

nuclear sector plan

Environmental
sector plan
for the
nuclear industry
Issue 2



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Foreword



This is the second issue of our Nuclear Sector Plan. The first version was published in 2005 and set out environmental objectives for the sector against which sector performance has been measured.

The Environment Agency and the nuclear industry worked together to develop the first sector plan. I am pleased that this collaboration continues. We have also jointly worked to produce annual reports on performance, and to revise and improve the plan.

This update reflects important changes in the nuclear industry. Government and the Nuclear Decommissioning Authority (NDA) are taking forward the decommissioning and clean up of the UK's nuclear legacy and mapping out an approach to dispose of higher activity radioactive waste in a future geological repository. The NDA is reorganising the civil nuclear industry in order to introduce new management consortia and drive innovative approaches to site decommissioning and clean up. The Environment Agency and the Health and Safety

Executive are assessing new evolutionary designs of nuclear power reactors that may be built in the UK to make sure they meet world class standards of safety, security and environmental performance .

There are still gaps and questions remaining. Most pressing is the need for an overview of the whole of the industry's infrastructure requirements, both now and in the future. The industry, NDA and Government need to take a much more strategic approach in order to establish and maintain the necessary sustainable infrastructure for the UK's nuclear industry.

This revised version of the plan builds on the successes of the first sector plan and looks ahead to forthcoming challenges. We will continue to report annually against the plan's objectives.

In recognition of our joint effort, where 'we' is used in this document it applies to the Environment Agency and the industry collectively. The logos of organisations participating in this initiative are given below.

Tricia Henton / Environment Agency



GE Healthcare



Introduction

The Environment Agency has published sector plans in partnership with some sectors of industry. Published in November 2005, the Nuclear Sector Plan was one of the first to be produced.

The aim of sector plans is to build a shared understanding with industry of priority issues. They work to improve the environment beyond the minimum standards of regulation, and provide a basis on which to set performance targets. Developing the Nuclear Sector Plan was a major opportunity to strengthen relationships with the sector's main stakeholders.

This is the second version of the Nuclear Sector Plan. It builds on and updates the first sector plan to reflect future priorities and changes since 2005. The Environment Agency and the nuclear industry have worked together to identify a number of well-defined objectives and goals. Where it makes sense to do so, we¹ have also set out performance measures and targets. We will report on progress against these annually. We will publish the first report against the performance indicators in this new sector plan in 2010, using data for 2009.

This sector 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 be responsible for environmental issues and to improve their environmental performance. This will reduce the need for regulation. It also commits the Environment Agency to improve how it regulates nuclear sites.

It is important to note that the objectives are not necessarily equally important. Priorities will differ depending on the particular issues at individual sites.

For example, decommissioning sites will have different environmental impacts and challenges from operating sites. Sites must continue to meet health, safety and security requirements at the same time as making improvements. There also needs to be a balance between objectives, so that achieving improvements in certain areas does not mean missed opportunities elsewhere. This needs to be considered on a site-by-site basis.

Environmental excellence

The Environment Agency wants the businesses it regulates to not only prosper, but to minimise their impact on the environment. It would like them not to cause pollution, and to produce as little waste and use resources as efficiently as possible. It also wants businesses to take responsibility for the impact their products have on the environment throughout their entire lifecycle. Businesses should also be aware of the effects they *could* have on the environment, and manage these appropriately. They need to know about and comply with all relevant environmental legislation, and aim to achieve “best practice”.

The Environment Agency aims to:

- regulate in proportion to the risks that business poses to the environment;
- get the best result for the environment at least cost to business;
- reassure the public;
- allow and, where possible, encourage innovation.

The nuclear industry supports this as a shared aim.

¹ Where the term ‘we’ is used in this document it applies to the Environment Agency and the industry collectively



Overview of the nuclear industry

The nuclear industry covers a wide range of operations and products. These include generating electricity, developing medical applications that help us to understand and treat human illness, national defence and decommissioning of redundant nuclear facilities. It is not always meaningful to compare nuclear sites, and it is often difficult to compare the nuclear industry with other industries. But, the nuclear industry is keen to measure its performance and share experience both within its own industry and with others to reduce its impact on the environment.

There is major change underway within the nuclear industry. Since 2005, the Nuclear Decommissioning Authority (NDA) has been responsible for overseeing the clean-up of the UK's civil nuclear legacy. The NDA is responsible for 16 of the 33 nuclear sites in England and Wales. These include nuclear power stations, fuel reprocessing plants, fuel fabrication plants, a redundant uranium enrichment plant, and laboratory complexes. Each NDA site is operated by a site licensee, which is responsible for day-to-day operations. Each licensee has a Parent Body Organisation, which provides overall direction. The NDA has put environmental and safety reporting requirements into site licensees' contracts. Where appropriate, these have some of the same objectives and targets as the sector plan. This will help to develop common standards and continue to improve sites' environmental performance in a way that influences the civil nuclear industry and sub-contractor organisations. In the future, the NDA may amend the contracts to include changes made to the sector plan to improve consistency and reduce the reporting burden on site licensees.

In 2008, the Government announced its support for building new nuclear power stations in the UK [1], recognising that “new nuclear power stations could make a material contribution to tackling climate change.” The Environment Agency and the Health and Safety Executive (HSE) are carrying out a Generic Design Assessment of candidate designs of reactors. Several organisations are seriously considering proposals to build new nuclear power stations in England and Wales, but it will be some time before the first new nuclear power station is generating electricity.

Main environmental issues for the nuclear sector

We have agreed eight environmental objectives for the nuclear sector:

- 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.**

Some of these objectives are voluntary undertakings by the nuclear industry, while others are key regulatory or policy requirements. We look at each objective in more detail overleaf.

Objective 1



Minimise the amount of natural resources used

Energy and water are important resources. The amount used very much depends on the particular operations at each site. For example, there are big differences between the amount of water and energy a generating power station, a research establishment and a large chemical works like Sellafield use. It is important to recognise that more water and/or energy may be used during decommissioning.

It may be possible for sites to reduce the amount of resources they use by recycling or improving the efficiency of on-site processes. However, this will depend upon the type of operations. It is useful to understand the amount of resources different operations use and then focussing effort on those operations that use the most.

**Objective 1: Minimise the amount of natural resources used**

| Improvement goals | Targets | Performance indicators |
|---|----------------|-------------------------------|
| Operators to develop optimised plans to minimise the amount of energy used. | End 2011 | Energy use (TJ) |
| Operators to develop optimised plans to minimise the amount of water used. | End 2011 | Water use (m ³ /y) |



Recognise the impact of climate change

It is now widely recognised that greenhouse gases contribute to climate change. They are produced directly from using energy, from process emissions and transportation. The Government has recognised this in introducing the Climate Change Act 2008, which commits the UK to making a least an 80% cut in greenhouse gas emissions by 2050. The Act also places a requirement on the Government to develop an adaptation programme on matters for which it is responsible

This objective has two aims. These are to reduce the effects of climate change by identifying and targeting significant sources of greenhouse gas emissions at each site, and to make sure that sites are prepared to adapt to the effects of climate change.

Nuclear power currently provides about 16 per cent of the UK's electricity (7.5 per cent of total UK energy). Compared to electricity produced from fossil fuels such as coal or gas, nuclear power produces significantly less carbon dioxide emissions. If the electricity produced by nuclear power stations in England and Wales during 2007 had been produced by burning fossil fuels, something like an additional 30 million tonnes of carbon dioxide would have been released.

Nuclear site operators recognise the importance of climate change and are developing plans to reduce greenhouse gas emissions, where appropriate.

The impacts of climate change include coastal erosion and increased flood risk. These may affect operations within the sector because some nuclear sites are in potentially vulnerable locations. Operators assess the risks associated with these and other external hazards as part of their site safety case. These assessments are reviewed periodically and it is important that the reviews take account of any new information about the effects of climate change.

Changing how flood and coastal risk is managed in an area can affect sites nearby or some distance away. Nuclear sites may be at risk from coastal erosion or flooding, flooding from rivers and ground or surface water flooding from local rainfall. Discussions about coastal flooding take place between interested parties as part of the development and use of Shoreline Management Plans (SMPs). Catchment Flood Management Plans (CFMPs) look at flooding from rivers and ground or surface water. The Environment Agency is reviewing or has recently reviewed both SMPs and CFMPs. Operators should find out the latest SMP and CFMP information for their area, and make sure that they understand the local flood and coastal risk management policies and how they might affect each nuclear site.

Courtesy of British Energy

Objective 2: Recognise the impact of climate change

| Improvement goals | Targets | Performance indicators |
|---|-----------|--|
| Operators to find out information from the latest SMPs, CFMPs or other information for their area to understand local coastal erosion and flood risk policies, and the implications for them. They should discuss these with site regulators. | End 2009 | – |
| Operators to understand the response of drainage systems to extreme rainfall events as part of flood risk assessments. They should discuss these with site regulators. | June 2011 | – |
| Operators to develop optimised plans to minimise CO ₂ emissions. | End 2011 | CO ₂ and other greenhouse gases generated (tonnes CO ₂ equivalent) |



Minimise discharges to air and water

Most sites in the nuclear sector discharge radioactive effluent into the air and/or water. Authorisations issued by the Environment Agency place conditions on how this waste is managed. A key requirement is to apply “best practicable means” (BPM) to minimise discharges. In the future this requirement will change to the need to use “best available techniques” (BAT) to reduce discharges to the environment². BAT is broadly equivalent to BPM, and the related best practicable environmental option (BPEO) process, as they are currently applied.

The UK has made a commitment, under the OSPAR (Oslo Paris) Convention (for the Protection of the Marine Environment in the North-East Atlantic), to continue to reduce radioactive discharges to the sea. The targets within the UK Strategy for Radioactive Discharges 2006-2030 [2] will be used to set the annual targets related to the performance indicators for this objective.

Decommissioning and clean-up activities temporarily increase discharges. Operators must minimise the amount of these increases by applying BPM (or BAT).

² This change applies to England and Wales. The term BPM will continue to be used in Scotland and Northern Ireland.



Courtesy of Sellafield Ltd

Objective 3: Minimise discharges to air and water

Improvement goals

Targets

Performance indicators

UK Strategy for Radioactive Discharges 2006-2030 values and targets.

Annual liquid alpha discharges

Annual liquid beta/gamma discharges (excluding tritium)

Annual liquid tritium discharges

Annual technetium-99 discharges from reprocessing

None.

–

Total annual radioactive discharges to air

Critical group doses due to discharges (retrospective assessment)



Minimise and manage solid waste

Like many other industries, operational and decommissioning activities in the nuclear sector generate a range of different wastes. In this sector, much of the waste is radioactive.

In managing waste it is particularly important to:

- minimise the amount of all types of waste produced;
- reuse or recycle waste as much as possible;
- make sure that the main waste management sites, particularly the low level radioactive waste repository ('LLWR') near Drigg, do not receive waste which could be dealt with in another way;
- continue to retrieve and treat 'legacy' intermediate level waste (ILW), and reduce the potential damage to the environment.

The waste management hierarchy³ applies to all waste, whether it is radioactive or not. All NDA sites are developing a comprehensive integrated waste strategy (IWS), which provides an overall plan for dealing with all types of waste produced on a site. This is good practice and the Environment Agency encourages all operators to develop site-wide IWSs. These strategies should also take account of the fact that recent

Government policy on dealing with low level radioactive waste (LLW) will open up alternatives to sending LLW to the LLW repository near Drigg. In particular, it will allow high volume very low level waste⁴ (HV VLLW) to be disposed of at specified landfills. In response to this Government policy, the NDA are working to develop a national strategy for the management of LLW from nuclear sites.

For historical accumulations of waste (so called 'legacy waste'), making progress on the conditioning and packaging of wastes, and also reducing the hazard potential of wastes are important.

Some sites are already retrieving and packaging legacy waste, or are planning to do so. The Environment Agency, Scottish Environment Protection Agency (SEPA) and HSE have introduced guidance and are trialling supporting technical guidance on how operators should develop "Radioactive Waste Management Cases" (RWMCs) for waste streams to demonstrate the long-term safety and environmental performance of the management of specific wastes from their generation to their conditioning into the form in which they will be suitable for storage and eventual disposal. When agreement has

³ A preferentially ranked series of waste management options of which reduce, reuse, recycle are key.

⁴ HV VLLW is a sub-category of LLW. It has much lower activity limits than LLW; the maximum activity is 4 MBq/te of total activity. For waste containing tritium, the concentration limit for tritium is 40MBq/te.



been reached on what RWMCs will look like, we would like to introduce a performance indicator addressing progress with establishing RWMCs.

Similarly we would like to introduce performance indicators associated with the hazard potential of wastes. The NDA has recently developed Radiological Hazard Potential (RHP), Chemical Hazard Potential

(CHP) and Safety and Environmental Detriment (SED) measures. The NDA will be using these measures to help prioritise radioactive waste management hazard reduction projects. This is aimed at funding projects that reduce the safety and environmental hazards associated with ILW. These developments will be kept under review in order to determine whether they can be used as a basis for performance indicators for this plan.

Objective 4: Minimise and manage solid waste

| Improvement goals | Targets | Performance indicators |
|--|--------------------|--|
| Operators to adopt an IWS relevant to each individual site, and to review periodically. | All sites by 2010. | None. |
| Operators to continue to retrieve and package 'legacy ILW'. | None. | % ILW by volume packaged for final disposal, with a Final stage 'Letter of Compliance' (FLoC) (if appropriate). |
| LLW management – operators to use the waste management hierarchy as much as possible and minimise unnecessary use of LLWR as a national asset. | None. | % LLW sent for: <ul style="list-style-type: none"> • reuse or recycling • disposal to routes other than LLWR (such as incineration, disposal as HV VLLW to landfill) • disposal to LLWR |
| Non-radioactive waste management – operators to use the waste management hierarchy as much as possible. | None. | % inert and non-hazardous (non-radioactive) waste reused or recycled: <ul style="list-style-type: none"> • operational waste • decommissioning waste |



Demonstrate sound environmental management and leadership

We believe that effective management systems are important in helping companies manage risks and in making sure they comply with their permit requirements. The Environment Agency strongly encourages companies to implement and use effective environmental management systems (EMSs). It also fully supports EMAS (Eco-Management and Audit Scheme, which incorporates ISO 14001), as it places even greater emphasis on legal compliance, environmental performance and public environmental reporting. Other approaches may be acceptable provided they offer equivalent levels of assurance.

Nuclear operators have to implement quality management systems as part of their site licence conditions. Many have either achieved or are working towards ISO 14001 or an equivalent EMS. When we report, we will also list the number of sites that have gone further by adopting the EMAS standard.

Leading organisations now have specific corporate social responsibility (CSR) policies, which cover socioeconomic commitments, sustainability, supplier partnerships, working with external stakeholders, and social and community projects. Many nuclear operators show their CSR policy on their website and we would like all nuclear operators to do this. The Environment Agency is particularly interested in the sustainable procurement aspect of CSR. The nuclear industry has many suppliers, and has the opportunity to work with them to identify and reduce their own impact on the environment. Influencing suppliers is also part of EMAS.

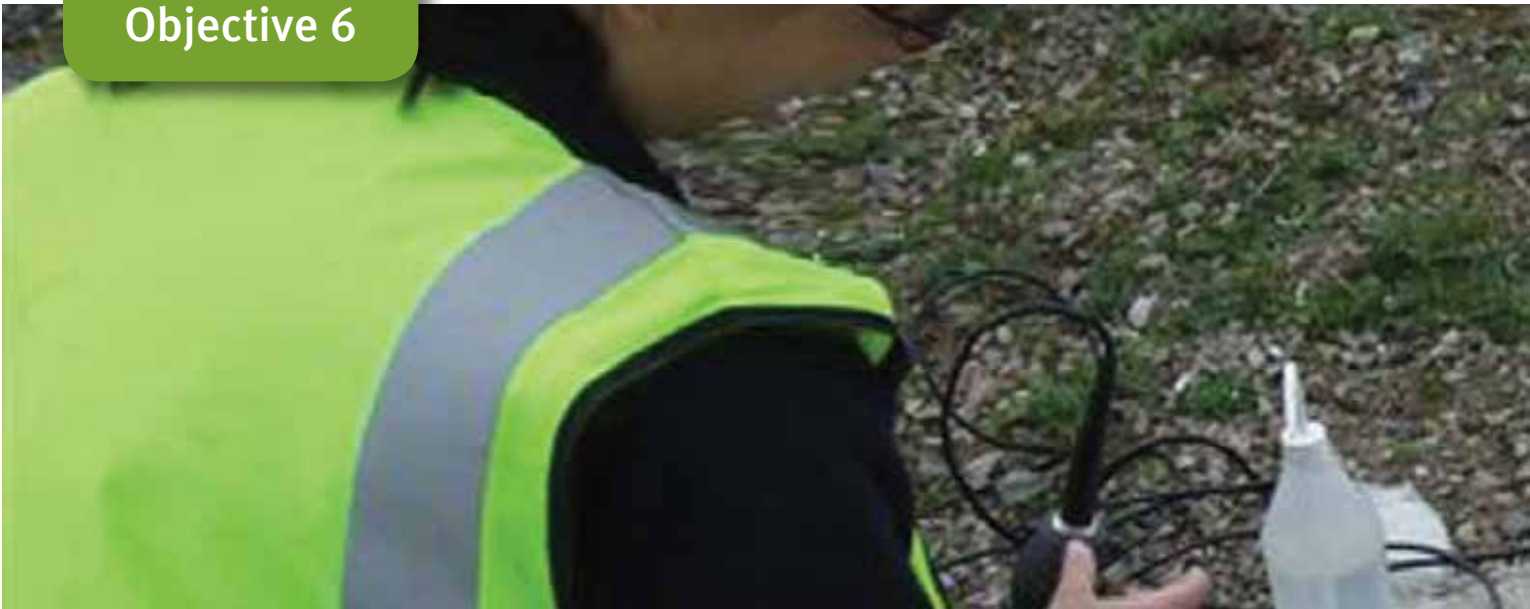
Many nuclear operators have formal programmes in place to involve local stakeholders in their decision-making. This helps the site to be more open with stakeholders and increases levels of trust. We would like all sites to develop similar programmes.



Objective 5: Demonstrate sound environmental management and leadership

| Improvement goals | Targets | Performance indicators |
|--|--------------------|------------------------|
| Operators to achieve and maintain independently verified certification to at least ISO 14001 or an equivalent EMS ⁵ . | All sites by 2012. | None. |
| Operators to publish and implement a CSR statement, incorporating sustainable procurement, based on their corporate CSR policy. | All sites by 2012. | None. |
| Operators to develop a programme to involve local stakeholders. | All sites by 2012. | None. |

⁵ May form part of a wider system, covering safety, health etc. and includes a requirement for external verification.



Manage land quality and biodiversity

Many nuclear site operators are identifying and managing land that is affected by chemical or radioactive contamination. The Nuclear Installations Inspectorate (NII) is the lead regulator for this on nuclear sites, although the Environment Agency has regulatory responsibilities for the associated contamination of groundwater, the disposal of waste from land being remediated and for chemically contaminated land. Managing all contaminated land is good stewardship. Sites which are to be fully decommissioned and de-licensed will need to be cleaned up so as to be fit for any reasonably foreseeable future use. This may be a long-term process.

The NDA is encouraging its sites to introduce land quality management plans. The NII and the Environment Agency are interested in how contaminated land is managed. The Environment Agency and HSE/NII have published information on the regulation of contaminated land on their websites.

Most nuclear sites are in remote, rural locations, and many cover large areas of land. Several sites have unique habitats for rare plants or animals. Many operators recognise that it is important to manage their sites to avoid damaging wildlife, and are encouraging biodiversity by developing and implementing biodiversity action plans. Some operators have been awarded, or are working towards, the Wildlife Trusts' Biodiversity Benchmark standard. This standard has only been achieved by a small number of industrial sites and shows a high level of commitment to promote biodiversity, but is at a higher level than felt necessary for all sites to achieve.



Courtesy of Springfields Fuels Ltd.

Objective 6: Manage land quality and biodiversity

| Improvement goals | Targets | Performance indicators |
|--|-------------------------------------|---|
| Environment Agency to work with other regulators, NDA and other nuclear site landowners to set out expectations for land quality management. | End 2010 | None. |
| All relevant sites have land quality management plans. | All sites, where relevant, by 2012. | Proportion of sites with land quality management plans. |
| All relevant sites have Biodiversity Action Plans. | All sites, where relevant, by 2012. | Proportion of sites with Biodiversity Action Plans. |



Improve or maintain a very high level of regulatory compliance

This objective aims to demonstrate that the standard of regulatory compliance continues to be high in the nuclear industry.

The Environment Agency has schemes for classifying⁶ and recording 'pollution incidents' and 'non-compliances' with environmental permit conditions. An incident is a specific event that may have an impact on the environment or operations. The categories have been defined to provide consistency across different regulatory regimes and a basis for comparison with other sectors.

⁶ Incidents and breaches are both classified from category one to four, with category one being the most serious. Incidents are classified in the Common Incident Classification Scheme (CICS) based on their actual impact. Breaches/non-compliances are classified in the Compliance Classification Scheme (CCS) on their potential impact. For example, a CICS category one incident has a major impact on the environment, while a CCS category two breach of permit has or could have a significant impact on the environment and a category four breach has no potential to have an effect. Both systems apply to all types of environmental permit issued by the Environment Agency (*for example* RSA93 disposal authorisations, EPR permits, water discharge consents, etc).

Objective 7



Courtesy of Sellafield Ltd

Objective 7: Improve or maintain a very high level of regulatory compliance

| Improvement goals | Targets | Performance indicators |
|-------------------|---------|---|
| None. | – | Annual number of pollution incidents and non-compliances for all environmental permits. |
| None. | – | Number of prosecutions and enforcement notices. ⁷ |

⁷ Enforcement notices are legally binding notices, issued under environmental legislation. They are issued in response to identified problems and require certain steps to be taken by prescribed dates in order to rectify the problems.



Achieve better regulation

The Environment Agency is committed to implementing ‘better regulation’. The Better Regulation Executive (part of the Department for Business, Innovation and Skills (BIS)) states that regulation should be ‘transparent, accountable, proportionate and targeted’. The Environment Agency aims to inspect and enforce in a risk-based, proportionate and targeted way, as set out in the Regulators’ Compliance Code [3]. The Nuclear Sector Plan has been developed in partnership with the nuclear industry, and supports better regulation of the sector.

Where practicable, the Environment Agency will work with other regulators to develop joint guidance on regulation. It also aims to reduce the regulatory burden on sites, and focus on key issues.



Objective 8: Achieve better regulation

Improvement goals

Support the Department of Energy and Climate Change (DECC), the Department for Environment, Food and Rural Affairs (Defra) and Welsh Assembly Government (WAG) in developing Phase 2 of the Environmental Permitting Regulations and associated guidance.

Develop, with appropriate input from industry, a 'regulatory package' to deliver the requirements of Phase 2 of the Environmental Permitting Regulations and the anticipated Government guidance. The 'package' will contain a number of published documents including a new application form, the permit template and guidance explaining how the Environment Agency will implement the regulations. It will also set out how the regulatory process will work, including explaining how best available techniques (BAT), radioactive substances regulation environmental principles (REP)s, environmental cases etc. will feature. It will also set out more clearly how the Environment Agency expects operators to comply with their permits.

Targets

Before the regulations come into force.

Performance indicators

None.

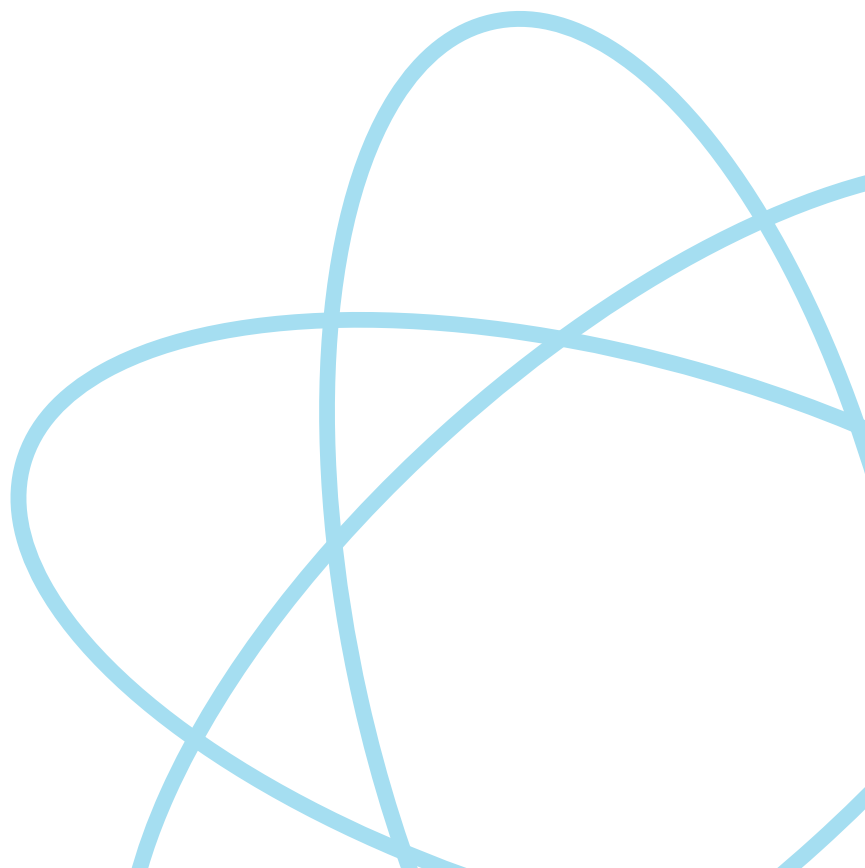
Objective 8: Achieve better regulation

| Improvement goals | Targets | Performance indicators |
|--|--|--|
| <p>Make risk-based regulation for nuclear sites clearer:</p> <ul style="list-style-type: none"> • provide annual objectives for radioactive substances regulation, which demonstrate a risk-based approach. The Environment Agency should discuss these with operators and they should take into account forthcoming operators' work programmes. • provide end of year report against regulatory objectives. • provide annual reports showing operators the cost of compliance assessment based environmental regulation as an indicator of operator environmental performance against RSA93 Authorisations. These reports will, in time, give an indication of improvement in overall performance and a reduction in charging for direct compliance assessment work. | <p>Available in time for operators' business planning rounds.</p> | <p>None.</p> |
| <p>Promote adoption of MCERTS so that external accreditation or certification of monitoring can replace Environment Agency compliance assessment. Environment Agency to work with nuclear operators to implement MCERTS for liquid effluent flow at nuclear sites. Environment Agency to work with nuclear operators to develop MCERTS performance standards for radioanalysis of waters (including liquid effluent) and to prepare implementation plan based on cost benefit case.</p> | <p>Mar 2011</p> | <p>None.</p> |
| <p>Support and encourage the review, led by DECC, of Radioactive Substances Act Exemption Orders (EOs) (both on the new Exemption Orders and Government guidance).</p> | <p>–</p> | <p>None.</p> |
| <p>Work with other regulators to develop clear and consistent guidance</p> <ul style="list-style-type: none"> • joint guidance with NII on management systems. • joint guidance with SEPA and NII on application of new EOs. • joint guidance with NII to support site specific applications for new nuclear build. | <p>Summer 2009.</p> <p>12 months after introduction of new EOs.</p> <p>End 2009.</p> | <p>None.</p> |
| <p>All incidents and non-compliances to be classified, recorded in CCS/CICS and actions needed to make improvements and prevent such an event or non-compliance happening in the future to be fed back to operators within two months of notification of the event.</p> | <p>From end 2009.</p> | <p>Percentage fed back to operators within 2 months of notification.</p> |

⁸ MCERTS is the Environment Agency's Monitoring Certification Scheme

References

- 1 Meeting the Energy Challenge – A White Paper on Nuclear Power. BERR. January 2008.
www.berr.gov.uk/files/file39387.pdf
- 2 Consultation on the draft UK strategy for radioactive discharges 2006 – 2030. Defra. June 2008.
www.defra.gov.uk/environment/radioactivity/government/discharges/index.htm
- 3 Regulators' Compliance Code. Statutory Code of Practice for Regulators. BERR. 17 December 2007.
www.berr.gov.uk/files/file45019.pdf



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