

Annual Report 2011



THE YEAR IN BRIEF

- Net sales increased to SEK204 million (2010: SEK194 million) and a profit of SEK12 million, after financial items, was reported (compared with a loss of SEK3.3 million last year).
- The number of employees in the Stockholm, Gothenburg and Beijing offices as of 31 December 2011 was 192 (193).
- In January, IVL researchers provided expert assistance to UNEP (United Nations Environment Programme) during negotiations in Chiba, Japan, aimed at reaching a binding agreement to reduce world usage of mercury.
- IVL was one of 24 companies and organisations that joined in spring 2011 to undertake the Sustainability certification of urban districts project on behalf of the building and property sector.
- IVL joined with leading Swedish universities, industries and research institutes to form f3, Fossil Free Fuels, the Swedish Knowledge Centre for Renewable Transportation Fuels.
- In the biggest interlaboratory comparison study ever carried out in the area, IVL's analysis of the total mercury and methylmercury levels in natural waters was ranked second best in the world. Arranged by Brooks Rand Labs, the study involved 51 registered laboratories from 14 countries.
- In 2011, a major effort was made to further reinforce the status of the State of the Environment and Sustainable Transport conferences, in particular, as important meeting places for environmental interests in Sweden. State of the Environment, at which then-Minister for the Environment Andreas Carlgren took part in a 75-minute question and answer session, attracted over 300 participants, while Sustainable Transport was attended by 250.
- A SEK45 million research programme to be carried out at the Hammarby Sjöstadswerk test facility was announced in September. The aim is to develop technologies for reusing treated wastewater.
- The final report on Clipore, the six-year climate policy research programme funded by the MISTRA research foundation and led by IVL, was published in 2011. Immediately following this, MISTRA approved funding of SEK25 million for its Indigo (Instrument Design for Global Climate Mitigation) research programme, which will also be hosted by IVL. Indigo will focus particularly on the role of industry in climate programmes.
- In November 2011, the BASTA system received the Swedish Recycling Award from Minister for the Environment Lena Ek. The BASTA system is operated by BASTAonline AB, which is owned jointly by IVL and the Swedish Construction Federation.
- In autumn 2011, IVL hosted a noted international conference on New brominated flame retardants. The event was held under the auspices of NORMAN, a network of reference laboratories and research organisations working to monitor emerging environmental pollutants.
- IVL, in collaboration with the Swedish Trade Council, has been appointed by the Swedish government to assist with the reconstruction of the basic infrastructure in Iraq, and to help in expanding trade between the two countries. In 2011, the focus was on building up a sustainable energy sector, and a training programme including working visits and company meetings has been established to bring Iraqi decision-makers, engineers and researchers together with Swedish companies in areas such as environmental engineering.
- A number of projects funded by the EU's Seventh Framework Programme for Research were commenced in 2011. These included ARCH, whose purpose is to develop methods of dealing with environment-related problems in sensitive coastal areas, ECLAIRE, to study the effects of climatic changes on air pollution and ecosystems in Europe, and PHARMAS, which will examine the environmental and health risks of antibiotics found in the environment.



Photo: Ulf Berglund

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2011 was another record year for IVL Swedish Environmental Research Institute in terms of both sales and results. In four years, turnover has been increased by approximately 50 percent to SEK240 million and the number of employees by about 20 percent to 192. Growth is occurring in all areas of operation.

CEO'S FOREWORD

We must continue to strengthen Swedish competitiveness

IVL's current activities are of a unique, industry-wide scope. Our mission of supporting Swedish companies and public agencies with assessments and new, sustainable solutions is becoming ever-more important. At the same time, the climate in which we are growing is one of increasing competition from pure consultancies and institutes prioritising energy and the environment, as well as from universities and institutes of technology engaged in environmental research.

IVL's form of ownership, which guarantees its credibility and independence alike, is an important prerequisite to the company's present and future success. We are owned by a foundation representing the Swedish government and Swedish business, and membership of the boards of both the foundation and company is comprised of equal numbers of representatives from both sectors, 50 percent being appointed by the Ministry of the Environment on behalf of the government and 50 percent by business.

THE YEAR GONE BY

Our activities at Hammarby Sjöstadsverk received a significant boost in 2011. Owned jointly by IVL and the Royal Institute of Technology, Stockholm (KTH), this pilot and demonstration plant is Sweden's leading facility of its type and is recognised internationally as a leading wastewater treatment R&D facility. The facility is used both by IVL and KTH for their own long-term research projects, both national and international, and by business and other stakeholders for project, testing and development activities.

Collaboration with other countries and partners in the Baltic region has been expanded, not only in the context of improving conditions in the Baltic Sea, but also in areas such as air quality and waste management. We continue to be a strong player in the European research sphere

and have achieved considerable success in our EU project applications – recognition of our high capacity to collaborate internationally. By the end of 2011, we were involved in 36 current EU projects. A comparison of the number of EU projects per employee indicates that IVL's representation is over 2.5 times higher than that of other Swedish research institutes, despite the fact that we do not have access to basic funding for preparing applications, but are obliged to meet this expense from other sources.

Outside Europe, our collaboration with the Swedish Trade Council continued. This included a Swedish government assignment to contribute to the reconstruction of Iraq, and to assist in expanding trade between the two countries. The focus of this effort is on establishing a sustainable energy sector.

Our climate-related activities continued, although the media focus on the climate issue was not as intense as in the previous year. The final report on Clipore, the climate policy research programme funded by the MISTRA research foundation and led by IVL, was published in 2011. Immediately following this, MISTRA approved funding of SEK25 million for a new four-year research programme known as Indigo. Hosted by IVL, this will focus on climate policy regulatory instruments and how these should be configured at international level, with particular emphasis on the role of industry in climate programmes.

A programme to develop the IVL brand was initiated during the year. Our operations and brand are based on competent and engaged employees, and on our core values of credibility, foresight and holistic approach. Together with our vision (in other words, what we aspire to) and our values (what we stand for), our brand (how we are perceived) form the basis of our continued success and of our commitment to enhanced customer benefit.



MEETING PLACE AND DISCUSSION FORUM

Continuous communication, to our customers and to society at large, of the knowledge gained from our activities is a major facet of our work. IVL represents an important meeting place for the research, business, public, societal and political sectors, and provides an essential communication link between them. In recent years, our major State of the Environment and Sustainable Transport conferences, as well as the Baltic Sea Seminar, have become important meeting places and discussion forums where Swedish environmental stakeholders can meet annually.

The events hosted by IVL during the year were attended by a total of approximately 1,200 delegates, and our seminars and courses have attracted over 3,000 participants since their inception.

OUR FUTURE

Environmental problems are constantly becoming more complex, calling for interdisciplinary, leading-edge solutions. IVL Swedish Environmental Research Institute will continue to strengthen Swedish competitiveness and work actively to ensure that Swedish companies remain in the forefront of development, offering an advantage during the transition to a green economy and green growth. There are many small and medium-sized Swedish enterprises in the environmental engineering sector that have the capacity to grow on both the global and European markets. IVL will continue to support both these and bigger Swedish companies with assessments and sustainable solutions. Access to the 'right' competencies is decisive to success in this endeavour and to our continued growth. We need to work consistently to secure and develop our combined competence. This will be achieved through dialogue with business and society in general in order to identify current and future needs, followed by the implementation of internal competence-enhancing measures, while recruiting

new employees both in Sweden and abroad. One example of internal competence development is provided by the project management training course that our Project Office has been providing for the last year and which is under continued development.

Despite the sustained development that we have undergone in recent years, IVL remains a relatively small institution. In the future, we will need to continue to combine internal competence with a high capacity to collaborate with outside partners within consortia, alliances and other groupings without jeopardising our independent status.

In other respects, I believe that IVL Swedish Environmental Research Institute requires access to some form of funding for long-term competence and methods development, and to strengthen our cooperation with business and academia. The universities and institutes of technology have just under SEK13 billion at their disposal in unused research funds. Transferring a tenth of one percent of these resources, or SEK13 million, to IVL and earmarking these funds for the support of small and medium Swedish enterprises in the environmental engineering sector would ensure that we remain at the leading edge of environmental research. Our basic funding – which currently amounts to zero – would thereby be increased by the same amount.

Tord Svedberg
President & CEO

Ever since its foundation, IVL has played an important societal role as a bridgebuilder between the research community, the business sector and public authorities, providing a neutral arena where these stakeholders can come together.

THIS IS IVL

Founded jointly by the Swedish government and Swedish business in 1966, IVL is now a limited company owned by the Foundation of the Swedish Environmental Research Institute (SIVL), whose purpose is to promote the long-term conditions for environmental research and, through its ownership, guarantee IVL an independent status. IVL has been operated as a limited company since 1982.

ORGANISATION

The company is organised into four operational units, together with units for research, business development and marketing, as well as staff functions for finance, human resources, IT and communication. The four operational units are Climate & Sustainable Cities; Natural Resources & Environmental Effects; Air Pollution & Abatement Strategies; and Sustainable Organisations, Products & Processes. All units collaborate within six thematic areas that also comprise IVL's market offer. These are Climate and Energy; Sustainable Building; Resource-efficient Products and Waste; Sustainable Production; Water and Soil; and Air and Transport.

BOTH RESEARCH AND CONTRACT ASSIGNMENTS

Research and development programmes form the basis of IVL's activities. Just over half of the company's total operations consists of research which is either funded jointly by the Swedish government and the Swedish business sector, or through grant aid furnished by national research bodies, research foundations and the EU. In 2011, the Swedish government, through the Swedish Environmental Protection Agency and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), guaranteed SEK34 million in research and development funding subject to the provision of an equivalent amount by stakeholders in the business sector.

BRIDGEBUILDER BETWEEN RESEARCH AND BUSINESS

One part of IVL's role is to act as a bridgebuilder between the research and business communities, and to create arenas where public players can meet. For this reason, IVL frequently takes the lead and participates actively in various networks and other cooperative ventures. With its many years of involvement in EU research, the company has established solid contacts with leading research practitioners at other European universities and research institutes. IVL is an active partner in research networks, such as the European Network of Environmental Research Organisations (ENERO), EurAqua, a grouping of fresh water research bodies, and NORMAN, a network of reference laboratories and research organisations working on the screening of new, environmentally hazardous chemicals.

IVL also enjoys close cooperation with Swedish universities and institutes of technology, including Lund University in the area of sustainable building, Chalmers University of Technology, Gothenburg (CTH) in transport, and KTH in activities at Hammarby Sjöstadsvärk.

KNOWLEDGE COMMUNICATION

Apart from its series of published reports and articles in scientific journals, IVL disseminates knowledge through lectures and participation in seminars. In addition, it holds its own courses and seminars under the banner of IVL Knowledge for professionals in the environment and sustainable development area.

LABORATORIES AND TEST FACILITIES

Advanced chemical analysis – both organic and inorganic – is carried out in IVL's own accredited laboratories, while new technologies for more resource-efficient production are developed in its experimental laboratory. The indoor



environment laboratory is equipped with the resources and equipment necessary for the advanced analysis of emissions, particulates, asbestos and a number of different microorganisms, notably mould. Together with KTH, IVL also owns and operates Hammarby Sjöstadsværk, a unique pilot and test facility for advanced wastewater treatment technology.

ENVIRONMENT AND QUALITY

IVL deals with environmental and quality management, as well as work environment issues, within the framework of an integrated management system, which has been awarded environmental certification under ISO 14001 and quality certification under ISO 9001:2000. Goals are established and monitored under a specified management system procedure.



Mission

IVL Swedish Environmental Research Institute undertakes applied research and contract assignments with the aim of promoting ecological, economic and socially sustainable growth within business and society at large.

Values

IVL's values are founded on credibility, foresight and holistic approach.

Vision

- *We are the leading player in Sweden, and an important player in Europe and the world, in providing innovative, competitive and customer-driven solutions to the environmental and sustainability issues of both today and tomorrow.*
- *We are an internationally attractive workplace and a contributor of unique expertise in strong alliances with other world-leading research environments and companies.*
- *We are the obvious meeting place and a significant bridgebuilder between universities and other third-level institutions, the business community, public authorities and political decision-makers in the community.*
- *We are shaping the future of the institute through our credibility and independence.*

Successes in European research

” We are continuing to develop our research activities to facilitate the adaptation to a more globalised world with limited natural resources and an even greater focus on research directed towards holistic solutions, sustainability, resource efficiency and ecosystem services. Scientific quality combined with applicability and relevance to societal development will also be keywords in IVL’s future research.”



JOHN MUNTHE
Vice President, Research

Research and development account for a little over half of IVL’s total activities. Research assignments are also undertaken directly on behalf of external customers. Joint research projects co-financed by government and business form a central part of research activities. EU-funded and grant-aided research are important elements of the company’s operations, and IVL has achieved major successes in the context of the EU’s Seventh Framework Programme for Research.

IVL LEADS IN ENVIRONMENTAL ENGINEERING RESEARCH

As the EU’s Seventh Framework Programme for Research (FP7) nears its end, it is clear that IVL has had a successful involvement in it. We have been granted over SEK40 million within the framework of FP7 to strengthen leading-edge research and competitiveness within the EU. At present, IVL is pursuing about 20 projects funded through FP7 and is the single Swedish player with the highest number of environmental engineering research programmes.

In all, IVL was involved in 36 different EU-funded research projects in 2011, ranging from fundamental environmental issues concerning emissions, the dispersion and effects of environmental pollutants, climate, sustainable building and environmental engineering, to the development of tools, indicators and models for the environmental and resource evaluation of products and processes.

After many years of engagement in EU-funded research, IVL researchers have established valuable contacts with many leading research practitioners at other European universities and research institutes.

GRANT-AIDED RESEARCH

Most of the funding for our grant-aided research is provided by the Swedish EPA and the Swedish Foundation for Strategic Environmental Research (MISTRA). However, grant aid is also sought and received from the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), Vinnova and other sources.

In recent years, the company has been appointed to manage several major research programmes. Clipore, the six-year climate policy research programme directed by IVL, concluded in 2011. This was followed immediately by the announcement of a new MISTRA climate policy research programme known as Indigo, which is also led by IVL. Other IVL-managed programmes include Entwined (also funded by MISTRA), as well as Sustainable waste management, Chemitecs, the Swedish Clean Air Research Programme (SCARP), and Climate Change and Environmental Objectives (CLEO) – all funded by the Swedish EPA.



COLLABORATION WITH UNIVERSITIES AND INSTITUTES OF TECHNOLOGY

Projects carried out jointly with universities and institutes of technology are important to IVL's research as a means of remaining in the forefront of academic research. IVL plays an important role in the academic world by serving as a link between basic and applied research, among other things by disseminating knowledge and ensuring that research has societal benefits. IVL enjoys the unique advantage of operating at one and the same time in the 'real world' of business and public life, and working in the research sphere.

As part of this, IVL has formalised its cooperation with institutions such as the Royal Institute of Technology, Stockholm (KTH), Chalmers University of Technology, Gothenburg (CTH), and the Faculty of Engineering at Lund University (LTH). In 2011, a separate cooperative agreement was signed with Chalmers to pursue long-term competence development and research in transport and logistics.

CO-FINANCED PROJECTS – UNIQUE FORM OF FINANCING FOR SWEDISH COMPANIES

Co-financed research programmes offer Swedish companies and industries a unique opportunity of carrying out research projects at IVL with funding provided equally by the Swedish government and Swedish business. The research is conducted within the framework of the thematic areas whose content

is determined by SIVL. The areas in question are Climate and Energy; Air and Transport; Water and Soil; Resource-efficient Products and Waste; Sustainable Building; and Sustainable Production.

Activities within these areas are governed by thematic committees, which are composed of government and business representatives, and are responsible for identifying future research requirements. The dialogue within the thematic committees enables the most important research needs of the various stakeholders to be monitored in a systematic manner.

State funding for co-financed research carried out at IVL is administered by the Swedish EPA and Formas. This totalled SEK34 million in 2011.

A co-financed research and development project must be based on an environmental problem or possess environmentally relevant development potential. As common factors, research projects must be of general societal interest, and must incorporate significant elements of research and development. Last, but not least, they must fall within the framework of the operational plan for IVL research adopted by SIVL. The findings of all co-financed projects are made public.

Participation in co-financed research projects is open to all private companies and organisations.

We need more effective innovation systems

Activities in the thematic area of Sustainable Production are of a very wide scope, covering everything from environmental engineering solutions to organisational measures relating to a satisfactory work environment, effective environmental management and the social aspects of an activity which, among other things, affects working conditions in our own facilities and in those of our suppliers.

Our objective at Sustainable Production is to meet the needs of companies for competence to analyse and develop activities and production systems meeting high environmental and work environment standards, while improving corporate profitability and generating benefits in the marketplace.

Backed by a very long tradition in this area, we work closely with a series of companies and industries to develop systems for cost-effective environmental engineering solutions, technical and organisational measures that will create a good work environment, and effective environmental management.

More effective innovation systems and smart Cleantech solutions are needed to meet global environmental challenges in a sustainable manner. IVL's work on demonstrators has proved highly successful in this context."



ÖSTEN EKENGREN
Executive Vice President,
Business Development &
Marketing

MAJOR WASTEWATER REUSE INITIATIVE

As scarcity of fresh water becomes a growing problem in many parts of the world. IVL, together with the Xylem company, has undertaken a major R&D project worth about SEK45 million in total to develop technologies that will enable wastewaters to be reused beneficially.

The development work will be carried out at the Hammarby Sjöstadsværk test facility owned jointly by IVL and KTH, where a number of different treatment and purification stages based on the best available technology will be built. The idea is to develop a number of alternative treatment systems for purifying municipal wastewaters in different parts of the world to different qualities, enabling them to be reused, for example, by industry and agriculture, or for showering and flushing toilets.

SOFTWARE FOR ENERGY-EFFICIENT PRODUCT DESIGN

IVL is developing a software service, Energy Analyser, a simulator-based optimisation procedure for industrial processes with potential for minimising energy usage and other parameters. The aim is to publish this type of software program as a service on the Internet at a future date.

The work is part of the EU's DEMI project and the prototype is scheduled for completion in autumn 2012. The software will then be implemented and integrated in three companies employing processes of widely different types – moulding of plastics, temperature treatment of steel products and design of compressed air systems.

SAFE MOULD REMOVAL

Damp in buildings frequently results in mould growth and building workers can be exposed to high levels of mould when repairing water damage. Working in collaboration with the Swedish Construction Federation, IVL is developing procedures for removing mould safely using reliable risk assessment as a basis for specifying the working methods and safety measures required to reduce the risks. IVL possesses extensive experience in microbiology, the indoor environment and the work environment. Risk assessment is carried out on the basis of this knowhow and procedures enabling mould to be removed without injury to cleaning personnel will be developed.

NITROGEN REMOVAL DEMONSTRATION PLANT

Part-funded by the EU, the ITTEST project has commissioned a demonstration plant designed to improve the removal



SUB-PROGRAMMES

- Resource-efficient production and process optimisation
- Sustainable business and sustainable working life
- Cleantech and innovation

of nitrogen from wastewater, with the aim of improving the efficiency of the process while reducing electricity consumption. For example, surplus heat from district heating return lines may be used to raise the temperature of the inlet water to a municipal treatment plant, enabling a low post-treatment nitrogen content to be achieved even under cold conditions. This is especially important in Sweden, whose colder climate makes the achievement of low nitrogen levels more difficult than in the rest of Europe. More efficient treatment using less electricity is another benefit.

MODERNISATION OF INDIAN PAPER INDUSTRY

Together with the Confederation of Indian Industry, IVL and Innventia, with support from the Swedish International Development Cooperation Agency (Sida), are to contribute to the modernisation and streamlining of the rapidly growing Indian pulp and paper industry, which is expected to increase its annual production from 9 million to 14 million tonnes over the next five years. The aim of the project is to develop solutions that are economically beneficial while significantly reducing environmental impact, greenhouse gas emissions and water consumption. A particular aim is to promote the export of Swedish environmental technology to India.

LONG-TERM RESEARCH COLLABORATION IN OCCUPATIONAL HEALTH AND SAFETY

Together with KTH and the Karolinska Institute of Stockholm, IVL has been allocated research funding by the Swedish Council for Working Life and Social Research (FAS) to establish a centre of excellence for occupational health and safety. The project will involve a significant level of interdisciplinary collaboration.

Studies may include methods of assessing workload, as well as the importance of the form in which company health and welfare is provided – as part of a large company organisation, as an industry-based system or by a national chain of health centres.

Sector accounts for high proportion of resource utilisation

” Sustainable Building is the IVL area of activity that affects most parts of society, although the building and property sector is the principal market.

Since sustainable building accounts for a high proportion of the environmental impact on society – not least in terms of resource utilisation, energy usage and chemicals consumption – the area offers significant potential for improvement.

IVL’s role is to help to establish environments that are sustainably built in social and economic terms, including good, healthy indoor environments. This means, among other things, that we must contribute, firstly, to reducing the flow of scarce resources in the built environment and, secondly, that we must reduce the spread of materials that have negative effects on humans, and on the internal and external environments.

In summary, we research everything from urban planning to energy efficiency, material issues, the indoor environment and air quality.”



ÅKE IVERFELDT

**Executive Vice President,
Business Development &
Marketing**

DANISH-SWEDISH ENERGY PROJECT FOR CLIMATE-SMART CITIES

The PRINCIP project, in which municipalities and research institutes in Gothenburg, Aalborg and Fredrikshamn have joined to survey the potential for more climate-smart energy systems, entered its second phase in 2011. Among other findings, the results indicate that greenhouse gas emissions from Gothenburg’s energy system can be reduced by 30 percent between now and 2030, primarily by improving energy efficiency, but also through increased use of renewable resources.

The project has also revealed that the three cities are working in extremely different ways to cut greenhouse gas emissions. Aalborg, for example, is focusing on technical solutions and efficiency improvements, whereas Gothenburg is looking more at behavioural aspects and encouraging its inhabitants to act in a more climate-smart manner.

HOUSEHOLD ELECTRICITY HAS BIGGEST ENVIRONMENTAL IMPACT IN LOW-ENERGY HOUSES

As part of a research project, IVL has been monitoring the planning, construction and operation of the first

multi-storey timber apartment building to be built using passive house technology. The Hyresbostäder company of Växjö has built two apartment buildings designed for a very low heating demand through the use of well-insulated walls, a well-sealed climatic shell and an efficient heat recovery system.

IVL has analysed the environmental impact of one of the buildings using life-cycle analysis (LCA). The results show that carbon dioxide emissions due to heating over a 60-year lifespan have been practically halved compared with a conventional building. In terms of the environmental impact of the building as a whole, including household electricity, material manufacture and transport, the environmental impact has been reduced by about 20 percent. Household electricity is now the biggest source of environmental impact in a low-energy building.

ENVIRONMENTAL CLASSIFICATION OF BUILDINGS

IVL is working on a project funded by parties including the Sweden Green Building Council to adapt the BREEAM and LEED environmental classification systems to Swedish conditions. Developed respectively in the UK and USA, BREEAM and LEED are designed



SUB-PROGRAMMES

- Urban building
- Buildings
- Building components and materials
- Indoor environment

primarily for conditions and standards in those countries. As a result, they lack provisions governing factors such as the chemical content of building materials.

MODEL CALCULATES COST OF 'MILLION' PROGRAMME

Sweden's existing housing stock is in considerable of renovation. This applies particularly to accommodation built between 1941 and 1980, which spans the postwar period and the Restore the Million programme. IVL has developed a model for calculating life-cycle cost that can be used to compare different energy efficiency improvement measures for buildings of this type. The model can be used as decision-making basis when undertaking a renovation process and different options need to be compared.

The model covers three different scenarios – a conventional case in which the original function of the building is restored without taking specific action to improve energy efficiency, a 'normal' case in which measures are taken to bring the energy efficiency up to present-day standards, and a case approaching zero energy, corresponding to passive house technology.

CLIMATE CERTIFICATION FOR HOUSES

IVL, in partnership with Swedish housebuilder A-hus, has calculated the carbon dioxide footprint of a standard-sized, 150 m² house. This was carried out as part of the noted One Tonne Life project undertaken by A-Hus in collaboration with the Swedish State Power Board (Vattenfall) and Volvo Cars. IVL and A-hus have taken the further step of integrating climate impact calculations directly from the CAD tool used by the company, enabling the information to be used to design the house correctly in environmental terms from the very outset. This, in turn, is a step towards giving consumers a definitive statement of the environmental impact of their houses.

SUSTAINABILITY CERTIFICATION OF URBAN AREAS

In 2011, a broad spectrum of companies and organisations in the building and property sector combined to undertake the Sustainability certification of urban areas project. IVL is one of the 24 players in this venture, the first stage of which has been to evaluate how international certification systems for sustainable urban development can be developed and implemented in Sweden.

Closer focus on climate change adaptation

IVL's climate and energy activities have expanded significantly. While our research in the area is founded on a basis of natural sciences and technology, we have successively reinforced our expertise in social science and economics.

Our work is focused on action, policy issues and regulatory instruments for reducing greenhouse gas emissions, as well as on the analysis of the causal relationships and consequences associated with climate change. Given the importance of this issue, we focus particularly on risk and vulnerability analysis. We also analyse the ways – direct and indirect – in which the relationships between political decisions taken at local, regional and global level influence the climate.

Energy system analysis is a key activity in which we attach particular importance to resource efficiency and minimum climate impact throughout the chain. The climate performance of biofuels is a particularly topical issue. In this context, we assist stakeholders such as public agencies and companies to interpret and calculate sustainability criteria for biofuels.”



JENNY GODE
Acting director, Climate & Sustainable Cities

CLIMATE AND VULNERABILITY ANALYSIS FOR BOTKYRKA MUNICIPALITY

The Municipality of Botkyrka was one of the first public authorities in Sweden to respond to the challenge of the Commission on Climate and Vulnerability to begin to adapt for a changed climate. Prior to the announcement of the new comprehensive plan, therefore, Botkyrka appointed IVL to carry out an overall climate and vulnerability analysis of the municipality; in other words, to examine how climatic changes taking place between now and the year 2100 may influence building activities and infrastructural development in the locality. In other studies, IVL examined how the municipality should plan in the future to prevent greater vulnerability and higher costs as a result of climate change, as well as new building restrictions and adaptation measures that may be required.

INDIGO TO ANALYSE INDUSTRY'S ROLE IN CLIMATE PROGRAMMES

After seven years, the MISTRA research foundation decided to conclude the IVL-led Clipore climate policy research programme in 2011, and to invest SEK25 million in its Indigo (Instrument Design for Global Climate Mitigation) programme, which will also be

hosted by IVL. The new programme will focus on the best way of structuring climate policy regulatory instruments at international level, with particular emphasis on highlighting the role of industry in climate programmes in the current unstable political situation. In addition to IVL, participants in the programme include the University of Gothenburg and the Resources for the Future organisation in Washington DC.

IVL PART OF NORDIC CENTRE OF EXCELLENCE FOR CCS RESEARCH

The Nordic region's leading CCS experts have come together to establish NORDICCS, a high-powered centre of excellence coordinated by SINTEF of Norway and funded by the Nordic Council's Top-level Research Initiative. Sweden is represented in the venture by IVL, CTH and the Geological Survey of Sweden (SGU). The purpose is to examine the potential of carbon capture and storage (CCS) as a contributor to reduced climate impact as part of joint action by the Nordic nations to introduce the technology on a major scale. A major goal of NORDICCS is to establish enduring networks, stimulate innovation and develop joint action plans to promote industry-relevant innovation in the CCS area.



SUB-PROGRAMMES

- Policy, decision-making support and climate strategies
- Energy systems and related measures
- Causal relationships and effects
- Renewable energy

CLIMATE-ADAPTED URBAN STRUCTURE

As part of the Climate-adapted urban structure pilot project led by IVL and the City of Gothenburg within the framework of Mistra Urban Futures, IVL is examining how different climate adaptation strategies – attack, retreat and defence – can be used in conjunction with the planning and development of the Frihamnen area in Gothenburg. The focus is on how construction can be adapted to rising sea levels and how the different strategies may affect the sustainable development of the area; in other words, what the economic, social and ecological consequences will be. The results will be used as a basis for the climate adaptation strategies and plans adopted not only by the City of Gothenburg, but by other cities also.

ENERGY SCENARIOS INDICATE THAT SWEDEN CAN ACHIEVE MAJOR EMISSION REDUCTIONS

In recent years, IVL researchers have been working to develop various energy and climate scenarios. These show that Sweden has the capacity to achieve major reductions in emission levels by the year 2050, basically using existing technologies, while maintaining economic growth. A low-carbon society is not a utopian concept; however, it does present major challenges and it is

high time to initiate the necessary societal adaptation measures. A systematic review of industry, transport, housing and premises, as well as energy conversion, has been carried out, and the researchers have analysed the potential for reducing fossil fuel dependency through substitution, efficiency improvement, and the introduction of new processes and technologies. According to the IVL scenarios, carbon dioxide emissions can be reduced by approximately 70-80 percent by 2050, compared with today's volume of just under 60 million tonnes. Carbon capture and storage may be required to achieve further reductions.

The scenarios indicate that sector-wide programmes will become increasingly important. Examples include the use of industrial waste heat for domestic heating, and burning forest residues to produce electricity, heat and motor fuels. One of the biggest challenges is to make the transport sector fossil-free. In purely technical terms, the carbon dioxide emissions that are most difficult to mitigate are mainly process emissions from the steel, cement and petrochemical industries.

Tools for analysing environmental and climate impact

)) Focusing on air and transport, the thematic area is concerned with research into the emission and dispersion of atmospheric pollutants, emissions from transport media of various kinds and their effects, particularly on air quality, precipitation and ecosystems, as well as abatement strategies and the consequences of regulatory instruments.

Air pollution research and the development of abatement strategies is one of the areas in which IVL has both a long tradition and broad expertise. Apart from the routine work of monitoring air quality and inventorying emissions, we have, in recent years, undertaken intensive research and development work in the transport area, focusing on the environmental and climate aspects, and including the development of models and tools for analysing the environmental impact of different transport and logistics solutions, as well as calculation of both direct and external costs.”



KARIN SJÖBERG
Director, Air Pollution & Abatement Strategies

IDENTIFYING HIGH-EMISSION BUSES

IVL has carried out a series of exhaust gas measurements on buses in western Sweden for the purpose of applying and evaluating a partly new method of identifying vehicles that do not comply with the emission standards relating to transport procurement. The method is based on the measurement of nitrogen oxides, hydrocarbons, carbon monoxide and particulate matter in terms of grammes of pollutant per litre of fuel consumption. Measurement was carried out at the roadside under the most realistic conditions possible.

The measurement programme has enabled buses suspected of emitting high levels of particulates to be separated from normal, low-emission vehicles. Nitrogen oxide measurement also yielded interesting findings, with a number of gas-driven buses known as EEVs (Enhanced Environmental Vehicles) being identified as sources of high NO_x emissions.

MEASURING NANOPARTICLES FROM MARINE ENGINES

In global terms, the primary contribution of particles from marine vessels is almost equal to that of road

traffic. Despite this, however, neither the EU nor IMO (International Maritime Organisation) has yet specified limits for this source. Calculations show that particulate emissions from ships cause between 19,000 and 64,000 deaths annually worldwide. The wide variation in the number indicates a lack of knowledge of factors such as dose-response relationships, as well as uncertainties relating to the emissions themselves and their composition. In other words, there exists a major need for more knowledge regarding the physical and chemical properties of the particles. IVL is currently engaged in a number of research projects in collaboration with partners including CTH and the University of Gothenburg to study and characterise the nanoparticles produced by marine engines.

IVL LEADS SWEDISH-RUSSIAN COOPERATION ON ENVIRONMENTAL PROTECTION ISSUES

The active participation of Russia in the Convention on Long-range Transboundary Air Pollution (CLRTAP) is assuming ever-greater importance as a means of improving air quality in Russia and its neighbouring countries, as well as in Europe as a whole. For this reason, IVL has been assigned by the Swedish EPA to lead a joint project to improve cooperation in this area with the overall aim



SUB-PROGRAMMES

- Air quality and exposure
- Air pollution and ecosystems
- International environmental protection strategies
- Sustainable transport, fuels and logistics solutions

of increasing awareness of the environmental and health effects of air pollution, and to raise the political profile of CLRTAP activities in Russia.

Another aim of the project is to improve the level of knowledge and expand the capacity of the GAINS model among the relevant Russian authorities. Developed in Austria, GAINS is used to calculate the effects and costs of future atmospheric emissions and greenhouse gases. Analyses and scenarios developed using the model are used regularly in CLRTAP negotiations, and in the EU's work on air quality and greenhouse gases.

EFFECTS OF AIR POLLUTION ON LAND ECOSYSTEMS IN EUROPE

The purpose of the EU ECLAIRE project, in which IVL is a participant, is to examine the manner in which future climate change will alter the effects of atmospheric pollution on land ecosystems in Europe. IVL will develop new dose-response relationships to evaluate the influence of tropospheric ozone on European forests, and will also develop a method of evaluating the effects of air pollution on ecosystems from a socio-economic perspective. The project

findings are expected to help to provide a basis that will inform future European policies in the area.

NEW METHODOLOGY FOR CALCULATING DISPERSION OF EQUINE ALLERGENS

IVL has developed a new and unique methodology for calculating the dispersion of equine allergens from stables. The need for this has increased due, among other factors, to the closeness of equine activities to residential areas compared with previous years. In its new animal husbandry planning guidelines, the Swedish National Board of Housing, Building and Planning has chosen not to specify minimum distances from such facilities since research carried out in the 2000s indicated that the dispersion of equine allergens from stables can vary widely depending on local conditions. As a result, an appropriate distance must be specified in each individual case depending on the size of the facility, and the prevailing topography, hardness zone and meteorology. A method of calculating the dispersion of equine allergens under different scenarios is urgently needed for this reason.

Creating opportunities for more sustainable consumption

” The thematic area is engaged in research and development into resource-efficient and environmentally compatible products, communication of environmental performance, and sustainable waste management. The overall aim is to develop methods and tools for sustainable products and closed cycles, as well as the implementation of these methods in a societal context. Another important task is to identify both obstacles and opportunities for more sustainable consumption.

IVL has been working on methods development and systems analysis of commercial products and production processes for over 20 years. Decision-making information based on complex issues in which systems analysis and a life-cycle approach are essential ingredients is often required, as are consequential analyses of action programmes, product or production changes and regulatory instruments.

Environmental marking and concepts such as ‘carbon footprint’ have made a certain impact due to wide usage. However, additional tools and regulatory instruments are needed to ensure that further improvement in the form of resource-efficient and non-toxic cycles can be achieved.”



ELIN ERIKSSON,
Director, Sustainable
Organisations, Products &
Processes

LCA AND CARBON FOOTPRINT

During the year, IVL carried out a large number of assignments and research studies in which LCA (Life-Cycle Analysis) and carbon footprint are used as methods. One example was the production of information for 28 certified environmental product declarations for various Korsnäs products. Another was the development of a methodology for updating the carbon footprint of market pulp and copy paper manufactured by APRIL (Asia Pacific Resources International Limited) at its plant in Indonesia – a method used by the company in communicating with its customers and with the Indonesian government.

IVL has also assessed the ILCD (International Life Cycle Data) handbook and the draft of the PEF (Product Environmental Footprint) Guide that are currently in preparation, and will have a major impact on the design and ‘green procurement’ of products. This project was funded by the Swedish Forest Industries Federation, Swedish Steel Producers’ Association, and Swedish Plastics and Chemicals Federation. An environmental handbook for the steel ecocycle has been produced as part of the MISTRA-funded Steel ecocycle project, in which IVL is responsible for systems analysis and environmental assessment.

GREEN PROCUREMENT

During the year, studies were made of green procurement methods and of the information required in public procurement procedures. Ways in which this information might be made more user-friendly were also examined in consultation with Astra Tech. Local authority purchasers were interviewed in depth as part of the project, and the findings were analysed to determine how the environmental information can be simplified and adapted to user requirements.

IRCOW TO IMPROVE MANAGEMENT OF BUILDING WASTE

As part of the IRCOW research project, IVL is developing technical solutions designed, from a systems perspective, to achieve the efficient recovery, and even recycling, of construction and demolition waste, which accounts for 25 percent of the total European waste mountain, of which little or none is recovered or reused. IVL is examining improved processes for reusing such materials, as well as the life-cycle analyses required to evaluate the methods developed as part of the project.



SUB-PROGRAMMES

- Systems analysis of goods and services
- Life-cycles and waste
- Innovation
- Sustainable consumption and new business models

SUSTAINABLE WASTE MANAGEMENT IN BALTIC REGION

IVL is directing Reco Baltic 21 Tech, an EU-funded INTERREG project whose purpose is to help the Baltic nations to achieve sustainable waste management. The project is intended to provide a transnational platform for knowledge exchange between the countries and to generate innovative business opportunities in the environmental technology sector. A special investment model showing how public authorities can improve their waste management systems and reduce the associated costs will also be developed.

SUSTAINABILITY DATABASE FOR EUROPEAN PAINT INDUSTRY

IVL is developing a database containing information of the environmental and sustainability of paints on behalf of CEPE, the trade organisation of European paint manufacturers. Producers from all over Europe are taking part in the project, which is a step on the road for the industry to learn more about the environmental impact of its products in dialogue with suppliers and customers, and to work consciously to improve their environmental performance.

HAZARDOUS CHEMICALS FROM EVERYDAY PRODUCTS

Directed by IVL and funded by the Swedish EPA, the Chemitecs research programme brings together researchers from many scientific disciplines – environmental chemistry, psychology and environmental systems analysis – to analyse the extent of the problem of emissions of organic substances from goods. The programme enters its final phase in 2012, when the results will be compiled and communicated. The researchers made a particular study of products such as tyres, PVC flooring, textiles, electronics and concrete, identifying the substances that leak from these materials and the extent of such leakage.

REUSE OFFERS MAJOR ENVIRONMENTAL BENEFITS

Donating good used furniture, clothes and electronic products rather than dumping them in a waste skip has environmental benefits. This is the finding of a study carried out by IVL in collaboration with the City of Gothenburg's Recycling Office and Waste Sweden on the ecopark at Alelyckan in Gothenburg, where visitors are helped to sort materials that can be reused. Nationally, almost 80,000 tonnes of waste per year could be prevented by converting all existing recycling centres in Sweden into recycling parks like Alelyckan, while saving sufficient energy to heat a large town.

Growing demand for holistic analysis

” The activity covers the entire water spectrum, including the freshwater and marine environments, groundwater, wastewater and surface drainage. We work on everything from identifying pollution sources, sampling and analysis to the development of warning systems, risk analysis and modelling of pollutant transport. In recent years, the focus has also been on agribusiness. Our aim is to highlight issues in areas such as forestry and agriculture, from both the natural resources and environmental perspectives. Research and collaboration with companies enable us to develop new knowledge, for example, of how to reduce leakage from agricultural and forestry operations.

In addition, we have seen clearly how the demand for holistic analysis, including the effects on both ecosystems and the social economy, has increased. As a result, we are undertaking a long-term programme to develop the concept of ecosystem services.

We are working on projects that will enable tools to be developed for studying planning and adaptation to the new environmental standards required by instruments such as the EU Water Directive, Marine Directive and Chemicals Directive (Reach), and how industry can limit water consumption while minimising the emission of chemicals to the environment.”



BJÖRNE OLSSON

Director, Natural Resources & Environmental Effects

GLOBAL STANDARD FOR WATER FOOTPRINT

IVL is participating in the task of developing a global ‘water footprint’ standard. The purpose is to develop internationally accepted, cradle-to-grave water footprint requirements for products and services. Stakeholders from both the developed and developing nations are represented in this effort.

IVL is working with industry to quantify and assess the impact of various products on the availability of clean water, contamination and its consequences for ecosystems. In this context, we are employing the systems approach inherent in life-cycle analysis, and combining this with our expert knowledge of the effects of various activities, the water directive, and the remedial measures that will be most effective in ecological and economic terms.

PHOSPHORUS LEAKAGE CAN BE CUT BY 60 PERCENT

The search for remedial measures to reduce emissions of eutrophying phosphorus and nitrogen is ongoing. As part of a project part-funded by Baltic Sea 2020, IVL has developed lime-based ditch filters that may prove effective in this context. New test results indicate that leakage can be reduced by almost 60 percent.

Measurements recorded during the first year show that the filter materials tested have the capacity to separate out 33-49 percent of the phosphorus in the filtered water. The filters should be combined with dams to trap a sufficiently high proportion of the annual water flow from the dewatered fields. Dams also serve to separate out phosphorus through sedimentation, increasing the total separation capacity to 50-60 percent.

MAJOR EU PROJECT ON PHARMACEUTICALS AND ENVIRONMENT

IVL is a participant in the PHARMAS research project that commenced in 2011 and is funded by the EU’s Seventh Framework Programme. The overall aim of the project is to develop and improve the risk assessment of pharmaceuticals found in the environment, with a particular focus on drinking water.

The project will examine the risks, both to humans and animals in the environment, of two different groups of pharmaceuticals – antibiotics and anti-cancer drugs. With a view to achieving more realistic risk assessment in the future, particular study will be made of the combined effects of mixtures of different substances.



SUB-PROGRAMMES

- Water management; climate adaptation
- Forestry and agriculture; environmental impact of agricultural sciences
- Chemicals: effects, occurrence and dispersion in the environment
- Risk assessment
- Marine environment

ROLE OF BOTTOM SEDIMENTS IN EUTROPHICATION OF THE BALTIC SEA

Bottom sediments are of key importance to phosphorus deposition in the Baltic Sea. Despite this, knowledge of how much phosphorus is actually present on the seabed, and how much can leach out, is relatively limited. IVL is involved in several projects designed to inventory the seabed and examine various courses of action to bind the phosphorus in the sediments. These include the following EU-funded projects:

- SEABED is mapping phosphorus storage in archipelagic seabed zones along Sweden's Svealand coast, and also in the archipelagos of Åland island and southwestern Finland. Computer modelling will be employed to evaluate the significance of the sediments in terms of the water quality in these zones.
- The purpose of WEBAP (Wave Energized Baltic Aeration Pump) is to test oxygenation of the seabed as a means of remediating the problem of dead bottom zones and algal growth in the Baltic Sea. Wave power is used to pump oxygen-rich surface water to the affected zones with the aim of encouraging phosphorus

dissolved as a result of oxygen depletion (hypoxia) to rebond with the bottom sediment.

PLANNING FOR HIGH WATER FLOWS IN CITIES

Working within the framework of the EU-funded GreenClimeAdapt project, IVL is evaluating the potential effects of high water flows and intensive rain in Swedish cities, and how densely populated areas can equip themselves to manage high water flows in the future.

As part of a future climate scenario, high water flows and intensive rain will increase the load on drainage systems and urban watercourses in many Swedish cities, creating an urgent need for appropriate planning measures. IVL is evaluating the effects of such measures in the City of Malmö as part of GreenClimeAdapt.

The Urban Measurement Network, IVL's air quality programme, celebrated 25 years of activity in 2011. This was marked, in September, by a full-day seminar focusing on air quality, air pollution trends and the work of the network over the years. IVL's former director of research, Peringe Grennfelt, reviewed the growth of air quality programmes in Europe, and IVL's long tradition and role in that development.

Urban Measurement Network celebrates 25 years



Karin Persson

NOTABLE 25TH ANNIVERSARY

IVL has been operating the Urban Measurement Network – a long-term programme for monitoring air quality in population centres – since 1986. Over 120 Swedish local authorities have taken part in the programme.

“When IVL commenced measurements in 1986, nobody imagined that the programme would run for so long. Now, containing over half a million 24-hour mean values, the Urban database is unique,” says Karin Persson, project manager for the programme at IVL.

Measurements are recorded in the urban background of the localities to reflect the general air pollution situation or, alternatively, in the street spaces. The levels are then compared with environmental quality standards and objectives.

“Previously, it was mainly the major cities that measured air pollution since small communities did not have the necessary resources. There was also a Catch 22. The absence of national limits made it difficult to have the figures taken seriously – and it was difficult to specify limits without measured data. This was one of the reasons that IVL initiated a coordinated measurement programme,” adds Karin Persson.

Initially, measurements were confined to nitrogen dioxide, sulphur dioxide and soot. At the beginning of the 1990s, these were extended to include volatile hydrocarbons, such as benzene, and measurement of particulate matter, together with the analysis of PAH and heavy metals, was started in 2000.

Over the years, the information provided by the Urban Measurement Network has become widely used in applications such as trend and epidemiological studies, and in the development of indices and indicators. It also comprises a high proportion of the localities data contained in the national air quality database and reported to the EU. The results are also used as a basis for developing the Urban model – an empirical model used for forecasting, and for calculating exposure, health effects and social costs.



Peringe Grennfelt

INTERNATIONAL AGREEMENTS KEY TO SUCCESS

“Our air quality programmes have been a success story in many respects.”

So says Peringe Grennfelt, IVL's former director of research, who reviewed the growth of air quality programmes in Europe and Sweden at the seminar held to mark the 25th anniversary of the Urban Measurement Network.

In many cases, the sulphur dioxide levels measured in the late 1960s and the early 1970s were 20-50 times higher than today. Present-day levels of soot are also much lower than 30 years ago.

“These reductions are attributable largely to the international agreements reached at the end of the last century, notably the agreement contained in the 1999 Gothenburg protocol and the EU's NEC (National Emission Ceilings) Directive,” comments Peringe Grennfelt. “But it took some time to get that far.

“It's now quite clear that air pollution can travel over long distances. But right up to the end of the 1960s, it was



regarded as a local phenomenon that mainly affected major cities and industrial regions.”

ACIDIFICATION PROBLEM IN FOCUS

In Sweden, air quality programmes in the 1970s and 1980s were dominated by the acidification issue, a problem that was first discussed at the United Nations Conference on the Human Environment in Stockholm in 1972.

“Inventories showed that thousands of Swedish lakes and watercourses were acidified. In Europe, however, the belief was that this was mainly a Nordic problem caused by our lime-deficient soils. So to show that pollutants were coming from the continent and from Britain, we established measuring stations along the Swedish coast.

The measurements were subsequently used as the basis for an OECD project on long-distance transport of sulphur that ran from 1971 to 1975, and involved about ten west European countries and a large number of measuring stations.

LONG-HAUL TRANSPORT SURVEY

The OECD project, in turn, provided the basis for the Convention on Long-range Transboundary Air Pollution (CLRTAP), which was signed in 1979 and which covered all of Europe, including the former Soviet Union, USA and Canada.

“Successfully negotiating a joint measurement programme in the middle of the cold war, when contacts between east and west were so limited, was a very special achievement,” says Peringe Grennfelt.

By the end of the 1980s, effective air quality tools had been developed, limits of natural compensation defined and models developed for optimising corrective action. This yielded a protocol for sulphur in 1994 and the Gothenburg protocol relating to all pollutants in 1999.

“Developments also began to move much faster with the collapse of the Iron Curtain and the Berlin Wall in 1989. Obsolescent methods have now been replaced and standards introduced for new installations, ensuring that pollution levels continue to fall.”

HEALTH EFFECTS OF PARTICULATES ON THE AGENDA

IVL and Sweden played a key role in both the OECD project and the air quality convention. Major parts of the research to map long-distance pollution transport and its effects were carried out at IVL.

“Ever since air quality programmes commenced in the late 1960s, IVL has been a key player in both the research and monitoring contexts, and we will continue in that role,” says Peringe Grennfelt.

“For although the environment is significantly improved, and many lakes and watercourses have begun to recover, the measures taken so far have not been sufficient,” believes Peringe Grennfelt.

“Europe will continue to be affected by air pollution problems in the years ahead, and fresh negotiations and agreements will be needed. Sulphur is no longer top of the agenda; work from now on will be driven by the health effects of particles and by ecosystem effects.”

One of IVL's most important functions is to provide a meeting place for research, business and society, and to create arenas for dialogue and potential collaboration. The training and conference activities developed in recent years represent a link in this chain. In 2011, IVL hosted two major conferences, as well as a number of seminars and workshops, with a total attendance of well over 1,000.

Creating arenas for dialogue and collaboration

IVL events are attended by researchers, company managers, decision-makers and consultants seeking to obtain updates on the latest environmental developments, discuss solutions and develop new opportunities for collaboration.

RECORD ATTENDANCES AT MAJOR MEETING PLACES

The annual State of the Environment and Sustainable Transport conferences both set attendance records in 2011, attracting a total of over 600 delegates. Arranged in partnership with the Swedish environmental magazine MiljöRapporten, the events have grown rapidly in recent years, not only in terms of attendance, but also of content. The programmes include debates on current issues in addition to a number of special sessions held in parallel. Including leading experts and players in the environmental and sustainability areas, the speakers are drawn from public authorities, government departments, universities, research institutes and business.

SEVENTH SUCCESSIVE YEAR FOR 'STATE OF THE ENVIRONMENT'...

State of the Environment was held for the first time in 2005 and has taken place annually since then. The conference has become a popular meeting place for Sweden's environment and sustainability professionals. Attended by 300 delegates, the 2011 event covered topics such as the Fukushima nuclear accident in Japan, the oil spill in the Gulf of Mexico, wind power, and the question of whether environmental decisions are guided by science or public opinion. The delegates also took part in special in-depth sessions dealing with biological diversity, climate compensation and how brands can be

built using sustainability arguments. The day concluded with a question and answer session with the then-Minister for the Environment, Andreas Carlgren, who spent an intensive 75 minutes fielding questions ranging from wind power, transport, chemicals and waste to the importance of pricing ecosystem services.

...AND EIGHTH FOR 'SUSTAINABLE TRANSPORT'

Held for the eighth time in 2011, Sustainable Transport also attracted a record attendance. The topics discussed included the super-green car rebate, high-speed trains, and new technologies for cutting emissions and improving transport efficiency. During the afternoon, the delegates attended four in-depth parallel sessions on topics such as new technology designed to encourage safe and fuel-efficient driving, ways and means of reducing emissions from heavy goods vehicles, and improving the efficiency of the transport chain by selecting the right transport media and using them more effectively.

PREMIERE FOR BALTIC SEA MEETING PLACE

A new meeting place in the form of a thematic seminar on issues concerning the environment and sustainable growth in the Baltic region was established in 2011. Dealing with a sustainable infrastructure, the first seminar attracted 100 participants.



Minister for the Environment Andreas Carlgren spent an intensive 75 minutes answering questions from delegates to the State of the Environment conference.



Photo: Ulf Berglund

About 300 delegates met at the Sustainable Transport conference held at the Stockholm Waterfront Congress Centre in November 2011.



Held at the Rival Hotel in Stockholm, the State of the Environment conference attracted an attendance of over 300. The question of what and who guides the environmental debate was discussed by experts including Mikael Karlsson of the Swedish Society for Nature Conservation (SSNC) and Stefan Fölster of the Confederation of Swedish Enterprise.



Photo: from State of the Environment conference: Ulf AGI

IVL CEO Tord Svedberg welcomed the delegates to the 2011 State of the Environment conference. In one of panel discussions, Katarina Bubr of IVL, Tomas Elmqvist of Stockholm University, Jonas Fejes of IVL, MEP Lena Ek (Swedish Centre Party) and Christina Lindbäck of NCC discussed the implications for environmental programmes of the oil disaster in the Gulf of Mexico, the unsuccessful Copenhagen environmental conference and the Fukushima nuclear accident.

Attracting and, in particular, retaining competent, creative and engaged employees is essential if IVL is to carry on successful research and development programmes. We work internally to promote career and development opportunities as a means of developing employee competence. In 2011, we also initiated a special programme to develop project management expertise.

Competence development in focus

Employee numbers increased by about 20 percent between 2008 and the end of 2011, totalling 192 at our offices in Stockholm, Gothenburg and Beijing. The aim is to maintain steady growth in both the number and overall competency of the workforce.

In terms of gender, the IVL employees is relatively well balanced, with 51 percent men and 49 percent women. Of the total workforce, 94 percent have academic qualifications and 29 percent hold research qualifications.

COMPETENCE DEVELOPMENT

Our approach to competence development is expressed by the 70-20-10 model, which means that on-the-job training accounts for 70 percent of professional development, training by more experienced colleagues for 20 percent and formal training activities for the remaining 10 percent.

A target of two days annual training per employee has been established to highlight the significance of competence development. Based on defined activities, this was achieved in 2011. A special five-module project management training course has been developed and is now implemented on a regular basis. Training is carried out both by IVL itself and with the assistance of outside specialists in the area. In 2011, a total of 115 employees underwent some training and it is intended that practically all of the workforce will take at least the first two of the five modules. Module five is equivalent to a third-level course in project management and five IVL project managers have reached this level so far.

CAREER DEVELOPMENT

In 2011, an internal programme was held to highlight career and development opportunities for employees, with the longer-term aim of developing a competence planning



BRITT BJÖRNSPJUT
Director, Human Resources

tool for the workforce and the operation itself. The programme yielded a model that was tested in discussions with employees and then evaluated.

The model will be further refined on the basis of the experiences of managers and employees. Looking to the future, we see the need for proactive development work that will keep pace with changes in activities and competence needs.

WORK ENVIRONMENT AND HEALTH

IVL's work environment activities are conducted on the basis of yearly plans and delegated responsibilities. The company has occupational health service agreements with Feelgood in Stockholm and Företagskliniken in Gothenburg. Employees are offered regular health checks, and can also seek medical treatment for illness and work-related problems.

IVL promotes the wellbeing and health of its employees by contributing financial support for cultural and sporting

activities. Subsidised fitness training is available to all employees.

EMPLOYEE SATISFACTION SURVEY

IVL has carried out an employee satisfaction survey every year since 2008. The survey is designed to measure trust, pride and comradeship at both organisational and unit level, and to enable employees to identify both what is good about the job and what is capable of improvement.

The results provide a basis for developing action plans. The employee satisfaction index (ESI) is calculated from the ratings awarded by the employees to the statement "Overall, I would regard this as a good workplace" in

the survey. Since 2008, this indicator has risen by 13 percentage points at organisational level and by nine percentage points at team level.

EQUALITY AND PARITY OF TREATMENT

IVL implements an overall policy and plan to ensure equality and parity of treatment. Developed by a representative group, this is implemented in the form of a yearly plan. Executive management, managers and employees must all work to ensure that our activities and corporate culture are characterised by a philosophy of diversity and by parity of treatment, contributing to IVL's credibility as an adviser on sustainability issues.



"We have many expert project managers, as demonstrated by the fact that IVL is being assigned the role of coordinator in more and more major national and international research programmes. However, the aim of this programme is to make these people even more professional and to further improve the quality of our project management in line with our management system."

"We work almost invariably in project form, carrying out everything from small internal projects to large and small external assignments, major co-financed projects, and huge research projects with funding from Swedish research financiers, such as Formas, Mistra and the Swedish EPA, or from EU research programmes. It is essential that every project be carried out in a professional manner and in harmony with the business world. It is also an advantage if every IVL project manager approaches a project in the same manner since this makes it easier to share experience and help one another."

Jonas Fejes, head of project management training at IVL



"I hold a doctorate in human ecology and I joined IVL in November 2010 working, among other assignments, on projects relating to energy and future issues. How to tackle the environmental and climate challenges of the future is a question that arises constantly in my job. Just like most other people in the company, I work exclusively on projects, often with external players and

also internationally. So I found it valuable to undergo more in-depth training in project management during the last year and I've completed three modules so far. What the course has given me above all are tools for things like quality assurance. But it has also been an eye-opener in terms of group dynamics and of the importance of assembling groups in which the members complement each other, not just as in terms of knowhow but also of skills."

Mathias Gustavsson



"I have worked for IVL for ten years. I'm a graduate engineer and now I'm a deputy group manager as well. In my time at IVL, I've headed about 30 projects of all types, from projects in which IVL was involved on its own and others in which it was a partner. I have also managed major Swedish projects involving a number of partners and led IVL's participation in major EU projects. I'm currently heading my biggest project ever in the form of RECO Baltic 21 Tech, an EU project with a budget of SEK30 million. As a project manager, I feel that I can trust those working with me, so I don't manage in detail. I prefer to work this way mainly because it gives every project team member responsibility and greater enthusiasm for the job – which ensures that the projects are carried out well."

Åsa Stenmarck



"I'm an analytical chemist and I've worked at IVL since 1990. I'm mainly involved in the analysis of organic substances and the related analytical methods. In my department, we work on both external and internal projects. I've completed parts of IVL's project management training course, and I've led many small and some big projects,

the biggest with a budget of up to about SEK3 million. I enjoy the project manager role, and structuring and planning the work. It's important to think straight in terms of structure, leadership and planning. But I also believe that communication and cooperation within the project team are crucial to a successful outcome."

Annika Potter



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Directors' report

The board and CEO of IVL Swedish Environmental Research Institute Ltd. hereby submit their report and statement of accounts for the operating year 1 January 2011 to 31 December 2011.

IVL Swedish Environmental Research Institute is owned by the Foundation of the Swedish Environmental Research Institute (SIVL). The boards of the company and the foundation are appointed by the Swedish government and Swedish industry. IVL undertakes research projects and contract assignments in the environmental field. Established in 1966, the company employed a total of 192 people in Stockholm, Gothenburg and Beijing as of 31 December 2011. IVL has been a limited company since 1982 and reported net sales of SEK240 million in 2011.

Operations and organisation

The purpose of IVL's operations is to promote ecological, economic and socially sustainable growth within business and society at large through research and contract assignments. The operation is structured into four operational units, together with research, business development and marketing units operating laterally across the organisation. IVL's research activities are contained in a long-term plan that is updated continuously by a research council. All units interact in a matrix organisation in six thematic areas: Climate and Energy; Water and Soil; Air and Transport; Sustainable Building; Sustainable Production, and Resource-efficient Products and Waste.

IVL's working methodology is characterised by an interdisciplinary and holistic approach. In contrast with its original focus on the solution of environmental problems caused by industrial emissions, the company now works actively across the entire area of sustainability. In addition to its traditional expertise in the environmental field, IVL now employs behavioural scientists, economists and social scientists.

Our activities range across the entire industrial spectrum and our customers represent Swedish society in its entirety, from small and medium enterprises to large multinationals, industrial and trade organisations, public authorities – of which the Swedish EPA is the biggest single principal – local authorities and other organisations.

IVL is also involved in comprehensive international activities concentrated mainly on China and India, Russia and the EECCA nations. Europe is regarded as the company's domestic market.

Subsidiaries

BASTAonline AB has been owned by IVL (60%) and the Swedish Construction Federation (40%) since 2007, and is based at IVL's offices in Stockholm. The company administers and develops the BASTA system of evaluating and phasing out particularly hazardous substances in building materials. Totalling 58 initially, the number of suppliers joining the system had increased to 243 by the end of 2011, by which time 22,639 products, corresponding to 74,000 individual items, had been registered. Developed in 2011 to meet user demands, the BASTA Project Handling tool enables information regarding the products used in individual projects to be documented by product identity, supplier, environmental performance, quantity and location in the building. This has enhanced the usefulness of the BASTA system, especially since it can be interlinked with the Swedish Green Building Council and Swedish BREEAM classification systems.

BASTAonline AB reported an operating profit of SEK240,000 (289,000) in 2011.

Business climate and future development

Population growth, urbanisation and climate change are the factors underlying the urgent sustainability-related challenges that we face today. This, in turn, is exerting greater pressure on resources, both limited and renewable, giving rise to food and water shortages, poverty, increased energy demand and effects on human health while highlighting the need for international agreements.

Following the failure to reach a binding climate agreement in Copenhagen at the end of 2009, expectations of what might be achieved in Durban in 2011 were relatively modest. At the eleventh hour, agreement was reached to maintain the Kyoto protocol although, so far, this covers very few, mainly European, countries. A process initiated during the Cancun Climate Change Conference to deal with negotiations and initiatives such as voluntary commitments and emission reductions is continuing in parallel. There is much to suggest that this may be fruitful.

IVL personnel continue to monitor ongoing trends in climate negotiations and are supplying policy information to the process, among other channels through the two MISTRA-funded programmes, Clipore and Entwined.

The major challenges in the immediate future, in an unstable and flagging European economy, accompanied by rising oil prices that threaten to slow the world economy as a whole, is to develop long-term, sustainable energy and resource solutions.

With its strong focus on resource efficiency improvement, and its roots in interdisciplinarity and systems analysis, IVL is ideally positioned in this context.

The environment, environmental engineering and energy are priority areas within the EU's Seventh Framework Programme for Research and Technical Development. IVL has been very successful in these areas, securing grants totalling EUR4 million to carry out research projects as part of the programme. The company has been particularly successful in the environmental engineering sector, in which it is the Swedish player with the highest number of current projects. In all, IVL is a participant in over 30 EU-funded research projects, and is represented in all of the EU's environmental and energy-related research activities.

Basic funding

IVL and other research institutes play a decisive and recognised role in increasing the competitiveness of Swedish industry, and ensuring that business benefits from the research conducted by the universities and other third-level institutions. Most research institutes are guaranteed basic funding from the national budget to expand and maintain their expertise.

Despite this, IVL's profitability remains high. However, the company must be given the same type of basic funding as that enjoyed by other institutes if it is to remain in the forefront of environmental research in the longer term, contributing to the development of Swedish industry.

Key events during the year

VAT case

IVL has been contesting a value-added tax case with the Swedish Tax Agency (SKV) since 2004, in which it has consistently maintained that its grant-aided activities cannot be regarded as separate, but as

an integral part of the company's overall operations. As such, the company should be entitled to relief in respect of tax paid on costs attributable to its grant-aided activities. However, in a judgement handed down in December 2010, the Administrative Court of Appeal concurred with the view of SKV that IVL should not be allowed relief in respect of these costs.

The judgement was made retrospective by five years. For the years 2005 to 2008, the total net cost amounted to SEK7,674 thousand. This amount was set aside in the company's accounts for 2010, and were reported under the heading of Other external costs in the profit and loss account. Since this allocation was not tax-deductible in 2010, tax expenses were increased by SEK2,018 thousand. In 2011, the non-deductible cost was restored and the reported tax for the year reduced by SEK1,892 thousand.

The decision of SKV was appealed to the Supreme Administrative Court of Sweden in Stockholm on 8 June 2011.

International activities

IVL's international activities are concentrated in China (where it has its own office) and India. The company is also active to a lesser extent in Russia and the EECCA (Eastern Europe, Caucasus and Central Asia) nations.

After more than 25 years of activity in China, carrying out assignments mainly in the context of aid-related programmes administered by the Swedish International Development Cooperation Agency (Sida) or the EU, IVL now accepts contracts directly from Chinese public authorities and companies. One example is a project that will transform contaminated industrial land into an artificial lake in the city of Wuhan. In another instance, IVL has been chosen by the China National Institute of Standardization (CNIS) as a partner and consultant in a building and design project.

IVL's environmental collaboration with the Chinese Research Academy of Environmental Sciences (CRAES) – now one of the foremost advisors to the Chinese government – is also undergoing further development. A letter of intent has also been signed with CRAES and the Tianjin Environmental Protection Bureau (EPB) regarding the measurement of atmospheric emissions in the Hebei region.

IVL and the Tianjin Academy of Environmental Sciences (TAES) have been joint owners of the Sino-Swedish Environmental Technology Development Centre (SEC) for about the last ten years. SEC has helped a large number of Swedish environmental technology companies to enter the Chinese market. In 2011, the primary focus was on biogas.

In India, IVL has established an effective working arrangement with the Confederation of Indian Industries (CII). In 2011, together with Innventia, the company undertook a project to modernise and streamline the rapidly expanding Indian pulp and paper industry. The project is supported by Sida and IVL's role will be to act as facilitator for the export of Swedish environmental technology to India. IVL is also conducting a project on behalf of the European Chamber of Commerce in Brussels with the aim of increasing cooperation between India and Europe in areas such as environmental engineering and energy.

Communication, course and seminar activities

Communication, together with the production of courses and seminars, are part of Business Development & Marketing. As such, the function is an integral part of the company's operational development.

Communication has become an increasingly important element, both in general terms and as part of research programmes, as a means of spreading information about IVL's activities. In this context, courses and seminars play a vital part, not least as a means of reinforcing IVL's role as an arena where stakeholders from the research, business, public and political worlds can meet. In 2011, a major effort was made to further reinforce the status of the State of the Environment and Sustainable Transport conferences, in particular, as important meeting places for environmental interests in Sweden. State of the Environment attracted over 300 participants, while Sustainable Transport was attended by about 250.

Courses and seminars for both internal and external customers are produced under the IVL Knowledge brand. In 2011, about 20 courses in environmental building were produced and held on behalf of the Sweden Green Building Council.

Attended by over 3,000 people, about 80 courses, seminars and conferences have been held since the start of the activity.

Commercialisation of R&D

Commercialisation of the research conducted by IVL can help to communicate environmental and resource-saving technologies more quickly to companies. Responsibility for commercialisation and incubation activities resides with Business Development & Marketing.

As an example, the possibilities of productising the company's services are examined regularly. In 2011, among other instances, this was carried out in conjunction with the development of the certification systems for the building sector that IVL is working on together with the Sweden Green Building Council.

BASTAonline AB is another example of a commercialised research project in which IVL, together with one of the research financiers, took the further step of forming a company to market the system – known as the BASTA system – that was developed for the purpose of evaluating and phasing out especially hazardous substances in building materials.

Collaboration with universities and institutes of technology

IVL's strategy includes the establishment and development of close cooperation with the business sector, international research bodies and third-level institutions. As part of this, IVL has also formalised its cooperation with the Royal Institute of Technology, Stockholm (KTH), Chalmers University of Technology, Gothenburg (CTH), and the Faculty of Engineering at Lund University (LTH).

As an example, the company has initiated a dedicated programme in collaboration with CTH to develop an infrastructure for long-term competence development and research in the transport and logistics area. IVL's primary role is to develop a database and a support function for long-term data processing, and to initiate and pursue transport research in collaboration with CTH.

At present, three IVL employees hold adjunct professorships at KTH, CTH and the University of Gothenburg, while a fourth holds a VinnMer fellowship at CTH under the auspices of the Chalmers Energy Initiative.

Hammarby Sjöstadsverk

IVL and KTH are joint owners of the Hammarby Sjöstadsverk R&D facility, which is a national resource for the development of wastewater treatment technology. The facility is used both by IVL and KTH

for their own research, and by outside stakeholders for testing new treatment technologies on effluents of various types.

In 2011, the facility received a significant boost with the initiation of a major project by IVL and Xylem (formerly ITT Water & Wastewater) worth about SEK45 million in total to develop technologies that will enable wastewaters to be reused beneficially. The budget for the four-year research project is just over SEK20 million, while Xylem is investing over SEK25 million in engineering, operation and maintenance.

Several other major projects have been carried out at Hammarby to study increased biogas recovery, more efficient nitrogen extraction, treatment of pharmaceutical residues, and the reduction of greenhouse gas emissions from wastewater treatment and sludge handling operations.

Together with KTH, Uppsala University, the Swedish University of Agricultural Sciences (SLU) and Mälardalen University, and aided by funding from the Swedish Water & Wastewater Association (SWWA) and municipal authorities in the Mälardalen region, Hammarby Sjöstadswerk is part of a centre for public water treatment.

CPM

IVL operates the Centre for Environmental Assessment of Product and Material Systems (CPM) in collaboration with CTH. In 2011, the parties initiated a process aimed at developing CPM into a national centre for LCM (Life Cycle Management) activities. In addition to IVL and Chalmers, bodies associated with the centre include KTH, the Technical Research Institute of Sweden (SP), the Swedish Institute for Food and Biotechnology (SIK) and a number of international companies, such as Volvo and Akzo Nobel, that are well advanced in LCA.

IVL is also leading the Vinnova-funded project entitled Business development through information systems in the value chain that commenced in late 2011. Work on potential projects in areas such as environmental pricing was also initiated during the year.

Another Vinnova-funded project already under way concerns the development of tools for calculating the environmental impact and efficiency of transport systems. Managed by IVL, the project will involve collaboration between IVL and Chalmers researchers and major Swedish industrial concerns.

Mistra Urban Futures

Mistra Urban Futures is a Gothenburg-based international centre for sustainable urban development. In addition to IVL, the partners in the consortium are CTH, University of Gothenburg, City of Gothenburg, Gothenburg Regional Association of Local Authorities (GR), Västra Götaland Region and Västra Götaland County Administrative Board. The centre is financed by MISTRA, together with the Swedish International Development Cooperation Agency (Sida) and the consortium members. The IVL-led pilot project entitled *Future Frihamnen – Climate Adapted City Structure* concluded in 2011.

Mistra Urban Futures enters a second phase in 2012, and IVL will take part both in the development of the centre and in two projects, *Business-driven sustainable urban development and Knowledge and working methodologies for a socially sustainable city*, dealing with higher population densities in urban environments.

Other cooperation and important networks

IVL's role is to act as a bridgebuilder between the research and business communities, and to create arenas for interaction between different players in society. This is one of the reasons why IVL is leading or participating in networks and other cooperative ventures of various types, some of which are featured above. Others include:

SWEDEN GREEN BUILDING COUNCIL (SGBC) is a non-profit organisation that is open to all Swedish building and property sector companies and organisations that wish to develop and influence sustainability activities in their field. Together with companies and organisations including Skanska, NCC, Fastighetsägarna and Akademiska Hus, IVL is a founder member of SGBC and is represented on its board.

STOCKHOLM ENVIRONMENTAL TECHNOLOGY CENTRE (SMTC) is a business network that was initiated by IVL and is administered by it. SMTC connects visitors, stakeholders, projects, technologies, companies and researchers in the environmental technology field in the Stockholm/Mälardalen region.

SWEDISH ENVIRONMENTAL EMISSIONS DATABASE (SMED) is a consortium formed in 2001 by IVL, Statistics Sweden (SCB), the Swedish Meteorological and Hydrological Institute (SMHI) and the Swedish University of Agricultural Sciences (SLU) to compile and develop Swedish competence in emission statistics relating to action programmes in the areas of air and water pollution, waste, and hazardous substances and chemicals. SMED has been supplying all of the data for Sweden's international reporting in these areas since 2006.

SWEDISH NETWORK FOR TRANSPORT AND ENVIRONMENT (NTM). As a member of the network, IVL has worked in formal collaboration with NTM since 2009. The aim is to strengthen cooperation by placing IVL's expertise at the disposal of NTM's members and working groups.

EUROPEAN NETWORK OF ENVIRONMENTAL RESEARCH ORGANISATIONS (ENERO) is a grouping of European research institutes operating under the umbrella of the European Research Area (ERA). As an active member, IVL held the chair of ENERO in 2009.

NORMAN is a network of reference laboratories and research organisations involved in the screening of new, environmentally hazardous chemicals. Established in 2005 with support from the EU's Sixth Framework Programme, NORMAN is now a permanent network financed by its members. IVL has been a so called 'founding member' since 2009. In autumn 2011, the company organised an international seminar on New brominated flame retardants within the framework of NORMAN.

EURAQUA is the European Network of Freshwater Research Organisations. IVL is the Swedish representative.

Ratio of research projects to contracts

Revenue from fees during the year was divided between research projects and contracts in the ratio of 54% to 46% (compared with 56% and 44% respectively in 2010). In this context, research projects are defined as projects funded jointly by the Swedish government and Swedish industry through the Foundation of the Swedish Environmental Research Institute (SIVL), as well as activities financed by grants from public research agencies, research institutes, the EU and similar bodies. Co-financed activities accounted for 21% (19%) of fee-based revenue and grant-aided activities for 33% (37%).

IVL's research is an integral part of the company's operations and is a prerequisite to its facility for undertaking assignments using leading-edge expertise.

Contracts undertaken by IVL include both short-term consultancy and analytical assignments, as well as more comprehensive national and international contracts of a research and development nature.

Assignments

In 2011, IVL, in collaboration with the Swedish Trade Council, continued work on its assignment from the Swedish government to assist with the reconstruction of the basic infrastructure in Iraq, and to help in expanding trade between the two countries. The focus of this second stage was on establishing a sustainable energy sector. Working visits and meetings with companies were organised as part of a training programme designed to bring Iraqi decision-makers, engineers and researchers together with Swedish companies in the environmental and engineering fields.

In addition to contracts from business, IVL undertakes major assignments for the Swedish EPA. Among other things, the company is responsible for data collection as part of the national and international environmental monitoring programmes in the areas of atmospheric and precipitation chemistry, air quality in population centres, environmental toxin levels and metals in biological materials. IVL also maintains a screening database of environmental toxins and metals.

Current EU projects

A large number of projects funded by various EU organs, mainly the Seventh Framework Programme for Research, was approved and initiated in 2011.

EU research programmes in which IVL is involved and which commenced in 2011 include ARCH, whose aim is to develop methods of dealing with the diversity of problems affecting sensitive coastal areas, ECLAIRE, to study the effects of climatic changes on air pollution and ecosystems in Europe, and PHARMAS, which will examine the environmental and health risks of antibiotics found in the environment.

IVL was assigned two major projects within the framework of the EU's Switch Asia programme, one of which, Train the Trainers, is designed to promote the exchange of knowledge of energy-efficient building methods between the EU and China.

At present, IVL is participating as coordinator or partner in over 30 EU projects.

Other current research programmes

The final report on Clipore, the climate policy research programme funded for six years by the MISTRA research foundation and led by IVL, was published in 2011. Immediately following this, MISTRA approved funding of SEK25 million for a new four-year research programme known as Indigo. Also hosted by IVL, this will focus on climate policy regulatory instruments and how these should be configured at international level, with particular emphasis on the role of industry in climate programmes. IVL also hosts the MISTRA-funded Entwined research project, which is studying the interaction between international environmental policies and global trade, with the focus on transboundary issues.

For the last couple of years, IVL has been leading four major research programmes financed by the Swedish EPA. These are

SCARP (Swedish Clean Air Research Programme), Chemitecs (a study of the emission of organic substances from goods), Sustainable Waste Management, and Climate Change and Environmental Objectives (CLEO), whose purpose is to study how future climate change will influence the prospect of achieving Sweden's environmental objectives.

AFA Insurance is financing several IVL projects dealing with the work environment. In 2011, among other projects, funding was approved for a study of new methods of dealing with work environment issues in manpower agencies.

Co-financed research

In 2011, the Foundation of the Swedish Environmental Research Institute (SIVL), as owner of the company and principal of IVL's co-financed activities, undertook a review of the working methodologies and thrust of its research activities. SIVL also decided to continue to evaluate the operation on a continuous basis.

Funding totalling SEK34 million for co-financed research was available to SIVL in 2011 through the Swedish government's grants to the Swedish EPA and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas). Total funding for co-financed research consists of SEK17 (14) million from Formas, SEK17 (15) million from the Swedish EPA, SEK21.1 (17.2) million from the Swedish business sector and SEK16.8 (12.9) million from the EU. An additional SEK450 thousand is provided by Formas for scientific publications.

Funding of SEK34 million for co-financed research will be available to SIVL in 2012.

Examples of co-financed research

The following are examples of co-financed research projects approved and/or commenced in 2011 in the respective thematic areas:

CLIMATE AND ENERGY: *Energy scenario 2050; Biofuels and land utilisation in Sweden; Future environmental issues in the energy sector*

AIR AND TRANSPORT: *Sulphur content of marine fuels; Logistics analysis of sensitivity models; Particles from marine engines*

RESOURCE-EFFICIENT PRODUCTS AND WASTE: *Alternative methods for toxicity in LCA; Development and optimisation of water treatment processes*

SUSTAINABLE BUILDING: *Best available technology for preventing sewer backup damage; Active swimming baths; BREEAM Community*

SUSTAINABLE PRODUCTION: *Evaluation of membrane distillation; Cost-effectiveness of anti-eutrophication measures; Plasma gasification of auto fluff; Work environment tools for public wastewater treatment plants*

Environmental and quality management

IVL deals with environmental and quality issues within the framework of an integrated management system. The system, and its application by IVL, are certified under ISO environmental and quality management standards SS-EN ISO 14001 and SS-EN ISO 9001 respectively. Certification is reviewed annually and the system is re-certified periodically by an accredited inspection agency. IVL has achieved the latest levels in both cases.

Most of the company's work relating to sampling, field measurement and analysis is accredited and inspected regularly by SWEDAC (the national Swedish accreditation authority) in accordance with SS-EN ISO 17025.

Environmental and quality activities are governed by the company's environmental and quality policies, which are implemented in the form of both overall and specific goals. Customer advisory services and company travel are by far the most significant contributors to IVL's environmental footprint. An attempt is being made to evaluate the environmental impact of the company's customer advisory services by performing a sustainability assessment following project completion.

More videoconferences

The company's videoconferencing equipment continues to increase the number of meetings and discussions that are being held without the need for travel. To meet a growing demand, an additional conference room in the Gothenburg office was equipped with videoconferencing facilities in 2011. Divided equally between the Stockholm and Gothenburg offices, the six conference rooms with video support are occupied 50 percent of the available time by video-assisted meetings.

The company's environmental footprint from travel has been reduced by undertaking more domestic journeys by rail (up 9% on 2010). The number of train journeys increased by 12% during the period 2008-11.

However, the company's international activities make air travel unavoidable, although the environmental loading due to air travel abroad decreased somewhat compared with 2010 (-1.6%). Calculated over a four-year period (2008-11), the environmental loading declined steadily from 140 g/km to 120 g/km (-1.6%), probably due to more efficient aircraft types.

IVL's quality activities have a customer relations focus. For this reason, activities are monitored continuously to ensure that customers are satisfied with the company's services. A survey is held annually to determine customer perceptions of IVL in terms of aspects such as customer care, competence, on-time performance and cost benefit. The customer satisfaction index in 2011 was 4.0 (2010: 3.8). The internal project management course launched in 2010 is one probable reason for this improvement.

IT and energy usage

The annual energy usage of the IT function has been reduced significantly in stages since 2009. However, the demand for data storage and updated communications technology, as well as more and bigger monitors, has absorbed part of the savings. Overall, IT energy usage was reduced by 70,000 kWh over the two-year period 2010-11.

In general, IVL seeks to minimise the overall environmental impact of its activities without compromising function or reliability. Environmental improvement measures in the IT area include environmentally compatible processing and sorting of packaging, influencing suppliers and products at the purchasing stage, and assessing suppliers on a regular basis.

Net sales, net income and capital structure

Group

The group's net sales for the financial year totalled SEK239,924 (2010: 193,986) thousand, yielding a net profit after financial items of SEK12,053 (-3,233) thousand. The net profit after taxes was SEK10,349 (-4,566) thousand. The return on adjusted equity was

negative (-17.5%), as was the return on capital employed (-8.7%). The improvement in the figures for 2011 is due partly to the one-off effect of the amount set aside for value-added tax in 2010, and partly to the improvement in the figures resulting from a higher workload factor and an increase in the hourly rates charged to customers. Tax expenses were also lower since taxes that were non-deductible the previous year were deductible in 2011.

The group's total assets increased to SEK140,680 (125,562) thousand and its total equity capital to SEK55,889 (45,527) thousand. Cash flow was positive at SEK18,336 (-38,729) thousand.

Capital investment in inventories and equipment totalled SEK3,145 (3,296) thousand. The equity/assets ratio improved to 39.7 (36.3) %.

Parent company

IVL's net sales for the financial year totalled SEK239,014 (193,022) thousand, yielding a net profit after financial items of SEK6,270 (-1,822) thousand. The net profit after taxes of SEK6,054 (125) thousand benefited from reduced tax expenses since the amount set aside for value-added tax in the 2010 accounts was deductible for tax calculation purposes in 2011.

Total assets amounted to SEK140,256 (125,084) thousand and total equity capital to SEK36,696 (30,642) thousand. Adjusted equity capital was estimated at SEK40,172 (34,081) thousand. Cash flow was SEK18,148 (-39,029) thousand. The return on adjusted equity was negative (-12.4%), as was the return on capital employed (-4.8%).

Capital investment in inventories and equipment totalled SEK3,145 (3,296) thousand. The equity/assets ratio increased to 28.6 (27.2) %.

Parent company employees

Structure and personnel turnover

During the operating year, the number of employees averaged 184 (176), of whom 51 (52) % were men and 49 (48) % women. Of the workforce, 29 (28) % hold research qualifications, while 65 (64) % hold masters degrees in engineering or other academic qualifications.

During the year, 9 (8) permanent employees left the company for other positions, while 2 (2) employees retired on pension. New recruitment totalled 10 persons in areas including sustainable building, environmental engineering and administration.

Equality and parity of treatment

IVL implements an overall policy and plan to ensure equality and parity of treatment. Developed by a representative group, this is implemented in the form of a yearly plan. Executive management, managers and employees must all work to ensure that our activities and corporate culture are characterised by a diversity perspective and by parity of treatment, contributing to IVL's credibility as an adviser on sustainability issues.

Chargeability rate

The chargeability rate for the period was 68.0 (66.1) %. Chargeability rate is defined as the proportion of total attendance time that is invoiced to the customer. The remaining (in-house) time is devoted

to marketing, training, technical maintenance, management and administration.

Absences and holidays

During the year, total absences, including holidays, accounted for 23.4 (23.5) % of normal working time. Sick leave accounted for 2.4 (1.9) % and holiday time for 8.9 (8.6) %. Leave of absence accounted for 9.6 (10.4) %, of which 6.8 (8.7) % was parental leave. Normal working time is defined as working time including holiday time and overtime worked, less absences due to sick leave, sickness of a child, parental leave or other leave of absence, as well as compensatory leave. The same basis is used to calculate the average number of paid-up years in Note 5 Personnel costs.

Special report on sick leave for period 1 January – 31 December 2011

Figures for employee sick leave are given below. These are stated as a percentage of total normal working time, and also include details of continuous sick leave totalling 60 days or more (defined as long-term sick leave), figures for men and women, and sick leave in different age groups. In the following summary, sick leave is shown as a percentage of normal working time, less leave of absence and parental leave. The method of calculation is, therefore, different to that used above for absences and holidays.

Group	TOTAL SICK LEAVE as percentage of normal working time		LONG-TERM SICK LEAVE as percentage of normal working time	
	2011	2010	2011	2010
All employees	2.5	2.0	0.4	0.2
Women	2.9	1.9	0.5	0.2
Men	2.0	2.1	0.4	0.2
29 years or younger	2.5	1.9	0.0	0.0
30-49 years	2.3	2.0	0.1	0.2
50 years or older	2.7	2.1	1.2	0.3

Other personnel information

Personnel turnover, %	2011	2010
Number of employees to resign as percentage of average workforce for year	4.9	4.5
– including pension	6.0	5.7

Age distribution, %	2011	2010
Age		
20–29	15	11
30–39	34	37
40–49	23	24
50–59	16	17
60–69	12	11

Average age: 42 (43) years

Key financial indicators per employee (figures in SEK thousand)	2011	2010
Sales, excl. expenses	1,104	974
Salaries	614	618
Net profit/loss after financial items	34	-10

Length of service, %	2011	2010
< 2 years	19	21
2-10 years	43	42
> 10 years	38	37

Average length of service: 10 (11) years

Qualification, %	2011	2010
PhD	26	24
Other research qualification	3	4
Graduate engineer	30	32
Other academic qualification	35	32
Technical high school qualification	6	8

Summary of business and financial ratios (figures in SEK thousand)

	GROUP					PARENT COMPANY				
	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
Sales and profit/loss										
Invoiced fees and expenses	239,924	193,986	204,542	196,261	162,561	239,014	193,022	203,939	195,483	162,347
Operating profit after depreciation	11,308	-3,322	5,338	5,539	1,292	5,527	-1,965	1,496	5,623	1,123
Operating profit after financial items	12,053	-3,322	5,401	6,183	2,217	6,270	-1,822	1,706	6,253	2,047
Profit margin	5.0	Neg	2.6	3.2	1.4	2.6	Neg	0.8	3.2	1.3
Capital structure										
Fixed assets	12,564	14,233	16,636	16,936	15,149	13,182	14,837	17,225	17,514	15,732
Current assets	128,116	111,329	126,489	120,232	83,016	127,074	110,247	125,779	119,124	82,539
Equity	55,889	45,527	50,079	46,020	41,684	36,696	30,642	30,517	30,128	28,094
Untaxed reserves						4,717	4,666	9,578	8,602	5,556
Current liabilities	78,000	73,857	84,204	82,181	51,128	98,843	88,892	101,031	95,035	64,621
Provisions	6,791	6,178	8,842	8,967	5,353	-	884	1,878	2,873	-
Total assets	140,680	125,562	143,125	137,168	98,165	140,256	125,084	143,004	136,638	98,271
Adjusted equity						40,172	34,081	37,576	36,321	32,094
Equity, annual funds	50,708	47,803	48,050	43,852	40,941	37,127	35,828	36,949	34,208	31,419
Capital employed, annual funds	133,121	134,344	140,147	117,667	99,253	132,670	134,044	139,821	117,455	99,403
Equity/assets ratio, %	39.7	36.3	35.0	33.6	42.5	28.6	27.2	26.3	26.6	32.7
Current ratio	1.64	1.51	1.50	1.46	1.62	1.29	1.24	1.24	1.25	1.28
Profitability										
Return on adjusted equity, %	17.5	Neg	8.1	10.2	3.9	12.4	Neg	3.4	13.2	4.7
Return on adjusted equity, 5-year average, %	7.0					6.0				
Return on capital employed, %	9.1	Neg	3.9	5.1	2.3	4.8	Neg	1.3	6.0	2.1
Other										
Capital expenditure	3,145	3,296	5,603	1,961	3,671	3,145	3,296	5,595	1,947	3,671
Invoiced sales per employee, incl. expenses	1,290	1,090	1,175	1,182	1,022	1,299	1,097	1,193	1,192	1,028
Invoiced sales per employee, fees and analyses	1,097	969	1,151	1,119	944	1,104	974	1,168	1,128	948
Chargeability rate, %	67.0	66.1	67.7	65.0	64.6	68.0	66.1	67.7	65.0	64.6
Number of employees	186	178	174	166	159	184	176	171	164	158
Personnel costs per employee	608	613	611	606	587	614	618	622	612	592
Return on equity Profit after net financial items and deduction of standard tax at 26.3% relative to average adjusted equity.										
Adjusted equity Total equity, plus untaxed reserves, less deduction of standard tax at 26.3%.										
Return on capital employed Profit after net financial items plus interest expenses relative to average balance sheet total.										
Equity/assets ratio Adjusted equity relative to balance sheet total.										
Current ratio Current assets divided by current liabilities.										
Profit margin Net profit after financial items as a percentage of net sales.										
Chargeability rate Time charged to client as a proportion of total work attendance.										
Annualised employees The number of employees for the year expressed in terms of full-time positions. The actual number of employees is higher due to part-time working and the fact that some employees work only part of the year.										

Proposed appropriation of profits (figures in SEK)

The following funds are available to the Annual General Meeting:

Profit carried forward	22,242,364
Profit for year	<u>6,054,110</u>
Total	28,296,474

The board and CEO propose that the total profit be distributed as follows:

To be carried forward	<u>28,296,474</u>
Total	28,296,474

See the income statement, balance sheet, cash flow statement, and notes to the financial statements and accounts for information on the results reported by the parent company and the group for the financial year, as well as the general financial position as of 31 December 2011. All figures are in SEK thousand.

Income statement (figures in SEK thousand)

		GROUP		PARENT COMPANY	
		2011	2010	2011	2010
Operating income					
Net sales	Note 1	239,924	193,986	239,014	193,022
Change in work in progress	Note 2	-20,892	4,849	-26,492	6,330
Other operating income	Note 3	453	417	453	415
		219,485	199,252	212,975	199,767
Operating expenses					
Expenses		-41,449	-36,159	-41,449	-36,159
Other external expenses	Note 4	-45,889	-41,995	-45,269	-41,399
Personnel costs	Note 5	-116,032	-111,881	-115,938	-111,650
Depreciation of tangible and intangible fixed assets	Note 6	-4,807	-4,865	-4,792	-4,850
Other operating expenses	Note 7	-	-7,674	-	-7,674
		-208,177	-202,574	-207,448	-201,732
Operating profit/loss		11,308	-3,322	5,527	-1,965
Earnings from financial investments					
Interest income	Note 8	872	188	870	185
Dividends from group companies				-	57
Interest expenses		-127	-99	-127	-99
Profit/loss after financial items		12,053	-3,233	6,270	-1,822
Appropriations	Note 9			-52	4,912
Tax on profit for year	Note 10	-1,704	-1,333	-164	-2,965
NET PROFIT/LOSS		10,349	-4,566	6,054	125

Balance sheet (figures in SEK thousand)

		GROUP		PARENT COMPANY	
		2011	2010	2011	2010
ASSETS					
Fixed assets					
Intangible fixed assets	Note 11	680	1,342	680	1,342
Tangible fixed assets	Note 12	11,874	12,886	11,851	12,849
Financial assets	Note 13	10	5	651	646
Total fixed assets		12,564	14,233	13,182	14,837
Current assets					
Current receivables					
Accounts receivable, trade		53,096	47,649	53,093	47,619
Receivables from group companies		15,006	24,050	15,254	24,050
Income taxes recoverable		4,829	1,906	4,739	1,939
Other receivables		462	1,482	440	1,371
Prepaid expenses and accrued income	Note 14	5,369	5,249	5,369	5,249
Total current receivables		78,762	80,336	78,895	80,228
Cash and bank balances		49,354	30,993	48,179	30,019
Total current assets		128,116	111,329	127,074	110,247
TOTAL ASSETS		140,680	125,562	140,256	125,084
Equity and liabilities					
Equity					
Note 15					
Restricted equity					
Share capital (7,000 shares)		7,000	7,000	7,000	7,000
Restricted reserves		20,431	16,241	1,400	1,400
Total restricted equity		27,431	23,241	8,400	8,400
Non-restricted equity					
Non-restricted reserves		18,109	26,852	22,242	22,117
Profit/loss for year		10,349	-4,566	6,054	125
Total non-restricted equity		28,458	22,286	28,296	22,242
TOTAL EQUITY		55,889	45,527	36,696	30,642
Provisions	Note 16	6,791	6,178	-	884
Untaxed reserves	Note 9			4,717	4,666
Current liabilities					
Advance payments for work in progress	Note 2	32,229	29,709	53,231	45,111
Accounts payable, trade		13,390	16,107	13,366	15,958
Other liabilities		13,369	9,251	13,367	9,251
Accrued expenses and deferred income	Note 17	19,012	18,790	18,879	18,572
Total current liabilities		78,000	73,857	98,843	88,892
TOTAL EQUITY AND LIABILITIES		140,680	125,562	140,256	125,084
MEMORANDUM ITEMS					
Pledged assets	Note 18	5,000	5,958	5,000	5,958

Cash flow statement (figures in SEK thousand)

	GROUP		PARENT COMPANY	
	2011	2010	2011	2010
Operating activities				
Profit/loss after financial items	12,053	-3,233	6,270	-1,822
Adjustment for non-cash items	4,025	10,776	4,095	10,521
Income tax paid	-3,130	-2,025	-2,964	-1,936
Cash flow from operating activities before changes in working capital	12,948	5,518	7,401	6,763
Cash flow from changes in working capital				
Increase/decrease in receivables	4,617	-24,186	4,253	-24,099
Increase/decrease in accounts payable, trade	-2,717	5,836	-2,592	5,685
Decrease in other liabilities	4,118	-3,460	4,116	-3,460
Increase/decrease in advance payments for work in progress	2,520	-19,927	8,120	-21,408
Cash flow from operating activities	21,486	-36,219	-21,298	-36,519
Investment activities				
Purchase of property, plant and equipment	-3,145	-3,296	-3,145	-3,296
Change in financial assets	-5	786	-5	786
Cash flow from investment activities	-3,150	-2,510	-3,150	-2,510
Financing activities				
Cash flow from financing activities	-	-	-	-
Cash flow for year	18,336	-38,729	-18,148	-39,029
Opening cash and bank balances	30,993	69,660	30,019	69,000
Exchange rate difference in cash and cash equivalents	25	62	12	48
Closing cash and bank balances	49,354	30,993	48,179	30,019

Comments and notes to the accounts

Parent company and ownership structure

IVL is a wholly-owned subsidiary of the Foundation of the Swedish Environmental Research Institute (SIVL), corporate identity number 802006-2611, whose head office is located in Stockholm. On conversion of the former Swedish Institute for Water and Air Pollution Research (IVL) into a limited company in 1982, the original share capital was allocated in equal proportions to the foundation by agreement between the Swedish government and the Swedish business sector. The aim of the foundation is to promote the long-term conditions required for environmental research and, through its ownership, guarantee the independent status of IVL. The foundation is responsible for the funds allocated by the Swedish government and the Swedish business sector for co-financed environmental research carried out by IVL. The foundation is governed by a representative board of directors, half of whose members are appointed by the Swedish government and half by Swedish business. The chairman of the board is appointed by the government.

Financing

The company's operations are financed by current cash flow and by an unused bank overdraft facility of SEK5 million.

Accounting and valuation principles

The accounts comply with the provisions of the Swedish Annual Accounts Act, the general rules of the Swedish Accounting Standards Board and the applicable recommendations of the Swedish Financial Accounting Standards Council. The accounting principles are unchanged from the previous year.

Consolidated accounts

The consolidated accounts have been prepared in accordance with Recommendation RR 14, Joint Ventures, of the Swedish Financial Accounting Standards Council. Consolidation of the associated companies, Sino-Swedish (Tianjin) Environmental Technology Development Co. Ltd. and BASTAonline AB (in which IVL has a 60% holding), has been carried out using the proportional method.

The annual accounts of the associated company have been converted using the current method, which means that the balance sheet assets and liabilities have been converted at closing day

rates. The income statement has been converted at the average rate for the year. Conversion differences do not affect the consolidated accounts, but are allocated directly to equity.

The untaxed reserves shown in the consolidated accounts are divided into restricted equity, equivalent to 73.7% of the Group's untaxed reserves, and deferred tax liability, equivalent to 26.3% of untaxed reserves. In the consolidated accounts, the tax reserve element of uninvoiced research and consultancy assignments has been valued at the quoted price, and allocated in corresponding manner to equity and deferred tax (in accordance with the accounting principle described under 'Work in progress' below).

Associated companies

Associated company shareholdings are not reported in the consolidated accounts in view of their relatively modest levels (also see Note 12).

Work in progress, parent company

Work in progress is defined as uninvoiced research and consultancy services carried out on a current-account or a fixed-price basis.

Under Swedish taxation law, fixed-price contracts shall be valued at the lower of the accrued direct and indirect costs, less any advance payments received from clients, providing scope for the creation of a reserve in respect of work in progress.

Fixed-price work in progress is valued at the lower of the production cost and invoicing value. The production cost has been calculated using a prudent valuation; in other words, by applying a value above a minimum and below a maximum permissible fiscal value, in accordance with good accounting practice.

Work in progress on a current-account basis is valued at the invoicing value.

In grant-aided projects in which IVL is a contract partner of the research financier, and disburses project funds to other project participants, the funds in question are not reported as sales revenue, but are entered directly in the balance sheet under 'Advance payments for work in progress'. This means that the invoiced amounts and outlay costs are reduced by an amount corresponding to the funds received from this source for disbursement to other project partners.

Notes

Note 1 NET SALES (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	2011	2010	2011	2010
<i>Net sales are divided between:</i>				
Invoiced fees and analyses	204,086	172,454	203,176	171,490
Invoiced expenses	35,838	21,532	35,838	21,532
Total net sales	239,924	193,986	239,014	193,022

Of the net sales for the year, 25.4 (25.7) % consists of amounts invoiced to the parent company as remuneration for co-financed research conducted by the company on a contract basis.

Note 2 ADVANCE PAYMENTS FOR WORK IN PROGRESS (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	31 Dec 2011	31 Dec 2010	31 Dec 2011	31 Dec 2010
Assignment costs	601,243	457,404	580,241	442,002
Invoiced in advance	-633,472	-487,113	-633,472	-487,113
Book value	32,229	29,709	53,231	45,111
Change reported:				
- in income statement	20,892	-4,849	26,492	-6,330
- in balance statement	-18,372	-15,078	-18,372	-15,078
Total change for year	2,520	-19,927	8,120	-21,408

Note 3 OTHER OPERATING INCOME (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	2011	2010	2011	2010
Other	453	417	453	415
Total other income	453	417	453	415

Note 4 OTHER EXTERNAL COSTS (FIGURES IN SEK THOUSAND), GROUP AND PARENT COMPANY

The item includes audit fees of SEK331 (336) thousand paid to the company's auditor and SEK15 (2) thousand to other group auditors.

Charges for financial leasing agreements in 2011 amounted to SEK14,704 (14,611) thousand. The charges shown include rental contracts for premises, company cars, computers and certain office equipment. Leasing charges for these agreements in future years are allocated as follows:

	2012	2013	2014	2015	2016
Leasing charges, other	2,005	1,187			
Premises	12,600	12,900	13,100	13,300	13,500
Total	14,605	14,087	13,100	13,300	13,500

Note 5 PERSONNEL COSTS (FIGURES IN SEK THOUSAND)

Salaries and other remuneration

Parent company	2011		2010	
	Salaries and other remuneration	Payroll over-heads (of which pension costs)	Salaries and other remuneration	Payroll over-heads (of which pension costs)
Board and CEO	2,206	1,463	2,007	1,329
		(619)		(562)
Other employees	74,529	35,262	71,184	34,584
		(9,905)		(10,062)
Total	76,735	36,725	73,191	35,913
		(10,524)		(10,624)

Group

The group also pays the salaries of the CEO of the joint-venture company, amounting to SEK90 (95) thousand, and other permanent employees amounting to SEK60 (135) thousand.

The average number of employees¹⁾ for the year was as follows:

Parent company	2011			2010		
	Men	Women	Total	Men	Women	Total
Stockholm	61	41	102	58	38	96
Gothenburg	31	48	79	31	46	77
Beijing	1	2	3	2	1	3
Total	93	91	184	91	85	176

1) defined as full-time, salaried employees

Number of employees in company management group (of which executive management):

	2011	2010
Men	6(5)	5(5)
Women	5(0)	6(0)

Group

The group recruited 2 (2) additional employees, including one man in an executive management position.

Management

Parent company

In accordance with the decision of Annual General Meeting, a total of SEK538 (319) thousand was paid in fees to members of the board. Of this amount, the chair of the board received SEK 60 (55) thousand.

The position of CEO of the parent company is subject to a period of notice of 12 months by the company, as well as a severance payment equivalent to 12 times the incumbent's fixed monthly salary. Should the position or responsibilities of the CEO be altered as a result of significant changes in the company's operations, or by a change in ownership structure affecting the majority of company shares, the CEO shall be entitled to resign subject to notice of six months and to receive a severance payment equivalent to 18 times his or her fixed monthly salary. The CEO shall be entitled to a pension from the age of 62. The CEO's pension is of the defined contribution type and an amount equivalent to 35% of salary for the particular year, including the benefit of a company car, is allocated annually for this purpose. If the pension is taken after age 62, old-age pension contributions shall be paid in full as though the CEO had continued to work until age 65.

Group

The CEO of the joint venture company is employed on a full-time basis for one year from 1 July 2011. Other than a statutory pension, no pension entitlement applies.

Note 6 DEPRECIATION OF TANGIBLE AND INTANGIBLE

FIXED ASSETS

GROUP AND PARENT COMPANY

Depreciation according to plan of fixtures and equipment is applied annually at a rate of 10 to 20% of the acquisition value, from the date of acquisition by the parent company during the year.

Depreciation according to plan of fixtures and equipment is applied on the basis of the remaining economic life of the asset, in accordance with a valuation developed for the international joint venture.

Depreciation according to plan of capitalised expenditure for software development is applied annually at a rate of 20 to 33.3% of the acquisition value, from the date of completion during the year.

Depreciation of business goodwill is applied at 20% of the acquisition value. The need for depreciation is assessed on the basis of the current value of future surpluses.

Note 7 OTHER OPERATING EXPENSES

GROUP OCH PARENT COMPANY

The amount of SEK7,674 (0) thousand is the estimated and allocated net cost of non-deductible value-added tax for the years 2005 to 2008. Resulting from the decision of the Swedish Tax Agency in 2011, the amount of SEK7,166 thousand is treated as a deductible expense for 2011.

Note 8 INTEREST INCOME AND EXPENSES

GROUP OCH PARENT COMPANY

The item includes accrued bank interest of SEK849 (168) thousand. Of the interest expenses for the parent company, SEK70 (32) thousand relates to group companies.

Note 9 APPROPRIATIONS AND UNTAXED RESERVES (FIGURES IN SEK THOUSAND)

	PARENT COMPANY	
	31 Dec 2011	31 Dec 2010
Opening untaxed reserves	4,666	9,578
Accumulated depreciation above plan	52	-1,242
Change in tax allocation reserve	-	-3,670
Total appropriations	52	-4,912
Closing untaxed reserves	4,717	4,666
of which deferred tax at 26.3%	1,241	1,227

Note 10 TAX ON PROFIT FOR YEAR (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	2011	2010	2011	2010
Estimate of effective tax rate				
Profit/loss before tax	12,053	-3,233	6,218	3,090
Tax at current tax rate of 26.3%	3,170	-850	1,635	813
Non-taxable income	-1,889	-46	-1,889	-46
Non-deductible expenses	400	2,174	400	2,174
Tax from previous year	-29	-1	-29	-1
Current tax expenses, international	68	50	47	25
Deferred tax	-16	6	-	-
Effective tax	1,704	1,333	164	2,965
Effective tax rate, %	14.1	-	2.6	95.9

Note 11 INTANGIBLE FIXED ASSETS (FIGURES IN SEK THOUSAND)

	DEVELOPMENT COSTS		GOODWILL	
	31 Dec 2011	31 Dec 2010	31 Dec 2011	31 Dec 2010
Opening acquisition value	1,277	1,277	1,800	1,800
Acquisitions for year	-	-	-	-
Closing accumulated acquisition value	1,277	1,277	1,800	1,800
Opening depreciation	-805	-503	-930	-570
Depreciation for year	-302	-302	-360	-360
Closing accumulated depreciation	-1,107	-805	-1,290	-930
Closing residual value according to plan	170	472	510	870

Note 12 TANGIBLE FIXED ASSETS (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	31 Dec 2011	31 Dec 2010	31 Dec 2011	31 Dec 2010
Opening acquisition value	82,472	79,176	82,290	78,994
Purchases for year	3,145	3,296	3,145	3,296
Exchange rate differential/scrapped equipment	8	–	–	–
Closing accumulated acquisition value	85,625	82,472	85,435	82,290
Opening depreciation	–69,586	–65,383	–69,441	–65,253
Exchange rate differential/scrapped equipment	–20	–	–13	–
Depreciation for year	–4,145	–4,203	–4,130	–4,188
Closing accumulated depreciation	73,751	–69,586	–73,584	–69,441
Closing residual value according to plan	11,874	12,886	11,851	12,849

Note 13 FINANCIAL ASSETS

Shares and holdings

Company	GROUP			PARENT COMPANY	
	Number	Holding, %	Booked	Nominal	Booked
IVL Swedish Environmental Research Institute foundation for staff training	1		5	5	5
Basta Online AB	600	60	–	60	60
WEREC Water Ecosystem Recovery AB	100	10		5	5
Sino-Swedish (Tianjin) Environmental Technology Development Co., Ltd	1	50	–	581	581
Total			5	651	651

Note 14 PREPAID EXPENSES AND ACCRUED INCOME (FIGURES IN SEK THOUSAND) GROUP AND PARENT COMPANY

Totalling SEK5,369 (5,249) thousand, this item consists of prepaid rentals for offices and premises amounting to SEK3,270 (3,088) thousand, and other prepaid expenses amounting to SEK 2,098 (2,161) thousand.

Note 15 EQUITY (FIGURES IN SEK THOUSAND)

Group	Share capital	Statutory reserves	Non-restricted reserves	Profit/loss for year	Total
Opening balance	7,000	16,241	26,852	–4,566	45,527
Appropriation per AGM			–4,566	4,566	
Transfer between restricted and non-restricted equity		4,198	–4,198		
Translation difference		–8	21		13
Profit/loss for year				10,349	
Closing balance	7,000	20,431	18,109	10,349	55,889

Parent company	Share capital	Statutory reserves	Non-restricted reserves	Profit/loss for year	Total
Opening balance	7,000	1,400	22,117	125	30,642
Appropriation per AGM			125	–125	
Profit/loss for year				6,054	6,054
Closing balance	7,000	1,400	22,242	6,054	36,696

Note 16 PROVISIONS (FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	31 Dec 2011	31 Dec 2010	31 Dec 2011	31 Dec 2010
Deferred tax	6,791	5,294	–	–
Pension provisions	–	884	–	884
Year-end total	6,791	6,178	–	884

Note 17 ACCRUED EXPENSES AND DEFERRED INCOME
(FIGURES IN SEK THOUSAND)

	GROUP		PARENT COMPANY	
	31 Dec 2011	31 Dec 2010	31 Dec 2011	31 Dec 2010
Holiday and overtime liabilities	4,728	4,128	5,013	5,573
Accrued payroll overheads	4,527	4,306	4,527	4,306
Other accrued expenses	1,798	1,237	1,665	1,019
Provision for VAT arrears, 2005-2008	7,674	7,674	7,674	7,674
Year-end total	19,012	18,790	18,879	18,572

Note 18 PLEDGED ASSETS AND CONTINGENT LIABILITIES
(FIGURES IN SEK THOUSAND)
GROUP AND PARENT COMPANY

	31 Dec 2011	31 Dec 2010
Pledged assets		
Floating charges	5,000	5,000
Pledged endowment insurance	–	958
Total	5,000	5,958

Stockholm, 7 March 2012

Annika Helker Lundström
Chair of the Board

Lars-Göran Bergquist

Peter Nygårds

Christer Forsgren

Johan Strandberg
Staff representative

Gunilla Saltin

Kerstin Cederlöf

Birgitta Palmberger

Kurt Palmgren

Håkan Stripplé
Staff representative

Tord Svedberg
President & CEO

Our auditor's report was submitted on 2 April 2012
Rödl & Partner Nordic AB

Ulf H Davéus
Authorised Public Accountant

Auditor's report

To the Annual General Meeting of IVL Swedish Environmental Research Institute Ltd.
Corporate identity number 556116-2446:

Report on annual accounts and consolidated accounts

We have audited the annual accounts and consolidated accounts of IVL Swedish Environmental Research Institute Ltd. for the financial year 2011.

Responsibility of board and CEO for annual accounts and consolidated accounts

The board and CEO are responsible for preparing annual accounts and consolidated accounts providing a truthful picture of the company's situation in accordance with the Swedish Annual Accounts Act, and for such internal control as deemed necessary by them to prepare annual accounts and consolidated accounts not containing material misstatements, whether due to impropriety or inaccuracy.

Auditor's responsibility

Our responsibility is to express an opinion on the annual accounts and consolidated accounts on the basis of our audit. The audit was conducted in accordance with International Standards on Auditing (ISA) and with accepted auditing practice in Sweden. These standards require us to observe the norms of professional ethics, and to plan and perform the audit in a manner offering reasonable assurance that the annual accounts and consolidated accounts do not contain material inaccuracies. An audit involves the sourcing, by various means, of audit evidence relating to figures and other information given in the annual accounts and consolidated accounts. The auditor specifies any measures that require to be taken, among other things by assessing the risk of material inaccuracies in the annual accounts and consolidated accounts, whether due to impropriety or inaccuracy. As part of this risk assessment, the auditor takes cognisance of those internal control aspects that are relevant to the manner in which the company prepares the annual accounts and consolidated accounts in order to provide a truthful picture, with the aim of formulating inspection measures that are appropriate to the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the company's internal control. An audit also includes an assessment of the suitability of the accounting principles used, and of the reasonableness of the estimates made by the board of directors and CEO in the accounts, as well as their overall presentation in the annual accounts and consolidated accounts.

We believe that the audit evidence that we have gathered provides a sufficient and suitable basis for our opinions.

Opinions

In our opinion, the annual accounts and consolidated accounts have been prepared in accordance with the Swedish Annual Accounts Act and, in all essential respects, give a truthful view of the financial performance position of the parent company and group as of 31 December 2012, and of their financial performance and cash flow for the year in accordance with the act. The directors' report is consistent with the other parts of the annual report.

We recommend, therefore, that the Annual General Meeting adopt the income statements and balance sheets of the parent company and the group.

Report on other legal or statutory requirements

In addition to our audit of the annual accounts and consolidated accounts, we have audited the proposal concerning the allocation of the company's profit or loss, and the administration of IVL Swedish Environmental Research Institute by the board and CEO in the year 2011.

Responsibility of board and CEO

The board is responsible for the proposed allocation of the company's profit or loss, while the board and CEO are responsible for the administration of the company under the Swedish Companies Act.

Auditor's responsibility

Our responsibility is to express a reasonably certain opinion on the proposed allocation of the company's profit or loss, and on the administration of the company, on the basis of our audit. The audit was conducted in accordance with accepted auditing practice in Sweden.

As a basis for our opinion on the board's proposed allocation of the company's profit or loss, we have examined whether the proposal is consistent with the Swedish Companies Act.

As a basis for our opinion concerning discharge from liability, we have examined significant decisions, actions taken and the circumstances of the company in order to determine the liability for damages to the company, if any, of any board member or the CEO. We have, furthermore, examined whether any board member or the CEO has, in any other way, acted in contravention of the Swedish Companies Act, the Swedish Annual Accounts Act or the company's articles of association. We believe that the audit evidence that we have gathered provides a sufficient and suitable basis for our opinions.

Opinions

We recommend that the Annual General Meeting allocate the profit in accordance with the proposal made in the directors' report, and discharge the members of the board of directors and the CEO from liability for the financial year.

Stockholm, 2 April 2012
Rödl & Partner Nordic AB

Ulf H Davéus
Authorised Public Accountant

Corporate governance

Corporate governance in IVL Swedish Environmental Research Institute is founded on Swedish law and best practice, taking account of the Swedish Code of Corporate Governance. The code is not implemented fully since it has been framed mainly for publicly quoted companies and companies with spread ownership.

Owners

IVL Swedish Environmental Research Institute has been wholly owned by the Foundation of the Swedish Environmental Research Institute (SIVL) since 2004. On conversion of the former Swedish Institute for Water and Air Pollution Research (IVL) into a limited company in 1982, the original share capital was allocated in equal proportions to the foundation by agreement between the Swedish government and the Swedish business sector.

The aim of the foundation is to promote the long-term conditions required for environmental research and, through its ownership, guarantee the independent status of IVL. The foundation is responsible for the funds allocated by the Swedish government and the Swedish business sector for co-financed environmental research carried out by IVL.

The foundation is governed by a representative board of directors, of whom the chairman and six members are appointed by the Swedish government and seven members by Swedish business. The chairman of the board has a casting vote.

Annual General Meeting

The Annual General Meeting of IVL is usually held at the end of May. Members are notified of the AGM by post. The owner, SIVL, is represented at the AGM by its chair.

All board members were re-elected at the AGM held at the beginning of June 2011.

Nomination procedure

SIVL is the sole owner of IVL and proposes members to the board of IVL, partly by inviting nominations from business interests for four ordinary members and one deputy member, and partly by inviting nominations from government for the position of chair, together with three government-appointed ordinary members and one deputy member.

The board of IVL shall comprise at least four and no more than eight ordinary members, together with at least one and no more than two deputy members. In addition, the staff shall be entitled to appoint two ordinary and two deputy members.

The members of the board of IVL are presented on page 47.

Board activities in 2011

The board is responsible, under the Swedish Companies Act and its articles of association, for the organisation and administration of the company. Every year, the board draws up rules of procedure, together with a working instruction for the CEO, governing the allocation of work between the board and the CEO.

In 2011, under the rules of procedure, the board held four ordinary meetings in addition to the June post-election meeting. As usual, the ordinary board meetings were held in conjunction with the announcement of the company's interim or annual results.

Among other things, the June AGM adopted new rules of procedure for the board and a working instruction for the CEO. Items

on the agenda at the December meeting included the company's budget for 2012, as well as its goals and strategy document. The ordinary board meeting in September was extended to discuss the IVL brand and the company's long-term strategy.

Remuneration committee

Under the rules of procedure for the board of IVL Swedish Environmental Research Institute, the board is charged with appointing a remuneration committee to deal with issues relating to employment and salary conditions. The committee proposes salaries, other forms of remuneration and other conditions of employment for the CEO, which are then ratified by the board. The corresponding conditions for other members of the company's executive management are proposed by the CEO and ratified by the remuneration committee. The company does not operate an incentive scheme.

Board remuneration

The remuneration of the chair and board members was determined by the 2011 AGM, which approved the payment of SEK62 (55) thousand to the chair and a total of SEK296 (319) thousand to the board members. Staff representatives on the board do not receive remuneration.

External audit

The task of the auditors is, on behalf of the owners, to carry out an independent audit of the administration of the board and the CEO, and of the annual accounts and financial statements.

Rödl & Partner, with Ulf Davéus as chief auditor, were appointed as auditors for the period up to the 2014 AGM. An authorised public accountant, Ulf Davéus has been responsible for IVL's financial audits since 1994.

Company management

The CEO is responsible for the ongoing administration of the company in accordance with the guidelines and other instructions of the board. The CEO's working instruction was adopted on 2 June 2011 in conjunction with the board's post-election meeting.

The company's executive management group is comprised of the CEO, two executive vice presidents, the CFO and the Vice President, Research. The management group includes four unit heads, with the Director of Human Resources, Information Director and Director of Quality and Environment as adjunct members.

Tord Svedberg, born in 1958, received his MSc in chemistry from KTH in 1983 and has been CEO of IVL Swedish Environmental Research Institute since 2008. Prior to that, he held various top management positions at Pharmacia (1984-90), Astra (1990-99) and AstraZeneca (1990-2007), including head of manufacturing in Sweden and member of group management. A member of the Royal Swedish Academy of Engineering Sciences, he also sits on the boards of Unimedica AB (since 2008) and Galilaeus Oy (since 2010).

Mats Ridner, born in 1955, holds a BSc in economics from Stockholm School of Economics and has been CFO since 1994.

Åke Iverfeldt, born in 1954, was awarded a doctorate in chemistry by the University of Gothenburg in 1986, and is executive vice president and head of the Business Development & Marketing unit.

Has been with the company since 1985 with the exception of a break from 1992 to 1993, when he worked as a section head at Stockholm County Council.

Östen Ekengren, born in 1952, received his MSc in chemistry from KTH in 1978, and is executive vice president and head of the Business Development & Marketing unit. He joined the company in 1978.

John Munthe, born in 1960, received his doctorate in chemistry from the University of Gothenburg in 1992 and has been Vice President, Research since 2010. He joined the company in 1992 and has been a department head since 1994.

The unit heads, CFO and Vice President, Research report to the CEO.

The executive management group is supported by finance, HR, communication and business development staff functions, as well as quality and environmental management systems.

Internal control

IVL's operational and management system forms the basis of the company's internal control procedures, and also comprises the company's integrated quality and environmental management systems, which are certified under ISO 9001 and ISO 14001 respectively. The management system is focused on the core activity of 'offering/selling and carrying out research and contract assignments in the environmental sector', and embodies guideline

documents, routines and tools relating to all company processes. Internal control of financial reporting is provided by the control environment, including the organisation, decision paths, authorities and responsibilities that are documented and communicated in guideline documents. All guideline documents, routines and tools are available on the company intranet.

Every year, the board draws up rules of procedure that govern the allocation of responsibilities between the board and the CEO, as well as financial reporting to the board. The board is provided with financial reports at every meeting. These contain outturn and budget figures for the period, including comparison with the corresponding period the previous year, as well as details of orders in hand, investments and a number of key performance indicators.

Risk analysis and management

The management system also includes procedures and a methodology for annual risk analyses relating to everything from financial risks and conditions, IT security, business climate factors and customer relations, to competence losses and risks associated with image and brand. Risk analyses are accompanied by action plans. The management system is subject to a biannual internal audit, and to continuous monitoring by an independent quality and environmental inspector.

Board of director



ANNIKA HELKER LUNDSTRÖM,
CHAIR
Member since 2010
CEO, Swedish Wind Energy



LARS-GÖRAN BERGQUIST
Member since 2000
Chair of SIVL



KERSTIN CEDERLÖF
Member since 2004
Director, Swedish
Environmental Protection
Agency



PETER NYGÅRDS
Member since 2008
Director, Swedbank



BIRGITTA PALMBERGER
Member since 2005
Department head
Swedish Energy Agency



CHRISTER FORSGREN
Member since 2008
Director, Stena Metall



KURT PALMGREN
Member since 2003
Director



GUNILLA SALTIN
Member since 2010
CEO, Södra Cell



HÅKAN STRIPPLÉ
Member since 2011
Staff representative



JOHAN STRANDBERG
Member since 2011
Staff representative

Deputy members

LARS EKECRANTZ, Ministry of the Environment

JONAS FEJES, staff representative

PERNILLA BENGTTSSON, staff representative

Management



Executive management group

*At rear, from left: Östen Ekengren, Jenny Gode, Mats Ridner, Britt Björnsput, Eva Bingel, Karin Sjöberg and Elin Eriksson.
Front, from left: John Munthe, Åke Iverfeldt, Tord Svedberg and Björne Olsson.*

Executive management group:

TORD SVEDBERG – President & CEO

ÖSTEN EKENGREN – Executive Vice President, Business Development & Marketing

ÅKE IVERFELDT – Executive Vice President, Business Development & Marketing

MATS RIDNER – CFO

JOHN MUNTHE – Vice President, Research

ELIN ERIKSSON – Director, Sustainable Organisations, Products & Processes

JENNY GODE – Acting Director, Climate & Sustainable Cities

BJÖRNE OLSSON – Director, Natural Resources & Environmental Effects

KARIN SJÖBERG – Director, Air Pollution & Abatement Strategies

Adjunct members

EVA BINGEL – Information Director

BRITT BJÖRNSPUT – Director, Human Resources

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