



IVL Water Risk Assessment Summary Report 2021

Introduction

Water is a very essential and important natural resource for all life functions on Earth. It sustains the functioning of human health, ecosystems, food security, energy supply, and human habitats. IVL is committed to the responsible use and sustainable water management practices in the entirety of our production processes, while complying with all relevant regulations.

We have geared our global operations towards achieving our water intensity reduction targets of 10% by 2025, and 20% by 2030 compared to the 2020 baseline. We report transparently on our water use and management and aim to continuously improve our overall water performance. Water mismanagement / unregulated water consumption is a risk that we must manage across our operations through effective water management practices, acknowledging that each site works within its own unique operating context.

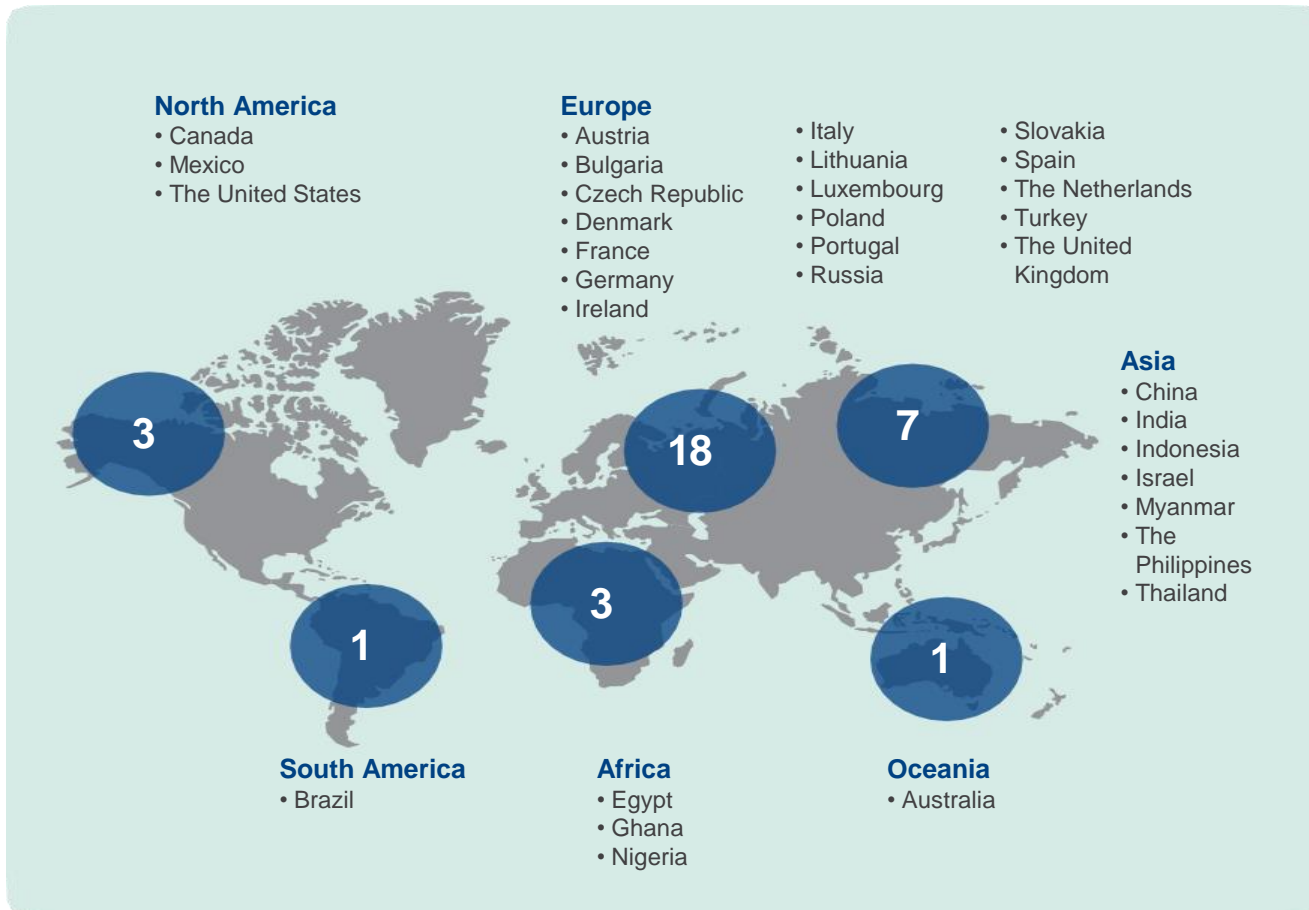
Our water sensitivity analysis was conducted using the AQUEDUCT 3.0 Water Risk tool developed by WRI which combines 12 indicators to create a clear picture of relative water risks, total water availability and total withdrawal. Through this tool, we conduct local water risk assessments and regularly assess both the limitations and opportunities related to water.

As a responsible corporate citizen, we engage with the local communities where we operate, participate in multi-stakeholder initiatives, and are considering a more all-inclusive approach that better includes all our relevant stakeholders along the value chain, specifically local communities.

By valuing water and committing to water conservation and efficient usage of water and are progressively contributing towards the achievement of SDG 6: Clean Water and Sanitation.

IVL at a Glance

IVL is a world-class sustainable chemical company and a global integrated leader in PET and fibers serving major customers in diversified end-use markets. In following our core strategies, we develop innovative products that meet the needs of our customers, making great products for society.



IVL OPERATIONS

as of 31 December 2021



* The Sustainability Report 2021 consists of data from 112 sites. Further details are provided under 'About This Report' in the full Sustainability Report 2021.

BUSINESS SEGMENTS



COMBINED PET

#1 PET globally-recycling leader
The only integrated player in Europe and fully integrated in North America
Packaging leadership in emerging markets
Global leader in PIA



FIBERS

#1 Staple fiber producer in ASEAN
#2 in Bicomponent fiber
#2 in Automotive safety and tires



INTEGRATED OXIDES AND DERIVATIVES (IOD)

#1 Non-ionic surfactants producer in the Americas
#1 EO producer in the Americas
#1 provider of fabric and homecare in the Americas
#2 Ethoxylation company globally

Importance of Water Risks Globally and to IVL

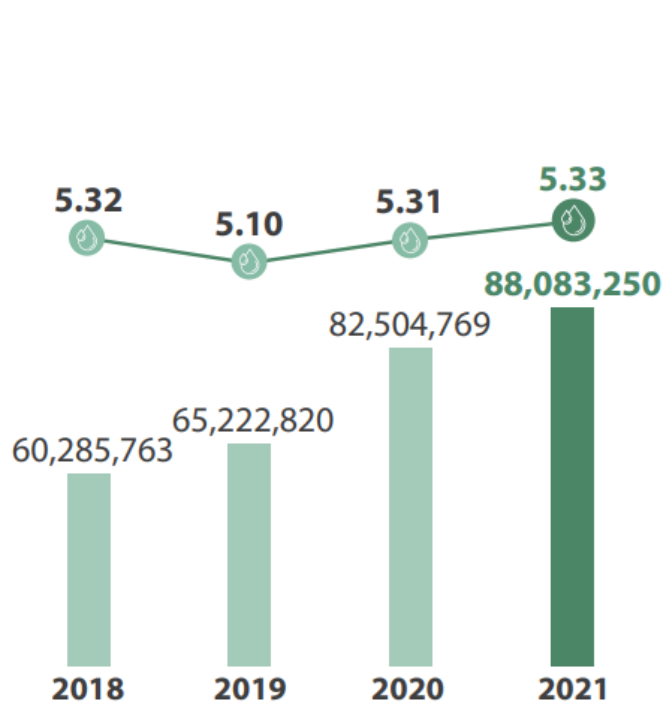


Anthropogenic interference (exploitation of groundwater reservoirs, water pollution from disposal of untreated waste in water bodies, etc.) and anthropogenically-driven climate change (droughts, floods, etc.) are exacerbating the water crisis around the world. About one-third of the global population are currently exposed to water risks as they live in water-stressed regions experiencing water scarcity. Governments, businesses and communities must adopt a more responsible approach to water consumption and sustainable water management practices to solve the global water crisis.

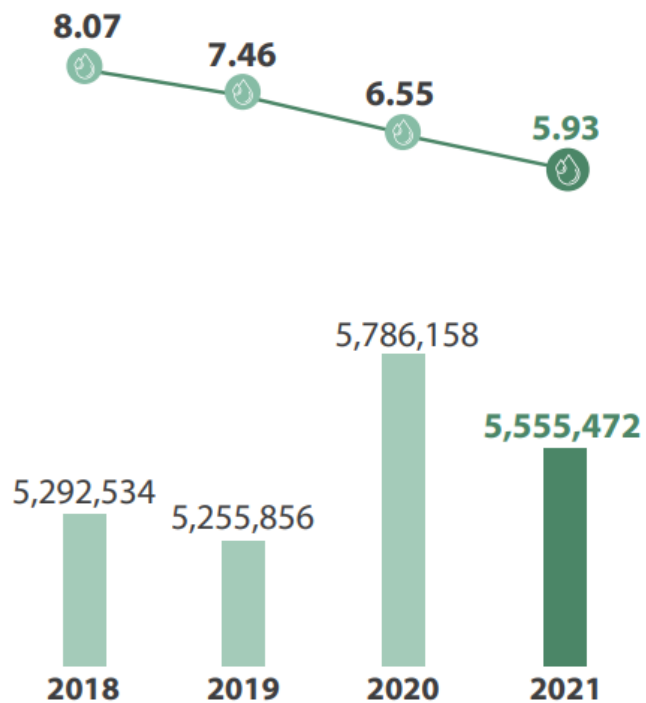
Businesses wanting to remain operational and profitable in the face of a changing climate must play a proactive and integral role in solving the climate crisis. IVL, having identified the risks that climate change poses on its business operations, has taken action. As our operations are water-reliant, water risk can detrimentally affect our business; therefore, our Climate Change Strategy 2025 incorporates water risk analysis as one of several climate change resilience strategies. We practice responsible water consumption, sustainable water management, and the 3Rs in our operations, in addition to ensuring compliance with all applicable legislation. The water risk analysis, therefore, helps us identify both water risks and opportunities to be managed across our operations.

2021 IVL's Water Performance

Total Water Withdrawal



Total Recycled / Reused Water




■ Total water withdrawal (m³)
 ● Intensity (m³ / ton of production)

■ Total volume of recycled / reused water (m³)
 ● Recycled / Reused water (%)

Note: 5.33 m³ / ton of production for 2020 and 2021 reporting scopes

2021 Highlights

 **US\$ 1.8 million CAPEX** investment in **Water Consumption Reduction Projects**

 **5** sites have zero wastewater discharge

2025 Target

10% reduction in water intensity*

2030 Target

20% reduction in water intensity*



* Base year 2020



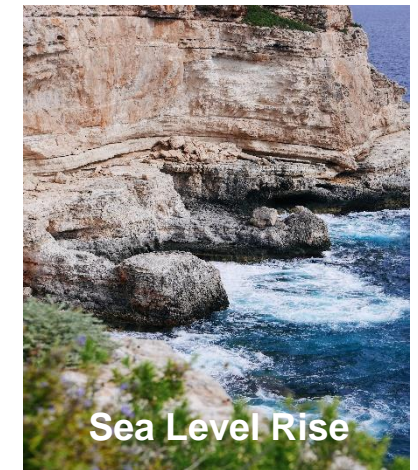
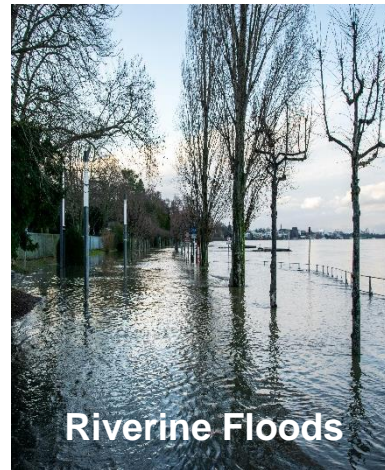
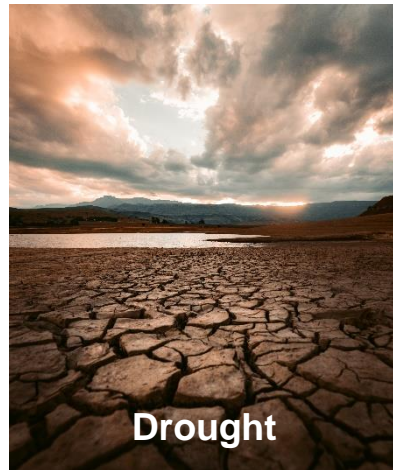
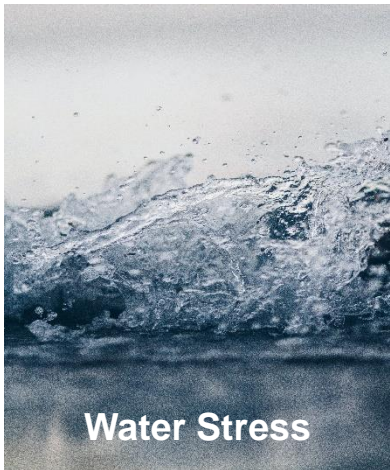
Progress against 2025 targets

0.48% increase in water intensity

Objectives of this Report

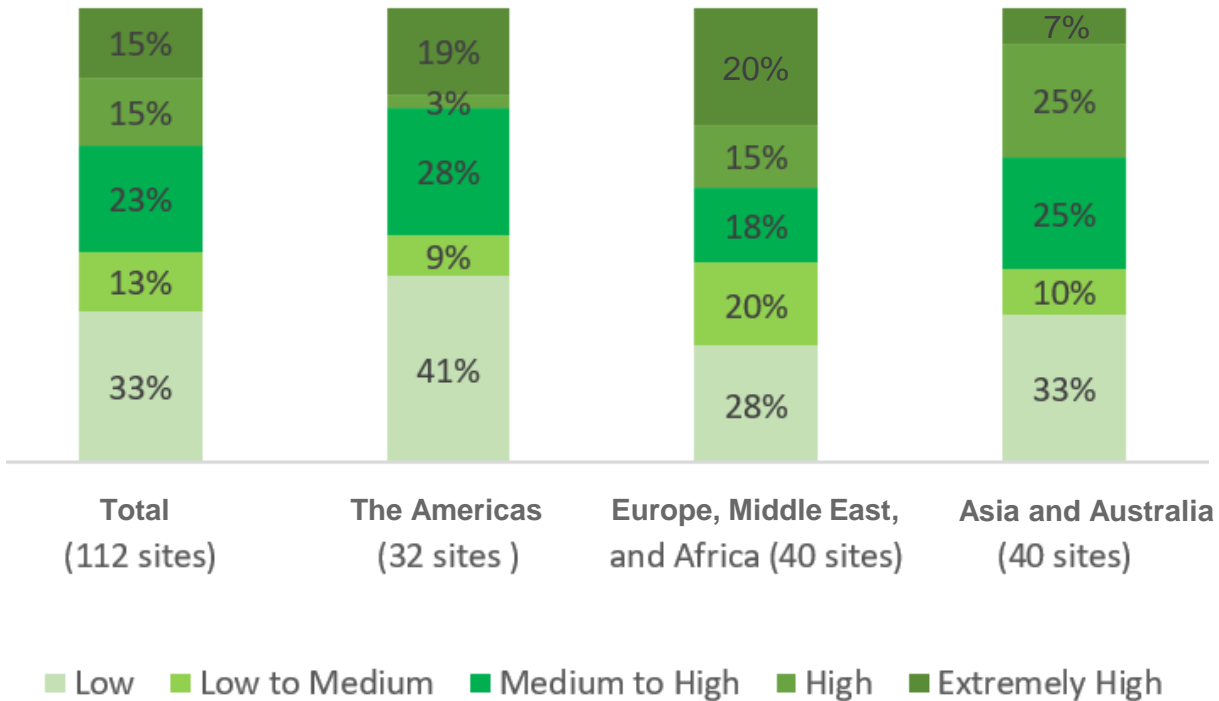
We analyzed the latest water status across IVL's global network using the WRI AQUEDUCT water tool to address the following:

- Status in current water stress (2021) and Change in future water stress (2030)
- Status in current drought (2021)
- Status in current riverine floods (2021)
- Status in current coastal floods (2021)
- Status in current sea level rise (2021)



Summary Water Risk Analysis

2021 Water Stress Assessment



Numbers of Sites	Water Stress		Drought	Coastal Floods	Riverine Floods
	2021	2030	2021	2021	2021
Extremely High	17	22	0	6	16
High	17	11	2	10	18
Medium to High	26	39	53	13	12
Medium	-	-	44	-	-
Low to Medium	15	21	10	16	23
Low	37	19	3	67	43
Total Sites	112	112	112	112	112

Summary

No. of sites	Water Stress		Regions (2021)
	2021	2030	
Extremely High	17	22	Europe (10), the Americas (6), Asia (3), Africa (1)
High	17	11	Asia (10), EU (5), the US (1), Africa (1)
Medium to High	26	39	
Medium	0	0	
Low to Medium	15	21	
Low	37	19	
Total	112	112	

Impacts to IVL

All impacted sites	Production Compared to IVL's total production	Water withdrawal compared with IVL's total water
Extremely High	2.9 M tons (16.5%)	12.7 M m³ (14%)
High	3.4 M tons (21%)	26.8 M m³ (30%)

*NOTE: IVL total production = 16.51 million tons (including intercompany sales)
IVL total water withdrawal = 88 million m³*

Total cost of water = US\$ 10.5 million in 2021 (actual)

Production loss = 6.3 million tons (38%)

Estimated 2021 cost from plant shutdowns due to water shortages = at least US\$ 35,535

WATER STRESS

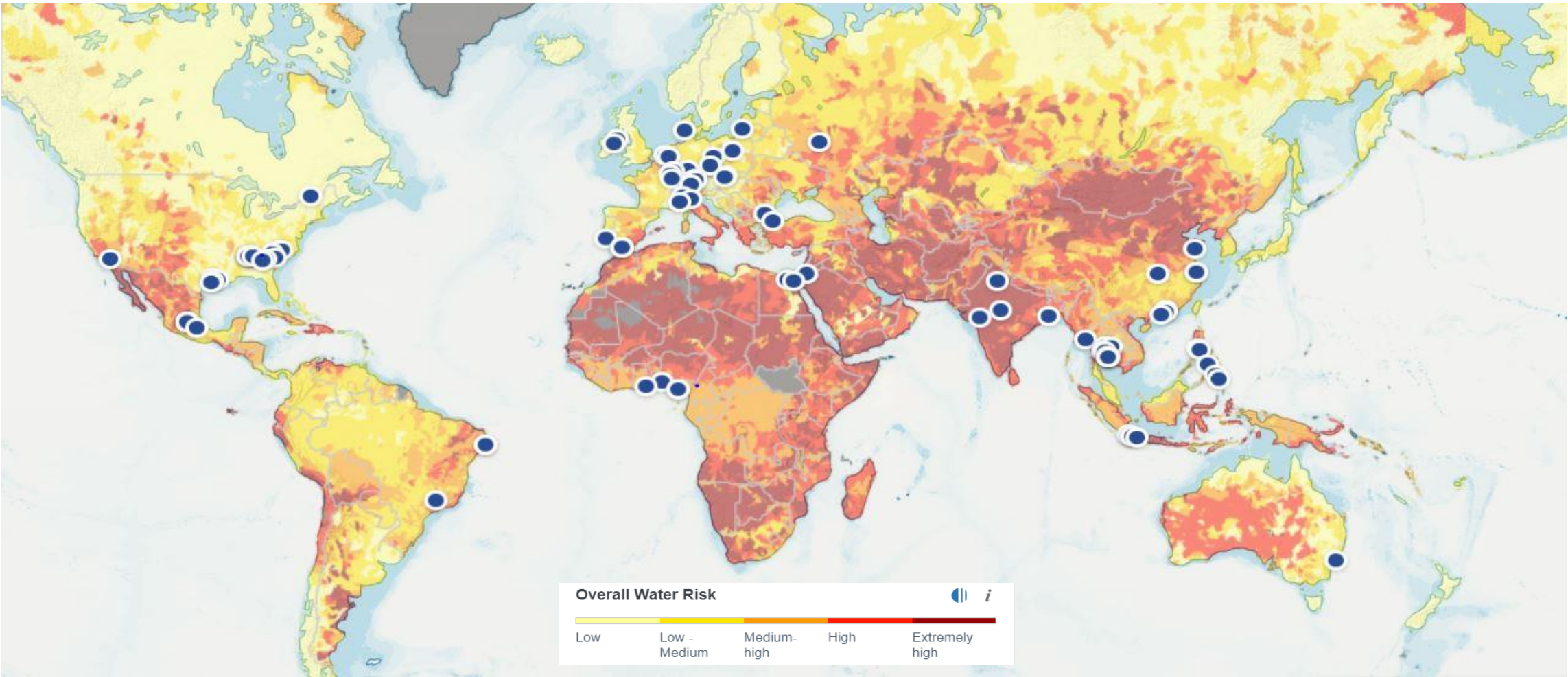
- Status in current water stress (2021)
- Change in future water stress (2030)

IVL CURRENT CONDITIONS – 2021

Number of Manufacturing Sites
112

2021 Water Consumption
88.0 million m³

2021 Water Cost
US\$ 28.0 million



Impacts to IVL in 2021 – from extremely high and high stress areas

2021 Water Cost
US\$ 10.5 million (38%)
 (out of total water costs = US\$ 28.0 M)

Production Loss
6.3 M tons, 38%
 (out of IVL's total production = 16.5 M tons)

Cost of Goods Sold
US\$ 4,863 million (34%)

Estimated Loss of EBITDA: based on the current 2021 water stress assessment

Stress level	No. of sites	30-day shutdown	60-day shutdown	90-day shutdown
Extremely High	17	25.6	51.2	76.8
High	17	30.3	60.6	90.9
Subtotal (US\$ million)		55.9	111.8	167.7
TOTAL of all levels (US\$ million)		140.8	281.6	422.3

Impacts to IVL in 2030

PROJECTION – 2030 water cost

2021 Water Cost
US\$ 28.0 million

2030 Estimated Water Cost
US\$ 31.1 million

% Increase
↑ 11%

Stress Level	No. of Sites	%	Estimated Water Cost 2030 (US\$ million)
Extremely high (>80%)	19	17%	7.65
High (40-80%)	17	15%	4.55
Medium-high (20-40%)	36	32%	11.72
Low - Medium (10-20%)	19	17%	0.39
Low (<10%)	21	19%	6.79
Total	112	100%	31.10

Climate-related scenarios for physical risks :

RCP4.5 and RCP8.5 2030 2040

Description:

Optimistic	The "optimistic" scenario (SSP2 RCP4.5) represents a world with stable economic development and carbon emissions peaking and declining by 2040, with emissions constrained to stabilize at ~650 ppm CO ₂ and temperatures to 1.1–2.6°C by 2100
Business as usual	The "business as usual" scenario (SSP2 RCP8.5) represents a world with stable economic development and steadily rising global carbon emissions, with CO ₂ concentrations reaching ~1370 ppm by 2100 and global mean temperatures increasing by 2.6–4.8°C relative to 1986–2005 levels.
Pessimistic	The "pessimistic" scenario (SSP3 RCP8.5) represents a fragmented world with uneven economic development, higher population growth, lower GDP growth, and a lower rate of urbanization, all of which potentially affect water usage; and steadily rising global carbon emissions, with CO ₂ concentrations reaching ~1370 ppm by 2100 and global mean temperatures increasing by 2.6–4.8°C

Scenario	2030						2040					
	Optimistic		Business as usual		Pessimistic		Optimistic		Business as usual		Pessimistic	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
Low	22	20%	22	20%	23	21%	19	17%	19	17%	18	16%
Low-medium	19	17%	19	17%	21	19%	21	19%	21	19%	23	21%
Medium-High	36	32%	38	34%	36	32%	35	31%	39	35%	37	33%
High	15	13%	13	12%	12	11%	16	14%	11	10%	14	13%
Extremely High	19	17%	19	17%	19	17%	21	19%	22	20%	19	17%
Arid and low water use	1	1%	1	1%	1	1%	0	0%	0	0%	1	1%
TOTAL	112	100%	112	100%	112	100%	112	100%	112	100%	112	100%

Summary

No. of sites	2021	Regions (2021)
Extremely High	0	
High	2	Asia (2)
Medium to High	53	
Medium	44	
Low to Medium	10	
Low	0	
Total	109*	

*Three sites were not applicable.

Impacts to IVL

Top 2 highest impacted sites	Production Compared to IVL's total production	Water withdrawal compared with IVL's total water
Extremely High	-	-
High	0.21 M tons (1.27%)	0.19 M m³ (0.21%)

NOTE: IVL total production = 16.51 million tons (including intercompany sales)
IVL's total water withdrawal = 88 million m³

Total cost of water = US\$ 46.1 million in 2021 (actual)

Production loss = 0.21 million tons (1.27%)

Estimated 2021 cost from plant shutdowns due to water shortages = at least US\$ 235.4 million

DROUGHT



RIVERINE FLOODS

Summary

No. of sites	2021	Regions
Extremely High	16	Asia (11), Africa (4), the US (1)
High	18	Asia (12), the Americas (5), Africa (1)
Medium to High	12	
Medium	0	
Low to Medium	23	
Low	43	
Total	112	

Impacts to IVL

Top 5 highest impacted sites	Production Compared to IVL's total production
Extremely High	4.34 M tons (26%)
High	1.15 M tons (7%)

NOTE: IVL's total production = 16.51 million tons (including intercompany sales)

Production loss = 5.49 M tons (33%)

Estimated 2021 cost from plant shutdowns due to floods = at least US\$ 2,541 million



Summary

No. of sites	2021	Regions
Extremely High	14	Asia (9), Africa (4), the US (1)
High	18	Asia (12), the Americas (5), Africa (1)
Medium to High	13	
Medium	0	
Low to Medium	15	
Low	64	
Total	110	

*There were 2 sites which were not applicable.

Impacts to IVL

Top 5 highest impacted sites	Production Compared to IVL's total production
Extremely High	1.0 M tons (6.1%)
High	3.39 M tons (21.2%)

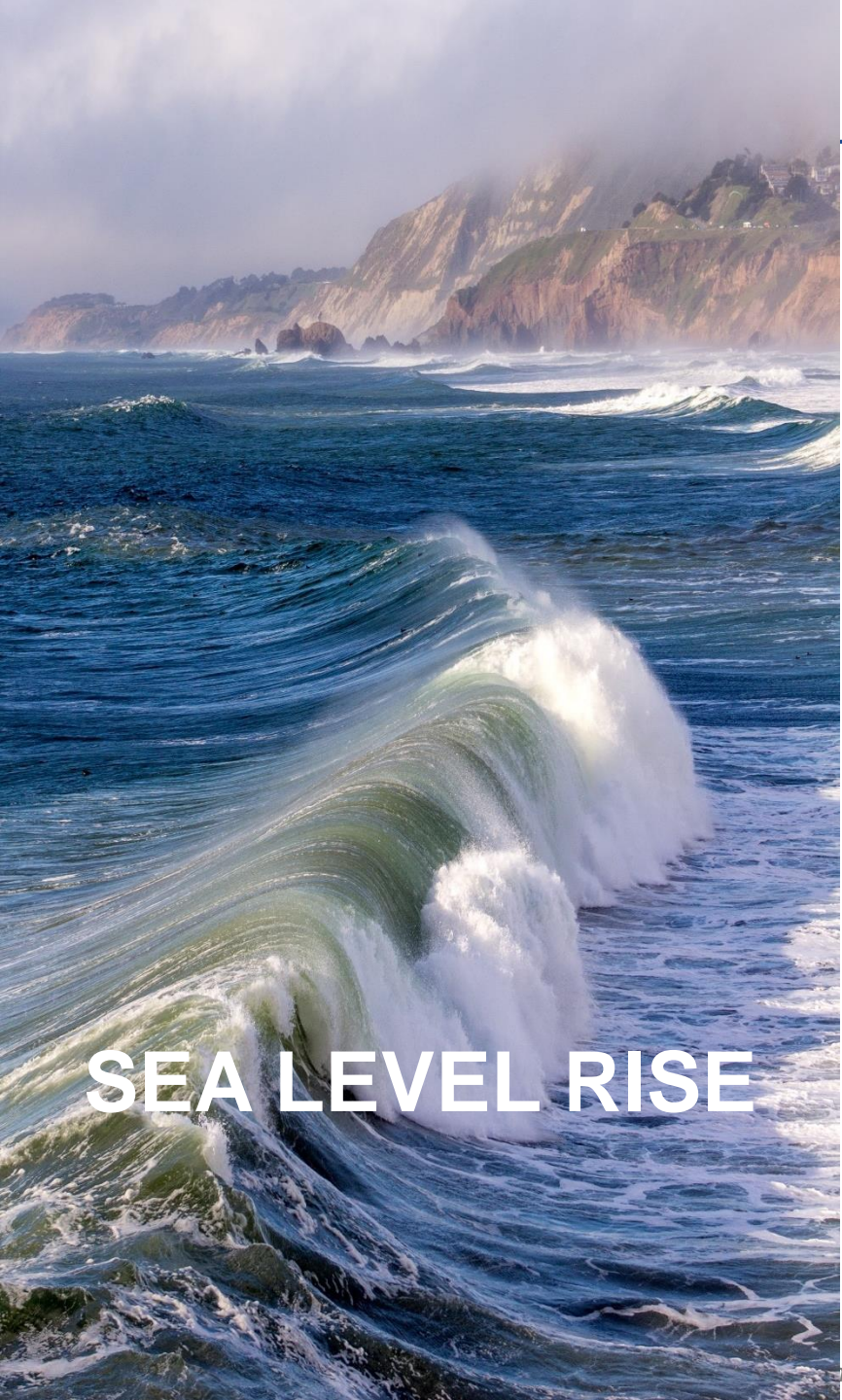
NOTE: IVL's total production = 16.51 million tons (including intercompany sales)

Production loss = 4.39 M tons (27.3%)

Estimated 2021 cost from plant shutdown due to floods = at least US\$ 1,815 million



COASTAL FLOODS



Summary

Impacts to IVL

All 5 sites impacted sites	Production Compared to IVL's total production
	1.83 M tons (11%)

NOTE: IVL's total production = 16.51 million tons (including intercompany sales)

Production loss = 1.83 million tons, 11%

Estimated 2021 cost from plant shutdowns due to sea level rise = at least US\$ 965 million

SEA LEVEL RISE

Mitigation Measures – Corporate levels

Water-related business risks are generally physical, regulatory or reputational in nature:



- **Physical:**
A business facing physical water-related business risks is ineffective in managing its operations due to a lack of water supplies or services. This can be the result of prolonged water scarcity due to droughts, damage to infrastructure and/or water supply disruptions due to floods, or polluted water that is unfit for operational use.
- **Regulatory:**
Corporate water consumption and management is challenged by regulatory risks that arise from changes in laws, regulations, or management practices. The regulatory changes are bound by issues like water scarcity, sectoral conflict, or a negative public image of the company regarding its business operations.
- **Reputational:**
A business suffers reputational risks from its unethical and harmful activities, such as the water-related impacts on water sources, ecosystems and communities. Such risks diminish the loyalty of stakeholders, reduce the company's brand value, and can result in regulatory concerns over the company's legal and social license to operate.

Mitigation Measures – Corporate levels

The following mitigation actions are ongoing with regards to the water crisis:

- The risk management committees of plants and business segments regularly monitor potential regulatory changes and evaluate water risks and opportunities by conducting scenario analyses with those changes.
- We communicate on an ongoing basis and work with local authorities to check ground water levels and levels in reservoirs to ensure satisfactory water supplies and avoid potential conflicts with nearby stakeholders. Water is one of the elements in the business continuity plans of our entities.
- We conduct a water sensitivity analysis using the AQUEDUCT Water Risk tool developed by the World Resources Institute to identify water stress locations. This tool helps us evaluate changes in water demand, water supply, risks from stakeholders and changes in regulations based on current and future conditions. We assessed our water risk for 2021 with forecasts for 2030. These results are analyzed and discussed during meetings held by the Risk Assessment Committee to identify necessary mitigation measures or initiatives on a quarterly basis, with a focus on plants in areas facing high risks of water stress or locations with significant risks to water usage.
- We evaluate options and the potential to reduce water consumption, increase the recycling and reuse of wastewater, and collecting rainwater to achieve our goal of zero effluent discharge at as many sites as possible, and establish targets at the entity and group level.
- We are committed to sustainable water management (including water withdrawal and discharge) by complying with all applicable environmental laws, international standards, and regulations in the countries where we have operations, and will be proactive in demonstrating our leadership and responsibility in line with our values.

Case Studies

A sustainable solution to large volumes of wastewater and excessive disposal

Avgol (Russia), a subsidiary of the Company, installed a wastewater evaporator to reduce the volume of wastewater discharge. This results in a reduction in the amount of wastewater treated after discharge, lowering treatment costs and contributing to more efficient and effective water management.



The use of a vacuum system in the installation allows the boiling process to be achieved for liquids at a temperature significantly lower than in normal atmospheric pressure conditions (boiling begins when the liquid reaches 30°C). This can reduce the energy needed for a high boiling point condition and decrease the amount of water consumption as evaporated water can return to the process.

100% wastewater recovery resulting in lower raw and potable water consumption

With 100% of wastewater being recovered at IVPSA's plant in Ipojuca, Brazil, three projects were implemented to reduce both raw and potable water consumption onsite. Two raw water projects aimed at recovering part of the water-cooling tower purge while taking advantage of rainwater during the winter season.

The first project treats the Cooling Tower purge in a coagulation/sedimentation system, followed by a reverse osmosis machine which removes antimony and phosphorus salts. This allows the water to be reused in the tower reducing raw water consumption by 26,000 m³/year.

The second project, which transfers and reuses rainwater from the PET resin warehouse to a contention basin, is already underway and achieving a reduction of 28,500 m³/year and an annual savings of US\$ 100,000.

Case Studies

A co-generator reduces water consumption with added environmental advantages

Glanzstoff Sicrem installed a co-generator, after verifying its feasibility, to gain a range of environmental advantages:

- a reduction of over 400,000 m³ in freshwater consumption (by about 45%) by modifying the existing “open circuit” of cooling in a “closed circuit” feeding unit.
- recovery of thermal energy supplied by the co-gen to:
 - o heat the plant buildings during the winter season.
 - o partially heat the diathermal oil used to feed the SEDU producing cold water that reduces the cabling area’s room temperature thereby improving working conditions.



Harvesting rainwater

IVL Dhunseri Petrochem Industries Private Limited, an IVL subsidiary located in Panipat, India, established a rainwater harvesting system at its plant in 2017 to supply surface water to subsurface aquifers (before it is lost as surface runoff).

The amount of rainwater estimated to percolate into the ground is over 41,500 m³/year, which amounts to over 30% of 2017 annual freshwater withdrawn by the plant. This water will be free of pollutants as well as salts, minerals and other man-made contaminants, and will help in reducing soil erosion and the contamination of surface water with pesticides and fertilizers by replenishing groundwater. This system will be extended to additional sites in the future.



Case Studies

Flood Preparedness, Protection and Safety Drills

Assessment of flood areas (likely – extent or reach – potential depth of flooding)

Evaluation of frequency (occurrence – historic frequency – probable timeline)

Location of infrastructure (critical at risk – natural resources under jeopardy – key assets compromised)

Identification response team (names and contacts – local response – provincial response)

Preparation of flood defenses (amount of sandbag storage – location of vital equipment – warning system)



Water Issues and SDGs



Water Issues and SDG #6

6 CLEAN WATER AND SANITATION



The increasing global population will place tremendous pressure on freshwater sources, which are expected to decline by 40% by 2030, leading to a global water crisis.

As freshwater is a finite resource, many regions are already experiencing water scarcity.

Leading global water concerns are related to:

- Healthcare facilities lacking basic water services.
- People lacking access to safe drinking water and sanitation facilities.
- The prevalence of open defecation.
- A majority of women and girls in charge of collecting water in households that do not have access to water on the premises.
- The lack of basic sanitation facilities.
- The lack of wastewater treatment before being discharged into rivers or seas.
- The death of children due to preventable water and sanitation-related diseases.
- The loss of lives due to floods and other water-related disasters.

The UN Sustainable Development Goals address global sustainability challenges.

SDG 6 addresses water-related issues including access to clean drinking water and sanitation.



Our Contributions

The water crisis (water stress, droughts, floods, and a rise in sea levels) is a growing concern around the world.

IVL is committed to sustainable water management and ensuring the most efficient water consumption by analyzing global water risk at all our operating sites in addition to implementing the 3Rs (reduce, reuse, recycle).

We also collaborate with the authorities on issuing collective actions on water issues to improve the efficiency of water supply management and avoid potential conflicts with stakeholders.

Additionally, we provide safe drinking water and systems to communities and schools in rural areas.

2021 PERFORMANCE

6.3.1 Water Consumption and Conservation

- Reduce - Reuse – Recycle
- Zero Wastewater Discharged = five sites

6.3.2 Water Quality

- 100% wastewater treatment
- Wastewater returned to sources at the acceptable quality and level of local laws and regulations

6.4.1 Water Use Efficiency

- Water intensity = 5.33 m³/ton of production
- Water reused & recycled = 5.93%

6.4.2 Water Stress

- Water stress assessment is conducted every year
 - 15% of sites are in extremely high-water stress area
 - 15% of sites are in high water stress area

6.5.1 Integrated Water Management

- Investment in water projects = US\$ 1.8 million

6.5.2 Transboundary Cooperation

- Ocean Clean Sweep project
- Deja Carbon Neutral is proud to partner with South Pole on the Safe Water project in Rwanda which provides safe drinking water to communities by restoring and repairing their boreholes.

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