISO 9001, ISO 14001 and OHSAS 18001 regulations for quality, environmental, and health and safety. UPM also aims to ensure a net climate sink by following the absolute net carbon sink from their forestry activities, following a methodology approved by the Science Based Targets initiative, and by evaluating the impact of substitution of non-fossil fuel based materials.

Management of proceeds

CICERO Green finds the management of proceeds of UPM to be in accordance with the Green Bond Principles.

UPM will establish a Green Bond Register in relation to green bonds issued by UPM for the purpose of monitoring the Eligible Assets and Projects and the allocation of the net proceeds from green bonds to Eligible Assets and Projects.

UPM will over the duration of the outstanding green bonds build up and maintain an aggregate amount of Asset and Projects in the Green Bond Register that is at least equal to the aggregate net proceeds of all outstanding UPM green bonds. Proceeds will be allocated on a sub-portfolio level within the ICMA Green Bond categorization, and

reporting is expected to follow the same process, as the Green Bond Register will form the basis for the impact reporting.

There may be periods when the total outstanding net proceeds of the Green Bonds exceed the value of the Eligible Assets and Projects in the Green Bond Register. Any such portion of unallocated proceeds will be held in accordance with UPM's normal liquidity management policy, and will, to the extent feasible, be reported on. UPM has specified that the normal liquidity management policy will ensure that assets are not temporarily held in fossil fuel related industries.

Reporting

Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs. Procedures for reporting and disclosure of green finance investments are also vital to build confidence that green finance is contributing towards a sustainable and climate-friendly future, both among investors and in society.

UPM Responsibility will annually produce a report on the allocation and impact of green financing issued under this framework, as part of their regular annual reporting. Where relevant, UPM will align the reporting with the latest standards and practices as identified by ICMA and the guidelines in the Nordic Public Sector Issuer's Position Paper on Green Bond Impact Reporting.

The allocation report will, to the extent feasible, include a list of all eligible assets and projects funded including amounts allocated, detailed descriptions and case studies of selected eligible assets and projects financed and amounts invested in each category, and the relative share of new financing vs. refinancing.

UPM will strive to report on the actual environmental impact of the investments financed by their green bonds. If/when actual impact for some reason is not observable, or unreasonably difficult to source, estimated impact will be reported. The impact indicators may vary with investment category. Each category will report on multiple relevant metrics. The impact report will, to the extent feasible, also include a section methodology, baselines and assumptions used in impact calculations, including transparency on e.g., grid emissions factors.

UPM will receive a third party audit, which will be made available on the website.

3 Assessment of UPM's green finance framework and policies

The framework and procedures for UPM's green finance investments are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where UPM should be aware of potential macro-level impacts of investment projects.

Overall shading

Based on the project category shadings detailed below, and consideration of environmental ambitions and governance structure reflected in UPM's green finance framework, we rate the framework **CICERO Dark Green.**

Eligible projects under UPM's green finance framework

At the basic level, the selection of eligible project categories is the primary mechanism to ensure that projects deliver environmental benefits. Through selection of project categories with clear environmental benefits, green bonds aim to provide investors with certainty that their investments deliver environmental returns as well as financial returns. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed and that the selection process should be "well defined".

We Act Through	Category	Eligible project types	Green Shading and some concerns
Forests *Climate-positive forestry*	Environmentally sustainable management of living natural resources and land use	**Sustainable forest management** Proceeds will be used to finance the acquisition, maintenance and management of forests certified under the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) Eligible projects include, but are not limited to: • **Sustainable certified forest** The holding value of forest areas certified by FSC, and PEFC in Finland • **Sustainable forest management** Maintenance of nurseries, new planting activities as well as maintenance and harvesting of sustainable management certified forest	**Dark Green** ✓ Forestry activities are located in Finland, Uruguay and USA. ✓ UPM has committed to ensuring the maintenance and/or growth of its carbon sink. ✓ All of UPM's own forests are FSC and PEFC certified. ✓ UPM has specified that forestry activities will not contribute to deforestation. ✓ Costs related to the development of new roads or fossil fuel transport of timber will be excluded. Any road-related costs will be maintenance of existing roads, and will not contribute to development of further roads. Note that while new fossil fuel infrastructure and equipment is excluded in the framework, certain

				OPEX for forestry management may include fossil fuel based machinery.
Products *Innovate novel products*	**Eco-efficient and/or circular economy adapted products, production technologies and processes**	**Climate positive products and solutions** Proceeds will be used to finance the development, operations, maintenance and expansion of the production of climate positive products and solutions Eligible projects include, but are not limited to: • **Development of Beyond fossils** R&D investments to develop next generation biochemicals and biofuels • **Investments in bio-refinery facilities** Our biorefinery will produce a range of 100% wood-based biochemicals which enable a switch from fossil raw materials to sustainable alternatives in various consumer-driven end-uses	**Dark Green** ✓ UPM's products in biocomposites, biochemicals and biomedicals are direct drop-in substitutes for fossil-fuel based alternatives. This includes biofuels and bioplastics for various consumer end-uses. ✓ The wood and residues from UPM's existing wood flows provide feedstock for biorefineries. Wood for the mills is 100% controlled through Chains of Custody, 82% FSC and PEFC certified, and locally-sourced primarily from Finland and Uruguay, but also Germany, Austria and other European locations. ✓ The two biorefinery facilities planned for financing under this framework (Leuna in Germany and Lappeenranta in Finland) are both majority powered by renewable energy (100% and 91% respectively). This includes own wood residues in the form of crude tall oil from pulp mills. Natural gas is involved only as a raw material for hydrogen treatment of crude tall oil, as well as for auxiliary gas firing. ✓ Biofuels are limited to second-generation or higher advanced biofuels. These have a lower climate impact as they reduce the risk of indirect land use change. ✓ 83% of UPM's products are eligible for ecolabeling and certification are certified. ✓ Biofuels and biochemicals (naphtha and turpentine) from biorefineries are certified with RSB (Roundtable on Sustainable Biomaterials) and ISCC or ISCC PLUS (International Sustainability and Carbon Certification). The RSB certification

ensures compliance with sustainability criteria of the EU Renewable Energy Directive. The ISCC certification is a sustainability certification system for bio-based materials and also includes whole lifecycle greenhouse gas emission calculations for all refinery streams in the same way as ISCC EU certification.

✓ Other paper and label end-products are additionally certified with further relevant national ecolabels such as Blauer Angel, Nordic Swan, Singapore Green label, and China Green label.

✓ UPM's R&D focuses on an eco-design approach that takes into account the entire lifecycle. This means maximising energy and resource efficiency by using recovered materials from production processes, as well as maximising recyclability through the value chain.

Pollution prevention and control	**Pollution prevention and control, including waste management** Proceeds will be used to finance the reduction of UPM's environmental impact and improvement of the environmental performance of UPM's operations Eligible projects include, but are not limited to: • **Air and waste management** Investments related to reduction of air (NO_x, SO_2) emissions and waste management • **R&D investments** Financing initiatives targeting circular economy and eco-labelled products, as well as projects that explores new sustainable, wood-based alternatives such as biocomposites and biomedicals	**Light to Medium Green** ✓ This will include individual retrofits, which may lead to an increase in electricity demand, e.g., for water purification processes. ✓ We note that several of UPM's 53 total eligible facilities are powered with a large share of natural gas, and peat is also used as a support fuel at certain facilities in Finland. UPM has a concrete plan to decarbonise these facilities. ✓ Investments in pollution control technologies will apply to both fossil fuel-based facilities, as well as the majority renewable powered facilities. ✓ UPM's combustion activities (of both biofuels and fossil fuels) result in emissions of local pollutants such

as NO_x, SO_2, PM, CO, and VOCs.[1] Efforts to reduce these pollutants will enhance local air and water quality.

- ✓ 36% of financing in this category is in R&D for UPM's products in biocomposites, and biomedicals. These are aimed at reducing the share of fossil-fuel based materials in products. This includes bioplastics for various consumer end-uses, e.g., outdoor decking, BioFormi polymers.
- ✓ UPM has specified that biocomposites and biomedicals will be produced from biochemicals produced in the biorefineries (e.g., UPM Formi EcoAce biocomposite, derived from UPM BioVerno naphtha).
- ✓ R&D efforts are also seeking to increase the use of recycled plastics in biocomposites.

Sustainable water and wastewater management	**Water and wastewater management** Proceeds will finance the reduction of wastewater and water withdrawal consumption from UPM's operations Eligible projects include, but are not limited to: • **Water treatment plants** Investments and management of effluent treatment systems, purification wastewater treatment plants, chemical wastewater treatment plants and protection of soil/groundwater projects • **Restoration of aquatic ecosystems** Migrating fish programs to restore the natural reproduction cycle of migratory fish stocks in watercourses including practical local projects and research activities to promote fish migration.	**Light to Medium Green** ✓ Investments in pollution control technologies will apply to both fossil fuel-based facilities, as well as the majority renewable-powered facilities. ✓ Note there are no new direct investments in fossil fuel equipment. ✓ Pulp and paper mills contribute significantly to water pollution ✓ All pollution control measures are subject to environmental screening to control for both local and global environmental impacts, such as air pollution and water pollution.

[1] https://www.eia.gov/energyexplained/biofuels/biodiesel-and-the-environment.php

Emissions *65% less CO_2 emissions*	**Energy efficiency**  	**Energy efficiency initiatives** Proceeds will be used to finance energy efficiency projects with a minimum improvement of 25% Eligible projects include, but are not limited to: • **Various initiatives and projects** Projects, initiatives and processes such as lighting, new technologies, efficient management systems and more	**Light to Medium Green** ✓ This category may include investments directed at equipment in any of UPM's 53 eligible facilities, and may therefore include multiple facilities that are powered with significant shares of fossil fuels. Where fossil fuel assets are involved, there is a risk of both rebound and lock-in effects as efficiency improvements lead to greater usage and longer lifetime of fossil fuel related assets. ✓ UPM has a concrete plan to decarbonise these facilities. ✓ Note there are no direct investments in new fossil fuel equipment. ✓ The 25% efficiency threshold displays a good level of ambition. We note that the IEA Sustainable Development Scenario requires a 3% annual efficiency improvement to remain on track.[2]
	Renewable energy 	**Renewable energy and waste to energy** Proceeds will be used for development, operations and maintenance of renewable energy solutions Eligible projects include, but are not limited to: • **Renewable boilers** Investments in renewable boilers utilizing wood waste, e.g. bark, from FSC (PEFC in Finland) certified forests and other mill residues as feedstock • **Excess energy from pulp mills** Distribution of surplus electricity generated from fossil-free feedstock • **Hydro and solar power** The acquisition, maintenance and refurbishment of hydro and solar power plants owned and operated by UPM Energy	**Dark Green** ✓ Waste to energy projects are limited to incinerating wood residues from own pulp mills, and will therefore be locally sourced, and will not contribute to increased virgin wood demand. ✓ This category may involve the construction of new transmission lines. These transmission lines will only be used by the renewable energy produced at the pulp mills. ✓ All hydro projects will be run-by-the-river. UPM has further specified that new hydropower projects will be limited to 10MW capacity. ✓ This will likely include modernization and increasing installed capacity and efficiency of existing hydro plants.

Table 1. Eligible project categories

[2] https://www.iea.org/reports/energy-efficiency-2019

Background

Forestry

Forests and land use represent important opportunities for reducing greenhouse gas emissions and sequestering carbon to counterbalance emissions from other sources. They also provide a source for adaptation and resilience through their provision of ecosystem and regulating services as well as preventing and reducing land degradation and maintaining land productivity. In addition, sustainable forestry provides raw materials and goods, such as biofuels and building materials for the low carbon economy. However, for forests to be a positive contribution to the environment and climate they have to be managed sustainably. Emissions from deforestation and forest degradation account for 11% of greenhouse gas emissions, of which a large portion arises from the paper and pulp industry.[3] Generally speaking, this means that if trees are harvested new ones should be replanted, that species should be suitable for the climate in which they grow (native) and that the rights of the people who live in or near forests should be respected. Forests are also exposed to the threats of climate change due to changes in weather patterns, and pest and disease outbreaks, and the UNFCCC estimates that an additional USD 14 billion in financial flows will be required to address climate impacts in agriculture, forestry and fisheries globally in 2030.[4]

Additionally, international standards such as the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) are often used as guidelines to ensure responsible management by covering both environmental and social impacts, such as biodiversity, water and soil, pollution, waste and GHG emissions, as well as community relations and workers' rights. WWF's certification assessment tool (CAT) evaluates the relative strengths of different forest certifications, including FSC and PEFC and concluded that FSC is currently the most credible certification, and performs stronger on both the environmental and social fronts.[5] Both certifications are however lacking in pollution, waste and GHG emissions criteria stringency.[6] [7] Certification is voluntary, but in Finland, the market practice is to have PEFC certification (roughly 85% of Finnish forests are PEFC certified). FSC certification is harder to achieve and less than 10 % of Finnish forests are FSC certified. Meanwhile, 95% of Uruguay's forests are FSC certified.[8]

For the 18% of wood that is non-certified, UPM guarantees origins through the FSC Controlled Wood requirements and PEFC Due Diligence System (DDS). Both these processes require access to information on tree species and country of origin, which is then screened through a country-level risk assessment and mitigation approach to ensure responsible sourcing of wood, including that the wood is not illegally harvested, that it does not lead to land use change.[9] [10] These requirements are much less stringent than the full FSC and PEFC certifications.

Investors should be aware that the environmental and social impact of forestry operations is highly location-specific. The commercial harvesting of forests in Nordic climates (boreal) is different from temperate or tropical forests in terms of climate impacts as well as the vulnerability of native species and issues related to the rights of indigenous peoples. The national regulatory framework and enforcement levels also vary, with important implications for how sustainably forest companies operate. Both Finland and Uruguay can be considered a low-risk country from a sustainability perspective.

[3] https://ec.europa.eu/clima/policies/forests_en
[4] https://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/adaptation.pdf
[5] https://wwf.panda.org/?246871/WWF-Forest-Certification-Assessment-Tool-CAT
[6] WWF Certification Assessment Tool V3: Forest Stewardship Council (FSC).
https://wwfeu.awsassets.panda.org/downloads/cat_fsc_14_5_15_final.pdf
[7] WWF Certification Assessment Tool V3: Programme for the Endorsement of Forest Certification (PEFC)
https://wwfeu.awsassets.panda.org/downloads/cat_pefc_14_5_15_final.pdf
[8] https://fsc.org/en/document-centre/documents/resource/401
[9] https://consultations.pefc.org/consult.ti/PEFC_CoC_Guidance/viewCompoundDoc?docid=4622228&partId=4623924&sessionid=&voteid=
[10] https://fsc.org/en/forest-management-certification

Bio-based products and industry

Finland is a global leader in producing second-generation biofuels from wood and by-products, notably biodiesel.[11] This includes both bioenergy for electricity, as well as biofuels for e.g., the transport and heating sectors. Bioenergy has been labelled as "carbon neutral", the idea being that the CO_2 emitted at combustion is compensated by the CO_2 absorbed during the growth period of a tree. However, the carbon accounting principle of bioenergy is highly technical and context specific (temporality, geography, etc.). Bioenergy can be controversial from a land-use perspective (competing uses, e.g. with growing food crops) and because of the potential impacts on biodiversity from dedicated plantations. Due to resource constraints (land, alternative uses), biomass is unlikely to represent a significantly scalable solution from a 2050 decarbonized energy perspective. Lignocellulosic biorefineries are considered key actors towards development of bio-based economy as they use lignocellulosic biomass, which avoids direct competition with food crops.[12] Life cycle emissions and environmental impacts have been found to vary by feedstock, as well as by the type and volume of fertilisers used, which may also lead to eutrophication of water.[13] Further, the climate benefits of biofuels also depend on the alternative source of energy in the system, e.g., share of electric vehicles or low-emission vehicles already in use.

Biomass energy with carbon capture and storage (BECCS) is a much-discussed technology in European policy circles as it could represent a carbon negative solution. However, the viability of BECCS is very site- and context-specific and depends on parameters such as location, size, costs and technology alternatives.

Total paper and paperboard demand is expected to continue rising to 2030, despite the decline in printing paper requirements, due to the increased need for packaging and sanitary paper. [14] Paper and pulp mills are considered to constitute a large portion of emissions within the forestry sector, and raising the energy efficiency of pulp and paper production is a key strategy to decarbonise the sector. This includes increasing on-site waste heat recovery and co-generation and increasing the share of production from recovered fibre, which requires improving recycling channels. Moreover, ensuring efficient equipment operations and maintenance and implementing energy management systems will further increase efficiency.

Additionally, the pulp and paper industry is a major source of pollutants and requires high volumes of water.[15] Pulping involves treating wood chips to remove lignin and improve fibers for papermaking, and bleaching involves the addition of multiple chemicals to whiten the pulp. The wastewaters generated from the pulp and paper industry have high concentrations of chemicals, toxic pollutants, and have high organic content. The disposal of solid wastes, including sludge and wood residues, often leads to harmful environmental impacts. The process also emits air pollutants in the form of NO_x, VOCs, SO_x and total reduced sulfur compounds. Multiple biological, chemical and mechanical treatment and waste management processes are available to control pollutants and waste, however the most effective reduction method is waste minimization, reusing and recycling.

There is a need for research and innovation in a bio-based economy to reduce our dependency on fossil fuels for everyday materials and fuel.[16] Additionally, biorefineries can ensure that biofuels follow a cascade utilization by separating the fuel into fractions whereby the valuable molecules are processed into high-value applications such as chemicals and materials, while the lower quality fractions are used for fuels and energy recovery.

[11] https://www.iea.org/countries/finland

[12] Vera, I., Hoefnagels, R., van der Krooj, A., Moretti, C., Junginger, M. (2019). A carbon footprint assessment of multi‐output biorefineries with international biomass supply: a case study for the Netherlands. Available at: https://onlinelibrary.wiley.com/doi/full/10.1002/bbb.2052

[13] Demirbas, A. (2010). Environmental impacts of biorefineries. https://link.springer.com/chapter/10.1007/978-1-84882-721-9_10

[14] https://www.iea.org/reports/pulp-and-paper

[15] Pollution prevention in the pulp and paper industries (2011). https://www.intechopen.com/books/environmental-management-in-practice/pollution-prevention-in-the-pulp-and-paper-industries

[16] https://gef.eu/wp-content/uploads/2017/01/A_strategy_for_a_bio-based_economy.pdf

EU Taxonomy

The proposed EU taxonomy for sustainable finance includes a number of principles and thresholds for different sectors including a "do-no-harm clause" clause and safety thresholds for various types of activities.[17] The current version of the Taxonomy covers the forest management activities that apply "up to the forest gate" irrespective of the end-use of the products. There are currently no developed thresholds for the pulp and paper industry, nor for other bio-industry sectors. However, it recognises the holistic mitigation potential of forests through the substitution of more GHG intensive materials and the long-term carbon sink potential of wood products, and highlights that aspects of these end-use products are captured in further Taxonomy categories e.g., in the buildings and energy sectors. The Taxonomy also recognises that certain activities in pulp and paper manufacturing contribute to significant emissions and environmental impacts, specifically from steam generation and local pollution from discharge to water, and plans to establish thresholds for these sectors in future versions of the Taxonomy. Biorefineries are also not part of the current version of the Taxonomy, however these may be considered as contributing to principles of the Circular Economy, in which the EU gives specific consideration to the use of forest products throughout the different economic sectors.

CICERO Green will not here verify UPM's framework against the full EU taxonomy, but notes that the taxonomy includes specific thresholds for the forestry sector, broken down by category: afforestation, restoration and rehabilitation, existing forest management and conservation forest. All these activities require the application of and continued compliance to the Sustainable Forest Management requirements, the establishment of a verified baseline GHG balance of relevant carbon pools, and demonstration of continued increase of carbon sinks over time. Above-ground carbon stocks must increase above the carbon baseline over the rotation period of the forest. Refer to the Taxonomy document for more specific details on each category.

The Do No Significant Harm criteria include, but are not limited to, identifying and managing risks related to water quality and consumption, minimising the use of pesticides and preventing pollution of water and soil, preventing illegal logging, promoting close-to-nature forestry, as well as ensuring improved long term conservation status and ensuring no conversion of habitats sensitive to biodiversity loss.

Governance Assessment

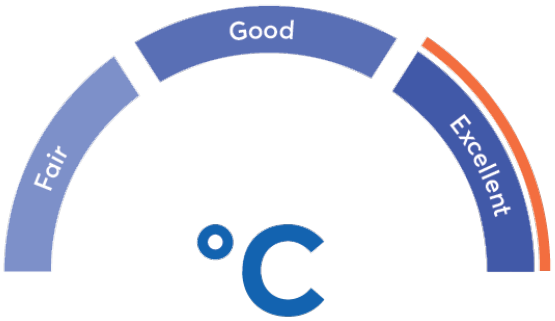
Four aspects are studied when assessing the UPM's governance procedures: 1) the policies and goals of relevance to the green finance framework; 2) the selection process used to identify eligible projects under the framework; 3) the management of proceeds; and 4) the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.

UPM demonstrates a strong, pioneering engagement with climate related issues, and is one of 41 companies globally to be a member of UN Global Compact LEAD, as a result of its significant engagement with climate and environmental issues. UPM conducts reporting on Scope 1, 2 and 3 emissions and has identified 36 goals relevant to all areas of UPM's operations, where regular annual reports display progress towards these goals. In addition, each individual UPM facility also conducts its own reporting, including transparent information on fossil fuel energy share, and water and air pollution.

TCFD recommendations have been implemented. The process for selecting and managing proceeds is aligned with the GBP and all projects are subject to UPM's existing policies on Code of Conduct for supply chain and responsible sourcing. These include screening of climate risk and resilience, and efforts to avoid lock-in and

[17] Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, March 2020. https://ec.europa.eu/knowledge4policy/publication/sustainable-finance-teg-final-report-eu-taxonomy_en

rebound effects, through conducting carbon accounting and life cycle assessments. Allocation and impact reporting for green financing are conducted on the project-category level and incorporate the GRI Standards, with multiple relevant key performance indicators for each project category. Reporting will also include transparency on methodology and the assumptions made. These reports will be publicly disclosed as part of the annual Responsibility report.



The overall assessment of UPM's governance structure and processes gives it a rating of **Excellent**.

Strengths

It is a strength that UPM's business areas employ key elements of circular economy thinking, through vertical integration and byproduct and sidestream utilisation, and increasing landfill diversion, while also leading to an overall reduction of fossil fuel elements in everyday products. Additionally, the activities and products are either already aligned or able to align with a 2050 zero-carbon future. The high share of ecolabelling and certification of their products highlight their commitment to sustainable practices throughout production processes.

UPM's focus on research and development of biocomposites and biomaterials taps into a key area of opportunity to promote the continued decarbonisation and impact of the bioeconomy sector, and will likely lead to long-term carbon reductions. The IEA highlights that this is still a relatively young industry, and further innovation is required to improve competitiveness with its conventional fossil-fuel based alternatives, which must urgently be phased out.

UPM places great emphasis on ensuring their products and operations are environmentally sound, and conducts climate risk and resilience assessments prior to initiation of each project. Additionally, all products that are eligible, and within the scope of currently available certifications, are certified with relevant standards and ecolabels. All UPM operations are certified according to ISO 14001. This also includes basing their net carbon calculations on approved methodology from the Science Based Targets initiative.

Weaknesses

CICERO Green finds no material weaknesses in UPM's Green Finance Framework.

Pitfalls

UPM's strategy places significant emphasis on the net climate benefits of their operations (as opposed to their absolute location-based emissions), which provides flexibility for allowing higher emissions in some areas and offsetting these with the carbon sink in their forestry activities. Thus, eligible under this framework are several of UPM's facilities that have a high share of fossil fuels in their energy mix, including some involvement of peat in Finland. There is a risk that UPM does not currently sufficiently screen for large fossil fuel investments, which may lead to a lock-in of fossil fuel assets that are not aligned with the low carbon economy. We further note that this strategy may lead to pollution hotspots in some areas, where control of emissions (of both global and local pollutants, e.g., CO, NOx) are given lower priority. CICERO Green takes a long-term, risk-based view on climate change, and thus, recommends excluding projects that support prolonged use of fossil-fuel based infrastructure and equipment that will contribute to GHGs in the long run. The inclusion of all 53 eligible facilities in the pollution prevention and control and energy efficiency categories may lead to rebound effects and lock-in effects, as at least

6 of the facilities are majority powered with natural gas. However, we note that UPM has, through its commitment to the UN Business Ambition for 1.5, an ambitious plan to fully decarbonise its operations at least by 2050, and likely earlier. CICERO Green would encourage UPM to continue robust and transparent reporting to ensure the completion of this plan.

The inclusion of an efficiency threshold ensures that efficiency improvements are substantial and lead to an overall reduction in GHG emissions, and will contribute towards UPM's goal of 1% annual efficiency improvement (since 1997). We note, however, that the IEA Sustainable Development Scenario (SDS) requires a 3% annual efficiency improvement. CICERO Green encourages UPM to integrate this into the 25% efficiency threshold for eligible projects, to guarantee alignment with the SDS target.

UPM has a stated commitment to improve the circularity of its products, including in maximizing resource efficiency by making use of side streams and by-products from production processes as raw materials for further production. CICERO Green would emphasise the relative climate benefit of extending lifespan and prioritising reparability of products through eco-design of products to reduce the amount that needs to be recycled in the first place.

Although all UPM's wood inputs are 100% Chain of Custody controlled, only 82% is certified according to the certifications FSC and PEFC. The Chain of Custody certification is much less stringent than FSC and PEFC, and only accounts for responsible sourcing by screening against national risk assessments, and lacks requirements on e.g., biodiversity and conserving old growth forests. This introduces risks of involvement of wood that does not sufficiently take into account climate factors.

Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	UPM Green Finance Framework.	UPM Green Finance Framework, dated November 2020.
2	UPM Annual report, 2019.	Annual report for the year 2019.
3	UPM Costs by projects	Breakdown of UPM's expected costs for projects planned under this green finance framework
4	UPM Environmental costs and investments, 2019	Breakdown of UPM's costs from the year 2019 in each business area

°CICERO
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Green

Appendix 2:
About CICERO Shades of Green

CICERO Green is a subsidiary of the climate research institute CICERO. CICERO is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international cooperation. CICERO has garnered attention for its work on the effects of manmade emissions on the climate and has played an active role in the UN's IPCC since 1995. CICERO staff provide quality control and methodological development for CICERO Green.

CICERO Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

We work with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions (ENSO). Led by CICERO Green, ENSO contributes expertise to the second opinions, and is comprised of a network of trusted, independent research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University and the International Institute for Sustainable Development (IISD).