Sustainability Report and Annual Report 2023



Research for a better future

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The sustainability report and the annual report has been approved and electronically signed by the board

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SUSTAINABILITY AT IFE

Introduction from the CEO

IFE's vision is 'research for a better future'. Since its establishment in 1948, IFE has played a leading role in the development of Norway as an energy nation. IFE's research in energy, the environment and digital systems is our most important contribution to a more sustainable society, both in Norway and internationally.

Sustainability has always been an important and integral part of IFE's work, but we are more familiar with it being referred to in terms of safety, safety culture, looking after our surroundings, social responsibility, and being a good workplace for our employees.

In recent years, our sustainability efforts have been more structured, and our reporting draws on the Corporate Sustainability Reporting Directive (CSRD) and European Sustainability Reporting Standard (ESRS). The nature of our sustainability work has changed in recent years, partly due to the regulation of several factors under national and EU laws, directives, standards and reporting, in addition to board and management requirements and expectations from customers, partners and employees. IFE supports this development and has chosen to use ESRS as a framework and guide for our improvement work within sustainability. The Sustainability Report 2023 demonstrates IFE's valuable efforts in sustainability, but also shows that we still have some way to go. Every day, our employees are contributing to the sustainability of IFE and society through research and operations, but IFE currently lacks adequate systems and methodologies to quantify the effects. We will work to improve this in the years ahead.

Kjeller, 16 April 2024



Nils Morten Huseby CEO

Photo: Birgitte Aarebrodt

IFE's sustainability efforts

Sustainability has always been an important and integral part of IFE's work. For 2023, IFE has taken inspiration from the disclosure requirements under the European Sustainability Reporting Standards (ESRS) that are relevant to IFE. The report does not meet, nor is it intended to meet, all the requirements of the ESRS.

The Sustainability Report 2023 has been approved by IFE's board, but it has not been verified by an auditor.

IFE started working systematically with sustainability in 2022. We identified applicable Norwegian laws and recommendations, relevant EU directives and UN Sustainable Development Goals (SDGs). A materiality and risk analysis was performed, and relevant standards for sustainability reporting were mapped. IFE prepared the first greenhouse gas accounts for 2022 according to the Greenhouse Gas Protocol (GHG Protocol), and we developed our first sustainability strategy, human rights policy and procedures for compliance with the Norwegian Transparency Act. The work was continued in 2023, and we have prioritised the training in CSRD and ESRS for managers and key personnel, climate and environmental improvements, and gap analyses to prepare for future reporting.

IFE is a research foundation whose objective is to conduct research in the field of energy and other areas that are particularly relevant to the foundation's expertise. IFE's research is its most important contribution to sustainability. However, it is difficult to quantify many of our projects' impact on sustainability. Research for developing more sustainable solutions comes with a footprint. We use gases, chemicals, oils and other input factors that have an environmental footprint. In the Sustainability Report, we elaborate on our work on environmental sustainability and our efforts to reduce our footprint.

IFE is subject to the Transparency Act that came into effect on 1 July 2022. We have developed guidelines and procedures for due diligence vis-àvis suppliers and business partners. IFE's management has also decided to introduce similar requirements for new collaboration partners, which is beyond the scope of the Act. The Sustainability Report addresses IFE's duty to publicly report on its due diligence pursuant to Section 4 of the Transparency Act, cf. Sections 3-5 and 3-3 (c) of the Accounting Act.

GOVERNANCE AT IFE

Basis for the Sustainability Report

IFE was established as a research foundation in 1953, whose objective is to conduct, on a not-for-profit basis and for the benefit of society, research and development (R&D) within energy and other areas that are particularly relevant to the foundation's expertise. In 2023, IFE was a multi-faceted and diverse organisation which, in addition to R&D, has activity in property, nuclear operations and safety, as well as radiopharmacy and commercialisation. IFE has two research divisions: Energy & Environmental Technology (ENET) at Kjeller and Digital Systems (DS) in Halden.

IFE has support staff who are responsible for Strategy, Sustainability and Communication. The head of the sector is a member of group management and has overall responsibility for IFE's sustainability efforts. IFE has safety support staff who set requirements for, control and advise on IFE's compliance with the Internal Control Regulations' requirements for systematic work in accordance with HSE legislation. Purchasing plays a key role in the compliance with the Transparency Act, conducting due diligence and following up on high-risk suppliers and business partners. Finance ensures that IFE has the tools and procedures needed to prevent and identify financial irregularities. HR follows up issues related to social sustainability for IFE's employees. The Organisational Director is a new role as of 1 January 2024, which is intended to strengthen the efforts within social sustainability.

In 2022, IFE established a new corporate structure to facilitate the development of values and opportunities in the various business areas, create a clearer distinction between research and commercial activities, facilitate capital acquisition for commercial activities, reduce risks between the business areas and enable consolidation with other research environments.

The Norwegian Parliament has decided that IFE's nuclear facilities and organisation are to be transferred to the Norwegian Nuclear Decommissioning Authority (NND). This will take place as a phased transfer, where the Halden Reactor and the associated organisation will be transferred on 1 January 2025, together with the National Combined



Disposal and Storage Facility for low- and medium-active waste (KLDRA) in Himdalen. The nuclear facilities and organisation at Kjeller will be transferred at a later date.

On 1 March 2023, the radiopharmaceutical activity was separated into a wholly owned subsidiary, Agilera Pharma AS.

IFE's sustainability report covers all activities in the foundation, including the wholly owned subsidiaries Agilera Pharma AS and IFE Invest AS.

As IFE is a multi-faceted organisation, there are a number of Norwegian laws that cover sustainability within the scope of IFE's work, including the Atomic Energy Act, the Radiation Protection Act, the Foundation Act, the Norwegian Public Limited Liability Companies Act, the Planning and Building Act, the Working Environment Act, the Pollution Control Act, the Nature Diversity Act, the Environmental Information Act, the Public Procurement Act ¹, the Transparency Act, the Equality and Anti-Discrimination Act, the Act on Ethics and Integrity in Research, the Personal Data Act, the Penal Code and the Marketing Control Act.

A materiality and risk analysis has been performed of areas with potentially the most negative impact on the environment, as well as the areas where the foundation has the best potential to have a positive impact. The risk mapping is based on social and environmental factors and governance, and forms the basis of the sustainability efforts.



RENEWABLE ENERGY HYDROGEN SYSTEMS BASED ON PV, WIND AND WATER ELECTROLYSIS

Hydrogen is a clean energy carrier that can replace fossil fuels like coal, oil and gas in industrial processes and in transport. Hydrogen is expected to become an important part of the energy system and will be used for storing energy and to generate power.

Hydrogen projects are being developed at too slow a rate to reach the net emission targets by 2025. The cost of hydrogen production is still too high and needs to come down to USD 1-2 /kg to be competitive. This is a massive challenge for the producers of water electrolysis as well as plant operators. Solutions must be found through a number of different approaches, including optimising locations and customising system designs and operation strategies.

The REHSYS project's objective is to study and optimise the design and operation of industrial-scale water electrolysis systems based on wind, photovoltaic solar (PV) and proton exchange membrane (PEM) technology, with a view to supporting technology developments that are required to reach the cost target for renewable energy-based hydrogen. The REHSYS project is managed by IFE and involves researchers in the fields of solar, hydrogen and energy system analysis. The Department of Technology Systems (ITS) at the University of Oslo will offer a PhD research fellowship in the field of PEM water electrolysis systems, and the National Renewable Energy Laboratory (NREL) in the USA is the most important international research partner. The project has been met with great interest from industrial actors and is supported by multinational Norwegian partners Equinor, Statkraft, Nel Hydrogen and Hydro Havrand. All of them are taking part in the project with a keen ambition to develop renewable energy and hydrogen systems.

> The United Nations' Sustainable Development Goals: SDG 7: Affordable and clean energy SDG 9: Industry, innovation and infrastructure SDG 12: Responsible consumption and production SDG 13: Climate action



Photo: Pixel & Co

Stakeholder dialogue

IFE's employees, customers, collaboration partners as well as regulatory authorities all have expectations in terms of IFE's sustainability. Sustainability is an important motivation for working at IFE, and employees naturally expect sustainability standards to be high in all areas. Our customers and collaboration partners have the same expectations. IFE is also facing higher expectations from financial institutions such as banks, insurers and investors, with regard to systematic sustainability efforts.

IFE's customers and those who commission our work have a strong and growing focus on sustainability. Many national and international industry players come to IFE with research commissions to develop more sustainable technology and solutions within energy, the environment and digital systems. Research projects funded by the Research Council of Norway or the EU are required to contribute to the green transition and digitalisation of society and to support the SDGs and the EU's strategic shift towards sustainability.

IFE's Technology and Property (T&P) division finds that collaboration partners, tenants, local communities and financial players all have a focus on sustainability and seek solutions in relation to IT and property. In meetings with tenants, internal tenants have shown that they have a focus on social sustainability and welcome IFE's work with Norasonde, a company that provides disability support in the workplace.

IFE's nuclear operation works closely with the government agency Norwegian Nuclear Decommissioning Authority (NND). The safe operation of nuclear facilities and management of nuclear waste are closely linked to the environmental aspect of sustainability and ensuring safe surroundings for society and employees. In 2023, IFE and the NND established an information exchange mechanism and initiated cooperation on sustainability in order to, inter alia, prepare for the implementation of climate and environmental requirements in public procurement ².

Agilera's customers and collaboration partners have a strong focus on sustainability. The company is a contract manufacturer of the cancer drug Xofigo for Bayer. The Bayer Group has an especially strong focus on sustainability and has set specific targets for reducing CO2 emissions, waste and packaging, among other things. In 2023, Agilera held several meetings and workshops with Bayer as part of the cooperation on sustainability.



Governance, risk management and control

The Ministry of Trade, Industry and Fisheries appoints five external board members, while two are elected by the employees. IFE's strategic plan and sustainability strategy, code of conduct and sustainability report are all subject to approval by IFE's board.

IFE's group management consists of the managers of all business areas and centralised support function. The group management make strategic decisions for the entire foundation, including on sustainability. The status of IFE's overarching goals and KPIs are followed up in monthly management meetings. The different business areas prepare their own strategies/action plans, and set annual targets and KPIs for sustainability. These are followed up in management meetings in the respective business areas and in business reviews with IFE's management. The figure below shows IFE's operational management, including committees, councils and boards, as well as its meeting structure.

IFE's Ethics Committee consists of four employees representing different parts of the business, one of whom is elected by the trade unions. There are also two external members with expertise in research ethics and law. The Ethics Committee deals with matters reported by managers and other employees, and gives advice to the CEO, managers and other employees on how to deal with ethical issues. The Ethics Committee has also addressed issues relating to sustainability, and the committee member with legal expertise and the head of the committee, who is also the Director of Sustainability, provide relevant competence.



Sustainability is an important motivation for working at IFE, and employees naturally expect sustainability standards to be high in all areas.

Photo: Pixel & Co



The figure shows IFE's operational management, including committees, councils and boards, as well as its meeting structure.

MORE CIRCULAR BUILDINGS

The RAGAFLOOR research project aims to facilitate higher productivity in the property sector. The project will see more buildings used according to the principles of a circular economy, reuse of existing structures and generation of options that will reduce the environmental impact of new-builds. More efficient use of resources, and buildings that have a longer life, will significantly improve the level of sustainability. Our algorithms will allow us to re-design old building to comply with the most recent regulations. This means fewer new-builds and therefore environmental gains.

When a tenant moves into a new office or when a property developer is planning a large building project, up to 20 weeks are spent on designing floor plans, i.e. deciding what should go where. Today, architects from all over the world use digital tools to produce manual floor plans. However, large parts of this work cannot be automated because the tools focus on architects as end-users. The tools are similar to digital pencils, which speed up the manual process of designing floor plans, but the endless buttons, slide switches and options, and the lack of automation make the process very challenging and ineffective for everyone involved. In particular, property companies (the end clients) find it hard to input to this phase. This leads to a time-consuming and costly ping-pong process, and the quality of the outcome is highly dependent on the architect and the time available.

Today, architects and property developers generally make use of existing data sets and software plugin-modules to try to introduce automation into the design process, but these efforts soon meet with constraints. This is the reason why our approach relies on algorithms and starts from scratch, because we believe the problem warrants this level of detail.

> The United Nations' Sustainable Development Goals (SDGs): SDG 9: Industry, innovation and infrastructure SDG 11: Sustainable cities and communities SDG 12: Responsible consumption and production



Photo: Mostphotos

IFE's Safety Committee is an advisory body for the CEO and the organisation whose role is to oversee IFE's nuclear safety requirements. The Safety Committee can deal with issues related to sustainability if they are relevant to safety.

Strategies

IFE's Strategic Plan 2023–2028³ provides the overall direction and framework for the development of the foundation as we approach 2028 and the foundation's strategy vis-à-vis the business areas. The strategic direction for the next few years is to develop values and opportunities as follows:

 Transfer nuclear activities to the State, as represented by the Norwegian Nuclear Decommissioning Authority (NND).

- Strengthen the research activity by developing values and opportunities in the business areas.
- Reduce risk for the foundation and the business areas.

• Ensure healthy finances, safe and efficient operations.

IFE's sustainability strategy ⁴ supplements the strategic plan and sets out strategic priorities and principles for sustainability. IFE shall promote sustainability in all its activities and priorities re-

garding social, environmental and governance issues. IFE's most important contribution to sustainability is research into energy, the environment and digital systems. Through its research, IFE serves as an important driving force for a robust, fair and sustainable society. We will continue our efforts to develop sustainable solutions to global and national challenges in partnership with those who commission our work. In 2024, IFE will revise and incorporate sustainability into the strategic plan.

Materiality analysis

In 2022, IFE conducted a risk-based materiality analysis of sustainability within social, environmental and governance issues. This work identified areas with the highest risk and areas where IFE has the greatest opportunity to make a positive impact. The regulatory requirements and legal risks that the foundation is subject to were also mapped. The materiality analysis was revised in 2023. Beyond implementing risk-reducing measures, only minor changes have been made since 2022.

The materiality analysis showed that the business areas face different sustainability risks, as shown in the figure below.



Below is an overview of improvement measures identified in the materiality analysis, measures that were implemented in 2023 and measures that are planned for 2024.

Area	Improvement measure	Implemented in 2023	Planned for 2024
Environ- ment	Map indirect footprints to a greater extent	 CO2 emissions for Scopes 1 and 2 broken down by business area ³⁰ Mapping of the value chain for CO2 emissions in Scope 3 	 More data on CO2 emissions in Scope 3 Training in greenhouse gas accounting System for collecting and reporting data
	Improve the environmental aspect analyses	 Improved the environmental aspect analysis template T&P devised an environmental aspect analysis 	 Improvements to be made on an ongoing basis
Social	Provide a system for training managers	 Training in CSRD and ESRS for managers and key personnel 	 Training in CSRD and ESRS for managers and key personnel
	Continue the safety culture efforts in the organisation	 Implemented various measures and carried out training 	Continue with, inter alia, dilemma training
	Devise practical processes for implementing sustainability in the supply chain and supplier controls in accordance with the requirements of the Transparency Act, as well as collaboration partners in research projects	 Devised policy and procedures Implementation 	 Revision based on experiences from 2023 Training of managers and other employee More information for employees
Govern- ance	Training, raising awareness and setting out how sustainability is relevant for the individual employee and business areas	 Presentation of Sustainability Report 2022, CSRD and ESRS in the business areas Training of managers and other employees 	 Communicate the Sustainability Report 2023 Training of managers and other employee Incorporate sustainability into IFE's strategic plan and the strategies of the business areas
	Better coordination of various internal bodies with a view to implementing the sustainability ambition in the stralegy. Clarify reporting responsibilities and roles	 Meetings held with relevant support staff and key personnel to align sustainability with relevant processes Decision made for Finance to assume responsibility for reporting data for inclusion in the sustainability report from Q3 2024 	 Draw up a requirement specification for sustainability to clarify the requirements for IFE and how compliance can be achieved Devise a procedure for sustainability reporting Increase collaboration and coordination between the support functions Establish a cross-functional working team
	Systematise the sustainability efforts and contextualise with existing guidelines, routines and systems in order to ensure compliance and follow-up in the organisation	 Meetings held with relevant support staff and key personnel to align sustainability with relevant processes 	 Draw up a requirement specification for sustainability to clarify the requirements for IFE and how compliance can be achieved Increase collaboration and coordination between the support functions
	Streamline the management system	 Drew up a mandate and plan for a revised corporate governance system 	 Devise and implement the revised corporate governance system
	Map and report on sustainability in a way that is engaging for employees and gives the business specific goals to strive for	 Sustainability Report 2022 Targets and KPIs 2023 	 More internal communication Involve more people in the sustainability efforts Sustainability Report 2023 to include more data on the business areas Improve data on sustainability Incorporate sustainability into IFE's strategic plan and the strategies of the business areas
	Improve how IFE communicates its contribution to increasing sustainability in society	 Sustainability Report 2022 External presentations, shared experiences 	 Sustainability Report 2023 External presentations, share experiences Networking

5 The Greenhouse Gas Protocol divides greenhouse gas emissions into three 'scopes'. Scope 1 encompasses greenhouse gas emissions from equipment that the organisation owns or controls. Scope 2 covers emissions from purchased energy. Scope 3 covers indirect emissions from the organisation's value chain from upstream activities (purchasing of goods, services, etc.) and downstream activities (transportation, investments, leasing of premises, etc.).

Business practices

IFE works to promote healthy business practices and to prevent corruption and bribery. IFE's Code of Conduct applies to all employees, managers, contract workers and personnel involved in our research and teaching activities. The Code of Conduct sets out clear guidelines for good business practice and conduct, and violations of the Code of Conduct are subject to sanctions. Separate guidelines exist for the use of agents and other intermediaries, which IFE uses to a very small extent. IFE also has guidelines for giving and receiving gifts. IFE's Procurement Manual refers to the Code of Conduct, guidelines for gifts, and places particular emphasis on employee conduct in connection with the procurement process. The systems for procurement and the approval of invoices require two signatories with authorisation according to the authorisation matrix. Large procurements and investments require the preparation of a business case and approval by the management team, as well as the board if above a certain threshold.

In 2022, the standard contracts were revised: the requirements for suppliers and business partners with regard to ethics, sustainability and business operations are now clearer and IFE has the option to terminate contracts in the event of non-fulfilment.

IFE facilitates a corporate culture in which employees are encouraged to report wrongdoing. An internal and external reporting channel has been established where wrongdoing can be reported openly or anonymously. External parties can notify an external law firm via our website. Employees can find information on the intranet on how to report wrongdoing and the subsequent procedure, as well as information on the protection of employees who report wrongdoing. The guidelines for reporting wrongdoing are set out in the Code of Conduct. In addition to the reporting of wrongdoing, IFE has experience in incident reporting and carrying out investigations that are internally or externally led.

Employees are required to undertake ethics training. The intranet provides information on the Code of Conduct, reporting wrongdoing and the Ethics Committee. There is also extensive training material covering ethics, research ethics, reporting wrongdoing, corruption, and the safety and corporate cultures. The training material consists of videos and presentations and exemplifies a variety of dilemmas. IFE carried out an internal audit of the ethics training in the research divisions in 2022, and in 2023 followed up on findings and non-compliance. In IFE's annual working environment survey, employees are asked about the training in and handling of ethical issues. The administration reports to the board on the ethics work every six months.

No. of enquiries/reported issues	2022	2023
Reports of wrongdoing	0	1
Corruption identified	0	0
Ethics Committee	2	3

ENERGY EFFICIENCY BY USING DIGITAL TWINS AND AI

The AiD catapult project has developed a computer-operated digital twin prototype of one of IFE's office buildings (Os Allé 5) in Halden. The aim was to integrate and make use of smart sensors (IoT), digital twins (DT) and artificial intelligence (AI) in order to improve energy performance predictions and to optimise existing, ageing buildings.

By using real-time data from IoT sensors, a digital twin provides a comprehensive digital image of a building. This enables intelligent monitoring and control to improve energy efficiency and user comfort. Al-assisted predictive modelling and intelligent control strategies make it possible to optimise the building's energy performance and contribute to promoting sustainability.

The building sector consumes over one third of the world's overall electricity production and contributes significantly to climate gas emissions. Environmental sustainability depends on smarter energy consumption in buildings.

The project seeks to make our buildings smarter by using digital twins, and thus complies with EU's EPBD Directive (Energy Performance of Building). This directive aims to significantly improve energy efficiency and decarbonise Europe's buildings by 2050. This is a new approach to monitoring the building's energy performance and predicting future patterns of energy consumption. The project outcomes contribute to better energy efficiency through predictive modelling and intelligent control strategies.

> The United Nation's Sustainable Development Goals : SDG 7: Affordable and clean energy SDG 11: Sustainable cities and communities SDG 12: Responsible consumption and production



Photo: AiD

CLIMATE AND ENVIRONMENT

IFE's main purpose is research. Since it was founded in 1948, IFE has served as a research partner for the business sector and the public sector, both in Norway and abroad. In our projects, we develop innovative solutions that enable companies to develop or improve operations, products and services, which makes them more sustainable and safeguards their competitiveness and market positions. This creates value and jobs in Norway.

In IFE's Strategic Plan 2023–2028, the following ambition has been set for the research activity:

1. IFE shall be a leading provider of research, innovation and value creation in Norway and the EU.

2. IFE shall be a driving force for a robust, fair and sustainable society.

3. IFE shall be an international expert in energy and environmental research and human-centred digitalisation.

It is difficult to give a precise estimate of the environmental sustainability effect of IFE's research. A small selection of examples of how our research improves environmental sustainability for society is presented in the sustainability report. The topic will be covered in more detail in future reports.

In order to strengthen the research on sustainable solutions to societal challenges within energy, climate, the environment, digitalisation and civil protection, IFE has established the NORIN research alliance together with the environmental institutes NILU and NIVA.

Research into more sustainable solutions comes with a footprint. We use gases, chemicals, oils and other input factors in research that have a negative impact on the environment. Laboratories and the business in general use energy and generate waste and emissions to air, soil and water. The goals in our sustainability strategy include reducing our direct climate footprint and actively working to reduce our indirect climate footprint by an amount proportional to our level of activity. A further goal is for IFE to develop and implement sustainable solutions for its properties and buildings by using these as the test arena for the research activities.



The figure below shows the results of the materiality and risk analysis conducted in 2022 and revised in 2023, measures implemented in 2023 and measures planned for 2024 for environmental sustainability:

Materiality and risk analysis	Implemented in 2023	Planned for 2024
IFE's direct environmental footprint is well under control, particularly in relation to radioactivity. However, the indirect climate and environmental footprint is not sufficiently being addressed. There is a need to map the indirect footprint to a greater extent.	 CO2 emissions for Scopes 1 and 2 broken down by business area Mapping of the value chain for CO2 emissions in Scope 3 	 More data on CO2 emissions in Scope 3 Training in greenhouse gas accounting System for collecting and reporting data
The reasons for a negative impact on the environment and climate vary between the different areas of activity. IFE's greatest environmental impact and highest emissions stem from gas and radioactive substances in connection with research, CO2 emissions from transport and travel, energy consumption related to technology and data processing, and energy consumption for property and operations.	 Information on IFE's greenhouse gas accounts for managers and other employees Laboratories with high CO2 emissions in 2022 implemented measures Installation of water and electricity meters in buildings Greenhouse gas accounts for Scopes 1 and 2 in 2023 are now broken down by business area in order to improve follow-up Initiated work on providing more data in Scope 3 	 More data in Scope 3 Supplier follow-up Information on the Sustainability Report 2023 and greenhouse gas accounts to be disseminated throughout the organisation Incorporate sustainability into strategic plans and action plans, set more specific targets and KPIs aimed at reducing IFE's climate and environmental footprint
IFE has established reporting using environmental aspect analyses. The analyses have generated important documentation for the business areas to map their direct environmental footprint. The work has been followed up to varying degrees, and improvement is needed	 Improved the environmental aspect analysis template T&P devised an environmental aspect analysis Improved analysis and use of the environmental aspect analyses in improvement and sustainability efforts 	 Improvements to be made on an ongoing basis

IFE is ISO 14001 certified and has incorporated the requirements of this certification into the corporate governance system. This is followed up by HSE advisers and through the management review. The business areas perform an annual environmental aspect analysis and are responsible for managing and reducing environmental risks in their respective areas. IFE prepares an annual environmental report for the Norwegian Radiation and Nuclear Safety Authority (DSA) for emissions and pollution licences issued by the Authority.

As IFE has nuclear activity and licences for handling radioactive substances, we also have guidelines and procedures for this, including a procedure for radioactive emissions and radioactive waste management, and guidelines for the safe use of hazardous substances. IFE has instructions for handling gases, chemicals, solvents and oils. The documents are available in the document management system and in the laboratories, and some of them are also available on the intranet.

Climate change

In the materiality and risk analysis, use of gas in research activity, energy consumption and transportation were identified as sources of greenhouse gas emissions. IFE escalated its efforts to enhance the knowledge on climate and the environment within its value chain in 2023. A team composed of personnel with specialist knowledge from across the organisation will help to enhance employees' carbon literacy. To gain a better overview of IFE's total carbon footprint, we mapped relevant Scope 3 reporting categories from the GHG Protocol 6. The analysis shows that 10 of the 15 categories are relevant to IFE. For these 10 categories, further measures are needed to improve the body of data, reporting procedures and calculations of greenhouse gas emissions. The relevant Scope 3 emission categories from the GHG Protocol are as follows: (1) Purchased goods and services, (2) Capital goods, (3) Fuel and energy-related activities, (4) Upstream transportation and distribution, (5) Waste generated in operations, (6) Business travel, (7)) Employee commuting, (8) Upstream leased assets, (9) Downstream transportation and distribution, and (15) Investments. IFE plans to map these categories step-by-step and aims to develop and implement reporting procedures for categories 6 and 7 in 2024. For category 6, this will be done through a reporting tool for registering business travel each year and the modes of transport involved. For category 7, the mapping will involve a survey of IFE and Agilera Pharma employees' habits in relation to commuting to and from their respective workplaces.

NORWAY'S NATIONAL BATTERY LABORATORY OPENED AT IFE IN 2023

The new battery laboratory was opened in November 2023 and is a part of the Norwegian Advanced Battery Laboratory Infrastructure (NABLA) which has received NOK 100 million in funding from the Research Council of Norway. Additionally, IFE has invested more than NOK 40 million to establish the new laboratory at Kjeller.

NABLA will help to speed up the transition from fossil to renewable energy, reduce emissions of greenhouse gases and generate significant new and sustainable value-creation in Norway. The lab facilities will enable the Norwegian research community to deliver specialists, expertise and technology to the growing field of energy storage in Norway, including material manufacturers, fuel cell producers and end-users.

While IFE heads the project, our partners include the University of Oslo, the Norwegian University of Science and Technology (NTNU), SINTEF, the University of Agder and the Norwegian Defence Research Establishment (FFI). NABLA also has close ties with FME Mozees (www.mozees.no), which gives access to a wider group of Norwegian academics, industry partners and end-users of the infrastructure.

IFE conducts research on several aspect of battery production. We investigate how different materials, structures and designs can make batteries better, cheaper, safer and more durable. We also use our expertise to customise battery testing, simulation and modelling for various Norwegian actors. The laboratory will enable IFE's researchers to conduct larger-scale studies of materials with maximum flexibility to meet the demand from our partners. Development of technology-based, eco-friendly materials is essential, as is the use of green energy in the production process. IFE contributes throughout the value chain, including to projects that focus on sustainable materials, recycling and re-use. Our collaboration partners include Elkem, Cenate, Morrow, Freyr and Beyonder.



The United Nations' Sustainable Development Goals: SDG 7: Affordable and clean energy SDG 12: Responsible consumption and production SDG 13: Climate action

Photo: Pixel & Co

Greenhouse gas emissions

The complex nature of IFE's activities makes it challenging to map greenhouse gas emissions at our own premises and in the value chain. The large variation from year to year in projects, laboratory operations and procurements means that emissions will be significantly higher some years than others. IFE will intensify its efforts to reduce greenhouse gas emissions from the main emission sources.

The Sustainability Report 2023 includes updated Scope 1 and 2 greenhouse gas emissions. IFE's calculations of greenhouse gas emissions are in accordance with the GHG Protocol for the following six gases: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulphur hexafluoride (SF6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Several of these are used in the research work and the development of more sustainable solutions for customers. The use of alternative gases has been considered, but this is not always easy or possible. We are therefore trying to reduce the use of greenhouse gases and the risk of accidental emissions.

Energy is consumed in the heating of buildings, office operations, in research and in the production of radiopharmaceuticals. In research, energy is consumed in the laboratories. For example, testing battery cells draws a lot of energy, as does data storage and analysing large volumes of data using high performance computing.

At Kjeller, some of the buildings date back to the 1940s, 50s and 60s and they are not particularly energy efficient. As part of the maintenance and upgrading work, these buildings will be insulated and solar panels will be installed on the roof.

The greenhouse gas accounts for 2023 are more detailed than the 2022 accounts, with energy consumption and fuel consumption broken down by business area and location. IFE has installed several electricity meters that enable the measurement of location-specific power consumption. In order to track energy consumption and the associated Scope 2 greenhouse gas emissions broken down by business unit, financial distribution keys have been used that provide information on the distribution of employees and business areas in IFE's building stock. Additionally, the same items that were presented in the 2022 report are included with updated consumption data and emission factors.

IFE's total greenhouse gas emissions in 2023 were 437 tonnes of carbon equivalents (CEs), of which 24% and 76% respectively are linked to Scope 1 and 2 greenhouse gas emissions. This corresponds to 0.6 tonnes of CE per employee in 2023 for 687 permanent employees. The largest sources of both Scope 1 and Scope 2 greenhouse gas emissions are IFE's operations at Kjeller. Scope 1 includes



transport with own vehicles, local fuel consumption and direct emissions from activities involving greenhouse gases. Scope 2 covers energy consumption, including electricity, district heating and district cooling.

IFE's total greenhouse gas emissions show a decline of 83% from 2022, mainly as a result of a reduction in direct emissions from laboratory operations. The largest proportion of this comes from SF6 emissions from the Brønnsløyfa laboratory. In 2023, emissions of SF6 accounted for 16% of IFE's total greenhouse gas emissions, compared with 90% in 2022. Emissions of SF6 were thus reduced by 97% from 2022 to 2023, a decline resulting from the implementation of a number of measures to prevent leakage. In addition, IFE has avoided projects involving the use of SF6 due to high carbon prices and pending upgrades to the facility that will enable the use of a gas with lower greenhouse gas emissions and costs. In 2023, SF6 emissions thus solely stem from the normal operation of the laboratory.

There has been an 8% increase in emissions of CO₂ from laboratory operations and an 80% reduction in CH4 emissions. Emissions for 2023 amount to approximately 3 tonnes CO₂ equivalents for CO₂ and CH4. Emissions of CO₂ and CH4 stem from operations of the FALCON and Hynor laboratories, and the scope depends on the ongoing projects.

Energy consumption increased by a total of 5% from 2022 to 2023, with greenhouse gas emissions from energy consumption in 2023 accounting for 334 tonnes CO₂ equivalents.

This includes emissions from electricity consumption and energy from remote heating and remote cooling. Changes in energy consumption from 2022 to 2023 vary between IFE's locations, and are mainly due to natural variations and differences in consumption related to ongoing projects. The installation of new electricity meters means that electricity consumption can be measured more accurately. The Halden Reactor experienced the highest increase in electricity consumption at 10%, while the largest decrease in remote cooling consumption was seen at Technology Park 10 at Kjeller with 31%.

Estimated emissions from energy consumption increased by 53% from 2022 to 2023. This is due to increased energy consumption and the fact that the grid emission factor increased from 2022 to 2023, giving a higher greenhouse gas emission per kWh consumption. The reason for this variation is that emissions from electricity consumption depend on Norway's electricity production and the energy sources used by export countries ⁷. The highest energy consumption and emissions come from operations at NUK Kjeller, followed by ENET, Agilera and NUK Halden.

In 2023, there was a 25% decline in Scope 1 emissions from transport, with emissions totalling 20 tonnes CO₂ equivalents. Electric vehicles (EVs) were not included in greenhouse gas accounts and Scope 1 in 2023, but will be included from 2024. Agilera had the highest transport emissions with 15.67 CO₂ equivalents, followed by NUK Kjeller with 2.35 and NUK Halden with 2.35 and 1.49 CO₂ equivalents.





7 https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-stroemmen-fra/

Agilera distributes radioactive pharmaceuticals to hospitals all over Norway, partly by road.

Transport accounted for 4% of IFE's calculated greenhouse gas emissions in 2023. IFE aspires to cut transport emissions and started the work to electrify the fleet of cars in 2023 by replacing one of the fossil fuel company cars with an EV. Agilera has considered the possibility of replacing diesel cars with EVs but so far no EVs satisfy the safety and HSE requirements for transporting radioactive pharmaceuticals. When replacing cars, Agilera will consider EVs if they satisfy the safety requirements.

Energy efficiency measures

IFE introduced energy efficiency measures in 2023, reducing greenhouse gas emissions from

daily operations. An environmental aspect analysis was carried out and improvement measures were identified, while energy efficiency measures for IFE's buildings were implemented. The mapping of energy-saving solutions in terms of buildings' heating needs and ventilation was initiated. New balanced ventilation systems and sensors for lighting the battery line were installed in addition to new regulators in several buildings. Conventional fluorescent tubes are being replaced with LED tubes on an ongoing basis.

In 2023, production of electricity from solar panels was 25 MWh, corresponding to a reduction in emissions of 0.5 tonnes CO₂ equivalents. No upgrading of the solar park was undertaken in 2023.



IFE introduced energy efficiency measures in 2023, reducing greenhouse gas emissions from daily operations.

Illustration: Grape Architects

THE IMPACT OF RENEWABLE ENERGY EXPANSION IN NOR-WAY

EnergyWise is a multidisciplinary project which aims to synthesise and assess the most important consequences that an expansion of renewable energy production will have on society, the economy, the climate and the natural environment in Norway.

The energy transition to reduce emissions of climate gases will require a massive expansion of renewable energy production in Norway. While the nature crisis needs to be considered on par with the climate crisis, we have seen that renewable energy developments have been curtailed due to conflicts and unfortunate distribution-related impacts. This demonstrates that economic efficiency cannot be divorced from distribution and policy acceptance. A more holistic approach is therefore needed to balance concerns for the climate, nature and wider societal interests.

EnergyWise involves stakeholders from multiple sectors who come together to investigate how an integrated techno-economic model, such as the TIMES energy system model, can accommodate several perspectives and interests. This will make it possible to analyse trade-offs and distribution-related effects of renewable energy expansion scenarios and to recommend effective and acceptable solutions that may provide a better balance between different interests. This will become increasingly important as the biodiversity and climate crisis deepens and difficult decisions must be made. The project seeks to find common ground from which to promote a wiser energy transition.

Researchers from Statistics Norway (SSB), Institute for Energy Technology (IFE), Norwegian Institute for Nature Research (NINA) and Menon will conduct the project with partners from several government agencies, including the Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Environment Agency, Statkraft, private and third-sector organisations and a panel of scientific experts.

> The United Nations' Sustainable Development Goals: SDG 7: Affordable and clean energy SDG 12: Responsible consumption and production SDG 13: Climate action SDG 15: Life on land



Photo: Mostphotos

Pollution

Parts of IFE's operations cause pollution and/or are at risk of generating pollution in the form of radioactive contaminants to air and water, chemicals and oils. IFE is subject to the Pollution Control Act and the requirement to hold an emissions licence. IFE has three licences covering the management of radioactive waste as well as the emission of radioactive substances and all relevant activities in the facilities at Halden, Kjeller and the National Combined Disposal and Storage Facility for low- and medium-active waste (KL-DRA) in Himdalen. Following the establishment of a corporate structure in 2022, IFE is currently in the process of obtaining separate licences for its various organisational sectors. Agilera and the nuclear activity at Kjeller applied to the Directorate for Radiation Protection and Nuclear Safety (DSA) for separate licences in 2023. The application for emission licences for IFE's research activity at Kjeller will be sent to the DSA in 2024.

IFE's research activity at Kjeller, ENET, includes trace element investigations and sample analyses, radioanalytical services and conditioning of sealed radioactive sources that may release radioactive substances into the environment. It is mainly ENET's use of open radioactive sources in isotope laboratories at Kjeller that entail or can entail the release of radioactive substances to air. Release to air from facilities where there is deemed to be a risk of air-borne radioactive contamination is discharged to the roof via the laboratories' ventilation systems after being subjected to emission-reducing measures and filtration. Emission-reducing measures and filtration result in radioactive substances being captured before the point of release or considerably reduced.

ENET has no direct release of radionuclides to water but transfers liquid radioactive waste that exceeds the applicable discharge limits to Radav-fall [®] or the Sløvag NORM repository.

Agilera's most significant sources of emissions and environmental impact are radioactive waste, biological waste, packaging and transport.

The largest sources of emissions from IFE's nuclear activity are emissions from the daily operation to maintain and prepare the facilities for decommissioning.

Measures aimed at preventing and reducing pollution

The terms of IFE's emissions licence require IFE to stay updated nationally and internationally on the best available techniques and/or technology (BAT), particularly in relation to waste management and emission limitation.

IFE has implemented various measures for reducing releases to air and water.

Methods to reduce release to air	Use of particle filters and coal filters
methods to reduce release to an	Delay systems and tanks for radioactive gas for decay
	 Condensation of moisture in discharge lines from the primary circuit for tritium separation
	 Automatic surveillance systems that shut down release valves if activity levels exceed permitted levels.
Methods to reduce release to water	 Temporary storage of wastewater to allow for radioactive decay of short- lived radionuclides
	 Evaporation of small amounts of wastewater to increase concentration/ solidification of the waste in preparation for encapsulation
	+ Filtration of wastewater using particle filters and ion-exchange technology
	Distillation
	Sludge separation
	Sedimentation in tanks
	Processes to minimise contamination of protective clothing being washed
	Cleaning processes to minimise contamination of controlled areas
	 Automatic surveillance systems that shut down release valves if activity levels exceed permitted levels

Pollution/emissions to air, water and soil in 2023

IFE's emissions licence sets specific limits for emissions of radioactive substances to air and water. The following table shows emissions to air and water for 2023.

In 2023, activity at Kjeller produced emissions to air (atmosphere) and water of an estimated effective dose to the public of 0.033 μ Sv and 0.0001 μ Sv, which is well below the requirements of the emissions licence. None of the radionuclide emission limits were exceeded in 2023. The reason for the increase in the release to air (atmosphere) is the handling of ion exchange masses/casting of liquid radioactive waste. In 2023, releases to air and water from the activity at Kjeller were largely consistent with the release in 2022.

Emissions to air (atmosphere) and water

Site	Emission and unit	2022	2023
Halden	Total release to atmosphere, $\mu S v$	0.046	0.03
	Total release to water, µSv	0.0001	0.01
Kjeller (total for NUK Kjeller,	Total release to atmosphere, μSv	0.01	0.033
ENET og Agilera)	Total release to water, µSv	0.00017	0.0001

Environmental monitoring

The terms of IFE's emission licences require the presence of radioactive substances in the surrounding environment of the site to be monitored in order to determine whether the activity leads to or can lead to elevated radioactivity in the environment. IFE has in place environmental monitoring programmes for Halden, Kjeller and KLDRA in Himdalen.

IFE has expertise in radiation protection, radioecology and radioactive waste, and is part of Norway's nuclear accident emergency preparedness organisation. IFE has laboratories for measuring radioactivity in a variety of sample types and for dosimetry and calibration of radiation protection instruments, in addition to its own electronics laboratory. Our internal radiation protection service ensures that all use of radiation sources and radioactive material is in accordance with national laws, regulations and guidelines. It also assesses and follows up recommendations from international organisations. The aim is to ensure compliance with the rules and regulations, limit and reduce any radiation doses for employees, and check that emissions during normal operations are within the specified limits.

The environmental monitoring programmes ensure that we have a full overview of our footprint with respect to radioactivity. Samples from the area surrounding the facilities at Halden and Kjeller are collected regularly and analysed in order to monitor the radioactivity in the close environment, which is known as 'recipient monitoring'.

See the table below for details of the monitoring.

Environmental monitoring	
Environmental monitoring programme at Kjeller	 Dosimeters outside the plant areas to measure external radiation within 5 km radius of the site.
	 Air filter stations within IFE's site in continuous operation, as well as five sampling stations that collect rainfall.
	 Grass samples in the summer months
	 Milk samples collected every week from two nearby farms and analysed for radioactivity.
	 Agricultural products collected each year in the autumn and analysed for radioactivity.
	 Collect and analyse samples of water, sediments, aquatic plants and fish from fixed sampling sites in the Nitelva river.
Environmental monitoring programme in Halden	 Area dosimeters located outside the plant areas to measure the externa radiation within a 5 km radius of the site.
	 Rainfall collected at two locations near the plant and analysed regularly
	 Samples of drinking water are analysed for radioactivity.
	 Grass samples at two different sites twice a year.
	 Water samples in the Tista river from three different places twice a year.
	 Samples of sand from four different beaches in the Iddefjorden once a year.
	 Fish are analysed annually.
	 Samples of the sediment in the Tista river at three different places twice a year.
Environmental monitoring	 Release to air and drainage water are checked monthly.
Himdalen KLDRA	 Annual control of well water from local farms, samples from ponds and streams and sample of borehole water from a well in the area.
	 Samples of blueberries from an extensive area around the plant.

Biodiversity and ecosystems

Environmental monitoring

At Kjeller, IFE 's property covers approximately 38 acres. IFE has drawn up a detailed zoning plan as a basis for developing parts of the property at Kjeller. The plan was submitted to Lillestrøm local authority for processing at the end of 2022, and a final decision is expected in 2024. The plan corresponds to the master plan that IFE has prepared for the area. In the master plan, there are three central and comprehensive strategic priority areas: sustainability; safety and preparedness; digitalisation.

In connection with the proposed zoning plan, the natural values of the area to be regulated were assessed. The area is made up of cultivated land, unused agricultural areas and areas with lawn/ grass that have been landscaped as a park. The site is host to a rich diversity of flora and fauna, including a bee species with red list status. In the master plan, the goal is to preserve and further develop the area into a green campus that strengthens local biodiversity and biology with, for example, wildflower meadows, diverse plant species and plants that are particularly attractive to pollinators.

In 2023, Lillestrøm local authority undertook the initial processing of the proposed plan, and following a recommendation from the administration and a unanimous political decision, the plan was put out for public consultation. Some comments were received as well as one objection, and these have now been addressed. Finally, a comment from the DSA still needs to be dealt with before Lillestrøm local authority can consider the plan for the second time and adopt it in 2024.

ENHANCING EUROPE'S COMPETITIVENESS IN CARBON CAPTURE AND STORAGE

ENCASE is a project that seeks to advance Carbon Capture and Storage (CCS) research and technology in Europe in order to address the EU's ambitious targets for reducing climate gas emissions.

ENCASE is working towards safer, more cost-effective and eco-friendly CO₂ transport and injection. Under the project, seven world-leading CCS research infrastructures will be further enhanced with state-of-the-art scientific instruments, tools and methods for research and development of CCS technologies.

The project has six goals:

- 1. Sophisticated scientific instruments and energy-efficient equipment
- 2. Improved research infrastructure, and staff that have been trained to meet the future needs of industry
- 3. New/improved software and tools
- 4. New social innovation laboratories
- 5. Digital technology that will optimise the operation of research infrastructures, training programmes and CCS pipeline networks
- 6. Platform for knowledge exchange

There is a broad European consortium behind ENCASE, and the project receives funding from Horizon Europe. To maximise the impact of the innovations, the consortium includes owners of research infrastructure, academic institutions, operators of CCS infrastructure, technology developers, business developers, technology end-users, government-owned organisations and organisations that specialise in social and environmental sciences.

IFE leads the consortium which includes OTECHOS, Delft University of Technology, UCL, The Open University, Oil & Gas Measurement Limited, University of Technology, Ineris, Politecnico di Milano, Laboratorio Energia & Ambiente Piacenza, Alpha Consult, Greentech, Warsaw University of Technology, CIGNUS, Shell, Equinor, SBL, EBN, TNO, TUV, and BP.

> The United Nations' Sustainable Development Goals: SDG 9: Industry, innovation and infrastructure SDG 12: Responsible consumption and production SDG 13: Climate action



Photo: Mostphotos

Waste

IFE's waste is complex and consists of chemicals, food waste, wood, cardboard and paper, glass, steel, iron and aluminium. Kjeller's radiopharmaceutical activity also produces waste that is classified as clinical waste. 72.8% in Halden, which was lower than the 85% target. The non-conformance was due to a lack of resources to follow up the sorting of waste. The waste is handled by the waste management company Norsk Gjenvinning, which also sorts residual waste. Norsk Gjenvinning is currently working with IFE to identify solutions that will increase the degree of sorting.

In 2023, IFE sorted 72.3% waste at Kjeller and

Amount/type	Site	2022	2023
Waste in total, kilo	Kjeller	150 400	150 94
	Halden	58 158	49 18
Sorted waste, kilo	Kjeller	113 155	109 12
	Halden	43 857	35 78
Degree of sorting	Kjeller	72,2	% (target 85 %
	Hälden	79,8	% (target 85 %
Residual waste, kilo	Kjeller	37 245	41 82
	Halden	14 301	13.400
Recovery rate	Kjeller	75 %	72,3 9
	Hatden	76 %	72,8 9

Nuclear and radioactive waste

IFE is the national repository for radioactive waste. In addition to IFE's waste, Radavfall receives and handles radioactive waste from the Norwegian Armed Forces, hospitals, and industry, as well as from smoke detectors. The waste is processed in the facility at Kjeller. Low- and medium-active waste is deposited at KLDRA in Himdalen. In 2023, no waste was deposited at KLDRA – all waste generated in 2023 was stored at Kjeller.

IFE maintains an overview of received and stored radioactive waste and reports annually to the DSA in accordance with the requirements for waste management in its licence. The reporting covers all stored radioactive waste.

Nuclear and radioactive waste

Shipper	Unit	2022	2023
External	Number of deliveries	86	83
	Percentage	86 %	78 %
IFE	Number of deliveries	14	23
	Percentage	14 %	22 %

KLDRA is the only repository for low- and medium-radioactive waste in Norway. In March 2020, IFE decided to stop the deposit of waste there temporarily due to uncertainty as to whether functional requirements for the facility were being met.

In 2021, an external status assessment of KLDRA, commissioned by IFE and the NND, was carried out to evaluate the repository in light of current requirements, which are far stricter now than when the facility was built. The survey identified a number of challenges in respect of the facility's construction and level of safety compared with present-day standards, and on this basis, IFE decided to prolong the temporary halt of deposits. Meanwhile, efforts were made to update the safety reports for the facility in line with the applicable requirements for the operational phase today (300 500 years), during which the facility is continuously monitored. Based on this, IFE's plan was to restart KLDRA deposits in 2025. However, in a letter of 20 December 2023, the DSA instructed IFE that the deposit of radioactive waste in KL-DRA must be stopped until comprehensive safety reports have been prepared and approved by the DSA, both for the facility's operational phase and in an eternal perspective for the ensuing period when the facility is permanently closed with no ongoing monitoring. This is a very comprehensive task that requires extensive investigations, which will mean no resumption of deposits at KLDRA for an estimated eight to ten years. Until that time, all radioactive waste that IFE receives and processes will be stored at Kieller, where capacity is already under pressure. A situation where IFE will neither be able to use KLDRA nor have sufficient space for temporary storage at Kjeller will result in major negative consequences for the handling of radioactive waste in Norway.

Access to a repository is crucial for handling radiation sources from Norwegian industry, the medical field, the armed forces and research. Safe and correct handling of radioactive waste is of decisive importance for several important projects and planned projects, including the production of groundbreaking pharmaceuticals in Norway. Even ordinary smoke detectors contain radioactive parts that need to be processed, stored and deposited as radioactive waste. A cessation in the receipt of low- and medium-active waste will impact on all actors with related activities or industries that generate this type of waste and currently depend on delivering the waste to IFE – the only approved repository in Norway.

IFE has established a programme for waste management, including several sub-projects, to improve the storage situation. A plan has been submitted to the DSA for a periodic safety review (PSR), which will be an important basis for revision of the safety report for KLDRA. IFE will place a call-off order under the supplier contract between IFE and NND, commissioning the NND to carry out a PSR and prepare a new safety report for KLDRA.

Radioactive waste from IFE

IFE holds a licence for handling radioactive substances and emissions of radioactive waste. The terms of the licence require IFE to stay updated nationally and internationally on the best available techniques and/or technology (BAT), especially in terms of waste management and emission limitation.

Agilera produces radioactive pharmaceuticals used in cancer treatment, and the production results in radioactive waste. In 2023, Agilera collaborated with Bayer to reduce the amount of waste from the production of pharmaceuticals by:

- Reducing consumption of Ac227

- Reducing overproduction leading to less radioactive waste

Reducing the scrapping of raw materials

- Reducing production of waste from new production that is subject to disposal

- Processing historic waste to reduce the amount that is subject to disposal

Reducing QC testing

- Carrying out digitalisation projects that reduce paper consumption and paper waste

IFE operated Norway's four research reactors from 1951-2019. The reactors generated 16.5 tonnes of spent nuclear fuel, which is a small amount of nuclear waste in an international context. However, Norway's nuclear waste is unique because it underwent a number of experiments to find effective and safer compositions of fuels. The complex and varied waste creates several challenges for the clean-up and decommissioning of the nuclear facilities.

The fuel storage facilities at Kjeller and Halden were built in the 1950s and 60s, and do not meet today's international best practice or national requirements. In recent years, IFE has initiated several measures to improve the safety of the storage facilities, and in 2023 submitted updated criticality assessments for fuel to the DSA. In 2023, IFE spent 23,361 working hours on the safe handling and security of nuclear waste in order to establish new, temporary storage solutions at the existing nuclear facility at Kjeller. IFE is working closely with the NND, which is examining longterm storage solutions. IFE regularly updates the DSA on the status at the facilities, improvements and what needs are a high priority going forward.

Norway has small but complex amounts of nuclear waste. Building a separate treatment facility to manage 16.5 tonnes of nuclear waste is costly and challenging. In 2021, IFE signed a contract with Studsvik Waste Management Technology AB and Studsvik Nuclear AB in Sweden for inspection and mechanical pretreatment at Studvik's facilities. Approval by the DSA and a national agreement on the return of the fuel are required before the work can be carried out.

Norway signed a memorandum of understanding with the United States in 2021 on the processing and management of IFE's highly enriched uranium at a US facility. Further technical investigations and regulatory approvals are still needed before a joint pilot project between the United States and Norway can be launched.

In 2021, IFE signed an agreement with Springfields Fuels Limited, whereby 960 kg of unirradiated uranium fuel would be shipped to the UK instead of being treated as waste and stored and deposited in Norway. The Norwegian Ministry of Foreign Affairs has granted an export licence for unirradiated uranium to the UK. Approval from the DSA is required to move the material to the UK. In a letter dated 21 April 2022, IFE requested the necessary permits to empty the JEEP I rod wells. Approval of IFE's applications to the DSA and the return guarantee to Norway were not clarified in 2023. IFE has prepared an updated building permit application for Lillestrøm local authority as part of the preparations for emptying the JEEP I rod wells.

SAFEGUARDING WILDLIFE AND THE NATURAL ENVIRON-MENT WHEN BUILDING AND OPERATING SOLAR POWER PLANTS IN NORWAY

Ground-mounted photovoltaic (PV) power plants help to reduce climate gas emissions, but they also require large areas of land and can lead to habitat destruction. The Envisol project, managed by IFE, aims to understand and mitigate the loss of habitats.

The Envisol project will run for four years and has an impressive list of partners: NINA, NIBIO, NMBU, NVE, National Cluster for Solar Energy, the Norwegian Society for the Conservation of Nature, the Norwegian Trekking Association, Fred Olsen Renewables, Solgrid, Innlandet Renewable, COWI, Norconsult and Multiconsult.

By conducting fieldwork before, during and after the building of PV plants, the project aims to understand how different solar arrays and mounts affect the natural environment that surrounds the plant. By modelling the microclimate inside the plant and analysing the operation and maintenance strategies (O&M) employed, we will learn how the design and operation of solar power plants can be adjusted to provide better safeguards for the natural environment. The project will also seek to understand what aspects of PV power plants have the greatest impact on the surrounding natural environment.

The United Nations' Sustainable Development Goals: SDG 7: Affordable and clean energy SDG 11: Sustainable cities and communities SDG 13: Climate action SDG 15: Life on land



Photo: Mostphotos

SOCIAL SUSTAINABILITY

IFE's sustainability strategy emphasises that the safety of our employees and surroundings is always the top priority for IFE, and that we must respect diversity and work actively to prevent discrimination in all areas. Social sustainability also entails playing an important role in our local community as a decent and responsible employer, business partner, creator of value and contributor to the local community. We endeavour to implement sustainability in all our activities and daily operations, respect basic human rights and decent working conditions throughout the value chain, and provide a good working environment for all our employees. We make improvements on an ongoing basis.

IFE is a major employer in Halden and Lillestrøm, and our activities and procurements generate economic ripple effects in the region. For example, we chose Norasonde as our catering supplier at Kjeller. Norasonde promotes responsible consumption by focussing on local producers and resources, in addition to providing work experience for people who are out of work or at risk of losing their job or unable to take education.

IFE's board and management have overall responsibility for safeguarding social sustainability. Managers and staff are responsible for following the guidelines, reporting relevant matters to the Ethics Committee and reporting wrongdoing. IFE has a well-established practice for involving employees in the operation and development of activities in accordance with Norwegian law and agreements with trade unions. IFE's board includes two employee representatives. The Cooperation Committee consists of the trade union leaders at Kjeller and Halden as well as IFE management. Five meetings are held each year in addition to extraordinary meetings when necessary, and these entail a mutual exchange of information in addition to formal discussions. The Working Environment Committee (AMU) consists of the chief safety representatives and representatives for the trade unions and IFE management as well as the occupational health service. The business areas have a local working environment committee (LAMU) consisting of a safety representative, trade union representative and management representative. Halden and Kjeller are in touch with contacts at AKAN (a resource centre for substance dependency) who assist staff and managers with the prevention and management of substance abuse problems.

Social sustainability is also about employees' physical and mental well-being, job satisfaction and work-life balance. IFE has a Welfare Committee that allocates annual welfare funds, and company sports teams at Halden and Kjeller that organise various activities.

Many of our new employees are from other countries and different parts of Norway. IFE arranges for employees from other countries to take Norwegian courses. We aim to include and integrate employees in the workplace and help ensure that they have a social network outside of work. At Halden, Lego and board game evenings are held as well as other arrangements for employees and



IFE's employees provide teaching within our areas of expertise at schools and universities, we offer summer jobs to students, have institute scholarships and provide supervision for Master's and PhD students.



IFE endeavours to ensure gender equality and equal opportunities in career development and employee benefits.



IFE works to safeguard human rights and decent working conditions in its own operations and in the supply chain, including through our work vis-à-vis the Transparency Act.



IFE works actively to reduce our climate and environmental footprint.

their families. At Kjeller, we established 'Young at IFE', which organises social meetings and activities for our younger employees to get to know each other better and build private and professional social networks.

Our workforce

Total sick leave in 2023 was 4.1% compared with 3.3% in 2022. Individual adaptations of the workplace and duties are undertaken as part of the close follow-up of employees on sick leave to ensure a timely return to work. Six work-related injuries were reported in 2023, three of which required medical treatment without sick leave, two required medical treatment with sick leave, and one involved a serious injury. In 2023, IFE initiated measures to reduce injuries, including clarification of the guidelines for use of personal protective equipment on IFE's premises and when working for IFE in other locations, securing doors and gates, improved gritting and providing ice grips for shoes, as well as strengthening HSE training.

IFE strives to provide a workplace that is tailored to the health, safety and environment of our employees. The foundation works with the occupational health service to provide preventive health care for its employees. In the case of maternity or adoption leave, IFE offers its employees more generous terms than those under the National Insurance Scheme. All employees retain their normal salary during the period of leave. Based on a risk assessment, pregnant employees who work with radioactive substances and ionising radiation are transferred to duties that do not involve exposure for the remainder of their pregnancy.

Dur workforce		
	2022	2023
Sick leave, percentage	3,3	4,
H1 (incl. sub-suppliers)	3,1	2,2
H2 (incl. sub-suppliers)	3,8	4,4
Injuries, total	8	e

Gender equality and anti-discrimination

IFE has 687 permanent employees, of whom 257 are women and 428 men. In total, there are 60 temporary employees, of whom 17 are women and 43 men. IFE has 39 part-time employees, of whom 18 are women and 21 men.

		Foundation 2023	Agilera Pharma 2023	IFE Invest AS	Corporate group 2023
Permanent employees	Total	539	135		674
	Women	172	84		256
	Меп	367	49	1	417
Temporary employees	Total	58	2		60
	Women	15	2		17
	Men	43	0		43
Part-time employees	Total	39	0		39
	Women	18	0		18
	Men	21	0		21
IFE group management	Total	9			ç
	Women	з			3
	Men	6			e
IFE board	Total	7			
	Women	3			
	Men	4			-1
Board IFE invest	Total	4			
	Women	0			c
	Men	4			4
Agilera Pharma management	Total		9		s
	Women		4		4
	Men		5		5
Agilera Pharma board	Total		4		4
	Women				4
	Men		3		3

In 2023, the research foundation's board consisted of three women and four men. IFE's management team consisted of three women and six men. Agilera's board consisted of one woman and three men in 2023, while the management team consisted of four women and five men.

IFE seeks to achieve full gender equality. The foundation has set up a multi-party group to analyse issues related to gender equality and discrimination. The group consists of HR representatives, chief safety representatives and trade union representatives, and reports to IFE's board and the Working Environment Committee. For IFE's report on the status of gender equality and a description of its gender equality and anti-discrimination efforts, see the Institute's website. IFE also has a 'Gender Equality Plan' to promote gender equality in research. In 2024, IFE will work on strategies and action plans to strengthen gender equality.

The foundation's Code of Conduct states that employees must help to safeguard a fair and inclusive working environment that does not discriminate based on ethnicity, gender, sexual orientation, religion, political orientation or social background. Diversity at IFE is safeguarded through our recruitment process, which is needs-based and subject


to objective and unbiased criteria that must not be influenced by the candidate's gender, pregnancy, maternity or adoption leave, care responsibilities, ethnicity, religion, worldview, disability, sexual orientation, gender identity or gender expression. Since 2022, a diversity statement has been included in all our job advertisements.

IFE has an international environment with employees from 38 different nations. In order to make our employees feel included, information on our website and in the Employee Handbook is in Norwegian and English. The CEO and HR hold introductory meetings with all new employees in Norwegian and English.

IFE's working environment survey also covers discrimination and unfair differential treatment in the organisation. The results of the survey are presented to IFE's entire line management. Based on this, action plans are drawn up at department level to address any non-conformance and improvement measures. The results of these are assessed in a midway evaluation and subsequently a final evaluation.

IFE has established internal and external channels for reporting wrongdoing, see Section 2.1. One report of wrongdoing was registered in 2023. The working environment survey has uncovered cases of bullying and harassment at IFE. IFE takes this very seriously and has initiated preventive measures in 2023, including training on how managers and staff should deal with the reporting of wrongdoing, bullying and harassment.

Human rights and working conditions in the value chain- reporting according to the transparency acy

This report covers the period from 1 January to 31 December 2023 for the IFE-Group, which includes the IFE Foundation, Agilera Pharma AS and IFE Invest AS. The IFE Foundation is a research institute whose principal purpose is to conduct research in the field of energy and associated areas. IFE is responsible for the safe operation of Norway's nuclear facilities and preparing for their decommissioning. The Group's property business develops and manages the properties in Halden and at Kjeller.

Agilera Pharma AS is a developer and manufacturer of radiopharmaceuticals. In its role as the national pharmacy for radiopharmaceuticals, the company also has a societal mission in that they receive deliveries from abroad and distribute them to health trusts all over the country. Agilera Pharma AS is subject to the Transparency Act in its own right, but the company's activities are included in this overall report.

IFE Invest AS manages and develops IFE's stake in companies that have commercialised the research outcomes. IFE Invest AS has one employee and is therefore exempt from the Transparency Act's reporting requirements, but the company's activities are included in this overall report.

IFE's work to respect fundamental human rights and decent working conditions

Under the Norwegian Act Relating to Enterprises' Transparency and Work on Fundamental Human Rights and Decent Working Conditions (the Transparency Act), IFE is obliged to carry out due diligence procedures for suppliers and other partners as in accordance with the UN Guiding Principles on Business and Human Rights, and the OECD Guidelines for Multinational Enterprises.

Please refer to the 'Governance of IFE' chapter for an account of how IFE is organised, the products and services we offer, the markets we operate in, our whistle-blowing channels and our complaint procedures.

IFE is subject to the Norwegian Security Act as well as the Norwegian Act on Nuclear Energy Activities, and this has an impact on which suppliers and business partners we are at liberty to use. Supplier risk is assessed in respect of staff safety and security control. IFE's suppliers cannot be based in high-risk countries or find themselves in a work situation that may compromise their security status, such as poor working conditions.

IFE's nuclear activities are financed with government funds allocated annually from the national budget and are subject to the Norwegian Act on Public Procurement. This means that all advertised public procurement contracts (parts II and III), require suppliers and subcontractors to complete the ESPD form to qualify for competitive tender competitions. A number of mandatory requirements are included, including in relation to crime, corruption, fraud, terror, money laundering, child labour, human trafficking, tax, quality, environmental issues, working conditions, and compulsory liquidation.

Every year, IFE buys goods and services to a value of approximately NOK 400 million from Norwegian and international suppliers. There is considerable variation from year to year as regards the types

38 ⁹ Agreement on Responsible Business Conduct

of goods and services that are procured. This is because IFE's principal mission is research, which is a dynamic activity, and procurements will vary with the type of current research projects. Our nuclear and property activities are also subject to considerable annual variation in terms of procurement, suppliers and business partners.

The materiality and risk analysis identified procurement as one of IFE's main risk areas in terms of social sustainability. IFE can make a positive contribution by choosing suppliers and business partners who incorporate sustainability into their social and environmental conditions, and by setting requirements for those we work with.

In 2022, IFE developed human rights policies and due diligence procedures to implement the Transparency Act into the procurement process. As IFE has over 8,000 suppliers registered in the procurement register, of which over 1,500 are active in any given year, we started by introducing procedures for approving new suppliers. Last year, we classified all active suppliers in 2022 and 2023 according to whether they are based in a high or low-risk country. All new suppliers underwent an overall risk assessment (including sustainability) before they were registered and approved.

IFE is working to reduce the overall number of suppliers and aims in particular to reduce the number of those who are high risk. This is one of our most important measures to ensure compliance with the Transparency Act.

If it is difficult to remove or replace high-risk suppliers and business partners, they will undergo a due diligence assessment and the results presented to IFE's management, who will then decide whether the risk is manageable and acceptable. If management decides to proceed, high-risk suppliers and business partners will be followed up every year. When negotiating and entering into contracts, all suppliers and business partners must sign IFE's ABC policy ⁹, thereby pledging to comply with IFE's Code of Conduct for business partners. In case of non-compliance, IFE may terminate the contract. IFE's standard contracts were revised in 2022 to reflect the new requirements and proce-

SAFETY IN NUCLEAR POWER PLANTS

IFE has been conducting nuclear safety research for over 40 years. This work started after the Three Mile Island accident in the USA in 1979, because it was found that the training of reactor operators, and how they handle incidents, impact considerably on safety levels. After the accident it became clear that human factors were significant, and that the operator had an important role to play in securing health and safety. HTO - Human aspects of nuclear safety and control room technology helps to develop solutions that will enable operators to carry out their work optimally. Under the auspices of the OECD NEA Halden Project, hosted by IFE, we commenced our research for Man-Technology-Organization (MTO) in 1980. In 2021, the project was renamed: Human-Technology-Organization (HTO).

OECD's NEA Halden HTO project is an international partnership project involving twenty participating organisations from twelve countries: the USA, Canada, Japan, Korea, China, the United Arab Emirates, Sweden, Germany, the Netherlands, Great Britain, the Czech Republic and Norway.

The main objective is to improve the safety of the nuclear industry through international collaborative research. The HTO research programme utilises a group of modern simulator labs in Halden, and the research topics are Human Performance, Digital I&C – Safety assurance, Control Room Design & Evaluation, Human-Automation Collaboration, Digital Systems for Operations and Maintenance, Digital Transformation of Decommissioning, and Cyber Security for Main Control Rooms.

The HTO project seeks to understand the interaction between people and technology in an organisational context, based on the fact that human and organisational performance plays an important role in the work to increase the safety of complex processing plants. The HTO project is also involved with small modular reactors (SMRs) and considers their potential applications in various industries. The HRP and HTO projects have been delivering solutions for the nuclear power industry since the 1980s, and continue to be world leaders in the field of nuclear safety. Our expertise and deliveries are of relevance across several domains, e.g. nuclear industry, oil and gas, air traffic control, railways, maritime activities and renewable energy.



The United Nation's Sustainable Development Goals : SDG 7: Affordable and clean energy SDG 13: Climate action

Photo: Stein Johnsen, Contentvideo

dures.

In addition to introducing new requirements and procedures for suppliers and business partners, IFE's management decided to introduce similar procedures for collaboration partners. This goes beyond the scope of the Transparency Act, but it is crucial to ensuring that our collaboration partners protect human rights and maintain decent working conditions.

Managers and staff members who procure goods or services, or enter into collaborations, are responsible for complying with the new policies and procedures introduced in conjunction with the Transparency Act. Managers and staff can seek the advice of the Council of Ethics, or escalate the matter to the divisional management or IFE's management team.

Integrity due diligence process for IFE's suppliers and business partners

Suppliers and business partners are made subject to a due diligence process whenever goods and services are procured. New suppliers and business partners are screened by third parties to establish if they are high or low risk, and the outcome is documented in the procurement register. Highrisk partners are either located in countries that score below 70 on the Transparency International Corruption Index, and/or below 70 in the Freedom House ranking, and/or appear on the 'red flag' list. If it is decided to proceed with a high-risk partner, the person in charge of the procurement must carry out a due diligence process and ask the supplier to complete and return IFE's IDD ¹⁰ form. The Procurement Department is responsible for assessing whether the due diligence outcome warrants proceeding to contract stage or whether the process should be terminated. They can also choose to escalate the matter to the Council of Ethics or IFE's management team. If they choose

to proceed, high-risk partners must be followed up every year in accordance with the established procedure. This is the responsibility of the person who uses the supplier/business partner. If the risk increases, the matter must be escalated to the Procurement Department which puts in place risk-reducing measures or decides whether the relationship will need to be terminated. Routines have been established for the archiving of due diligence documentation.

Integrity due diligence process for IFE's collaboration partners

IFE has collaboration partners who are not classified as suppliers or business partners. These include companies, individuals, research communities or business clusters that IFE collaborates with by exchanging data, guest lecturers, students, infrastructure etc. The Transparency Act does not cover collaboration partners, but IFE has decided to introduce similar requirements and procedures for any such partners who are considered high risk ¹¹.

High-risk partners are either located in countries that score below 70 on the Transparency International Corruption Index, and/or below 70 in the Freedom House ranking, and/or appear on the 'red flag' list. If it is decided to proceed with a high-risk partner, the person in charge of the project must carry out a due diligence process and ask that IFE's IDD Form be completed and returned. The division management is responsible for assessing whether the outcome of the due diligence process warrants an agreement to be made or whether the process will have to be terminated, or they can escalate the matter to the Council of Ethics or IFE's management team. If they choose to proceed, procedures have been put in place for annual follow-up of high-risk collaboration partners. The project manager is responsible for any such follow-up. If the risk increases, the matter should be escalated

10 Integrity Due Diligence

¹¹ This requirement does not apply to IFE's partners in research projects funded by the Research Council of Norway or the EU, because there are routines in place for the approval of research partners in such projects. Research partners in the Halden Project are also exempt from this requirement. However, when establishing consortiums or negotiating with research partners who seek to become party to any such project, IFE can introduce these requirements and procedures so as to consider whether we want

to the division management who will put in place risk-reducing measures or decide whether there is a need to terminate the relationship. Routines have been put in place for the archiving of due diligence documentation.

Actual adverse impacts, and significant risk of adverse impacts, as identified through IFE's due diligence process

Based on the provisions of the Norwegian Security Act, the Nuclear Energy Activities Act and the Public Procurement Act, IFE has in recent years strengthened the company's risk assessment and procurement procedures above and beyond the requirements of the Transparency Act.

IFE has worked to reduce the number of suppliers and business partners who are considered high risk as regards security, human rights or decent working conditions. This has been done by avoiding high-risk suppliers as far as possible, and by replacing existing high-risk suppliers with lowrisk suppliers if feasible. The number of high-risk suppliers and business partners who have been excluded in this way, has not been recorded.

The organisation reports that the introduction of the Transparency Act has increased awareness of risk in the supply chain, and that efforts are actively made to avoid high-risk suppliers and business partners.

In 2023, seven high-risk suppliers and business partners were made the subject of due diligence procedures. In one instance, the supplier failed to complete the IDD form, with the result that IFE dropped the supplier. In all other cases, the suppliers satisfactorily completed the IDD form. These suppliers were selected, but are followed up as in accordance with the agreed procedure. Through IFE's work on the Transparency Act in 2023, the company uncovered some negative consequences. A very small number of purchases from high-risk countries had been debited to IFE's credit card, thereby avoiding the IDD procedure. In the future, purchases debited to IFE's credit card will need to meet the same risk assessment criteria as suppliers recorded in the procurement register.

On occasion, an order has been placed and invoice received although no application has been recorded for inclusion of a new supplier. IFE will strengthen its staff training and information regime in respect of IFE's current procedures. Management support for procurement policies and guidelines will be further strengthened.

In 2023, two injuries occurred that affected workers employed by subcontractors. In the first instance, an individual was injured at a building site because a concrete beam with steel reinforcement had not been moved to the designated are for waste. The individual concerned received an injury that required medical attention and involved sick leave. IFE followed this up by improving the procedures for moving waste to the right compound on building sites, an incident report was completed, and several measures were put in place to reduce the risk of similar accidents. In the other case, a subcontractor's employee suffered an injury that was reported to the Norwegian Labour Inspection Authority. The injury happened because the subcontractor's employees failed to make use of adequate personal protective equipment (PPE). IFE followed this up with the subcontractor and demanded that they improve their use of PPE at our premises.

Due diligence report for 2023, Agilera Pharma AS

Agilera Pharma AS was established on 1 March 2023 as a wholly owned subsidiary of IFE. Like IFE, the company is subject to the Norwegian Act Relating to Enterprises' Transparency and Work on Fundamental Human Rights and Decent Working Conditions (the Transparency Act). In 2022, IFE's report included Agilera's activities.

The activities undertaken by Agilera (formerly a division under IFE) have substantially remained the same after the formation of Agilera Pharma AS, and Agilera has been working to establish a separate policy framework to ensure compliance with the Transparency Act. In 2023, Agilera drew up a compliance statement to ensure that all relevant rules are accommodated in the company's policy framework. In 2023, Agilera drafted a human rights policy and due diligence procedure based on an ethical framework that takes account of matters that are specific to the company's activities. This includes whistle-blowing channels. Separate policies and a Code of Conduct for Business Partners are also being considered. Agilera is subject to GMP and GDP regulations ¹² under which traceability and verification of key processes are requirements for manufacturing permits and other licenses to be issued by the Norwegian Medical Products Agency (DMP). This is followed up by the relevant authorities and their authorised representatives through audits and local inspections. Agilera Pharma AS is also subject to the Norwegian Radiation Protection Act and the Pollution Control Act.

Agilera conducted an overall review of suppliers in 2023 in accordance with their draft due diligence procedure. This review identified no partners in high-risk countries. High-risk partners are either located in countries that score below 70 on the Transparency International Corruption Index, and/ or below 70 in the Freedom House ranking, and/or appear on the 'red flag' list. If it has been decided to proceed with a high-risk partner, the procurement officer in charge must carry out a due diligence assessment. Agilera's screening of business

partners and suppliers suggests that there is no significant risk that the requirements of the Transparency Act are not being met. Most of Agilera's production is carried out under a franchise agreement with the German pharmaceuticals company Bayer, and the next step of the due diligence process is to verify that Bayer's and Agilera's combined follow-up of suppliers will ensure that all suppliers and industries have been reviewed in accordance with the due diligence procedure. In addition to procuring inputs for the production of pharmaceuticals, and for the company's wholesale import of pharmaceuticals for distribution to Norwegian hospitals, Agilera also makes purchases in industries (consumables, disposable equipment) where the risk of non-compliance with the Transparency Act may be greater than for the company's other categories of suppliers. However, based on Agilera's own policy framework, any supplier of consumables and disposable equipment must also verify compliance with the requirements.

Managers and staff members who make purchases or enter into collaboration agreements, will be responsible for ensuring compliance with the new policies and procedures that are being introduced to reflect the provisions of the Transparency Act, and a special training programme will be introduced to ensure that Agilera's framework is used as intended.

Actual adverse impacts, and significant risk of adverse impacts, as identified through Agilera's control procedures In 2023, Agilera has not identified any adverse impacts and/or matters that the Transparency Act is intended to uncover. Targeted training in Agilera's responsibilities as an independent corporation, based on an established framework of policies and an effective distribution of responsibilities with major partners, will improve the company's ability to address risks within its area of business.

ROOF-MOUNTED SOLAR PANELS

In urban areas, roofs should preferably be multifunctional. They should produce energy, handle surface water, contribute to biodiversity, help to cool the city during heat spells etc. Multifunctional roofs can give rise to a number of challenges caused by conflicting objectives, but there are also some synergies.

To find out how solar panels can be used successfully on green roofs, IFE conducted a project funded by RFF Oslo for Oslobygg. The project team included people from IFE, Over Easy Solar AS and the Norwegian Institute of Bioeconomy Research (NIBIO). The project involved visits to combination roofs to take measurements and samples, targeted interviews and workshops with businesses and property owners.

Some project findings:

- Involve the supplier at an early stage and discuss the solutions.

- Adjust the height of mounts to the type and height of vegetation to avoid producing shade. Simple sedums are best suited for today's vertical and horizontal solar arrays. Higher vegetation is challenging if growing too near the panels. Different depths of growing medium can be used to regulate the height of vegetation near panels.

- Make sure that there is sufficient space between panels to allow for maintenance of the array and the vegetation.

The United Nations' Sustainable Development Goals: SDG 7: Affordable and clean energy SDG 9: Industry, innovation and infrastructure SDG 11: Sustainable cities and communities SDG 13: Climate action SDG 15: Life on land



Photo: OverEasy

Annual Report 2023



Foto: Pixel & Co

Institutt for energiteknikk				
Consolidated accounts 2023				
Parent company		Income statement	Group	
Figures in NOK 1 000			Figures in NOK 1 000	
2023	2022		2023	2022
492 668 496 745 42 281 81 847	763 441 451 164 40 018 3 182	Contract revenues Government grants Contributions from international partners at Halden Other operating income	783 593 496 745 42 281 7 717	763 441 451 164 40 018 6 209
1 113 542	1 257 806	Total operating revenues	1 330 337	1 260 833
698 021 21 231 377 286 23 481 0	715 849 105 549 427 631 26 611 0	Payroll and personnel expenses Cost of sales Other operating expenses Depreciation, fixed and tangible assets Write-down of fixed assets	783 616 146 318 391 728 27 891 0	717 817 105 549 428 272 26 611 0
1 120 018	1 275 641	Total operating expenses	1 349 553	1 278 249
- 6 476	-17 835	Operating result	- 19 216	- 17 416
20 827 7 042	7 426 4 661	Financial income Financial expenses	21 781 13 652	19 155 28 612
13 785	2 765	Net financial items	8 129	- 9 457
7 309	- 15 070	Result before tax	- 11 087	- 26 873
0	0	Tax	- 2 498	97
7 309	- 15 070	Net result for the year	- 8 589	- 26 970
		Allocation of result for the year		
7 309	- 15 070	Other equity		

Nature and location of the business

The Institute for Energy Technology (IFE) was established in 1953 with the objective of conducting nuclear research. Today, the foundation works on a not-for-profit basis for the public good by conducting research and development in the field of energy and other areas where the foundation's expertise is of particular relevance. The foundation is registered in the Register of Business Enterprises in Brønnøysund, with organisation number 959 432 538. IFE's premises are at Kjeller and in Halden.

The Board of Directors has seven members. The Ministry of Trade, Industry and Fisheries (NFD) appoints five of IFE's directors, while two are elected by the employees.

In 2018 and 2019, IFE decided to wind up the operation of its nuclear reactors in Halden and at Kjeller. In March 2021, the Norwegian parliament approved Report to the Storting no. 8 (2020-2021) on the safe decommissioning of Norwegian nuclear facilities and radioactive waste management. The Storting decided that IFE's nuclear facilities and employees are to be transferred to the Norwegian Nuclear Decommissioning Authority (NND) and determined that the Norwegian government shall cover all necessary costs for the clean-up of nuclear waste. This overarching framework is very important because it provides the requisite conditions for dealing with the important task of addressing the challenges of winding up 70 years of nuclear operations in Norway while also developing IFE's other activities further. IFE and NND are planning a phased transfer of the nuclear facilities to NND, with a view to transferring the Halden Reactor and KLDRA (Combined Storage and Repository for Radioactive Waste) on 1 January 2025.

While IFE originally focused on nuclear research, the foundation's current range of activities is extensive. They are primarily associated with the foundation's two societal missions: Research for a better future and value creation in Norway, including the safe management and clean-up of waste after more than 70 years of nuclear operations in Norway. Research and development continue to be the foundation's core activity and includes the research divisions Energy and Environmental Technology (ENET) at Kjeller and Digital systems (DS) in Halden. Value creation from research and development is also an important task, and in 2023 IFE's development, production and distribution of radiopharmaceuticals were demerged into the wholly owned subsidiary Agilera Pharma. Maintaining the safety of the nuclear facilities, and the transfer of these to NND, is IFE's other main task.

The IFE Group includes the IFE Foundation and the wholly owned subsidiary IFE Holding AS. IFE Holding AS is a holding company for IFE's commercial activities, and has a 100% shareholding in the subsidiaries IFE Invest AS and Agilera Pharma AS. The Group also includes IFE Research AS, which for the time being is a dormant company. The foundation holds a 33% stake in NORIN Research AS through participation in the NORIN research alliance.

The current group structure took effect on 1st March 2023 when IFE Invest AS and the radiopharmacy activities were transferred from the IFE Foundation to IFE Holding AS. IFE Invest AS and the Radiopharmacy division were transferred to IFE Holding AS by way of a non-cash contribution. Meanwhile, the radiopharmacy activity was transferred, by way of a non-cash contribution, to Agilera Pharma AS. IFE Holding AS is therefore now purely a holding company with a portfolio consisting of the wholly owned subsidiaries IFE Invest AS and IFE Holding AS.

Research and Development (R&D)

The R&D division conducts applied research and aspires to be a leading contributor to international research in the fields of energy, the environment and digitalisation. Through its research activities, IFE will build on the UN Sustainable Development Goals (SDGs) and the EU's focus areas related to societal challenges.

The R&D division employs approximately 340 staff in two sub-divisions: ENET (Energy and Environmental Technology) at Kjeller, and DS (Digital Systems) in Halden.

IFE is a research institute for technology and industrial development and receives core funding from the Research Council of Norway. This is an important source of funding for the research activities, and it gives IFE the opportunity to develop research and expertise within the guidelines for government core funding for research institutes and research groups. As from 2024, part of our core funding will form Norway's payment for membership in the Halden project, which is Norway's longest running and largest research project and is important for maintaining national competence within the field of nuclear safety.

IFE is involved in national and international research projects. Funding is mainly from contracts and contributions to research activities under the auspices of the Research Council of Norway, the EU's research programmes and industry-funded projects. IFE disseminates knowledge generated from research activities through scientific articles in international journals and other publications approved for the Norwegian Science Index, participation at science conferences and through popular science outlets.

Many of the project applications that IFE submitted to the Research Council of Norway in 2023 were successful. Among the projects awarded to IFE in 2023, the Norwegian Nuclear Research Centre (NNRC) was key. The centre highlights IFE's role as a national focal point in Norway's nuclear research, in partnership with the University of Oslo and the Norwegian University of Life Sciences. In recent years, IFE has focused on growth in projects funded by the EU, and in 2023, we took part in



Research infrastructure is important to the research institutes, and IFE has long had a highly regarded research infrastructure with a number of high-tech laboratories. 46

Foto: Stein Johnsen, Contenctvideo

more than 30 EU projects, while serving as coordinator for a further eight projects.

Nemonoor, one of two digital innovation hubs in Norway that was established in 2022, received no government funding in 2023. The level of activity was therefore kept at a minimum. Two new projects supported by the Research Council of Norway were approved in 2023. Both are of relevance to the application of all research and innovation within the fields of Artificial Intelligence and Cybersecurity. The two projects are the IPN project Netron Automated Optimisation for Virtual Production, and the Petromaks2 project CoreSIM (Context-Based Real-Time OT-IT Systems Integrity).

Research infrastructure is important to the research institutes, and IFE has long had a highly regarded research infrastructure with a number of high-tech laboratories. IFE continued this strategy in 2023, and in November, the new Norwegian Advanced Battery Laboratory Infrastructure (NABLA) was opened. This is IFE's largest investment since the solar labs more than 15 years ago and lays the foundation for IFE to serve as a key contributor to future battery research.

The Halden Project has seen considerable activity in 2023. Since the decision was made to decommission the Halden Reactor, research activities have carried on under two different projects: the 'Halden HTO project', where HTO stands for Human-Technology Organisation, and the 'Halden Reactor Project', which deals with fuel and materials research. In 2023, the Halden HTO project consisted of 20 international organisations from 12 countries, with a budget of NOK 141 million for the 2020-2023 programme period, of which Norway's share was NOK 63 million. The Halden HTO project completed its first programme period in 2023 and has entered into agreements for a further programme period 2024-2026. This involves some partnership changes. For the Halden Reactor Project, the research partners have decided to extend the original project agreement to the end of 2025, to ensure that all ongoing research activities are completed.

In connection with the transfer of IFE's nuclear activities to the Norwegian government as represented by NND, some of IFE's premises at Kjeller will be transferred to NND. This means that several key laboratories and much of the national research infrastructure will have to be relocated. Under the 2022 Revised National Budget, IFE was granted a NOK 120 million government loan to build new laboratories. Work has already started on plans for a new laboratory building at Kjeller.

Nuclear operation and safety

Today, IFE's nuclear operations consist of the decommissioned licensed nuclear reactors at Kjeller and in Halden, the associated facilities and approximately 220 staff. All activities are fully funded by government subsidies. In March 2021, the Storting decided that IFE's nuclear facilities were to be transferred to NND. The plan is for all operations, facilities and personnel to be transferred to NND once NND has been granted a licence.

IFE's most important task in this area is to maintain operations and safety at the Norwegian nuclear plants. IFE's priority is compliance with the instructions from the Norwegian Radiation and Nuclear Safety Authority (DSA) to bring the facilities in line with current requirements for modern nuclear plants. The plants were built in the 1950s and 60s under a different legislative and regulatory regime. The exception is KLDRA, which was designed and built by the Norwegian state in the 1990s, but even this is affected by fundamental changes in international knowledge and best practice. Satisfactory solutions will therefore have to take account of the facilities' design and the consequential limitations. This a very large and extensive job, which IFE is working diligently and systematically to complete.

There were no serious incidents, no non-compliance with emission licences and no unnecessary exposure to radiation in 2023. The nuclear waste has been safely managed and stored, based on existing premises and conditions.

Spent reactor fuel is currently kept at various storage facilities at Kjeller and in Halden. Temporary storage of fuel requires continual operation, monitoring and maintenance. Recommendations for the safe storage of spent reactor fuel are described in international standards, and these are incorporated within the national requirements imposed by the DSA. The repositories were built in the 1950s and 60s and are no longer in a satisfactory condition, nor do they comply with current international recommendations. Establishing a repository for long-lived radioactive waste will take a long time, and this is why, in January 2018, the DSA instructed IFE to establish new temporary storage facilities. For several years, IFE has been working to improve the existing storage facilities and establish new ones. IFE and NND are working together to establish new interim storage for spent fuel. DSA has forbidden IFE from moving fuel before the Criticality Safety Assessments have been approved. IFE submitted its Criticality Safety Assessments within the DSA's deadline of 31 December 2023.

The procurement process for new interim storage is ongoing. This work has demonstrated that the total cost of the procurement is likely to exceed NOK 1 billion. Clarification is therefore needed on whether it is necessary to conduct a Concept Study in accordance with the government's project model, with the associated quality assurance, or if the Ministry of Finance can grant a dispensation from this requirement, to enable IFE to proceed directly to the pre-project phase. NND and IFE are planning to transfer the Halden nuclear operation on 1 January 2025, but it is not yet clear what the



IFE's most important task in this area is to maintain operations and safety at the Norwegian nuclear plants.

Foto: Jan Johannessen

relationship between IFE and NND should be at the time of entering into the contract and how delivery call-offs from IFE and NND should be carried out under the contract. Furthermore, in December 2023, DSA issued new guidelines for the planning of clean-up operations at Norwegian nuclear facilities, which must be applied to the project. Due to the many new factors that have been introduced after the procurement commenced, IFE and NND are currently considering how this might affect the ongoing process.

IFE was commissioned by NFD to devise a plan for complying with their instructions ahead of the transfer of activities to NND. The plan was submitted to the ministry within the deadline of 31 March 2023. Based on IFE's assessments, the latest safety report, which concerns the Kjeller area, will be submitted to the DSA by the end of the second quarter of 2027.

Furthermore, IFE and NND were commissioned by NFD to plan for a phased transfer to NND, commencing with the Halden Reactor, possibly in combination with KLDRA. IFE and NND believe that a phased transfer of the nuclear facilities, starting with the Halden Reactor and KLDRA on 1 January 2025, can be done in a way that ensures the same level of safety as before the transfer. NFD supports a phased transfer. The Kjeller plant transfer will have a considerably longer planning period due to the need to investigate and establish new infrastructure so that the nuclear facilities can be operated independently of IFE's other plants.

In recent years, IFE has implemented significant security upgrades at the nuclear plants and protected the information assets, technically as well as organisationally. The increased national threat level in recent years has led to stricter security requirements for IFE's activities, because the political security situation has become more acute and threat agents are increasing their capabilities, particularly in terms of technological development. There is greater uncertainty concerning the nature of potential incidents, and international events over the last year have clearly demonstrated that surprise and speed are now more important factors than previously. Based on the higher threat level, IFE has updated its risk and vulnerability analyses of IFE's basic security, which based on these analyses will see continued improvement.

KLDRA is the only repository for low and medium level radioactive waste in Norway. IFE decided back in March 2020 to introduce a temporary stop on depositing waste at KLDRA, due to uncertainty about whether the operational requirements for the plant were being met. In 2021, IFE and NND commissioned an external status assessment of KLDRA to consider the concept in light of current requirements, which are far stricter than when the plant was built. The status assessment highlighted several challenges associated with the design and safety arrangements at the facilities in relation to current requirements, and IFE therefore decided to continue the temporary halt in waste deposits. In parallel, efforts were made to update the safety reports for the plant based on today's requirements for the current operational phase (300-500 years), during which the plant will be constantly monitored. IFE's plan was therefore to re-open KLDRA for deposits in 2025.

On 20 December 2023, IFE received instructions from DSA that no further radioactive waste can be deposited at KLDRA until exhaustive safety reports have been drawn up and approved by DSA. This applies to both the plant's operational phase and for eternity, when the plant has been permanently closed down and is no longer the subject of constant monitoring. This is a major undertaking that requires thorough investigation. It will therefore take an estimated eight to ten years before it will be possible to resume depositing waste at KLDRA. Until such time, all radioactive waste received and managed by IFE must be stored at Kjeller, where the capacity is already strained. A halt in the receipt of deliveries of low and medium-level waste will affect all institutions and industries that generate this type of waste, and which currently depend on delivering their waste to IFE, which is Norway's only approved recipient.

IFE has set up a waste management programme, with several sub-projects, to improve the storage situation.

There is a need to establish a comprehensive, overall risk profile that addresses the current situation for the nuclear facilities and infrastructure. Factors to be considered include the halt in ordinary operations, the planned decommissioning, the outdated fuel storage facilities, and the existence of international solutions for the management and interim storage of spent fuel, as well as the current national and international security situation. This is a far-reaching process that involves updating security assessments, safety reports, criticality safety assessments, the fuel management processes involved in procuring a new fuel repository, in addition to security risk and vulnerability analyses. To make sure that strategic decisions can be made in time, it is important that the overall risk associated with the clean-up operation after IFE's nuclear activities and plants is comprehensively understood and accepted.

Technology and Properties

IFE owns a large portfolio of properties at Kjeller and in Halden. The main objectives for Technology and Properties are to deliver comprehensive property management services to IFE's own businesses and other tenants within property management, cleaning, logistics, IT, security and emergency preparedness. The remit also includes further development of the property portfolio and implementing development projects.

The property portfolio at Kjeller needs significant investment in infrastructure and upgrading, and the transfer of nuclear facilities to the government means that IFE will lose access to a number of laboratories. IFE's activities within R&D and radiopharmaceuticals are seeing significant growth, and new laboratories and production areas need to be built in the future. As a key contributor to the communities at Kjeller and in Halden, IFE wishes to develop the property portfolio to facilitate further growth within R&D and radiopharmacy, and to attract other businesses for collaboration. Lillestrøm is growing fast, and Kjeller represents an attractive area for further urban development. Zoning plan proposals for IFE's properties at Kjeller were submitted to Lillestrøm local authority in December 2022 and went through the first round of political debate in the spring of 2023. It was agreed unanimously to put the plan out for public consultation in the summer/autumn of 2023. Only a single consultee comment, made by DSA, remains unresolved. This prevents the second round of debate and approval by Lillestrøm local authority. The interventions that are required to satisfy DSA's concerns will be clarified in 2024, thus allowing approval of the plan.

IFE's property portfolio in Halden also has considerable potential for further development, and together with our partners we are considering whether co-location synergies could be created, thereby developing better research from a shared arena.

Society's focus on technology is increasing, and actors throughout the value chain want more self-service and more flexible, customised solutions. To secure a better customer experience and create tomorrow's research and services, innovation and development of digital solutions for researchers and other parts of IFE's organisation form a part of Technology and Properties' core activities.

The world is changing, and thus IFE must be alert to changing threat and risk profiles. Norway's security services (the Norwegian National Security Authority and the Norwegian Police Security Service) point to a raised threat level in relation to several of IFE's activities. While security issues must be handled in all parts of the chain, these issues must never prevent us from conducting our business. IFE Technology and Properties can deliver security at multiple levels and will customise security interventions according to the tenants' wishes. We have the required competence to protect assets, buildings, projects and personnel.

From Radiopharmacy to Agilera Pharma AS

In March 2023, IFE transferred all activities related to the development, production and distribution of radiopharmaceuticals to the wholly owned subsidiary Agilera Pharma AS (Agilera). The reason for the transfer was the rapid development within the field of radiopharmacy both nationally and internationally. Establishing a separate limited company opens up new opportunities for financing and partnerships for Agilera, which will better position the company for participation in the expected growth in this area.

Agilera has a complete infrastructure involving development expertise, production expertise and facilities, local and global distribution networks as well as infrastructure in the form of licences and permits, accreditation, radiation protection, waste management, physical security and emergency preparedness. The company has laboratories that are classified both in respect of purity classes in accordance with international GMP (Good Manufacturing Practice) regulations and radiation protection legislation, and has been granted a permit by the Norwegian Medicines Agency and the DSA to conduct wholesale and retail operations within radiopharmacy. Agilera has well-established collaborative relationships and close access to clinics and research institutions and to companies of various sizes and in different stages of development at Oslo University Hospital and the University of Oslo.

The activity in Agilera is grouped in three sectors: Production, Wholesale and R&D (research and development). All these sectors are involved in radiopharmaceuticals, which are medications that contain radioactive agents and are used to treat cancer.

Production involves commercial manufacturing of pharmaceuticals as well as production for clinical trials. The manufacturing process is in line with the pharmaceutical authorities' quality requirements



Over several decades, IFE has developed unique expertise in the import, export, control, and distribution of radioactive pharmaceuticals, which has now been transferred to Agilera.

Foto: Pixel & Co

and GMP (Good Manufacturing Practice) regulations.

In addition, Agilera is involved in development projects with Norwegian and international clients and produces pharmaceuticals that are used in clinical trials throughout the world. Agilera also provides quality control services, including sterile testing of radiopharmaceuticals in both the commercial and clinical phases, as well as the development of radiochemical/chromatographic methods.

Over several decades, IFE has developed unique expertise in the import, export, control and distribution of radioactive pharmaceuticals, which has now been transferred to Agilera. Agilera is a national wholesaler and retailer for radiopharmaceuticals in Norway, and controls all radiopharmaceuticals and distributes them directly to the nuclear medicine departments of Norwegian hospitals. Agilera also distributes radiopharmaceuticals to clinical trials throughout the world.

IFE Invest AS

IFE has a long history of commercialising research ideas, and in 2008, IFE Venture AS, subsequently renamed as IFE Invest AS, was established as a wholly owned subsidiary of IFE with the aim of commercialising more research at IFE. IFE Invest AS establishes and develops companies, and as an active owner, provides support for daily management, further market development, upscaling and capital injections.

The annual financial statements

The group's consolidated turnover in 2023 amounted to NOK 1 330 million (NOK 1 260 million in 2022), while the IFE foundation's turnover was NOK 1 113 million (NOK 1 257 million in 2022).

The group shows a 5% increase in turnover, while turnover in the foundation has fallen by 13% compared to 2022 due to the transfer of the Radiopharmacy division to Agilera Pharma AS with accounting effect from 1 March 2023.

Government grants account for NOK 496 million of the foundation's and group's turnover. The largest share relates to the operation and safety of nuclear facilities, while other items relate to core funding and allocations for the Halden Project etc. See note 3 to the accounts for further details. The group's and the foundation's other revenues relate to income from contracts and contributions to research activities, international stakeholders in the Halden Project and Agilera Pharma AS. The group's and the foundation's research activities are mainly funded through the Research Council of Norway, the EU and partners in industry.

The R&D division reported a turnover of NOK 521 million in 2023 (NOK 486 million in 2022), which was made up of NOK 385 million from ENET and NOK 135 million from DS. Nuclear Operations and Safety reported a turnover of NOK 449 million (NOK 395 million in 2022), while the turnover for the Technology and Properties division was NOK 37 million (NOK 6.8 million in 2022).

The Radiopharmacy division, which was transferred to the wholly owned group company Agilera Pharma AS on 1 March 2023, reported a turnover of NOK 355 million (NOK 364 million in 2022). Of this, NOK 65 million was credited to income in the foundation for the first two months of the year, while NOK 290 million, for the period from 1 March to 31 December 2023, was credited to income in Agilera Pharma AS.

2023 has been a financially challenging year for IFE, with negative operating results for both the group and the foundation. The group shows a loss after tax of NOK 8.5 million, while the foundation shows a profit of NOK 7.3 million. The group's consolidated loss stems from the losses in Agilera Pharma AS and IFE Invest AS. The nuclear activity is reported at break-even.

Despite increased turnover for the IFE group, both the group and the foundation show negative operating results. This is because of a higher than expected cost base in the foundation, mainly due to high pension costs associated with the pension scheme in the Norwegian Public Service Pension Fund (SPK). IFE discontinued this pension scheme in 2022 and switched to a defined contribution pension, but a number of employees still remain in the SPK as a closed scheme. The group's consolidated operating loss stems from the operating losses in Agilera Pharma AS and IFE Invest AS. The loss in IFE Invest is as expected as the company is primarily an investment company with no operating income. Meanwhile, after losing a substantial contract towards the end of 2022 and for 2023, Agilera Pharma AS has not accumulated sufficient new income to generate a profit from operations.

The foundation has reported a contingent liability of NOK 10 million, which is classified as shortterm debt in the balance sheet. This is largely associated with disputed accounts payable and expected contract losses. The liability has been valued at the best estimate based on probable outcomes. The true cost may turn out to be higher or lower than the book value.

As at 31 December 2023, the equity for the group amounted to NOK 415 million (NOK 424 million in 2022), while the equity for the foundation was NOK 389 million (NOK 382 million in 2022). The equity ratio is 44% for the group and 41% for the foundation, and is considered satisfactory.

The group and foundation show a negative cash

flow of NOK 63 million and NOK 69 million, respectively. The effect on liquidity of investment in operating assets is the most significant explanatory factor, in addition to increased capital tied up in accounts receivable and a lower level of advances from customers. However, increased accounts payable and an increase in other short-term debt yielded a positive effect on liquidity in 2023. Furthermore, the group and the foundation have both had a positive cash flow effect from an increase in long-term debt.

Total bank balances at the end of 2023 amount to NOK 79 million for the group and NOK 55 million for the foundation. Additionally, investments in fixed-income instruments amount to NOK 181 million. The liquidity is considered satisfactory, and the level of liquid assets is sound.

The change in the corporate structure, involving the transfer of IFE Invest AS from the IFE foundation to IFE Holding AS and the transfer of radiopharmacy from the IFE foundation to Agilera Pharma AS, was undertaken with accounting continuity in mind. Assets credited to the balance sheet were carried forward.

KPMG is the auditor for the group and the foundation.

Financial risk

The foundation endeavours to minimise the financial risk. In accordance with the foundation's financial management policy, the financial risk should be as low as possible in respect of normal business operations. The foundation must not expose itself to unnecessary financial market risks, including currency risks. The policy also stipulates that excess liquidity can be invested in low-risk fixed-income funds. The latter are exposed to value fluctuations when interest rates change.

Market risk

The group and the foundation are exposed to fluctuations in currency exchange rates, particularly EUR, which affect both project revenues and purchasing costs. In December 2023, the foundation chose to secure future income streams for its largest single project through futures contracts for the sale of EUR with delivery over the next three years. As of 31 December 2023, outstanding futures transactions amounted to EUR 8 100 000. For major purchases in foreign currency, an individual assessment is made regarding the need for hedging through a futures contract. At year-end, there are no outstanding futures transactions for the purchase of foreign currency. Futures contracts entered into for the purpose of securing future cash flows are not recognised in the balance sheet.

The foundation's portfolio of fixed-income funds is exposed to interest rate fluctuations. At the end of 2023, the foundation has NOK 181 million placed in low-risk money market and bond funds. The investments in money market funds amounted to 47% of the total portfolio, while investments in bond funds constituted 53%. All investments are in Norwegian fixed income securities.

Credit risk

Both the group and the foundation are exposed to credit risks, mainly associated with accounts receivable and loans. The group and the foundation have made provisions for bad debts to the tune of NOK 4.3 million. There is also a potential credit risk associated with advance payments to suppliers.

Liquidity risk

The group's and foundation's liquidity are considered satisfactory. The group's bank deposits minus tax withholdings amounted to NOK 51 million at 31 December 2023, while the corresponding figure for the foundation was NOK 31 million. In addition, the group and the foundation have investments in fixed income funds of NOK 181 million. The foundation and the wholly owned subsidiary IFE Invest AS have a cash pool agreement that provides greater flexibility.

Continued operation

Pursuant to section 3(3)(a) of the Norwegian Accounting Act, the Board confirms that the conditions for continued operation are present and that the group's finances are in a healthy state.



Zoning plan proposals for IFE's properties at Kjeller were submitted to Lillestrøm local authority Illustrasjon: Grape Architects in December 2022 .

Sustainability

IFE's vision is 'research for a better future', and in line with the group and the foundation's sustainability strategy, IFE shall create added value for society, our partners and customers by developing more sustainable solutions to important societal challenges, whilst also fostering value creation in Norway. The SDGs form the basis of IFE's strategy, in addition to the EU's goal of orientating research and innovation towards finding solutions to global societal challenges.

The research activity within energy, the environment and digital systems is IFE's most important contribution to a more sustainable society. Sustainability must form the basis of all the institute's activities, and its scope includes governance, the environment and social issues.

IFE shall endeavour to incorporate sustainability into all the institute's activities and daily operations, respect fundamental human rights, provide decent working conditions throughout the value chain, and be a good employer. In order to achieve the SDGs and ensure that they have an impact, IFE shall set annual targets and key performance indicators (KPIs) for sustainability, report annually and transparently on sustainability efforts, introduce a method for calculating the impact of sustainability in research applications and projects and communicate this impact to clients and institutions that fund research. Training initiatives shall also be introduced to increase managers' and other employees' awareness of IFE's sustainability goals and ensure achievement of these.

IFE produced its first stand-alone sustainability report in 2022. For 2023, the sustainability report has been published together with the annual report. The report addresses the main components of the sustainability strategy, governance, and environmental and social issues, and is based on European Sustainability Reporting Standards (ESRS). IFE is under no obligation to follow these standards but has voluntarily chosen to base its reporting on the reporting principles of ESRS. The report does not cover, nor is it intended to cover, all the requirements of the ESRS. IFE's sustainability reporting for 2023 will be available on the foundation's website: www.ife.no.

Due diligence

IFE falls under the definition of 'larger enterprises' in Norway's Transparency Act and as such has a statutory duty to carry out due diligence with a view to promoting respect for fundamental human rights and decent working conditions in connection with the production of goods and the provision of services. IFE has prepared a consolidated group report that includes Agilera Pharma.

The aforementioned statutory duty includes publication of an account of the due diligence undertaken. This is published in the 2023 sustainability report under 'Human rights and working conditions in the value chain – reporting according to the Transparency Act', and is openly accessible on IFE's website: Sustainability and ethics – IFE.

Working environment

The working environment at IFE is considered to be good, and this is supported by the results of the annual survey of employee satisfaction. The results from the 2023 survey show high scores for team spirit and leadership. This is considered positive in light of the extensive restructuring that has taken place at IFE in recent years following the decision to decommission the reactors and that will continue until the nuclear facilities are transferred to NND.

IFE's working environment survey is also used to identify discrimination or unreasonable bias within the organisation. The results of the survey are presented to IFE's entire line organisation. Based on this, action plans are prepared down to departmental level to manage any non-compliance or improvement measures. The results of these are assessed in a midway evaluation and subsequently a final evaluation.

The annual working environment survey forms the basis for specific working environment measures. Based on the survey, tailored measures are drawn up and implemented at departmental level. Bullying was identified in the workplace in 2023, and targeted measures are being continued, including dilemma training in each division, aimed particularly at managers. In collaboration with the company health service, IFE holds mandatory HSE training courses for all managers.

IFE has established internal and external whistleblowing channels for employees to report wrongdoing. The internal whistleblowing channel is managed by the HR department, while the external, anonymous channel is managed by a law firm. Whistleblowing has been incorporated into IFE's Code of Conduct, and is included in the training in the Code of Conduct and management training. One internal case of whistleblowing was reported to HR in 2023. This is being closely followed up in line with procedures for internal whistleblowing. HR has a specific duty of confidentiality and will ensure that the reported concern is handled in accordance with the Personal Data Act.

Total sick leave in 2023 was 4.1%, which is slightly higher than in 2022. Employees on sick leave receive close follow-up to ensure that a speedy return to work is facilitated through individually adapted work stations and duties. A webinar on sick leave follow-up was held for all managers in 2023. This webinar is accessible on the intranet for further guidance.

Preventive measures to reduce absenteeism are also carried out in collaboration with the company health service, where employees are offered, for example, the influenza vaccine, health check-ups and psychosocial counselling. IFE has introduced flexible arrangements for paid short-term absences in connection with, for example, doctor's appointments.

Six injuries were reported in 2023. Three of these did not involve time off work, two resulted in short-term sick leave and one involved a serious injury.

Equal opportunities and discrimination

IFE aims for full gender equality, and has appointed a cross-party group consisting of representatives from the HR department, the senior safety representative and employee representatives to work on this area. The group is surveying and analysing the current situation and will propose necessary measures to promote equality and prevent discrimination. The result of their work will be anchored in group management and the foundation's Board of Directors, and published in the annual report.

The foundation is subject to the extended duty to carry out certain activities under the Equality and Anti-Discrimination Act. This includes a duty to issue a statement on the actual status of gender equality and what is being done to comply with the activity duty. The report on IFE's efforts in equality and anti-discrimination is published on the foundation's website, see IFE's efforts in equality and anti-discrimination, and includes an account of how IFE works to promote equality and anti-discrimination, the status of gender equality and goals and action plans.

Of the foundation's 539 permanent employees, 172 (32%) are women and 367 (68%) are men. There are a total of 57 temporary employees, of whom 14 (24%) are women and 43 (76%) are men. The foundation has 39 part-time employees, of whom 18 (46%) are women and 21 (54%) are men. In 2023, the foundation's Board of Directors consisted of 3 women and 4 men, while IFE's management group consisted of 3 women and 6 men.

IFE has an international working environment, with employees from 38 different nations. In order

for all of our employees to feel included, our website and personnel handbook are in both Norwegian and English.

The foundation's Code of Conduct stipulates that employees must contribute to a fair and inclusive working environment that is devoid of discrimination on the grounds of ethnicity, gender, sexual orientation, religion, political leanings or social background. Diversity at IFE is safeguarded through our recruitment practices, which are based on demand and objective criteria that should not be affected by a candidate's gender, pregnancy, parental leave for childbirth or adoption, care responsibilities, ethnicity, religion, life stance, disability, sexual orientation, gender identity or gender expression. IFE drew up a diversity statement in 2022, which is included in all job advertisements.

External environment

IFE is certified under ISO 9001 and 14001:2015, and works continually to identify any major environmental issues seen in a lifelong perspective. See the section on 'Climate and Environment' in the sustainability report for more information about the external environment, which describes factors impacting on the external environment and measures to prevent or reduce negative environmental impacts. IFE has emission licences that have covered the entire operation. In connection with the corporate restructuring in 2023 and the demerging of the Radiopharmacy division into a separate limited company, individual emission licences were applied for from DSA for the different areas; Research and Development, Nuclear Operations and Safety, and Agilera Pharma AS.

IFE's research activity at Kjeller (ENET) includes the conditioning of sealed radioactive sources and sample analyses that can release radioactive substances into the environment. Gas, chemicals and oils are also used in the research, which entails a risk of unwanted emissions. ENET has implemented measures to reduce the impact on the external environment.

Agilera's main emission sources and environmental impact are assumed to stem from radioactive waste, biological waste, packaging and transport. Agilera has implemented measures for more environmentally friendly internal transport and is considering more sustainable solutions for transporting end products from Agilera to patients. In addition to reducing waste, Agilera has implemented measures in the production facilities to reduce emissions to air.



The largest emission sources from IFE's nuclear activity are those from the daily work to maintain

Research activities in energy, environment, and digital systems are IFE's most important contributions to a more sustainable society.

Foto: Pixel & Co

and prepare the facilities for decommissioning.

Nuclear waste and storage

Norway was a pioneer in the field of nuclear research, and was the sixth country in the world to build a nuclear reactor. Operations have generated approximately 17 tonnes of spent reactor fuel. Because IFE was an early pioneer in nuclear research and has researched many different types of fuels and materials over the years, the type and composition of waste is extremely heterogeneous. Waste management is therefore complex and challenging, and extensive investigations and the construction of new facilities are needed to carry out the clean-up. IFE is working with NND to ensure that the waste management process and decommissioning preparations are safe, responsible and cost-effective. IFE

has a licence for ownership of the fuel and manages this according to current legislation. As the licensee, IFE is responsible for all projects and activities related to licensed facilities. NND is the project owner and is responsible for conducting fuel studies and studies associated with the ongoing decommissioning.

Highly enriched uranium poses a security risk, and Norway is one of the few countries in the world that still possesses this type of material. In 2021, Norway and the United States signed a letter of intent to develop a method which will ensure that Norwegian highly enriched uranium can no longer be used for nuclear weapons and which will make it suitable for storage and disposal. This is an important agreement for Norway and an important step on the path to the safe clean-up of Norway's nuclear activities.

The National Combined Disposal and Storage Facility for Radioactive Waste (KLDRA) is located in Himdalen in Aurskog-Høland municipality. The KLDRA plant is state-owned and managed by the Norwegian Directorate of Public Construction and Property, and was put into operation in 1998. IFE has an operating licence for the plant through an agreement with the Ministry of Trade, Industry and Fisheries, which finances its operation. KLDRA is Norway's national facility for the storage and disposal of radioactive waste and manages waste from IFE, the Norwegian manufacturing industry, the health service and the Norwegian Armed Forces. No waste was transported to or deposited at the plant in 2023.

Future development

In 2023, IFE experienced a high demand for research in its core market areas; energy, the environment and digitalisation. In the coming years, these research areas will be central to meeting the objectives of the Long-Term Plan for Research and Higher Education and the international targets for climate and biodiversity. We therefore expect a strong market with many opportunities both in Norway and the EU in the years ahead. The high demand in 2023 resulted in strong growth in staffing levels and turnover. IFE was successful in establishing research projects and commissions in Norway, but there was particularly significant growth in the portfolio of EU projects, which reflects our competitive strength internationally. We expect the growth in the EU to slow somewhat in 2024, despite the healthy order book.

In recent years, the market outlook for projects within energy and digitalisation in Norway has been on a downward trajectory. Based on the national budgets for 2023 and 2024, it is clear that the total research budgets are not keeping pace with the growing costs in research, both in terms of infrastructure and staffing. Over time, this will lead to significant changes in the conditions for sound financial operations in the industrial technology research institutes and reduce our ability to contribute to the green transition. IFE is therefore looking forward to the announced review of the Norwegian research funding system. For IFE, it is important that the Norwegian model for the institutes provides the financial conditions necessary for financial sustainability.

In the years ahead, IFE will continue to invest in research infrastructure sought by industry. However, given the economic conditions and the associated reduction in research funding, our ability to invest will diminish compared to previous years. This investment is crucial for strengthening IFE's opportunities to secure future projects in these research areas.

For the Nuclear Operations and Safety division, the focus will continue to be on strengthening safety and security, managing spent fuel and preparing for the transfer of facilities and personnel to NND. Through the grants for the operation of IFE's nuclear facilities, the Ministry of Trade, Industry and Fisheries has provided a good financial framework for ensuring safety in recent years. The State set the framework for this societal mission through the Storting's deliberations and passing of the white paper on the safe decommissioning of Norwegian nuclear facilities and disposal of nuclear waste (Meld. St. 8 (2020-2021)). The Storting's decision stated the following: 'The Storting asks that in the future clean-up of IFE's nuclear activiti-

es, the Government establishes the basic premise that the State is wholly responsible for the clean-up and liable for all necessary costs associated with this.' IFE and NND have calculated that the annual cost of the societal mission is NOK 400 million, and this highlights the need to transfer the nuclear facilities as quickly as it is safe to do so.

IFE and NND are planning a phased transfer of the nuclear facilities, with the transfer of the Halden Reactor and KLDRA on 1 January 2025. This must be done in a way that maintains the same level of safety as prior to the transfer. The Ministry of Trade, Industry and Fisheries supports this phased transfer. The Kjeller facility will continue to have a significantly longer planning horizon for transfer due to the need to investigate and establish new infrastructure to enable the separation of the nuclear facilities from IFE's other facilities.

IFE's Technology and Properties division is exposed to various risk factors in its development, leasing and management of land and buildings, and must carry out continuous risk management. The division needs to be aware of and understand the risks that drive earnings and costs, and must strive for optimum capital management within the adopted strategy.



IFE aims for full gender equality

Foto: Pixel & Co

The master plan and the detailed zoning plan for parts of IFE's site at Kjeller provide for an increase in the number of jobs from 720 to 2200, from 4000 m2 to 40 000 m2 of laboratory space and from 18 000 m2 to 82 000 m2 of building space. This development potential is to be realised gradually, in pace with other processes in IFE.

In addition to this, the need for investment in the next few years will relate to adaptation projects for new R&D projects, moving out researchers from the nuclear areas to another part of the research park to increase safety at the nuclear areas, as well as the necessary upgrading of building stock and replacement of technical installations when they have reached the end of their useful life. IFE has a varied property portfolio with potential for sustainable transformation, and investments associated with this will be considered. IFE is working continuously to reduce energy consumption in the property portfolio and ensure lower energy prices. In 2023, an environmental aspect analysis and energy efficiency analysis were carried out, which will serve as a basis for measures to be implemented in the coming years. Examples of measures implemented in 2023 are energy management tools, air-to-air heat pumps, and electricity and water meters installed in most buildings to enable targeted measures to be taken where they can have the greatest effect. An extensive adaptation project for a new battery laboratory was completed in summer 2023, and the design process for a new laboratory building was initiated.

After IFE's nuclear operations in Halden have been transferred to NND, the nuclear activities at Kjeller will continue alongside the research and other activities there for a long time to come. Setting aside land for the State for future decommissioning is an essential factor for living up to both of IFE's societal missions, and will require extensive work in 2024 and in the years ahead. The Technology and Properties division will play a key role in the separation of Kjeller, but will also assume more responsibility for construction/property projects within the nuclear area. In parallel, the Technology and Properties division will explore opportunities for the further development of the research park within the available framework, pending completion of the separation of Kjeller.

Agilera Pharma AS forecasts major growth opportunities, and in 2023 continued discussions with several new potential customers. The projected growth opportunities are supported by market studies showing a large global potential for radiopharmaceuticals. Agilera is well positioned to capitalise on this growth, but significant investment will be required in additional development and production areas for operations, as well as new customer projects. Establishing Agilera Pharma AS as a separate limited company enables partnerships and financing opportunities, paving the way for more rapid expansion than if it remained part of the IFE foundation.

During 2023, IFE Invest has divested a small portion of the investment portfolio for non-strategic equity investments and made a downward adjustment of the book value of the remaining non-strategic equity investments. However, there is potentially significant added value associated with individual investments if the technologies in these companies are successfully commercialised. These are technologies researched by IFE and further developed through IFE's limited companies and scaled up using external risk capital.

Kjeller, 16 April 2024



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Til styret i Institutt for Energiteknikk

Uavhengig revisors beretning

Uttalelse om årsregnskapet

Konklusjon

Vi har revidert årsregnskapet for Institutt for Energiteknikk, som består av:

- årsregnskapet for Institutt for Energiteknikk (stiftelsen), som består av balanse per 31. desember 2023, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter til årsregnskapet, herunder et sammendrag av viktige regnskapsprinsipper, og
- konsernregnskapet for Institutt for Energiteknikk og dets konsoliderte datterselskap (konsernet), som består av balanse per 31. desember 2023, resultatregnskap og kontantstrømoppstilling for regnskapsåret avsluttet per denne datoen og noter til årsregnskapet, herunder et sammendrag av viktige regnskapsprinsipper.

Etter vår mening

- oppfyller årsregnskapet gjeldende lovkrav,
- gir årsregnskapet et rettvisende bilde av stiftelsens finansielle stilling per 31. desember 2023 og av dets resultater og kontantstrømmer for regnskapsåret avsluttet per denne datoen i samsvar med regnskapslovens regler og god regnskapsskikk i Norge, og
- gir konsernregnskapet et rettvisende bilde av konsernets finansielle stilling per 31. desember 2023 og av dets resultater og kontantstrømmer for regnskapsåret avsluttet per denne datoen i samsvar med regnskapslovens regler og god regnskapsskikk i Norge.

Grunnlag for konklusjonen

Vi har gjennomført revisjonen i samsvar med International Standards on Auditing (ISA-ene). Våre oppgaver og plikter i henhold til disse standardene er beskrevet nedenfor under *Revisors oppgaver og plikter ved revisjonen av årsregnskapet*. Vi er uavhengige av stiftelsen og konsernet i samsvar med kravene i relevante lover og forskrifter i Norge og International Code of Ethics for Professional Accountants (inkludert internasjonale uavhengighetsstandarder) utstedt av International Ethics Standards Board for Accountants (IESBA-reglene), og vi har overholdt våre øvrige etiske forpliktelser i samsvar med disse kravene. Innhentet revisjonsbevis er etter vår vurdering tilstrekkelig og hensiktsmessig som grunnlag for vår konklusjon.

Øvrig informasjon

Styret og daglig leder (ledelsen) er ansvarlige for informasjonen i årsberetningen og annen øvrig informasjon som er publisert sammen med årsregnskapet. Øvrig informasjon omfatter informasjon i årsrapporten bortsett fra årsregnskapet og den tilhørende revisjonsberetningen. Vår konklusjon om årsregnskapet ovenfor dekker verken informasjonen i årsberetningen eller annen øvrig informasjon.



I forbindelse med revisjonen av årsregnskapet er det vår oppgave å lese årsberetningen og annen øvrig informasjon. Formålet er å vurdere hvorvidt det foreligger vesentlig inkonsistens mellom årsberetningen, annen øvrig informasjon og årsregnskapet og den kunnskap vi har opparbeidet oss under revisjonen av årsregnskapet, eller hvorvidt informasjon i årsberetningen og annen øvrig informasjon ellers fremstår som vesentlig feil. Vi har plikt til å rapportere dersom årsberetningen eller annen øvrig informasjon fremstår som vesentlig feil. Vi har ingenting å rapportere i så henseende.

Basert på kunnskapen vi har opparbeidet oss i revisjonen, mener vi at årsberetningen

- er konsistent med årsregnskapet og
- · inneholder de opplysninger som skal gis i henhold til gjeldende lovkrav.

Ledelsens ansvar for årsregnskapet

Ledelsen er ansvarlig for å utarbeide årsregnskapet og for at det gir et rettvisende bilde i samsvar med regnskapslovens regler og god regnskapsskikk i Norge. Ledelsen er også ansvarlig for slik intern kontroll som den finner nødvendig for å kunne utarbeide et årsregnskap som ikke inneholder vesentlig feilinformasjon, verken som følge av misligheter eller utilsiktede feil.

Ved utarbeidelsen av årsregnskapet er ledelsen ansvarlig for å ta standpunkt til stiftelsens og konsernets evne til fortsatt drift, og opplyse om forhold av betydning for fortsatt drift. Forutsetningen om fortsatt drift skal legges til grunn for årsregnskapet så lenge det ikke er sannsynlig at virksomheten vil bli avviklet.

Revisors oppgaver og plikter ved revisjonen av årsregnskapet

Vårt mål er å oppnå betryggende sikkerhet for at årsregnskapet som helhet ikke inneholder vesentlig feilinformasjon, verken som følge av misligheter eller utilsiktede feil, og å avgi en revisjonsberetning som inneholder vår konklusjon. Betryggende sikkerhet er en høy grad av sikkerhet, men ingen garanti for at en revisjon utført i samsvar med ISA-ene, alltid vil avdekke vesentlig feilinformasjon. Feilinformasjon kan oppstå som følge av misligheter eller utilsiktede feil. Feilinformasjon er å anse som vesentlig dersom den enkeltvis eller samlet med rimelighet kan forventes å påvirke de økonomiske beslutningene som brukerne foretar på grunnlag av årsregnskapet.

Som del av en revisjon i samsvar med ISA-ene, utøver vi profesjonelt skjønn og utviser profesjonell skepsis gjennom hele revisjonen. I tillegg:

- identifiserer og vurderer vi risikoen for vesentlig feilinformasjon i regnskapet, enten det skyldes misligheter eller utilsiktede feil. Vi utformer og gjennomfører revisjonshandlinger for å håndtere slike risikoer, og innhenter revisjonsbevis som er tilstrekkelig og hensiktsmessig som grunnlag for vår konklusjon. Risikoen for at vesentlig feilinformasjon som følge av misligheter ikke blir avdekket, er høyere enn for feilinformasjon som skyldes utilsiktede feil, siden misligheter kan innebære samarbeid, forfalskning, bevisste utelatelser, uriktige fremstillinger eller overstyring av internkontroll.
- opparbeider vi oss en forståelse av intern kontroll som er relevant for revisjonen, for å utforme revisjonshandlinger som er hensiktsmessige etter omstendighetene, men ikke for å gi uttrykk for en mening om effektiviteten av stiftelsens og konsernets interne kontroll.
- evaluerer vi om de anvendte regnskapsprinsippene er hensiktsmessige og om regnskapsestimatene og tilhørende noteopplysninger utarbeidet av ledelsen er rimelige.
- konkluderer vi på om ledelsens bruk av fortsatt drift-forutsetningen er hensiktsmessig, og, basert på innhentede revisjonsbevis, hvorvidt det foreligger vesentlig usikkerhet knyttet til hendelser eller forhold som kan skape tvil av betydning om stiftelsens og konsernets evne til fortsatt drift. Dersom vi konkluderer med at det eksisterer vesentlig usikkerhet, kreves det at vi i revisjonsberetningen henleder oppmerksomheten på tilleggsopplysningene i årsregnskapet, eller, dersom slike tilleggsopplysninger ikke er tilstrekkelige, at vi modifiserer vår konklusjon. Våre konklusjoner er basert på revisjonsbevis innhentet frem til datoen for revisjonsberetningen. Etterfølgende hendelser eller forhold kan imidlertid medføre at stiftelsens og konsernet ikke kan fortsette driften.



- evaluerer vi den samlede presentasjonen, strukturen og innholdet i årsregnskapet, inkludert tilleggsopplysningene, og hvorvidt årsregnskapet gir uttrykk for de underliggende transaksjonene og hendelsene på en måte som gir et rettvisende bilde.
- innhenter vi tilstrekkelig og hensiktsmessig revisjonsbevis vedrørende den finansielle informasjonen til enhetene eller forretningsområdene i konsernet for å kunne gi uttrykk for en mening om konsernregnskapet. Vi er ansvarlige for å lede, følge opp og gjennomføre konsernrevisjonen. Vi har eneansvar for vår konklusjon om konsernregnskapet.

Vi kommuniserer med styret blant annet om det planlagte innholdet i og tidspunkt for revisjonsarbeidet og eventuelle vesentlige funn i revisjonen, herunder vesentlige svakheter i intern kontroll som vi avdekker gjennom revisjonen.

Uttalelse om andre lovmessige krav

Konklusjon om forvaltning

Basert på vår revisjon av årsregnskapet som beskrevet ovenfor, og kontrollhandlinger vi har funnet nødvendige i henhold til internasjonal standard for attestasjonsoppdrag ISAE 3000, *Attestasjonsoppdrag som ikke er revisjon eller forenklet revisorkontroll av historisk finansiell informasjon*, mener vi at stiftelsen er forvaltet i samsvar med lov, stiftelsens formål og vedtektene for øvrig.

Oslo, 16. mai 2024 KPMG AS

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