JRC Scientific and Technical Reports

Safety, Health and Environmental Annual Report 2010

EC Joint Research Centre
Institute for Energy and Transport

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The mission of the JRC-IET is to provide support to Community policies related to both nuclear and non-nuclear energy in order to ensure sustainable, secure and efficient energy production, distribution and use.

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Glossary

	Dutch	English
BHV	Bedrijfshulpverlening	In-company Emergency Response Team
BSI	British Standards Institution	British Standards Institution
CPR	Commissie voor de Preventie van Rampen door gevaarlijke stoffen	Committee for the prevention of disasters by dangerous goods
ECN	Energieonderzoek Centrum Nederland	Energy research Centre of the Netherlands
EMAS	Eco-Management and Audit Scheme	Eco-Management and Audit Scheme
EMS	Milieu Management Systeem	Environmental Management System
EPBD	Europese richtlijn energiepresentatie gebouwen	Energy Performance of Buildings Directive
EPC	Energiepresentatiecertificaat	Energy Performance Certificate
GHG	Broeikasgassen	Greenhouse gases
GHS	Globally Harmonized System (of Classification and Labeling of Chemicals)	Globally Harmonized System (of Classification and Labeling of Chemicals)
HFR	Hoge Flux Reactor	High Flux Reactor
HSC	Commissie voor Veiligheid, Gezondheid en Milieu	Health and Safety Committee
IE	Instituut voor Energie	Institute for Energy
INO	Intern Noodplan Onderzoek Locatie Petten	Internal Emergency Plan Research Site Petten
ISO	Internationale Organisatie voor Standaardisatie	International Organisation for Standardization
JRC	Gemeenschappelijk Centrum voor Onderzoek (GCO)	Joint Research Centre
KFD	Kernfysische Dienst	Department of Nuclear Safety, Security and Safeguards
NRG	Nuclear Research and consultancy Group	Nuclear Research and consultancy Group
OHSAS	Handleiding voor het opzetten van een ARBO-managementsysteem (vrij vertaald)	Occupational Health and Safety Assessment Series
RSC	Reactor Veiligheidscommissie	Reactor Safety Committee
SCBA	Ademhalingstoestel	Self contained breathing apparatus
SES	Veiligheid, Milieu en Beveiliging (Sector)	Safety, Environment and Security (Sector)
VOC	Vluchtige Organische Stoffen	Volatile Organic Compounds
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer	Ministry of Housing, Spatial Planning and the Environment
WVO	Wet Verontreiniging Oppervlaktewater	Waste water licence

Executive Summary

This report is the integrated Safety, Health and Environmental Annual Report 2010 of the Institute for Energy (IE) of the JRC. The report is split in a health and safety part and an environmental part. The report includes description of the organisational systems and structures together with the planned activities and the achieved goals. The environmental part contains in addition assessment of the environmental impact of the Institute. This report only refers to the activities of the JRC-Petten site of the Institute. The Institute has implemented a Quality Management System of which Environmental and Safety Management is an integral part. Internal audits and external inspections by Dutch authorities have not identified significant deviation from legal requirements. The institute will continue to improve on environmental and safety system in 2011 and will among others focus on improving energy performance of the institute.

Introduction

The research activities of the Institute are carried out under the 7th Framework Programme (2007 to 2013) of the Commission. The Framework Programme is the legal basis for the work of the JRC and thus also of the Institute for Energy. The Framework Programme outlines in general terms the main priorities for Research and Development (R&D) funded by the European Union. Nuclear R&D is approved by the European Council, whereas non-nuclear R&D is approved by a co-decision between the European Council and the European Parliament.

Within the current Framework Programme the activities of the Institute for Energy in Petten have not significantly changed. However there is an increase in the desk top type activity with the recent creation of a new unit which deals with the area of Energy Security. This change has no impact on safety, health and environmental issues at the Institute.

Over the last couple of year's environment, safety, health and well-being have received continuous attention and a high priority within the Commission and at the Institute for Energy. The Institute's Environmental Management System was implemented and first certified in 2004 according to ISO 14001. The development of a Safety Management System had been completed in 2008 to such an extent, that certification according to OHSAS standard 18001 was achieved in 2009. Environmental and Safety Management are integrated into the overall Quality Management System of the JRC-IE.

With these management systems the IE is continuously striving to be a safer and more environmentally friendly workplace for everyone on site and living in its surroundings.

The units of the institute located in Ispra (Italy) are excluded from this report, since their safety, health and environment related activities are managed by the Ispra Site Directorate. Where 'Institute' or 'IE' is used in this report it refers to the JRC-Petten site.

The Safety, Environment and Security (SES) sector is part of the Site Management Unit and is advising the Director and Staff of IE regarding the regulations of occupational health and safety, radiation protection, environmental protection and is monitoring the respect of the regulations. These tasks are integrated in the Quality Management System.

The Head of the SES sector is responsible for monitoring legislation and is also the liaison officer towards the Dutch authorities. He is in charge of communication of safety and environmental related issues towards the staff and management.

The Site Safety Officer manages the (near-) accident register and organise accidents investigations. He further coordinates safety and environmental training of staff, liaise with the fire brigade, provide support to risk assessments and advice staff on a day-to-day basis. He also supports the management in safety tours and can report directly to the Director.

Preventive maintenance of health-and-safety critical equipment (e.g. safety cupboards, hoisting equipment) is performed in close cooperation between the SES sector and the Infrastructure sector.

SAFETY AND HEALTH

Background

At the Institute for Energy, Petten site, the implementation of the Commission Decision (C(2006)1623) on 'Establishing a Harmonised Policy for Health and Safety at Work for all Commission Staff' has been finalized.
In order to monitor the compliance with this Decision and to constantly improve the safety at the site, the Institute has set up a safety management system according to the OHSAS 18001 (2007) standard.
This occupational health and safety management system was originally certified by TNO in November 2009, this certification was acknowledged by BSI in November 2010.

Safety related goals

Safety Plan 2010

In 2009 the institute management has published for the first time a multiannual Safety Programme for the Petten site. In this Programme 2009-2011 the management has defined safety targets and goals and has confirmed that it will continue to improve the safety management system (SMS). The specific goals for 2010 have been fixed in the Annual Safety Plan, see table below.

Annual Safety Report
Prepare and complete the report of 2009
Certification OHSAS 18001
Have two external audits OHSAS 18001 performed successfully
Safety Awareness Campaign
Execute the safety awareness campaign
Handling of hazardous substances
Remove all long-term unused (15 years) and mislabelled substances
Implement Globally Harmonized System (GHS) for Classification and Labelling of Chemicals
Organise in-house training to the relevant staff of the JRC-IE Petten on Globally Harmonized System
Emergency preparedness
Increase the number of participants in the in-company emergency response team (BHV) with at least 4 persons.

All objectives of the plan were achieved. Concerning the Safety Management System according to the OHSAS 18001 standard, the certifying body (BSI) has performed a transfer assessment instead of the two planned external audits.

Safety inspections and audits

At the Institute, Petten Site, various inspections and audits were carried out by staff of the Institute and by external bodies.
There is a well-established practice for the internal inspections made by the Management, internal auditors, and members of the Sector Safety-Environment-Security.
Regular site visits were performed by the European Commissions Medical Service. These visits are primarily intended for personal medical checks but are also used to inspect work places or to give advice on general health related issues.
External inspections were performed by the different local and national inspection bodies. Based on the inspection and audit reports, action plans were drawn up and the required actions were carried out. No major deviations from the licenses were indentified in 2010.
For an overview of the 2010 inspections and audits see the table on page 18 in the Environment section.

Safety Related Committees

Health and Safety Committee

The Joint Committee on Health and Safety (HSC) of the Institute is a statutory committee according to European Commission rules. It is composed of members appointed by the Director and members appointed by the staff representatives. The committee is an advisory body for management and staff regarding health and safety matters.
In 2010 the committee had 5 meetings. The main areas dealt with were review of documents belonging to the health and safety management system and review of near-accident and accident reports. The Committee also discussed items like psycho-social support for institute staff, as the need for such service in multi-cultural working environment is recognised by the Commission. The HSC publishes its own annual report.

Reactor Safety Committee

The task of the RSC is to advise the directors of JRC-IE, NRG and ECN on all nuclear safety aspects related to any of their nuclear facilities on the Petten site.
This includes all work and experiments in and around the research reactors and other nuclear facilities as well as facility operations, modification and testing. Licensing documentation, including safety related procedures and instructions affecting the Safety Technical Specifications or safety related procedures and instructions of a facility, which have to be sent to the competent authorities, are also to be reviewed.
The RSC also has the authority to investigate, request additional information and give advice on matters the committee itself believes to be relevant for nuclear safety, including matters brought to the attention of the Committee. The RSC publishes its own annual report.

Safety related training and instructions

To keep staff updated and to increase awareness, representatives of the SES sector provide information on safety and/or environment related matters during Unit meetings. The SES also organises so called toolbox meetings to specific groups of staff members like laboratory managers, in line with the requirements of our safety and environmental management systems.
Training and instructions are useful tools to improve the knowledge of workers regarding safety and health at the workplace. IE Petten therefore gives to all its new staff members (about 70 in 2010) general safety instructions within the first month of their arrival. Moreover specific safety related subjects are presented during unit meetings, e.g. results of risk assessments, occupational incidents.
On individual basis staff members have the possibility to request safety related training in accordance with their work area, e.g. course Self Containing Breathing Apparatus.

Safety Awareness Campaign

In 2009 the Institute management has decided to start a new phase for further improvement of safety and health at work at the IE Petten. In order to have an objective approach to this, an external consultant was invited to analyze the safety climate in the Institute followed by workshops. A steering group was formed from different interested and experienced staff members providing input on the contents of the campaign. The campaign was launched in the beginning of 2010 and coordinated by the Institute's Safety, Environment and Security sector together with the Quality Manager. The programme consisted of the following three actions:

- Determine the current level of safety culture.
- Decide where we whish to take the culture.
- Chart and navigate a path from the current situation to the new.

As a result a an specific action plan was drawn up for the institute based on the emerged actions from the campaign. The follow up of the implementation will continue in 2011.

Ergonomics at computer work stations

In 2009 risk assessments were performed for all workplaces at the institute. One of the findings was that office work, in particular working on computer work stations, has to be classified as potentially harmful. To reduce this risk, the institute has decided to launch a pilot "Ergonomics at computer work stations". In this context general information on ergonomics at computer work stations and individual workplace assessments have been made in 2010. As this initiative was received very positively, it will be more extensively continued in 2011.

Improvement items on pc workplace ergonomics

Third parties

Contractors and external companies working at the JRC-IE receive the document 'Safety regulations for third parties working at the JRC-IE Petten site' before starting their work. All external persons arriving to work on site either have direct supervision by the internal work responsible or are shown the film 'General Safety Regulations at the Research Location Petten' and are given job-specific instructions.

The JRC-IE has organized internal and external safety related training for its staff in 2010 as shown below.

Course name	**Duration**	**Nr. of participants**
Radiation Protection:		
Radio Protection/Health Physics Courses (level 5B) according to Article 15 "Besluit Stralingsbescherming"	4 days	1
Safety:		
Safety Awareness Campaign - Workshops	½ day	All staff
Advanced Defensive Driver Training	1 day	1
S-H-E training for lab users	2 x 2 hours	10
Workshop on electromagnetic fields	½ day	1
Health		
Ergonomics at computer work stations	½ day	10
Lay-out of office space	1 day	1
Emergency preparedness and first aid:		
Emergency Response Team (BHV) Basis	2 days	10
Emergency Response Team (BHV) refresher course	1 days	8

Self containing breathing Apparatus (SCBA) (Basic Breathing Apparatus)	2 days	5
Self containing breathing Apparatus (SCBA) (refresher training)	3 x 2 hours	8
INO training and exercises	2 hours	15
Evacuation exercise (all buildings)	2 times	All staff
Environment:		
GHS / CLP New classification and labelling legislation	2 hours	22

Operational emergency preparedness

To increase the emergency preparedness of all staff evacuation exercises were held twice in all buildings. The in-company emergency response team had an important role during these exercises. The team consist of 20 staff members who work in close cooperation with the site fire brigade.
For the members of the JRC-IE Petten emergency crises team so-called 'Table-Top' exercises were organised by the SES sector, in order to train them for their tasks during emergency situations.
Besides the standby rota of the members of the JRC-IE Petten emergency crises team, several other relevant function groups are on an emergency rota system e.g. for the Plant Simulation Testing Laboratory, Fuel Cell Testing facility and the Infrastructural Service.
At the level of the Petten research location, collaboration between the different companies and institutes on-site has taken place to prepare and execute site emergency exercises. Lessons learnt during this process are implemented in collaboration by all participants.

Training item for the JRC-IE in-company emergency response team.

Occupational incidents

Within the Institute an internal reporting system is in use for occupational incidents. The purpose of this system is to get information on potential and actual hazards and to

continuously improve the health and safety situation. Over the last three years no accidents with reporting obligation towards the labour authorities have occurred at the Institute. One minor contamination incident in a radiological laboratory was reported to the nuclear authorities.

Near accidents reporting

Main causes	2008	2009	2010
Organisational	17	14	13
Technical	17	14	9
Human	6	8	10
Total number of near accident reports	40	36	32

The number of near accident announcements over the past three years is in the same order of magnitude. Also the distribution over the three main causes is similar.

Work permits

The established work permit system is a suitable tool to improve the safety and health of workers at work and it covers the following types of work and areas:

Controlled areas	All areas where special instructions based on the possible risks in this area are needed.
Excavation work	For work at which the knowledge of the existence of underground cables, pipes, drain system, etc. is essential.
Naked flame	For work involving the use of naked flame, or other activities involving the risk of fire, or work when dust is created which smoke detectors can see as smoke.
Confined space	Work in confined spaces such as pits, tanks, reservoirs, crawling spaces or spaces with inadequate or no ventilation.
Working on height	For work on height >2.5 m where there is a risk of falling or of falling objects and for activities that can cause falling like opening floors.

Work permits are for a limited period of time. However, for JRC-IE staff annual work permits for specific activities and places can be issued after related safety training. Such general work permits were issued to staff of the Infrastructure sector concerning working on heights.

The following work permits were given out:

Type of work permit	2008	2009		2010	
		External	Internal	External	Internal
Controlled area	13	6	0	43	
Excavation	20	38	1	21	2
Naked flame	27	27	6	29	2
Confined space	5	9	0	5	
Working on heights	87	72	9 *	76	11*
Total	152	168		189	

**) including annual work permits*
Note 1) work permits can cover more than one day and more than one person. The number of work permits per year depends on the kind of activities going on at the Institute.
Note 2) from 2009 on the numbers are split into external permits (for work carried out by external companies) and internal permits (for work carried out by JRC-IE staff).

The number of work permits per year has increased during the last years. It is clear that the majority of work permits are given to external companies. Since April 2008, notes are sent to the responsible unit head if work is performed for which the required work permit either was missing or was not complied with. There were 8 such instances in 2008 (April-December), 6 in 2009 and 6 in 2010 corresponding to 7%; 4% and 3% of the total number of work permits granted in the respective period, showing an increased compliance with the safety system.

Example of working on height at JRC-IE for which a work permit is required.

Radiological workers

In 2010, 40 Institute staff members (about 15% of all staff) were registered as a radiological worker, including 5 staff members who left the Institute and 2 staff members who joined the Institute during 2010. The measurement and registration of staff exposure to ionising radiation is contracted to NRG.
The Table below gives the values of the cumulative doses for 2008-2010. For 2010, it includes the dose of 2 non-JRC staff working on JRC projects. Three-quarters of all radiological workers are Category A (annual dose limit < 20 mSv). About one-quarter

of the radiological workers are Category B (annual dose limit < 6 mSv). For comparison, a non-radiological worker (citizen) has an annual dose limit < 1 mSv.

Annual Dose of Registered Radiological Workers at JRC Petten

	Dose (mSv)		Number of persons		
Year	Cumulative	Average	Total	< 1 mSv	≥1 mSv
2008	8.15	0.14	57	57	0
2009	5.99	0.11	53	53	0
2010	4.73	0.12	40	39	1

From the table it is clear, apart from one exception*, that the exposure of registered radiological workers at JRC-IE Petten has not changed compared with previous years. The measured doses for 2010 are well below the limits as defined in the Council Directive 80/836/Euratom and amending Directives.

* During measurement period 2010/10, a Radiation Worker Category A received a dose of 1.99mSv. This had already been anticipated as this person had allowed his dosimeter, on at least one occasion, to pass through the X-ray machines at International Airports during a routine visit on duties abroad. As a Category A worker, this is still less than 10% of the allowable annual limit.

Health related activities

Medical service

The staff members of the Institute are under the supervision of the Medical Service of the Commission in Luxembourg. The frequency of visits to Petten by the company doctor is about once every six weeks.

One task of the company doctor and his staff is to perform the annual medical examinations of all staff; another one is to advise on work related matters. In this advisory role inspections of working places were carried out.

The Medical Service is also carrying out annual vaccination campaigns against seasonal influenza. In addition to this in 2010 vaccination campaigns against the H1N1 influenza were organised on site.

At the level of the Commission, information on health, safety and wellbeing is distributed regularly to all staff members.

Gym facility

The institute has facilitated a gym where staff members can follow their personal training programme developed in consultation with the qualified resident gym instructor or participation in the different group lessons (like e.g. Body Balance or Bag Boxing classes).

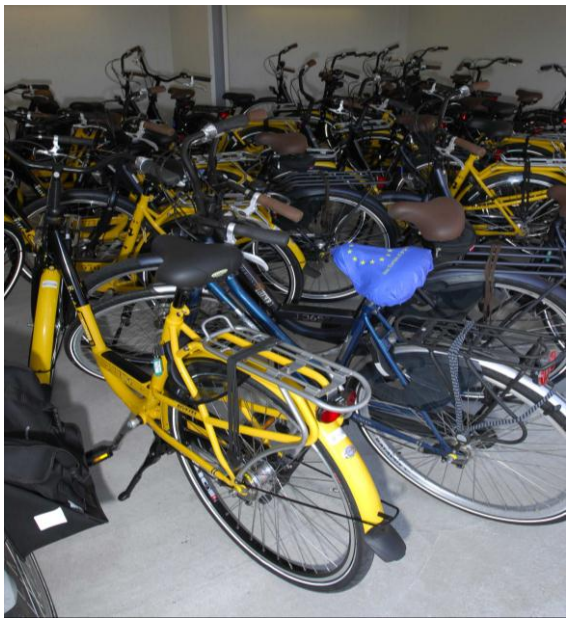
In 2010 about 30% of the Institute staff members continued to use the facility. The total amount of instruction time in 2010 was about 500 hours. All gym activities take place outside core hours. The institute has launched a framework contract for maintenance of all the equipment.

The gym facility is a demonstration of the importance the management places in the health and well-being of the staff.

Gym facility at IE-Petten

Bike cycles

In 2010 the institute acquired 20 service bikes for staff to be used on the terrain. These bikes can be used by staff during working hours as transportation between buildings or during lunch time to go to the forum restaurant. This initiative has been very successful and it is envisaged to develop the initiative further in 2011.



Zero emissions, environmentally friendly transport

Other activities

Outside working hours, staff members of the institute have the possibility to participate in a number of sport activities organised by colleagues like football, volleyball, horseback riding and tennis.

IE Petten site infrastructure projects related to SHE in 2010

The infrastructure sector of the Institute is dealing with the management of utilities and facilities. Standard tasks of this sector are the organisation of SHE relevant maintenance and certification e.g. fume hoods, ventilation cupboards, ladders, cranes, first aid equipment.

Also specific SHE related projects are launched and/or supervised by this sector, in 2010 all water taps in toilets were replaced with sensor activated taps. The motivation for this activity was a reduction of risk in spread of viruses (e.g. H1N1) by a general increase in hygiene.

As other lager scale project undertaken by the sector in 2010 can be mentioned the renewal of the cooling system for building 325, towards a more environmentally friendly and more energy efficient system. Besides the cooling system also the heating boilers for building 325 were renewed.

ENVIRONMENT

Background

The Institute for Energy is committed to assess the environmental impact of past, current and planned IE activities, and to minimise the potential harmful effects of such activities where reasonably possible. In order to achieve this and to fulfil legal obligations, an Environmental Management System (EMS) has been set up according to ISO 14001. It has been implemented and certified in 2004 and has been developing ever since. In 2008 several improvements have been made to the system. The EMS is audited internally and externally every year, and no major deviations or non-conformities were found in 2010. The site environmental licence on main headings requires a certified environmental management system conforming to ISO 14001.
The current certification is granted by TNO Certification and dates from 19 March 2007. The certificate was in 2010 recognized by BSI after external audit.

Improvements of the heating systems at the Institute

EMAS

EMAS stands for "Eco-Management and Audit Scheme" and is a voluntary scheme for organisations willing to commit themselves to evaluate and improve their environmental performance. Following a pilot started in 2001, the Commission decided in 2009 to extend this environmental management system to all its activities and buildings in Brussels and Luxembourg as described in Decision C(2009) 6873. The JRC has stated that it will take into account the Commission-wide policy towards EMAS, starting with ISO 14001 certification for all sites. The Institute for Energy has been certified for several years now and will continue to improve in this area. The additional registration to EMAS will impose few changes in our way of work and we therefore do not foresee any difficulties.

Environment related goals

Environmental Plan 2010

Long-term environmental targets and goals have been defined in the IE Environmental Programme 2009-2011. The specific goals for 2010 have been fixed in the Annual Environmental Plan.

Collection, separation, storage, removal and reduction of waste
Review waste management approaches to evaluate possibilities to reduce waste
Waste water monitoring/sampling twice a year
Implementation of a printer policy
Implement energy saving measures
Improvements of heating installations of 325
Repair/replace compressed air pipe network
Implementation of the virtual server concept
Improve monitoring of energy and water usage
Improve the Energy Monitoring and Control system of buildings and major scientific installations
Obtain the Energy Performance Certificate (EPC) for building with more than 1000m^2
Determine carbon footprint for the Institute
Determine carbon footprint for 2009
Recertification for ISO 14001
Obtain recertification for ISO 14001 by BSI

The objectives relating to the compressed air pipe network of the Environmental Plan 2010 were not achieved. Further review of the situation is foreseen in 2011 in view of a complete renovation of building 310.
All other items are handled according to the planning.

Environmental licence

The environmental licence was granted in 2005. Since then experience has been gained on its practical implementation. The activities of the institute are also evolving. Therefore updates or additions are needed regularly; the last one was in 2008.

Inspections and audits

The IE has an environmental audit programme covering a period of three years. In this programme it is defined which areas of the environmental licence are covered during the internal and external audits and inspections.
The institute's Quality and Environmental Management Systems (ISO 9001 and 14001) were audited in July 2010. This external audit was carried out by the British Standards Institute and resulted in a new certification for both Management Systems.
Inspections were performed together with experts from different authorities. The results of these inspections are taken up in action plans. The progress of these action plans are reviewed periodically.
In 2010 the following audits and inspections were performed related to (safety and) environmental matters:

	Number
Internal inspections:	
Safety and Environmental Unit Tours (inspection by Unit Head and Site Safety Officer)	1 per Unit
Facilities for fire prevention, detection and fire fighting equipment (inspection by site fire brigade)	1
EC Medical Service	1
External inspections:	
Environmental Service of the Municipality Zijpe (*Milieudienst Kop van Noord-Holland*)	
Regional Water Board (*Hoogheemraadschap Hollands Noorderkwartier)*	2
Labour Inspectorate *(Arbeidsinspectie)*	4 June 2010
Combined inspection by KFD (VROM) and Labour Inspectorate (*Arbeidsinspectie*)	24 Nov2010
Combined inspection by KFD (VROM), Labour Inspectorate, Environmental Service of the Municipality of Zijpe, Province of Noord-Holland / Regional Water Board	4 Oct 2010
Internal audits:	
Internal Audits (with respect to ISO 14001 and OHSAS 18001)	11
External audits:	
External Audit by British Standards Institute BSI (with respect to ISO 9001 and 14001)	1

Environmental incidents, significant malfunctions

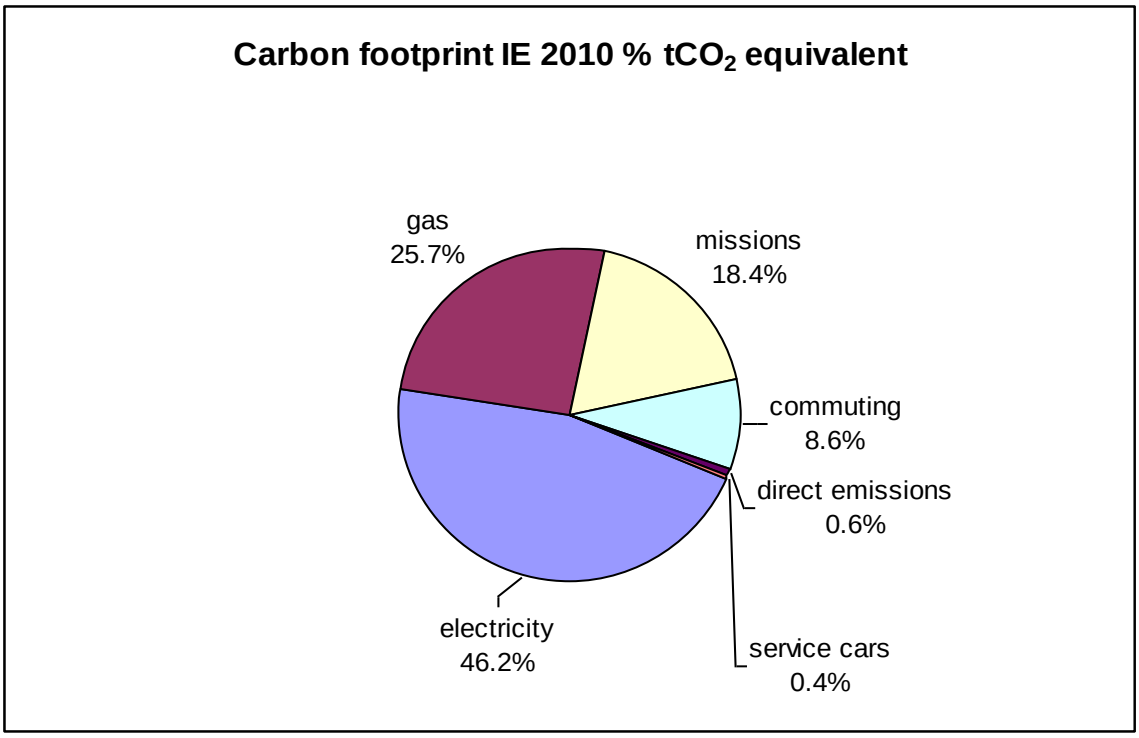
In 2010 no environmental relevant incident were reported to the environmental service of the municipality.

Carbon Footprint

One of the tools used to evaluate the environmental impact is the Carbon Footprint: the total amount of greenhouse gas (GHG) emissions caused by an organization, event or product. For simplicity of reporting, it is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs, emitted. For IE the contributing factors are energy use on site (electricity and gas), energy use in travelling (missions, commuter traffic and own means of transport) and the direct emission of GHGs. These contributions are summarized below in the table and the figure.

Table Carbon footprint IE 2010

	Ton CO_2 equivalent	Percentage	Source of data
Electricity	1924	46.2	Electricity usage
Gas	1071	25.7	Gas usage
Missions	765	18.4	Number of flights and distances
Commuting	359	8.6	Estimate of travel by car/bus
Direct emissions	26	0.6	Leak of refrigerant
Service cars	16	0.4	Fuel consumption
Total	**4161**	**100**	



Nature Management

The four site organisations (JRC-IE, ECN, NRG and Covidien) have developed a nature management plan for the site together with the external company ARCADIS. The goals are to improve the quality of the nature within the site, to establish a common understanding with the authorities on the management of the nature on site, to prepare our contribution to the management plan of the Province and to promote the Petten site, showing that we respect nature. With the present layout of the IE buildings and their appearance, the main impact is on future developments: to keep the group of buildings as much as possible a harmonious entity, to blend in with nature as far as possible and to facilitate the growth of naturally occurring plants.

The open area between the buildings and the Westerduinweg is already for many years kept in the desired state with the help of sheep, the built up area is maintained by an external gardening company.

The Petten site is surrounded on three sides by a natural reserve which has been proposed as NATURA 2000 area by the Dutch authorities. In addition has a part of the JRC terrain been proposed to be included in NATURA 2000. The proposal has been contested by the institute in 2007, with a proposal to move the border of the NATURA 2000 to the outside of JRC grounds. The final designation decision of the area is still pending from the Dutch authorities.

Winter impression

ENVIRONMENTAL IMPACTS

Energy use

Table Consumption of gas and electricity

Year	Gas (m^3)* (excl. HFR)	Gas CO_2 emission (tonnes)	Electricity (kWh) (excl. HFR)	Electricity CO_2 emission (tonnes)	Nr. days with temperature < 0°C **
2008	550 518	980	3 196 097	1 809	58
2009	487 673	868	3 132 962	1 773	65
2010	601 754	1 071	3 399 641	1 924	117

*) The number quoted in last year's report were not correct because of an error made due to the transition from the building management system. The currently used numbers are based on the invoice of the supplier. The resulting CO_2 emission value has consequently to be modified as well. New correct values have been included in the table above.
**) source www.knmi.nl

Electricity

Due to the scope of the institute activities, the energy consumption fluctuates, mainly depending on the usage of energy by the experimental facilities. The figures shown in the table indicate the total amount of used energy in the Institute. In the future the contributions by offices and installations to the energy consumption should be available after improvement of the building management system.

Gas

The use of so-called 'graaddagen' for comparison of gas consumption is at the moment not very useful, since no strict separation can be made between gas consumption used for processes and for utility purposes.

EPC Labels

Reducing energy consumption and eliminating wastage of energy is a main goal of the European Union (EU). 40% of our energy consumed is used in buildings therefore the EU has introduced legislation to ensure that they consume less energy. A key part of this legislation is the Energy Performance of Buildings Directive (EPBD) which requires all EU countries to enhance their building regulations and to introduce energy certification schemes for buildings.
Since 1995 the EPC is a tool in the climate policy in the Netherlands. In 2010 the IE has measured the energy performance of the main buildings of the Institute.

Building	Energy consumption (MJ/ m^2)	CO2 Emission (kg/m^2)	Surface (m^2)	Energy label
308	718	40	2205	B
309	697	39	1965	B
310*	2323	123	1650	G
312	826	46	4406	D
313	986	77	487	D
314	1070	81	361.8	E
325	966	54	1650	E

** Building 310 is considered being an industrial building which means that it does not fall under the requirements of the EPBD*

Emissions to air

There are two main origins for the emissions to air namely from building facility installations (e.g. heating and air conditioning) and from the use of chemical substances in laboratories.

Heating installations

The emissions considered are those of CO_2 and of NO_x. The emission of CO_2 follows directly from the amount of gas used; see the numbers under Energy Use above.
The emission of NO_x is also related to the amount of natural gas and to the state of the heating installations. All heating installations are regularly maintained and checked. The newer installations fulfil the requirements according to the Decree on the emission of NO_x (*NO_x besluit*). Due to the lack of accurate technical specification sheets from older installations the amount of produced NO_x can only be estimated. Based on a conservative calculation the emission is around 1060 kg per year.

Cooling installations

As in previous years the maintenance of all cooling installations was outsourced to a certified external company. The objectives of this contract are two fold: 1) Ensure that installations are leak proof and 2) Advise to replace installations at the end of their technical lifecycle.
In 2010, eight installations with R22-coolant were dismantled. The nominal amount of R22 within these 8 installations was 41.2 kg. Due to loss of coolant by maintenance and leakage, 28.5 kg were retrieved for recycling. The loss of R22 accounts for 12.8 kg, which corresponds to emission of 23.5 tonnes CO2.
Due to leaks 0.5kg of R134A and 0.85kg R410A were lost, amounting to a CO2 emission of 2.5 tonnes
The total amount of R22-containing air conditioning units located within the institute premises is, as of 1 January 2011, reduced to 7.

Volatile Organic Compounds

The used amount of VOC in 2010 was 33 litres, which is lower than the used amount in 2009 (68 litres). Due to the fact that these substances are used for cleaning purposes and not in processes, it is obvious that the major part (>60%) is vaporized and emitted to air. 30% of the amount (ca. 13 litres) was disposed of as liquid chemical waste.

Waste

In July 2010 the JRC-IE has renewed the contract for waste disposal and recycling. The new contract foresees that the amount of household waste, paper, wood, glass, metal and electro waste is monitored (weighed). After introduction of this contract only one certified company specialized in waste treatment take care of the proper disposal and the recycling of materials.

Beside the disposal of old scientific equipment to a recycling company the approach of the Institute is to offer it to high schools for scientific and education purposes.

The amount of household waste shown in the table below for 2008 and 2009 was estimated based the frequency of disposal, the volume of the waste bins and factor of 150kg per m^3 (www.milieuzorgoverheden.nl). Now it appears that the estimated weight was over sized by approximately 10 times.

Table Type of waste by volume or weight

Type of waste	2008	2009	2010 **	2010 July - December
	Amount (kg)	Amount (kg)	Amount (kg)	Amount (kg)
Household waste	108 680	108 575	10.160	5.080
Paper and cardboard	9 820	9 250	9.770	4.885
Wood	4 200	5 600 Wood A 800 Wood B 4800	3560	1780
Glass	0 *	1 500	400	200
Metal	2 200	3 000	2600	1300
El. equipment			9120	4560

* This waste was collected on site, disposal will take place in 2009.
** Estimated production based on July – December 2010 figures (measured).

Type of waste	2008	2009	2010
	Amount (kg)	Amount (kg)	Amount (kg)
Small chemicals: Batteries Cartridges	 110 0**	 53 140 pieces	 50 76*
Laboratory mixed waste	0**	150	118
Oil filters; oil containing products	0**	0	25
Spray containers, paint	0**	15	40
Developer	0**	700	
Oil	0**	0***	50
Medical waste	17	5,4	4
Fluorescent lamps (*TL-buizen*)		161	
Diesel oil		7,1 l	

* Cartridges are collected in special boxes which are made available by the supplier of office material and are returned to the supplier for recycling.
** This waste was collected on site, disposal will take place in 2009
*** This waste was collected on site, disposal will take place in 2010.

Internal recycling

Packaging material, like foam chips, is removed from incoming packages and reused (about 1.000 litres in 2010).

Wood from different kind of transport packages is partially reused to make new containers for transport of material and equipment.

Water

The consumption of water in different buildings was measured using the building management system. However, for facilities/laboratories it is not reasonable to split the water consumption between household water and process water because the water consumption for processes is low. The FCTEST facility, located in building 310, is the only facility at the Institute which has a substantial consumption of water in the work process. In general the water consumption of the Institute is stable.
The system for the fire extinguishing water was changed into a ring covering the whole research location Petten. The total amount of water put into the ring is known, but cannot be split per company Therefore no amount can be given for the fire extinguishing water at IE only.

Table Water consumption in m^3

Building	2008	2009	2010
Total	3849	2845	3058
113	45	59	75
300	30	51	62
308	267	281	317
309	236	209	345
310 (incl. FCTEST)	1786	1171	1277
311	4	4	0.5
312	534	515	500
313	210	209	277
314	65	126	67
315	95	92	89
320	37	32	27
325	130	95	124
330 (temporary offices)	4	NA	NA
Construction site	4	NA	NA
Fire extinguishing water	402	NA	NA

Emission to water

The discharge of water to the sewers equals the consumption of water plus the water produced and discharged to sewers by the FCTEST facility, minus the water collected from the chemical laboratories in 312 (this building has an additional collection circuit for waste water from the laboratories).
Concerning the discharged tap water or de-ionized water produces by the FCTEST facility we assume an estimation based on the operating time during 2010.
Tap water for the FCATS is used for the steam generator and the Septron EDI.
The estimated consumption is based on assumption that the FCATS has run using de-ionized water for 160 days and what we call the water production system (Septron EDI) has run for 340 days.
Then :
1) Water produced and discharged to sewage per year: 489 m3
(via the Septron EDI) => [(15% of 400 l/h)* 24 * 340]
2) Water produced and discharged in the air per year: 6.9 m3
(via steam generator and FCATS) => [(150gr/m3 of H2O * ((600 l/min of Air+H2 or 36m3/h) * 8 * 160)] = 150gr * 46080 m3 of Air+H2/year.
The waste water from the chemical laboratories in 312 is collected in separate tanks. These are emptied by an external certified company. In 2010 the amount of this waste water was so little that it was not necessary to empty the tanks.
The total amount of water discharge into the sewers was therefore 3058+489–6.9 = 3540.1 m^3.
This amount is below the amount allowed according to the licence.
The release of heavy metals and relevant inorganic emissions to the drain system is given in the table below. The measurements are performed by one external company for all the Petten site organisations at different locations.

Typical waste water sample pit

Table Inorganic emissions to the sewer system

Substance	Concentration (g/m^3)		
	2008	2009	2010
Chloride(Cl^-)	210	230	260

Table Release of heavy metals to the sewer system

Metal	Concentration (mg/m^3)		
	2008	2009	2010
Cadmium (Cd)	< 1	< 1	<0.4
Chromium (Cr)	< 5	< 2.5	15
Copper (Cu)	120	120	190
Nickel (Ni)	< 10	< 2	14
Lead (Pb)	< 8	< 8	<5
Zinc (Zn)	110	120	180
Mercury (Hg)	< 0.1	0.46	<0.3
Arsenic (As)	< 10	< 10	<2

Based on the requirements of the Waste Water licence (WVO) the IE is annually taking samples of waste water generated at specific workplaces. In 2009 the Regional Water Board (Hoogheemraadschap) has discovered that the threshold regarding heavy metals, particularly the one of chromium and nickel, had been exceeded. The cause of the pollution could not be traced.
In 2010 the samples taken from the sewer system have not shown exceeding values for heavy metals. Unfortunately the concentration of this pollution is still higher then in previous years. As a result of this the IE has decided to take place more sample pits for better evaluation of waste water.

Soil

Considering that the soil investigation campaign of 2004 showed a generally good quality of the soil in the area of the Institute, no actions were required in 2010.

Storage of dangerous substances and gases

The chemicals and gases are stored according to the CPR 15 and the environmental licence. The capacity has not changed significantly during 2010. The storage facilities are maintained by an acknowledged company on annual basis.

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Abstract
This report is the integrated Safety, Health and Environmental Annual Report 2010 of the Institute for Energy (IE) of the JRC. The report is split in a health and safety part and an environmental part. The report includes description of the organisational systems and structures together with the planned activities and the achieved goals. The environmental part contains in addition assessment of the environmental impact of the Institute. This report only refers to the activities of the JRC-Petten site of the Institute.

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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