Cyfoeth Naturiol Cymru
Natural Resources Wales

Environment Agency

nuclear sector plan

2013 environmental performance report

LIT10070

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local councils, other agencies, civil society groups and the communities we serve.

We are a Welsh government sponsored body formed in April 2013. We have taken over much of the work of the Countryside Council for Wales, Forestry Commission Wales and the Environment Agency in Wales, as well as certain Welsh government roles.

It is our job to protect, maintain and improve the environment and natural resources of Wales now and in the future.

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Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

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T: 03708 506506

Email: enquiries@environment-agency.gov.uk.

Foreword

We are pleased to introduce this annual report on the environmental performance of the nuclear industry in England and Wales. It shows how the industry performed in 2013 against the objectives and targets in issue 3 of the nuclear sector plan. This is the first report against Issue 3 of the Plan which was published in December 2012 and the first jointly produced with Natural Resources Wales.

Issue 3 is a change from Issue 2 in that we have re-grouped existing objectives and added new improvement goals. This reflects new developments in the nuclear industry, particularly in the area of decommissioning, with 19 out of 30 sites now carrying out full or partial decommissioning.

The industry progressed well against all objectives in 2013, maintaining good relationships and sharing best practice.

Highlights included:

- The industry sent just 13% of its low level radioactive waste to the national Low Level Waste Repository in Cumbria.
- Sites recycled 99% of inert waste and 70% of non-hazardous waste.
- The nuclear industry continued to consistently comply with regulations, with no serious permit breaches.
- The percentage of packaged vs unpackaged intermediate level waste rose from 25% in April 2012 to 28% in April 2013.

We are pleased that the nuclear industry continues to support and help us develop the nuclear sector plan. We want the industry to use it to share lessons it has learned and to encourage new ideas to further improve its environmental performance.

Recognising the joint effort between the regulators and the nuclear industry, where we use ‘we’ in the main part of this document, we are referring to the Environment Agency, Natural Resources Wales and the whole nuclear industry.

Organisations involved in the nuclear sector plan are shown below.

Ed Mitchell - Environment Agency

Ceri Davies - Natural Resources Wales

Summary

Overall, the environmental performance of the industry during 2013 was good, with improvements made in a number of areas.

1. **Minimise resource consumption and carbon footprint**
In 2013, although several sectors reduced the amount of energy they used, the nuclear industry used 0.8% more energy than in 2012. Nearly all sectors used less water, with the nuclear industry using 4% less. Greenhouse gas emissions were 13% lower than the previous year.
2. **Minimise discharges to air and water**
Although discharges to water were 15% higher than in 2012, almost half of the expected outcomes for 2020 in the 'UK Strategy for Radioactive Discharges' are already being met. Discharges to air increased by 9% on 2012 figures but are still low compared with 2005 levels.
3. Promote use of the waste hierarchy
In 2013 the industry disposed of around 10,800 m^3 more low level waste (LLW) than in 2012. By applying the waste hierarchy (reduce, reuse, recycle), and other ways of disposing of waste, the industry sent just 13% of this LLW to the national Low Level Waste Repository (LLWR). Nearly all inert waste and 70% of non-hazardous waste was recycled in 2013.
4. **Demonstrate environmental management and leadership**
Industry operators are committed to working together and sharing environmental best practice. All operators have ways of sharing environmental awareness across the organisation and have a management system accredited to ISO14001 or equivalent. We're now looking at ways of sharing best practice across the whole industry.
5. **Progress decommissioning and manage land quality**
The ratio of packaged to unpackaged ILW in storage increased in 2013 from 25% to 28%. Operators continued to report progress against land quality management targets.
6. Maintain or improve a very high level of regulatory compliance
The nuclear industry continues to consistently comply with regulations, with no serious breaches of permits in 2013. The number of minor breaches stayed almost the same.
7. Further implement better regulation
In 2013 the Environment Agency introduced a new way of checking that feedback on incidents and permit breaches has been given to the operator in writing within a certain time. In 70% of cases the Environment Agency provided written feedback to operators within two months of being told about an event.

Introduction

The Environment Agency and Natural Resources Wales regulate the disposal of radioactive waste at and from nuclear sites in England. The Environment Agency also provides nuclear regulatory services to nuclear sites in Wales on behalf of Natural Resources Wales (Cyfoeth Naturiol Cymru), ensuring a consistent approach to nuclear regulation across England and Wales. Published by the Environment Agency and Natural Resources Wales, this report has been prepared with the help of operators. It presents the latest information on environmental performance for the nuclear industry in England and Wales.

The report describes the progress made by the Environment Agency and the nuclear industry in meeting the seven objectives set out in Issue 3 of the 'nuclear sector plan' *(*published in 2012*)*. This is the first time we have reported against the objectives in Issue 3 of the Plan. Issue 3 has regrouped some existing improvement goals and performance indicators, and added new ones, giving a total of seven objectives rather than eight. The table below shows the new Issue 3 objectives compared with Issue 2.

Table 1: Comparing nuclear sector plan objectives

Issue 2	Issue 3
1. Minimise the amount of natural resources used	1. Minimise resources consumption and carbon footprint
2. Recognise the impact of climate change	
3. Minimise discharges to air and water	2. Minimise discharges to air and water
4. Minimise and manage solid waste	3. Promote use of the waste hierarchy
5. Demonstrate sound environmental management and leadership	4. Demonstrate environmental management and leadership
6. Manage land quality and biodiversity	5. Progress decommissioning and manage land quality
7. Improve or maintain a very high level of regulatory compliance	6. Maintain or improve a very high level of regulatory compliance
8. Achieve better regulation	7. Further implement better regulation

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

Since 2005, when the first nuclear sector plan was published, the industry has improved its overall environmental performance and contributed significantly to the UK economy. In 2013, 18% of electricity in the UK was generated by the nuclear sector. The Department of Energy & Climate Change (DECC) 'UK Energy in Brief 2014' states that just under 60% of low carbon energy in 2013 was from nuclear.

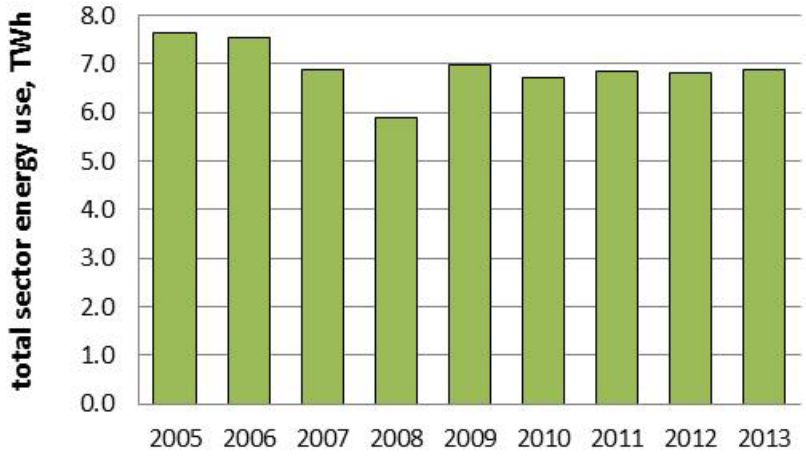
The UK has world-class research and development capabilities in important areas across the nuclear fuel cycle. It also has significant expertise in decommissioning, safety management, regulatory frameworks and advanced manufacturing. Overall, the UK should be well placed to take early advantage of the growing global market for nuclear power. The UK's civil nuclear sector has contributed approximately £3.3 billion to gross domestic product (GDP). It is a major exporter of technology and skills, with UK companies involved in joint projects with overseas bodies ('UK Nuclear Fission Technology Roadmap Preliminary Report (2012)').

Objective 1: Minimise resources consumption and carbon footprint

Energy and water are important resources. The amount used very much depends upon the particular operations at each site. Resource use will change with time, for example, more water or energy may be used during some decommissioning projects to achieve the desired hazard reduction.

Minimise energy use

Figure 1: Total energy use

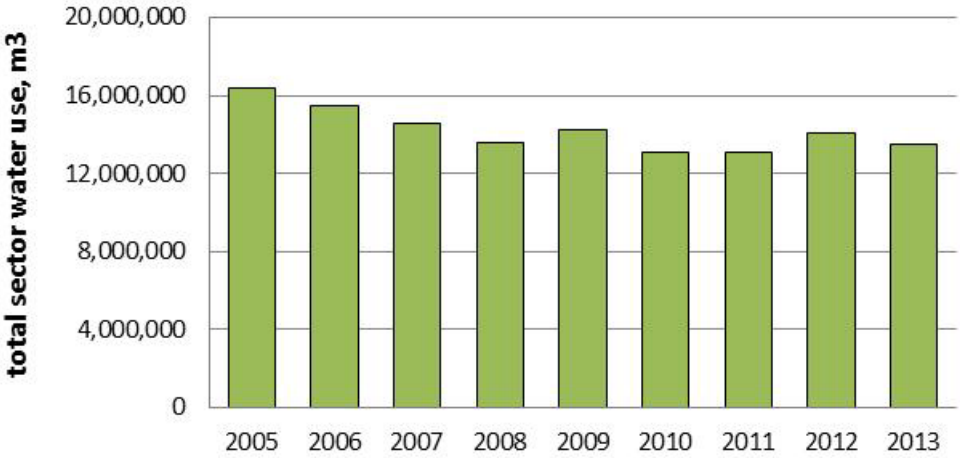


Overall, the nuclear industry used 0.8% more energy (approximately 56,000 MWh) in 2013 than in 2012. It used more energy to generate electricity, fabricate and reprocess fuel and to manage waste. However, the research, defence and medical and bioscience subsectors used less energy.

Operators continually review the amount of energy they use and try to reduce it. They share good practice among themselves so they can put energy saving initiatives in place.

Minimise water use

Figure 2: Total water use



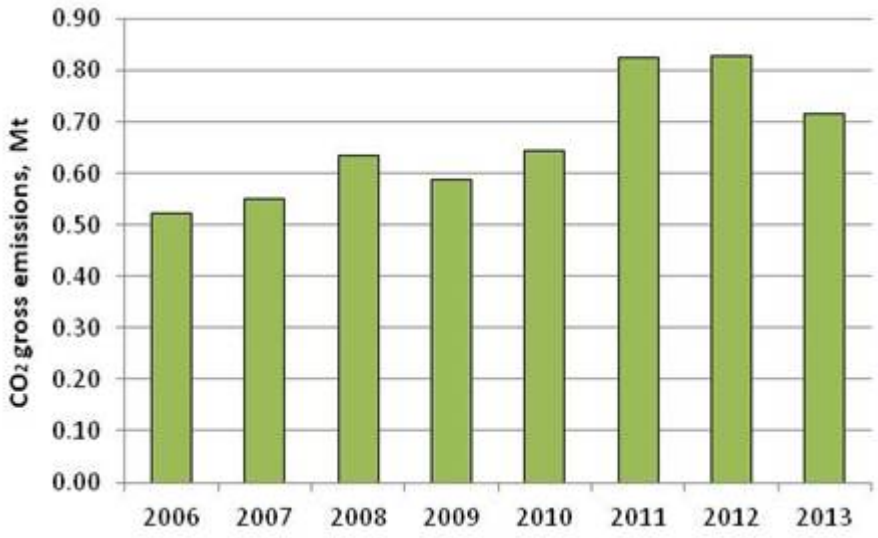
The nuclear industry used 4% (600,000m^3) less water in 2013 than the previous year. Nearly all subsectors used less, with the defence subsector seeing the greatest saving of 440,000 m^3.

Waste management, research and bioscience and the fuel reprocessing subsectors used more water in 2013. Sellafield used around 46% of the total amount of water used by the whole nuclear industry in 2013. The amount of water it used increased by 250,000 m^3, a 4% rise on 2012.

Some nuclear sites use water in their production and safety-related processes and equipment. This means that they have limited scope to reduce the amount of water they use in these areas. Learning from others through the nuclear sector plan has allowed sites to share best practice in minimising the amount of water they use.

Minimise the amount of greenhouse gases generated

Figure 3: Total greenhouse gas emissions



Emissions fell in most nuclear industry subsectors in 2013 and overall they were 13% lower than 2012. The largest contributors were the fuel fabrication and enrichment, defence and fuel reprocessing subsectors. Together, these three subsectors produce 87% of the gross emissions. But each subsector produced fewer emissions in 2013, saving a total of 100,000 tonnes of CO_2.

In all sectors the majority of greenhouse gas emissions result from energy required to power major plant to support important activities. Only a small amount (less than 1% in some cases) is associated with minor plant, lighting and heating.

Emissions of CO_2 are estimated by multiplying energy use by a constant called an “emission factor”. Emission factors are based on the typical products of combustion of a fuel source and vary depending on the chemical composition of the fuel. In the case of electricity generation the CO_2 emission factor is a composite value. It depends on the mix of energy sources (for example, nuclear, coal, gas, hydroelectric) used to generate the electricity. The CO_2 emission factor for electricity used by the nuclear electricity generation subsector is low as most energy is sourced from its own (nuclear) power generation, which is virtually CO_2 free. Energy consumption decreased in most other subsectors which have higher CO_2 emission factors. Therefore, the net result was that CO_2 emissions from the nuclear sector declined in 2013, despite an increase in energy consumption.

Objective 2: Minimise discharges to air and water

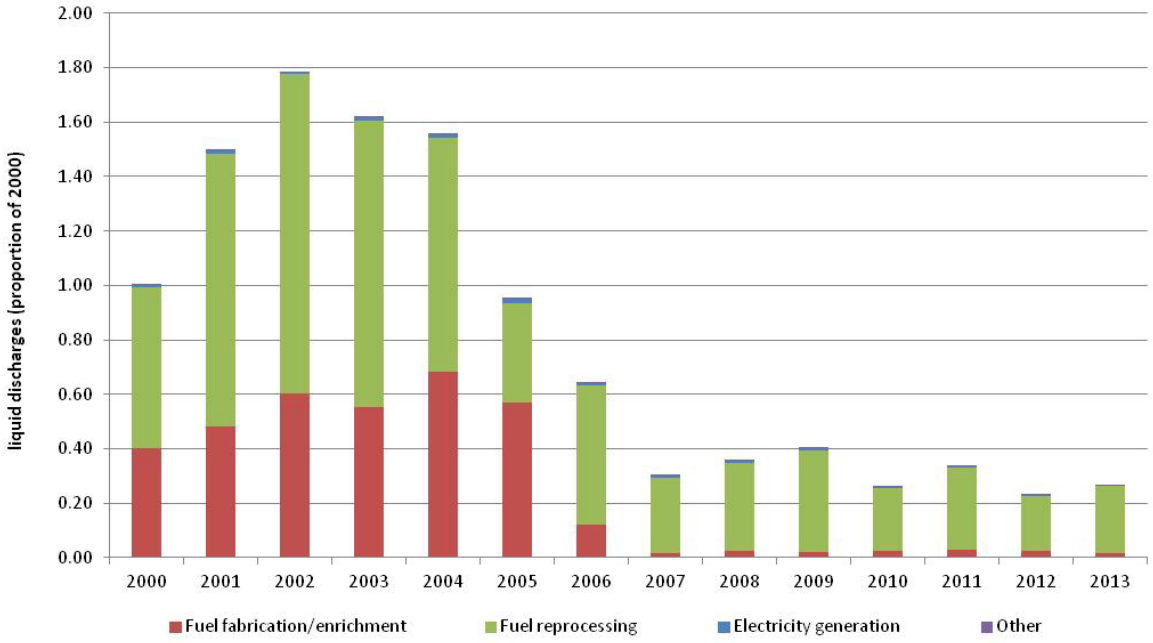
The Environment Agency and Natural Resources Wales regulate radioactive discharges to air and water by issuing permits. Permits state that operators must use ‘Best Available Techniques’ (BAT) to minimise any releases of radioactivity to the environment. All discharges of radioactivity to air and water in 2013 were below the levels permitted.

Minimise discharges to water

For each of the nuclear subsectors, the 2009 'UK Strategy for Radioactive Discharges' set a number of expected outcomes for reducing discharges to water (liquid discharges). Appendix 1 'Detail of liquid discharges' shows a more detailed breakdown by type of radiation and subsector compared with the expected outcome. A fuller description of radioactivity and the discharges from the nuclear industry can be found in the ‘UK Strategy for Radioactive Discharges’.

In the chart below, the total activity of each radionuclide the different subsectors discharged to controlled waters is multiplied by a specific ‘dose per unit release’ factor which takes into account the different potential effects of each radionuclide by combining the level of each radionuclide in the environment with the radiation exposure or 'dose' that results from that radionuclide. 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. The ‘other’ category includes medical and bioscience, defence, research and waste management.

Figure 4: Trends in radioactive discharges to water



- Discharges were 15% higher than in 2012.
- Fuel reprocessing produced the highest level of discharges, with an increase of 22% due to increases in discharges of carbon-14. This was because of a significant increase in the amount of Magnox fuel reprocessed in 2013 compared to 2012.
- The dramatic decrease in discharges produced by the fuel fabrication/enrichment sector from 2006 onwards happened when Springfields stopped processing uranium ore.

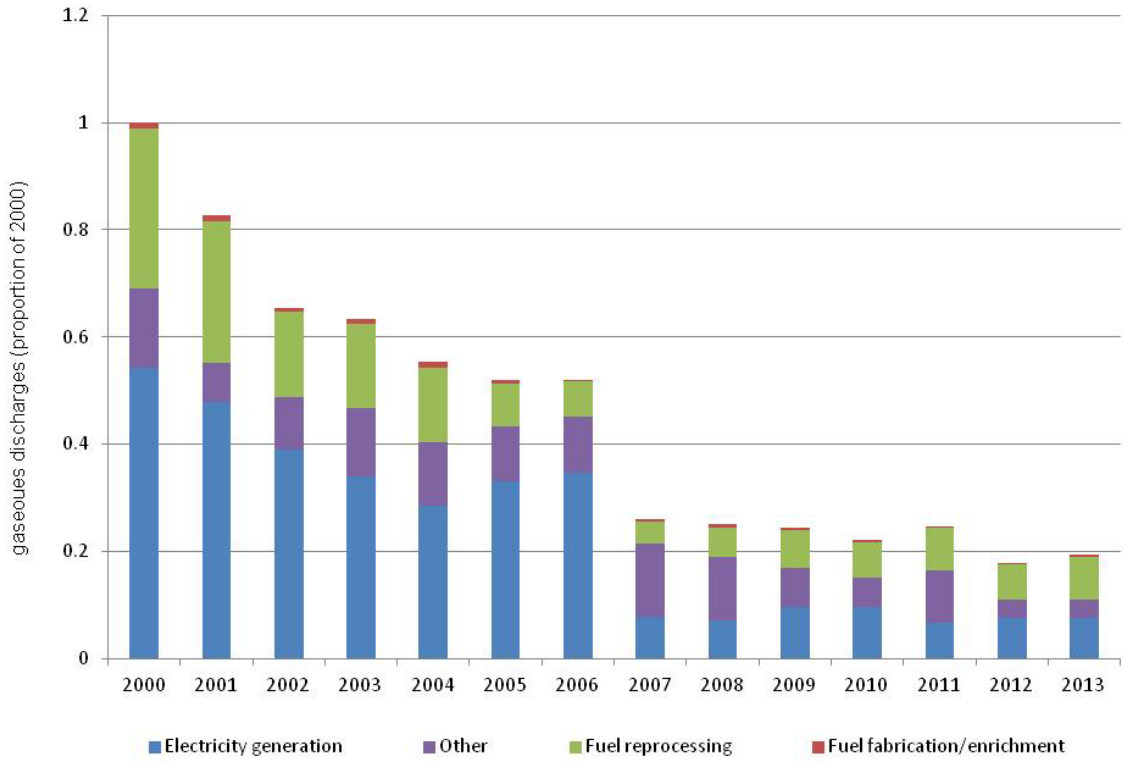
- Since 2007, discharges of radioactivity to water have consistently been less than half the amount discharged in 2000.

Minimise discharges to air

Appendix 2 'Detail of gaseous discharges' shows a more detailed breakdown of radioactive discharges to air by type of radiation and subsector.

In the chart below, the total discharges to air have been calculated in a similar way to Figure 4 above, but by using standard values of dose per unit inhaled.

Figure 5: Total assessed radioactive discharges to air



- Discharges to air increased by 9% overall in 2013.
- Discharges are substantially lower than in 2000 and less than half of 2006 levels.

Minimise critical group doses

Radiation doses to the most exposed members of the public (critical group doses) due to discharges from nuclear sites in England and Wales are well within the EU and UK legal dose limit of 1 millisievert per year.

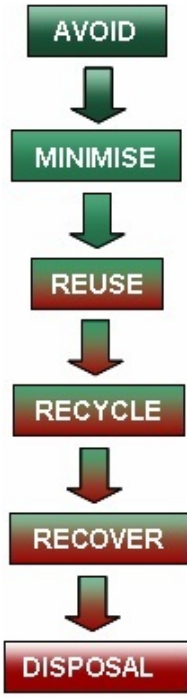
Radiation doses are worked out mainly by monitoring the concentration of radionuclides in food and the environment around nuclear sites. The results are published each year in the Radioactivity in Food and the Environment (RIFE) report. The Environment Agency and Natural Resources Wales use this data, together with information on the habits of people who live and work near nuclear sites, to assess radiation doses affecting people as a result of discharges.

Table 2: UK population average annual dose relative contribution (%) from all sources of ionising radiation (from HSE report HPA-RPD-001, published 2005)

Source	% of annual dose
Radon	49.0
Medical	15.5
Gamma radiation	13.2
Cosmic radiation	12.4
Internal sources	9.4
Occupational	0.245
Fallout	0.222
Disposals	0.030
Consumer products	0.004

The average annual dose of radiation to a member of the public in the UK is 2.7 millisieverts. Table 2 above shows the percentage of radiation from different sources. Disposals of radioactive waste account for less than 1% of the total amount of radiation dose to the public during the course of a year.

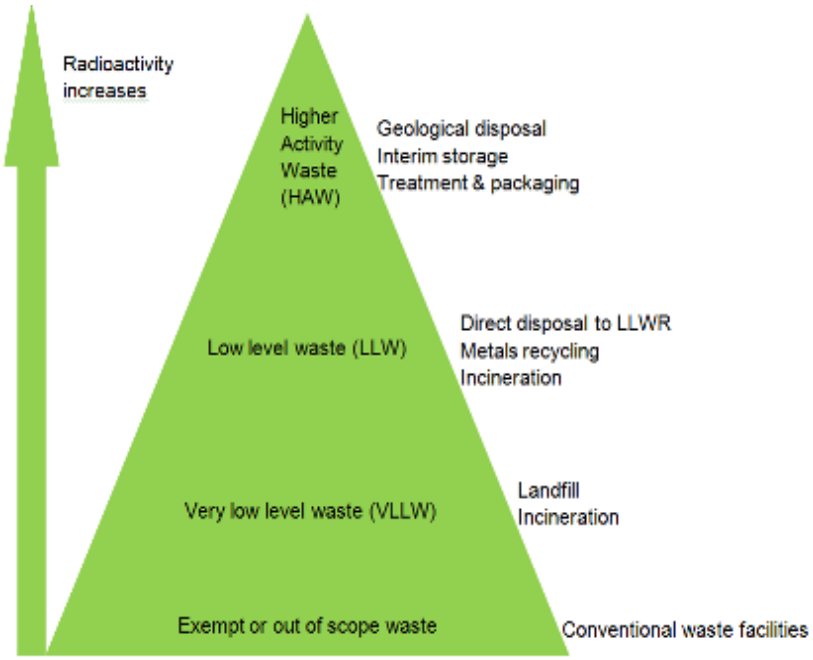
Objective 3: Promote use of the waste hierarchy



The nuclear industry generates a range of radioactive and non-radioactive solid waste from activities at its sites. Decommissioning and clean-up of sites produces large amounts of waste, most of which will be lightly contaminated building materials or soils. Waste is disposed of in accordance with permits granted by the Environment Agency and Natural Resources Wales.

Operators must use the 'waste hierarchy', prioritising different ways of disposing of all types of waste. One of the benefits of this approach is to minimise the need for specialised waste disposal facilities, which tend to be limited national assets

Figure 6: Options for disposing of different categories of waste



Solid radioactive waste is divided into categories according to the amount of radioactivity it contains and the heat it produces. Figure 6 shows the different categories of waste and the options for disposing of them. Higher activity waste includes both high and intermediate level waste (HLW, ILW). You can find further details on the types of radioactive waste in the UK in the UK National Radioactive Waste Inventory. The summary document provides a useful introduction. You can read about the Government's programme to find and implement a solution to managing higher activity waste in 'Managing Radioactive Waste Safely'.

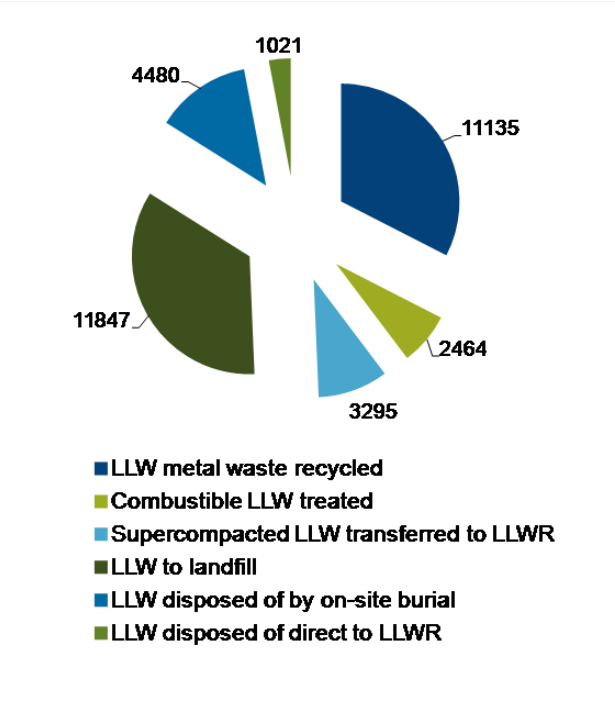
Since 2007, there have been more options for disposing of low level radioactive waste (LLW). Some categories of LLW, including very low level waste (VLLW), can now be disposed of at permitted landfill sites. You can find the UK Low Level Waste Strategy on the Low Level Waste Repository website.

Managing low level waste in 2013

The regulators are encouraging the nuclear industry to reduce the amount of waste it sends to be disposed of at the Low Level Waste Repository (LLWR) by using the waste hierarchy (reduce, reuse, recycle) and other ways of disposing of waste (recycling, using incinerators for certain wastes or using landfill sites permitted to accept VLLW and LLW).

Minimise amount of waste disposed of at LLWR

Figure 7: 2013 LLW disposals, m^3, by method of disposal



In total, the industry disposed of 34,243 m^3 of low level waste in 2013. This is 10,825 m^3 (46%) more than in 2012.

Table 3: Low level waste disposal in 2012 and 2013 (m^3)

Year	Reused	Metal recycled	Combustible	Super-compacted to LLWR	Direct to LLWR	Permitted landfill	On-site permitted landfill	Annual total
2013	0	11135	2465	3295	1021	11847	4480	34243
2012	0	5567	1589	Data not collected in 2012	3067	9892	3303	23418

Table 3 shows that there was an increase (20%) in the amount of LLW that operators sent to permitted landfill sites in 2013. Sellafield also increased the amount of waste consigned to its permitted on-site landfill facility. This is an engineered facility used for the disposal of some very low level wastes. There was an increase in metal waste recycled (double the 2012 figure) and in combustible waste treated by incineration (55% rise). The volume of LLW reused remains at zero. This is because since 2012 we have changed the way we account for waste initially classified as LLW that has, on further investigation, been found to be exempt waste or out of scope of regulation. This material is now excluded from the LLW figures and accounted for in the non-radioactive waste numbers. It was previously categorised as “Reused LLW”.

The 2012 and 2013 figures for direct disposals to the LLWR are not comparable as waste treated by supercompaction prior to transfer to the LLWR has been accounted for separately in 2013

Table 4: Low level waste sent to Low Level Waste Repository for disposal

	2009	2010	2011	2012	2013
Volume of LLW consigned to LLWR for disposal (m^3)	6,255	6,304	4,995	3,067	4,316

Table 4 shows that almost 1,250 m^3 more waste was sent to the LLWR in 2013 than in 2012, but 76% of this had been supercompacted. Progress with decommissioning (for example, demolition) could potentially increase the amount of waste sent for disposal to the LLWR, so this increase is not unexpected. Disposals to the LLWR in 2013 were significantly lower than in 2011, when permitted landfills became an alternative way of disposing of many types of LLW.

By using the waste hierarchy and other options, the nuclear industry sent just 13% of its low level waste to the LLWR, the same fraction as in 2012.

Managing non-radioactive waste

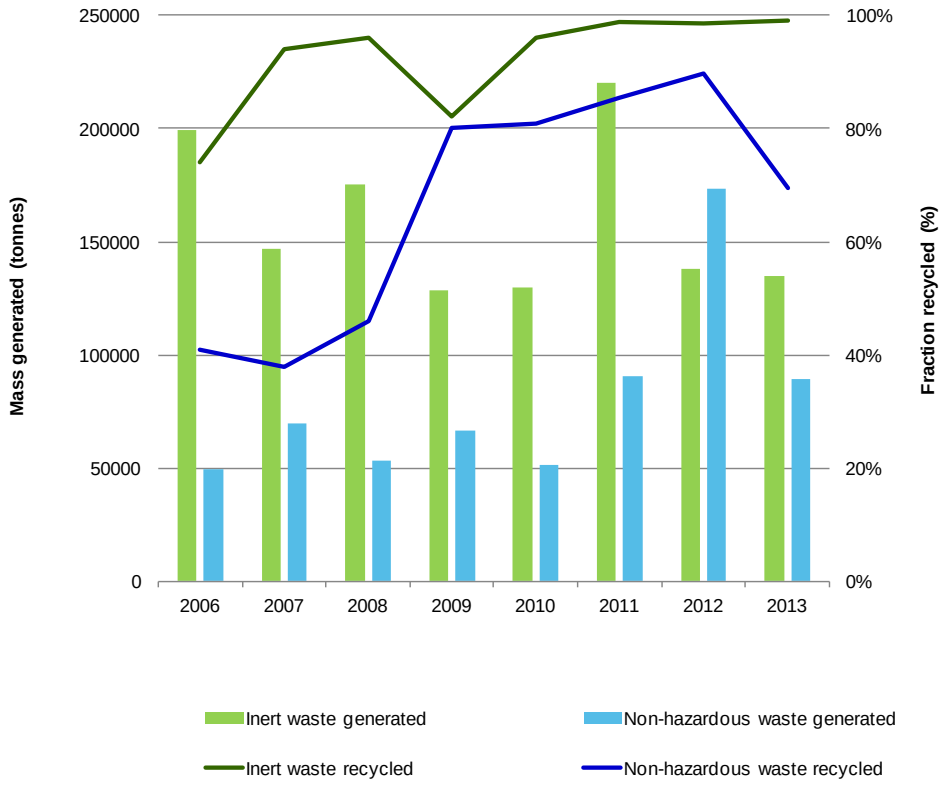
Most of the waste the nuclear industry generates is non-radioactive. Non-radioactive waste is divided into three categories: hazardous, inert and non-hazardous waste.

Hazardous waste is harmful to people and the environment and has to be disposed of using a specific technical treatment or sent to a specialist landfill site. Examples include asbestos, solvents, oil and pesticides.

Inert waste has no hazardous properties and does not undergo any significant physical, chemical or biological transformations, for example sand.

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

Figure 8: Amounts of inert and non-hazardous waste generated and recycled



The largest part (63%) of inert waste generated by the nuclear sector was silt dredged from the cooling water intake area at Oldbury Power Station and deposited in onsite lagoons. Abstracting cooling water and the associated dredging activity stopped at Oldbury in December 2013. The majority of inert waste generated by the nuclear sector is therefore likely to decrease significantly in 2014. Almost 100% of inert materials continued to be recycled in 2013.

The percentage of recyclable waste produced during decommissioning will vary. Recycling of non-hazardous waste fell to 70%, largely due to Sellafield's contribution. The decommissioning projects carried out at Sellafield in 2013 produced a greater proportion of non-hazardous waste, which was difficult to recycle.

Objective 4: Demonstrate environmental management and leadership

Industry operators remain committed to working together and sharing their views and experience on good environmental performance.

Long-term strategic environmental goals

The nuclear sector plan asks operators to have long-term strategic environmental goals in place by the end of 2013. All operators can point to strategies, sustainability plans or vision statements that include long- and medium-term goals. From 2014 onwards operators will be producing statements of progress against these goals.

Demonstrate environmental awareness throughout the organisation

All operators have ways of improving environmental awareness throughout their organisations. There are numerous programmes in place across the industry. These include:

- environmental newsletters
- induction training for new starters
- director briefings
- development of training packages
- raising visibility of environment staff on site

Retain accredited management systems

Most operators have an environmental management system that has been independently certified to an international standard (such as ISO 14001). Others have chosen alternative arrangements to equivalent high standards.

Develop sustainable procurement

Operators reported that they are continuing to develop sustainable procurement via the supply chain. For example:

- Sustainability is a core part of Sellafield's supply chain management policy.
- Springfields is developing green procurement guidelines.
- Magnox's sustainability plan is looking at how best to train procurement staff on sustainability so they can make an impact with the projects they manage.
- EDF has developed a practical guide to educate suppliers about the high standards of human rights, labour statements, ethical conduct and environmental management within the 10 principles of the UN Global Compact.

- Atomic Weapons Establishment (AWE) has set objectives and targets for sustainable procurement within its company sustainability plan.

Share good environmental practice

The nuclear sector plan encourages operators to share good environmental practice by submitting examples of innovation or good practice as an important part of annual reporting. In 2013 operators shared case studies of good practice to benefit others in the industry. Looking forward to the 2014 report, we are now planning how to share learning from case studies more effectively.

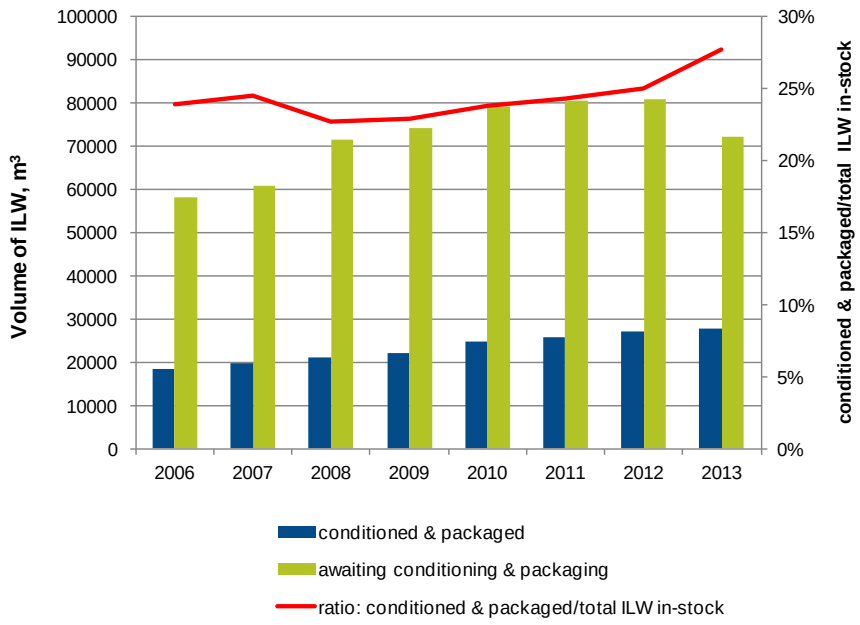
Objective 5: Progress decommissioning and manage land quality

The UK has a diverse nuclear legacy with challenges ranging from the complex issues at Sellafield to the smaller sites with nuclear research facilities. To track progress across the various sites we are working with the Office for Nuclear Regulation and the Nuclear Decommissioning Authority to produce further appropriate indicators for the nuclear sector plan. Once we have agreed these, we will add them to the Plan.

Continue to retrieve and package intermediate level waste (ILW)

As sites are decommissioned more intermediate level waste (ILW) is being produced. ILW is an area of waste management that needed improving. This relates particularly to conditioning and packaging of 'legacy ILW' within the nuclear industry. These are wastes that are not yet in a final form which can be safely disposed of. The nuclear sector plan performance indicator for this measure is the percentage of ILW packaged for final disposal with a final letter of compliance (FLoC) from Radioactive Waste Management Ltd.

Figure 9: Total volume of raw and conditioned/packaged ILW and ratio of packaged waste to total ILW in stock



Radioactive Waste Management Ltd provided the data in figure 9 above. Figures are based on the 2013 UK Radioactive Waste Inventory and waste package numbers at 1 April 2013 (provided by site licence companies), rounded to whole numbers. All waste volumes are reported in the conditioned state, that is, the actual or predicted volume of the waste form (waste plus any immobilising medium) within the waste container.

The volume of packaged ILW in storage increased by 648 m^3 between April 2012 and April 2013. The amount of packaged ILW rose from 25% in April 2012 to 27.7% of ILW in stock in April 2013.

Disposing of most ILW is difficult due to the lack of a national geological disposal facility (GDF) to accept higher activity waste. The nature of this disposal facility will determine the specific requirements for packaging of the wastes that will be sent there. Interim storage facilities are being set up on various sites to store the waste safely until a GDF is available.

Some sites have ILW that is not destined for final disposal in a geological disposal facility. This includes waste containing short-lived radionuclides that will decay to low level waste (LLW). This waste may have different conditioning and packaging requirements.

The industry continues to research methods and technologies to treat various types of ILW through groups such as the Nuclear Waste Research Forum.

Record progress in managing land quality

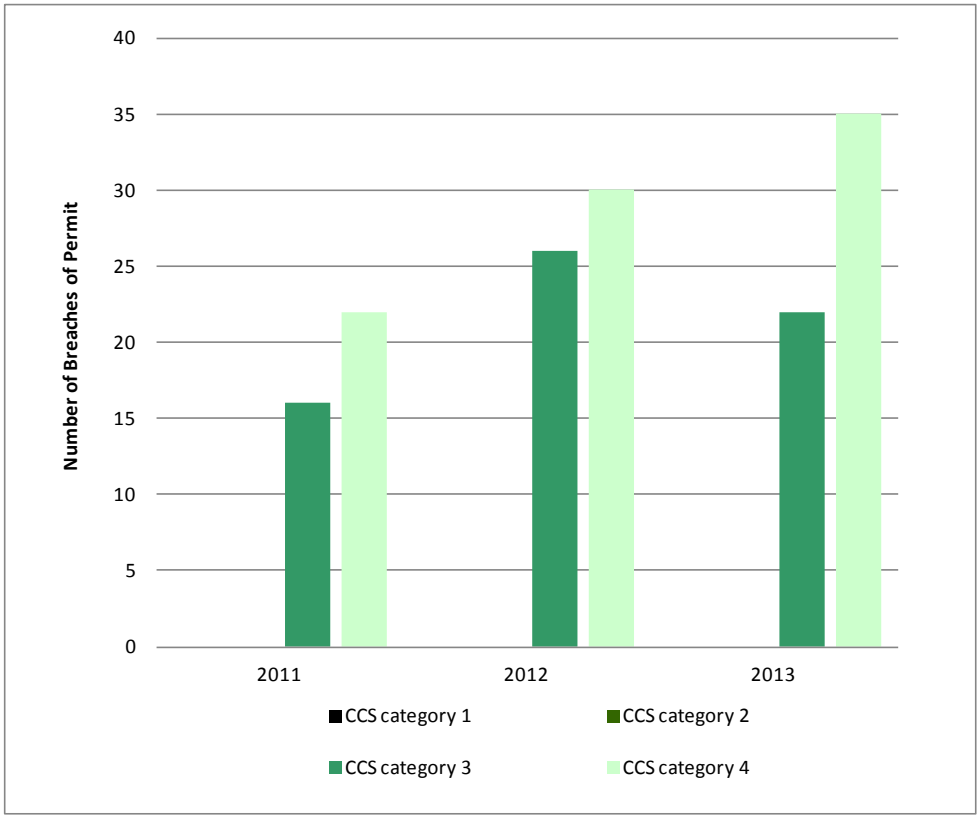
Issue 2 of the NSP included a goal for all sites to have land quality management plans in place by the end of 2012. Issue 3 of the Plan builds on this by asking operators to report progress on land quality management, using a set of goals suggested by the industry. Reporting against these goals for 2013 showed that:

- 83% of sites confirmed that they recognise land quality arrangements in their corporate procedures.
- There are people trained and skilled in land quality management at 90% of sites.
- 90% of sites have a register of known or potential land quality hazards on site.
- A process for reviewing known or potential hazards on site is in place at 94% of sites.
- 73% of sites have a prioritised action list and other sites are developing an action list for dealing with known or suspected land quality hazards.
- All operators reported that they have systems for keeping land quality records up to date that they can easily access.
- In 2013, 73% of sites reported to the public on land quality. This was mainly through reports to local interested groups and liaison committees.
- 60% of sites produced a statement against targets on land quality management.

Objective 6: Maintain or improve 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 and Natural Resources Wales work closely with the industry and the Office for Nuclear Regulation to ensure compliance and support improvements in performance. Few sites fail to comply, but when this happens, we are committed to responding promptly to understand how this occurred and how we can avoid it happening in the future.

Figure 10: Number of breaches of permit



The Environment Agency and Natural Resources Wales monitor breaches of permit conditions using the Compliance Classification Scheme (CCS). This ranks breaches on a 1-4 scale, with category 1 being the most serious. There were no category 1 or 2 breaches in 2013.

Category 3 breaches are activities that could cause minor harm to or pollution of the environment, such as failure of monitoring equipment. The number of category 3 breaches fell in 2013 against 2012 figures.

Category 4 breaches have no impact or potential impact on the environment. This could include a minor failure in record keeping. The number of category 4 breaches rose in 2013. Overall, the level of minor (CCS 3/4) breaches in 2013 was similar to 2012.

Thorough investigations into potential breaches can take time, so it's not unusual for breaches to be categorised some time after they have happened. Since the 2012 report, five more permit breaches from 2012 have been added to the Environment Agency database. Figure 10 includes these breaches.

Table 5: Number of events leading to breaches

	2011	2012	2013
Number of events	23	30	39
Number of breaches	38	56	57
Number of events self-reported	-	-	30

The number of breaches is not the same as the number of events, because regulatory officers give CCS scores to both permit breaches and the cause(s) of the breach. For example, if an operator failed to take a sample because a member of staff was not properly trained, officers will give CCS scores to both the failure to take the sample and also to the operator's failure to have an adequate management system to make sure training is carried out.

Operators reported 77% of events leading to non-compliances themselves to the Environment Agency and Natural Resources Wales.

Table 6: Comparison with other industries

Sector	Number of serious breaches of permit in 2013	Number of permits 2013	Ratio of serious breaches to permits
Nuclear	0	38	0.0
Water	262	23561	1.1
Chemicals	9	487	1.8
Energy	15	369	4.0
Waste	909	11283	8.0
Mineral products	0	35	0.0
Farming	12	1120	1.0
Food and drink	16	353	4.5
Paper and textiles	3	74	4.0

'Serious' breaches of permits are classified as Category 1 or Category 2.

The nuclear industry had no serious breaches of permits in 2013. This was less than all the other regulated industry sectors in 2013 apart from the mineral products sector.

The figures above, for sectors other than nuclear, are for England only. Natural Resources Wales is responsible for regulating these sectors in Wales.

Enforcement

During 2013 the Environment Agency issued one formal caution to Studsvik, which was accepted in March 2014. There was one prosecution in 2013, relating to the misconsignment of radioactive waste from Sellafield Ltd to the Lillyhall landfill site in Workington, Cumbria in 2010.

Objective 7: Further implement better regulation

The regulators have made progress against each of the improvement goals:

Reduce requirements for operators to supply data - ongoing

Operators no longer have to report against Part 5 of the pollution inventory (data on transfers). This reduces the amount of time the nuclear industry needs to spend on reporting. The pollution inventory as a whole is under review and other changes may follow.

Simplify requirements for keeping records - ongoing

The regulators have until the end of 2015 to work with operators to simplify the permit requirements for operators to keep records. The Environment Agencies' Requirements Working

Group (EARWG) of the Safety Directors' Forum has volunteered to work on this and produce proposals.

Provide guidance - complete

The Environment Agency has met its objective to provide guidance on the information and demonstrations operators are expected to maintain under environmental permits, allowing operators to use and reference information provided for other purposes. This was for completion by June 2013.

RGN RSR2: regulation of radioactive substances activities on nuclear licensed sites was updated in 2012 to provide this guidance.

In 2013 the Environment Agency and Natural Resources Wales published joint guidance on the decommissioning of nuclear facilities.

Review requirements for monitoring - ongoing

By the end of 2015 the regulators aim to work with operators to review operator requirements for discharge and environmental monitoring and to remove requirements that don't add value.

In 2014, an audit of the Environment Agency's independent environmental monitoring is underway.

Non-compliance feedback - ongoing

The regulators aim to provide feedback to operators on incidents and permit breaches within two months of being told about an event. Detailed investigations by both operators and regulators are needed. These investigations often take longer than two months, which, in the past, has led to delays in giving feedback to the operator.

In 2013, the regulators introduced a new way of checking that operators have received feedback within two months.

In the first year of the new system the regulators have provided written feedback to 70% of sites within two months, or agreed in writing with the site that the feedback would take longer due to continuing investigations.

Listen and respond to customer views - complete

In 2013 the Environment Agency sent out an updated customer survey questionnaire to Nuclear Industry Liaison Group (NILG) members. This follows one undertaken in 2012. Very few responses were received. The Environment Agency decided that the small number of responses was insufficient to provide any meaningful indication of views and decided not to pursue this for the time being.

Conclusions

Overall, the nuclear industry’s environmental performance in 2013 has remained good. The industry has continued to perform and progress well against all of the sector plan objectives, while also maintaining good relationships with its interested groups and sharing best practice.

In 2013, as in previous years, the 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 and Natural Resources Wales, working with the nuclear industry, continue to support the industry in achieving these high levels of performance.

Highlights in the industry’s environmental performance in 2013 include:

- The industry sent just 13% of its low level radioactive waste to the national Low Level Waste Repository in Cumbria.

- Radiation doses to the public from permitted discharges remained well below statutory limits and constraints.
- Sites recycled 99% of inert waste and 70% of non-hazardous waste.
- The ratio of packaged to unpackaged intermediate level waste rose from 25% in April 2012 to *28*% in April 2013.

Significant challenges ahead

The UK government is currently working with communities to identify potential sites for a deep geological disposal facility (GDF). Geological disposal is the preferred way of disposing of higher activity radioactive waste from England and Wales. In July 2014, the UK government published a new white paper 'Implementing Geological Disposal'. This sets out a revised process for selecting a site for a geological disposal facility for higher activity radioactive waste.

In April 2014, the Welsh Government sought views from the public on the current Welsh Government policy for disposing of higher activity radioactive waste (HAW) and the various options it might consider in the future. Following the analysis of responses received on the call for evidence, the Welsh Government decided to undertake a full review of their policy on the disposal of high activity waste and has issued a public consultation, on the principles of a disposal policy. http://wales.gov.uk/consultations/environmentandcountryside/disposal-higher-activity-radioactive-waste/?status=open&lang=en

Current Welsh Government policy is neither to support nor to oppose the United Kingdom government policy of geological disposal for HAW. Nor does the Welsh Government currently support any other disposal option for HAW.

More information

You can find more information on how individual companies have performed by following the links to their websites at the end of this report.

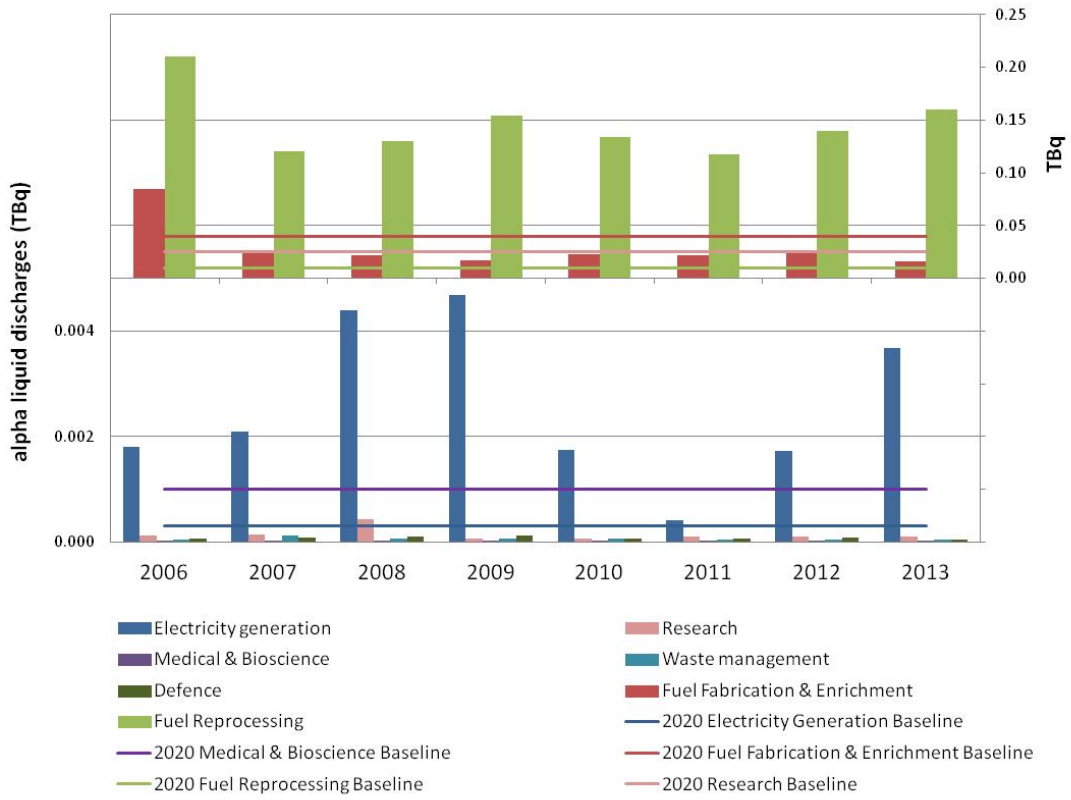
Feedback

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

Appendix 1

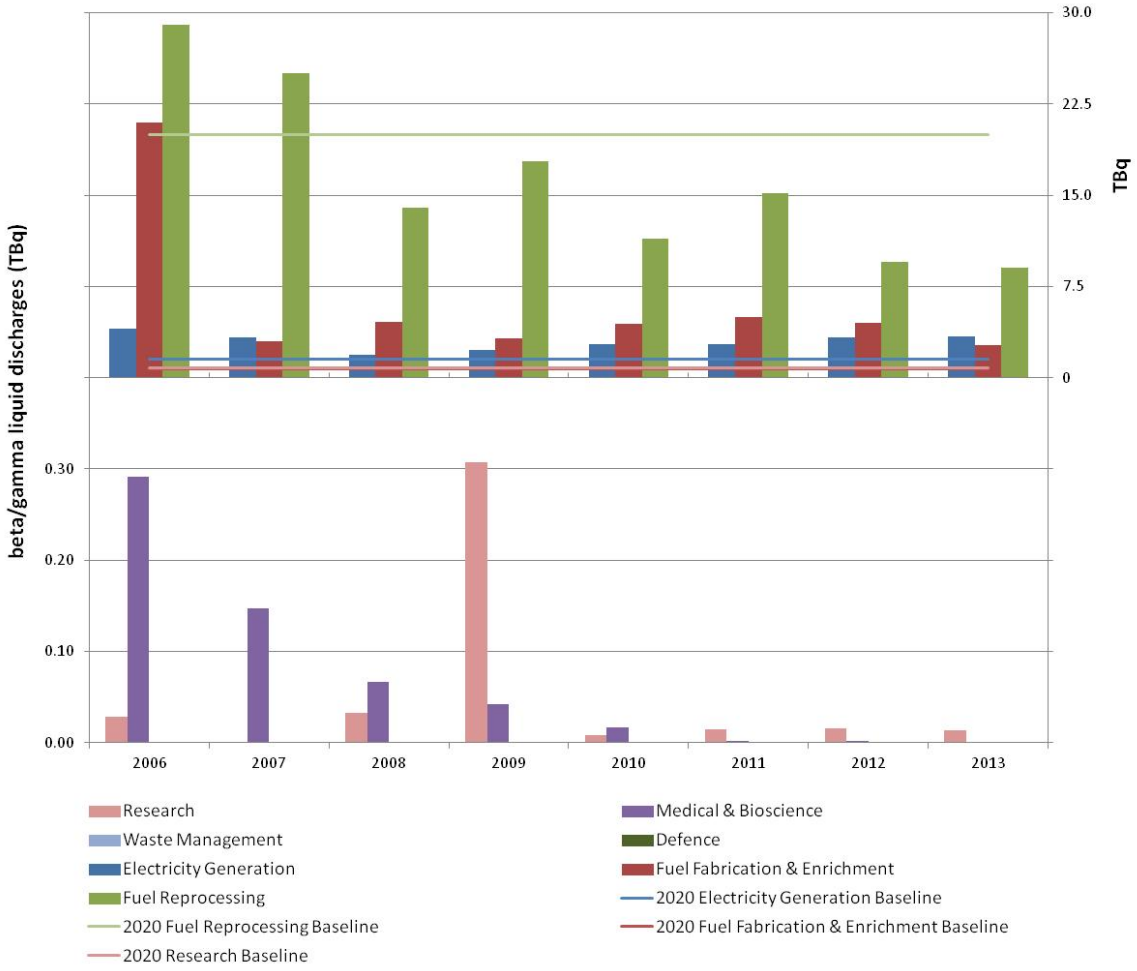
Detail of liquid discharges

Figure 11: Annual discharges of alpha radioactivity



- Baselines represent the expected level of discharges for certain subsectors by 2020 set out in the UK Strategy for Radioactive Discharges 2009.
- In 2013, discharges of alpha emitting radionuclides increased across the nuclear sector by 8% on the previous year to 0.18 TBq.
- Discharges by the fuel reprocessing subsector increased by 0.02 TBq or 14%. This was due to a significant increase in the amount of Magnox fuel reprocessed in 2013 compared with 2012. Discharges from this subsector make up 89% of the total annual figure.
- The electricity generation subsector experienced a large increase of 114% due to draining of reactor ponds as part of the decommissioning process. However, electricity generation contributed just 2% to the industry total.
- The fuel fabrication and enrichment, research, and medical and bioscience subsectors all succeeded in reducing discharges below the expected outcome for 2020.
- The figures for electricity generation and fuel reprocessing are not yet below the expected level for 2020.

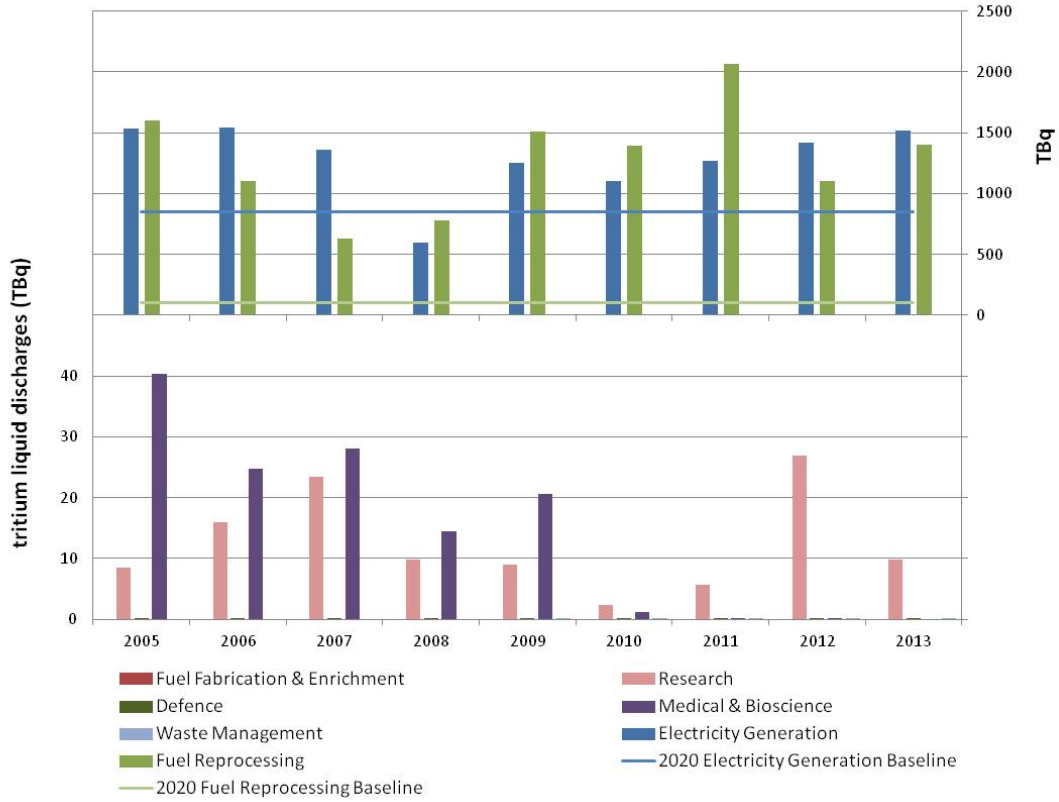
Figure 12: Annual discharges of beta/gamma radioactivity (excluding tritium)



- Baselines represent the expected level of discharges for certain subsectors by 2020 set out in the UK Strategy for Radioactive Discharges 2009.
- Total industry liquid beta/gamma discharges decreased by 12% in 2013 compared to 2012, to an annual total of 15 TBq.
- All subsectors except for electricity generation saw a decrease in their beta/gamma discharges, with the largest decrease (40%) occurring in the fuel fabrication subsector.
- Liquid beta/gamma discharges in 2013 in the electricity generation subsector increased slightly by 4%.
- Fuel reprocessing is the largest contributor to the industry total, with 59% of the total activity (9 TBq). This sector saw discharges decrease by 5% in 2013.
- Discharges from the research and fuel reprocessing subsectors were both below the expected outcome for 2020.
- Discharges from electricity generation and fuel fabrication and enrichment were above the expected level for 2020.

Note: The 2020 targets for the electricity generation and fuel fabrication subsectors do not take account of current extended lifetimes of some power stations or potential new nuclear power stations.

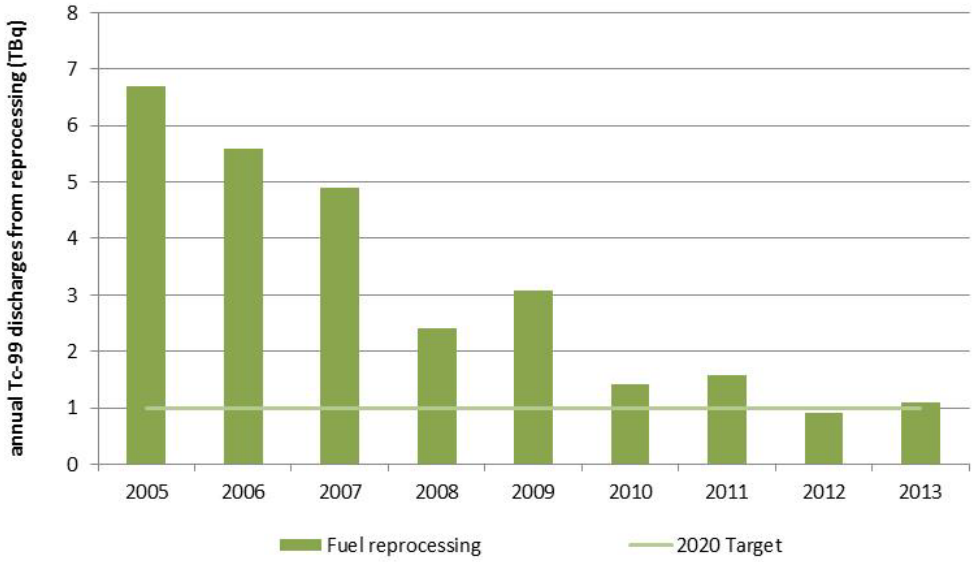
Figure 13: Annual discharges of tritium



- Baselines represent the expected level of discharges for certain subsectors by 2020 set out in the UK Strategy for Radioactive Discharges 2009.
- There was an increase of 15% to 2,900 TBq in 2013 from 2012. This was due to increased emissions from the electricity generation and fuel reprocessing subsectors.
- The defence, research, and medical and bioscience subsectors saw significant reductions, with decreases of 58%, 64% and 61% respectively.
- Discharges from electricity generation and fuel reprocessing were above the expected outcome.

Note: The 2020 targets for the electricity generation subsector does not take account of current extended lifetimes of some power stations or potential new nuclear power stations.

Figure 14: Annual discharges of technetium-99 from reprocessing

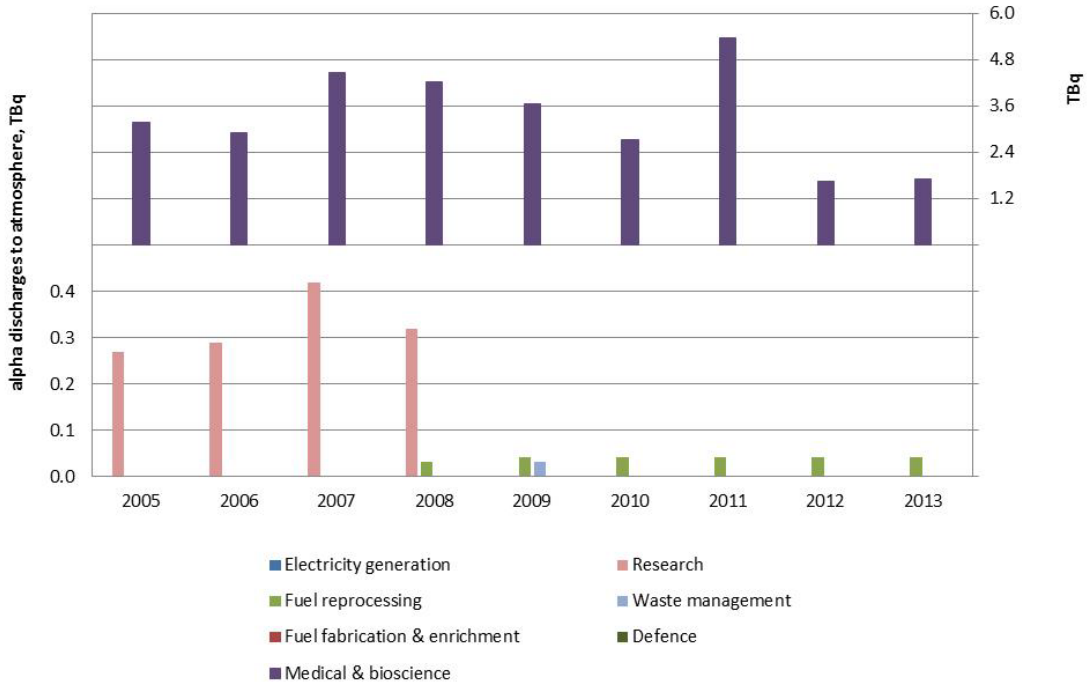


- The UK Strategy for Radioactive Discharges 2009 has an expected outcome for technetium-99 discharges set for the fuel reprocessing subsector.
- In 2013 the total discharges to controlled water was 1.1 TBq, which is just over the 2020 expected outcome of 1.0 TBq.

Appendix 2

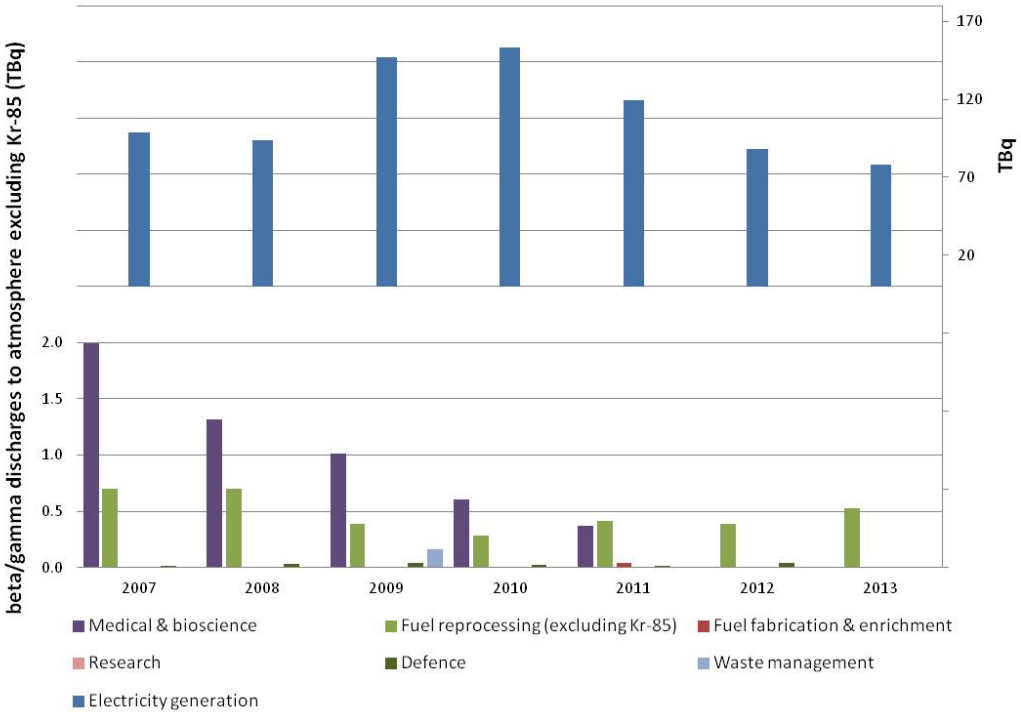
Detail of gaseous discharges

Figure 15: Annual discharges of alpha radioactivity



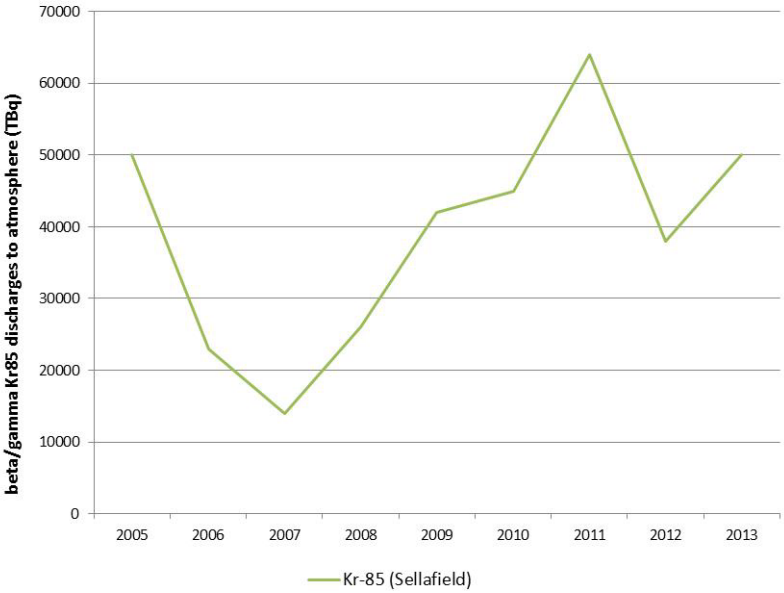
- Total discharges for 2013 were 1.8 TBq, which marked an annual increase across the industry of 4%.
- The medical and bioscience subsectors continue to be the largest producers of gaseous alpha discharges, contributing 98% of the sector total. There was a 4% increase in 2013 to 1.7 TBq.
- Only two subsectors saw a decrease in their discharges from 2012; defence by 26% and waste management by 36%. There was a 116% increase in electricity generation, but this did not make a significant contribution to the nuclear sector total.

Figure 16: Annual discharges of beta/gamma radioactivity (excluding tritium and krypton-85)



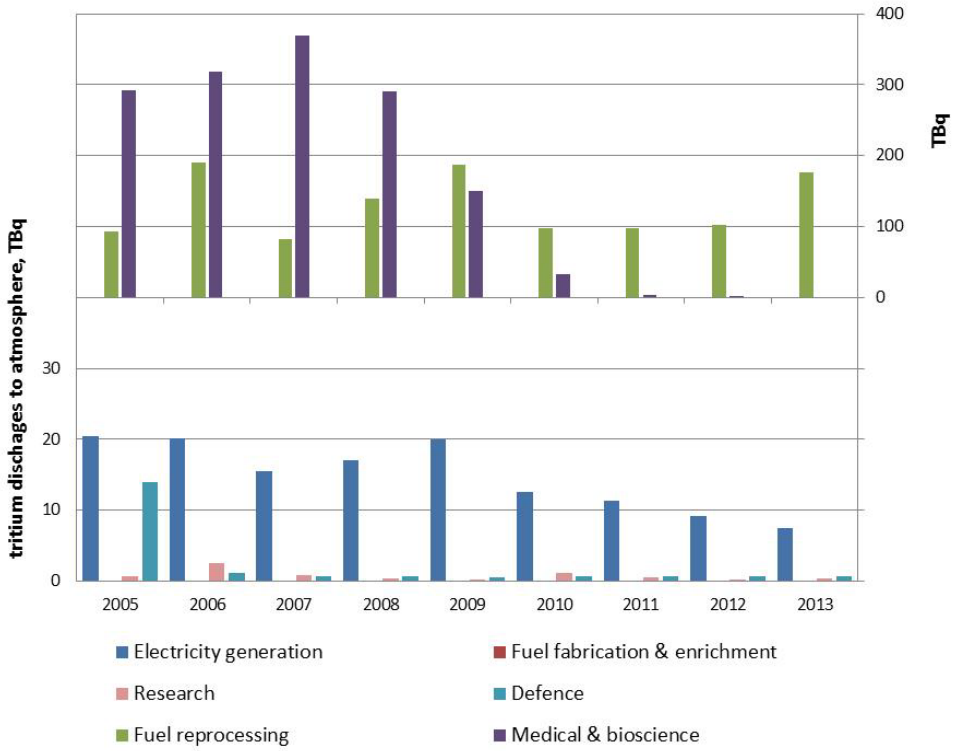
- Total beta/gamma gaseous discharges, excluding tritium and krypton-85, for 2013 decreased from 2012 by 11%. This is due to the decrease in discharges of the electricity generation subsector, which contributes 99% of the annual total.
- Several subsectors had a decrease in discharges. Defence achieved the largest relative reduction (99%).
- Fuel reprocessing and research saw an increase in discharges. Research discharges contribute less than 0.01% to the sector total, while fuel reprocessing accounts for 0.67%.

Figure 17: Annual discharges of krypton-85 from Sellafield



- The discharge of krypton-85 from Sellafield has increased by 32% due to increased reprocessing of Magnox fuel.

Figure 18: Annual discharges of tritium



- The 2013 tritium gaseous discharges increased by 63% from 2012 to 186 TBq.
- Fuel reprocessing is the largest contributor, discharging 95% of the annual total. In 2013, this subsector saw a 73% increase in discharges compared with the previous year.
- Fuel fabrication and enrichment increased its discharges by 64% and the research subsector by 48% respectively. But both these subsectors contribute less than 0.24% to the annual figure.
- The medical and bioscience subsector has seen a decrease in discharges of 20%.
- Electricity generation, which contributed 4% to the annual activity figure, achieved a decrease in discharges of 19% compared to 2012's emissions.

Useful links

Guidance on the scope of and exemptions from the radioactive substances legislation in the UK
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69357/pb13624-rsl-guidance-110914.pdf

Implementing geological disposal - policy paper
https://www.gov.uk/government/publications/implementing-geological-disposal

Integrated Waste Strategy document specification and format
http://www.nda.gov.uk/publication/eng01-specification-for-the-content-and-format-of-a-site-integrated-waste-strategy-document/

Ionising Radiations Regulations 1999
http://www.legislation.gov.uk/uksi/1999/3232/contents/made

Managing Radioactive Waste Safely
https://www.gov.uk/government/publications/managing-radioactive-waste-safely-a-framework-for-implementing-geological-disposal

Natural Resources Wales
English - http://naturalresourceswales.gov.uk/?lang=en / Welsh - http://naturalresourceswales.gov.uk/?lang=cy

Nuclear sector plan performance reports
https://www.gov.uk/government/publications/nuclear-industry-environmental-performance-reports

Nuclear sector plan Issue 3
https://www.gov.uk/government/publications/nuclear-industry-environmental-performance-reports

Radioactivity in Food and the Environment (RIFE) reports
http://www.sepa.org.uk/radioactive_substances/publications/rife_reports.aspx

RGN RSR2: regulation of radioactive substances activities on nuclear licensed sites
https://www.gov.uk/government/publications/rgn-rsr-2-regulation-of-radioactive-substances-activities-on-nuclear-licensed-sites

Ten principles of the UN Global Compact
http://www.unglobalcompact.org/abouttheGc/TheTenprinciples/index.html

UK energy in brief 2014
https://www.gov.uk/government/statistics/uk-energy-in-brief-2014

UK National Low Level Waste Strategy
http://llwrsite.com/national-waste-programme/national-llw-strategy/

UK National Radioactive Waste Inventory
https://www.nda.gov.uk/ukinventory/

UK Nuclear Fission Technology Roadmap Preliminary Report
http://eti.co.uk/downloads/related_documents/Nuclear_Fission_Technology_Roadmap_Feb_2012.pdf

UK Strategy for Radioactive Discharges
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249884/uk_strategy_for_radioactive_discharges.pdf

Links to participating organisations

http://www.awe.co.uk

http://www.babcockinternational.com

http://www.baesystems.com

http://www.edfenergy.com

http://www3.gehealthcare.co.uk/

http://www.llwrsite.com/

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

http://www.nda.gov.uk

http://www.research-sites.com

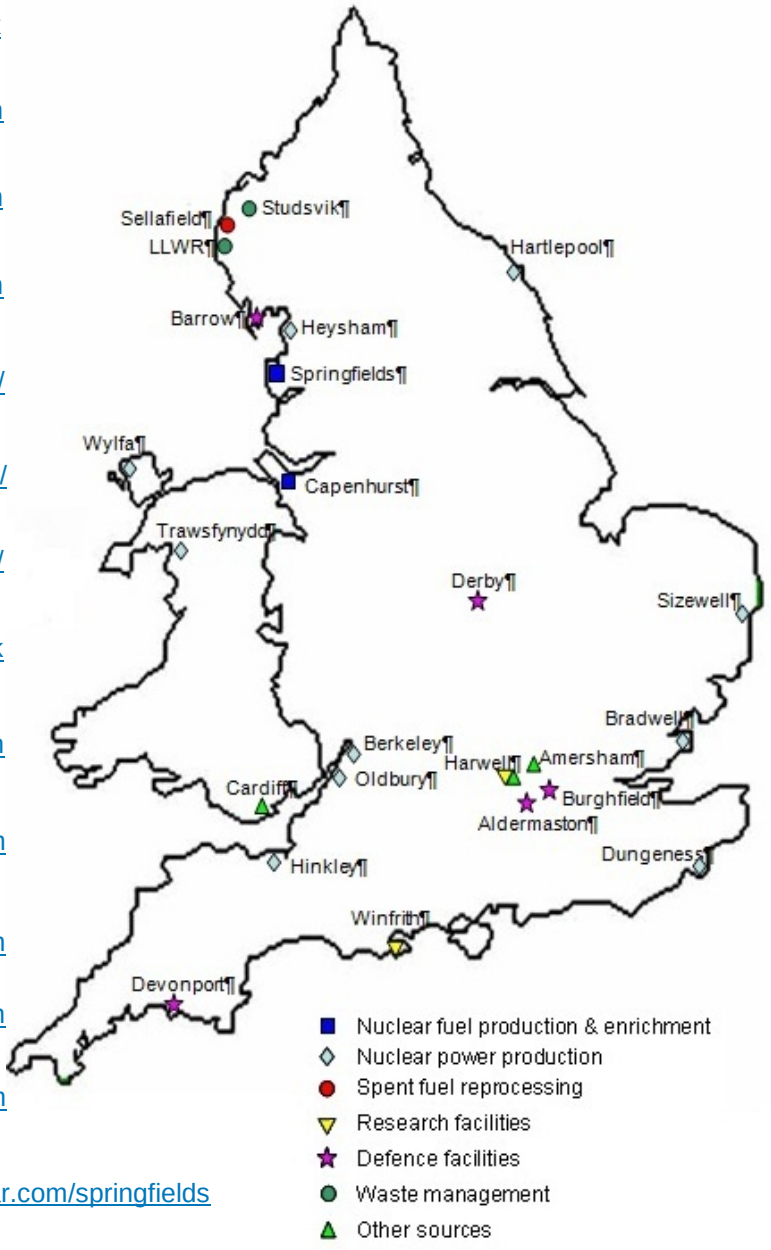
http://www.rolls-royce.com

http://www.sellafieldsites.com

http://www.studsvik.com

http://www.urenco.com

http://www.westinghousenuclear.com/springfields



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