Environment Agency

nuclear sector plan

2010 Environmental Performance Report

Foreword

This is our sixth annual report on the environmental performance of the nuclear industry in England and Wales. It describes the performance of the industry measured against the objectives and indicators set out in the Nuclear Sector Plan.

We published the first nuclear sector plan in November 2005, and a revised version, Issue 2, in July 2009. Issue 2 built on the successes delivered so far and looked ahead to forthcoming challenges such as the need to minimise greenhouse gas emissions and managing wastes. We are now considering how to update the plan further.

The plan sets out the main environmental issues facing the nuclear industry over the next few years, and the ways in which we can work together to address them. It encourages nuclear operators to continue to be responsible for environmental issues and to improve further their environmental performance beyond the minimum standards of regulation. It also commits us to continue our work to be a 'better regulator', focusing on significant issues and streamlining regulation as appropriate.

We are delighted that the nuclear industry continues to support the use, and further development of, the Nuclear Sector Plan. We want the industry to use it as a basis for regular dialogue between operators on what represents best practice, to encourage greater sharing of lessons learned and innovative thinking that will support further improvements in environmental performance.

This report was written in 2011, based on 2010 data. It also references, but does not include, the additional work undertaken by the nuclear industry as a result of the incident at Fukushima in Japan. Since the event, the Chief Nuclear Inspector of the Office for Nuclear Regulation (ONR) has reported on the lessons learned for the UK. The report contains a number of recommendations for operators. A key one is that operators need to demonstrate the steps taken by them to protect nuclear sites from extreme flood events, in line with objective 2 "Recognise the impact of climate change" of the Nuclear Sector Plan.

In recognition of the joint effort between ourselves and the nuclear industry, where 'we' is used in the body of this document it applies to the Environment Agency and the industry collectively. Logos of organisations participating in this initiative are shown below.

Ed Mitchell / Environment Agency

Summary

This report describes the environmental performance of the nuclear industry in England and Wales. It measures performance against the objectives and performance indicators set out in Issue 2 of the Nuclear Sector Plan, published in July 2009. Overall, the environmental performance of the industry during 2010 was good, with improvements made in a number of areas. Here, we highlight how the industry performed against its eight main environmental objectives during the year, and since 2005 when we started reporting.

Our 'traffic light' indicates the status of each objective as follows:


Poor performance


Good performance


Areas where performance is adequate


Positive trend in performance since 2005


Negative trend in performance since 2005

Minimise the amount of natural resources used		
The industry continues to reduce its energy and water use. In 2010 it used just over 65 million megawatt hours of electricity (4 per cent less than in 2009) and 13 million cubic meters of water (9 per cent less than in 2009).		
Recognise the impact of climate change		
The nuclear industry in England and Wales generated 17 per cent of the UK's electricity in 2010, which if produced by fossil fuels would have released around 26 million tonnes of CO_2. Compared to 2009, CO_2 emissions increased by 10 per cent, as a result of carrying out more hazard reduction activities at Sellafield and the improvements made by industry in reporting CO_2 emissions.		
Minimise discharges to air and water		
Discharges to air and water remain low and on target to meet UK Discharge Strategy commitments. Discharges of beta/gamma and tritium have fallen due to the reduced Magnox reprocessing throughput at Sellafield and the ending of commercial operations at GE Healthcare's Cardiff site. The overall trend since 2005 continues to show a reduction in discharges to air and water.		
Minimise and manage solid waste		
During 2010 the industry avoided sending 78 per cent of its low level waste to the Low Level Waste Repository – an increase on the 69 per cent it avoided sending in 2009. Operators continue to recycle the majority of their inert and non-hazardous wastes. They still need to make progress in the conditioning and packaging of 'legacy waste' (the proportion of which has remained roughly the same since 2005). New facilities are currently being built at Sellafield to help speed up the rate at which intermediate level wastes are being dealt with.		
Demonstrate sound environmental management and leadership		
Nuclear operators continue to maintain robust environmental management arrangements at their sites.		
Manage land quality and biodiversity		
The industry is committed to developing land quality management plans where appropriate. Biodiversity plans are being implemented at most nuclear sites, with a number of operators going beyond this and achieving biodiversity benchmarks.		
Improve or maintain a very high level of regulatory compliance		
The nuclear industry continues to maintain a high standard of regulatory compliance, with far fewer incidents than other regulated sectors. When notified of a breach or incident, the Environment Agency is working towards providing feedback on our investigations and regulatory position to all operators within a two		

month time period, and in more complex cases, updating the operators as investigations progress.		
Achieve better regulation		
The Environment Agency continues to make good progress against each of its improvement goals. Guidance was published to support the Environmental Permitting Regulations 2010 and an improved system was introduced to prioritise work to ensure it is more risk-based. New Environmental Permitting Regulations were issued in October 2011, introducing a revised basis for exempting radioactive waste (more details will be given in next year's report).		

Contents

Introduction

This report presents the latest information on environmental performance for the nuclear industry in England and Wales. It describes the progress made by the Environment Agency and the nuclear industry towards meeting the objectives set out in issue 2 of the Nuclear Sector Plan, published in 2009:

1. Minimise the amount of natural resources used
2. Recognise the impact of climate change
3. Minimise discharges to air and water
4. Minimise and manage solid waste
5. Demonstrate sound environmental management and leadership
6. Manage land quality and biodiversity
7. Improve or maintain a very high level of regulatory compliance
8. Achieve better regulation

Environmental performance of the nuclear industry

The nuclear industry is diverse and includes a wide range of activities including electricity generation, decommissioning and clean-up of redundant facilities, waste management, research, and development and defence.

With the support and encouragement of the Environment Agency, the nuclear industry has committed to, and successfully delivered, year-on-year improvements in its overall environmental performance, while continuing to make significant achievements and contributions to the UK economy.

Highlights in the environmental performance of the nuclear industry in 2010 include:

- A significant contribution towards helping the UK meet its climate change targets. Electricity generated by nuclear power in England and Wales saved 26 million tonnes of CO_2 (equivalent) from burning fossil fuels.

- The nuclear industry continues to deliver a high standard of regulatory compliance with far fewer incidents than in other regulated sectors.

- The industry managed to avoid sending 78 per cent of its low level radioactive waste to the national repository through recycling, or using alternative disposal routes.

- The industry continued to reduce consumption using 12 per cent less electricity and 20 per cent less water than in 2005 when reporting first began. Similarly sites continue to improve recycling of inert and non-hazardous wastes.

Areas for improvement

While the overall environmental performance of the nuclear industry remains good, work still needs to be done in two key areas:

- developing optimised plans which focus on reducing greenhouse gas emissions;
- improving the management of contaminated land on nuclear sites.

Regulators need to set out their expectations for land quality management. We recognise this and remain committed to making progress in this area.

Conditioning and packaging of 'legacy' intermediate level wastes remains a key area in which the nuclear industry needs to improve. The industry recognises this and is working with the regulators to look at ways in which the situation can be improved, so that more legacy waste can be conditioned and packaged.

More information

In the following chapters we describe the environmental performance of the nuclear industry against each of the specific objectives. Information on the performance of individual companies within the nuclear industry can be found by following the links to their websites provided at the end of this report.

Significant challenges ahead

Visible progress needs to be made on decommissioning and the clean up of legacy facilities, particularly facilities at Sellafield. In order for this work to be completed, progress also needs to be made in establishing a deep Geological Disposal Facility for higher activity wastes.

Climate change remains a priority issue that must be tackled. As with other industries, parts of the nuclear industry will be participating in the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme. This scheme aims to improve energy efficiency in large organisations and so help minimise the extent of climate change. We hope that the work already underway and identified in this Nuclear Sector Plan will help the nuclear industry become more energy efficient.

The industry needs to implement the recommendations from the Chief Nuclear Inspector's report on lessons learned from the Fukushima incident. These will help ensure that nuclear facilities remain robust and resilient to the impacts of climate change.

Feedback

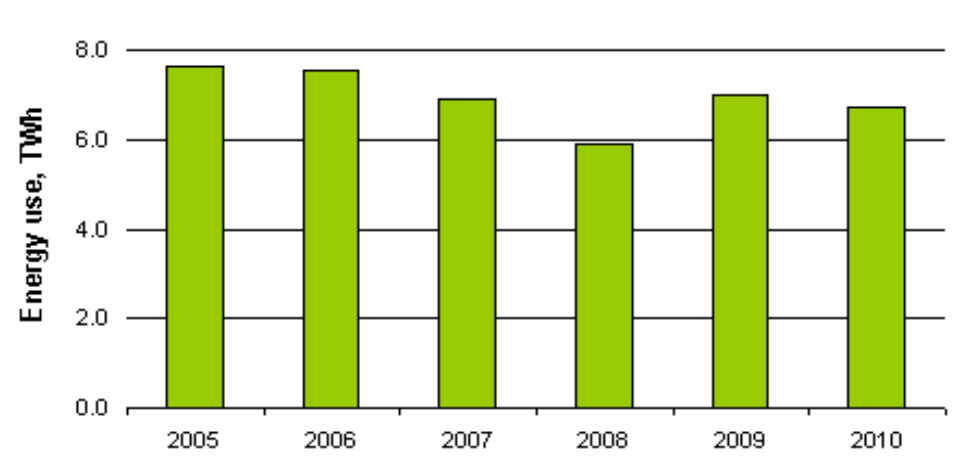
We welcome your views on the content and/or format of the report. If you have any queries or wish to make any comments, please contact nrg.north@environment-agency.gov.uk.

Minimise the amount of natural resources used

Energy use

The nuclear industry is a net generator of energy, generating 56[1] terawatt hours (TWh) of electricity in 2010 and only actually using 13 per cent of this. The industry continues to use slightly less energy than when reporting first began in 2005.

Total energy use



The amount of energy the industry uses depends upon the activities taking place at each of the sites, the amount of electricity produced at power stations and throughputs of other plant. While work was being carried out on site, Sizewell B power station underwent an extended outage, which contributed to the decline in energy use during 2010.

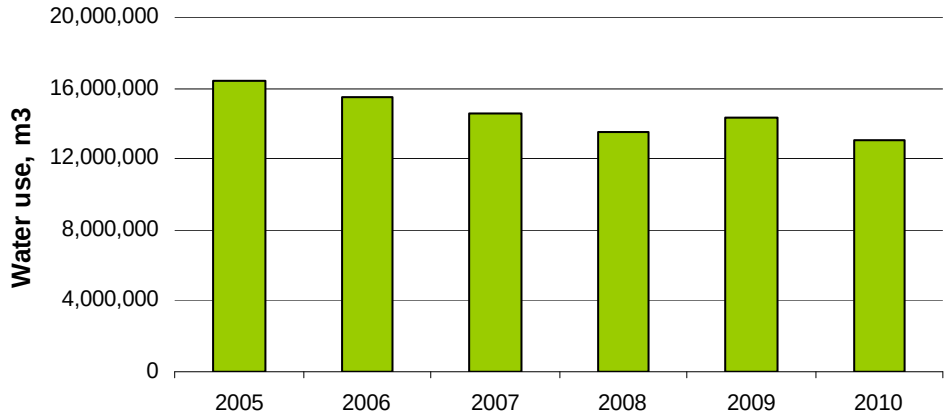
Operators are continuing to review their energy use, and how this might be minimised. The industry has developed a range of initiatives including more energy efficient lighting and the review of all inefficient equipment and processes.

[1] DECC energy generated in England and Wales 2010- http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/source/electricity/electricity.aspx

Water use

The nuclear industry has reduced its water use by 20 per cent over the last five years. Overall the amount of water used by the nuclear industry is declining.

Total water use



The industry is focussed on reducing water consumption. One way in which it is doing this is through the development of leakage management plans. Several sites are also introducing their own water saving initiatives. For example, a water usage group which meets regularly at Dungeness A; monitoring of minimum water usage at Wylfa and the publication of a cold weather protection strategy to prevent frozen pipes and water leaks at Trawsfynydd.

Improving water use at Wylfa & Sizewell B

Wylfa began monitoring overall water use on a weekly basis in order to identify any adverse trends. By monitoring and understanding the usage requirements of the site on a frequent basis, leaks were identified and fixed. The site's minimum water usage has decreased by over 85 per cent since monitoring began. By continuing to monitor usage in the future, the site will be able to identify any adverse trends promptly. As a result of these efforts Wylfa reduced water consumption by over 110 000 m^3 during 2010.

Sizewell B carried out an audit on water usage in 2010. This has resulted in a saving of around 35 m^3 of water per day (12,460 m^3 per year). Changes have also been identified for the water treatment plant, which will result in significant savings of both mains water and treatment chemicals.

Recognise the impact of climate change

As with other industries, the nuclear industry contributes to climate change and is also susceptible to its impacts.

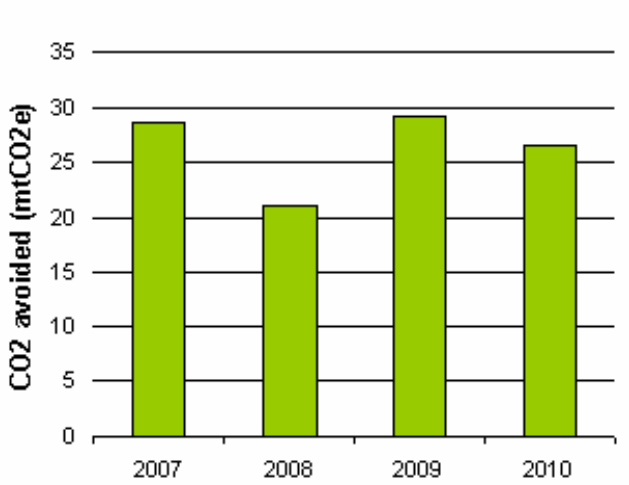
Reducing the impact of climate change

In England and Wales the nuclear industry provides electricity to the UK grid and, in doing so, contributes less carbon dioxide (CO_2) by comparison with other fossil fuel generation.

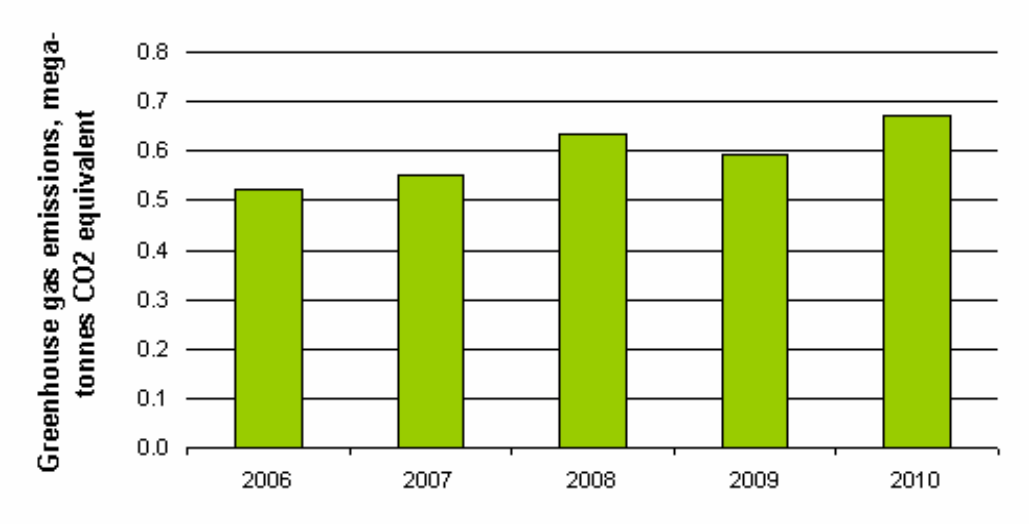
In 2010 the nuclear industry generated 17 per cent of the UK's electricity and in doing so saved approximately 26 million tonnes of CO_2 (equivalent). This is a significant saving – equivalent to one sixth of the UK's household emissions.[2]

The nuclear industry is continually working to improve its understanding of climate change.and to raise awareness externally. In 2010 this included the running of campaigns for World Environment Day, raising awareness of climate change and encouraging the reduction of greenhouse gases.

Carbon dioxide avoided



Total greenhouse gas emissions



Note: data from 2005 have not been included because they were unreliable

Greenhouse gas emissions increased during 2010 by 10 per cent. At Sellafield Ltd carrying out more hazard reduction activities led to a 20 per cent increase in greenhouse gas emissions from the site. The extended outage at Sizewell B meant that the auxiliary boilers were in use more which resulted in slightly higher CO_2 emissions in 2010.

The industry is improving how it identifies and targets significant sources of greenhouse gases, and the accuracy of reporting. Optimised plans are being

[2] *http://www.citypopulation.de/UK-Cities.html*

developed to target and reduce CO_2 emissions. The industry recognises that this is important and is continuing to work to improve its performance in this area.

Adapting to climate change

The nuclear industry is reviewing how best to manage its own operations in order to adapt to the impacts of climate change. This includes planning how to respond to flooding and coastal erosion at nuclear sites. Understanding and minimising the risk of flooding is a key task for nuclear sites going forward. To meet their commitments under the Nuclear Sector Plan, operators have undertaken flood risk assessment studies.

During 2011, additional work was carried out by the nuclear industry following the Fukushima incident in Japan. This included work for the EU 'Stress Test', which is reassessing the safety margins of nuclear power plants in the light of events which occurred at Fukushima. These were extreme natural events which challenged the plant safety functions and led to a severe accident. Additionally, the Chief Inspector of the Office for Nuclear Regulation (ONR) published a 'lessons learned for the UK' report in October 2011. The report made 38 recommendations for further work on issues such as the reliance on off-site infrastructure (for example the electrical grid supply), emergency response arrangements and risks associated with flooding. Many of the recommendations are for operators.

The Environment Agency is working with the ONR and industry on the flood risk studies at nuclear sites which will follow from the report. We are setting up a joint advisory group with ONR and the Scottish Environmental Protection Agency to carry out an independent review of flood risk assessments and flood safety margins for nuclear sites. We will also be involved in assisting ONR in the review of its internal guidance on external hazards such as flooding.

Minimise discharges to air and water

Radioactive discharges to air and water are permitted by the Environment Agency. Permits require nuclear operators to implement 'best available techniques' to minimise any such releases to the environment. (A fuller description of radioactivity and the discharges from the nuclear industry can be found in the UK Strategy for Radioactive Discharges).

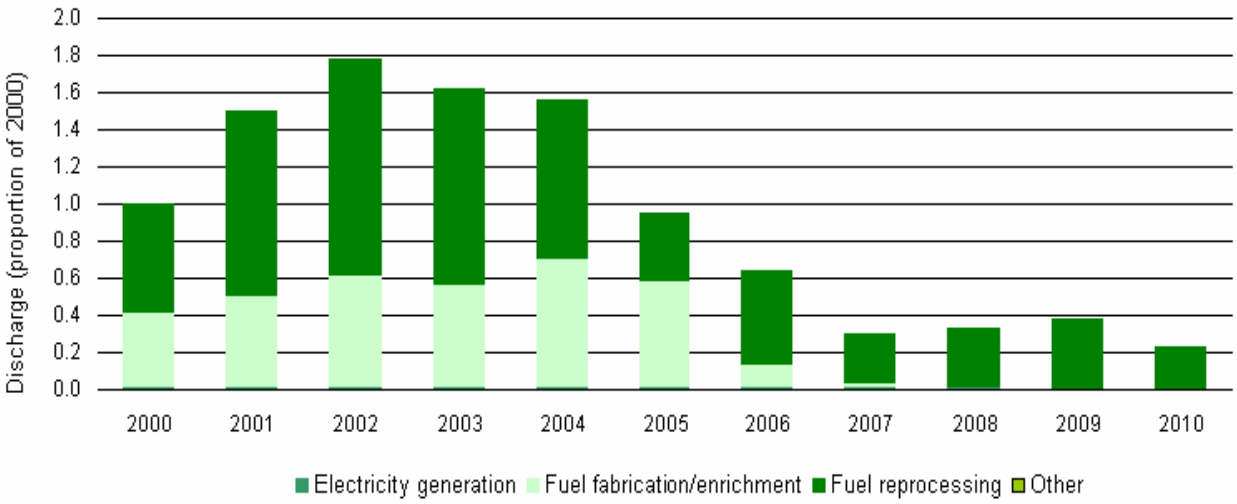
Sellafield effluent treatment plant 25 years of operation

The Site Ion Exchange Plant (SIXEP) at Sellafield has now been operational for 25 years. The treatment plant which has treated over 20 million cubic metres of contaminated water has been, and will continue to be, vital in reducing discharges from the site. Sellafield's radioactive discharges are now less than one per cent of the total being discharged in the mid 1970's. SIXEP has been vital in contributing to this substantial reduction.

Discharges to water

Radioactive discharges to water remain low and on target to meet the commitments set out in the UK Strategy for Radioactive Discharges, which specifies targets to be achieved by 2020. One of the aims of the UK Strategy is to progressively and substantially reduce liquid radioactive discharges. The radioactive discharges from the nuclear sector are in line with, or reducing faster than, the projections given in the original strategy.

Trends in radioactive discharges to water

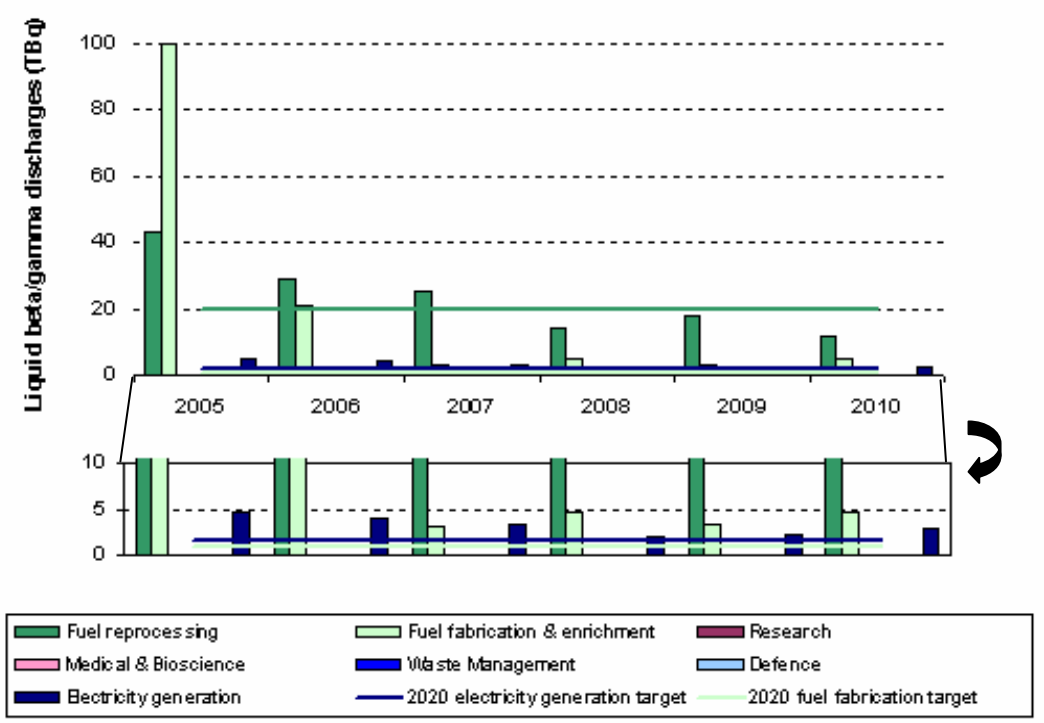


*Discharge of each radioactive substance weighted by dose impact

Notes: i) the total discharge of each radionuclide from each sub-sector is multiplied by a specific "dose per unit release" factor which takes into account the different toxicities of different radionuclides and the likely concentration in the environment. The total is then compared to the 2000 total to show the trend in this indicator over time. The graph is therefore comparative and does not have any units. ii) the "other" category includes the medical and bioscience, defence, research and waste management sub-sectors. iii) discharges from the "electricity generation" and "other" sub-sectors are too low to be seen on the graph.

In 2010 radiation doses from liquid discharges were at the lowest since 2000 and continue to be dominated by those from the fuel reprocessing sub-sector. Across the majority of the sector, liquid alpha discharges have decreased since 2009. This is a result of the range of operations occurring at sites; for example, at Bradwell, less radioactivity was released in their liquid discharges largely as a result of the fuel ponds being drained as part of site decommissioning.

Annual liquid beta/gamma discharges (excluding tritium)

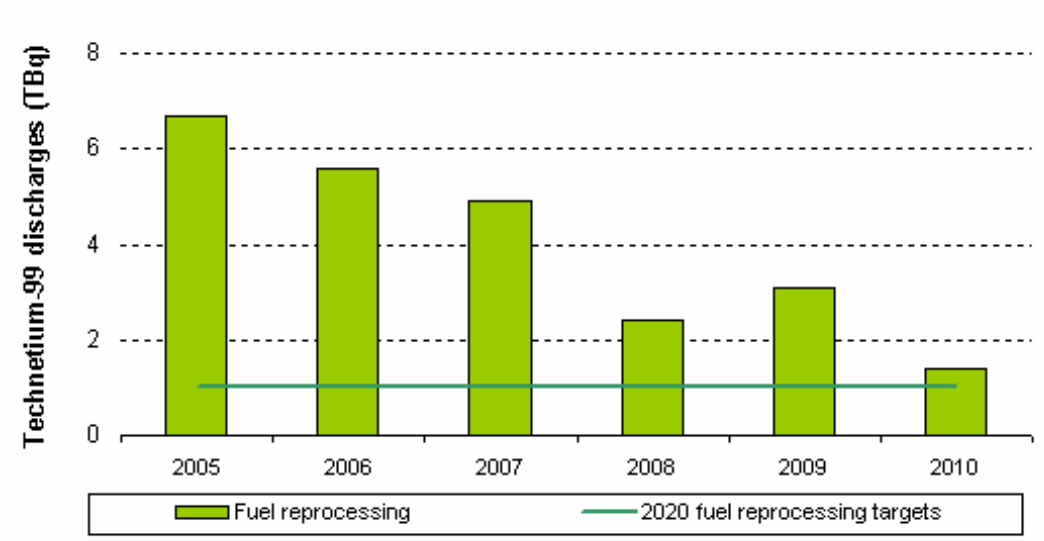


Note: there are no targets in the UK radioactive discharge strategy for liquid beta/gamma discharges from the research, medical and bioscience or waste management sub-sectors. The 2020 target for the defence sub-sector is 0.002 TBq/yr, and the discharges measured for this sub-sector have already achieved this target. Fuel fabrication target will be achieved by 2020 once the Natural Residues Processing Plant at Springfields closes down in 2015/16.

Liquid beta/gamma discharges have decreased since 2009, particularly in the fuel reprocessing sub-sector; a result of the reduced Magnox reprocessing throughput at Sellafield during 2010.

Liquid tritium discharges continue to fluctuate with the exception of the medical and bioscience sub-sector, while discharges decreased following the end of commercial operations associated with the nuclear work at GE Healthcare, Maynard Centre in 2010.

Annual technetium-99 discharges to water from reprocessing



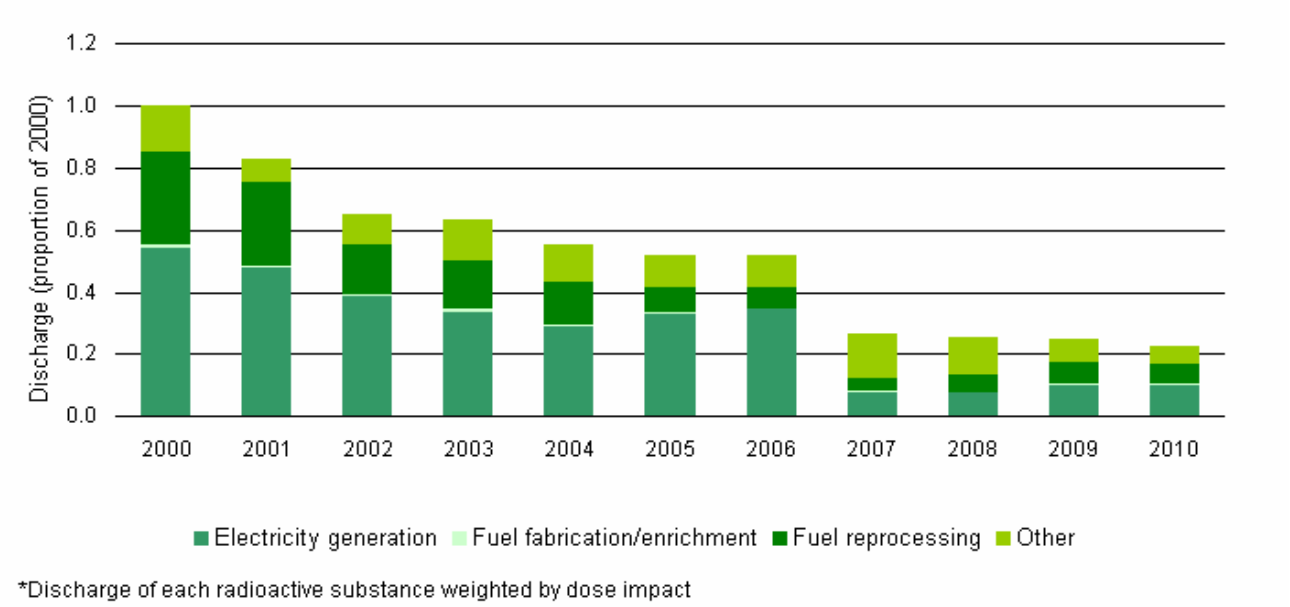
Note: The UK radioactive discharge strategy has technetium targets solely for the fuel reprocessing sub-sector

Technetium-99 discharges in 2010 were over 50 per cent lower than those recorded in 2009. This is a result of the reduced Magnox reprocessing throughput at Sellafield during 2010. Discharges decreased after 2008, when processing of the legacy Medium Active Concentrate was completed. Discharges are expected to remain low but linked to reprocessing rates, into the future.

Discharges to air

The total radioactive discharges to air from the nuclear industry continue to fall. The overall trend since 2000 has shown a significant reduction.

Total assessed radioactive discharges to air

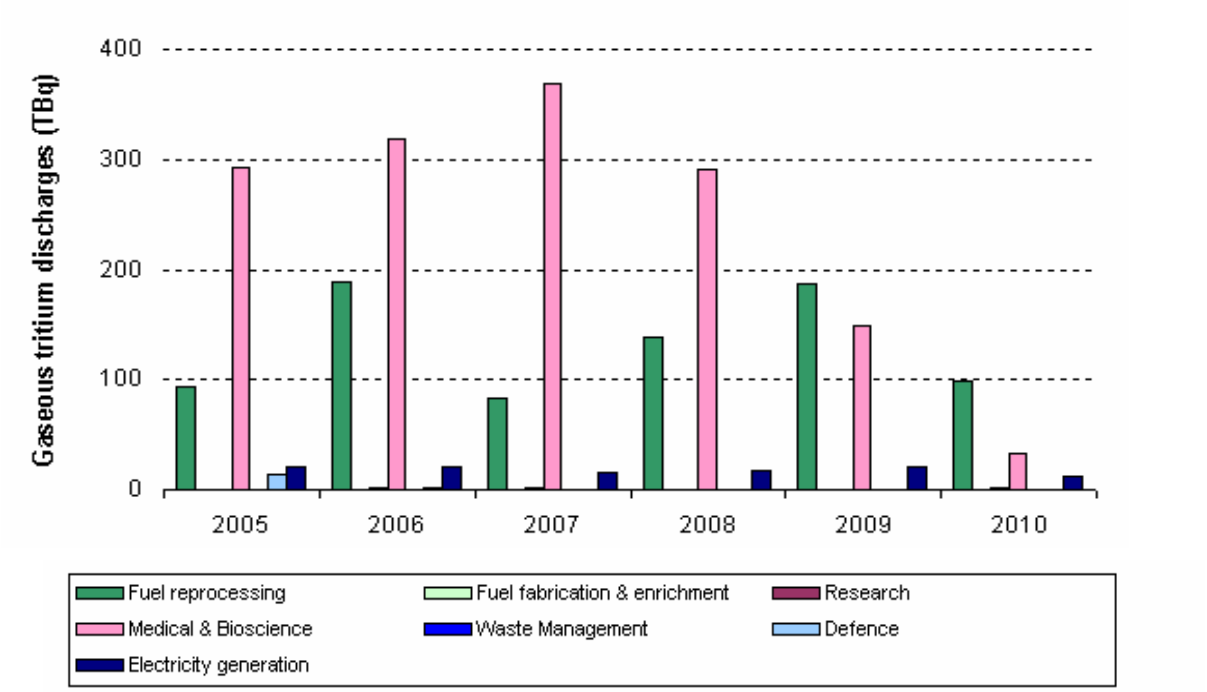


*Discharge of each radioactive substance weighted by dose impact

Notes: i) The total discharge of each radionuclide from each sub-sector is multiplied by a specific "dose per unit release" factor which takes into account the different toxicities of different radionuclides and the likely concentration in the environment. The total is then compared to the 2000 total to show the trend in this indicator over time. The graph is therefore comparative and does not have any units. ii) the "other" category includes the medical and bioscience, defence, research and waste management sub-sectors.

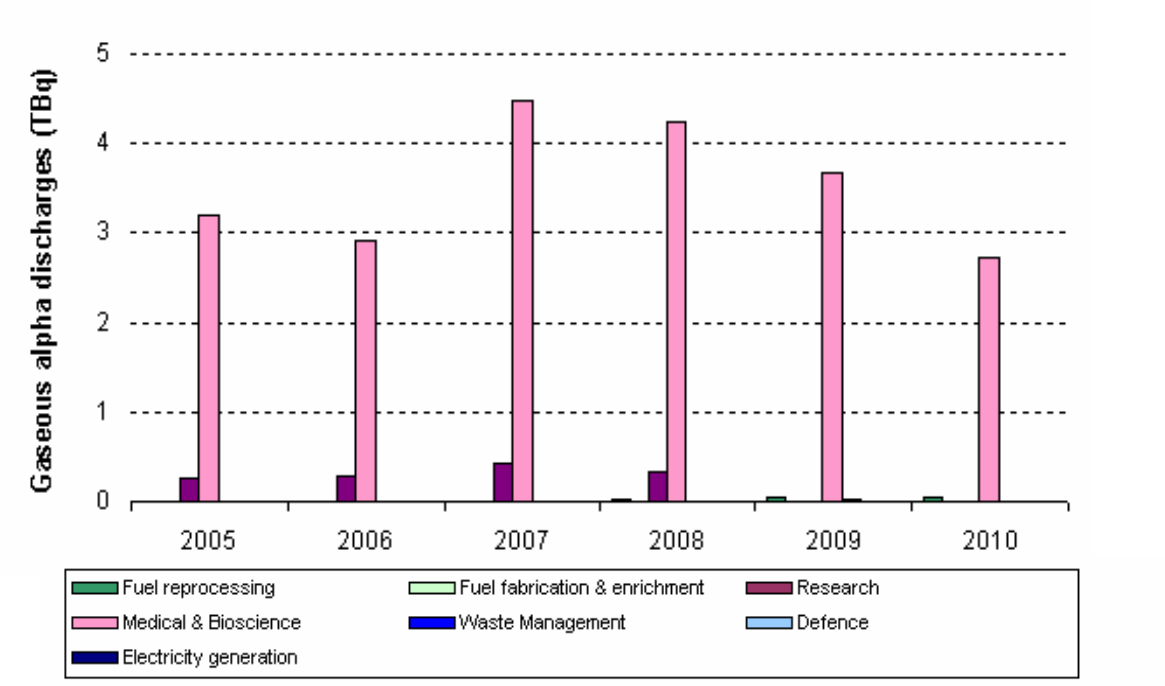
Discharges from electricity generation, fuel fabrication and enrichment and fuel reprocessing were the same as in 2009.

Annual tritium discharges to air



Gaseous tritium discharges have decreased since 2009. As with the liquid beta/gamma discharges (tritium is closely linked to the same activities) the decreases are associated with the reduction in Magnox reprocessing throughput and the ending of commercial operations at GE Healthcare, Cardiff.

Annual alpha discharges to air



Note: gaseous alpha discharge data reported in 2009 for the fuel reprocessing and fuel fabrication sub-sectors were incorrect. Correct data are reported in the graph above.

The gaseous alpha discharges continue to be dominated by those from the medical and bioscience sub-sector. They are dominated by discharges of Radon-222 from a redundant radium source production line at the Grove Centre, Amersham. This facility is currently programmed for decommissioning in 2013.

Radiation doses due to radioactive discharges

Radiation doses to the most exposed members of the public due to discharges from nuclear sites are well within the legal limit of 1 mSv per year.

The radiation doses are determined by monitoring food and the environment around nuclear sites. The results are published annually in the Radioactivity in Food and the Environment (RIFE) report. The Environment Agency uses this data, together with information on the habits of people in the vicinity of the nuclear sites, to assess radiation doses affecting people as a result of discharges.

Radiation doses change from year to year and are mostly caused by variations in the form and concentrations of radioactivity. However, doses are also affected by changes in people's habits, for example in the food they eat. The 'total dose' assessment method makes use of information on habits around all the nuclear sites. Members of the public most exposed to radiation near all nuclear sites in the UK are known as the 'representative person'.

During 2010 the representative persons who received the largest doses from both liquid and gaseous discharges were those at Sellafield. Doses from liquid discharges are due to the effects of current and past liquid discharges in seafood and the environment. Compared with 2009, the reduction in dose from Sellafield discharges was largely due to the reduction in consumption of molluscs

Representative person doses due to current and past discharges from Sellafield[3]

	2009	2010
Liquid discharges (mSv)	**0.20**	**0.18**
Gaseous discharges (mSv)	**0.029**	**0.022**

[a] largest dose as a result of liquid discharges was at Sellafield from fish and shellfish consumption and external intertidal areas (excluding naturally occurring radionuclides)

[b] largest dose as a result of gaseous discharges at Sellafield from terrestrial foods, external and inhalation

The second highest radiation dose was received, as in previous years, by those living on houseboats in the Ribble Estuary. In 2010 the dose calculated was 0.16mSv, an increase on the 2009 measure of 0.13 mSv. Much of this exposure was due to external dose from historic radionuclides deposited in intertidal sediments, although discharges from Springfields also contributed.

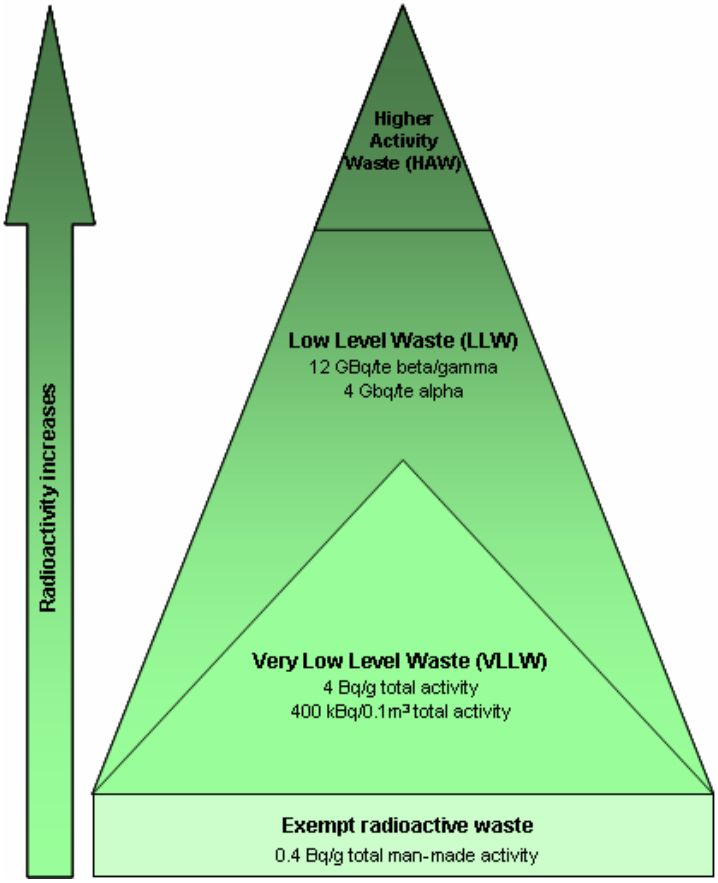
[3] RIFE 16 & 15 - Radioactivity in Food and the Environment, 2010

Minimise and manage solid waste

The nuclear industry generates a range of solid wastes, both radioactive and non-radioactive, as a result of activities at its sites. Operators are required to minimise the production of all wastes. Most of the waste is non-radioactive and comes from construction and demolition projects. Radioactive wastes are disposed in accordance with permits granted by the Environment Agency.

Radioactive wastes

Solid radioactive waste is divided into three categories (see figure) according to the amount of radioactivity it contains and the heat it produces. (note: figure does not include intermediate level waste specifically). Further details on types of radioactive waste in the UK can be found in the UK National Radioactive Waste Inventory. A description of the Government's programme to find and implement practicable solutions to the management of higher activity waste can be found at 'Managing Radioactive Waste Safely'.



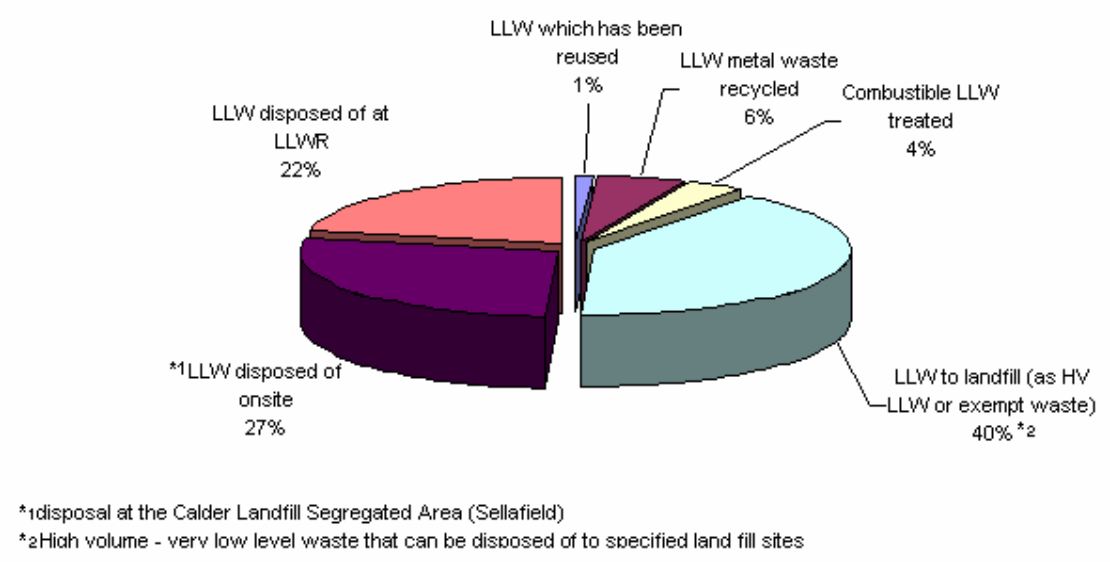
All operators are required to have Integrated Waste Strategies, which provide an overall plan for dealing with all types of wastes produced on site. At present not all sites have these but all are currently developing them. Operators are continuing to update their strategies, addressing individual waste streams and how the waste management hierarchy is being employed in order to devise strategies to deal with these streams.

Highly active waste successfully transferred overseas

During 2010 the first consignment of highly active waste (HAW) arising from the reprocessing of Japanese nuclear fuel was successfully shipped back to Japan. This safe, secure and highly regulated movement of HAW to Japan is a significant milestone in **Sellafield Ltd** delivering on **government policy**, by returning the waste to the country that benefited from the fuel from which the reprocessing waste originated.

Also during 2010, Sellafield Ltd, in partnership with International Nuclear Services, completed a shipment of solid highly active waste to the Netherlands. All Dutch HAW has now been returned from the UK.

Management of Low Level Waste in 2010



The Low Level Waste Repository (LLWR) near Drigg is a national asset with limited capacity. The nuclear industry is actively reducing the amount of waste it sends for disposal there. In 2010 it avoided sending 78 per cent of it's low level waste to the LLWR by recycling or using other disposal routes. This is an increase on the 69 per cent which was avoided in 2009. This is a significant achievement, which is helping to ensure that the limited capacity of the national repository is being protected for waste that *does* require the protection it offers.

	2009	**2010**
Volume of LLW disposed of at LLWR (m^3)	**6255**	**4007**

Studsvik Metals Recycling Facility

During 2010, four 10 tonne sections from the Calder Hall heat exchangers were processed through the **Metals Recycling Facility (MRF)** as part of a six-year project. As well as providing a more environmentally friendly option for dealing with the material, it also avoids filling the current Low Level Waste Repository (LLWR) near Drigg.

Sellafield Ltd has signed a contract with the Metals Recycling Facility to treat Multi Element Bottle (MEB) racks which will save valuable disposal space at the **LLWR**. The contract will see more than 200 tonnes of LLW metal pre-treated at the MRF, with the wastes requiring smelting being treated at the Studsvik facility in Sweden. In total the contract prevents more than 24 iso-freight containers of waste being disposed of at LLWR.

Intermediate Level Waste (ILW)

Management of intermediate level waste is an area of waste management that still needs improving. Progress has been made during 2010 in the conditioning and packaging of 'legacy ILW' within the nuclear industry. These are wastes that, while safely managed at the sites, are not yet in a final form which can be safely disposed.

Total volume of raw and conditioned/packaged ILW produced [4]

Volumes of 'raw' intermediate level wastes are increasing as sites undergo decommissioning and other activities on site.

Overall, the rate of progress within the industry remains slow. Since 2005 the proportion of the total volume of intermediate level waste that has been conditioned and packaged in England and Wales remains at under 25 per cent. As reported in last years report, this reflects the slow rate of progress in addressing the large volumes of legacy wastes stored at Sellafield.

The industry recognises that the rate of progress is slow. However, it is working to increase this and is looking at ways to improve the amount of intermediate level wastes being conditioned and packaged. For example, Sellafield Ltd is progressing a number of significant new projects/facilities to speed up the conditioning and packaging of intermediate level wastes. The overall rate of progress of ILW management will be determined by the availability of a Geological Disposal Facility.

Conditioning and packaging of intermediate level wastes at Sellafield

Sellafield has an integrated nuclear waste management programme in place which seeks to reduce waste volumes arising from current commercial as well as historic operations. As part of this Sellafield is continuing to progress a number of significant new projects/facilities to accelerate the conditioning and packaging of intermediate level wastes (ILW). A key milestone in managing ILW will be the completion of the Encapsulated Product Store 3 (EPS3), which is scheduled for completion in 2012/13. EPS3 will provide additional capacity of ILW interim storage and support the existing two stores.

[4] *Data based on the 2010 UK radioactive waste inventory*

Non-radioactive wastes

The bulk of the waste generated by the nuclear industry is non-radioactive. Non-radioactive waste is divided into three categories according to its hazardous nature and other characteristics.

Hazardous waste is waste which is harmful to human health or the environment and so is disposed of by landfill or specialist treatment. Examples include asbestos, solvents, oil and pesticides.

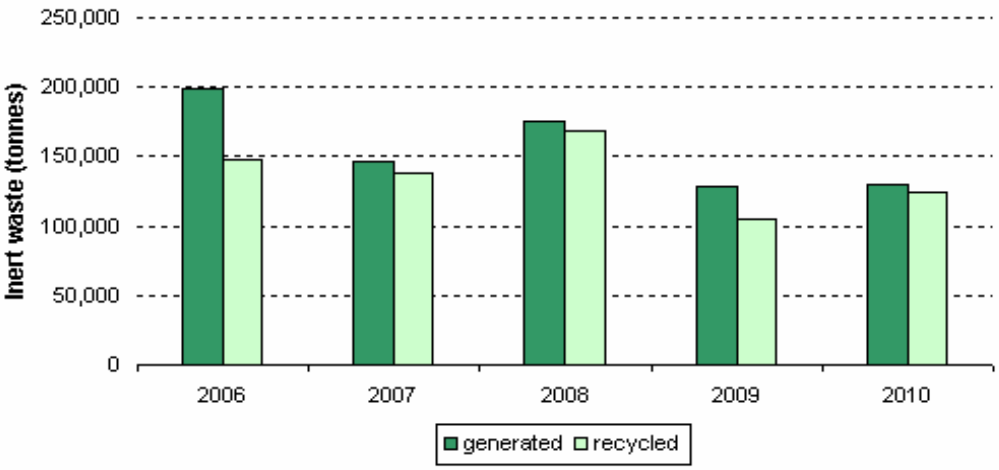
Inert waste is waste that has no hazardous properties and which does not undergo any significant physical, chemical or biological transformations. Sand is an example.

Non-hazardous waste is waste that, while it doesn't have any hazardous properties, is not inert and could cause problems if not dealt with properly due to the fact it may biodegrade. Examples of non-hazardous waste include paper, cardboard and plastic.

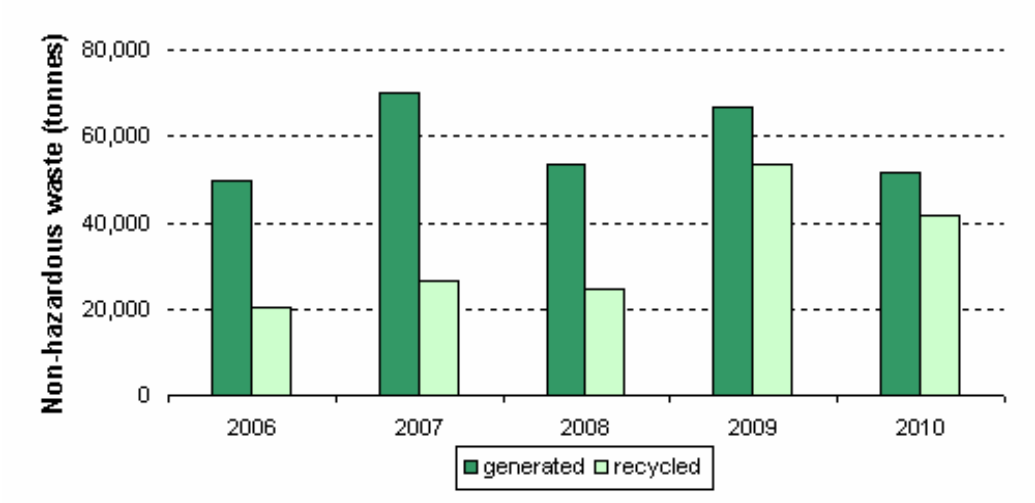
Asbestos removal project at Calder Hall

The £26 million project to strip asbestos cladding as part of decommissioning the Calder Hall nuclear reactors on the Sellafield site, was completed in March 2010. The five-year project was one of the largest asbestos removal projects in Europe and has been recognised as a significant milestone in the overall decommissioning of Calder Hall.

Proportions of non-hazardous and inert waste generated and recycled



Note: there is no data for the amount of inert waste recycled in 2005, only the amount generated, so this was not depicted on this graph.



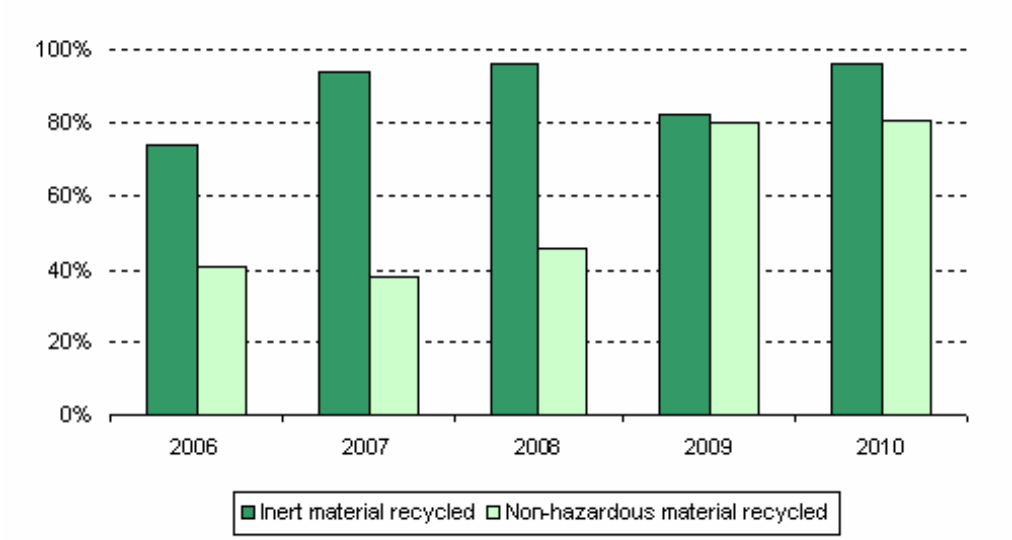
Note: there is no data for the amount of non-hazardous waste recycled in 2005, only the amount generated, so this was not depicted on this graph.

Non-hazardous material recycled in other sectors during 2010
(source Environment Agency 2011)

	Amount recycled (tonnes)
Nuclear	41,770
Paper & Pulp	2,724,970
Food & Drink	2,464,760
Metals	2,178,860
Chemicals	451,210
Minerals	200,780
Water	28,920

The amount of waste produced is dependent upon the activities occurring on site. For example at Oldbury, there was an increase in 2010 of non-hazardous waste as a result of care and maintenance preparation work. Care and maintenance (C&M) is the decommissioning phase during which the nuclear site has been put into a 'safe' state, requiring minimal maintenance and human intervention. Work is currently ongoing at sites such as Oldbury, Trawsfynydd, Bradwell and Berkeley in preparation for the C&M phase, which will span decades.

Percentage of inert and non-hazardous material recycled



The nuclear industry continues to achieve a high rate of recycling for inert and non-hazardous wastes. Across the nuclear sector the majority of the inert waste created is reused either on or off the site of origin. For example, at Berkeley, inert waste is to be used as engineering infill for future build projects on site and for EDF Energy NGL sites, much of the inert wastes is sent offsite for re-use.

Sites are continuing to apply the waste hierarchy and segregate wastes carefully to allow recycling to take place. Specific facilities have been built at Berkeley for the recycling of hard plastic, wrapping plastic, mixed paper and cardboard. Operators are also introducing new ways of tackling various waste streams such as the introduction of a compostable waste route at Sizewell A, while continuing to segregate recyclable material.

Segregation of non-hazardous waste at Oldbury nuclear power station

Demonstrate sound environmental management and leadership

Nuclear operators continue to have robust environmental management arrangements at their sites. Most operators have an environmental management system that has been independently certified to an international standard (ISO 14001), while others have chosen alternative arrangements to equivalent standards.

The industry remains committed to working together and sharing its views and experience on good environmental performance and is continuing to make good progress towards the goals set out in the nuclear sector plan.

Where relevant, sites are continuing to work towards their own corporate social responsibility (CSR) policy targets which cover socioeconomic commitments, sustainability, supplier partnerships, working with external stakeholders and social and community projects. Although this goes beyond the sector plan, we would like all nuclear sites to have their own individual CSR policies by 2012.

Sites are encouraged to involve local stakeholders. The Nuclear Decommissioning Authority (NDA) has developed guidance on what it expects from Site Stakeholder Groups (SSGs) and what the support the SSGs can expect in return. Several sites already have stakeholder plans in place, or well established local liaison groups which meet regularly.

Manage land quality and biodiversity

Many operators are making progress in identifying land affected by chemical or radioactive contamination. The industry is committed to developing Land Quality Management Plans, where appropriate. The Environment Agency, Scottish Environment Protection Agency (SEPA) and the Office for Nuclear Regulation (ONR) are working with the industry to develop these plans and some common expectations.

Most nuclear sites have biodiversity action plans (BAPs) to manage or enhance the flora and fauna present on site or on surrounding land. For example at Hinkley Point A, indigenous trees and shrubs were planted in an area of former site workings and the second edition of Sellafield Ltd's BAP now focuses on biodiversity onsite and surrounding landholdings. A number of sites have gone beyond this and have achieved the Wildlife Trusts' Biodiversity Benchmark Standard, for example Springfields, Sizewell B and Hartlepool. This standard has only been achieved by a small number of industrial sites and shows a high level of commitment to promote biodiversity.

Springfields Great Crested Newts

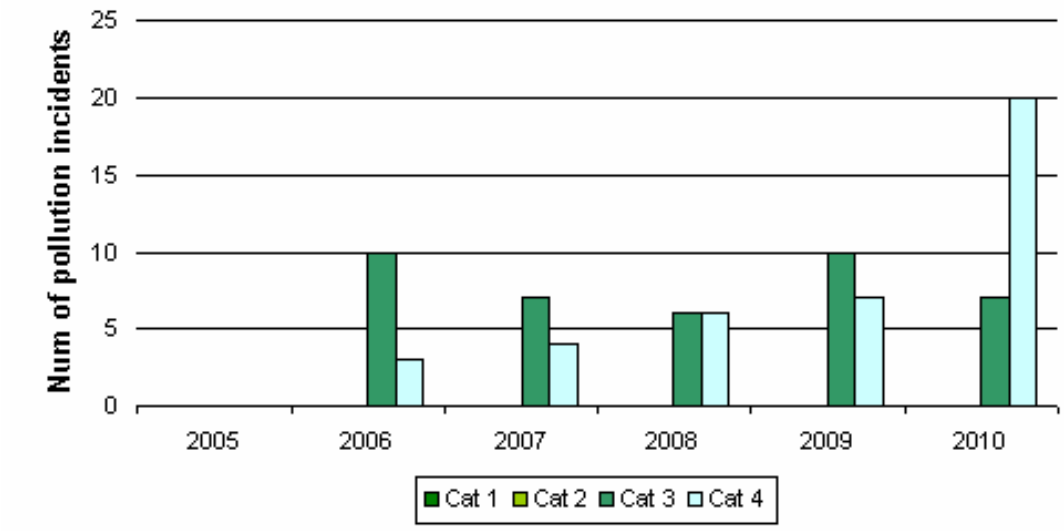
Great Crested Newts (GCN) are listed as a European Protected Species. The Springfields Works ponds, which are now well established, were originally designed as potential habitats for the GCNs. A survey carried out in 2006 confirmed that GCNs are now thriving and have now colonised a total of nine ponds on site.

Improve or maintain a very high level of regulatory compliance

The nuclear industry continues to achieve a high standard of regulatory compliance. It is a heavily regulated industry, reflecting the significant hazards and risks associated with activities on its sites. The Environment Agency works closely with the industry and other nuclear regulators (particularly the Office for Nuclear Regulation) to ensure compliance and support improvements in performance. Non-compliances are rare and when they do happen, both the Environment Agency and the industry are committed to responding promptly to understand how these occurred and how any future recurrence can be avoided.

Over the last five years there have been some incidents at nuclear sites which have either had an impact, or potential impact, on the environment, or to breach a permit. None of the incidents at nuclear sites have had major or significant impacts on the environment (as categorised in the Environment Agency's Common Incident Classification Scheme).

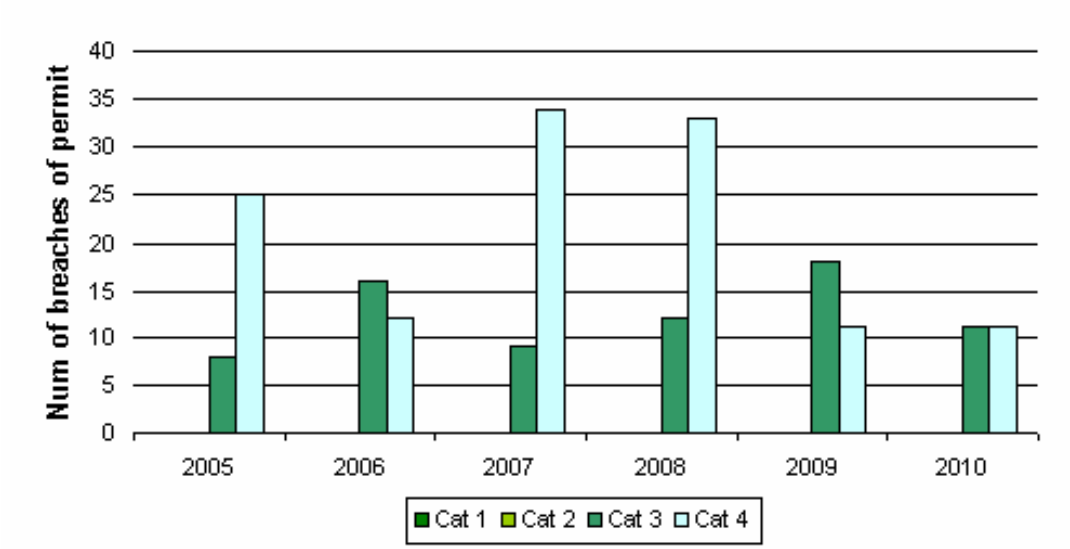
Number of pollution incidents



Note: The Environment Agency classifies incidents (in the CICS scheme) from Category 1 to Category 4, where Category 1 is the most serious. Incidents are classified based on their actual impact. For example, a Category 1 incident has a major impact on the environment, while a Category 3 incident has a minor impact.

The number of Category 4 incidents (which have no environmental impact) increased during 2010. These type of incidents may include a minor deviation from the authorised activity or a discharge being made from an incorrect discharge point. Industry and regulators have worked together to ensure the reporting process is fully used and transparent, which is the reason for the increase in reported Category 4 incidents in 2010.

Number of breaches of permit



Note: The Environment Agency classifies breaches (in the CCS scheme) from Category 1 to Category 4, where Category 1 is the most serious. Breaches are classified on their potential impact. For example, a Category 1 breach of permit has or could have a major impact on the environment. A Category 4 breach has no potential to have an effect on the environment.

The Environment Agency also monitors breaches of permit conditions using a 1 – 4 scale, with Category 1 being the most serious. During 2010 the number of Category 4 breaches was the same as in 2009, but the number of Category 3 breaches (an activity that may have the potential to result in minor harm or pollution of the environment) declined. The overall number of permit breaches in 2010 was the lowest since reporting began in 2005. Working together, the industry and regulators need to continue to monitor performance.

Comparison with other industries

The nuclear industry had fewer serious pollution incidents or serious breaches or permits than any other regulated industry sector in 2010.

Sector	Number of serious pollution incidents in 2010[a]	Number of serious breaches of permit in 2010[a]	Number of permits[b]	Serious incidents per permit	Serious breaches per permit
Nuclear	0	0	38	0	0
Water	64	226	31,719	0.002	0.007
Chemicals	14	11	560	0.03	0.02
Energy	3	5	406	0.007	0.01
Waste[b]	120	218	10508	0.01	0.02
Metals	0	1	202	0	0.005
Mineral products[c]	2	1	57	0.04	0.02
Farming	91	6	1063	0.09	0.006
Food and drink	8	3	373	0.02	0.008
Other[d]	20	6	128	0.16	0.005

(a) "Serious" pollution incidents are those classified as Category 1 or Category 2 in the Environment Agency's Common Incident Classification Scheme (CICS). "Serious" breaches of permits are those classified as Category 1 or Category 2 in the Environment Agency's Compliance Classification Scheme (CCS).
(b) Waste management include waste operations with waste management licenses and installations with PPC permits
(c) The "mineral products" sector includes cement and lime industries, glass ceramic and brick manufacturers, but not mineral extraction.
(d) The "other" sector includes construction, textiles, and retail/wholesale.

During 2010 the Environment Agency took enforcement actions against four nuclear operators:

- Two warning letters were issued to AWE
- Three warning letters and 1 Enforcement notice were issued to Sellafield Ltd
- One warning letter issued to GE Healthcare, Cardiff
- Two warning letters were issued to Magnox Ltd

Achieve better regulation

The Environment Agency has made good progress against each of its improvement goals:

- We supported the Department of Energy and Climate Change (DECC) in developing the Environmental Permitting (England and Wales) Regulations 2010 (EPR). These were introduced in April 2010 and replaced the Radioactive Substances Act 1993 (RSA93) for the disposal of radioactive waste from nuclear sites. To help implement the regulations , we produced some new guidance for environmental permitting and updated the existing guidance.

- During 2009/10 we developed our Medium Term Action Plan (MTAP) which sets out our priorities for radioactive substances regulation of the nuclear industry. Site Environmental Reviews (SERs) are being developed to set out environmental priorities for each nuclear site. Together the medium term action plan and the site environmental reviews complement one another and inform the Environment Agency's future risk based regulatory position.

- Where relevant, nuclear site operators completed their inspection of the monitoring certification scheme (MCERTS) for flow and provided reports to us in 2010. Most sites' flow measurements passed with few or no improvements required. We have issued guidance on the final stages and expect full implementation to be achieved for most sites by March 2012.

- The new MCERTS performance standard for radiochemical analysis of waters will be finalised and published in early 2012. We will begin the process of implementing it through our independent checking programme. We plan to seek cost information from the nuclear operators to inform a regulatory impact assessment, to establish whether implementation by industry is achievable.

- In the Sector Plan, we committed to providing feedback to operators on incidents and breaches within two months of notification of an event. Events are subject to detailed investigation by both the operators themselves and the Environment Agency as regulator. These investigations commonly take longer than the two month deadline. Although we only made 54 per cent of notifications in the two month period, we have focussed our efforts on ensuring events were investigated fully, requiring any appropriate improvements to be put in place to avoid recurrence. In future we will work to ensure that, where we can't provide a final classification of an event to sites within the two month time period, as a result of our own investigations or while waiting for information and results from operators, we will keep them informed of progress and of anticipated timescales.

Summary

Overall, the industry's environmental performance in 2010 has been good. The industry has continued to perform and progress well against most of the sector plan objectives, while at the same time maintaining good relationships and sharing best practice.

In 2010 the nuclear industry continued to maintain a high standard of regulatory compliance, but is committed to achieving further improvements in environmental performance that go beyond just compliance. The Environment Agency, by working with the nuclear industry, remains committed to supporting the industry in achieving these high levels of performance.

There are aspects of environmental performance that do need improvement and we are working to address these areas. They include;

- using resources efficiently
- better understanding and minimisation of greenhouse gas emissions
- reducing the amount of low level waste sent to the national repository

As in 2009, conditioning and packaging of legacy wastes continues to remain the nuclear industry's main challenge. Work is underway to increase the rate of progress and we will continue to work together to monitor this and other progress across the sector.

Glossary

Geological Disposal Facility
Engineered repository located deep underground to hold high active waste i.e. spent nuclear fuel. The Repository is designed to isolate and contain wastes for long term periods.

Integrated Waste Strategy
An Integrated Waste Strategy is a strategy which describes:

- how a site optimises its approach to waste management in an integrated way
- the waste streams and discharges expected from current and future operations,
- actions required to improve the site's approach to waste management.

The waste includes all radioactive and non-radioactive wastes (including those in solid, liquid or gaseous form) arising from the site's past, present and future operations, and any other waste transferred from other sites for management or disposal.

Land quality management plans
Plans for the control, monitoring and remediation of radioactive and non-radioactive contamination in the ground or groundwater at a site.

Low Level Waste Repository
The UK's national low level radioactive waste facility, located close to the West Cumbrian coastline in the north-west of England.

Monitoring Certification Scheme (MCERTS)
MCERTS is a scheme established by the Environment Agency. It provides a framework that businesses can use to demonstrate that their emission monitoring arrangements meet the quality requirements of their permits. A range of schemes exist, including for air monitoring, soil analysis, water monitoring and for environmental data management software.

Radioactive waste inventory
The radioactive waste inventory is a public record of information on radioactive waste present in the UK. It describes the sources, quantities and properties of radioactive waste that exist at a particular point in time. The latest available inventory relates to that waste which existed at 1 April 2010 and that was forecast to arise in the future.

Waste hierarchy
The waste hierarchy is a useful framework which sets out the order in which options for waste management should be considered, based on environmental impact. The framework is based on trying to avoid the creation of waste in the first instance, if this is not possible then working down the hierarchy try to minimise, re-use/recycle as much of the waste as possible. The last resort is to dispose of the waste i.e. to landfill.

Links to participating organisations

http://www.awe.co.uk

http://www.babcock.co.uk

http://www.baesystems.com

http://www.edfenergy.com

http://www.gehealthcare.com/uken

http://www.llwrsite.com/llw-strategy

http://www.magnoxsites.co.uk/publication

http://www.nda.gov.uk

http://www.research-sites.com

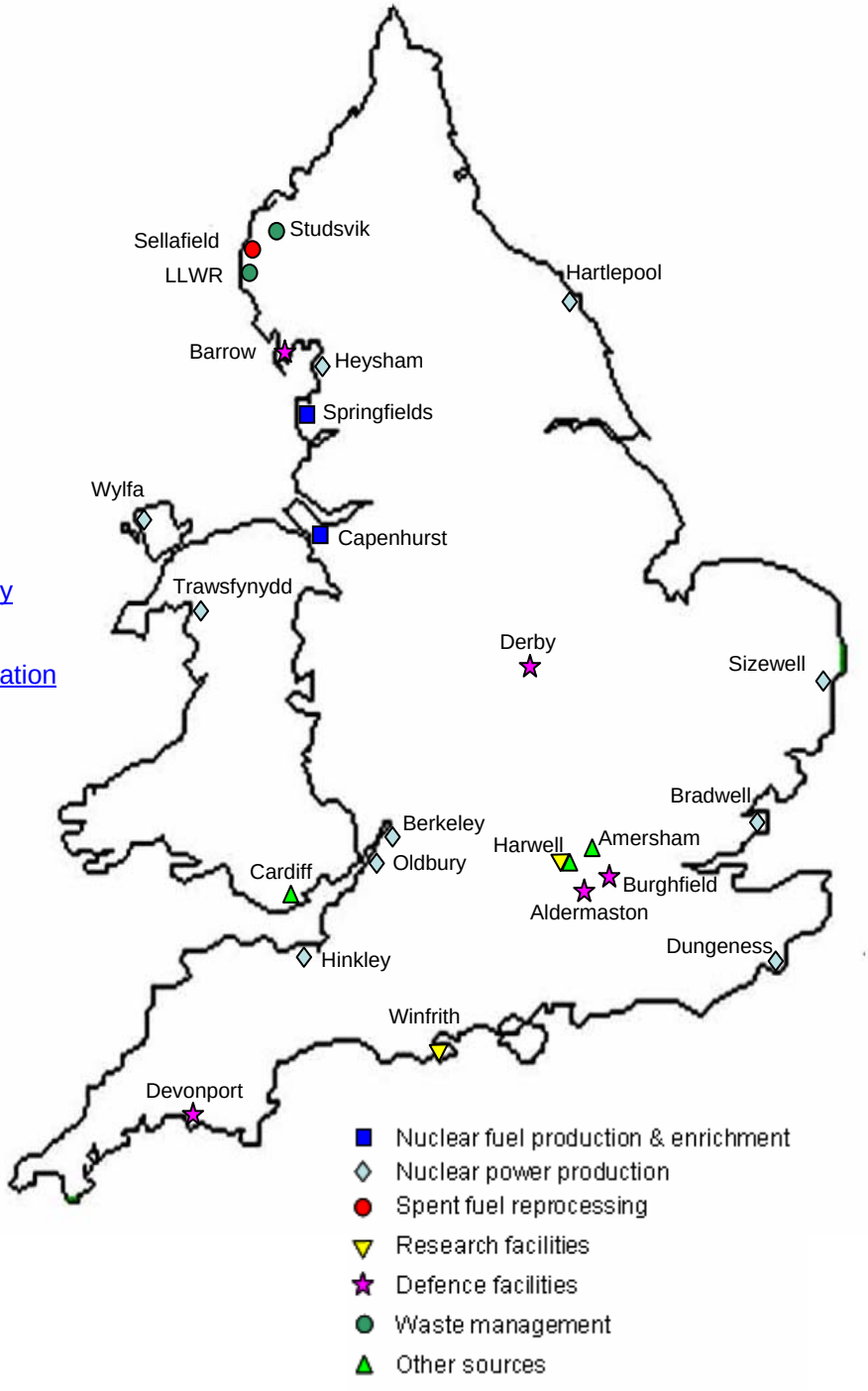
http://www.rolls-royce.com

http://www.sellafieldsites.com

http://www.studsvik.com

http://www.urenco.com

http://www.springfieldsfuels.com



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