

Climate-Related Risk Management Report

Prepared in accordance to the recommendations of the TCFD



July 2021

INTRODUCTION

TCFD Reporting Framework

Figure 1: TCFD reporting framework overview



PURPOSE

The chemical sector supplies a broad range of products that serve a range of markets and industries. The chemical sector is a large energy user and greenhouse gas (GHG) emitter, and faces risks associated with climate change and other sustainability issues. It is linked across entire value chains across almost all other industries, and is a key enabler of the low-carbon economy.

ABOUT TCFD

The Task Force on Climate-Related Financial Disclosures (TCFD) was created in 2015 by the Financial Stability Board (FSB) to develop consistent climate-related financial risk disclosures for use by companies, banks, and investors in providing information to stakeholders. TCFD recommendations are globally recognized for climate-related risk management from the perspective of financial institutions.

TCFD recommendations serve as a global foundation for effective climate-related disclosures. IVL's disclosures are in line with the TCFD recommendations which enhance its consistency, robustness, and comparability. Our activities and contributions are detailed demonstrating how they

support each of the four frameworks. [IVL is a supporter of the TCFD recommendations](#) and has implemented core elements of recommended climate-related financial disclosures. The TCFD recommendations consists of four parts (Governance, Strategy, Risk Management, Metrics and Targets) which are explored in this report.

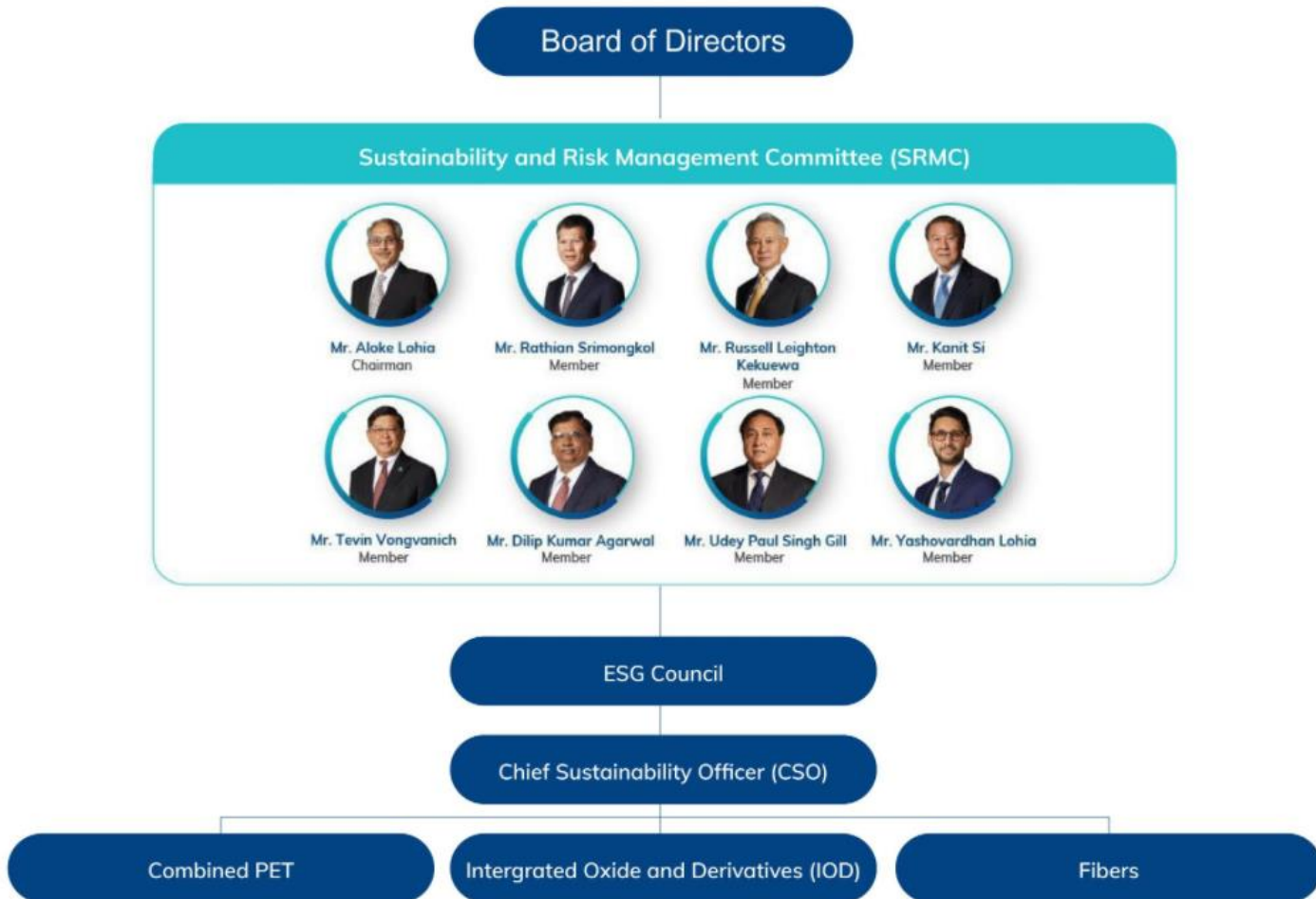
ABOUT INDORAMA VENTURES

Indorama Ventures is one of the world's leading petrochemicals producers with a presence in 33 countries, 123 manufacturing facilities, 25,207 employees, and a consolidated revenue of US\$10.6bn in 2020. We are committed to improving our sustainability performance and have established our targets as indicated in our [Sustainability Report 2020](#). We see the circular economy as an important instrument in combating climate change and an opportunity to strengthen our recycling business globally. We expect to link our targets directly to climate science by working towards the Science Based Targets (SBT). We plan to initiate SBTs in 2021-2022 as part of our Sustainability and Climate Strategy.

1. GOVERNANCE

Oversight & decision-making

Figure 2: Sub-committee structure



The Board of Directors provides oversight of and reviews climate-related risks and opportunities directly and additionally through the Sustainability Risk Management Committee (SRMC). The SRMC is one of three board sub-committees. The other two sub-committees are the Nomination, Compensation, and Corporate Governance Committee (NCCG) and the Audit Committee. The Audit Committee takes an active role in assessing the quality and reliability of sustainability performance reporting.

The SRMC, which meets quarterly, is chaired by the Group CEO and includes the CEO - Combined PET, IOD and Fibers businesses, Chief Strategy Officer, Chief Sustainability Officer, and four independent directors. The eight members of the SRMC work with all key functions of the organization including Communications, Risk Management, Strategy, Business Continuity Management (BCM), Environment, Health & Safety (EHS), and Sustainability in view of the broad and multidisciplinary nature of sustainability matters.

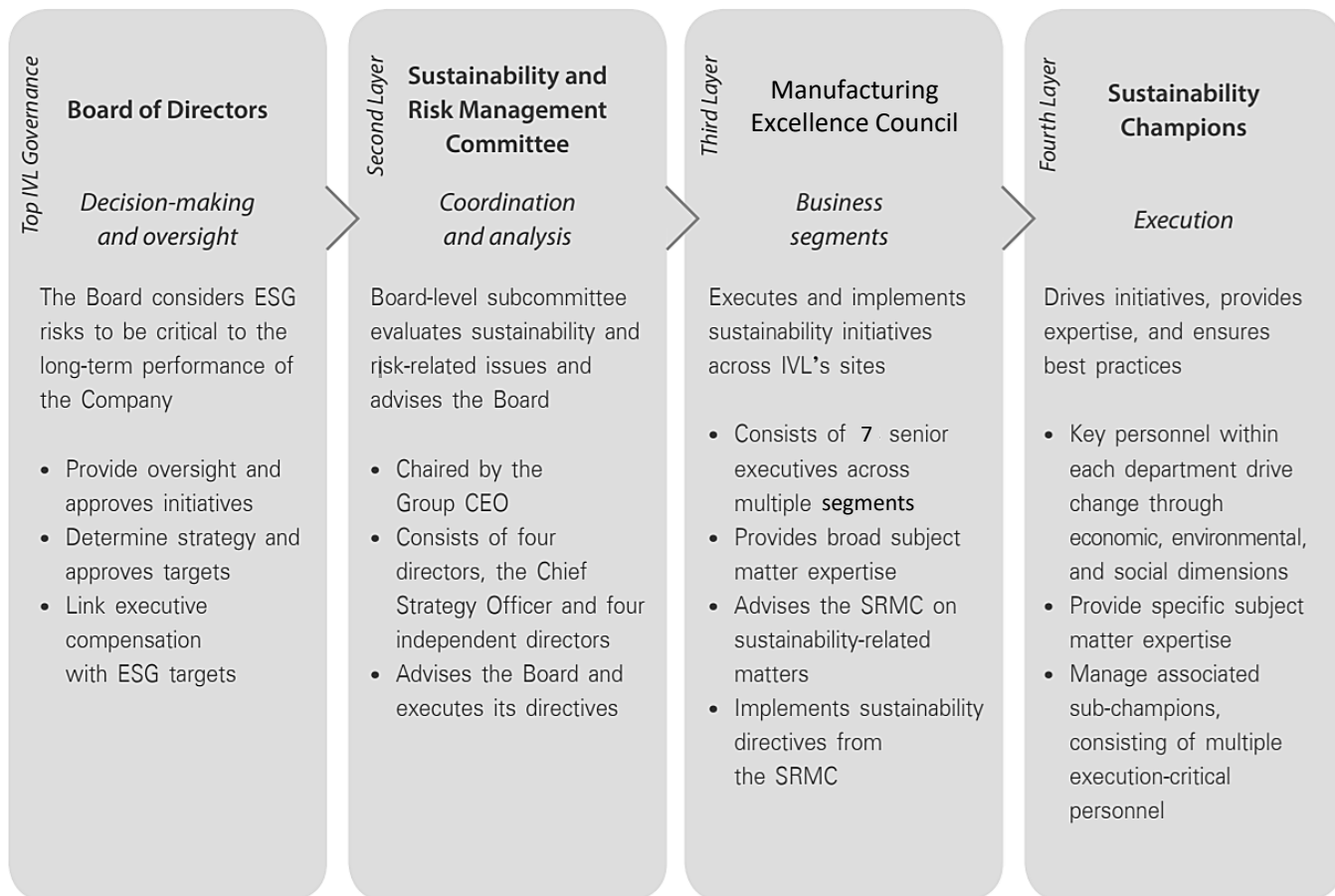
The SRMC approves and reviews the implementation of sustainability strategies including climate strategies, the implementation of sustainability initiatives including TCFD recommendations, scenario analyses, current and future physical and transitional risks including financial and non-financial implications, and plan the necessary measures to mitigate or eliminate these impacts. Restructuring is ongoing to integrate each department and foster greater collaboration within the broader risk structure.

More information on the individual members of the SRMC is available [here](#).

1. GOVERNANCE

Organizational risk management structure

Figure 3: Climate-related risk integrated into existing risk management structure



IVL's risk management process is based on the Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework and integrates climate risk into the risk management structure. An effective risk management structure provides strong support for risk management processes and their implementation. The Sustainability & Risk Management Committee (SRMC), a subcommittee of the Board, business risk committees and risk champions play an important role in endorsing risk management throughout the organization which encourages the establishment of lines of authority, and the distinct roles and responsibilities of management and employees. Embedding risk champions as coordinators in enterprise risk management is designed to support our business in applying risk management processes and techniques with increasing awareness, ownership and management of risks leading to improved business performance.

We conduct a company risk assessment that allows any entity to obtain a holistic view of the risks it faces and allows management to identify these risks and capitalize on opportunities. We assess the potential impact and likelihood of risks. This covers the assessment and review of internal

and external risks, including global risks and other factors that may affect our operations due to increased business and international operations.

This also helps us to gain an understanding of the risks that can pose potential difficulties to our operations. We categorize business risks, operational risks, management risks, financial risks, and compliance and legal risks that cover our enterprise risk management as a whole. In addition, emerging risks are analyzed as they may develop or already exist but remain difficult to quantify and may have a high loss potential or a high degree of uncertainty. Additional information on "Risk Factors" and "Emerging Risks" are provided in our [Annual Report 2020](#).

While the tone of the organization at all levels is geared to risk management, other significant elements include our risk governance structure, corporate values, codes of conduct and ethics programs, policies and procedures, risk committee oversight activities and risk assessment processes

2. STRATEGY

Climate-related risk management framework

Figure 4: IVL Sustainability Strategy framework



As part of our global corporate citizenship, we analyze and find opportunities to ensure that our sustainability efforts and measurable contributions are in line with climate science, and keeping a rise in global temperatures to well below 2°C with efforts to keep temperatures within 1.5°C by 2100 as per the Paris Agreement. We apply Climate Governance guidance from the World Economic Forum as a tool to help elevate the strategic climate debate and drive holistic decision-making that includes careful consideration of the links between climate change and business. Climate governance is the structure of rules and processes that IVL puts in place to ensure that we properly assess climate-related risks and opportunities, take appropriate strategic decisions on how to manage those risks and opportunities,

and report on relevant goals and targets, along with roles and responsibilities.

IVL identifies risks at the corporate and subsidiary levels around the world through integrated work processes and group-wide risk management, applying the enterprise risk management (ERM) framework using top-down and bottom-up approaches to anticipate any issues to mitigate their impacts in advance. They are identified through short-, medium-, and long-term timeframes. The climate-related risk management are analyzed through the perspective of (1) physical risk and (2) transition risk and their respective subcategories:

2. STRATEGY

Climate-related risk management framework

Climate-Related Risks

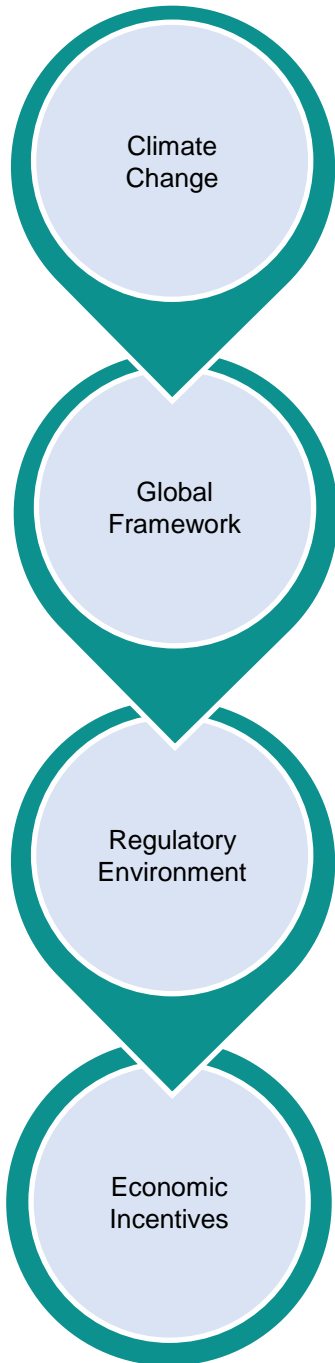
Transition Risk	<p>Technology</p> <p><i>Medium-term (3-10 years)</i> Higher costs from increased energy consumption Unsuccessful investments in new technologies Substitution of existing products with low emissions products</p>	<p>Market</p> <p><i>Medium-term (3-10 years)</i> Changes in consumer preferences from high carbon intensive to low carbon products Increased cost of raw materials Access to financing & insurance increasingly affected by climate & environmental risks</p>
	<p>Policy and Legal</p> <p><i>Medium- and long-term (3-20 years)</i> Increased operational costs due to changes in environmental legislation Implementation of cap-and-trade or carbon tax in jurisdictions in which the company operates Exposure to litigation Enhanced emissions reporting obligations</p>	<p>Reputation</p> <p><i>All time frames</i> Global focus on plastic pollution Movements on fossil fuel avoidance Change in consumer preferences Increased stakeholder concern</p>
	<p>Acute</p> <p><i>Medium- and long-term (3-20 years)</i> Increased severity of extreme weather events such as cyclones, droughts, and floods</p>	<p>Chronic</p> <p><i>Medium- and long-term (3-20 years)</i> Risk of sea level rise and riverine flooding for sites located in high-risk areas Rising mean temperatures Changes in precipitation patterns and extreme weather variability leading to production disruption Impact of water stress on production</p>
	Physical Risk	

Climate-Related Opportunities

<p>Resource Efficiency</p> <p>Use of more efficient modes of transport Use of more efficient production and distribution processes Use of recycling Building efficiency improvements Reduced water usage and consumption New technologies to reduce resource intensity in production</p>	<p>Energy Source</p> <p>Use of lower emission sources of energy Use of supportive policy incentives Use of new technologies Participation in carbon markets Innovative power purchase contract structures</p>	<p>Products and Services</p> <p>Development and expansion of low emission goods and services Development of climate adaptation and risk solutions Development of products or services through R&D and innovation Diversification of business activities Shift in consumer and customer preferences</p>
<p>Markets</p> <p>Access to new markets Use of public-sector incentives Access to new assets and locations needing insurance coverage</p>	<p>Resiliency</p> <p>Participation in renewable energy programs and adoption of energy efficiency measures Resource substitution, innovation, and diversification Development and deployment of recycling technologies Meeting and getting ahead of emissions and single-use plastics regulation</p>	

2. STRATEGY

Climate-related risk impact on IVL



Physical and Ecological Effects

Climate change has severe and irreversible effects on the environment, ecology, and human health. The Intergovernmental Panel on Climate Change's (IPCC) 5th Assessment Report (AR5) detail these catastrophic effects including rising temperatures and sea levels, changing precipitation patterns, severity of extreme weather events, and the collapse of entire ecosystems. These effects may lead to food and water stress, resulting in famines, droughts, and human displacement.

Paris Climate Agreement (PCA)

The PCA is a landmark agreement adopted by nearly every nation in 2015 to address climate change and its negative impacts. The deal aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2°C above preindustrial levels, while pursuing means to limit the increase to 1.5°C. There are commitments from all major emitting countries to cut their pollution and to strengthen those commitments over time.

Carbon Pricing

Carbon pricing covers 22% of global GHG emissions across 61 carbon pricing initiatives. These include 31 emissions trading schemes such as the EU ETS, and 30 carbon taxes which combined raised US\$45bn in 2019.

Emissions Regulation

Governments around the world are regulating the carbon content of products directly, such as through vehicle emission standards or through the proposed EU Carbon Border Adjustment Mechanism (CBAM).

Sustainable Finance

The increased popularity of sustainability-linked credit facilities and ESG-integrated equities have made access to financing directly dependent upon our carbon performance.

Customer Demand

Strong carbon footprint performance is now a competitive advantage due to both consumer awareness of climate issues and ambitious GHG target-setting by our customers.

Resiliency

Global regulations on GHG emissions will become stricter and customers may increasingly favor low-carbon products. Investing now will prevent disruption in the future.

2. STRATEGY

Decarbonisation pathways

Conventional Pathways

Efficiency & Optimization

Proposed projects that seek to address resource intensity are classified as green projects. Sites regularly propose green projects, with new projects to be approved by the head office. IVL maintains a pipeline of green projects classified into approved, promising, and aspirational scenarios according to payback period and cost efficiency.

Natural Capital Solutions

Natural capital solutions compensate for each ton of GHG emitted by ensuring that there is one ton less GHG in the atmosphere such as by funding additional renewables, forestry and wetland projects, or injecting it underground. IVL is exploring carbon credit issuance at recycling facilities and additionally is exploring ownership structures for carbon offsetting projects to address residual emissions.

Energy Transition

IVL has implemented solar rooftops and is exploring switching from coal to low carbon-intensive energy sources. IVL is also exploring renewable energy purchases through Virtual Power Purchase Agreements (VPPA) which is expected to make up the bulk of our renewable energy procurement.

Recycling

Recycling addresses both emissions reduction and plastic pollution. Recycled PET (rPET) has significant environmental advantages over virgin PET both in terms of lower lifecycle carbon emissions and in addressing plastic pollution.

Supporting Activities

Supplier Engagement

A pilot supplier engagement program is expected to come online within 2021 / 2022 which will seek to address IVL's scope 3 emissions and enable IVL to set Science-Based Targets (SBT).

Internal Carbon Pricing

Internal carbon pricing (ICP) is used in project finance assessments in some sites and we plan to introduce guidance and training to sites to accelerate the use of ICP.

New Technologies

Carbon Capture, Utilization, and Storage (CCUS)

Carbon capture, utilization, and storage (CCUS) is a family of technologies that directly removes carbon dioxide directly from the air from a high-intensity source such as a coal or gas power station. IVL is monitoring the development of CCUS technology and applicability to sites.

Renewable Natural Gas (RNG)

RNG is methane gas, chemically identical to fossil fuel natural gas but sourced from decaying feedstocks. Nearly all available RNG is siphoned off landfills, sewage treatment plants, or livestock manure ponds on large industrial farms. RNG can have significantly lower emissions than conventional natural gas.

Bio / Renewable Feedstock

IVL manufactures biobased PLA at the Trevira site in Germany and is exploring expanding this capability to other sites within the group. Biobased and biodegradable feedstock can have significant environmental advantages including a lower carbon footprint and can be industrially compostable.

Green Hydrogen

Green hydrogen is produced by splitting water molecules into hydrogen and oxygen via electrolysis in which the process is powered by renewable electricity. Green hydrogen may play a significant role in decarbonizing sectors resistant to electrification.

3. RISK MANAGEMENT

Overview of climate risk management initiatives

Figure 5: Examples of IVL's climate-related risk management initiatives

Water Stress Analysis

IVL uses the WRI's Aqueduct Water Risk Atlas, Climate Resilience Evaluation and Awareness Tool (CREAT), and Climate Information Portal (CLIPC) to examine current and projected climate-related issues. We also conducted a high-level study based on the Intergovernmental Panel on Climate Change (IPCC)'s 5th Assessment Report (AR5) on changes in regional weather phenomena and changes in annual mean temperatures up to 2040.

Carbon Pricing Financial Impact Analysis

This analysis forecasts IVL's expected carbon pricing impact through existing and announced regulations. This forecast differs from shadow carbon pricing in that it projects direct financial impact from existing and expected Emissions Trading Schemes (ETS), whereas shadow carbon pricing estimates both direct and indirect financial impact from all climate-related sources including carbon taxes, ETS, CBAM, operational disruption, and customer demand.

Scenario Analysis

The scenario analysis is based on the Carbon Pricing Financial Impact model with different carbon price inputs according to each scenario's parameters. We conducted stress-testing using both the IEA Stated Policies Scenario and the Sustainable Development Scenario to predict the carbon pricing financial impact on IVL and evaluating how those scenarios differ from our own proprietary scenario.

Sustainable Products and Services

IVL is investing in numerous initiatives to achieve a more sustainable product portfolio. We are in the process of transitioning towards low carbon-intensive fuels, and aim to invest USD 1.5bn in recycling plants to achieve 750kt recycling capacity by 2025. We are also growing our environmentally sustainable Deja™ product range by launching Deja™ Carbon Neutral PET with neutralized raw material emissions, from cradle to IVL's plant gates.

Sustainable Finance

We aim to improve our ESG performance in order to attract additional investments from the rapidly growing sustainable finance sector. Global sustainable debt issuance grew from US\$85.1bn in 2015 to US\$732.1bn in 2020. IVL has issued approximately US\$1bn in sustainable debt instruments including sustainability-linked loans and blue loans.

Decarbonisation Case Studies

IVL carries out decarbonization initiatives at both the corporate and the site level through the pathways detailed in *Decarbonisation Pathways*.

IVL manages risks at the corporate and subsidiary levels around the world through integrated work processes and group-wide risk management, applying the Enterprise Risk Management (ERM) framework using top-down and bottom-up approaches. On an initial assessment, we identify risks and opportunities associated with climate change through the use of an ERM framework to anticipate any issues to mitigate their impacts in advance. Mapping is performed across the IVL asset portfolio to identify sites with high ESG risk. We then perform a targeted intervention to mitigate the identified risk.

Financial analyses are performed according to the scenarios underlying the above themes in order to see how they affect Revenue, Cost of Goods Sold, EBITDA. From the results and cost estimations, we communicate directly with plants to develop clear action plans and assign champions to coordinate with all plants and regularly report to management.

3. RISK MANAGEMENT

Water risk analysis

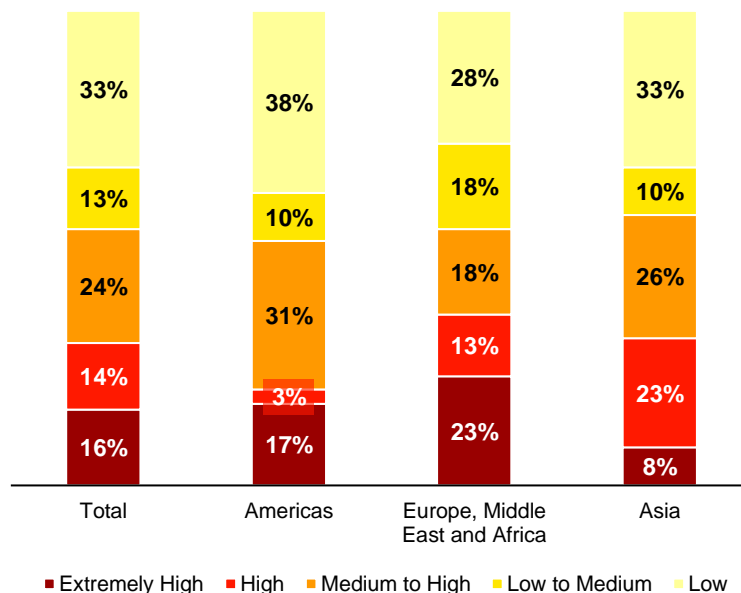
We manage our water responsibly, including water withdrawal and discharge, and seek continuous improvements in water management through the 3Rs. IVL is conscious of water risk and is demonstrating responsibility through our efficient water management stewardship. We focus on local water risk assessments and through follow-up, have an effective risk management system in place, and regularly assess our exposure to water related risks. We conducted a water sensitivity analysis using the AQUEDUCT Water Risk tool developed by WRI to identify water stress locations in 2020.

This tool helped us to evaluate changes in water demand, water supply, stakeholder risk, and regulations based on current and future conditions. It also enabled us to foresee changes to water risk forecasting in 2020, 2030 and 2040. These results have been analyzed and discussed during risk assessment committee meetings on a yearly basis to identify the necessary mitigation measures [2] and any meaningful initiatives for plants located in areas facing extreme water stress or significant risks to water usage.

More information on our water usage and management is available on our 2020 [Sustainability Report Executive Summary](#).

Figure 6: Water Stress Assessment

(% of IVL's operations identified in water stress areas using the AQUEDUCT Water Risk Tool)



2013-2020 Progress

7% reduction in total water intensity



2025 Target

10% reduction in water intensity*

* Base year 2020

Figure 7: Water Cost Projection and Cost of Shutdown

Stress Level	#Sites	%Sites	Estimated Water Cost 2030 (USD)
Extremely high (>80%)	19	18%	3,909,522
High (40-80%)	14	13%	1,522,170
Medium-high (20-40%)	34	32%	13,186,316
Low - Medium (10-20%)	19	18%	7,018,159
Low (<10%)	20	19%	2,418,032
Arid and low water use	1	1%	28,916
Total	107		28,083,114

Note: Water cost in 2020 was US\$25.39m USD. 2030 figure of US\$28.08m is a 9.58% increase from 2020.

Stress Level	No. of sites	30-day shutdown	60-day shutdown	90-day shutdown
Extremely High	19	15.2	30.3	45.5
High	14	9.9	19.7	29.6
Total (millions USD)		25.1	50	75.1

Note: Financial impact estimated via loss of EBITDA from plant shutdown due to water shortage, based on 2020 water stress assessment

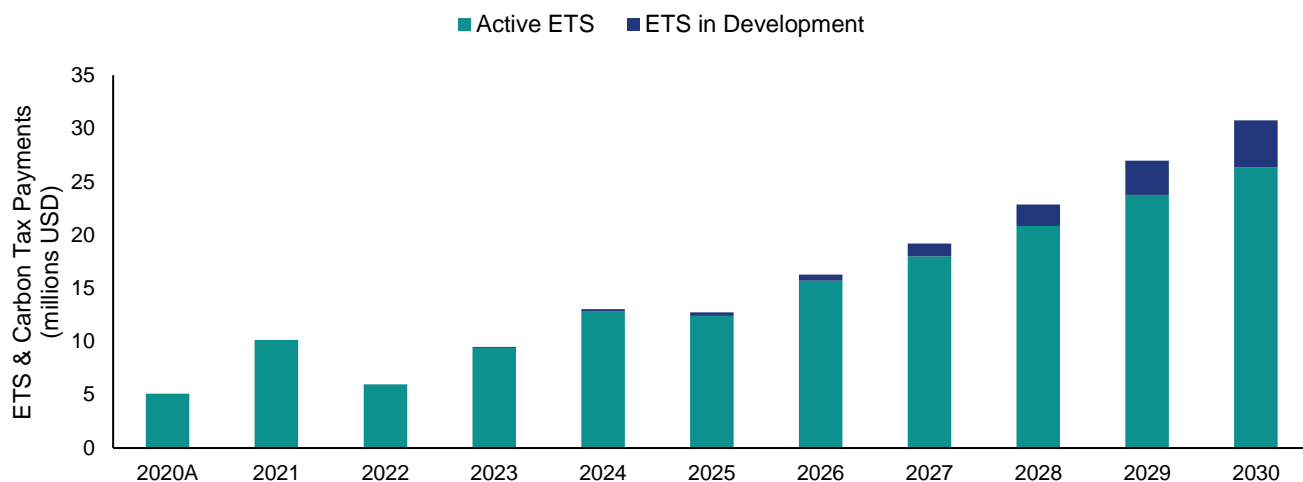
[1] Image sourced from [WRI Aqueduct Water Risk Atlas tool](#) based on 107 sites worldwide

[2] WRI (2019), [Setting Site Water Targets Informed By Catchment Context](#), WRI, Washington, D.C.

3. RISK MANAGEMENT

Carbon pricing financial impact model

Figure 8: Estimated ETS payments at IVL-level 2020A-2030F

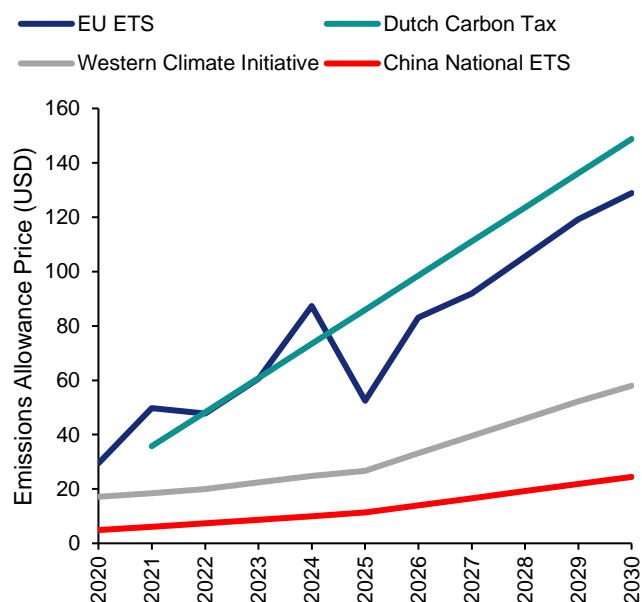


IVL also measures climate-related regulatory risks through financial impact modelling. The Carbon Pricing Impact Model (“model”) forecasts the annual payments IVL makes towards emissions trading schemes (ETS) worldwide. The results of the model indicates that IVL’s compliance costs are projected to increase from less than US\$10m over the previous decade to between US\$170m-210m over the next decade, with US\$12m of the figure from new ETS expected to come into operation. ETS coverage is also expected to rise from 8% of IVL’s scope 1 emissions in 2020 to 37% by 2030 based on business plan.

The key inputs of the model include the following:

- (1) Estimated scope 1 GHG abatement from decarbonization projects, with projects aggregated into 3 distinct scenarios (Approved, Promising, Aspirational).
- (2) ETS free allocation / cap reduction schedule.
- (3) Emissions allowance price forecast.
- (4) Estimated operational date, allocation methodology, and sector coverage for future ETS [1].
- (5) Overall IVL production to increase by 43% by 2030 from 2020 according to business plan, including expansions to existing sites, greenfield projects, and M&A.

Figure 9: Emissions allowance price forecast



The key assumptions of the model include the following:

- (1) All sites making current ETS payments or with annual scope 1 emissions greater than 25ktCO₂e and within an area covered by an ETS in the future may be subject to ETS payments.
- (2) Free allocation remains at the level announced by regulators or at the level assumed for future ETS that have not disclosed a free allocation amount.
- (3) Emissions allowance prices remain within acceptable bounds of the allowance price forecast [2][3][4][5][6].
- (4) Exchange rates remain constant.

All information disclosed regarding the model are forward-looking, except for statements of historical fact. All forecasts, projections, and estimates have a high level of uncertainty including but not limited to (1) estimated emissions allowance prices, (2) estimated ETS coverage, structure, free allocation, operational dates, and (3) IVL emissions due to operational changes or mergers & acquisitions. Change in any variable’s value may materially impact model output.

The model is used to inform management decisions and provide site-specific carbon prices for use in project finance.

[1] Based on [International Carbon Action Partnership](#) (ICAP) materials and regulatory filings
 [2] EU ETS price forecasts based the average 16 analyst forecasts including Berenberg, BloombergNEF, ClearBlue, PointCarbon, Morgan Stanley, ICIS, S&P Platts, Macquarie, etc. (between 19 Oct 2020 and 15 Jan 2021)
 [3] Dutch carbon tax based on active legislation
 [4] Western Climate Initiative (WCI) based on ClearBlue scenario analysis (17 Feb 2021) and BloombergNEF forecasts.
 [5] China ETS price forecast based on China Carbon Trading market report from JPMorgan (7 Jan 2021) and Refinitiv forecasts.
 [6] Based on exchange rates as of 23 June 2021

3. RISK MANAGEMENT

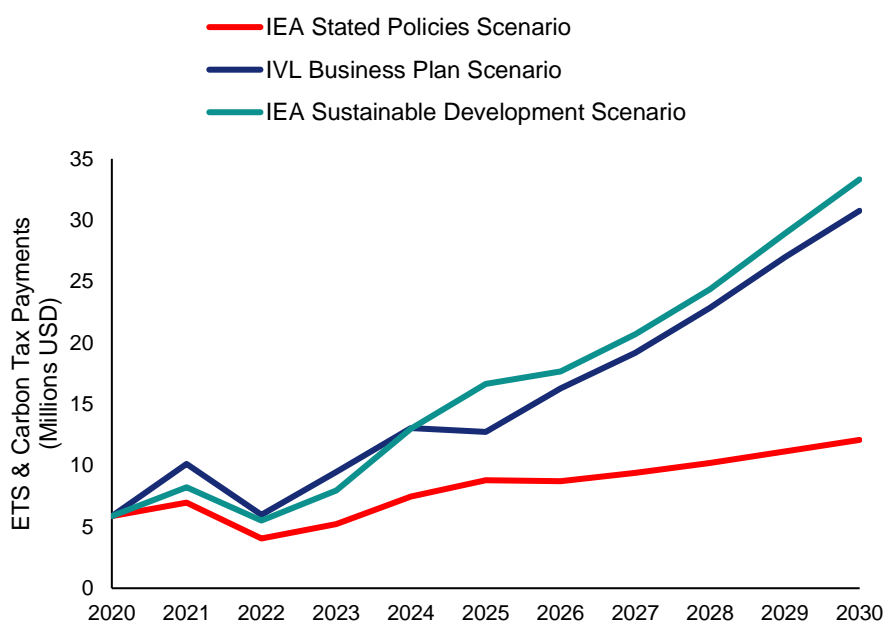
Scenario analysis

Figure 10: Scenario references (USD) [1][2]

Scenario	Scenario Description	2030 Impact	Carbon Price 2025	Carbon Price 2040
IEA Stated Policies Scenario (STEPS)	Business-as-usual without new climate policies. From 2016-2040. The Stated Policies Scenario reflects the impact of existing policy frameworks and today's announced policy intentions. The aim is to hold up a mirror to the plans of today's policy makers and illustrate their consequences for energy use, emissions and energy security.	\$12,084,676	Canada: \$34 China: \$17 EU: \$34	Canada: \$38 China: \$35 EU: \$52
IVL Business Plan	Forecast based on analysis of global carbon pricing initiatives currently in operation and expected to come into operation. Provides internal estimate of future compliance costs and is calculated at site-level with different prices and cap reduction factors for each ETS. See previous page for more detail.	\$30,763,157	Set at site-level based on analyst forecasts	Set at site-level based on analyst forecasts
IEA Sustainable Development Scenario (SDS)	Combines climate and social targets for limiting global warming to 2°C. From 2016-2040. The world is not on track to meet the energy-related components of the Sustainable Development Goals (SDGs). The IEA's Sustainable Development Scenario (SDS) outlines a major transformation of the global energy system, showing how the world can change course to deliver on the three main energy-related SDGs simultaneously.	\$33,310,613	Advanced Economies: \$63 Selected developing economies: \$43	Advanced Economies: \$140 Selected developing economies: \$125

Note: IVL made carbon pricing payments of approximately \$5.1m in 2020

Figure 11: Scenario analysis



The Carbon Pricing Financial Impact Model uses site-specific variables (ETS-specific price, estimates for new ETS to come into operation, cap reduction factors, actual ETS payments data, and proposed decarbonisation / energy transition projects) and our 2030 business plan (planned M&A, production expansions by site) to more accurately model our forecasted actual payments. While the carbon price varies according to the scenario, other parameters remain the same.

Note: IEA scenario data was last published using 2019 data, whereas the IVL Business Plan scenario uses the latest available information as of June 2021. Carbon price projections have shifted significantly during the intervening period, leading to overlap between the IVL Business Plan scenario and the IEA SDS.

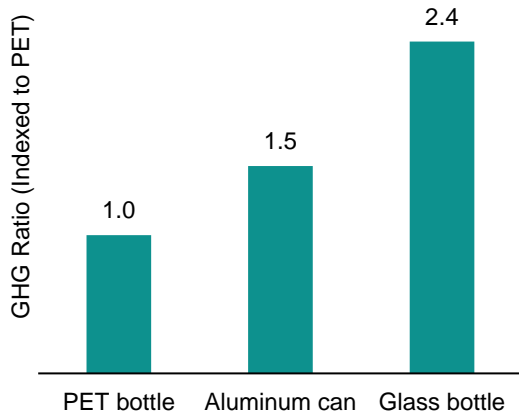
[1] [Table of reference for climate scenarios](#), UNPRI (2021)

[2] [World Energy Model](#), IEA (2020).

3. RISK MANAGEMENT

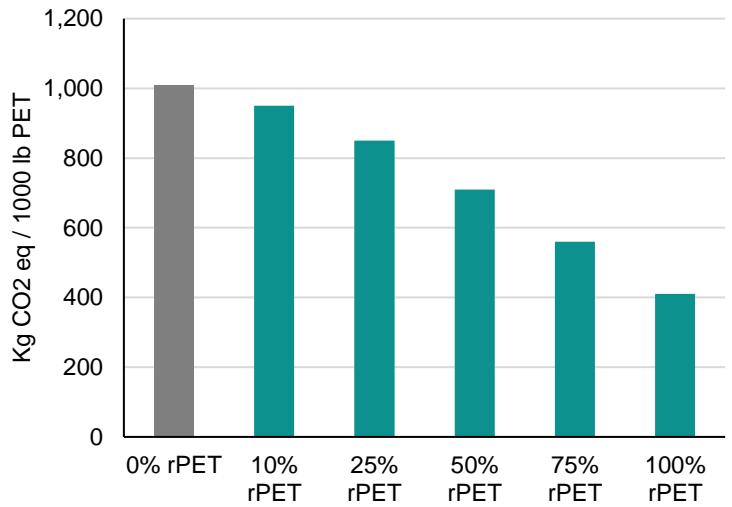
Sustainable products & services

Figure 12: GHG emissions comparison between packaging materials



Note: Based identical container volume, PET = 1X; [1][2]

Figure 13: GHG emissions comparison between rPET blends



Note: Based on LCI of PET with varied %Virgin PET / rPET

Recycled PET (rPET) has significant environmental advantages over virgin PET both in terms of lower lifecycle carbon emissions and in addressing plastic pollution. PET is a fully recyclable material that when recycled that can have lower lifecycle emissions than virgin PET and other materials. Our recycling strategy is focused on strengthening our capability to increase recycling rates globally, contributing to a circular economy, and ensuring a fully closed loop. We will build on our leadership position as the largest virgin PET producer and remain a leader in rPET.

We are actively working with the European Union to reduce plastic waste as part of their Single Use Plastic Directive and intend on remaining at the forefront of recycling plastic waste and adopting business models that reinforce circular processing.

As a leading recycler in Europe, North America and Asia, we have a competitive advantage in rPET with 30 years of recycling expertise and strong partnerships across the circular value chain.

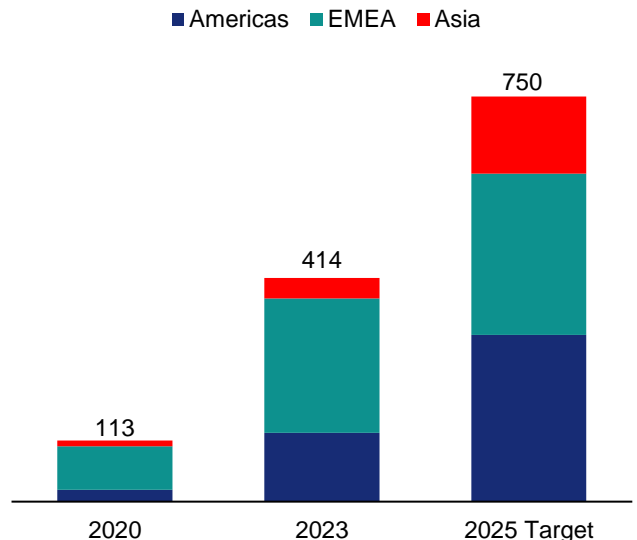
Recycling Capacity Expansion

We are increasing our investments in recycling plants and committed **US\$1.5 billion** to build the recycling infrastructure needed globally to close the loop, encouraging the end-use of recycled PET and delivering a circular economy for beverage packaging. We have committed to increasing PET input to **750,000 tons per annum by 2025** and are working with several industry partners to achieve a circular economy for sustainable plastics.

We have acquired proprietary knowledge of mechanical recycling and developed partnerships with innovative players to develop and test next-generation chemical recycling technologies.

IVL currently has 15 recycling plants worldwide, with 4 acquisitions/JVs in 2020: IVSSF (USA), IVSSB (Brazil), IMP Polowat (Poland), and a greenfield PETValue JV (Philippines).

Figure 14: Path to 2025 rPET target (kt)



[1] Based on Lifecycle Inventory Analysis, which includes total energy, raw material, air and water emissions and total solid waste produced from cradle-to-disposal/recycling of product

[2] Source: Converse & Woodmac / Euromonitor; Franklin Associates, Cleanmetrics Corp; Goldman Sachs GIR

[3] Source: NAPCOR, Franklin Associates Promoting and Protecting the PET Package report

3. RISK MANAGEMENT

Sustainable products & services

Figure 15: Deja™ brand launch materials

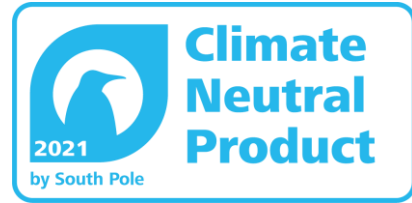


Through its **Deja™** global, sustainable ingredient brand, IVL is differentiating itself in the marketplace by offering a performance-led suite of sustainable solutions that helps its customers to achieve their sustainability targets, while also responding to end consumers' demand for transparency and environmental responsibility.

Figure 17: Deja™ product range

	Deja™ rPET Flake 100% Post-Consumer Recycled Flake
	Deja™ rPET Pellet 100% Post-Consumer Recycled Pellet
	Deja™ rPET Filament Yarns 100% Post-Consumer Recycled Polyester (rPET) Performance Filament
	Deja™ rPET Staple Fibers 100% Post-Consumer Performance Fibers
	Deja™ Carbon Neutral Pellet Fully neutralized raw material emissions from cradle to our plant gates


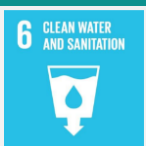
Figure 16: Deja™ product carbon neutrality verification and labelling carried out by South Pole



Deja™ Carbon Neutral PET pellet is the latest innovation under IVL's **Deja™** global brand offering as the world's first certified carbon neutral PET pellet solution. It is a significant addition to the growing **Deja™** portfolio, which includes sustainable PET, rPET, polymer and fiber range of products available across flake, pellet, fiber and filament ingredients. **Deja™ Carbon Neutral** PET pellet has been sustainably produced throughout its supply chain and helps environmentally conscious companies to achieve their sustainability targets by lowering their Scope 3 GHG emissions. IVL's unique access to recycling sources through its own global supply chain ecosystem means it can power sustainability and support customers that are aiming to close the loop.

Deja™ Carbon Neutral is a PET proposition with neutralized raw material emissions, from cradle to IVL's plant gates [1]. It comes with an independently verified carbon neutral certification of compliance from globally established providers. Through a partnership with South Pole, a leading project developer and provider of global climate solutions, IVL offsets unavoidable carbon emissions through projects that help transform lives and protect the environment. IVL currently supports three projects through the purchase of high-quality carbon offsets for **Deja™ Carbon Neutral**, an example of which is shown below:

Safe Community Water Supply, Rwanda

	 <p>1 NO POVERTY</p>	 <p>6 CLEAN WATER AND SANITATION</p>
	 <p>13 CLIMATE ACTION</p>	 <p>15 LIFE ON LAND</p>

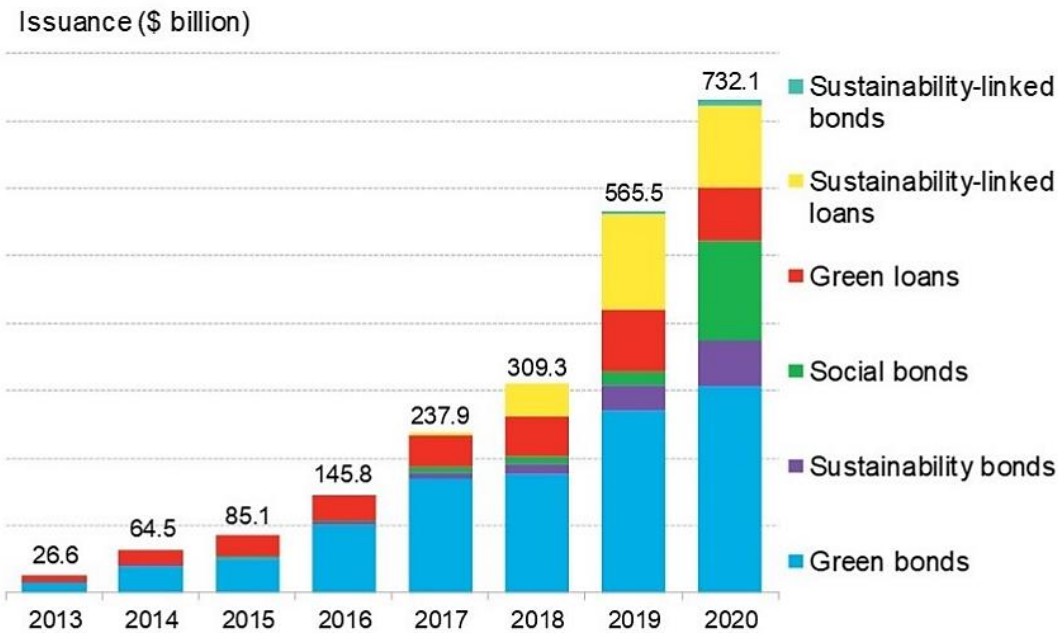
Lack of safe water, along with poor sanitation and hygiene, is among the greatest causes of poverty in Africa. Without access to clean drinking water, breaking the poverty cycle is incredibly difficult. The [Rwanda Safe Water Project](#) both provides local communities with clean water and reduces CO2 emissions.

[1] Lifecycle Inventory Analysis carried out in conjunction with Environmental Resources Management (ERM) with verification carried out by First Environment in the case of Alphanet. Carbon neutrality verification carried out by South Pole.

3. RISK MANAGEMENT

Sustainable finance

Figure 18: Sustainable debt issuance 2013-2020



Source: BloombergNEF

Sustainable finance represents a significant opportunity for IVL, with many multinational lenders and asset managers becoming signatories to the UNPRI (United Nations Principles for Responsible Investment) and UNPRB (United Nations Principles for Responsible Banking). Financial institutions are integrating ESG into the investment process.

A company that is lagging in this area could face the risk of being outmaneuvered by companies that have positioned themselves more favorably with eco-friendly or green products/services, may not be in a position to attract green loans, low cost funds, ESG investors.

IVL regularly performs gap analyses on identified ESG risks based on data provider metrics and industry experts in order to drive improvements in the risk profile of the company and secure more favorable credit terms. ESG data used in the gap analysis was sourced from the largest ESG data providers with active relationships with financial institutions including MSCI, Sustainalytics, ISS, and RobecoSAM.

IVL's leadership in sustainable finance

IVL is a global leader on ESG integration and was able to secure US\$1 billion in sustainable financing, which includes:

1. Thailand's first green loan from Japan's Mizuho Bank for both USD 200m and EUR 200m linked to IVL's ESG rating
2. A syndicated ESG loan for USD 255m arranged by Mizuho Bank linked to IVL's ESG rating
3. A blue loan for USD 300m for use in increasing recycling in developing countries, arranged by the International Finance Corporation (IFC). Sources of funds are as follows:
 - International Finance Corporation (IFC): USD 150m
 - Asian Development Bank (ADB): USD 100m
 - Deutsche Investitions-und Entwicklungsgesellschaft (DEG) USD 50m

3. RISK MANAGEMENT

Decarbonisation case studies

Solar panel wall at Lithuania site



UAB Orion Global PET, our subsidiary in Lithuania, installed a solar power plant in place of a fence, which performs the dual functions of marking the boundary and generating 55.82 MWh of electricity per year bringing total solar energy capacity at the site to 390,000 kWh.

GT Apollo Project - New Cogeneration Plant at IVI, Tangerang



PT Indorama Ventures Indonesia installed new gas turbine plant with downstream TOH & HRSG system. The concept is to install a gas turbine for power generation while using waste heat for HTM heaters for process heating, steam generation & chilled water generation all using waste heat. The new cogeneration plant consists of gas turbine for power generation, thermal oil heater, steam generation, ABS & hot water chillers.

The installation of the new gas turbine is expected to have the following effects:

- Existing HTM heaters are stopped & used for hot back up
- No natural gas consumption in HTM Heaters
- Reduction in power consumption (2.3 MW) & utilities cost
- Stoppage of electrical turbo chillers, auxiliary HTM FD fan for natural gas heaters
- 23% reduction in carbon footprint

PETValue recycling JV in Philippines



Coca-Cola Beverages Philippines, Inc. (CCBPI), the Bottling arm of Coca-Cola in the country, and Indorama Ventures signed a joint-venture agreement to establish [PETValue](#), the largest state-of-the-art, bottle-to-bottle recycling facility in the Philippines. PETValue will ensure that used PET plastic bottles that are 100% recyclable, and therefore not “single-use,” are given new life and used again and again within a circular economy. The plant’s projected capacity is 30,000 MT/year of flakes which will recycle almost two billion plastic bottles with an output of 16,000 MT/year of recycled PET resin in the first phase. A second extruder will subsequently be installed to consume the remaining quantities of flakes.

Renewable Electricity Supply from Solar Modules



Indorama Polyester Industries (Nakhon Pathom), Thailand, or IPI – N, a wholly-owned subsidiary of the Company, demonstrated its green credentials by installing photovoltaic modules for captive solar power generation on the roof of their facility. These high efficiency modules have a capacity of 840 kilowatt peak (kWp) and can generate an estimated 1,173 MWh per year. The advantages from this inexhaustible energy source are clear from a financial and environmental perspective, as they provide an annual electricity cost-savings of roughly USD 122,000 with a reduction in CO2 emissions of 560 tCO2e/year. They were installed and started operating in July 2019. Total electricity generated in 2019 was 565,327 kWh which reduced 270 tons of GHG emissions. It reduced energy consumption from other conventional sources by 2,035 GJ and contributed to electricity cost-savings of USD 58,788. IPI – N’s photovoltaic modules are an important step in reducing utility costs and greenhouse gas emissions.

4. METRICS AND TARGETS

Figure 19: IVL sustainability targets

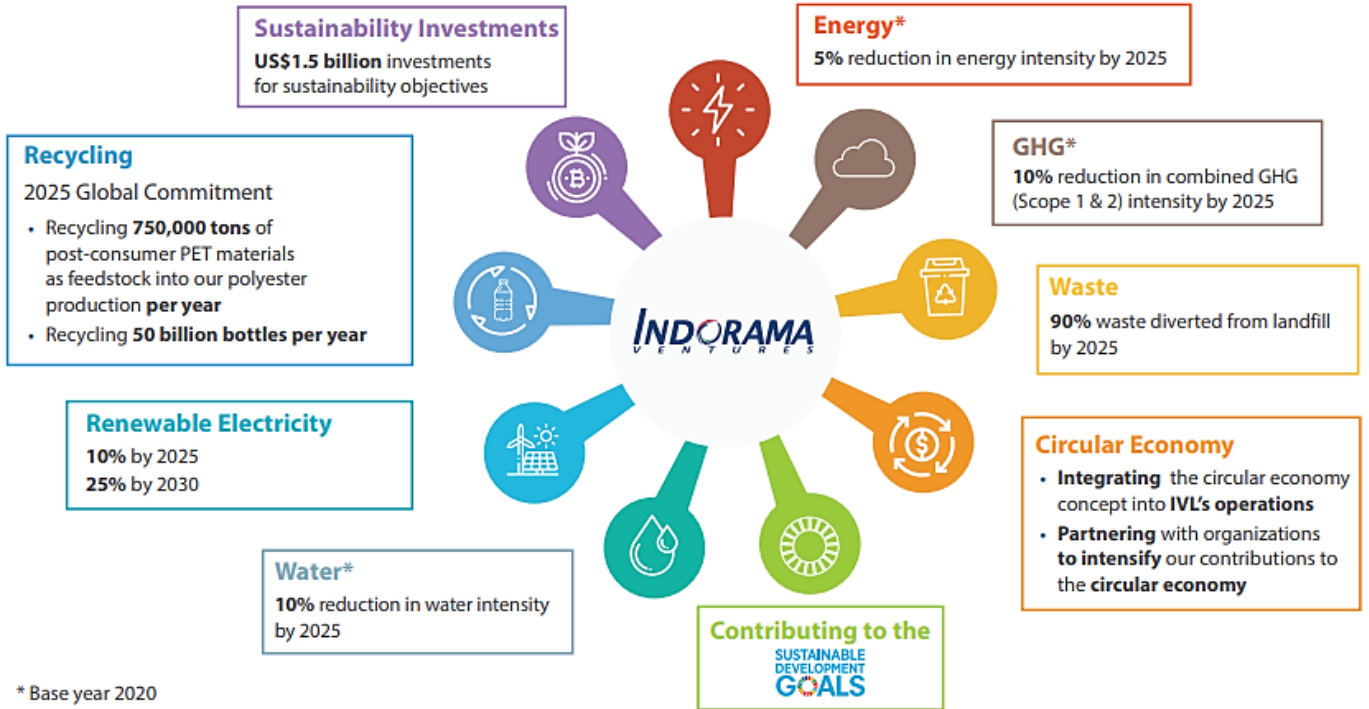
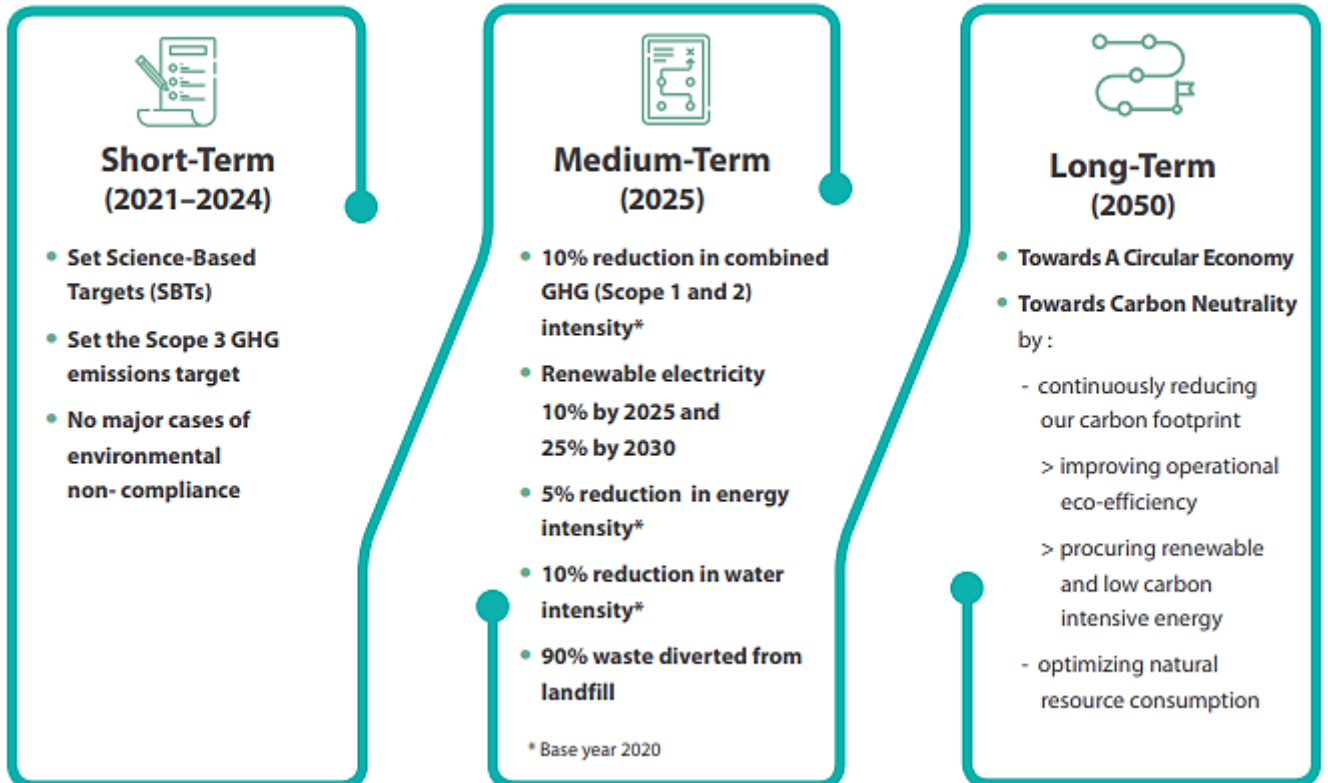
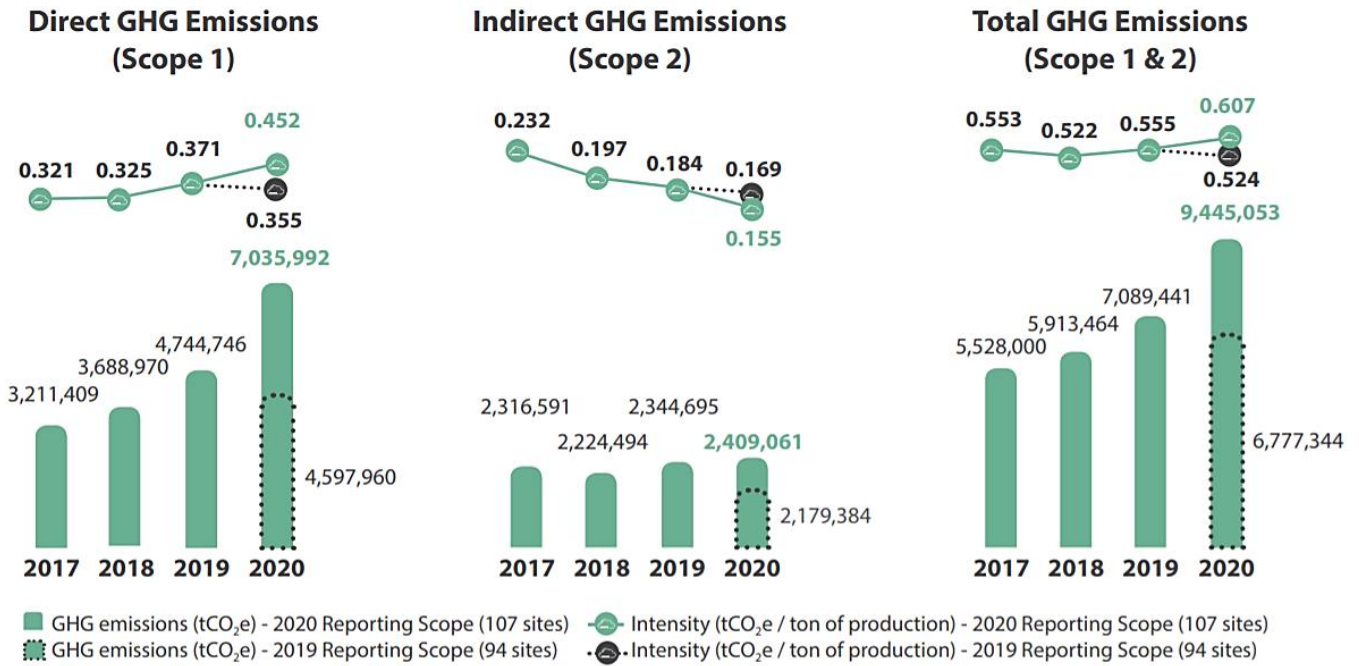


Figure 20: IVL carbon neutrality ambitions

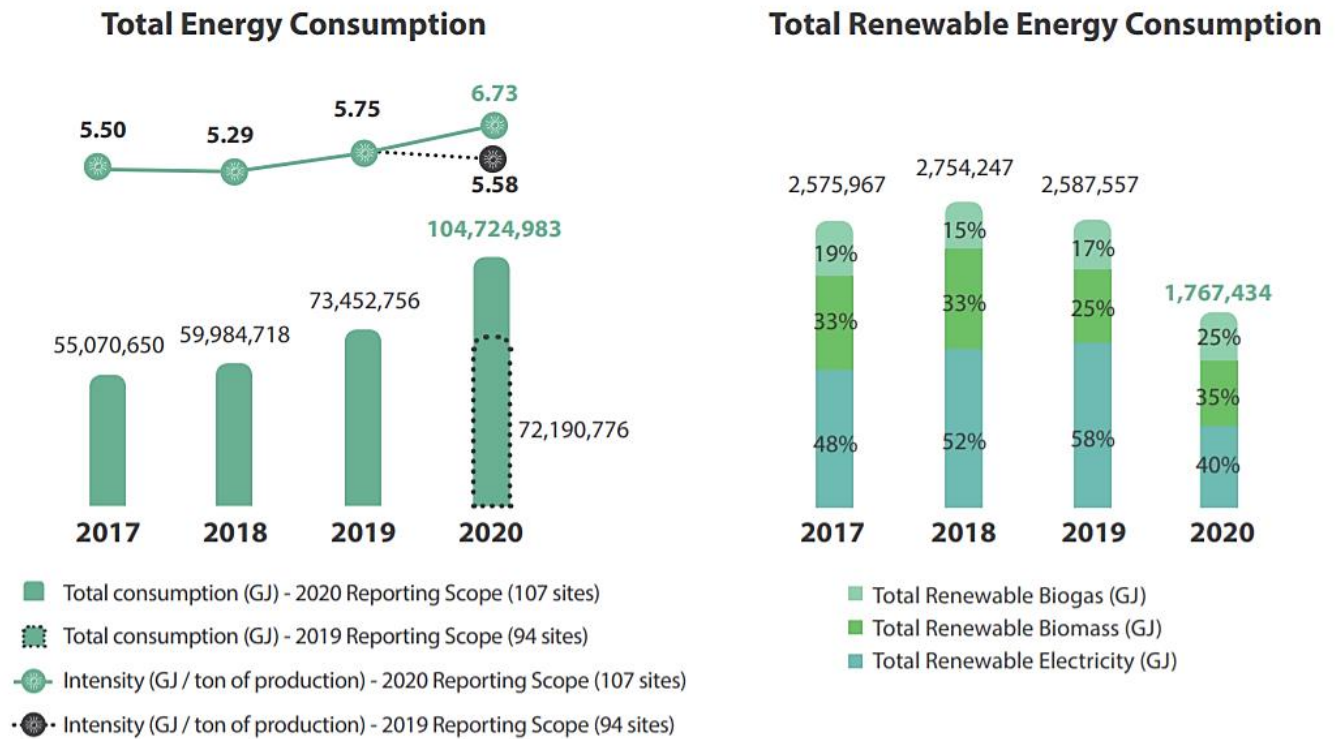


4. METRICS AND TARGETS

Figure 21: IVL GHG and energy performance for 2020



Note: Intensities are calculated based on overall production including inter-company sales.
 2020 emissions has increased as IVL acquired cracker plants, which resulted in higher GHG emissions.

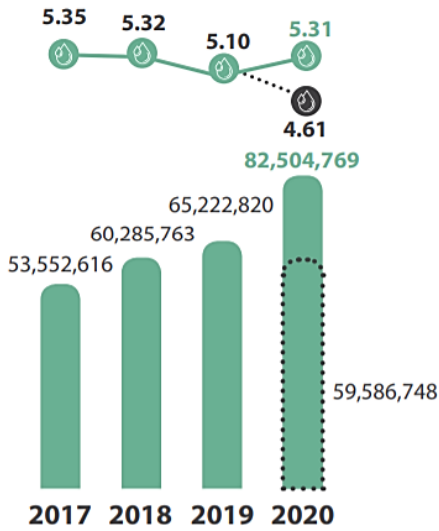


Note: Intensities are calculated based on overall production including inter-company sales.
 2020 energy has increased as IVL acquired cracker plants, which resulted in higher energy consumption.

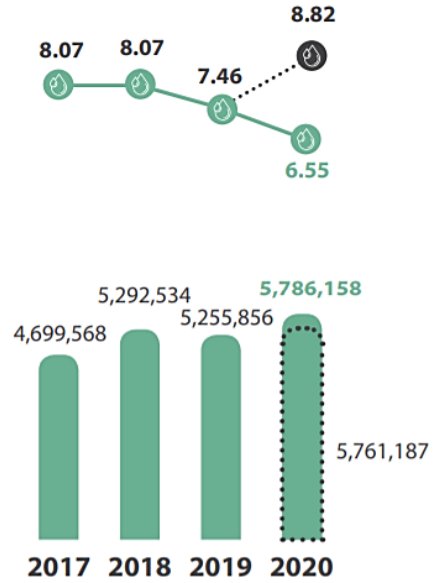
4. METRICS AND TARGETS

Figure 22: IVL water and waste performance 2020

Total Water Withdrawal



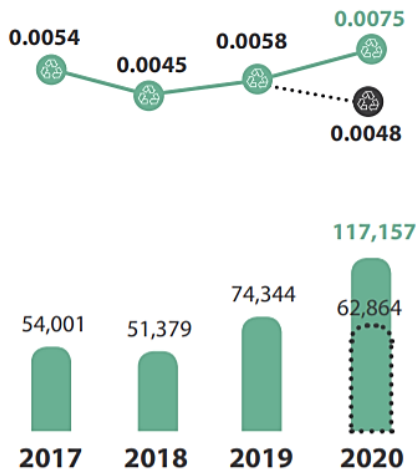
Total Recycled/Reused Water



- Total water withdrawal (m³) - 2020 Reporting Scope (107 sites)
- Total water withdrawal (m³) - 2019 Reporting Scope (94 sites)
- Intensity (m³ / ton of production) - 2020 Reporting Scope (107 sites)
- Intensity (m³ / ton of production) - 2019 Reporting Scope (94 sites)

- Total volume of recycled/reused water (m³) - 2020 Reporting Scope (107 sites)
- Total volume of recycled/reused water (m³) - 2019 Reporting Scope (94 sites)
- Recycled/Reused water (%) - 2020 Reporting Scope (107 sites)
- Recycled/Reused water (%) - 2019 Reporting Scope (94 sites)

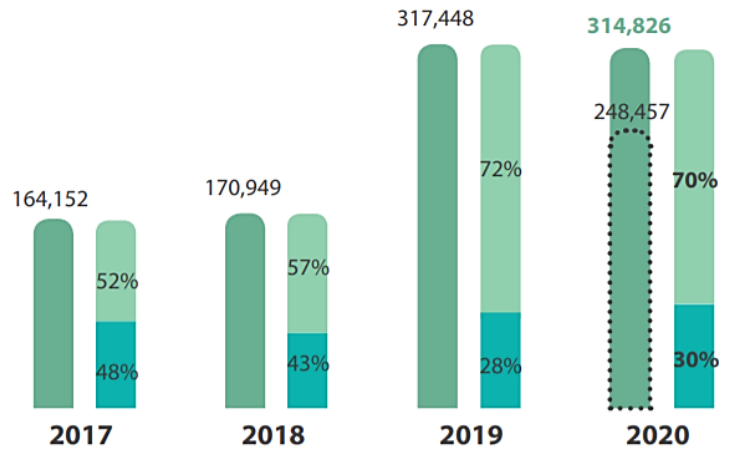
Total Hazardous Waste



- Total hazardous waste (tons) - 2020 Reporting Scope (107 sites)
- Total hazardous waste (tons) - 2019 Reporting Scope (94 sites)
- Intensity (tons / ton of production) - 2020 Reporting Scope (107 sites)
- Intensity (tons / ton of production) - 2019 Reporting Scope (94 sites)

Total Waste

Generated, Disposed, Reused, Recycled and Recovered



- Total generated waste (tons) - 2020 Reporting Scope (107 sites)
- Total generated waste (tons) - 2019 Reporting Scope (94 sites)
- Total reused, recycled and recovered waste in 2020 (% of total generated waste)
- Total disposed waste in 2020 (% of total generated waste)

Note: Intensities are calculated based on overall production including inter-company sales.

DISCLAIMER

Forward-Looking Statements

This Climate-Related Risk Management Report contains 'forward-looking statements' - i.e. statements relating to our projected future performance. These statements can be identified through the use of language such as 'aim', 'believe', 'estimate', 'expect', 'goal', 'intend', 'may', 'plan', 'target', 'will' and other similar terms. Forward-looking statements offer investors and other stakeholders important insight into our vision and how we believe our strategy sets us up for long term success. In their nature they also include making some assumptions in the future business environment or wider which may affect our ability to deliver on our targets.

For example, shifts in legal and regulatory frameworks, national fiscal complexities which can affect our ability to compete effectively, unforeseen economic and social challenges in the countries in which we operate, etc. There is therefore a degree of uncertainty inherent within forward-looking statements which readers are asked to accept when assessing the information provided therein. Investors are cautioned not to place undue reliance on any such forward-looking statements, which speak only as of the date they are made. IVL undertakes no obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise.



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