

Circular transition:
"We need to be better
at using what has
already been built"

Housing companies
prepare for climate change

The forest equation
– how will everything
fit together?

New invention enables
smart water monitoring

SWIC develops the water
treatment of the future

Inadequate treatment in the
shipping sector endangers the
marine environment

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Anna Söderholm,
acting CEO 2023 and Head of Business Development

“The business sector's pace of transition to fossil-free business is locked in”

The timetable for reducing greenhouse gas emissions is becoming increasingly strained. The most recent climate summit, COP28, ended with a historic climate agreement where countries across the globe committed to move away from fossil fuels. This is a very positive step, but in order to succeed, measures are needed here and now. In light of this, it is particularly promising that the roadmaps that have been developed for various sectors in Sweden continue to be supported by large parts of the business sector. IVL Swedish Environmental Research Institute has a very important role to play in this effort.

IVL has a unique opportunity to contribute to the transition through our interdisciplinary research and consultancy assignments, where we have a unique opportunity to see the big picture for different environmental problems, as well as their solutions. IVL is assembling more and more expertise in critical areas such as the social sciences, technology and natural sciences, but also in business development and project management.

In terms of operations, we have intensified our pilot activities during the year at *the Sjöstadverket Water Innovation Center*, which has now moved to Loudden. Much of the work we do at the plant is about ensuring that water resources can be managed sustainably in the future. At IVL, our work encompasses more than just climate change. We are able to balance several different conflicting goals and create a vision to solve several different problems at the same time. In order to properly manage our wastewater, we need to be able to recycle nutrients while extracting energy in the form of biogas, and particularly hazardous substances can be removed from the cycle.

We have also strengthened our work in the area of the sustainable workplace and chemical health risks. The green transition will bring new products and manufacturing processes, which will also bring new work environment issues that will require both new research and new applications. We also see that requirements that are now being established at EU level in areas such as taxonomy are placing increasing demands on the business sector. Our new sustainability management and strategy group will be able to make a significant contribution in this respect.

We continue to support Swedish authorities with environmental data and data for Sweden's international reporting in the areas of air, water, waste and hazardous substances through renewed confidence within the SMED consortium. We have also strengthened our laboratory operations, where we are now able to perform biodiversity analysis through eDNA. We can also report that the innovation project *Centre for Circular Building* became a permanent part of operations

at IVL through the newly formed subsidiary IVL Sustainable Building. Circular processes and reduced climate impact will go hand in hand in shaping the built environment of the future! Finally, we can report that our international operations have also been strengthened, where our subsidiary EPD International and IVL's China operations participated in the launch of the “Life Cycle Thinking Initiative” in Beijing. We can clearly see that methods to reliably communicate a product's environmental performance throughout the value chain will be crucial when purchasing products in the future.

*Anna Söderholm,
acting CEO 2023 and
Head of Business
Development*



Change of CEO in 2023

Marie Fossum Strannegård stepped down as CEO during the year. Anna Söderholm has served as acting CEO during the autumn and the Board has appointed John Rune Nielsen as the new CEO of IVL Swedish Environmental Research Institute as of 1 January 2024.

About us

IVL Swedish Environmental Research Institute works with applied research and consultancy projects with the objective of promoting ecologically, economically and socially sustainable growth in business and society at large. Our vision is to create a sustainable society. We aim to be leaders in this transition by turning research into practical solutions, environmental problems into opportunities, and linear processes into a circular economy.

Ownership

The Swedish Institute of Water and Air Conservation Research Foundation (SIVL) is the sole owner of IVL Swedish Environmental Research Institute AB and finances research and innovation with a special focus on applied issues in an interdisciplinary and systems-oriented approach.

SIVL works closely with the business sector and government agencies to collaborate on important issues related to the environment and sustainable development.

Company

IVL has five subsidiaries that offer digital solutions in sustainable construction, eco-labels and climate calculations.

Within the subsidiaries, there are six brands: Basta, BM – The Construction Sector’s Environmental Calculation Tool, CCBUILD – Centre for Circular Building, eBVDeBVD i Norden, EPD International and Möbelfakta.

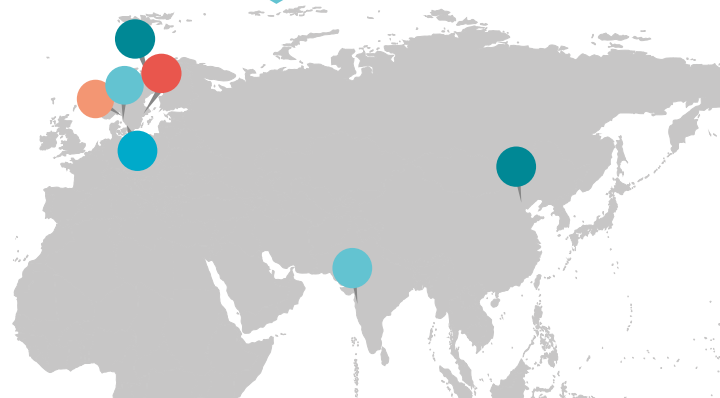
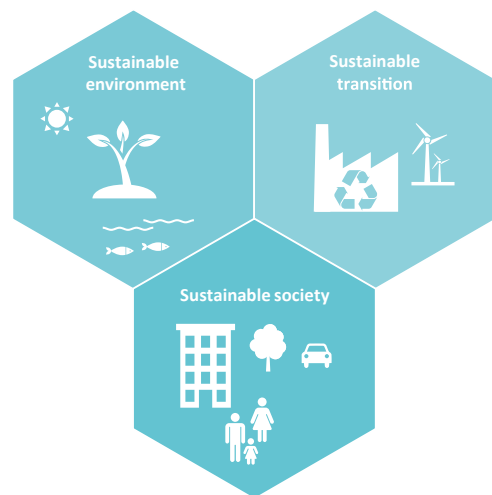
The Group also consists of a wholly-owned subsidiary in Beijing China, IVL Environmental Technologies (Beijing) Company Ltd, the joint-venture company SEC (Sino-Swedish Environmental Technology Development Centre Ltd) based in Tianjin, and IVL India Environmental R&D Private Limited in Mumbai.

Office

Just over 400 people work in our offices in Stockholm, Gothenburg, Malmö, Fiskebäckskil, Skellefteå, Beijing, Tianjin and Mumbai.

Thematic areas

Within our thematic areas, *Sustainable environment*, *Sustainable transition* and *Sustainable society*, we take on various challenges by applying different perspectives and approaches. We take an interdisciplinary approach to promote collaboration and develop research at IVL.



Employees



437

people were employed by the Group

Sales



mSEK **517**

the Group's sales

Results



mSEK **35**

profit after tax for the year for the Group was

Reports



84

reports were published

Articles



90

scientific articles were published

Project



950

Ongoing projects



Socially, economically and environmentally sustainable development is the guiding principle in all we do

Our operations are based on Agenda 2030 and the UN's Sustainable Development Goals (SDGs), which aim to reach all countries of the world by providing guidance on what needs to be done to achieve socially, economically and environmentally sustainable development. The SDGs permeate our research and business activities and serve as a guiding principle in all our work.

IVL works locally, nationally and internationally to contribute to sustainable development. We generate new knowledge and develop practical solutions for the benefit of the environment. Our starting point is that applied research and knowledge dissemination are two of the keys to solving the environmental and sustainability problems we face in the modern world.

In September 2015, the UN member states adopted the 2030 Agenda, a universal plan for sustainable development that includes three dimensions: social, economic and environmental sustainability. The agenda includes 17 Sustainable Development Goals (SDGs), which in turn are divided into 169 sub-goals. The agenda aims to achieve sustainable development by, for example, finding solutions with a lower climate impact and reduced impact on ecosystems, which at the same time reduce inequality and injustice in the world.

In order for the world to succeed in achieving the 17 SDGs, research, knowledge, innovation and utilisation are required through collaboration with the business sector and decision-makers. We will need to find new solutions locally, nationally and globally, or use existing solutions in new ways. This requires collaboration between different actors, both nationally and internationally. Sweden is at the forefront of sustainability and can play a leading role globally when it comes to research and innovation that contribute to the achievement of the SDGs.

IVL works with all dimensions of sustainability and has projects and tools that contribute to greater social, economic and environmental sustainability. Together with our clients and partners, we build knowledge and develop solutions in areas such as water treatment, energy, sustainable community building, circular flows and waste, and sustainable consumption and production. We are also out in the field actively investigating

biodiversity and ecosystems, researching how chemicals affect the environment and generating knowledge and documentation for decision-making in strategic policy instruments for sustainability. We strive to adopt a holistic approach and a life cycle perspective in our work, where all aspects of sustainability are often integrated into the same project. ■

IVL's activities contribute to several of the SDGs. The SDGs guide us in the establishment of our operational goals and our annual follow-up. In the 2023 Annual Report, you can read more about our work in some of these areas:



Stefan Pettersson, Head of Research and
Mona Olsson Öberg, Head of Section, Sustainable Business and Consumption:

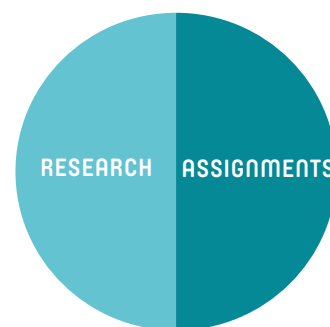
“Research and business go hand in hand”

IVL Swedish Environmental Research Institute's activities in environment and sustainability are more valuable than ever. In a modern world that has seen its share of uncertainty, conflict and recession, there is a risk that environmental and sustainability issues will be deprioritised, but doing so will only postpone the need to take meaningful action to address these issues, placing an even higher burden on future generations.

The aspects of research and innovation that IVL works with are crucial for Sweden's prosperity, competitiveness and ability to address societal challenges. It has also become increasingly clear that in many areas, it is the business world that is driving the transition towards a fossil-free and sustainable society. This is a positive development and it generates both a need for new knowledge and the resources to facilitate implementation. As a research institute, we serve as a natural bridge between academia, business and government and make a strong contribution to Sweden's innovation capacity.

IVL conducts work in all matters related to the environment and sustainability. We start by looking at societal challenges that are often too complex to be handled by a single actor or within a single sector, which therefore require more developed forms of applied research and collaboration. We aim to generate new knowledge and develop practical solutions that can be applied to address important environmental issues. This work often requires expertise from several research disciplines and interdisciplinary approaches. Our approach is characterised by a holistic perspective that encompasses systemic issues, with a high degree of overlap and collaboration with other organisations. We are a natural bridge between academia, corporations and the public sector, and this gives us the power to accelerate the green transition.

In the long term, research creates benefits for all of society, and the utilisation of knowledge also gives rise to new research ideas. It is therefore natural that our activities are divided equally - half research, and half external assignments and services - where both halves are part of an interconnected cycle. The business aspect is important, partly because it allows us to apply the results of our work and partly because it generates a surplus that allows us to prepare and conduct internal research and invest in new areas that can benefit society in the long term.



Our activities are equally balanced - half research and half external assignments and services.

There are several good examples of research work that has resulted in business opportunities. One example is IVL's subsidiary, the Centre for Circular Building (CCBuild), which is the building and real estate sector's common arena for circular building.

It went from an innovation project to a market solution for continued implementation. Another example is the Turbinator, which is now a patented solution that will facilitate the monitoring of wastewater networks. The Turbinator is the culmination of several projects that have investigated the ability to use sensors and other digital tools to send early warnings about, for example, contaminants or leakage in the wastewater network.

During the year, research at IVL has contributed to approximately one hundred scientific articles and we have participated in a wide range of debates and discussion forums. Sweden is the main focus of our operations, but research activities in Europe



Mona Olsson Öberg, Head of Section, Sustainable Business and Consumption and Stefan Pettersson, Head of Research.

and across the world are becoming increasingly important and currently account for almost a quarter of our operations. Through applied research and utilisation, Sweden as a whole and IVL have the ability to export know-how and package it into business activities, which creates the conditions for Sweden to continue to be a pioneer in climate, environmental and sustainability work.

The research conducted by IVL is dependent on the ability to continue to strengthen the organisation's capacity to utilise and generate business opportunities from the results of our

research. Furthermore, we intend to increase our utilisation and collaboration with the business sector even further through more strategic investments with the funds raised through co-funding, so that we can further increase Sweden's competence, ability to act and competitiveness in issues related to the environment and sustainability.

It is with great confidence that we look to the future, a future where IVL is well-equipped and balanced in its research and business activities in environmental and sustainability issues. ■



Our Global Partnerships

At IVL, we have worked with SDG 17 for many years, which is about global partnerships and cooperation. In 2023, our commitment in this area has increased even further. The knowledge and experience we have built over the years – not least in waste, water treatment and energy – is relevant to stakeholders all over the world.

At IVL's office in China, we conduct research in close collaboration with reputable research institutes and organisations. We work extensively with consultancy projects in life cycle assessment and environmental product declarations, as well as low-carbon development planning and carbon-neutral strategies. In addition, we have a strong focus on platforms, technology transfer and training.

During the year, IVL and PCCC – Beijing PCCC Power Certification Center, released the product category rule (PCR) for electromechanical equipment for solar cells. This will accelerate international cooperation in the area of green energy and drive the large-scale development of renewable energy sources.

In November, IVL and CAS – Chinese Academy of Sciences and ACEF – All-China Environment Federation, initiated an International Action Initiative on Life Cycle Thinking in China, a collaboration for sustainable, efficient and climate-smart development.

FURTHER MILESTONES REACHED IN INDIA

In India, we have celebrated the completion of a water purification project in the Mithi River, which flows through the megapolis of Mumbai. Several other projects in Mumbai are now gain-

ing momentum, and we expect to reach several important milestones in the coming year.

At the beginning of the year, together with the Swedish Embassy in India, the Swedish Consulate in Mumbai, Business Sweden and Smart City Sweden, we organised a roadshow across three cities in western India. The delegation consisted of about twenty representatives from Swedish companies, authorities and academia. The purpose of the roadshow was to exchange knowledge, showcase solutions used in Sweden and discuss potential business collaborations, joint innovations and research projects.

CIRCULAR WASTE MANAGEMENT IN WINDHOEK, NAMIBIA

Namibia's capital Windhoek has made a commitment to move towards more sustainable waste management practices. The city's landfills will soon be full, and opening new landfills is not an option. Through Smart City Sweden, IVL has supported Windhoek's municipal operations by performing an initial analysis of potential measures to create more circular solutions, and during the year, a Namibian delegation has also visited Sweden to gain a better understanding of the Swedish systems perspective on waste management.



Smart City Roadshow – a Swedish delegation visited three cities in India. Here are some members of the delegation on a test drive on India's first hydrogen-powered bus.



IVL provides consulting services in project management to reduce pollution in the Mithi River and restore it to its original state.



Gina Aspelin Hedbring, head of the international group at IVL, speaks to a Swedish and Indian delegation during the Smart City Roadshow.



Rebecca Larson and Aditi Bhasin from IVL visiting Kupferberg's landfill in Namibia in March 2023.

ACCELERATING INVESTMENTS IN ENERGY SYSTEMS

To facilitate decision-making in companies, cities, regions and countries, IVL has helped develop an international collaboration platform for the development of energy systems for district heating. The platform is called TEN21, *Thermal Energy Networks for 21 degrees of indoor comfort*, and it has had an established business model and format since early 2023.

BUILDING CAPACITY TO STRENGTHEN COMMUNITIES

IVL has been involved in capacity-building programmes for a number of years. In 2023, a programme for young Moroccan women was carried out. The aim was to provide inspiration and increase expertise in the area of sustainable societies. In both Côte d'Ivoire and Ukraine, IVL has introduced targeted programmes to build skills, change working methods and introduce more renewable energy into the systems.

“There is a lot we can do to support other countries, but we also have to be humble and understand how we can learn from other countries,” says Gina Aspelin Hedbring, head of the international group at IVL. ■



Rupali Deshmukh, CEO of IVL in India.

Thematic area

Sustainable environment

Within the theme area **Sustainable environment**, we work with:

- Good knowledge of the state of the environment
- Good air quality
- Good noise status
- Good biodiversity
- Non-toxic environment
- Sustainable agricultural industries and ecosystem services
- Access to clean seas and water
- Sustainable blue economy
- Sustainable land use





How we protect children from noise and poor air quality

Air pollution and noise have a negative impact on health, and children are particularly vulnerable. But it is possible to make a difference. To support the effort to protect our youngest citizens, IVL Swedish Environmental Research Institute, the University of Gothenburg and the City of Gothenburg have jointly introduced guidance for better air and less traffic noise in preschool playgrounds.

“Children cannot choose their environments the same way as adults. When we spend time outdoors, we prefer to avoid areas with a lot of traffic. It’s not always that easy for children who are outdoors for several hours every day at preschool,” says Ågot Watne, researcher at IVL Swedish Environmental Research Institute.

For two years, she worked with colleagues at IVL, the Occupational and Environmental Medicine research group at the University of Gothenburg and the City of Gothenburg to measure, model and analyse the air quality and noise levels at preschools in Gothenburg. The survey concluded that the largest source of air

pollution and noise is road traffic. Noise decreases with distance to the source. It is therefore mainly traffic in the immediate vicinity that affects noise levels in preschool playgrounds. In order to get a handle on air pollution, overall emissions must be reduced, not just immediately adjacent to the preschools.

“It is clear that we need to significantly reduce vehicle traffic to meet the environmental goals for all preschools. Many people may think and hope that electric cars will solve the problem, but unfortunately, it is not that simple. They also release particulates, and at speeds above 40 km per hour, they make almost as much noise as other cars,” says Ågot Watne.

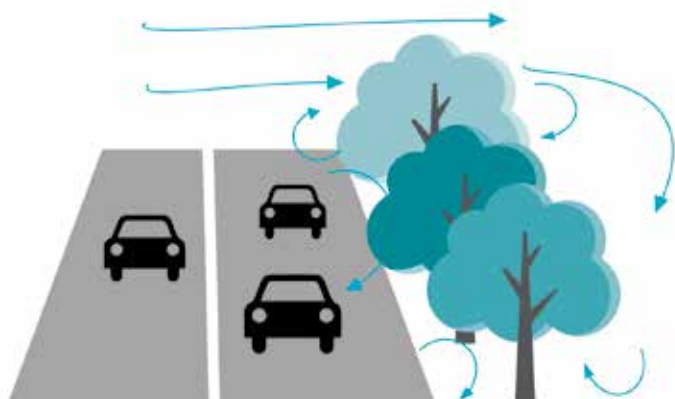


illustration of wind flows when a row of trees is placed next to a road.

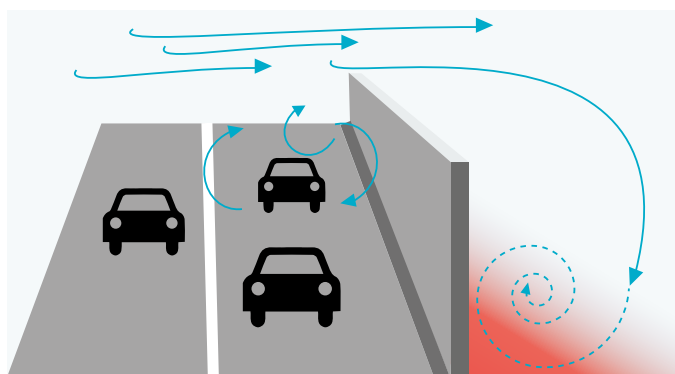


Illustration of wind flows when a noise barrier is placed near a road. Red indicates places where levels of pollutants may accumulate.



Ågot Watne, researcher at IVL Swedish Environmental Research Institute.

“It is clear that we need to significantly reduce vehicle traffic to meet the environmental goals for all preschools”

LOW EMISSION ZONES, LOWER SPEED LIMITS AND GREEN PLAYGROUNDS

Because children are more physically active than adults when they are outdoors and have a higher metabolism, they also breathe in more air pollutants in relation to their body weight than adults. In addition, children breathe more through their mouths than their noses, which allows particulates to travel further down into the airways.

Extended low emission zones, lower speed limits and more vegetation on the playgrounds are some of the range of measures the project has evaluated. The study shows that green preschool playgrounds with trees and other vegetation reduce exposure to some extent. And, of course, these features add other values, such as ecosystem services and increased well-being. The placement of new preschools in relation to road traffic is also important, not least to avoid the need for costly measures in the future.

The guidance has been developed within the framework of the Formas funded project “Kartläggning och åtgärder för bättre luftkvalitet och ljudmiljö på förskolegårdar” (Mapping and measures for better air quality and sound environment in preschool playgrounds). ■





The forest is Sweden's key resource in the climate transition – but is it enough?

We ask a lot of our forests in Sweden, and demands may be even higher in the future: more wood, more biofuel, more renewable products to replace plastic. At the same time, the forest needs to be a carbon sink, accommodate high biodiversity and provide a place for recreation. How can we make this complex equation work? Is it even possible? Researchers at IVL are developing tools that can create a better overall picture of sustainability in Swedish forestry and what trade-offs need to be made.

Studies in both Sweden and the EU indicate that all of the positive aspects of forestry – full climate benefit, maximum biodiversity, high social values and high economic returns - will not be able to be fully achieved. Policy trade-offs and compromises will be needed.

“The question of how the forest should be managed is so polarising that it will ultimately be up to politicians to decide how the forests will be used. It is therefore important that the decisions they make are based on well-founded assessments and a good knowledge base,” says Eskil Mattson, researcher in forests and ecosystems at IVL Swedish Environmental Research Institute.

Swedish forestry may need to change in the future. The new forest strategy in the EU points to a shift in the approach to forestry, with more close-to-nature forestry without clear-cutting, more natural regeneration and more investment in products with long useful lives. In addition, the EU's Nature Restoration Law will require more forests to be protected within the EU. The question is what this will mean for Sweden. Will the current Swedish approach to forestry be considered sustainable or seen as depleting?

Within the Mistra Digital Forest research programme, IVL researchers Eskil Mattsson and Per Erik Karlsson are working to develop digital tools and methods to create integrated, quantitative sustainability assessments of

Swedish forestry as a way to respond to the transition to a sustainable society.

“There is a significant need for the standardisation of assessment methods and target values to calculate sustainability in Swedish forestry. It is not enough to say ‘this is good and this is bad’; you need to calculate numerical values for widely different aspects as a basis for a good dialogue. In this context, the work we do within Mistra Digital Forest is an important contribution,” says Per Erik Karlsson.

During the first four years of the research programme, IVL has been responsible for the work package called “*Skogen och skogens värden*” (*The Forest and the Value of the Forest*). Much of the work has been about developing sustainability indicators for, among other things, climate impact, biodiversity, the forest's recreational value, jobs generated by forestry, and the forest owners' annual net income.



Eskil Mattsson, researcher in forest and ecosystems at IVL Swedish Environmental Research Institute.



Researcher Per Erik Karlsson is developing tools that can provide a better overall picture of sustainability in Swedish forestry. Photo: Olsson/Mistra Digital Forest.

Together with SLU, the researchers have performed analyses to predict the outcome of these indicators in a number of scenarios for the future.

“The method we have developed can be used to assess a forest owner’s impact based on forestry practices. It is also possible to see the impact of forestry in relation to different target values, such as the environmental quality objectives that are included in Living Forests, which is one of Sweden’s national environmental objectives,” says Eskil Mattsson.

Another tool that has been developed is the BioMapp visualization tool, which can be used to visualize different flows coming from the forest and how these are distributed among different product categories such as forestry, pulp and paper, and the wood products industry. The tool can also be linked to sustainability indicators to show the environmental impact of the forest raw materials and forest products in different parts of the value chain.

“The sustainability indicators and BioMapp are useful for both forest companies and decision-makers. On the one hand, they can be used in the sustainability assessments of products coming from the forest, and on the other hand, in the forest companies’ strategy work to assess different scenarios for future production. They can also be used as the basis for well-founded policy decisions to visualize potential developments in different types of forestry in the future, ranging from forestry that simulates increased production and increased extraction of forest raw materials, to forestry with greater consideration for the environment through nature conservation set-asides, longer rotation periods or more continuous cover forestry,” says Per Erik Karlsson

In September 2023, Mistra Digital Forest secured funding for an additional four years. In the next phase of the research

programme, the goal is to include the entire forest value chain in the sustainability assessment. This also means that the climate benefits from carbon sequestration in wood products (*harvested wood products*) are included according to the applicable principles for international climate reporting. The researchers also want to assess substitution effects, i.e. the climate benefits of replacing fossil-based products with bio-based products.

“The forest has an important role to play in limiting Sweden’s climate impact, while the forest provides a habitat for much of our biodiversity. These roles are closely interconnected and need to be considered together, with the least possible impact on society in general. The work that Mistra Digital Forest does is helping us meet this challenge,” says Eskil Mattsson. ■

“There is a significant need for the standardisation of assessment methods and target values to calculate sustainability in Swedish forestry.”





Inadequate treatment in the shipping sector endangers the future of the marine environment

In several studies, researchers at IVL have drawn attention to problems with the exhaust gas cleaning systems, or scrubbers, on many ships. They “wash” exhaust gases to remove sulphur, but at the same time release the toxic scrubber water into the aquatic environment where it can cause tremendous damage to marine life.

“In practice, the ships’ stacks have been turned upside down, so instead of going into the air, hazardous substances and particles from the exhaust gases are flushed into the sea,” says ecotoxicologist Maria Granberg at IVL.

Scrubbers are a type of technology installed on many ships to reduce air emissions of sulphur from fuel oil in accordance with the International Maritime Organization’s (IMO) new sulphur directive [sulphur cap], which came into force in 2020.

“The original intention of the Sulphur Directive was for the shipping industry to switch to cleaner fuels, but by making it acceptable to install scrubbers instead, you opened the door for shipping companies to continue using the cheaper high-sulphur heavy fuel oil,” says Maria Granberg.

The Baltic Sea is considered one of the world’s most polluted seas, and is therefore particularly vulnerable to further discharges of environmentally hazardous substances. Polluted

scrubber water is a new source of emissions that was basically non-existent before 2015, but which is now showing a sharp and steady increase.

In the most commonly used scrubber systems, the exhaust gases are sprayed with seawater. The sulphur in the exhaust gas is then dissolved in the water, but so are many other environmentally hazardous substances and particulates resulting from combustion. The scrubber water is then discharged more or less untreated into the sea.



*Maria Granberg,
marine ecotoxicologist.*

A SPICE MEASURE IS ENOUGH
The scrubber water contains high levels of many highly problematic components, toxic organic substances from the ships’ fuel oil, heavy metals, sulphur (which contributes to ocean acidification)

and nutrients (which contribute to eutrophication).

When researchers in the EU-funded project *Emerge* studied the effect of scrubber water on aquatic organisms, they found harmful effects even at very low concentrations.



“Many shipping lanes run along coastlines where the species richness in the marine environment is the highest, and there is a tremendous risk that we will see significant environmental effects from the scrubber systems.”

“We saw effects at much lower levels than previously reported. Five laboratories in Europe performed ecotoxicological tests on different organisms and we all came to the same conclusion – this is toxic,” says Maria Granberg.

The researchers saw negative effects on organisms such as sea urchin larvae, bristleworms, crustaceans and clams even at the lowest tested concentrations, 0.0001 – 0.001 percent, which corresponds to a pinch of spice or a couple of teaspoons of this scrubber water in one cubic meter of water.

“Many shipping lanes run along coastlines where the species richness in the marine environment is the highest, and there is a tremendous risk that we will see significant environmental effects from the scrubber systems,” says Maria Granberg.

Government authorities such as the Swedish Agency for Marine and Water Management and the Swedish Transport Agency have also sounded the alarm about the harm scrubbers have on the sensitive marine environment in the Baltic Sea, and they have proposed a total ban on the discharge of scrubber water into Sweden’s internal waters.

“The discharges from ship scrubbers pose a serious threat to marine biodiversity. Our hope is that a ban will be introduced as soon as possible, both to protect the marine environment but also to get shipping companies to phase out this environmentally harmful technology and invest in long-term sustainable solutions instead,” says Maria Granberg.

The researchers at Emerge have also detected problems with air emissions from the scrubber systems. Measurements onboard ships show that there are still significant problems with emissions of particulates, among other substances.

“Sulphur regulations were in place to address the problems with emissions of sulphur oxide and particulates to air by switching to low-sulphur fuel. The scrubber solution takes care of the sulphur but does not reduce particulate emissions as intended. So it’s not a good solution for air quality either,” says Erik Fridell, transport researcher at IVL. ■



IVL's oil spill experts on site during clean-up operation

In October, TT-Line's Marco Polo passenger ferry ran aground in Pukavik Bay in Blekinge and oil spread along the coast. IVL's oil spill experts were on site and contributed to the response effort.

“IVL’s oil emergency service was a voluntary resource in the clean-up of oil in Pukavik Bay. We were on site in the affected area and offered assistance through our experience and advice to minimise the damage,” says IVL’s oil spill expert Jonas Henriksson.

The oil spill is a tough blow to a Baltic Sea that is already under threat. Maria Granberg, marine ecotoxicologist at IVL, notes that the oil spill will affect the natural environment and wildlife for many years to come.

“The heavy fuel oil contains toxic substances such as heavy metals and polycyclic aromatic hydrocarbons and has both acute and long-term effects. Seabirds are severely impacted immediately by the sticky oil, but the environmental toxins can also end up in fish and clams that people eat,” says Maria Granberg.

In addition to assisting with experience and expert knowledge in oil spills, IVL also conducts training in oil spill response. The training is held in four different stages, from basic training and the practical handling of oil spill response equipment to the certification of clean-up managers and the training of oil experts among crisis management staff.

According to IVL’s oil spill experts, Sweden’s preparedness for oil spills needs to be improved. A survey conducted by MSB in 2021 shows that just over half of Sweden’s coastal municipalities address the risk of oil spills in their risk and vulnerability analyses.

“Considering all the ship traffic in the Baltic Sea, oil spill response should be a priority issue among the municipalities. Unfortunately, there will be more oil spills, the only question is when. When there is a limited capacity for oil spill response, the municipalities will react slowly and may make the consequences worse when an accident does occur, which also makes the clean-up work more expensive,” says Jonas Henriksson. ■



Invasive fish are on the increase, environmental DNA shows

The invasive round goby continues to spread and appears to be one of the dominant fish species in some places in Gävle Bay. This has been confirmed by testing that IVL Swedish Environmental Research Institute has performed with environmental DNA (or eDNA), which can be used to analyse biodiversity in different types of ecosystems. The round goby originates from the Black Sea and the Caspian Sea. It is highly adaptable and can reproduce efficiently under different environmental conditions. There is now concern that it will spread further up into estuaries.

Multiple points of contact between researchers, decision-makers and the business community

After a couple of years where only digital meetings could be held, 2023 was a great year for in-person events, with many large conferences and face-to-face meetings. In September, IVL hosted the international scientific conference Transport and Air Pollution & Shipping and Environment Conference, TAP&SE. Over 170 abstracts were received, and during the four-day conference, over 166 presentations were held.



Åke Sjödin and Jana Moldanova from IVL arranged TAP&SE together with the University of Gothenburg and Chalmers University of Technology, among others.

Study examines the cost of air pollution

The list of diseases linked to air pollution and chemicals is long. What are the costs for society and what measures are most effective?

Nitrogen oxide, particulates, ozone, heavy metals and solvents are common pollutants that harm the climate, our ecosystems and human health. However, in order to be able to evaluate the consequences in terms of illness and years of life lost, a range of measures and metrics need to be considered.

The EU project *Valesor – Valuation of Environmental Stressors* – aims to clarify differences, similarities and the relationships between different health and economic metrics and to highlight the most relevant metrics in order to be able to evaluate the most common and most important air pollutants and chemicals. The project will also develop a digital tool for the simple assessment of health and welfare consequences.

Report proposes policy instruments for reduced underwater noise

Ship noise can cause a flight-or-flight response in marine animals and causes a large number of species to have difficulty communicating and avoiding predators. In a new report, IVL and the Swedish Maritime Administration present proposals on how underwater noise can be addressed at the national level. The report also summarizes the latest knowledge on underwater noise from ships, including its characteristics and sources, methods for noise measurement and reduction, and the environmental impact of noise.



The protected harbour porpoise is sensitive to underwater noise, and ship noise can interfere with the porpoise's echolocation activity from several kilometres away.



Study on PFAS in cosmetics garners widespread attention

According to a study from IVL and Stockholm University, emissions of PFAS from cosmetics amount to 11,000 kg of fluoride on average per year in the European Economic Area (EEA). An article based on the study has been named Best Paper in the journal *Environmental Science*.

In order to calculate the amount of PFAS that is attributable to the cosmetics industry annually, the researchers have gone through several different product databases. The products that most often had PFAS listed as an ingredient were in the category decorative cosmetics, where it was found in 3.7 percent of all products.

“My recommendation is to use as little cosmetics as possible. We have identified more than 170 ingredient names where PFAS are hidden behind the names. Even though I work with this issue, I would not recognize all the substances if I did not have my substance list as a comparison next to it,” says Kerstin Pütz, the author of the article.

140 million

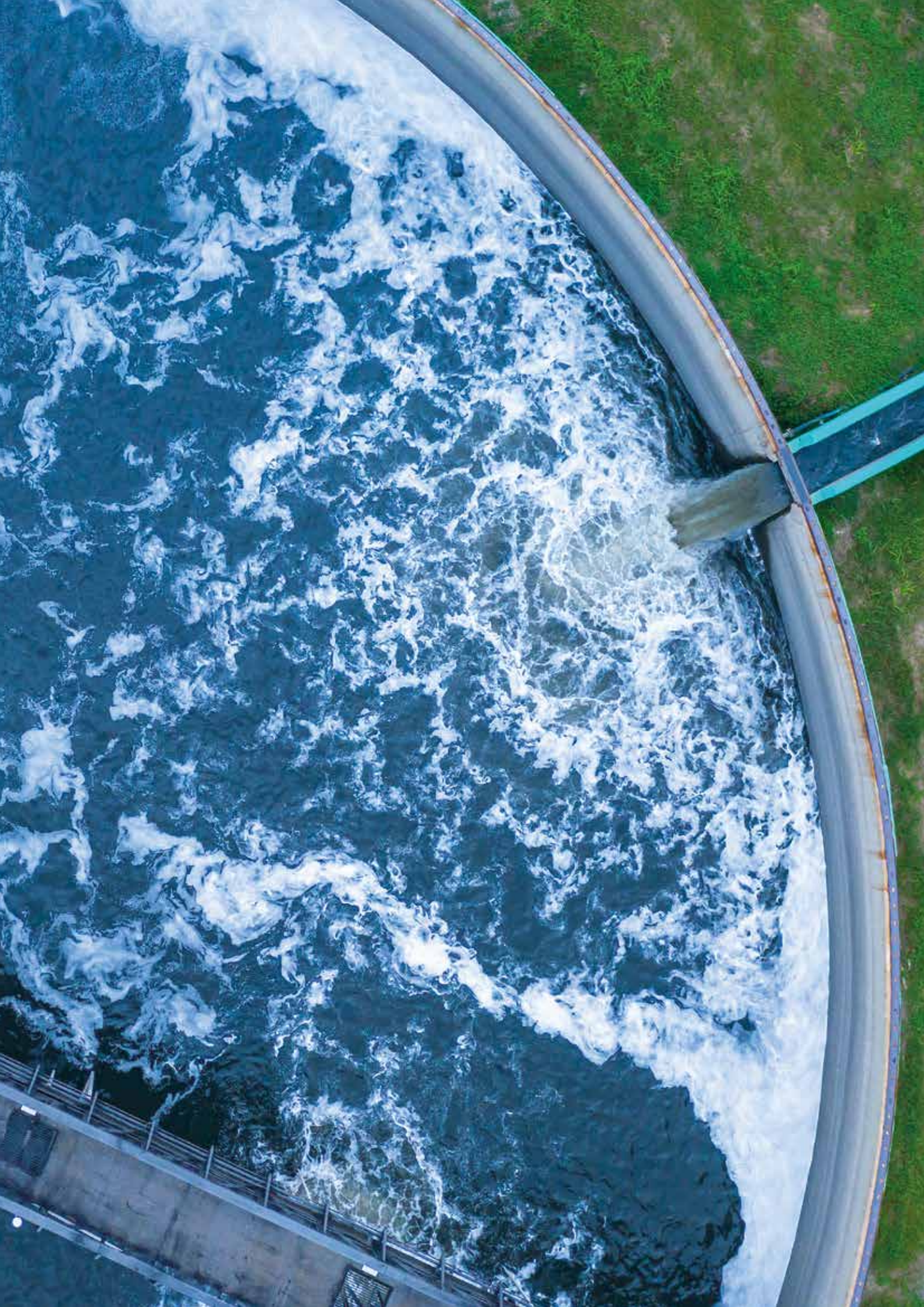
That's how many metres of fishing line are lost every year in Nordic waters, along with 28 million lures and 11 million sinkers. This staggering number was revealed by a study that IVL conducted on behalf of the Swedish Environmental Protection Agency. A separate survey also estimates that about 3,900 lobster pots are lost every year on the west coast of Sweden alone.

Thematic area

Sustainable transition

Within the theme area **Sustainable transition**, we work with:

- Resource-efficient and sustainable value chains
- Resource-efficient industrial processes
- Circular water solutions, efficient treatment and reuse of water
- Efficient resource flows and waste
- Sustainable procurement and consumption
- Sustainable chemical management
- Sustainable working life
- Sustainable digitalisation





Tailor-made and one step ahead at IVL's laboratory

The analyses performed at IVL's laboratory are vital to many of our research projects and make up a large proportion of our customer assignments. In 2023, over 50,000 analyses were performed at our laboratories in Gothenburg, Stockholm and Fiskebäckskil, which together had a turnover of MSEK 25.

“We combine standard analyses with very advanced analytical methods and tailor analyses based on the customer's needs,” says Kristian Thörnblom, head of the Analytical Chemistry group, which mainly operates in Gothenburg.

The samples that IVL handles consist of everything from incoming and outgoing water from wastewater treatment plants, air pollution and precipitation in both rural and urban environments to indoor environments, soil and soil samples and various consumer products.

Phthalates, flame retardants, phenols, pharmaceuticals, PFAS, hydrocarbons, pesticides, heavy metals, particulates,

sulphur, nitrogen and environmental DNA – the list of substances that IVL analyses is long and growing.

In addition to targeted analyses, there are also an increasing number of non-target screenings, which aim to broadly capture which hazardous substances are present in the environment.

“We are trying to be five or ten years ahead and also be involved in developing the analysis methods that will be needed in the future,” says Dämen Johann Bolinius, head of the Environmental Chemistry group at IVL Swedish Environmental Research Institute. ■



Ioannis Liagkouridis, researcher and project manager at IVL's laboratory in Stockholm.

PFAS analysis: "Without interpretation, you can get completely lost"

Perfluorinated substances, PFAS, are a group of water and dirt repellent chemicals found in a variety of everyday products. They are very resistant to degradation and have negative effects on the environment and human health.

An increasing number of businesses are working to reduce the use and spread of these substances, but in order to be sure that a product or an environmental sample is free of PFAS, careful analysis is required.

There are currently almost 10,000 different PFAS substances, and known PFAS are just the tip of the iceberg. IVL has standardised methods for analysing about 70 of these and continuously develops methods to be able to analyse more.

"Considering how many different PFAS there are, it is very difficult for the customer to know which analyses are needed. If you only search for those that are well known, you miss thou-

sands. Therefore, we also screen for these lesser known PFAS," says Ioannis Liagkouridis, researcher and project manager at IVL's laboratory in Stockholm.

IVL has a great deal of collective knowledge of the entire PFAS problem and, not least, robust methods for several different matrices with powerful instruments that can identify extremely low levels," says Ioannis Liagkouridis.

"We handle the entire analysis process, from sampling selection to analysis with detection levels below the limit values. We also interpret the results and offer customer support after delivery. Without interpretation, you can be completely lost. ■



New invention enables smart water monitoring

Climate change and urbanisation are increasing the challenges cities face in the management of wastewater, stormwater and flooding. Researchers at IVL Swedish Environmental Research Institute have developed an invention that uses sensors and artificial intelligence to facilitate the monitoring activities of cities while facilitating preparedness so that any changes in conditions can be quickly addressed.

“The Turbinator is an example of a solution that saves both time and money while creating the conditions to focus more on sustainability. Always having updated information is an advantage, both socio-economically and in terms of safety, because it provides opportunities to act proactively,” says Helén Galfi, urban water researcher at IVL Swedish Environmental Research Institute.

In several projects, IVL has explored how digital tools can be used in water-related activities to provide early warnings in the event that contaminants are present and for other events, such as leaks and flooding in the cities’ pipeline networks for wastewater and stormwater.

Sensors provide access to a wealth of real-time data. By putting this data to use and visualizing the information, you can create a better knowledge base. It leads to better readiness to respond quickly to changes and makes it easier to make fact-based decisions.

The patented sensor, called the Turbinator, combines a camera, a laser beam and image analysis to measure the turbidity and level of the water. One advantage is that it does not need to be in contact with the



Helén Galfi, urban water researcher.

water. It can be placed at the top of, for example, a sewer well. The Turbinator can provide early warning if there are contaminants in the systems, clogs or blockages in the pipes, if treatment is not working properly, or if there are leaks or other faults that need to be quickly addressed.

“The goal was to develop a low-cost sensor with minimal maintenance that can be used by cities, municipalities and companies responsible for the water supply networks. This facilitates the operation of the pipeline network and leads to the need for fewer manual inspections, which in turn results in less disruption to, for example, traffic,” says Jens Wilhelmsson, AI expert at IVL who has been involved in developing the technology.



Jens Wilhelmsson, AI expert.

PATENTED INVENTION

The technical solution has received patents in Sweden, the US and within the EU. This means that the Turbinator meets the conditions for patent protection – that the invention must be novel, have inventive height and be industrially applicable, which means that it must address a problem through the use of technology. The next step is to continue



the experimental testing and to demonstrate the technology and collect data on a larger scale to develop services for cities.

“Our hope is that the technology will be widely used and create a benefit for society. The Turbinator has been tested in Gothenburg’s stormwater pipeline network and Stockholm’s wastewater network. Soon it will also be installed in Southwest Skåne’s (VA-Syd) wastewater network,” says Helén Galfi.

TESTED IN CITIES

The Turbinator has been tested in Gothenburg’s stormwater pipeline network and Stockholm’s wastewater network. Next, it will be installed in Southwest Skåne’s (VA-Syd) wastewater network. The bottom line is that it works very well.

“It can be used in places that are difficult to monitor in the

pipeline network, such as streets with a lot of traffic. The Turbinator provides better data at more frequent intervals and also means that the operating staff will have a safer working environment,” says Joel Wanemark at IVL.

Together with Stockholm Vatten och Avfall and Kretslopp och Vatten in Gothenburg, he has studied how digital monitoring can facilitate the operation of cities’ wastewater networks.

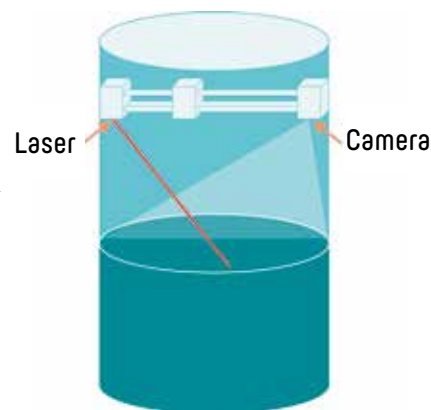
“Cities often use several different measurement methods and data storage systems. This makes it difficult to reuse results and to develop the operation based on data-driven insights. We wanted to contribute to developing the ability of water and wastewater organisations to use new technology to collect data, but also to improve the interaction between different systems,” says Joel Wanemark. ■



How the Turbinator works

The Turbinator combines a camera, a laser beam and image analysis to measure the turbidity of the water and the water level. The sensor sends a laser beam into the water, takes a photo where the light hits the surface and uses an AI algorithm to calculate the turbidity based on the photo.

The Turbinator has been developed in a collaboration between several actors, including the EU project ScoreWater and IoT for sustainable water management, and in collaboration with the City of Gothenburg, Stockholm Vatten och Avfall, and the companies Eeware and Greenwave.





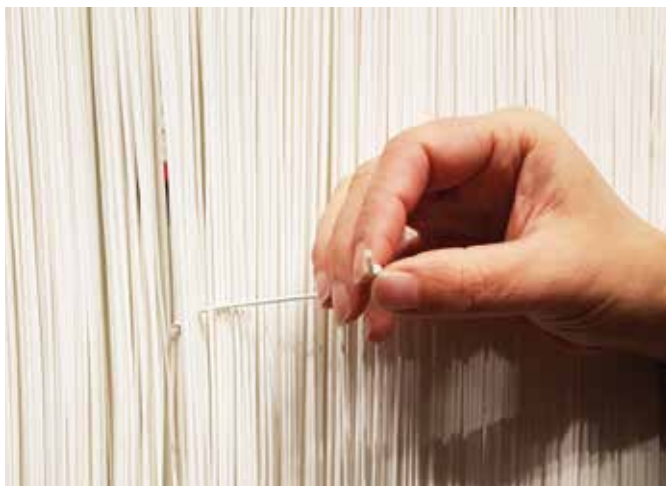
At SWIC, advanced research is carried out in the treatment and recycling of wastewater

Immediately adjacent to Frihamnen in Stockholm is a unique facility that develops new solutions for circular water management and resource extraction: SWIC, Sjöstadverket Water Innovation Centre. It is run by IVL Swedish Environmental Research Institute and KTH and is used both for research and as a testing and pilot facility for industry and other parties.

There are a range of pipes, metal containers and instruments that need to end up in the right place when moving a wastewater research facility. SWIC, Sjöstadverket Water Innovation Centre was previously located on Henriksdalsberget in southern Stockholm and is now located at Loudden in Stockholm.

The facility has been up and running since 2008 under the name Hammarby Sjöstadverk and has now moved to a former municipal wastewater treatment plant, which is leased from Stockholm Vatten och Avfall and has now been complemented with a newly built processing hall.

Lack of access to clean water is a growing problem in the world. The SWIC test facility develops techniques for reusing and utilising treated wastewater. The facility's work is focused on achieving treatment processes that are more energy- and resource-efficient, reducing greenhouse gas emissions and making use of all the valuable resources found in wastewater.



The so-called "spaghetti membranes" are plastic tubes from a membrane bioreactor. Thanks to SWIC's optimisation of this technology, Stockholm Vatten och Avfall can reduce its use of chemicals in wastewater treatment.

"We want to help people see wastewater as a resource – for nutrients, energy and, not least, water for reuse," says IVL employee Mayumi Narongin-Fujikawa, coordinator for SWIC.

One example is the beer PU:REST, Sweden's first beer brewed from recycled wastewater. It was manufactured in 2018 thanks to a collaboration between IVL, Nya Carnegiebryggeriet and Carlsberg Sverige to raise awareness that advanced water purification is part of the solution to the world's water needs.

PILOT STUDIES ON-SITE OR AT THE CLIENT'S FACILITY

All of the work performed at SWIC is done with laboratory or pilot-scale equipment, so there are no large ponds with water as at other treatment plants. But SWIC still has access to municipal wastewater for its testing activities.

"Our customers can also send a couple of cubic metres of wastewater here, which we test with different types of treatment techniques in pilot plants. This allows us to produce realistic results at reasonable costs," says Mayumi Narongin-Fujikawa.

Employees at SWIC are also able to build a mobile pilot plant inside a container that is transported to, for example, a municipality that needs to test new processes on its local water. Another possibility is that customers can send as little as five litres of water or sludge for a laboratory-scale study at SWIC.

"SPAGHETTI" MEMBRANE PURIFIES WATER

Inside the newly built processing hall at SWIC is a metal scaffold with something that resembles a couple of meters of long spaghetti. These are thin hollow plastic tubes from a membrane bioreactor (MBR), a technology that SWIC has been working to develop for many years together with Stockholm Vatten och Avfall. Thanks to MBR technology, it is possible to implement stricter treatment requirements and increase the load at the treatment plants.



“Our new test facility offers a unique place for collaboration between researchers, companies and wastewater treatment plants,” says coordinator Mayumi Narongin-Fujikawa, here in the newly built processing hall at SWIC, Sjöstadverket Water Innovation Centre at Louden in Stockholm.

“The membranes separate the biological sludge from the water, making it completely free of particles. It is therefore easier to clean the wastewater by removing, for example, pharmaceutical residues. By optimising the MBR process, we can help ensure that Stockholm Vatten och Avfall will not need to use as many chemicals in its wastewater treatment,” says Mayumi Narongin-Fujikawa.

SWIC is also a platform for basic and continuing education in water-related topics through lab courses, degree projects and

doctoral projects for students, as well as work placements for future operating engineers. Experts and the actors responsible for water treatment come here on study visits, which includes a large number of international delegations.

The plant is used in both national and international research projects and offers a unique setting for collaboration between researchers, companies and wastewater treatment plants. ■

Digital twin helps streamline wastewater treatment plant operations

Digital twins are a hot topic, and this is also the case in the water and wastewater sector. Hanna Molin, who is a doctoral student at IVL, is conducting a pilot study with a digital twin at Henriksdal’s wastewater treatment plant in Stockholm.

The digital twin concept means that the physical system has a virtual copy that can be used for troubleshooting, maintenance planning, forecasting, etc.

“The copy can be anything from software sensors to a complete model of the treatment plant,” says Hanna Molin, who is conducting experiments with real-time data through a digital pilot at the Henriksdal Wastewater Treatment Plant.

A digital twin maintains a continuous, automated data transfer between the physical system and the digital copy. Data is

collected from sensors, machinery and lab analyses in the physical system – in this case, the treatment plant – and used in the copy.

Hanna Molin’s doctoral project “Implementation of digital twins at water resource recovery facilities” studies how process models can be used in real time as decision-making support to streamline operations while reducing disruptions and errors. ■



Hanna Molin,
PhD student at IVL.



Critical raw material flows in society

The demand for metals for climate-friendly energy technology will increase dramatically in the years ahead. But how much of these valuable metals and minerals are actually already in circulation? Significant resources that can potentially be recycled currently leave Europe as waste and scrap. To create a better overview of this potential, IVL has developed a proposal for a mapping system for critical raw material flows within the collaboration SMED. The system focuses on identifying where different materials can be found, in what quantities they occur and when these materials can be made available for reuse or recycling.



New ways to reduce food waste

What should stores do when there is a bad onion in a bag of perfectly good onions? Or when a yoghurt container in a multipack is broken? Instead of throwing everything away, a project led by IVL will try to find solutions that make it financially viable for stores to use food that is still fit for consumption. The project is being carried out together with Coop and Ica, which will try out different solutions in their stores. The hope is that more grocery stores and chains will follow their lead.

“Food production accounts for a major proportion of global climate emissions, so it is important that all edible food is actually eaten,” says Annelise de Jong, consumption researcher at IVL.



Sustainability benefits of Swedish wool

Wool production in Sweden can have a lower climate impact and a more significant positive effect when compared to wool production in other countries. This has been shown in a study conducted by IVL on the initiative of Axfoundation. One advantage is that water use in Swedish agriculture is lower than in other countries, which reduces the water footprint for domestic feed production. In addition, Sweden's animal welfare rules are often stricter than those of other countries (e.g. lower antibiotic use), which is another positive consequence of reliance on Swedish wool. According to The Swedish Wool Initiative, which is behind the sustainability analysis, more and more Swedish brands are starting to demand Swedish wool in the fashion sector and home décor.

Great potential to recycle textile waste

Europe has a significant capacity to recycle more textiles. This has been shown by a survey carried out by the research project Framtidens hållbara kläder (Sustainable Clothing of the Future). Operators in the sorting and recycling of post-consumer textiles are active all over Europe and have access to promising technologies with the potential to improve the way we manage our textile waste.

“It would be very positive if more textile waste can be recycled. Our clothing consumption is far too high, and we don't use our clothes enough before we throw them away. Many garments that could have been reused or recycled today end up in residual waste; it is a huge waste of resources,” says Maja Dahlbom, project manager at IVL Swedish Environmental Research Institute.



Food waste to new food

Researchers will develop new foods by utilising side streams from the production of vegetables and beef. This includes vegetable and fruit skins, leaves, imperfect vegetables and trimmings that are currently discarded or used as animal feed because there is no other area of use. The goal is to increase resource efficiency and profitability in the Swedish food sector by offering innovative food products.

The project is being carried out by IVL in collaboration with the Swedish University of Agricultural Sciences, Ipsos, Axfoundation, MatLust and *the Matsvinnet* platform. The target group is both younger and older consumers, and the project focuses on food that can be used in the public sector.



Investment in hydrogen and increased circularity in the metal industry

A project led by IVL will survey the conditions for increasing the production and use of hydrogen in Västerbotten. The project will also investigate how increased circularity can reduce the amount of waste and the climate impact from the mining and metal industries. New areas of use will be tested for resources that are currently considered waste products in smelting and mining activities. This work is being carried out in close collaboration with Luleå University of Technology, Swerim and several regional actors. MSEK 24 has been secured in grants from the Swedish Agency for Economic and Regional Growth and the Just Transition Fund.

Good conditions for mechanical textile recycling

Mechanical textile recycling means that textiles are broken down into fibres that are then sold so that they can be included in new products. Facilities are located all over Europe, but not in Sweden.

A study conducted by IVL within BioInnovation's textile initiative has investigated the potential for such a facility, and the calculations suggest that this type of business could be a success.

The calculations show that the climate impact of mechanically recycled cotton fibre in Sweden is 70–300 kg carbon dioxide equivalents per tonne of fibre. This can be compared to 500–4,000 carbon dioxide equivalents per tonne of fibre in the production of new cotton fibre. According to the study, it does not matter where in Sweden the recycling plant is located, the most important factor is reliable access to materials. Hospital clothing and work clothing are can be very important resources in this context.





Thematic area

Sustainable society

Within the theme **Sustainable society**, we work with:

- Climate neutrality
- Climate adaptation
- Socially sustainable transition
- Sustainable urban and regional planning
- Sustainable construction, management and renovation
- Sustainable energy systems and energy carriers
- Sustainable transport and mobility solutions
- Sustainable finance and investment







“We need to be better at using what has already been built”

Avoiding new construction by transforming, optimising and renovating existing buildings for new purposes can save resources and reduce climate emissions. The recommendation of Anna-Maria Blixt, architect and specialist in circular building at IVL. In the “Bostadisering” project, she investigates the opportunities for optimising the use of the existing building stock in Gothenburg and converting premises into housing.

The need for housing in Sweden is great. In Gothenburg, for example, it has been determined that we will need 80,000 new residences by 2035. At the same time, the city has a goal of being close to a net zero climate impact by 2030. How will it all come together? Building new homes costs money and demands significant resources. It also leads to significant climate emissions and generates waste.

“There is a major conflict right now between the objective to meet the growing need for new housing and the urgent need to reduce emissions. An important parameter for solving this is to take a closer look at how we can optimise what has already been built in order to reduce new construction,” says Anna-Maria Blixt.

Construction is progressing at a furious pace around the world; Every five days, buildings equivalent to a new Paris are erected, according to the United Nations Environment Programme (UNEP). In Sweden, the construction and real estate sector accounts for about a fifth of Sweden’s greenhouse gas emissions and half of the country’s resource extraction.

At the same time, many cities find themselves in an ongoing transformation; The urbanisation of city centres leads to the relocation of industries, the growth of the information society and changes in the demand for premises. E-commerce is an increasingly significant factor, contributing to a reduced number of physical shops, vacant premises and increased insecurity in the urban environment. There is therefore a practical need to improve the utilisation rate of the existing building stock in cities.

In the research project *Bostadisering – cirkulärt, hållbart, levande* (Housing conversion – circular, sustainable, living), researchers and architects at IVL, together with Skanska and Lund University, are investigating the opportunities for converting premises in Gothenburg into housing.

The purpose is to adopt an entrepreneur’s perspective to identify the obstacles and opportunities for scaling up the conversion of existing premises into housing, based on aspects such as legislation and requirements, business opportunities and the utilisation rate of the existing stock. Gothenburg is a case study, but the idea is to transfer the results nationally.

“The project aims to zero in on shifting attitudes as we now move towards a more systemic approach to how a city should function, where we first and foremost start with our existing building stock before we consider new construction. It is challenging, of course, but there is tremendous interest in these issues and significant potential benefits – in terms of reduced climate impact, resource extraction and waste, but also because it creates the opportunity to preserve culture and raise awareness of how we can manage what has already been produced.

“Systems thinking is essential for us to be able to create the more resilient society we are striving to achieve. And the fact that there is an increased focus on this right now is very encouraging,” says Anna-Maria Blixt. ■



In the research project, researchers and architects are investigating the opportunities for converting existing premises in Gothenburg into housing.



Martin Erlandsson, researcher and expert in sustainable construction.

"It is possible to significantly reduce climate emissions from the construction sector"

The way we build has a major impact on the climate and the environment. Renovating an older building instead of building a new one can reduce emissions by between 50 and 75 percent. It is also possible to achieve significant climate improvements by making wise material choices, through technical solutions and by reusing more building materials than we do today.

"Simply by using the technologies that we already have in Sweden, it is possible to reduce climate emissions by 40 percent in the construction of apartment buildings," says Martin Erlandsson, researcher and expert in sustainable construction at IVL.

One way to achieve climate improvements is to replace materials that have a significant environmental impact with renewable materials, such as wood. At the same time, materials such as steel and various binders for concrete will also be needed in the future, so climate improvements need to be made there as well," says Martin Erlandsson.

"Using wood can be a piece of the puzzle to reduce the climate impact, but we also need to conserve forest resources. By switching from practices that rely on solid wood to the use of more material-efficient methods, many trees will be saved. And I also want to emphasize that significant environmental improvements can be made for concrete buildings if alternative binders and carbon capture techniques are used in the future," says Martin Erlandsson.

Previous studies conducted by IVL show that it is possible to nearly halve our climate impact by using known construction technologies and by using more environmentally friendly concrete.

"It is entirely possible to reduce the climate impact of concrete while using the technology that already exists today. What is needed now is for clients to set requirements to build structures with a low environmental impact and longer lifespans in order to drive climate work forward," says Martin Erlandsson. Renovating and recycling instead of building new structures is another important piece of the puzzle.

"Not demolishing, but rebuilding and taking advantage of what is already there is one of the most important things we can do to reduce the climate footprint of the construction sector. In the future, we also need to build in a way that makes it easier to rebuild. One example is to build interior walls that can be moved if needs change," says Martin Erlandsson. ■



Inauguration of meeting place in Gottsunda, Uppsala, June 2023.
Photo: Theory Into Practice, TIP

From car park to gathering place

In residential areas in Gothenburg, Uppsala and Örebro, pleasant outdoor environments have been created in converted car parks. A major focus of these projects has been to engage residents and allow children, young people and the elderly to have a major influence on the design of the converted spaces. The results present an example of how practical social sustainability efforts can incorporate mobility and environmental issues.

“The goal has been to develop a concept where property owners can transform this type of space in a relatively simple way, and in ways that involve residents. It has been very interesting to watch how three different spaces have emerged as a result of committed property owners, creative architects and children and elderly residents who live and spend time in the area,” says Åsa Romson, researcher and project manager at IVL.

The work has been carried out together with three major public property owners; Familjebostäder in Gothenburg, Uppsalahem and Örebrobostäder, as well as the architects at Theory into Practice. The process has been inspired by methods used in place-led development and has focused on ways residents and other stakeholders can be involved in the design of shared outdoor environments. The project has resulted in a design concept that has subsequently been tested at locations in Markbacken in Örebro, Gottsunda in Uppsala and in Kortedala, Gothenburg.

A network for circular building is established in Skellefteå

In Skellefteå, actors from the construction and property sector have been assembled to create a network for circular building. The project, which is run jointly by Skellefteå Municipality, CCBUILD – Centre for Circular Building and IVL Swedish Environmental Research Institute, aims to reuse materials that naturally occur in the construction process.

With the exception of mining, construction is the sector in Sweden that currently generates the most waste. Much of the material generated in construction can be reused.

IVL's subsidiary CCBUILD works in a variety of ways to support the building and real estate sector in the transition to more circular building practices. The business, which started in 2015, includes network forums, knowledge support and digital services that facilitate the reuse of materials. To date, CCBUILD's geographical coverage has been limited to southern Sweden, particularly the Västra Götaland region, but based on the emerging green industrial transition in northern Sweden, a similar platform is needed in Skellefteå to support reuse in the region. The project aims to implement CCBUILD's tools and working method, for example, regional network meetings and a digital marketplace for the reuse of construction products.

“We want to increase reuse in the construction sector and create sustainable conditions for the extraordinary societal shift that is currently taking place in the region. The target group includes the entire value chain – from contractors and material suppliers to property owners and architects,” says Aurora Pelli, Head of IVL Northern Sweden.





The climate is changing – and it is high time to raise our preparedness

Extreme weather, droughts and floods – climate change poses major challenges for society. The extent of the impact will be dependent on the extent of the climate change, but also on our ability to adapt society to these changes.



Magnus Hennlock.

“By adapting as a society and becoming more resilient to climate change, we can reduce the need for urgent and costly measures and contribute to long-term sustainable development. This is something we need to do to reduce our vulnerability as a society,” says Magnus Hennlock, researcher at IVL Swedish Environmental Research Institute.

IVL conducts research to increase knowledge and the implementation of climate adaptation. IVL also takes on assignments to provide expert support in issues related to urban development, blue-green solutions and sustainable construction.

In 2023, IVL Swedish Environmental Research Institute worked together with Insurance Sweden to conduct a survey of climate adaptation work for the sixth year.

The results show that there are significant differences within the country. Smaller municipalities in particular are lagging behind in the work to adapt to a changing climate. This is likely due to limited resources and a lack of access to the skills needed to pursue these issues. Small municipalities in particular need support from the regional and national level.

“There are some troubling trends in this year’s report. The rate of increase previously seen in the municipalities’ climate adaptation work seems to have stalled, despite the fact that it needs to increase significantly. It is also troubling that municipalities tend to implement measures only after they have suffered costly damage caused by extreme weather and climate change,” says Magnus Hennlock. One of the findings from this year’s survey is that the strongest driving force for municipalities to implement climate adaptation measures is

first-hand experience with damage caused by extreme weather and climate change.

“Swedish municipalities need to switch from a reactive to a proactive approach to climate adaptation. The extent of the damage and costs of climate change will largely be determined by our ability to adapt as a society, and in this work, the municipalities have a very important role,” says Magnus Hennlock. A common characteristic of the municipalities at the top of the ranking is that they have all made policy decisions to implement climate adaptation efforts and that they have allocated resources to this effort. According to IVL and Insurance Sweden, this is something that all municipalities need to do. It is also important that all municipalities identify their risks and vulnerabilities.

“Over the past year, we have seen the serious consequences that landslides and heavy rain can have, for example. Preparedness needs to be increased. Although some municipalities are more vulnerable than others, the whole country will be affected by climate change. By identifying and understanding

risks and vulnerabilities, municipalities can prioritise the right measures and plan neighbourhoods and new construction accordingly,” says Magnus Hennlock. ■



The survey of the work Sweden’s municipalities are doing in respect of climate change adaptation has served as the basis for a comparison and ranking of the municipalities’ efforts. The full report with results is available for download on IVL’s website.



Example of climate adaptation with blue-green solutions in Augustenborg in Malmö. In areas where properties were often impacted by flooding in the past, drainage systems have been built that include water channels and retention ponds.

Housing companies prepare for climate change

Extreme weather events such as Storm Hans and heavy rain in Bergslagen are a wake-up call. It should be clear to municipalities and property owners that as a society, we need to be better equipped to increase our resilience.

The cost of flooded properties, damaged roads, treefall and other damage adds up to hundreds of millions of kronor over the past year.

Together with Public Housing Sweden, IVL has conducted vulnerability analyses for five public housing companies in Östersund, Västerås, Nykvarn, Jönköping and Malmö. They show where the risks are, so that action can be taken.

“If housing companies are to become more resilient, proactive and preventive work is needed,” says Johan Holmqvist, researcher and project manager at IVL.

In 2024, the project will present concrete guidance for public housing companies. It will make existing information available and contribute to the development of new methods for improved climate adaptation in property portfolios.

Johan Holmqvist particularly highlights nature-based blue-green solutions as part of the solution. This may include planting trees and greenery that provides shade and cooling, noise reduction and reduces the spread of airborne particles.

“Or the construction of rain gardens and overflow surfaces that regulate water both when there is too much water at high flows and too little during dry periods.

“Systematic work on climate adaptation involves more than one-off measures and measures for individual properties. Flood prevention requires: This often means, for example: a systems perspective that looks at the entire catchment area and tackles the causes rather than symptoms,” says Johan Holmqvist. ■



Johan Holmqvist, researcher and project manager at IVL.



Vision of the new district of Jägersro. Illustration: FOJAB Arkitekter.

Unique tool for measuring the climate impact of city districts

To achieve the vision of creating the most sustainable district in the Öresund region, Project Jägersro has worked in collaboration with IVL to develop a brand new model for calculating the total climate impact of a district. The goal is to create the best possible conditions for residents to achieve climate neutrality in the new district that is emerging in Malmö.

The work has resulted in the “Jägersro model”, where a climate budget can be used to calculate the district’s total climate impact in relation to the Paris Agreement’s goal that earth’s temperature will not increase by more than 1.5°C. The model makes it possible to study changes over time, which means that it is possible to calculate variations in climate emissions and determine how different factors affect each other. The model includes everything from construction methods and urban planning to climate calculations of the greenhouse gas emissions of individual residents.

Blue-green solutions in the urban environment

Green roofs, living walls or rain gardens – these are just a few of the many new solutions and technologies that can make our cities more resilient to extreme weather. But which solution is the best option?

To help municipalities and property owners, IVL has worked with SLU and the Scandinavian Green Roof Institute, among others, to develop the web tool Blågröna Systemguiden (Blue-green system guide). It gives the user a good overview of the available solutions and compares different options. IVL has analysed the value and ecosystem services that the different systems provide.



Blue-green systems provide a buffer for rainwater and reduce the risk of flooding.



Hydrogen – a key for the transition in the shipping industry

The HOPE project has analysed the conditions for using hydrogen and fuel cells in the Nordic shipping industry. Technically, it is already possible to operate certain routes in the Nordic region with hydrogen power and fuel cells. Combined passenger and cargo ships (also known as ROPAX ships) are a particularly interesting solution in the Nordic region. But there are still obstacles to implementation and it will likely be a number of years before there is a major breakthrough in the market. As researchers from IVL note, the solution is still relatively expensive, there is not a reliable supply of green hydrogen and challenges remain in relation to infrastructure, storage and bunkering. Among other things, new policy instruments are needed to accelerate and facilitate the introduction of renewable marine fuels.

Challenges of Bio-energy with Carbon Capture and Storage (BECCS)

In order to achieve the goals of the Paris Agreement and limit global warming to 1.5 degrees, large-scale negative emissions will be needed across the globe. A report from IVL shows that there are challenges associated with scaling up bioenergy with carbon capture and storage (or BECCS), a technology that can create negative emissions.

The researchers note in the report that Sweden has good conditions for developing BECCS, but also note that it is important that it is done in a well-thought-out and sustainable way so that it is not used as a means to delay real emission reductions. One issue that researchers highlight is the risk of double counting carbon offsets.

“We conclude that changes and updates are needed in the legislation to address the double counting problem and to create the conditions for reliable carbon offsetting that contributes to a higher climate ambition,” says Kenneth Möllersten, researcher at IVL.



Increasing the pace of the climate transition

The Nordic countries have all set their own targets for achieving climate neutrality by sometime between 2030 and 2050, but at the current pace of transition, it may be difficult to achieve these targets. This is one of the main conclusions of a Nordic cooperation project in which IVL participated. Since 1990, emissions have only been reduced by 26 percent in the Nordic region, and most of that reduction is in the energy sector. If we are to achieve climate neutrality, much more needs to be done in other sectors, especially in the transport sector and in agriculture, land use and forestry.

“The Nordic countries are well positioned to work together to accelerate this transition. Examples of these areas are biofuels, negative emissions and better policy instruments,” says Lars Zetterberg, researcher at IVL who participated in the study.

Strategies to reduce vehicle traffic – seven lessons for Swedish cities

In an assignment from WWF, IVL has taken a closer look at four cities – Ghent, Birmingham, Leuven and Brussels – all of which have taken innovative approaches to transform the traffic environment in their cities. A recent report presents seven lessons for the more sustainable use of urban space in Swedish cities. One recommendation is introducing so-called circulation plans where inner cities are divided into zones that you can drive into but not between.

“The cities we have studied provide a recipe for success, with the limitation of through traffic and strong initiatives to make it easier to walk, cycle and use public transport,” says Tobias Gustavsson Binder, transport expert at IVL.





“Our employee expertise is the backbone of our operation”

Our employees and their expertise are the company's most important assets. Therefore, we have chosen to devote 2023 to developing our employees under the prioritized area “the year of skills”.

“We want everyone to have sustainable positions where we can grow, prosper and have fun at work. We also want everyone to feel that they are developing, and we have therefore spent 2023 creating the conditions for that,” says Anna Amgren, HR Manager.

In addition to managers’ days, we have started gatherings we call ‘lunch and learn’, where we invite both internal and external inspirational speakers. We have also completed a wide range of internal training sessions, such as project management training, training in information security, ergonomics and communication, and launched a digital training tool for interactive courses that makes it easier to access our range of courses.

The aim is to gather all internal training on one and the same learning platform. We should also be able to use it for courses that we sell or for courses that we purchase and offer to our employees.

Digitalisation has been a major focus of our HR work in other ways as well. In order to get new employees up to speed quickly, everyone is now offered an effective, digital induction. Here, they get practical information about the work at IVL, and union clubs and safety representatives can communicate the knowledge they want to convey.

“However, most of the skills development at IVL takes place in all the projects we run, as well as the networks and collaborations in which our employees participate,” says Anna Amgren.

IVL has dedicated employees, which is particularly noticeable in the associations that conduct activities in the organisation.

For us, it is only natural that we should sponsor both our sports clubs and art and

cultural associations, which arrange a number of different activities. The group ski trip to the Swedish mountains is something a lot of people look forward to, as is the annual fermented herring (surströmming) party, mushroom courses, running school and evening pétanque . During the autumn, we have also held well-attended family days in Gothenburg, Stockholm and Malmö, where all employees and their families were invited to participate in a day of activities at Skansen, Universeum or the Aquarium at Malmö Museum.

“One characteristic of IVL is the commitment our employees have in the activities that are arranged. Whether it’s an after-work event that includes table tennis and board games or kayaking, there is a great turnout, which is really fun,” says Anna Amgren.

And we also get confirmation that we have happy employees through the Winningtemp tool, which was used during the year. Weekly temperature measurements in the organisation show where we are on the index compared to the 1,500 other companies that use the same tool.

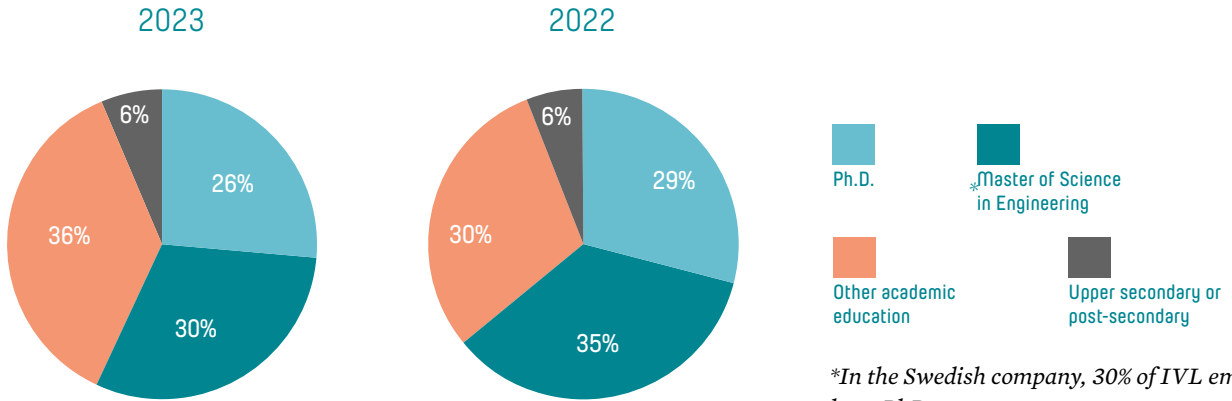
“Leadership is the area where we get the best results, which is gratifying because everything depends on leadership.

The goal is that everyone feels that they are developing and that we have a sustainable work environment. But it is also important to have fun along the way. This is how we are building the future together and making a difference for our employees, customers, partners and society as a whole,” says Anna Amgren. ■



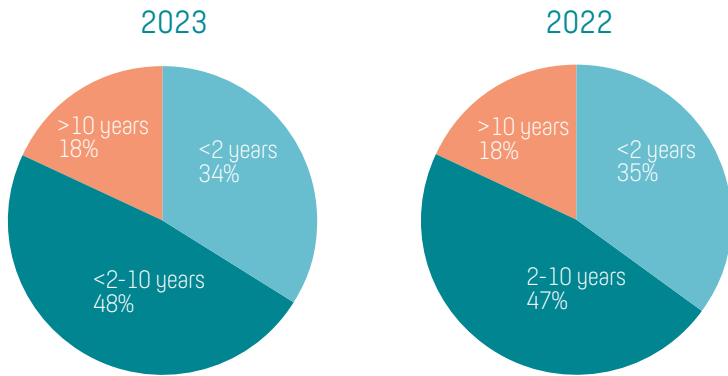
Anna Amgren, HR Manager.

Training



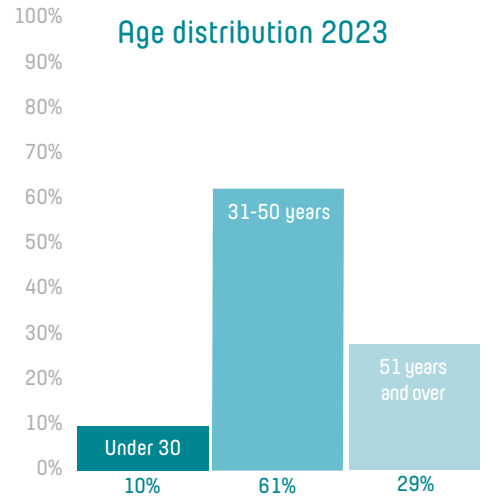
*In the Swedish company, 30% of IVL employees have Ph.Ds.

Period of employment

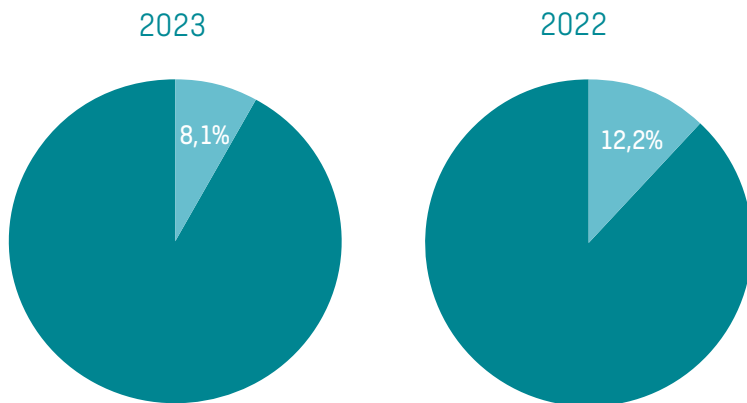


The average length of employment is 6.4 years (excluding fixed-term employment.)

The average length of employment is 6.5 years (excluding fixed-term employment.)

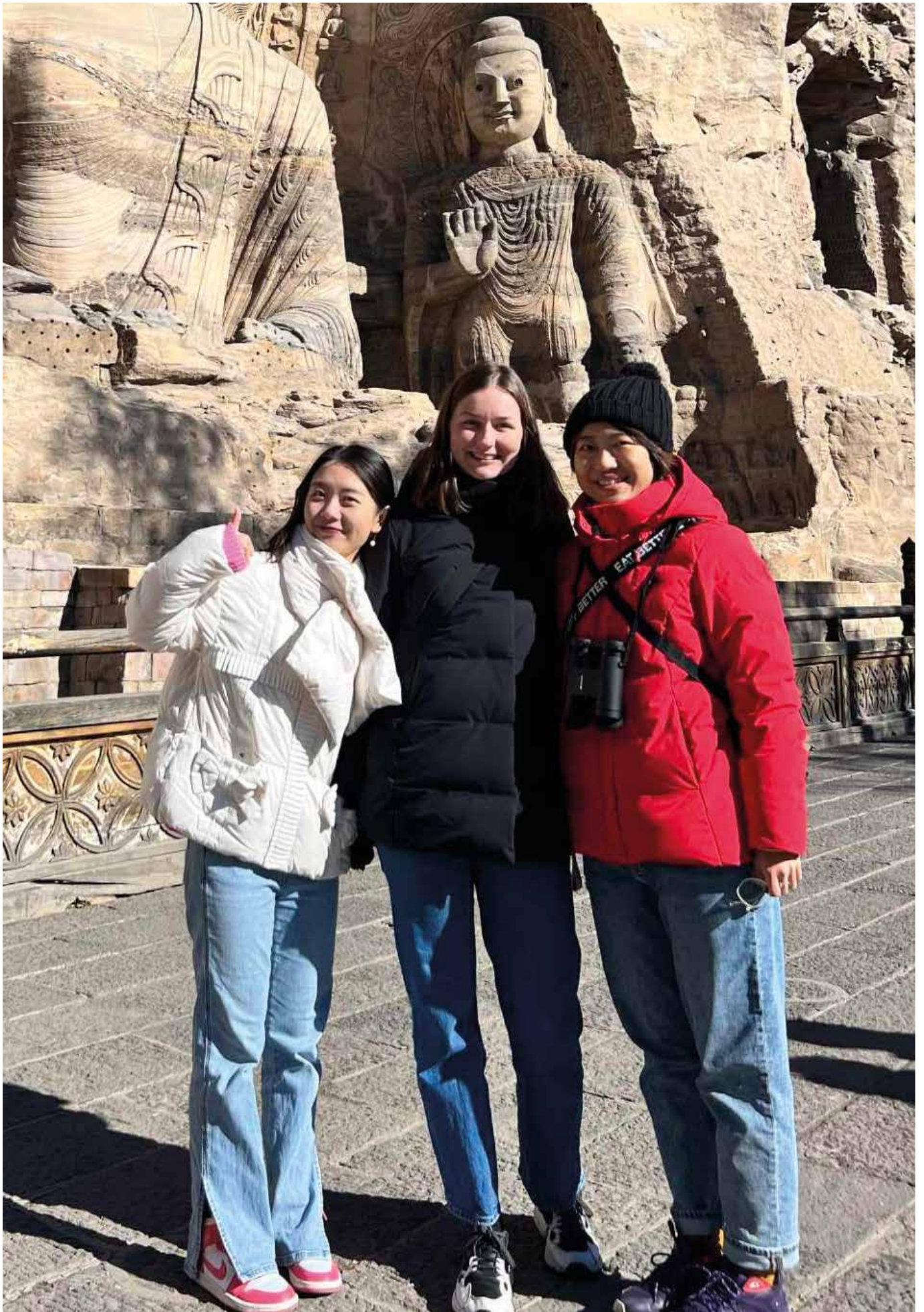


Staff turnover



Proportion of employees leaving relative to average number of employees excluding retirements and fixed-term contracts.

All figures include IVL's operations in China and India.



Matilda Lidfeldt on an excursion in Datong together with Chinese colleagues Shuhan Huang och Sijia Yang.



Ethics and integrity

For the IVL Swedish Environmental Research Institute, our independence is fundamental to the entire operation. This independence is guaranteed by our ownership structure, a foundation that was formed jointly by the state and the business sector. IVL was established with the task of supplying independent and credible decision-making data that all parties can rely on.

The Sustainable Development Goals (SDGs) that we primarily work with are SDG 16, Just, Peaceful and Inclusive Societies (secondary goals 16.5 and 16.6). Credibility is one of our most important core values, where our independent position allows us to deliver results that provide sustainability benefits for our customers.

CODE OF CONDUCT

Our employees are our most important resource, and it is important for us to act ethically and responsibly in our work and our relationships. As a basis for this, IVL has had a code of conduct for many years, based on the UN Global Compact's ten principles and on IVL's values. This applies to all IVL employees and board members, and governs IVL's conduct towards employees, suppliers, business partners and other stakeholders.

The induction programme for new employees includes a review of what the code of conduct means and how it is applied.

In connection with the code of conduct, IVL has a whistleblower function. This provides employees with a communication channel to report suspected violations of the code of conduct, both internally and externally. Through this system, IVL provides its employees with the opportunity to submit reports, where the right to remain anonymous and not risk repercussions is guaranteed. In 2022, no notifications were received.

RISK ASSESSMENT

IVL's management conducts ongoing assessments of risks related to the company's operations. This includes risks relating to corruption, human rights, working conditions and the environment. Risk assessment is also integrated into IVL's project process and is carried out in connection with tenders and applications. The purpose is to identify possible risks with projects, identify measures and decide whether IVL can carry out the assignment based on our Code of Conduct and our basic principles of credibility and independence. ■

Environmental impact of our own operations

Environmental considerations permeate everything IVL does, and our own operations must of course be conducted with the lowest possible environmental impact.

Our work contributes primarily to the following Sustainable Development Goals (SDGs): SDG 2: Zero hunger, SDG 3: Good health and well-being, SDG 7: Affordable and clean energy, SDG 8: Decent work and economic growth, SDG 12: Responsible consumption and production, and SDG 13: Climate action.

We do this through our environmental work primarily in the following areas, based on which environmental aspects are most significant for our operation:

- Climate and energy (secondary goals 7.2, 13.2 and 13.3)
- Resource efficiency and circularity (secondary goals 2.4, 8.4, 8.7, 12.2, 12.4 and 12.5)
- Sustainable use of chemicals (secondary goals 3.9 and 12.4)

IVL's environmental management system, which covers operations in Sweden, is certified according to ISO 14001. The report covers operations in Stockholm, Gothenburg, Malmö and Kristineberg, including SWIC Sjöstadverket Water Innovation Center, which is a unique research facility for water treatment jointly owned by IVL and the Royal Institute of Technology (KTH).

CLIMATE AND ENERGY

Greenhouse gas emissions from business travel and energy consumption within IVL's operations totalled 207 (176) tonnes CO₂e, of which 166 (143) tonnes CO₂e comes from business travel and 41 (33) tonnes CO₂e from energy consumption. The majority of emissions, 80 (81) percent, come from business travel, of which air travel makes up 87 (88) percent and travel by car 12 (14) percent. The climate intensity, kgCO₂e/employee, i.e. emissions per employee for business travel and energy consumption amounted to 550 (502) kgCO₂e.

BUSINESS TRAVEL

In 2023, business travel has increased compared to last year; this increase is not in line with the numbers for 2019 before the pandemic. The number of person-kilometers has increased by 26 percent from the 2022 level, and the climate impact (CO₂e) has increased by 8 percent from the 2022 level. IVL's goal of reducing emissions from business travel, including by always considering whether travel is necessary and by choosing the train rather than air travel, remains. It is likely that travel will

not return to pre-pandemic levels thanks to an increased proportion of digital meetings. However, some travel is unavoidable in order to conduct operations and carry out assignments.

The share of air travel in passenger-kilometres has increased to 51 (42) percent; trains account for 42 (52) percent and car travel has increased slightly to 7 (6) percent.

ENERGY CONSUMPTION IN OPERATIONS

Total energy consumption for IVL's operations totalled 2,016 (1,838) MWh, of which 52 (48) percent comprised electricity, 40 (41) percent district heating and 8 (8) percent cooling. The increase is primarily related to temperature variations between the years. Most of the energy supply comprises renewable energy. IVL works together with our property managers to jointly identify and execute energy savings and measures for reducing energy consumption. Evaluation and implementation of the measures is ongoing.

CLIMATE FUND

Since 2016, IVL has been setting aside funds for a climate fund, which is used to offset carbon dioxide emissions from business travel. Carbon offsetting is conducted by means of credible standards, which ensure genuine and long-term emission reductions as well as contributing to other global goals within Agenda 2030.

As from 2019, IVL decided to allocate additional finances to the fund, corresponding to the external costs for emissions, and that the fund should also include emissions from energy consumption. Furthermore, it was decided that the funds should also be used for climate compensation, in order to facilitate additional measures for reducing emissions from IVL's activities, employees and society at large.

RESOURCE EFFICIENCY AND CIRCULARITY

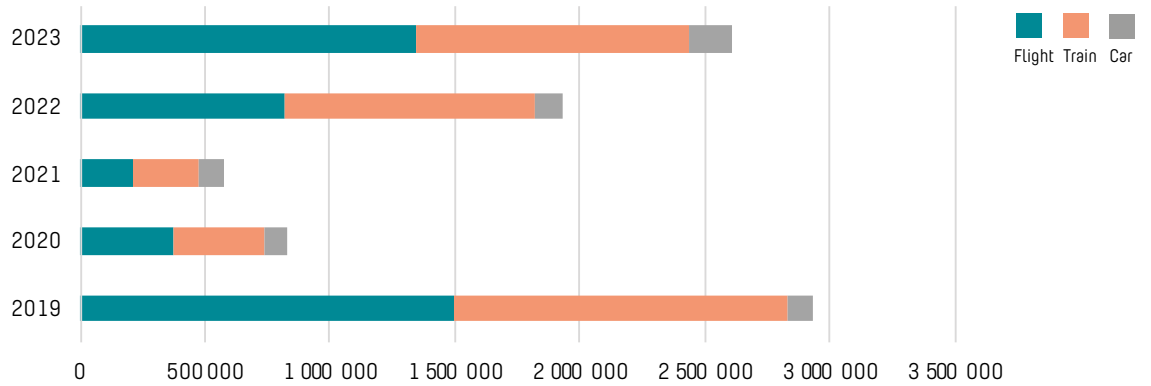
IVL's operations will be run in a resource-efficient manner, with reuse and recycling being obvious elements. The reuse of IT equipment and mobile phones has increased, and furnishings are also reused as far as possible. Any furnishings and equipment that IVL no longer requires are resold for reuse and continued use. To achieve sustainable purchasing, IVL prioritises purchasing environmentally friendly alternatives when it comes to consumables.

Climate and energy - business travel



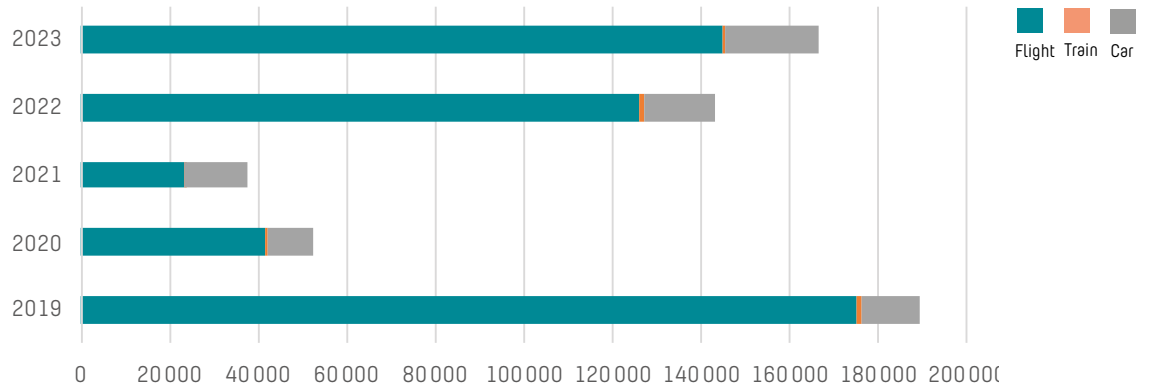
Business travel

Car Distance passenger km



Business travel

Greenhouse gas emissions
Climate impact kgCO₂e



Catering at meetings, conferences and other IVL events is vegetarian, organic and seasonal, and fairtrade and locally produced food is selected where available; food waste is also minimised. The total amount of waste from IVL's offices, measurement and analysis activities, as well as SWIC, amounted to 20.8 (43.2) tonnes, of which 18.1 (37.5) tonnes were recycled. Hazardous waste from measurement and analysis activities and process activities amounted to 2.7 (5.6) tonnes, of which 2.4 (4.5) tonnes were recycled (R code) and 0.4 (1.2) tonnes were disposed of (D code).

SUSTAINABLE USE OF CHEMICALS

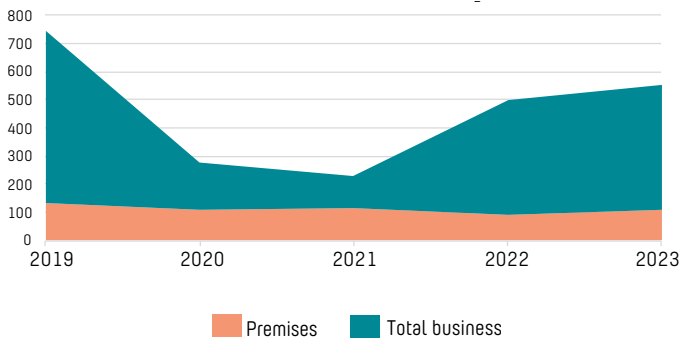
Chemicals are mainly used in IVL's measurement and analysis activities, where the choice of chemicals is largely governed by the analysis methods and the equipment used.

When developing analysis methods and purchasing equipment, IVL therefore works systematically to reduce the use of chemicals as far as possible and replace hazardous chemicals with alternatives that have a lower impact on the environment and provide a safer work environment.

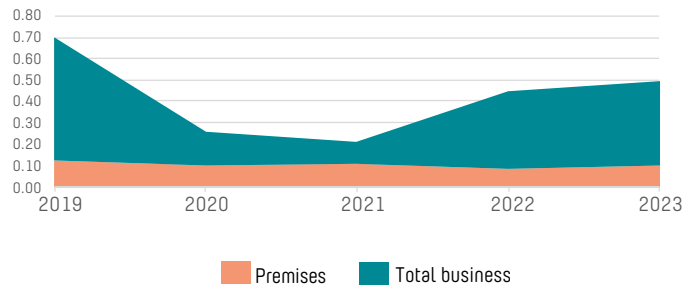
In 2023, we changed one of our analysis methods at the laboratory in Gothenburg, which resulted in both reduced chemical consumption and an improved work environment. Chemicals are also used in the research activities at SWIC, the Sjöstadverket Water Innovation Center. Here, techniques are developed for reusing and utilising treated wastewater, while optimising both chemical and resource use in water treatment. ■

Comparison of climate intensity 2019-2023

Climate intensity per employee, kg CO₂e/employee



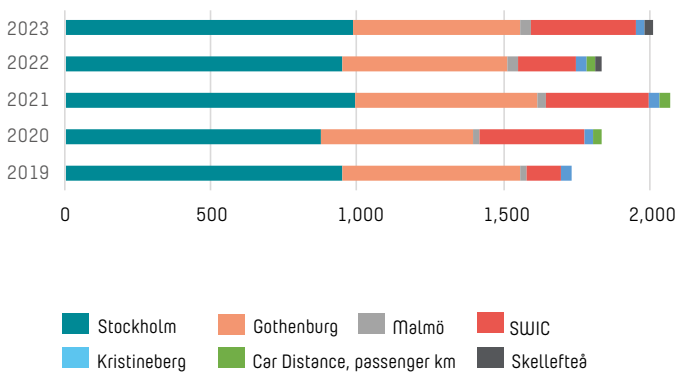
Climate intensity per net turnover, kg CO₂e/TSEK



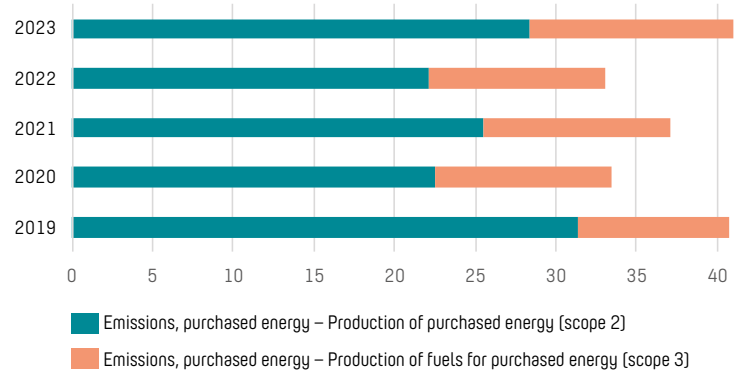
Energy and climate facilities



Total energy consumption premises, MWh

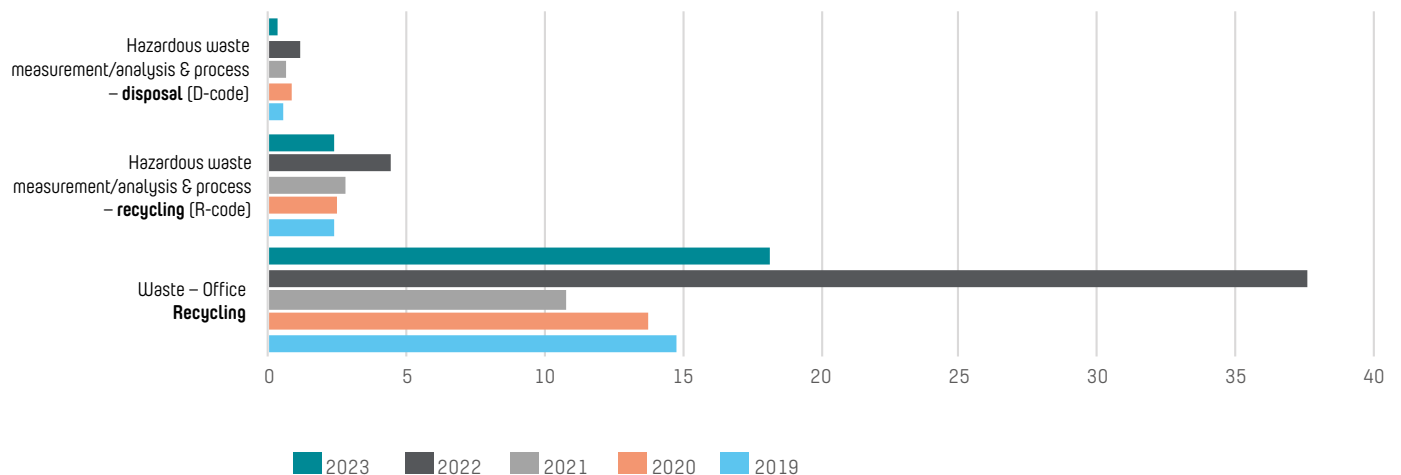


Climate impact purchased energy, tonnes of CO₂e



Resource efficiency and circularity – waste

Resource efficiency and circularity – waste, Tonnes







Directors' report

The Board of Directors and the CEO of IVL Swedish Environmental Research Institute, corporate ID no. 556116-2446, hereby submit the annual report for operating year 1 January 2023 - 31 December 2023.

Operations in general

The IVL Swedish Environmental Research Institute (IVL) conducts applied research and consultancy assignments across the entire environmental and sustainability area. Our customers are found in all industries, government agencies and organisations. Our operations are based in Sweden and Europe, but our customers are located throughout the world, particularly in China, where IVL has been active for more than 30 years. IVL has offices in Stockholm, Gothenburg, Malmö, Skellefteå, Beijing, Mumbai and Fiskebäckskil.

IVL, founded in 1966, is owned by the Swedish Institute for Water and Air Quality Research Foundation (SIVL). The Swedish government and the Swedish business sector appoint directors to serve on the boards of the company and the foundation. IVL has operated as a limited company since 1982.

In addition to the parent company, IVL, the Group consists of the partially owned subsidiaries BASTAonline AB, eBVD i Norden AB, Möbelfakta Sverige AB and the joint venture company Sino-Swedish Environmental Technology Development Center (SEC) in China, as well as the wholly-owned subsidiaries EPD International AB, IVL Sustainable Building AB, IVL India Environmental R&D Private Limited in Mumbai. IVL's operations are essentially conducted within the parent company.

Overview of Results and Financial Position

Sales and profit 2023

Group

Consolidated net sales during the financial year increased by 1.5% (6.7) and amounted to TSEK 517,320 (509,558).

Profit after tax for the year amounted to TSEK 35,301 (35,036), of which the minority share is TSEK 84 (141). For a more detailed overview of developments in the Group's and the Company's operations, position and results, see the multi-year overview in Note 2.

Parent company

Consolidated net sales during the financial year increased by 1.5% (4) and amounted to TSEK 484,399 (477,015). Profit for the year after tax amounted to TSEK 13,848 (14,208).

Distribution between research and consultancy assignments in activities

During the year, the shares of fees earned and expenditures incurred in IVL's research and consultancy activities accounted for 45.3 (45.2) percent and 54.7 (54.8) percent, respectively. In this context, "research activities" refer to (i)

research co-funded by the central government and the business sector via the Swedish Institute of Water and Air Conservation Research Foundation, and (ii) activities funded through subsidies from central government research bodies, research foundations, the EU and its equivalents. Co-funded activities accounted for 9.6 (10.9) percent of fees earned and expenditures incurred during the year, while activities funded through subsidies represented 35.8 (34.5) percent.

Dividend policy

IVL is run as a limited company and is owned by the Swedish Institute for Water and Air Quality Research (SIVL). IVL has operated as a limited company since 1982. The IVL Swedish Environmental Research Institute is non-profit in the sense that no profit is distributed to the owners, rather it is reinvested in the company's R&D operations.

The owner foundation, SIVL, is responsible for the funds made available by the state for co-funded environmental research at the IVL Swedish Environmental Research Institute. SIVL has a joint board where the business sector appoints half of the members and the government the other half. The chair of the board is appointed by the government.

Subsidiaries

■ BASTAonline AB

BASTAonline AB (corp. ID no. 556719-5697) is 60 percent owned by IVL Swedish Environmental Research Institute and 40 percent owned by the Swedish Association of Construction Product Industries. The BASTA system is intended for anyone who wants to make conscious product choices with the aim of phasing out substances with particularly hazardous properties. This includes property owners, contractors, architects, structural engineers, private individuals and others. The biggest event last year was the launch of a new website with many new functions, such as item and company pages. During the year, the system's criteria were also recast and the registration procedure was improved to simplify the registration process and accommodate large-scale imports.

■ Möbelfakta Sverige AB

Møbelfakta Sverige AB (corporate ID no. 559252-0810) is 51% owned by IVL Swedish Environmental Research Institute and 49% owned by Trä- och Möbelföretagen (TMF). Möbelfakta is a sustainability label for furniture in public procurement. The core operations consist of the development of criteria for the labelling of furniture and processes for verification of compliance with requirements by furniture manufacturers. Möbelfakta works actively to harmonise the requirements at a Nordic and a European level. During the financial year, Möbelfakta increased its use as a type 1 eco-label in public

procurement in Sweden, Norway and Denmark. Affiliated companies are based in Sweden, Norway, Denmark, Finland, the Baltic countries and Poland.

■ EPD International AB

EPD International AB (corporate ID no. 556975-8286) has been a wholly owned subsidiary of IVL since 1 July 2014. The company has its registered offices in Stockholm, and operations are located at IVL's offices in Stockholm, Gothenburg, Malmö and Beijing, as well as being conducted through international partners. The company operates and manages the International EPD® System, a programme for third-party-verified environmental product declarations (EPDs).

The company operates globally and has customers in all continents. In total, EPD International has over 6,900 valid EPDs from over 45 companies published on www.environdec.com. In 2023, more than 2,900 new EPDs were registered.

■ eBVD i Norden AB

Since 2017, eBVD i Norden AB (corp. ID no. 559093-5390) has been 51 percent owned by IVL Swedish Environmental Research Institute and 49 percent owned by the Swedish Association of Construction Product Industries. The construction sector in Sweden has agreed to voluntarily declare construction products from an environmental point of view according to the digital building product declaration eBVD. eBVD i Norden AB operates a digital system that aims to streamline and reduce the costs of environmental information and to offer a place where the information can be accessed. At the end of the year 2023/2024, the company had 276 (264) licensed users of the system.

■ IVL Sustainable building AB

IVL Sustainable Building AB (corp ID no. 559419-6270) was founded in 2023 as a wholly owned company of IVL Swedish Environmental Research Institute. The company operates the construction industry's common arena for circular building and management, CCBuild, which started as an innovation project in 2015. Reuse in the construction sector will be one of

the measures needed to reduce climate impact and achieve efficient resource management. During the year, it was also decided that the company will operate the construction sector's Environmental Calculation Platform, which offers a digital calculation tool and a knowledge platform for climate declarations of constructionworks. At the end of 2023, CCBuild had 167 affiliated partners and the Environmental Calculation Platform had 115 licensees.

■ IVL Environmental Technologies (Beijing) Company Ltd

Since 2014, IVL has a wholly-owned subsidiary in China. The subsidiary offers environmental research and consulting services in matters related to environment and sustainability. The focus in recent years has been on the environmental impact of value chains, where the company works with both Swedish and Chinese companies that strive to communicate credible data on the environmental impact of their products with the help of life cycle analyses and environmental product declarations (EPDs). The company also works to promote cleantech and assist Swedish cleantech companies in the Chinese market in air and water-related activities.

■ Sino-Swedish Environmental Technology Development Center Ltd (SEC)

For more than twenty years, IVL and the Tianjin Academy of Environmental Sciences (TAES) have been joint owners of the Sino-Swedish Environmental Technology Development Centre Ltd (SEC), based in Tianjin. SEC has helped a large number of Swedish environmental technology companies enter the Chinese market.

■ IVL India Environmental R&D Private Ltd

Since 2019, IVL has had a wholly owned subsidiary in India, which mainly works with technology for wastewater treatment projects on the Indian market. Currently, IVL in India provides project management expertise to the city of Mumbai as it manages the construction of wastewater treatment infrastructure with a focus on the reuse of treated wastewater and stormwater management.

Key ratios for IVL's subsidiaries

Subsidiaries, TSEK	Net sales		Profit after financial items		Equity	
	2023	2022	2023	2022	2023	2022
BASTAonline AB	8,508	7,614	1,253	616	4,873	4,064
Möbelfakta Sverige AB	3,981	3,137	250	115	417	269
EPD International AB	25,437	16,515	4,607	4,610	9,909	7,037
eBVD i Norden AB	1,756	1,133	40	62	452	429
IVL Sustainable building AB	3,759	N/A	94	N/A	81	N/A
IVL Environmental Technol.(Beijing) Company Ltd	7,516	3,437	500	235	4,802	4,327
Sino-Swedish Environmental Technol. Develop. Center Ltd (SEC)	3,147	1,984	86	-203	1,759	1,680
IVL India Environmental R&D Private Ltd	17,491	23,175	6,409	6,690	8,795	3,552

Expected future developments

IVL's financial position is stable and we continue to see a high demand for services in our business areas as existing and new customers seek support within sustainability and environmental issues. We continuously adapt our services to changes in the operating environment and technological developments.

Risks and risk management

Within IVL's business planning, an assessment is made annually of the most significant risks to the operation. Based on this risk analysis, a proactive risk management plan is also drawn up.

The IVL Group is exposed to financial risks consisting of fluctuations in income and cash flow resulting from changes in exchange and interest rates, as well as credit risks. Overall, however, the financial risks are relatively minor. The company continually assesses the need to hedge the flows of payments, but once more elected not to engage in hedging during 2023.

Other information about the company's operations

Assignments

In addition to assignments for clients in industry and the business sector, municipalities and organisations, IVL performs large-scale assignments for the Swedish Environmental Protection Agency. For example, IVL is responsible for most of the national monitoring activities, together with partners, for the collection and reporting of Sweden's total emissions of air, water, waste and hazardous substances.

National and EU-funded research

In 2023, IVL successfully secured funding through grants for a large number of research projects and major programmes. The largest share of this funding consists of national research grants, which IVL applies for in competition with other project proposals. Sales in 2023 for the four largest funders are as follows: Vinnova MSEK 25 (26), Formas MSEK 22 (15), Mistra MSEK 15 (14) and the Swedish Energy Agency MSEK 12 (13). Sales in EU projects amounted to MSEK 56 (37), which is an increase of more than 50 percent. Our research is focused on current issues in sustainability and environmental issues within IVL's three thematic areas sustainable society, sustainable transition and sustainable environment.

Co-funded research

The Swedish Institute for Water and Air Quality Research (SIVL) is the owner of the company and the principal for IVL's co-funded research. SIVL receives government funding for co-funded research and development at IVL. The co-funding is conditional and requires co-funding from industry and the business sector of at least an equal proportion. In 2023, SIVL

allocated a total of MSEK 37 (37) for co-funded research with the business sector and co-funding of EU grants through government grants to the Swedish Environmental Protection Agency MSEK 17 (17) and MSEK 20 (20) from Formas. The government funding serves as a foundation for a total research budget of MSEK 84 (92). In 2023, MSEK 10 (10) was received through Formas for basic funding for the development of skills and research activities, as a complement to the co-funded research.

European networks and collaborations with higher education institutions

As a research institute, one of IVL's roles is to create arenas for collaboration with different actors in society. This is one of the reasons why IVL has an active role in different types of networks and participates in a number of European technology platforms. IVL has entered into strategic collaboration agreements with KTH and Chalmers regarding the development of collaborative research.

Significant events during the year

- ▶ The relocation of Sjöstadverket Water Innovation Centre (SWIC) to Loudden, east of Frihamnen in Stockholm.
- ▶ CEO Marie Strannegård left her post and Anna Söderholm (Jarnehammar) took over as acting CEO, while a new CEO was recruited to start in the organisation on 1 January 2024.
- ▶ Stefan Pettersson took over as Head of Research and Anna Holmquist as Head of Communications and Marketing.
- ▶ We started the subsidiary IVL Sustainable Building.

Significant events after the end of the financial year

John Rune Nielsen will take over as CEO of IVL on 1 January 2024.

Description of operations and activities

The purpose of IVL's operations is to promote ecologically, economically and socially sustainable growth in business and society through applied research and consultancy projects. The business is organised into three operational units, as well as sections for research, business development and international business, HR, administration and finance, which operate across the organisation. IVL's working methodology is characterised by an interdisciplinary and holistic approach. The company operates broadly in the entire field of sustainability. Therefore, in addition to the traditional environmental expertise, there is also expertise in behavioural science, economics, communication and social sciences.

Operations extend across all industries and client groups in Swedish society, from small businesses to large international companies, trade associations, government authorities – where

the Swedish Environmental Protection Agency is the largest single contributor and client – as well as municipalities and organisations.

Ownership

Since 2004, IVL has been wholly owned by the Swedish Institute of Water and Air Conservation Research Foundation (SIVL), corp. ID no. 802006-2611, with its registered office in Stockholm. The purpose of the foundation is to create the long-term conditions for environmental research at IVL and, through ownership, to guarantee that IVL maintains an independent position. SIVL has a joint board where the government appoints the chairperson and six members, while the business sector appoints seven members. SIVL is the sole owner of IVL and proposes members to the board of IVL, partly by inviting nominations from representatives of the business community, and partly by inviting nominations from the government.

Organisation and our operational units

IVL's activities are organised into four operational units, which in turn are divided into a number of groups with group managers who lead personnel and occupancy planning. This work is carried out within the three thematic areas: Sustainable environment, Sustainable transition and Sustainable society. A council with external stakeholders, appointed by IVL's ownership foundation SIVL, is linked to the three thematic areas. Central functions for research, HR, finance and administration, the project office, and communication and marketing operate across the entire organisation.

IVL's thematic areas



Organisation chart



Group management and management team

IVL's executive management consists of the CEO, the Executive Vice President, the CFO and the Head of Research. The company management group also includes the three heads of sections, the Head of Communications and Marketing and the Director of Human Resources.

Affiliates outside of Sweden

IVL's operations in China are conducted in part through branch called IVL China Representation office, which had eight employees at the end of 2023.

Business intelligence

IVL's strategy work includes comprehensive business intelligence. In 2023, issues related to the climate have continued to be a top priority. The green industrial transition has gained increased attention due to the realisation that we will need to transition more quickly to a fossil-free society. This momentum can largely be credited to international climate negotiations during the year.

We also continue to see that in addition to climate-related issues, other issues are important. IVL's strength lies in our ability to work to address several different environmental issues at the same time.

Gender equality and diversity

In order to achieve our vision of a sustainable society, great emphasis is placed on gender equality and diversity issues. Of the Group's full-time employees, 52% (53%) are women. At IVL, we focus on expertise when recruiting staff, and over the past year we have brought in new employees from various nationalities and backgrounds. IVL's board comprises 30% (40) women, and 60% of IVL's management team are women.

Sustainable development

A sustainable IVL

IVL reports information about the company's sustainability work together with the development and financial results of our operations. IVL reports according to GRI's (Global Reporting Initiatives) latest guidelines, entitled GRI Standards, and it reports at CORE level. Through stakeholder dialogues and materiality analyses, IVL has identified the areas that are of material significance to the company. These are: Customer and environmental benefit, i.e. how IVL contributes to improving the environmental performance of customers and a sustainable society

- Work environment, health and safety
- Equality, non-discrimination and diversity
- Competence and leadership development
- Ethics and integrity
- Climate and energy
- Chemical management
- Resource efficiency and circularity

A report on the principles and GRI indicators is presented in the Annual Report in the GRI index section. The Board's tasks include identifying how sustainability issues affect the company's risks and business opportunities. In accordance with Chapter 6, Section 11 of the Swedish Annual Accounts Act, IVL has chosen to prepare a statutory sustainability report as an integrated part of the annual report.

Strategic objectives

IVL's Board of Directors has adopted the following strategic objectives for 2023:

Market

- Customer satisfaction
- Balance between assignments and research

Finances

- Increased turnover nationally and internationally
- Margin

Attractive workplace

- Employee satisfaction (eNPS)
- Staff turnover

Brand

- Brand awareness

Innovation and research

- Document and communicate how we achieve environmental benefits linked to the SDGs
- Scientific articles
- 20-25 percent of research turnover from EU programmes

Environmental and quality management

IVL works on sustainability, environmental and quality issues within the scope of an integrated management system. The system and its implementation at IVL are ISO-certified for environmental and quality management in accordance with SS-EN ISO 14001:2015 and SS-EN ISO 9001:2015 respectively. These certifications are maintained annually and certified periodically by accredited certification agencies. Most of the operations comprising sampling, field measurements and analyses are accredited and audited regularly by SWEDAC in accordance with SS-EN ISO/IEC 17025:2018. IVL also operates according to the ISO information security standard, ISO 27 000.

Quality

IVL's work on quality focuses on customer relations, and regular follow-ups are performed to ensure that customers are satisfied with the company's work. The customers represent the business sector, local authorities and government agencies. The Customer Satisfaction Index (CSI), on a 10-point scale, was 8.3 in 2023 (8.4 in 2022). The analysis of the results from the interviews is used as a basis for the development of IVL's operations and continuous improvement work.

The interviews show that our customers have a positive view of IVL as a professional and important partner and supplier.

The work and composition of the Board during the year

During the 2023 financial year, the Board held five ordinary meetings in addition to one statutory meeting. The Board's work primarily includes strategic issues, financial statements and major investments and acquisitions. The Board receives regular reports on the development of the company's operations and finances. Selections of the company's operations are presented at ordinary meetings. The CEO reports to the board at the meetings. The Board appoints a remuneration committee from among its members, which proposes principles for remuneration and other terms of employment for the CEO and other members of the executive management. The committee consists of at least two members who are appointed for a term of two years. ■

Specification of equity in the group and parent company

GROUP, TSEK	Share capital		Other equity, including profit for the year			Total
Opening balance	7,000			183,344		190,344
Minority equity share						(3,220)
Translation difference				402		402
Profit/loss for the year				35,301		35,301
Amount at year end	7,000			219,047		226,047
Non-controlling interest						(3,671)

PARENT COMPANY, TSEK	Share capital	Statutory reserve	Fund for development expenditure	Retained earnings	Profit for the year	Total
Opening balance	7,000	1,400	530	77,654	14,208	100,792
Appropriation of profit according to annual general meeting				14,208	-14,208	0
Dissolution Fund for development expenditure			-133	133		0
Profit/loss for the year					13,848	13,848
Amount at year end	7,000	1,400	397	91,995	13,848	114,640

Proposed appropriation of parent company's profit/loss

At the disposal of the annual general meeting (TSEK):

Retained earnings	91,995
Profit/loss for the year	13,848
Total	105,843

The Board and the CEO propose that the profit (TSEK) be allocated so that it is

carried forward	105,843
Total	105,843

For more information on the company's and the Group's financial position and performance for the financial year on 31 December 2023, see the following income statements, balance sheets, statements of cash flows and notes to the financial statements.



Consolidated financial statements and parent company financial statements

Income Statements

TSEK	Note	GROUP		PARENT COMPANY	
		2023	2022	2023	2022
Operating income					
Billed fees and expenses	Note 3	517,320	509,558	484,399	477,015
Change in work in progress	Note 4	8,508	-34,563	85	-36,678
Other operating income		559	1,269	463	1,269
Net sales		526,387	476,264	484,947	441,606
Operating expenses					
Expenses		-74,575	-53,542	-74,575	-53,542
Other external costs	Note 6	-95,134	-90,174	-83,490	-79,456
Staff costs	Note 7	-309,156	-277,728	-300,889	-269,808
Depreciation of fixed assets	Note 8	-7,360	-8,955	-7,078	-7,579
Total costs		-486,225	-430,399	-466,032	-410,385
Operating profit		40,162	45,865	18,915	31,221
Profit from financial items					
Interest income	Note 9	5,129	468	4,698	452
Interest expenses	Note 9	-151	-164	-133	-159
Profit or loss on other securities and receivables which are fixed assets		330	-2,900	330	-2,900
Profit after financial items		45,470	43,269	23,810	28,611
Appropriations	Note 10	0	0	-5,736	-9,955
Tax on profit for the year	Note 11	-10,169	-8,233	-4,226	-4,448
Profit/loss for the year		35,301	35,036	13,848	14,208
Minority share of profits for the year		451	141		

Consolidated balance sheet

TSEK	Note	GROUP	
		2023-12-31	2022-12-31
Assets			
Fixed assets			
Intangible fixed assets			
Capitalised software development expenditure	Note 12	3,173	3,975
Business combinations, goodwill		0	0
Property, plant and equipment			
Furniture and equipment	Note 13	25,287	26,441
Financial assets			
Shares and participations		0	0
Total fixed assets		28,460	30,416
Current assets			
Current receivables			
Accounts receivable		76,282	99,330
Receivables from Group companies		17,999	12,471
Tax assets		6,034	5,678
Other receivables		8,014	8,815
Accrued revenue	Note 5	142,240	14,554
Prepaid costs	Note 15	12,904	10,533
Total current receivables		263,473	151,381
Short-term investments	Note 20	135,809	29,776
Cash and bank balances	Note 19	149,399	221,090
Total current assets		548,681	402,247
Total assets		577,141	432,663
Equity and liabilities			
Equity			
Share capital (7,000 shares)	Note 21	7,000	7,000
Other equity including profits for the year		219,047	183,344
Total equity		226,047	190,344
Non-controlling interest		3,671	3,220
Provisions	Note 16	22,884	19,423
Non-current liabilities			
Liabilities to credit institutions	Note 18	1,293	1,842
Current liabilities			
Liabilities to credit institutions	Note 18	1,800	1,679
Work in progress on behalf of others		0	131,226
Accounts payable		28,132	27,118
Other liabilities		16,481	18,862
Unearned revenue	Note 5	257,221	16,964
Accrued costs	Note 17	23,283	25,205
Total current liabilities		326,917	221,054
Total equity and liabilities		577,141	432,663

Balance sheet - Parent Company

TSEK	Note	PARENT COMPANY	
		2023-12-31	2022-12-31
Assets			
Fixed assets			
Intangible fixed assets	Note 12		
Capitalised software development expenditure		2,044	2,725
Property, plant and equipment	Note 13		
Furniture and equipment		21,500	22,526
Financial assets			
Shares and participations	Note 14	3,581	3,556
Total fixed assets		27,125	28,807
Current assets			
Current receivables			
Accounts receivable		68,721	83,513
Receivables from Group companies		33,329	20,303
Tax assets		6,441	6,222
Other receivables		2,315	4,974
Accrued revenue	Note 5	16,381	14,554
Prepaid costs	Note 15	12,880	10,533
Total current receivables		140,067	140,099
Short-term investments	Note 20	119,809	29,701
Cash and bank balances	Note 19	113,816	192,304
Total current assets		373,692	362,104
Total assets		400,817	390,911
Equity and liabilities			
Equity			
Restricted equity			
Share capital (7,000 shares)	Note 21	7,000	7,000
Restricted reserves		1,400	1,400
Development expenditure reserve		397	530
Total restricted equity		8,797	8,930
Non-restricted equity		91,999	77,654
Profit/loss for the year		13,844	14,208
Total non-restricted equity		105,843	91,862
Total equity		114,640	100,792
Untaxed reserves	Note 10		
Depreciation in excess of plan		10,637	12,070
Tax allocation reserve		26,586	19,417
Total untaxed reserves		37,223	31,487
Provisions		1,116	808
Work in progress on behalf of others	Note 4	148,815	178,391
Accounts payable		23,932	20,784
Other liabilities		15,398	16,776
Unearned revenue	Note 5	37,107	16,964
Accrued costs	Note 17	22,586	24,909
Total current liabilities		247,838	257,824
Total equity and liabilities		400,817	390,911

Cash flow statement

TSEK (Direct method)	GROUP		PARENT COMPANY	
	2023	2022	2023	2022
Current operations				
Profit after financial items	45,470	43,269	23,810	28,611
Adjustments for non-cash items	25,341	17,522	20,924	13,637
Tax paid	-9,155	-13,076	-4,445	-9,815
Cash flow from current operations before changes in working capital	61,656	47,715	40,289	32,433
Cash flow from changes in working capital				
Decrease (+)/Increase (-) in receivables	18,321	-16,930	4,425	-4,105
Decrease (-)/Increase (+) in accounts payable	1,014	8,544	3,148	3,977
Increase (+)/Decrease (-) in other liabilities	-2,259	2,295	-1,378	433
Increase (+)/Decrease (-) in advance payments for work in progress	-36,971	35,435	-29,576	30,057
Cash flow from changes in working capital	41,761	77,059	16,908	62,795
Investments				
Acquisition of intangible assets	0	-1,250	0	0
Sale/Acquisition of tangible assets	-5,271	-11,948	-5,371	-10,193
Sale/Acquisition of financial fixed assets	0	0	-25	-2,253
Change in short-term investments	-106,108	2,900	-90,108	2,900
Cash flow from investment activities	-111,379	-10,298	-95,504	-9,546
Financing activities				
Non-current liabilities	-549	1,151	0	0
Amortisation of loans	0	0	0	0
Cash flow from financing activities	0	0	0	0
Cash flow for the year	-70,167	67,912	-78,596	53,249
Opening cash and bank balances	221,090	155,068	192,304	139,582
Difference when switching to the acquisition method	0	0	0	0
Exchange rate differences in cash and cash equivalents	-1,524	-1,890	108	-528
Cash and bank balances at year-end	149,399	221,090	113,816	192,304

Notes

with accounting policies and year-end comments

Note 1 Accounting principles

Compliance with standards and legislation

The annual report and the consolidated accounts have been prepared in accordance with BFNAR 2012:1 Annual Report and Consolidated Accounts (K3).

Where guidance is not available from the K3 regulation, it has been obtained from the Swedish Annual Accounts Act (1995:1554).

The Parent Company applies the same accounting principles as the Group, other than as indicated below in the section "Parent Company's accounting principles". Any differences between the parent company's and the Group's principles are caused by limitations in the ability to apply the same valuation principles in the Group and the Parent Company as a result of K3 regulations.

Basis for the preparation of the financial statements of the Parent Company and the Group

The Parent Company's functional currency is the Swedish krona (SEK), which is also the reporting currency for the Parent Company and the Group. The financial statements are therefore presented in SEK. Assets and liabilities are recognised at historical cost, with the exception of certain financial assets and liabilities that are measured at fair value.

The preparation of financial statements under K3 requires the company management to make judgements, estimates and assumptions that affect application of the accounting principles and the amounts recognised for assets, liabilities, income and expenses. The estimates and assumptions are based on historical experience and a number of other factors that in the prevailing circumstances are judged to be reasonable. The results of these estimates and assumptions are then used to assess the carrying amounts for assets and liabilities that are not otherwise revealed clearly from other sources. The actual outcome may differ from these estimates and judgements. These estimates and judgements are typically made during preparation of the year-end and half-year accounts. In the event of changes at the company level or in its operating environment, it may become necessary to revise these estimates and judgements.

Financial instruments

In 2022, the Group changed its accounting policy regarding the valuation of financial instruments. Previously, valuation was applied on the basis of fair value. The Group has changed the accounting principle for valuation of financial instruments to K3 Chapter 11 regarding valuation of financial instruments based on acquisition value.

Classification etc.

Fixed assets and non-current liabilities of the Parent Company and the Group essentially only consist of amounts expected to be recovered or paid after more than 12 months from the balance sheet date. Current assets and current liabilities in the Parent Company and the Group essentially only consist of amounts expected to be recovered or paid within 12 months calculated from the balance sheet date.

Principles of consolidation

Subsidiaries are entities over which IVL exercises a controlling influence. A controlling influence consists of a right, directly or indirectly, to control the financial and operational strategies of another company in order to gain economic benefits. In establishing whether a controlling influence exists, account shall be taken of shares with potential voting rights that may be used or converted without delay.

The acquisition method is used to report IVL's acquisitions of subsidiaries. The cost of an acquisition consists of the fair value of assets provided as remuneration, issued equity instruments and liabilities incurred or assumed at the date of transfer. Identifiable acquired assets and assumed liabilities and contingent liabilities in a business combination are initially valued at their fair values on the acquisition date, regardless of the extent of any holding without a controlling interest. The surplus represented by the difference between the cost and fair value of the Group's share of identifiable acquired assets, liabilities and contingent liabilities is recognised as goodwill. If the cost is less than the fair value of the acquired subsidiary's assets, liabilities and contingent liabilities, the difference is recognised directly in the income statement.

Intragroup receivables and liabilities, income and expenses and unrealised gains or losses arising from transactions between Group companies are eliminated in their entirety during preparation of the consolidated accounts.

Foreign currency

Foreign currency transactions are translated to the functional currency at the exchange rate prevailing on the transaction date. Monetary assets and liabilities in foreign currencies are translated to the functional currency at the exchange rate prevailing on the balance sheet date.

Exchange rate differences arising from recalculations are recognised in the income statement. Non-monetary assets and liabilities recognised at historical cost are recalculated at the exchange rate on the transaction date. Non-monetary assets and liabilities recognised at fair value are recalculated to the functional currency at the rate prevailing at the time of measurement at fair value, and any exchange rate difference is then recognised in the same way as for other changes in value for the asset or liability. The functional currency is the currency of the countries in which the companies included in the Group conduct their operations.

The functional and reporting currency of the Parent Company is the Swedish krona (SEK). The reporting currency of the Group is the SEK.

Assets and liabilities of foreign operations are translated to SEK at the exchange rate prevailing on the balance sheet date. Income and expenses in foreign operations are translated to SEK at an average rate that is an approximation of the rates at the times of the respective

transactions. Any translation differences arising during translation of foreign net investments are recognised in other comprehensive income.

Revenue

The percentage of completion method is used for all projects where the outcome can be calculated reliably. Assignments carried out on current account, whereby revenue is recognised when the work is performed and normally invoiced to the customer in the following month, generated but unbilled income, are reported as accrued income. Where a fixed price is agreed, the income is reported when the work is essentially completed according to the so-called percentage of completion method. Unbilled ongoing projects are assessed in the balance sheet as the amount of the directly paid expenses plus indirect expenses minus invoiced partial payments.

If it is probable that total contract costs will exceed total contract revenue, the anticipated loss is recognised immediately as an expense in its entirety. Revenue is not recognised if it is likely that the financial benefits will not accrue to the Group. In the event of significant uncertainty regarding payment or associated costs, there is no revenue recognition.

In grant-funded projects in which IVL functions as a contractual partner with the research funding body and allocates project funding to other participants in the projects, such funds are not recognised as income, but accounted for directly under the heading of work in progress on behalf of others. As a result, the invoicing and costs of expenses are deducted corresponding to the funds received, and are then paid out to other project partners.

Operating expenses and financial income and expense

Parent Company costs under operating leases are reported in the income statement on a straight-line basis over the term of the lease. Benefits acquired in connection with the signing of an agreement are reported as a part of the total leasing cost in the income statement. Variable charges are expensed in the periods in which they are incurred.

Minimum lease fees under finance leases in the Group are allocated between interest expenses and the amortisation of the outstanding liability. Interest expenses are distributed over the term of the lease such that each accounting period is charged with an amount corresponding to a fixed interest rate for the liability recognised in each period. Variable charges are expensed in the periods in which they are incurred.

Financial income and costs consist of interest income from bank deposits, short-term investments and receivables, and interest expenses to suppliers and other creditors.

Receivables and liabilities

Receivables are recognised at the estimated amount of income, i.e. after deduction of uncertain debts assessed individually. Impairment of receivables is recognised in Operating expenses. Other receivables are classified as long-term receivables if the holding period is longer than one year and if they are shorter than other receivables. Cash and cash equivalents consist of cash and immediately available balances with banks and similar institutions.

Loans and other financial liabilities, such as accounts payable, are measured at accumulated acquisition cost. Accounts payable have a short expected maturity and are valued without discounting to a nominal amount. Non-current liabilities have an expected term of more than a year, while current liabilities have a term of less than a year.

Property, plant and equipment

Owned assets

Tangible fixed assets are reported as assets on the balance sheet, if it is probable that future economic benefits will accrue to the company and the acquisition cost for the asset may be calculated reliably. Tangible fixed assets are recognised in the Group at acquisition cost after deduction of accumulated depreciation and any impairment losses. Acquisition cost includes the purchase price and costs directly attributable to putting the asset into place and in a condition that it is fit for use in accordance with the intention of the acquisition.

The carrying amount for a tangible fixed asset is removed from the balance sheet upon scrapping or disposal or when no future economic benefits are expected from the use or the scrapping or disposal of the asset. Any gain or loss arising from disposal or scrapping of an asset is determined as the difference between the selling price and the carrying amount of the asset, less the direct costs of the sale. Any gain or loss arising is recognised as an operating income/expense.

Leased assets

In the consolidated accounts, leases are classified as either finance or operating leases. A finance lease exists when the economic risks and benefits associated with ownership are essentially transferred to the lessee. Where this is not the case, the lease is an operating lease. Assets leased under finance leases are recognised as assets on the consolidated balance sheet. The obligation to pay future lease fees is recognised under non-current and current liabilities. The leased assets are depreciated according to plan, while the lease fees are recognised as interest and the amortisation of the liabilities. Under operating leases, the lease fee is recognised as an expense on a straight-line basis over the term of the lease.

Intangible assets

Goodwill

Goodwill is defined as the difference between the acquisition cost of operating acquisitions and the fair value of assets acquired, liabilities assumed and contingent liabilities.

Goodwill is allocated to cash-generating units and groups of cash-generating units and is tested annually for impairments. Goodwill is thus measured at acquisition cost less any accumulated impairments.

Capitalised software development costs

Other intangible assets acquired by the Group are recognised at acquisition cost, less accumulated amortisation. Subsequent expenditure on capitalised intangible assets is recognised as an asset in the balance sheet only when this results in an increase in future economic benefits associated with the specific asset to which it relates. All other expenses are recognised as a cost when incurred.

Other assets

Other assets are measured at cost unless otherwise stated.

Impairment and impairment testing

The reported amounts for the Group's assets are tested for devaluation on every balance sheet date to determine whether there is any indication of devaluation. If any such indication is found, the recoverable amount for the asset is calculated. Any impairment loss is charged to the income statement.

The recoverable amount is the fair value less costs of sale or the value in use, whichever is the higher. In calculating the value in use, future cash flows are discounted by a discount factor that takes into account

the risk-free interest rate and the risk associated with the specific asset. The recoverable amount for goodwill and other intangible assets with indefinite useful lives and intangible assets not yet ready for use is calculated annually.

At each reporting date, the company assesses whether any objective evidence exists to indicate impairment of any financial assets or group of assets. Objective evidence includes observable events that have occurred and adversely affect the possibility of recovering the acquisition cost, and a significant or prolonged decline in the fair value of an investment in a financial investment classified as a financial asset available for sale.

Employee benefits

Obligations relating to fees for defined-contribution pension plans are recognised as expenses in the income statement as they arise. IVL does not operate any defined-benefit pension plans.

Provisions in connection with terminations of employment are reported only if the company is demonstrably obligated to terminate employment before the normal date, or when compensation is offered as an incentive for voluntary departure. For the company to be obligated to terminate an employment, there must be e.g. a detailed plan setting out, as a minimum, details of the workplace, positions affected and the approximate number of affected employees, as well as compensation amounts for each personnel category or position and the time for implementation of the plan.

Provisions

Provisions are recognised in the balance sheet when the Group has an existing obligation (legal or constructive) arising from an event that has occurred, when it is probable that an outflow of financial resources will be required in order to discharge such an obligation and when the amount can be estimated reliably.

Income taxes

Income tax is made up of current tax and deferred tax. Income taxes are recognised in the income statement.

Current tax is tax that is to be paid or received for the current year, applying the tax rates that have been decided or decided in practice on the balance date, as well as the adjustment of current tax attributable to earlier periods. Deferred tax is calculated using the balance sheet method, which focuses on temporary differences between the reported amount of an asset or a liability and its taxable amount. The assessment of deferred tax is based on how the reported value of assets or liabilities is expected to be realised or settled.

Deferred tax is based on the tax rates and tax rules enacted or in practice on the balance sheet date.

Parent Company's accounting principles

The Parent Company's accounts have been prepared in accordance with BFNAR 2012:1 Annual Report and Consolidated Accounts (K3) and the Swedish Annual Accounts Act (1995:1554).

Differences between the accounting policies of the Group and the Parent Company

In the Parent Company, participation in subsidiaries and associated companies is recognised using the cost method. Dividends received are recognised as income. In the Parent Company, all leases are accounted for in accordance with the rules on operating leases. Leasing in the consolidated financial statements is reported as tangible fixed assets with short-term and long-term liabilities to credit institutions. In the Parent Company, untaxed reserves are reported, including deferred tax liability. In the consolidated financial statements, however, untaxed reserves are divided into deferred tax liability and equity. In the Group, work in progress is reported at a fixed price according to the main rule, with successive profit settlement. Profit settlement is then calculated on the basis of processing at customer prices, with a certain provision for precautionary reasons. In the parent company, work in progress is reported according to the percentage of completion method. Profit recognition takes place when projects are substantially completed, at a completion rate of 95 percent.

Note 2 Summary of finances and key ratios

TSEK	GROUP					PARENT COMPANY				
	2023	2022	2021	2020	2019	2023	2022	2021	2020	2019
Sales and profit										
Billed fees and expenses	517,320	509,558	476,912	423,588	383,309	484,399	477,015	458,986	405,885	376,037
Net sales	526,387	476,264	434,420	396,246	383,112	484,947	441,606	406,867	373,146	368,812
Operating profit after depreciation and amortisation	40,162	45,864	34,316	28,543	18,930	18,915	31,221	25,326	15,565	9,983
Operating profit after net financial items	45,470	43,269	36,280	29,316	20,299	23,810	28,611	27,297	16,341	11,363
Profit margin	8.8%	8.5%	7.6%	6.9%	5.3%	4.9%	6.0%	5.9%	4.0%	3.0%
Equity ratio	50.1%	44.0%	46.8%	45.9%	40.9%	28.5%	32.2%	32.5%	31.4%	29.6%
Current ratio	2.09	1.82	1.92	1.80	1.54	1.50	1.40	1.40	1.31	1.22

Profit margin

Profit after net financial items as a percent of net sales.

Equity ratio

Adjusted equity in relation to total assets.

Current ratio

Current assets divided by current liabilities.

Note 3 Net sales

TSEK	GROUP		PARENT COMPANY	
	2023	2022	2023	2022
Net sales are divided into:				
Billed fees and analyses	468,706	443,739	435,785	411,196
Billed expenses	48,614	65,819	48,614	65,819
Total net sales	517,320	509,558	484,399	477,015

Of net sales for the year, 20.4% (20.2%) relates to invoicing to other companies in the Group. This portion consists of remuneration for co-funded research carried out by the company on a contract basis and remuneration for personnel services and expenses.

Note 4 Change in Work in progress/ Work in progress on behalf of others

TSEK	PARENT COMPANY	
	2023	2022
Assignment costs	862,489	815,910
Advance billing	-1,006,232	-984,474
Book value	143,743	173,564
Change reported in		
Income Statement	-85	36,678
Balance Sheet	29,576	-30,057
Total change in work in progress for the year	29,491	6,621

Note 5 Accrued revenue/ unearned revenue

TSEK	GROUP		PARENT COMPANY	
	2023	2022	2023	2022
Accrued revenue				
Assignment costs	617,532	127,806	126,709	127,806
Advance billing	-475,292	-113,252	-110,328	-113,252
Book value	142,240	14,554	16,381	14,554
Unearned revenue				
Assignment costs	538,236	50,608	149,825	50,608
Advance billing	-795,455	-67,572	-186,832	-67,572
Book value	257,221	16,964	37,107	16,964

Note 6 Other external costs

Auditor's fees

TSEK	GROUP		PARENT COMPANY	
	2023	2022	2023	2022
R3 Revisionsbyrå KB				
Audit assignment	429	411	301	290
Other services	462	123	462	123
Other auditors				
Audit assignment	18	18	0	0
Total	909	552	763	413

Leasing costs, Group and Parent Company

Leasing fees for operating leases during the year amounted to TSEK 28,372 (24,735). Leasing fees include lease agreements for properties, computers and certain office equipment. The costs relating to future leasing fees in these agreements are payable in the following years:

TSEK	2024	2025	2026	2027	2028
Other lease fees	1,800	912	381	0	0
Rental of premises	27,139	25,388	26,023	26,673	13,925
Total	28,939	26,300	26,404	26,673	13,925

Note 7 Personnel, staff costs and senior executives

Staff costs, Group

TSEK	2023		2022	
	Salaries and other remuneration	Social costs (of which pension costs)	Salaries and other remuneration	Social costs (of which pension costs)
Board of Directors and CEO	2,285	873	3,165	1,276
Other employees	211,376	89,865	186,404	82,924
Total	213,661	90,738	189,569	84,199
		(24,873)		(26,686)

Average number of employees* in the Group

	2023			2022		
	Men	Women	Total	Men	Women	Total
Stockholm	72	82	154	64	80	144
Gothenburg	66	105	171	63	101	164
Fiskebäckskil	4	5	9	1	5	6
Malmö	11	21	32	16	11	27
Beijing	4	11	15	4	10	14
Tianjin	8	4	12	8	4	12
Mumbai	43	1	44	36	1	37
Total	208	229	437	192	212	404

*defined as the number of paid full-time equivalents

Staff costs, Parent company

TSEK	2023		2022	
	Salaries and other remuneration	Social costs (of which pension costs)	Salaries and other remuneration	Social costs (of which pension costs)
Board of Directors and CEO	2,285	873	3,165	1,276
Other employees	203,055	88,807	179,040	82,040
Total	205,341	89,680	182,205	83,816
		(24,873)		(26,686)

Sick leave rate, Parent company

	2023	2022
Sick leave rate	2.77%	3.23%

Average number of employees* in the Parent Company

	2023			2022		
	Men	Women	Total	Men	Women	Total
Stockholm	72	82	154	64	80	144
Gothenburg	66	105	171	63	101	164
Fiskebäckskil	4	5	9	1	5	6
Malmö	11	21	32	16	11	27
Beijing	3	7	10	2	6	8
Total	156	220	376	146	203	349

*defined as the number of paid full-time equivalents

Number of employees on company's management team

	2023	2022
Men	3	3
Women	5	6

Members of the Board

	2023	2022
Men	6	6
Women	3	4

Senior management

Parent company

In accordance with a decision by the AGM, Board of Directors fees totalling TSEK 684 (613), including social costs, were reported as costs. Of this amount, the chairperson was paid TSEK 125 (125) excluding national insurance costs.

The period of notice for the CEO of the Parent Company is 12 months and severance pay in an amount corresponding to 6 times the CEO's fixed monthly salary is due if employment is terminated by the company. Pension is expensed according to ITP 2 plan.

Note 8 Depreciation of intangible and tangible fixed assets

Group and Parent Company

Planned depreciation of capitalised costs for programme development occurs annually at the rate of 10 percent to 33.3 percent of cost from the date of completion during the year.

Amortisation of operating goodwill occurs annually at 20 percent of cost. Any need for impairment is assessed with regard to the present value of future surpluses.

Planned depreciation of machinery and equipment is done annually at a rate of 10 percent to 20 percent of the acquisition cost from the date of acquisition during the year in the parent company.

Machinery and equipment is depreciated according to plan on the basis of the remaining economic life of the asset in accordance with a measurement conducted specifically for an international joint venture.

Note 9 Interest income and costs, Group and Parent Company

The Group reports interest income and return on short-term investments of 5,459 (-2,432), and in the parent company TSEK 5,028 (-2,448). Interest costs of TSEK 151 (161) were reported for the Group, and TSEK -133 (135) for the parent company; of the interest costs in the parent company, TSEK 98 (78) refer to Group companies.

Note 10 Appropriations and untaxed reserves

TSEK	PARENT COMPANY	
	2023-12-31	2022-12-31
Opening balance, untaxed reserves	31,487	21,531
Change in accumulated depreciation according to plan (machinery & equipment)	-1,433	3,099
Change in tax allocation reserve	7,169	6,857
Total appropriations	5,736	9,956
Closing balance, untaxed reserves	37,223	31,487

Note 11 Tax on profit for the year

Estimate of effective tax rate, TSEK	GROUP		PARENT COMPANY	
	2023	2022	2023	2022
Profit before tax	45,470	43,269	18,073	18,656
Tax at applicable tax rate 20.6% (20.6)	9,367	8,913	3,723	3,843
Non-taxable income	-10	0	-10	-1
Non-deductible expenses	616	356	616	356
Standard income, tax allocation reserves	391	0	78	13
Standard income, funds	24	25	24	27
Tax from previous year(s)	-205	0	-205	0
Foreign tax expense	2,135	188	0	210
Difference foreign tax	-2,149	-1,249	0	0
Reported effective tax	10,169	8,233	4,226	4,448
Reported effective tax rate	22.36%	21.91%	23.38%	23.84%

Note 12 Intangible fixed assets

GROUP, TSEK	Development expenditure	
	2023-12-31	2022-12-31
Opening acquisition cost	10,450	11,328
Acquisitions for the year	134	1,250
Disposals	0	-2,128
Closing accumulated acquisition cost	10,584	10,450
Opening depreciation	-6,476	-6,599
Disposals	0	2,127
Depreciation for the year	-935	-2,004
Closing accumulated depreciation	-7,411	-6,476
Closing residual value according to plan	3,173	3,975

PARENT COMPANY, TSEK	Development expenditure	
	2023-12-31	2022-12-31
Opening acquisition cost	7,312	7,312
Disposals	0	0
Closing accumulated acquisition cost	7,312	7,312
Opening depreciation	-4,586	-3,906
Disposals	0	0
Depreciation for the year	-681	-681
Closing accumulated depreciation	-5,267	-4,586
Closing residual value according to plan	2,045	2,725

Note 13 Property, plant and equipment

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Opening acquisition cost	116,776	115,471	112,076	112,526
Purchases for year incl. finance leases	5,347	11,947	4,921	10,192
Retirements for the year	0	-10,462	0	-10,642
Closing accumulated acquisition cost	122,124	116,776	117,447	112,076
Opening depreciation	-90,335	-93,931	-89,550	-93,294
Exchange difference	-4	-4	0	0
Retirements for the year	0	10,642	0	10,642
Depreciation for the year	-6,500	-7,042	-6,397	-6,898
Closing accumulated depreciation for equipment	-96,836	-90,335	-95,947	-89,550
Closing residual value according to plan	25,287	26,441	21,500	22,526

Finance leases

Equipment held under finance leases is included in the Group with a carrying value of TSEK 3,093 (3,520). Under short-term and long-term liabilities in the Group's balance sheet, future payments are reported in respect of leased liabilities imposed. See also Note 18 "Liabilities to credit institutions".

Note 14 Group companies and other long-term securities holdings

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Opening acquisition value, shares and participations	0	0	3,556	3,556
Acquisitions/divestments for the year	0	0	25	0
Closing accumulated acquisition cost	0	0	3,581	3,556

Shares and participations

Company , TSEK	GROUP			PARENT COMPANY	
	Number	%	Book	Quota value	Book
Basta Online AB	600	60%	0	60	60
EPD International AB	500	100%	0	50	50
Sino-Swedish (Tianjin) Environmental Technology Development Co., Ltd	1	50%	0	581	581
IVL Environmental Technologies (Beijing) Company Ltd	1	100%	0	546	2,799
IVL India Environmental R&D Private Limited	1	100%	0	16	16
eBVD i Norden AB	510	51%	0	26	26
Möbelfakta i Sverige AB	510	51%	0	26	26
IVL Sustainable Building AB	250	100%	0	25	25
Total			0		3,581

Profit/loss for the year, equity, registered office and corporate ID number are presented in the Directors' Report.

Note 15 Prepaid costs

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Rentals for offices and other premises	7,501	6,197	7,501	6,197
Other prepaid expenses	5,403	4,335	5,379	4,335
Amount at year end	12,904	10,532	12,880	10,532

Note 16 Provisions

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Deferred tax liabilities	21,712	18,754	-	-
Climate funding	1,172	808	1,008	808
Amount at year end	22,884	19,562	1,008	808

Note 17 Accrued costs

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Holiday and overtime liabilities	9,919	7,238	9,919	7,238
Accrued social costs	9,995	15,543	9,995	15,543
Other accrued costs	3,364	2,424	2,673	2,128
Amount at year end	23,278	25,205	22,587	24,909

Note 18 Liabilities to credit institutions

TSEK	GROUP	
	2023-12-31	2021-12-31
Non-current liabilities		
Amount at start of year	1,679	691
Change in liabilities to credit institutions	-386	988
Amount at year end	1,293	1,679
Current liabilities		
Amount at start of year	1,841	1,479
Change in liabilities to credit institutions	-41	362
Amount at year end	1,800	1,841

All liabilities have maturity dates of less than 5 years

Note 19 Pledged collateral and contingent liabilities, Group and Parent Company

TSEK	2023-12-31	2022-12-31
Pledged collateral in respect of debt owed to credit institutions		
Chattel mortgages	22,800	22,800
Total	22,800	22,800
Contingent liabilities	None	none

Note 20 Short-term investments, Group and Parent Company

TSEK	GROUP		PARENT COMPANY	
	2023-12-31	2022-12-31	2023-12-31	2022-12-31
Opening balance	29,701	32,601	29,701	32,601
Increase in fixed income investments	106,000		90,000	
Change in value	108	-2,900	108	-2,900
Amount at year end	135,809	29,701	119,809	29,701

Note 21 Disclosures on share capital, Parent Company

TSEK	2023-12-31		2022-12-31	
	Number	Quota value per share	Number	Quota value per share
Value/number at beginning of the year	7,000	1,000	7,000	1,000
Value/number at year-end	7,000	1,000	7,000	1,000

Note 22 Appropriation of profit or loss, Parent Company

TSEK	2023-12-31	2022-12-31
Retained earnings	91,995	77,654
Profit/loss for the year	13,848	14,208
Total	105,843	91,862
Carried forward	105,843	91,862

Certification

Stockholm, March 2024

The Board of Directors and the CEO declare that the annual accounts have been prepared in accordance with generally accepted accounting principles in Sweden. The Annual Report gives a true and fair view of the position and performance of the Parent Company and the Group. The Directors' report for the Parent Company and the Group provides a true and fair overview of the development of the Parent Company's and the Group's operations, position and results.

Alf Engqvist
Chairman of the Board

Måns Nilsson
Board member

Linda Styhre
Employee representative

Peter Nygårds
Board member

Pär Larshans
Board member

Marie Louise Falkland
Board member

Henrik Sundström
Board Member

John Rune Nielsen
CEO

Anne Vadasz Nilsson
Board member

Mikael Malmaeus
Employee representative

Our audit report has been issued April 2024

R3 Revisionsbyrå KB

Tomas Nöjd
Authorised Public Accountant

Christina Kallin Sharpe
Authorised Public Accountant





Corporate governance

The corporate governance of IVL Swedish Environmental Research Institute is based on Swedish legislation and generally accepted practices, with due account taken of the Swedish Code of Corporate Governance. Due to the fact that IVL is not a listed company and is owned by a foundation, the Code of Corporate Governance has been adapted accordingly. The Board's tasks include identifying how sustainability issues affect the company's risks and business opportunities.

Ownership

Since 2004, IVL Swedish Environmental Research Institute has been wholly owned by the Swedish Institute for Water and Air Quality Research Foundation (SIVL). At the conversion of the then Institute for Water and Air Conservation Research into a public limited company in 1982, SIVL's original share capital was allocated in equal part by an agreement between the Swedish government and the Swedish business sector.

SIVL's purpose is to promote long-term conditions for environmental research and through ownership guarantee IVL an independent position. SIVL is responsible for the funds provided by the Swedish government and the Swedish business sector for environmental and sustainability-related research at IVL.

IVL has a joint board where the government appoints the chairperson and six members, while the business community appoints seven members. The chairperson has the deciding vote.

Annual General meeting

The Annual General Meeting is normally held in May. Notice of the Annual General Meeting will be sent by e-mail with acknowledgement of receipt to the owner. The owner, SIVL, is represented at the general meeting by SIVL's chairperson.

Nomination procedure for IVL's Board of Directors

As the sole owner of IVL, SIVL proposes members for IVL's Board of Directors, partly by inviting nominations from of the Industry Group of the Confederation of Swedish Enterprises for four regular members and one deputy member for IVL's Board of Directors, and partly by inviting nominations from the government for the Chairperson, as well as three regular members and one deputy for IVL's Board of Directors.

IVL's Board of Directors shall consist of no less than four and no more than eight members, plus no less than one and no more than two deputies. The trade union representatives are also entitled to nominate two members and two deputies.

The members of IVL's Board consist of three women and six men. The members of the Board are presented on page 72.

The Board of Directors and the work of the Board in 2023

Within the framework of the Swedish Companies Act and the Articles of Association, the Board of Directors is responsible for the company's organisation and administration. Every year, the Board adopts rules of procedure. It is accompanied by a work instruction for the CEO, which regulates the division of duties between the Board of Directors and the CEO. In 2023, according to the rules of procedure, the Board held five ordinary meetings in addition to the statutory meeting held in May in connection with the Annual General Meeting. As usual, the ordinary Board meetings took place in connection with the presentation of full-year or interim financial statements, i.e. in March, May, September and December, as well as an additional day in June for strategy discussions.

At all ordinary board meetings, an agenda is followed, which always includes a report from the CEO, financial reports, strategic issues and risk and impact analysis. At the board meeting in March, the Director's Report and proposal for the appropriation of profits was adopted, along with a new investment policy. At the meeting in May, the rules of procedure for the Board of Directors were adopted, as well as instructions to the CEO. In June, a strategy day was held together with the board of the owner foundation. The results from this collaborative meeting served as the basis for the strategy that was discussed and adopted at the Board meeting in September. At the Board meeting in September, a decision was made per capsulam to appoint Anna Söderholm as acting CEO. At the Board meeting in December, John Rune Nielsen was appointed as the new CEO of IVL as of the start of 2024, and the budget and business plan for the coming year were adopted.

Remuneration Committee

Under the rules of procedure for the Board of Directors of the IVL Swedish Environmental Research Institute, the Board of Directors shall appoint a Remuneration Committee to deal with issues related to terms and conditions of employment and remuneration. The committee proposes salaries, other forms of remuneration, and other terms and conditions of employment for the CEO, which are then presented to the Board of Directors for approval. Similarly, terms and conditions for

other members of executive management of the company are proposed by the CEO, and these are then presented to the remuneration committee for approval. The company does not operate any incentive programmes.

Remuneration to the Board of Directors

The 2023 Annual General Meeting approved fees to the chairperson and members of the board. Remuneration for the chairperson was set at TSEK 125 (125) in fixed remuneration, TSEK 50 (50) in fixed remuneration to ordinary members and TSEK 20 in fixed remuneration to deputies. No remuneration is paid to the employee representatives.

External audit

The auditors' task, on behalf of the owner, is to conduct an impartial review of the administration of the Board of Directors and the CEO, as well as the company's annual report and annual accounts. R3 Revisionsbyrå KB, represented by Tomas Nöjd and Christina Kallin Sharpe as senior auditors, has been elected as auditor to serve during the period up to the 2024 AGM.

Tomas Nöjd and Christina Kallin Sharpe are authorised public accountants and have led the auditing task on behalf of IVL since 2014.

Corporate governance

The CEO is responsible for the day-to-day administration of the company in accordance with the guidelines and other instructions issued by the Board of Directors. The CEO's instructions were adopted on 4 May 2023 in connection with the board's inaugural meeting.

The company's executive management group consists of the CEO, the Executive Vice President, Director of Administration, Director of Research, Director of Human Resources and three operations unit managers.

In addition to the executive management group, the head of the project office and the quality and environmental manager report to the CEO regarding functional responsibility ("dotted line")

- **Marie Fossum Strannegård**, CEO from 15 April 2020 through 15 August 2023, born 1973, B.Sc. System Analysis 1995, Karlstad University and MBA Strategic Management 2005, Norwegian School of Economics
- **Anna Söderholm (Jarnehammar)** has served as IVL's acting CEO from 15 August 2023 to 31 December 2023. born 1965, M.Sc. Mechanical Engineering, 1991, Luleå University of Technology, Executive Vice President and Director of Business Development and International Business. She has been employed by the company since 2004. Anna Jarnehammar is chair of IVL's subsidiaries Bastaonline AB and Möbel-fakta AB

Internal control

The basis for internal control within the company is IVL's operations and management system. At the same time, this represents the company's integrated quality and environmental management systems, which are certified in accordance with ISO 9001 and ISO 14001. The management system focuses on IVL's core operations, i.e. "to offer/market and conduct research and consultancy projects in the environmental field", and includes governing documents, procedures and tools for all processes within the company.

The internal control regarding financial reporting comprises the control environment with organisation, decision pathways, authority and responsibilities that have been documented and communicated in governing documents. All governing documents, procedures and tools are available via the company's intranet.

Every year, the Board adopts rules of procedure that govern the division of responsibilities between the Board and CEO as well as the company's financial reporting to the Board. Financial reports are presented to the Board at every meeting. These comprise outcomes, budget and comparison with the preceding year, as well as order backlog, investments and a number of key ratios.

Evaluation of the Board of Directors and the CEO

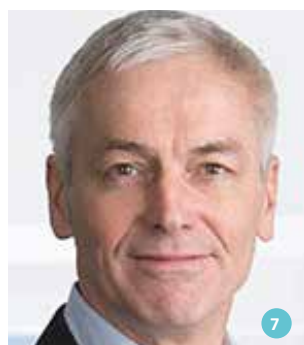
The Board's work is evaluated annually. In 2023, this evaluation was done through an anonymous survey that was presented at the board meeting in March.

The Board of Directors continually evaluates the CEO's performance by monitoring progress towards established objectives. Once a year, in conjunction with the March board meeting, a more formal evaluation is discussed with the CEO.

Risk analysis and management

The management system also includes routines and a methodology for annual risk analyses regarding everything from financial risks and conditions, IT security, external factors and customer relationships to loss of competence and risks associated with image and brand. The risk analyses are accompanied by action plans. The management system is subject to internal audits twice a year and ongoing control by independent quality and environmental auditors. This work is also reported to the Board. ■

Board of Directors on 31 December 2023



Chair

1 Alf Engqvist

Board member since 2021

Position: Senior Advisor

Other assignments: Board member of Gomero Group AB, Board member of Ribera AB

Members

2 Peter Nygårds

Board member since 2008

Position: Chairman of the Swedish Institute for Water and Air Quality Research Foundation

Other assignments: Chairman of the Board of Ecoclime Group AB, Chairman of the Board of Almi Invest GreenTech AB, Board member of PN Extended Strategies AB, Board member of Compita Sweden AB, Board member of Polar Capacity

3 Måns Nilsson

Board member since 2019

Position: CEO, SEI

Other assignments: Board member of Sveaskog AB

4 Anne Vadasz Nilsson

Board member since 2021

Position: Director-General, Legal, Financial and Administrative Services Agency

5 Marie Louise Falkland

Board member since 2017

Position: Senior Technical Manager, Outokumpu

Other assignments: Board member of Outokumpu Prefab AB, Board member of Outokumpu Press Plate AB, Board member of the County Administrative Board of Dalarna

6 Pär Larshans

Board member since 2017

Position: Sustainability Manager Ragn-Sells

Other assignments: Board member of SIWI, government appointment; Advisory Council for the Swedish Chemicals Agency, Chair of the ICC Global Working Group on Circular Economy in Paris, Member of the Board of Water Europe, Chair of the EuRIC Construction & Demolition Branch

7 Henrik Sundström

Director since 2020

Position: self-employed

Other assignments: CEO of Ånö Hållbarhet & Hantverk AB

8 Mikael Malmaeus

Board member since 2017

Position: employee representative

Other assignments: Deputy Board member of Malmaeus Konsult AB

9 Linda Styhre

Board member since 2021

Position: employee representative

Other assignments: CEO of Progressor Development Sweden AB

Deputies

10 Johan Gistorp

Deputy member since 2020

Position: Head of Department at the Swedish Radiation Safety Authority

Other assignments: Limited partner in KR's Bilplåt Kommanditbolag

11 Sara Gorton

Deputy member since 2022

Position: Head of Sustainability at Skanska Sverige

Other assignments: Chair of the Stig and Ragna Gorthon Foundation

12 Anders Björk

Deputy member since 2018

Position: employee representative

13 Andreas Englund

Deputy member since 2022

Position: employee representative

Other assignments: Chairman of Ekoingenjörernas Riksförbund, Chairman of the Nomination Committee SACO-förbundet Naturvetarna

CEO

14 Anna Söderholm (Jarnehammar)

Position: Acting CEO, IVL Swedish Environmental Research Institute

Management team on 31 December 2023



Anna Söderholm (Jarnehammar)
InterimCEO
Head of section: business development
and international business



Thomas Nilsson
CFO



Stefan Pettersson
Head of research



Karin Sjöberg
Head of Section: Environmental permits
and action strategies



Patrik Isaksson
Head of Section: Sustainable society



Mona Olsson Öberg
Head of Section: Sustainable business
and consumption



Anna Holmquist
Head of Communications and Marketing



Anna Amgren
Director of Human Resources

Sustainability notes

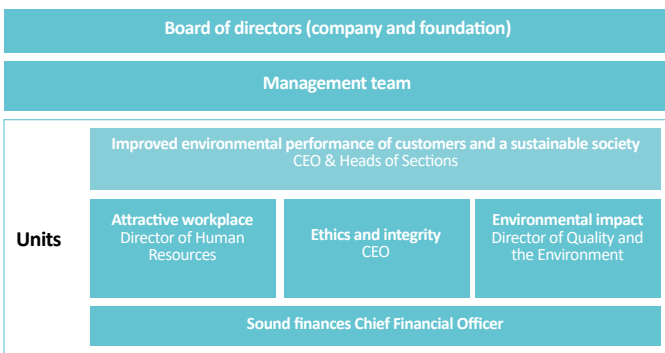
IVL's vision, Sustainable Society, means that sustainability should permeate all parts of our operations, both in relation to our customers and other stakeholders as well as in our internal work. IVL's sustainability work is structured around policies, strategies, management systems and business plans. The work is headed by the IVL management team, which establishes strategy, focus and goals for sustainability work. Development and implementation of the work takes place in the sections. The CEO regularly reports the status of the work to the company's Board of Directors and the foundation's Board of Directors. The Board has overall responsibility for IVL's sustainability strategy and long-term goals and approves the annual sustainability report.

Focus areas and responsibilities

IVL's sustainability work has been divided into five focus areas, within which various aspects of the work are developed and conducted. The focus areas have been defined based on the essential areas of operations. This focus ensures that sustainability is integrated into all parts of our operations. The structure and focus areas were defined in 2018 as part of the work to clarify and strengthen IVL's sustainability work.

A focus area supervisor has been defined for each focus area and is responsible for the development of each focus area, including objectives, action plans and follow-up, and for coordinating the implementation in the sections. The sections are responsible for implementation and development within the framework of each section's area of responsibility.

Focus areas and responsibilities



■ Improved environmental performance among customers and a sustainable society

Through assignments and research, IVL will contribute to meeting both the Global Sustainable Development Goals (Agenda 2030) and the Swedish environmental goals. Customer and sustainability benefits are created in assignment projects and research projects together with customers and other partners.

■ Attractive workplace

IVL's employees are our most important resource for achieving our vision. For this reason, IVL should be a good and attractive

workplace with a healthy working environment. It must also promote gender equality, equal treatment and diversity, with skills and leadership development taking place on a continual basis.

■ Ethics and integrity

Ethics and integrity are key components of IVL's reputation as an independent and credible institute. Operations must be conducted in accordance with IVL's code of conduct and values. IVL also works actively to identify and manage sustainability risks for the operation.

■ Environmental impact

As Sweden's leading environmental institute, it is important for IVL to take responsibility for and minimise both the direct and indirect environmental impact of its own operations. Internal environmental work is mainly conducted in three areas - *Climate and energy*, *Resource efficiency and circularity* and *Sustainable use of chemicals*.

■ Healthy finances

In order to successfully run and develop our operations and ensure our competitiveness, we need to maintain a healthy financial profile. The profit that IVL generates is reinvested in our own research and development. This also includes integrating sustainability aspects into decisions when IVL is providing funding, e.g. when investing in equipment or making a purchase.

Policies

The guiding principles for IVL's sustainability work are set out in our code of conduct, which is based on the UN Global Compact's ten principles and on IVL's values. The code of conduct applies to all IVL employees and board members and governs IVL's conduct towards employees, customers, suppliers, business partners and other stakeholders.

IVL's policies are reviewed and revised regularly. IVL has eight policies. IVL's sustainability and environmental policy describes the content and focus of sustainability work, and includes gender equality and diversity, work environment, skills development, environmental and quality aspects, as well as requirements for suppliers and partners. IVL also has an overall work environment policy that describes IVL's level of ambition for IVL as a workplace and working conditions within the organization in more detail and includes gender equality and equal treatment. There is also a travel policy describing principles related to environmental, safety and ethical aspects of business travel and corporate entertainment. The following policies also exist: salary policy, information security policy, media policy and a quality policy.

Management system and systematic approach

IVL has an integrated management system that provides a systematic and structured approach to the business and all aspects of sustainability work. The system is certified in accordance with the environmental and quality management standards, ISO 14001 and 9001. Within the framework of the management system, IVL continuously strives for improvement, setting goals and following up according to a defined system of management. The working environment work is conducted according to a working environment plan, which includes division of responsibility, goals, working methods, as well as a plan of action for the areas of organisational and social working environment.

All suppliers and partners are encouraged to follow IVL's code of conduct. The principles in IVL's code of conduct must be applied when evaluating of current and future suppliers.

Development of sustainability work

The work to clarify and strengthen IVL's sustainability work has continued during the year. Within the framework of this internal work, improvement activities are being carried out in prioritised areas. In 2023, improvement activities have continued in two focus areas in IVL's sustainability work and in our stakeholder dialogue:

- Within the focus area “Improved environmental performance of customers and a sustainable society”, work to further develop a method for calculating IVL's concrete contribution to the benefit of customers has continued.
- Within the focus area “Environmental impact”, the work of clarifying IVL's climate impact within scope 3 and calculating category 3.5 Waste has been carried out.

In addition to the specific improvement activities that are carried out within the framework of this internal work, continuous improvement work is also conducted in the various focus areas of IVL's sustainability work within the framework of regular line activities.

Dialogue and collaboration with stakeholders

Our dialogue with stakeholders is an important part of IVL's sustainability work and is a central component in the work to achieve IVL's vision: A sustainable society. For employees, customers, suppliers, the board and owners, a close and ongoing dialogue is conducted during the year through various forums. There are also stakeholders such as funders of research projects, politicians, authorities and, for example, the general public where IVL informs about our activities to contribute to a more sustainable society in general.

IVL's stakeholders, important aspects and channels

	Ongoing dialogue ← → Information				
Stakeholders	Employees	Customers Suppliers and partners	Board of directors and owners	Funders Politicians and authorities	Local community The general public Job seekers
Key aspects	<ul style="list-style-type: none"> • Improved environmental performance of customers and a sustainable society • Work environment, health and safety • Gender equality, equal opportunities and diversity • Competence and leadership development • Ethics and integrity 	<ul style="list-style-type: none"> • IVL shall be a role model for its internal sustainability work • Customer value contributes to the customer's sustainability performance • Requirements for suppliers 	<ul style="list-style-type: none"> • Business acumen and secured financing • Increased earnings • Work environment, health and safety • Gender equality, equal opportunities and diversity • Improved environmental performance on the part of the customer 	<ul style="list-style-type: none"> • Customer value and contributing to a sustainable society • Expertise in environment and sustainability • Contribute to business intelligence an input for new research areas 	<ul style="list-style-type: none"> • Contribution to Agenda 2030, the Paris Agreement, environmental goal • The local environment to our test beds and offices • A sustainable society
Channels	<ul style="list-style-type: none"> • Inforum, intranet • Unit meetings and group meetings • Manager forum (Chefsforum) • AMK, Safety representative • Employee appraisals • Pulse conversations • Employee survey 	<ul style="list-style-type: none"> • Customer survey including NQI • Ongoing customer dialogues • Reference and steering groups • Events, workshops, web, social media • Business councils • Meeting with strategic partners 	<ul style="list-style-type: none"> • CEO • Board meetings • Business councils • Questionnaire for alternative dialogue with the Board 	<ul style="list-style-type: none"> • CEO, Management, experts • Dialogue with government offices, ministries, political parties • Business councils • External communication such as media, Internet, SoMe 	<ul style="list-style-type: none"> • Career fairs • External communication such as media, Internet, SoMe

Customer survey (NQI)

Every year, a customer survey is conducted of a selection of IVL's commissioned projects, where in-depth interviews are conducted to determine how well the collaboration with IVL is working. This year's customer survey continues to show a high level of confidence in IVL, where 98% of surveyed clients would consider using IVL's services again and recommend us to others.

There is still a demand above all for analysis and impact assessments to understand environmental impact and less of a demand for strategies for long-term sustainability, which is a trend that has now been seen for a number of years. We can also see that proposals for measures are being demanded more and more, but still from a low level. If we look a little further ahead, strategy work and proposals for measures to improve environmental performance seem to have a greater impact on what we offer our customers.

Materiality analysis

The results from the dialogue with IVL's stakeholders in the company's various channels are used as a basis for IVL's materiality analysis and reporting according to GRI Standards. This governs which areas are highlighted in the sustainability report, in line with the principle of materiality. During the evaluation of the materiality analysis, the eight key areas that had previously been identified were still deemed to be relevant. These essential areas have been divided into five focus areas as shown in the table below. The most important aspect overall for IVL is the degree to which our operations contribute to environmental and sustainability benefits for the customer and the sustainable development of society, which is the foundation of IVL's vision. ■

IVL, material aspects and focus areas

Key aspect	Focus area
1. Customer and sustainability benefits	1. Improved environmental performance among customers and a sustainable society
2. Work environment, health and safety 3. Gender equality, equal opportunities and diversity 4. Competence and leadership development	2. Attractive workplace
5. Ethics and integrity	3. Ethics and integrity
6. Climate and energy 7. Sustainable use of chemicals 8. Resource efficiency and circularity	4. Environmental impact
9. Customer and sustainability benefits	5. Healthy finances



Photo: Fredrik Gårdsmo

GRI index – content and page references

IVL Swedish Environmental Research Institute reports information about the company’s sustainability work together with the development and financial results of the business in the annual report.

The sustainability report, as well as the annual report, pertains to the 2023 financial year and includes the Parent Company, unless otherwise stated. The sustainability-related information in the annual report is not audited by a third party.

We report all general standard disclosures. For specific standard disclosures, we report what has been defined as material for the business. This GRI index refers to where in the Annual and Sustainability Report the information is presented.

Disclosure number	Disclosure	Page	Comments and Omissions
General disclosures			
Organisation profile			
102-1	Name of organisation	Cover, 50	Front page of the report.
102-2	Activities, brands, products and services	4, 10-39, 50-52	
102-3	Head office location	4, 86	
102-4	Countries in which the organisation operates	4, 8-9	
102-5	Ownership structure and legal form	4, 50-52	
102-6	Markets in which the organisation operates	4, 8-9	
102-7	Scale of the organisation	4, Note 2	
102-8	Information about employees and other colleagues	4, 41-43, Note 7	
102-9	Supply chain	50-52	
102-10	Significant changes in the organisation and supply chain	52	
102-11	Precautionary principle	44, 50-52	
102-12	External initiatives	50-52	
102-13	Membership in organisations and networks	52	
Strategy			
102-14	Statement by the CEO	3	
Ethics and integrity			
102-16	The company’s core values, principles, standards and norms for conduct	4, 44, 54, 75-77	
Governance			
102-18	Governance and ownership structure for the organisation	50-55, 70-71, 75-77	
Stakeholder dialogue			
102-40	Stakeholder groups	4, 12-39, 72, 75-77	
102-41	Employees covered by collective bargaining agreements		100% of employees in Sweden are covered by collective bargaining agreements. Employees in China and India do not have collective agreements.
102-42	Identification and selection of stakeholder groups	5, 54, 75-77	
102-43	Methods for dialogue with stakeholders	75-77	
102-44	Key topics and concerns raised in dialogue with stakeholders	75-77	
Reporting practice			
102-45	Parts of the organisation included in the report	Note 1.5	
102-46	Definition of report content and limitations	75-77	
102-47	List of essential areas	75-77	
102-48	Adjustments to previously submitted information		
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Disclosure number	Disclosure	Page	Comments and Omissions
102-51	Date of the most recent report	75-77	
102-52	Reporting cycle	61-63	
102-53	Contact information for issues regarding the report	Cover	Back page of the report.
102-54	Statements on reporting according to GRI Standards	75-77	
102-55	GRI Index	75-77	
102-56	External review	75-77	
Essential areas			
Social standards			
Work environment, health and safety			
103-1	Explanation of important areas and their limitations	41-43	
103-2	Sustainability management and its components	41-43	
103-3	Sustainability governance evaluation	41-43	
403-1	Management systems for occupational health and safety.	41	
403-2	Hazard identification, risk assessment, and investigation of incidents	41	
403-3	Healthcare in the workplace	41	
403-4	Employee participation, advice and communication on the working environment, health and safety	41-43	
403-5	Training in occupational health and safety	41-43	
403-6	Health promotion	41-43	
403-8	Workers covered by an occupational safety and health management system	41-43	
403-9	Work-related injuries	41-43	
Gender equality and equal opportunities			
103-1	Explanation of important areas and their limitations	41-43, 45-46, 54	
103-2	Sustainability management and its components	41-43, 45-46, 54	
103-3	Sustainability governance evaluation	41-43, 45-46, 54	
405-1	Diversity in governing bodies and among employees	41-43, Note 7	
Training and education			
103-1	Explanation of important areas and their limitations	41-43	
103-2	Sustainability management and its components	41-43	
103-3	Sustainability governance evaluation	41-43	
404-1	Average training time per employee per year	42	
Economic standards			
Anti-corruption			
103-1	Explanation of important areas and their limitations	45-46, 54, 75-77	
103-2	Sustainability management and its components	45-46, 54, 75-77	
103-3	Sustainability governance evaluation	45-46, 54, 75-77	
205-2	Communication and training on anti-corruption	44	Part of training in IVL's Code of Conduct.
Environmental standards			
Energy			
103-1	Explanation of important areas and their limitations	54, 75-77	
103-2	Sustainability management and its components	45-46, 54, 75-77	
103-3	Sustainability governance evaluation	45-46, 54, 75-77	
302-1	Energy use within the organisation	45-47	
302-3	Energy intensity	45-47, 54, 75-77	
Emissions			
103-1	Explanation of important areas and their limitations	45-47, 75-77	
103-2	Sustainability management and its components	45-47, 54, 75-77	
103-3	Sustainability governance evaluation	45-47	
305-1	Direct greenhouse gas emissions (Scope 1)	45-47	Emissions from cars leased by the company are included in the reporting of business travel.
305-2	Indirect greenhouse gas emissions from energy consumption (Scope 2)	45-47	
305-3	Other indirect greenhouse gas emissions (Scope 3)	45-47	Includes business travel and production of fuels for purchased energy.
305-4	Intensity of greenhouse gas emissions	45-47	

Scientific publications

The scientific publications presented here have been generated using the citation database Web of Science. The search was conducted on 2024-01-11, where the search string specified that authors must be affiliated with IVL and that the date of publication is in 2023.

Thematic area: Sustainable environment

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Audit report

To the Annual General Meeting of IVL Svenska Miljöinstitutet AB
Org. reg. no. 556116-2446

Report on the annual accounts and consolidated accounts

Opinion

We have performed an audit of the annual report and consolidated accounts for IVL Svenska Miljöinstitutet AB for the year 2023. The company's annual report and consolidated accounts are included on pages 50-67 in this document.

In our opinion, the annual accounts and consolidated accounts have been prepared in accordance with the Swedish Annual Accounts Act and in all material respects, provide a fair presentation of the financial position of the parent company and the Group as of 31 December 2023, as well as their financial performance and cash flow for the year in accordance with the Swedish Annual Accounts Act. The Director's Report is consistent with the other parts of the annual report and consolidated accounts.

We therefore recommend to the Annual General Meeting that the parent company and consolidated income statements and balance sheets be adopted.

Grounds for opinions

We conducted our audit in accordance with International Standards on Auditing (ISA) and generally accepted auditing standards in Sweden. Our responsibility according to these standards is described in more detail in the section on "Auditor's responsibility". We are independent in relation to the Parent Company and Group in accordance with generally accepted auditing standards in Sweden and have otherwise fulfilled our professional ethics responsibility according to these requirements.

We believe that the accounting evidence we have obtained provides an adequate and appropriate basis for our opinions.

Information other than the annual report and consolidated accounts

This document also contains information other than the annual report and consolidated accounts, which is available on pages 1-49, 68-84. The Board and the CEO are responsible for this other information.

Our opinion regarding the annual accounts and consolidated accounts does not cover this information and we make no statement confirming this other information.

In connection with our audit of the annual accounts and consolidated accounts, it is our responsibility to read the information identified above and consider if the information to a material extent is inconsistent with the annual accounts and consolidated accounts. In this review, we also take into account the information we collected otherwise during the audit and assess if the information otherwise appears to contain material misstatements.

If we draw the conclusion based on the work done regarding this information that the other information contains a material misstatement, we are obliged to report it. We have nothing to report in this respect.

Responsibilities of the Board of Directors and the CEO

It is the Board of Directors and the CEO who are responsible for the preparation of the annual report and consolidated accounts and for ensuring that they provide a true and fair view according to the Annual Accounts Act. The Board and CEO are also responsible for the internal control that they deem to be necessary to prepare the annual report and consolidated accounts that do not contain any material misstatement, whether due to error or impropriety.

In preparing the annual accounts and consolidated accounts, the Board and CEO are responsible for the assessment of the company's and the Group's ability to continue the operations. They provide information, when appropriate, concerning conditions that might affect the ability to continue operations and presume continuing operations. However, this going concern assumption is not applied if the Board and CEO intend to liquidate the company, cease operations, or have no realistic alternative than to do either.

Auditor's responsibilities

Our objective is to obtain a reasonable degree of assurance as to whether the annual report and consolidated accounts as a whole contain no material misstatements, whether due to fraud or error, and to provide an audit report containing our

opinions. Reasonable certainty is a high degree of certainty, but it is no guarantee that an audit performed according to ISA and generally accepted auditing standards in Sweden will always discover a material misstatement if such exists. Misstatements can arise due to impropriety or error and are considered to be material if they, individually or together, can reasonably be expected to affect financial decisions that users make based on the annual accounts and consolidated accounts.

As a part of an audit according to ISA, we use professional judgement and adopt a professionally sceptical approach throughout the entire audit. Moreover:

- We identify and assess the risks of material misstatements in the annual accounts and consolidated accounts, whether due to fraud or error, formulate and carry out auditing procedures based in part on these risks and gather audit evidence that is adequate and suitable to form a basis for our opinions. The risk of not discovering a material misstatement due to fraud is higher than for a material misstatement due to error because improprieties can include acting in collusion, falsifying, intentional omission, incorrect information or disregarding internal controls.
- We acquire an understanding of the part of the company's internal control that is important for our audit in order to design audit measures that are appropriate in view of the circumstances, but not to express an opinion on the effectiveness of internal control.
- We evaluate the suitability of the accounting principles used and the reasonability of the Board's and CEO's estimates in the accounts and associated disclosures.
- We draw a conclusion on the suitability of the Board and CEO using the going concern assumption in preparing the annual accounts and consolidated accounts. We also draw a conclusion, based on the audit evidence obtained, as to whether there is any material uncertainty factor relating to events or conditions that could lead to significant doubts about the company's and the Group's ability to continue as a going concern. If we draw the conclusion that there is a material uncertainty factor, we must in our audit report call attention to the disclosures in the annual accounts and consolidated accounts regarding the material uncertainty factor or, if such disclosures are inadequate, modify the opinion regarding the annual accounts and consolidated accounts. Our conclusions are based on the audit evidence gathered up to the date of the audit report. However, future events or conditions may mean that a company and a group can no longer continue operations.
- We evaluate the overall presentation, structure and content of the annual report and consolidated accounts, including

the disclosures, and whether the annual report and consolidated financial statements reflect the underlying transactions and events in a manner that gives a true and fair view.

- We collect adequate and suitable audit evidence regarding the financial information for the units or business activities within the Group, in order to express an opinion concerning the consolidated accounts. We are responsible for the management, supervision and implementation of the Group audit. We are solely responsible for our opinions.

We must inform the Board of the audit's planned scope and emphasis, as well as its timing. We must also provide information about significant observations during the audit, including any significant deficiencies in the internal control we have identified.

Statement on other legal and regulatory requirements

Opinion

In addition to our audit of the annual report and consolidated accounts, we have also performed an audit of the management of the Board of Directors and the CEO of IVL Svenska Miljöinstitutet AB for 2023 and of the proposed appropriation of the company profit or loss.

We recommend to the Annual General Meeting that the profit be allocated in accordance with the proposal in the Director's Report and that the members of the Board of Directors and the CEO be discharged from personal liability for the financial year.

Grounds for opinions

We have conducted our audit in accordance with generally accepted auditing standards in Sweden. Our responsibility according to these standards is described in greater detail in the section "Auditor's responsibility". We are independent in relation to the Parent Company and Group in accordance with generally accepted auditing standards in Sweden and have otherwise fulfilled our professional ethics responsibility according to these requirements.

We believe that the accounting evidence we have obtained provides an adequate and appropriate basis for our opinions.

Responsibilities of the Board of Directors and the CEO

The Board of Directors has responsibility for the proposal on the allocation of the company's profit or loss. In the event of a proposed dividend, this includes an assessment of whether the dividend is justifiable considering the requirements set by the company's and Group's nature of operations, scope and risks on the size of the Parent Company's and the Group's equity, consolidation requirements, liquidity and position otherwise.

The Board is responsible for the company's organisation and the management of its affairs. This includes continuously assessing the company's and Group's financial situation and ensuring that the company's organisation is structured so that accounting, asset management and the company's financial affairs otherwise are controlled in a satisfactory manner. The CEO will take care of the operating management according to the Board's guidelines and instructions, and will take the actions necessary for the company's accounting to be performed in accordance with the law and for assets to be managed in a satisfactory manner.

Auditor's responsibility

Our objective with regard to the audit of the administration, and thus our discharge opinion, is to obtain audit evidence in order to assess with a reasonable degree of certainty whether any member of the Board of Directors or the CEO in any material respect:

- has taken any action or been guilty of any negligence which may give rise to liability for damages against the company, or
- in any other way acted in violation of the Swedish Companies Act, the Annual Accounts Act or the Articles of Association.

Our objective regarding the audit of the proposed allocation of the company's profit or loss, and thereby our statement regarding this, is to assess with a reasonable degree of certainty whether the proposal is consistent with the Swedish Companies Act.

Reasonable certainty is a high degree of certainty, but is no guarantee that an audit performed in accordance with generally accepted auditing standards in Sweden will always discover actions or negligence that can lead to liability to pay damages to the company, or that a proposed allocation of the company's profit or loss is not consistent with the Swedish Companies Act.

As a part of an audit according to generally accepted auditing standards in Sweden, we use professional judgement and have a professionally sceptical approach in the entire audit. The review of the administration and the proposed appropriation of the company's profit or loss are primarily based on the audit of the accounts. What additional review procedures are done is based on our professional assessment on the basis of risk and materiality. This means that we focus the review on such measures, areas and circumstances that are significant to the business and where deviations or violations would be of particular significance to the company's situation. We review and examine decisions taken, decision support, measures taken and other matters relevant to our discharge statement. As a basis for our opinion on the Board of Directors' proposed allocations of company profit or loss, we have examined whether the proposal is consistent with the Swedish Annual Accounts Act. ■

Stockholm on the date indicated
by our electronic signatures

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