EDF Energy Nuclear Generation: Our journey towards zero harm

Summary of our nuclear safety and waste policies and management systems

Save today. Save tomorrow.

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Registered Company Details:
EDF Energy plc. Registered number 02366852
EDF Energy Customers plc. Registered number 02228297
Registered office: 40 Grosvenor Place, Victoria, London SW1X 7EN

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About EDF Energy

EDF Energy is one of the UK's largest energy companies and its largest producer of low-carbon electricity. A wholly-owned subsidiary of the EDF Group, one of Europe's largest energy groups, we generate around one fifth of the UK's electricity and employ around 15,000 people. We supply electricity and gas to around 5.5 million residential and business customers, making us the biggest supplier of electricity by volume.

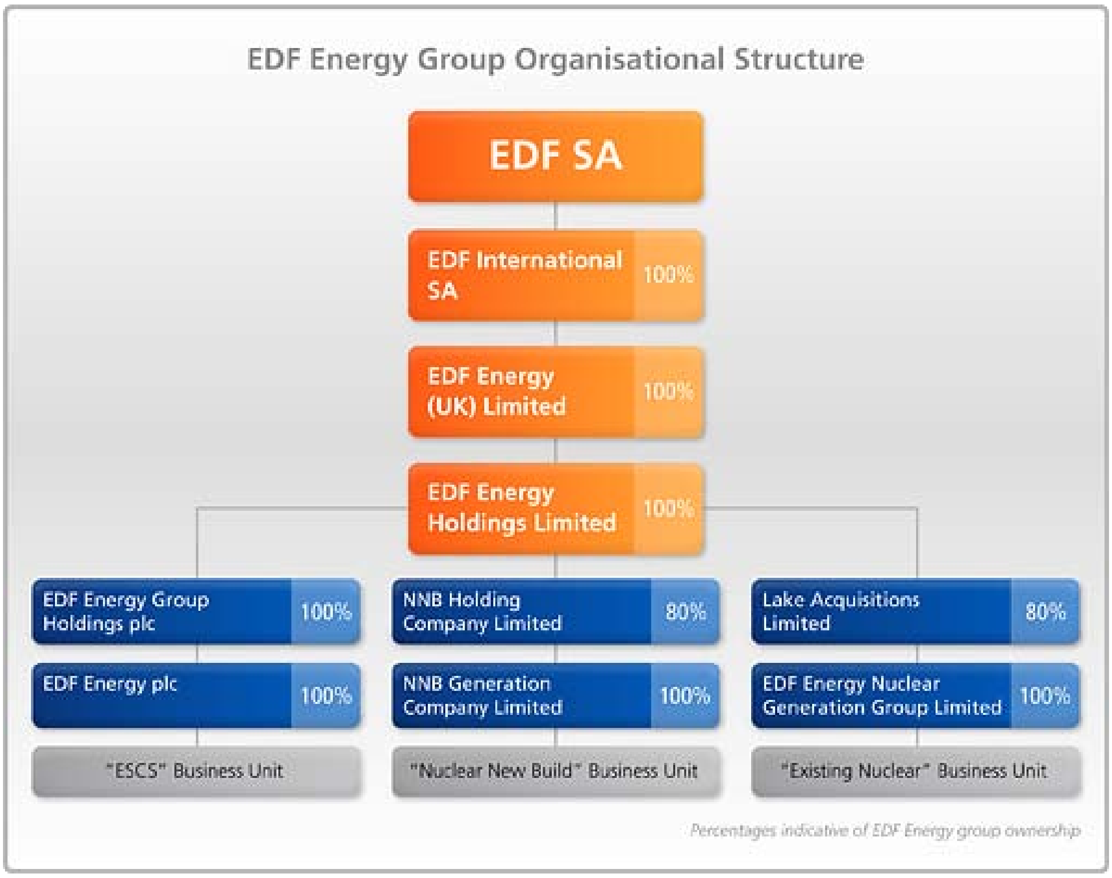
The company is organised into the following business units:

- **Nuclear Generation** operates eight nuclear power stations in the UK with a combined capacity of almost 9,000 megawatts – electricity that is vital to the UK economy.
- **Nuclear New Build** which is tasked with the delivery of the new generation of nuclear plants in line with EDF's global programme of producing safe, affordable, reliable, low-carbon production of electricity in the UK.
- **Energy Sourcing and Customer Supply** runs power stations and wind farms, buys and sells power to meet future generation and customer needs and deals with all our energy customers.

Organisational structure

EDF Energy is part of EDF Group, one of Europe's largest power companies. EDF Energy is organised into three business units: Energy Sourcing and Customer Supply, the Nuclear New Build project and Nuclear Generation.

Figure 1: EDF Energy ownership structure



Centrica plc ("Centrica") holds a 20% shareholding in Lake Acquisitions Limited, the company within which the Nuclear Generation business unit sits. Centrica also holds a 20% stake in NNB Holding Company Limited, the company which has been created to undertake the pre-development activities for a nuclear new build programme in the UK. EDF and Centrica intend this joint venture to construct, operate and decommission four nuclear power stations in the UK. The sale of these shareholdings to Centrica was effective from 26th November 2009.

EDF Energy's company ambitions

EDF Energy is committed 'to bring sustainable energy solutions home to everyone.' This guiding principle shapes the way we do business.

Sustainability lies at the core of our Vision, Mission and Ambitions:

Our Vision: 'Leading the energy change'

Our Mission: 'To bring affordable low carbon energy solutions home to everyone'

Our Ambitions represent our balanced view of business success:

- To achieve a world-class zero harm safety record
- To be first choice for customers
- To lead the way in nuclear power generation
- To deliver consistently strong financial performance
- To be a leader in sustainability
- To have high performing people

About EDF Energy Nuclear Generation

EDF Energy operates eight nuclear power stations in the UK with a combined capacity of almost 9,000 megawatts – electricity that is vital to the UK economy.

Figure 2: EDF Energy's Nuclear Power Stations

Figure 3: About the Nuclear Generation fleet

Our vision: leading the energy change

At EDF Energy we are leading the decarbonisation of Britain and enabling everyone to save today and save tomorrow.

Our nuclear fleet

Station	Reactor type	Date commissioned	Scheduled date of decommissioning*	NET capacity in Megawatts (MW)
Hunterston B	2 Advanced Gas-cooled Reactors (AGR)	1976	2016	820
Hinkley Point B	2 AGRs	1976	2016	820
Hartlepool	2 AGRs	1983	2019	1,190
Heysham 1	2 AGRs	1983	2019	1,160
Dungeness B	2 AGRs	1983	2018	1,040
Heysham 2	2 AGRs	1988	2023	1,235
Torness	2 AGRs	1988	2023	1,230
Sizewell B	Pressurised Water Reactor (PWR)	1995	2035	1,188

Capacities are stated net of all power consumed for the stations' own use, including power imported from the National Grid. Capacities are subject to review at the year end. Values quoted above are relevant to the financial year ended 31 March 2009.

*Based on currently agreed accounting lives. One of EDF Energy's business imperatives is to extend the lifetimes of its nuclear power stations where it is technically and economically viable to do so safely.

Scope of disclosures

As a part of our commitment to openness and transparency, we are providing information about the governance of nuclear safety and waste in **EDF Energy's Nuclear Generation business** only. Unless specified, this information **does not** apply to the Nuclear New Build project (NNB Generation Company Limited) given the current stage of development of the project.

The policies described here guide the operating practices of EDF Energy Nuclear Generation's operations in the UK. EDF Energy is part of EDF Group, which also has nuclear operations in France and the United States. Each country has its own regulatory regimes and, consequently, specific nuclear policies have been developed in each country. Nevertheless, each nuclear operator within EDF Group exercises the same commitment to nuclear safety and waste management.

EDF Group is in the process of creating an overarching policy and accompanying management system for nuclear safety and nuclear waste. Policies at a country-level will be consistent with, and may exceed, the EDF Group policy. This policy will be published at the beginning of 2012.

Nuclear safety policy

General

In operating our nuclear facilities, we have no greater responsibility than to protect the public, the environment and ourselves from the potentially adverse effects of our technology. We are responsible for the safe operation of these facilities. Our obligation, as a nuclear operator, is to protect the people of this country and the population worldwide by maintaining nuclear safety at all times. We need to take that obligation very seriously throughout the organisation. The importance of maintaining nuclear safety cannot be overstated and this policy requires that everyone is aware of their obligations.

Our primary focus is to ensure nuclear safety through positive control of reactivity, core cooling and containment of the contents of the core and all by-products of nuclear power plant operations whether in reactor, during movement, disposal or storage.

Safe nuclear operation is achieved by:

- Plant that is well designed, well operated and well maintained;
- Processes that are robust and focused on problem identification and resolution;
- People who are well trained, follow procedures, demonstrate a questioning attitude, uphold the highest standards and who coach each other to improve those standards;
- A learning organisation that strives for excellence by continuous improvement;
- An organisation that has a positive Nuclear Safety Culture.

In discharging our legal and moral duty to reduce the risks arising from our operations to a level that is As Low As Reasonably Practicable (ALARP) we design and operate our plant in accordance with these principles:

a) All reasonably practicable steps will be taken to ensure safe plant operation and to prevent accidents and risks to health at work.
b) All reasonably practicable steps will be taken to minimise the consequences of any accident including radiological consequences.
c) No person will receive doses of ionising radiation in excess of statutory dose limits as a result of normal operation.
d) The exposure of any person to radiation and the collective effective dose to staff and the general public, will be kept as low as is reasonably practicable.
e) All activities which may affect safety, including those undertaken by contractors, will be carried out by, and under the control of, suitably qualified and experienced persons within an effective management system.

We have adopted the following definition of Nuclear Safety Culture:
"That assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." (From IAEA Safety Series No75-INSAG-4 "Safety Culture".)

A positive Nuclear Safety Culture will be continually fostered within the organisation, characterised by communications founded upon openness, mutual trust and shared values. This includes fostering a Safety Conscious Work Environment in which we all openly report and pursue safety issues or concerns without experiencing a negative reaction.

The health of our Nuclear Safety performance and culture will be periodically assessed to ensure that the objectives of this policy are being achieved.

Unplanned plant shut-downs

EDF Energy Nuclear Generation's vision is to be "Leading the Energy Change" and this is sought within the framework of defined values that guide the behaviour of the organisation and everyone within it. Unplanned shutdown policy is effectively incorporated within The Asset Management Policy (BEG/POL/012). The foundation of the Asset Management Policy is that safety is the overriding priority. Whether nuclear, radiological, environmental or industrial, safety is placed before commercial gain.

The asset management processes must, as a minimum, ensure compliance with applicable legislation, statutory and regulatory requirements. In addition, they should integrate with, and complement, Nuclear Generation's health and safety, environmental and quality management systems.

The Asset Management Policy requires that processes deliver the following business imperatives:

- Achieve world class operational safety and excellence
- Improve our financial stability
- Pursue life extension for our Stations
- Supporting new nuclear build

Three policy standards are specified;-

1. Asset operation, replacement, modification, refurbishment, maintenance, inspection, testing and performance monitoring will be to the approved and documented company standards.
2. Continuous Improvement is delivered through Strategic Objectives (Management of Work, Equipment Reliability, Nuclear Professionalism and Value of Doing Work) and Breakthrough Initiative Programmes. These address performance of our staff and delivery of work. This forms the foundation of the company's performance improvement programme.
3. Asset management decisions should be informed by risk management information and analysis. In addition, they should be taken in the context of the following fleet differentiation strategy:

Unplanned shutdowns challenge the operational safety of a power plant, consequently EDF Energy Nuclear Generation is primarily committed to their reduction and eventual elimination in order to promote Nuclear Safety, Radiation Protection and Public Safety performance. Furthermore reduced plant availability due to unplanned shutdowns has an adverse economic impact in terms of lost revenue and additional costs. EDF Energy Nuclear Generation adopts international best practices in this field. The international standards and performance criteria defined in the INPO (Institute of Nuclear Power Operations), WANO (World Association of Nuclear Operators), EPRI (Electric Power Research Institute) and IAEA (International Atomic Energy Agency) constitute the foundation used by EDF Energy Nuclear Generation.

Incidents and events

The company's management system implements the following principles relating specifically to the avoidance, reporting and mitigation of incidents and events:

- All reasonably practicable steps should be taken to identify and avoid the occurrence of initiating events which have the potential to lead to public harm.
- Maintenance practices, that underpin the sustained delivery of safe, reliable generation, are defined to prevent structures, systems, and components from degrading or failing and to ensure that actions are taken that promptly restore intended functions.
- The conditions and limits necessary for safety of operations are contained in Technical Specifications. All operations which may affect safety are carried out in accordance with written instructions in accordance with Nuclear Site Licence Condition 24 (Operating Instructions). These instructions comprise Technical Specifications, Environmental Specifications and Station Operating Instructions derived from Technical Specifications and Environmental Specifications.
- High performance is established, maintained, and improved through the careful selection, training and development of operational candidates, especially Shift Managers. Operators are trained and qualified to gain the necessary knowledge, skills, and abilities to support safe and reliable operation.
- All Nuclear Generation (corporate, station and contractor) personnel shall:
    - Identify conditions that have or could have an undesirable effect on performance of equipment, programmes, or organisations.
    - Ensure necessary immediate actions are implemented to place the plant/situation in a safe and stable condition.
    - Report the condition to a supervisor or the control room, as appropriate, including immediate corrective actions taken.
    - Promptly initiate a Condition Report
    - Provide sufficient information so that the condition can be properly evaluated for operability, reportability, significance and disposition.

- Symptom based emergency response guidelines and accident management guidance should be available to control any accident, or mitigate the consequences, in the unlikely event of failure of any of the required engineered protective features.
- The Emergency Preparedness Programme includes arrangements for working with other emergency services and government bodies to provide countermeasure advice and actions to protect the public and environment as a consequence of any significant radioactive material from any of our power stations.

Risk and Nuclear Safety assessments

As noted in the nuclear safety policy section, the Company, as an owner and operator of commercial nuclear power plant, is responsible for the safety of its employees and the public and aims to minimise risks arising from normal operation and from any nuclear accident arising from its installations and from natural events (e.g. flooding, earthquakes, extreme winds, climate change, human error, fires, loss of coolant, loss of power) to an acceptable level in line with national and international standards and industry best practice. The nuclear safety case therefore includes risk assessment of:

- Plant based faults, e.g. loss of coolant
- Internal hazards, e.g. steam release
- External hazards, e.g. climate change, flooding, earthquakes.

There is a fundamental legal requirement for risks to be ALARP (As Low As Reasonably Practicable). This responsibility is fully recognised by the Company and leads it to continuously improve the maintenance of nuclear safety standards in its nuclear power plants. The safety cases for plant based faults, internal hazards and external hazards all minimise consequences and drive risks as low as reasonably practicable.

Reviews of the nuclear safety case and risk assessment

The nuclear power stations were constructed to the best contemporary advice, including national and international standards and guidelines, and each entered service with a single document summarising its safety case which included assessment of risks i.e. plant based, internal and external hazards such as climate change, flooding, earthquakes. The stations are expected to operate for a number of decades, during which guidelines will change. In addition there will be numerous changes to plant and procedures at each station, each of which is separately documented and represents a small change in the safety case.

The entire safety case, including risk assessments of plant based, internal and external hazards, is therefore reviewed at intervals against current national and international standards which set industry best practices e.g. IAEA. The review also encompasses operating experience gained within the company, the global nuclear industry e.g. Fukushima and through global high hazard industry events. The review process, which is referred to as Periodic Safety Review, is carried out at intervals of approximately 10 years, and is one of the conditions of the Nuclear Site Licence. The review is submitted to Office for Nuclear Regulation (ONR), an agency of the Health and Safety Executive (HSE) for their consideration and, if appropriate, agreement to any proposed changes to the safety case. These reviews may identify shortfalls with respect to current guidelines. All reasonably practicable improvements identified by the review are implemented, to bring the stations within the current guidelines.

Less comprehensive reviews of the station safety case, including risk assessments, are also undertaken at intervals of two to three years. Typically each Advance Gas-cooled Reactor (AGR) is shutdown for statutory maintenance every three years (two years on some AGR stations at present); the Pressurised Water Reactor (PWR) interval is currently 18 months. Following each statutory maintenance outage, the findings are presented to the ONR, who must approve the return to service for the next maintenance period.

Regulation

Each nuclear power station is subject to a Nuclear Site Licence, which is issued by the ONR. The licence has 36 conditions, which govern all aspects of safe operation of the station. The ONR monitors the performance of the power station operator, and appoints a site inspector for each station. All significant changes to the plant or to its operating procedures are subject to approval by ONR.

Although subject to monitoring by the ONR, the licensee, EDF Energy Nuclear Generation Ltd is self regulating. It has an independent internal safety and oversight department. All proposals for changes to plant or operating conditions are referred to these departments for Independent Nuclear Safety Assessment before they are put into effect. Each station has a Nuclear Safety Committee which advises on safety matters and which is required to approve all significant changes to the safety case before they are submitted to the ONR. The membership of the Nuclear Safety Committee consists of the Station Director, senior safety officers of the company, and independent safety experts.

Design philosophy

Nuclear power stations are designed so that failures and malfunctions can be tolerated without the risk of a release of radioactivity. The objective of the safety case is to assess risks and demonstrate that, in the event of any credible accident; the reactor can be shut down and cooled without the risk of failure of the fuel cans. The reliability of safety systems is secured by the design principles of redundancy, diversity and segregation.

Redundancy is the provision of duplicate plant items, in excess of the number which can be foreseen as necessary. Redundancy enables safety systems to perform satisfactorily even if individual plant items fail to perform on demand. It also allows items to be taken out of service for maintenance.

Redundancy may not however be sufficient if there is a common failure mode. A row of pumps which rely on a common electrical supply would be of no use if that supply were to fail. Even if they have electrical supplies from a variety of sources, there may be an unforeseen fault, for instance a substandard batch of bearings, which might conceivably cause breakdowns at a critical time. Important safety systems are therefore provided with diversity: they are duplicated by alternatives of a different type or design. All the nuclear power stations have diverse trip, diverse shutdown systems and diverse post trip cooling systems.

Redundant and diverse systems located within the same area may still be subject to a common form of mechanical damage, for instance fire or flooding. The final stage in securing reliability is therefore segregation. Diverse systems are kept apart, or if this is not possible, are separated by suitable barriers.

Detailed consideration has been given to hazards which might damage the plant. Appropriate protective measures have been incorporated such that the worst damage which might potentially be inflicted by each hazard would not prevent safe reactor trip, shutdown and post trip cooling. The more significant of the hazards originating from outside the station include climate change, flooding, earthquakes and extreme winds. Aircraft impact is treated differently, because it is not practicable to consider all possible effects in detail. A probabilistic argument is therefore used instead. It is shown that the probability of a crash causing damage leading to a release is acceptably low, and is within guidelines drawn up by the HSE. The more significant of the hazards originating from within the plant include fire, steam release, hot gas release (AGRs), and loads dropped from cranes.

The safe operating envelope

The reactor operating parameters are restricted at all times such that no credible accident will cause any fuel cans to melt, or to fail through any other mechanism. Limits are determined by means of fault studies. A fault study is a simulation of the events following a postulated initial accident, or fault. It determines the changes with time of temperature, pressure, neutron flux and other relevant parameters in the affected part of the reactor. From these it deduces the time at which the guardline initiates the reactor trip. Allowing for the time delays while the control rods are released, and the time for them to fall under gravity, it calculates the peak temperature in the hottest fuel can. It then adds appropriate allowances for random variations and uncertainties in the data, and compares the resulting temperature with the melt temperature of the can. It repeats this process for a range of reactor operating conditions, thereby establishing which reactor conditions are safe with respect to that particular accident.

A list of credible faults is maintained, and is referred to as the Fault Schedule. Fault studies are undertaken for each fault on the schedule. The reactor is operated within a set of conditions which are safe with respect to all faults on the Fault Schedule. This set of conditions is referred to as the Safe Operating Envelope.

Radiation exposure (to workers and the general public)

We are committed to maintain a comprehensive radiological protection programme safeguarding all our employees and contractors and the general public against the hazards of ionising radiation arising from operating our plants. Our approach is to ensure as a minimum, compliance with all applicable regulations, to emulate best nuclear industry practices and continuously improve our practices and to work to a common fleet standard. We strive to ensure that any radiation exposure to ionising radiation is kept as low as reasonably practicable (ALARP), to reduce individual and collective radiation doses and prevent any worker exceeding a statutory radiation dose limit.

Radiation dose to the public and the environment

We are committed to demonstrate high standards of performance in the way we ensure safety and protect the environment. Recognising our duty to care for the environment, we have a special obligation to assure our nuclear power stations are operated in a manner that safeguards the public and the environment.

Our goal is to achieve excellent environmental performance, recognising that compliance with regulations is not enough on its own to achieve excellence and holding ourselves to a higher standard.

We seek continuous improvement in our environmental performance and comply with all applicable legal and other requirements, by:

- Reducing the environmental effect of our activities, products and services to a practicable minimum by the prevention of pollution, reduction of waste and the efficient use of resources;
- Promoting the efficient use of energy;
- Continuing to develop a sense of environmental responsibility among staff and contractors;
- Openly reporting performance against environmental targets;
- Assessing the impact of our operations on biodiversity and implementing opportunities for enhancement.

Our policy includes adherence to the following standards:

- Clear compliance criteria are defined for all environmental permits, authorisations and consents, that if met will ensure we remain within the strict requirements of the regulations.
- Best Practicable Means' are used where required.
- Clear and documented support is obtained from the environmental regulatory bodies for our interpretation of their environmental permits, authorisations and consents.
- We work with the environmental regulators to ensure our permits, authorisations and consents are based on sound science and are documented to avoid uncertainty in scope or interpretation.
- Activities are planned, specified and implemented in a manner to achieve environmental excellence.
- Plant is operated within the bounds of permits, authorisations, consents and other applicable environmental regulations.
- Plant design and operating margins are recognised and carefully guarded at all times by investigating and resolving problems promptly.
- Equipment is maintained so that it can perform fully as required in permits, authorisations and consents and other applicable environmental regulations.
- Operational decisions and actions are based upon the need to maintain margins of compliance to environmental limits. Decisions are made, based on the fullest information available, toward a long-term view of operation.
- A positive culture is fostered within Nuclear Generation, characterised by communications founded upon mutual trust and by shared values that recognise the importance of excellent environmental performance.

Security

EDF Energy Nuclear Generation recognises the value of the people, physical assets, information and systems that it utilises to undertake its business and the necessity to protect them. Security is about protecting our physical and intellectual property, our staff and the public from any potential or actual event which could adversely affect the confidentiality, integrity or availability of our infrastructure and information as well as the personal security and safety of staff and the public.

There are a series of safety and security measures in place at each of our power stations in addition to the inherent physical security provided by the very robust design of the nuclear reactors. Access to nuclear power stations is strictly controlled and armed police are deployed at all of the UK's nuclear sites to complement existing security measures. The Civil Nuclear Constabulary is a specialised armed force whose role is the protection of civil nuclear sites and nuclear materials. The overall purpose of the Constabulary is to deliver an effective and efficient police response service, complying with national security requirements.

Our policy takes account of the business drivers and perceived business risks as well as our obligation to fulfil specified security requirements of the Office for Nuclear Regulation (Civil Nuclear Security), the security regulator for the civil nuclear industry in the UK and the UK Information Commissioner's Office. It is this responsibility to address the nuclear safety risks which differentiates EDF Energy Nuclear Generation from other equivalent non nuclear organisations and drives us towards the need for high quality security regimes which address the optimum balance of physical, operational, personnel and information security requirements.

Nuclear safety management systems

General

EDF Energy's Nuclear Generation division operates in accordance with a single unified management system that integrates safety, health, environmental, security, quality and economic objectives. The management system defines the responsibilities of key post holders, the line management organisation and the main interfaces between the company and other organisations.

Our management system draws on best practice, as defined within the International Atomic Energy Agency (IAEA) Safety Requirements No. GS-R-3 'The Management System for Facilities and Activities', together with BS EN ISO 9001, BS EN ISO14001, BS OHSAS 18001 and PAS 55-1. It has also been designed to ensure that the requirements of our nuclear site licences are fulfilled.

The management system supports the achievement of the two general aims of a management system, as stated by the International Nuclear Safety Group on 'Management of Operational Safety in Nuclear Power Plants' INSAG-13:

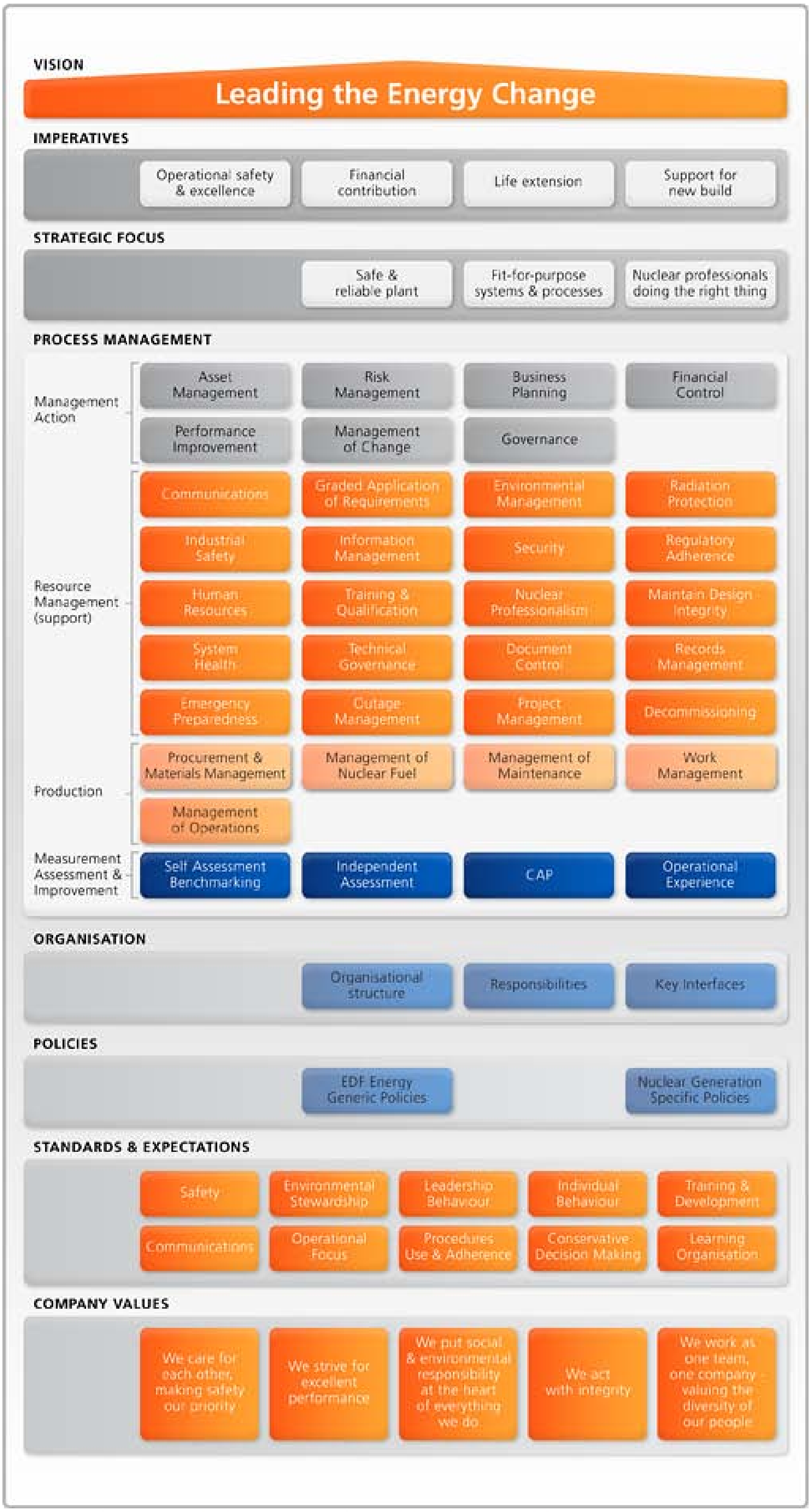
- To improve the safety performance of the organisation through the planning, control and supervision of safety related activities in normal, transient and emergency situations;
- To foster and support a strong safety culture through the development and reinforcement of good safety attitudes, values and behaviour in individuals and teams so as to allow them to carry out their tasks safely.

The structure of the system is summarised in the diagram below, which shows how our company vision and associated strategic objectives are implemented through a defined organisational structure and 36 interlocking processes. For each process there is an identified champion in the business who owns the process definition and documentation and is charged with its continuous improvement. The whole is underpinned by the values, standards and expectations that should inform and permeate all activities throughout the company.

Based on the standards the processes include all the elements necessary to manage and control nuclear power stations safely and efficiently. Alongside the processes for specific technical activities there are processes for securing sufficient suitably qualified and experienced staff (including training), for implementing and monitoring governance procedures, for ensuring adherence to regulations, for securing independent assessment of our activities, for investigating departures from expected plant and personnel behaviour and preventing their recurrence (CAP – the Corrective Action Programme) and for driving improvement in all aspects of performance.

As you would expect for a high-hazard industry there is a particular emphasis on oversight to monitor performance and conformity to both our internal standards and external regulations. We operate a multi-layer model with increasingly independent oversight being exercised through:

- Management accountability - the exercise of leadership;
- In-process oversight in peer checking and self assessment;
- Functional oversight – review and audit by company experts;
- Independent internal oversight from our Safety and Regulation Division who report to the Board independently of the operating arm of the company
- External oversight from our Nuclear Safety Committees with their external members, from peer evaluations by teams from other utilities, from standards accreditation bodies and from the Government's Office for Nuclear Regulation.



VISION
Leading the Energy Change
IMPERATIVES
Operational safety & excellence
Financial contribution
Life extension
Support for new build
STRATEGIC FOCUS
Safe & reliable plant
Fit-for-purpose systems & processes
Nuclear professionals doing the right thing
PROCESS MANAGEMENT
Management Action
Asset Management
Risk Management
Business Planning
Financial Control
Performance Improvement
Management of Change
Governance
Resource Management (support)
Communications
Graded Application of Requirements
Environmental Management
Radiation Protection
Industrial Safety
Information Management
Security
Regulatory Adherence
Human Resources
Training & Qualification
Nuclear Professionalism
Maintain Design Integrity
System Health
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Communications
Operational Focus
Procedures Use & Adherence
Conservative Decision Making
Learning Organisation
COMPANY VALUES
We care for each other, making safety our priority
We strive for excellent performance
We put social & environmental responsibility at the heart of everything we do
We act with integrity
We work as one team, one company - valuing the diversity of our people

Unplanned plant shut-downs

According to worldwide industry accepted best practice, the implementation of a rigorous process-based approach to plant operational management is the most effective and robust means to ensure sustainably high safety and environmental performance including avoidance of Unplanned Shutdowns. Three of the most important processes are:

- Work Management
- Equipment Reliability
- Nuclear Professionalism (human error prevention)

EDF Energy Nuclear Generation has implemented Work Management best practices following the Institute of Nuclear Power Operations (INPO) guideline AP-928 and has implementation plans in place for Equipment Reliability best practices following the INPO guideline AP-913.

The Nuclear Professionalism programme, which includes both human performance and nuclear safety culture components, is in place throughout EDF Energy Nuclear Generation. This programme focuses on minimising the frequency and consequences of human errors through training, effective use of human error prevention tools, performance coaching and the identification and reduction of organisational weaknesses through investigations into events, incidents, near misses and performance trending of sub standard conditions.

Work management - INPO AP-928 Implementation

Work Management deals with the Identification, Planning, Scheduling, Execution and Closure of maintenance and maintenance related activities.

The guiding principles of an effective work management process are:
1. To ensure nuclear safety and non-nuclear safety by providing timely identification, selection, planning, coordination, and execution of work necessary to maximize the availability and reliability of station equipment and systems
2. To manage the risk associated with conducting work
3. To identify the impact of work to the station and work groups and to protect the station from unanticipated transients due to the conduct of work
4. To maximize the efficiency and effectiveness of station staff and material resources

Since a significant proportion of the maintenance and maintenance related activities are carried out during the periodic shutdowns (statutory outages), the quality of the outage planning and execution has a significant effect on the safety and reliability of the Nuclear Power Plant, and consequently on the occurrence of unplanned shutdowns.

Equipment reliability - INPO AP-913 Implementation

The Nuclear Industry has established a documented standardised best practice in the area of Equipment Reliability based upon Reliability-Centred Maintenance. This has been formalised under the INPO guideline AP-913. A System Health programme is being rolled out in EDF Energy Nuclear Generation to fully implement AP-913. This Equipment Reliability process represents the integration and coordination of a broad range of equipment reliability activities into one process for plant personnel to evaluate important station equipment, develop and implement long-term equipment health plans to manage their health, monitor equipment performance and condition, and make continuing adjustments to preventive maintenance tasks and frequencies based on local, fleet wide and industry wide equipment operating experience. All of which is focused on the principal goal of underpinning nuclear safety.

Through the equipment reliability process the equipment that is critical for nuclear safety and operation is systematically identified and the performance is meticulously tracked. Risk based maintenance techniques are then selected and used to define the preventive maintenance programs and the life cycle management strategies to be adopted in order to maximise reliability and availability. This is done at both system and component levels, and is used to anticipate and prevent ageing and degradation effects impacting on nuclear safety and reliability. The process focuses on improving equipment reliability and availability which results in increased nuclear safety margins.

Nuclear Professionalism

All events leading to an unplanned shutdown derive directly or indirectly from human errors. The objective of having a structured Nuclear Professionalism programme is to prevent safety and reliability related events and incidents and maximise nuclear safety margins. This is done by systematically identifying and addressing organisational weaknesses which lead to error likely situations, promoting fundamental behaviours that reduce human error, and by developing a nuclear safety culture which instils a defence-in-depth philosophy supplementing and reinforcing the nuclear professionalism of individuals.

The Nuclear Professionalism programme is founded on the following principles:

- Humans are fallible, even the strongest performers make mistakes.
- Error-traps are predictable, manageable, and preventable.
- Human Performance tools are used to minimise the frequency and severity of errors.
- Individuals achieve high levels of performance based largely on the encouragement and reinforcement received from supervisors, peers, and direct reports.
- Understanding the reasons human errors occur and applying the lessons learned from past errors can prevent events.
- Organisational processes and values determine and influence individual behaviour.
- Performance improves when members of the organisation learn from their successes and failures.

EDF Energy Nuclear Generation has deployed and continues to deploy extensive initiatives following these principles and based on feedback of experience from the best performers in the Nuclear Industry worldwide.

The programmes have been developed starting from values and expectations that are supported by appropriate Error Prevention Tools and adequate training programmes.

Both the tools and training programs are tailored to each specific working category, including executives, managers, supervisors and engineers/technicians/staff.

A coaching programme has been implemented, and this is supported by a Nuclear Professionalism learning clock programme. This monitors the frequency of notable events and the learning which ensues. This is done at station and department level with the objective of promoting continuous improvement and learning.

All events and incidents are promptly investigated according to a dedicated procedure to determine and address the root causes and underlying organisational weaknesses. Trending of causes is also conducted to judge programme effectiveness and help guide future plans.

Continuous Improvement

All company processes including those described above (Work Management, Equipment Reliability and Nuclear Professionalism) apply Continuous Improvements methodologies. The Continuous Improvement approach is based on the INPO Operational Excellence model (ref) and is prescribed in the EDF Energy Nuclear Generation Quality Management System procedures. Issues and emerging trends are identified, analysed, solution options are studied and prioritised and the highest value activities are implemented through business plans, improvement plans, asset management plans and other arrangements. Finally an effectiveness review is conducted to ensure that the intended results have been delivered.

A good example of this is the development of the Nuclear Leadership Academy. The need to further improve nuclear leadership competencies of supervisors and managers was identified through in-depth analysis into underlying root causes of many safety and reliability conditions in 2008/09. In 2010 a Nuclear Leadership Academy was established to provide this training and development for nuclear leaders. The Nuclear Leadership Academy programme has been tailored for the specific needs of the organisation and is based on international best standards. Training the first group of nuclear leaders through this academy began towards the end of 2010. In 2011 it's pedigree as a centre of excellence for nuclear leadership training and development is already being recognised by supervisors and managers in the business. Further development of the nuclear leadership programmes continues and its long term success will be judged on the impact it contributes towards improved plant safety and reliability performance.

In this way all aspects of the companies people, plant and organisational resources are continuously updated, developed and re-engineered (where appropriate) in the pursuit of nuclear excellence.

Corrective Action Programme

The Corrective Action Programme (CAP) is a cornerstone of Continuous Improvement and organisational learning.
An effective CAP is fundamental to the effective management of plant safety and reliability. The objective of the CAP is to identify, document, evaluate, and trend undesirable conditions (problems) and to take actions to correct problems and their causes. The aim is to proactively identify sub standard conditions and practices at a local, low consequence level and take positive action to prevent more significant consequence events arising and adverse trends developing.

The CAP establishes the processes to ensure that deficiencies, non-conformities, weaknesses with a process, documents, or a service, or conditions that adversely impact, or may adversely impact plant operations, personnel, nuclear safety, the environment, or equipment and component reliability, are promptly identified and resolved in accordance with their inherent risk to nuclear safety and reliability.

For those conditions considered significant, or repetitive in nature, these processes ensure that appropriate levels of management are notified, causes identified, and actions taken to prevent recurrence. They also ensure that the actions taken to address the identified issues are verified to be complete and effective through formal effectiveness reviews which are scheduled usually 6 months to 1 year later.

1. Plant staff are expected to identify and report all problems affecting safety by entering a 'Condition Report' (CR) into the system. The fleet raised approximately 55,000 condition reports in 2010, roughly 6000 per nuclear station on average. CRs requiring immediate attention are reported immediately to the Shift Manager or Line Supervisor as appropriate.
2. Daily, CRs raised during the previous 24 hours are screened according to their safety and reliability significance, organisational ownership is assigned and actions to be taken to correct the issue are placed.
3. Where further investigation is required the level of investigation to be performed (root cause or apparent cause) is defined based on the safety and/or reliability significance and a lead investigator assigned. The lead investigator is trained in root cause investigation and/or apparent cause investigation. For root cause investigations they will normally lead a team of experts to collect facts, determine what happened, why it happened and what organisational weaknesses failed to prevent the problem developing into a consequential condition. The potential extent of condition is considered and this helps determine the extent of corrective and preventative actions required. Extent of condition is considered locally, at other stations in the fleet and internationally. Where there are potential international implications reports are submitted through international bodies such as the World Association of Nuclear Operators (WANO), Institute of Nuclear Power Operations (INPO) and the Nuclear Plant Event Reporting (NUPER) database. A final report is compiled which includes a corrective and preventative action plan. This report is subject to oversight from the location Corrective Action Review Board (CARB). The CARB is comprised of senior management and independent company oversight representatives and takes the final judgement on the adequacy of the investigation and appropriateness of the proposed corrective and preventative action plan.
4. Preventative actions are targeted at the root causes of problem, taking into account the potential extent of condition and are designed so that the benefits outweigh the costs. In certain cases, interim mitigation measures are taken to limit exposure to hazards and to restore adequate confidence while final corrective actions are being generated or deployed. Personnel involved in the original issue receive feedback on what was done. This is important to the reinforcement of prompt reporting behaviour and is vital to appropriate organisational learning. Condition report priorities are regularly reviewed so that resources are applied to those actions with the greatest importance to the organisation.
5. Routine programme health reporting, which includes CAP trending analysis is carried out in order to identify degrading conditions early before an adverse trend in safety or reliability performance develops. A standard coding system is used so that effective trend analysis can be done subsequently. Finally, the information from the CAP is combined with industry-wide information exchanges and integrated within the Operational Experience Feedback process.

Operational Experience Feedback (OEF)

Together with CAP, the effective sharing and utilisation of experience is a fundamentally important process established by the nuclear industry from the lessons learned initially following the Three Mile Island accident in 1979, and subsequently developed. The Operating Experience processes cover the reviewing, screening, disseminating of internal and external nuclear industry event notices or other operating experience for applicability to specific EDF Energy Nuclear Generation facilities. It also provides the basis for external communication of events from within the organisation for the benefit of the worldwide nuclear community through the WANO global Event Reporting system. (An "event" is defined as any significant deviation from the normal expected functioning of a plant.).

The OE teams produce internal reports, newsletters and briefings for staff about to consider work activity or plant manoeuvres. Of particular value is the "Just-In-Time Briefing" process where the OE is collated and presented to operators and staff at the point of work and immediately prior to the activity.

At the global level, WANO (and INPO) maintain a database of events reported by every nuclear power plant on the secure WANO members' website. WANO has established specific reporting information categories, including causes, corrective actions and learning points. Members are encouraged to report events promptly, so that others can benefit from their experience.

The WANO Operating Experience Central Team conducts analysis and monitors events across WANO to identify significant issues. Based on the number and significance of events, the Operating Experience Central Team writes SOERs (Significant Operating Experience Reports), SERs (Significant Event Reports) or JITs (Just-in-Time briefings). These reports warrant focused member attention and provide analysed information and learning points that can be applied across all plant types. For effectiveness management purposes, there are OE Process performance indicators, regular self assessments and effectiveness reviews of the OE process.

Incidents and events

Our plant is designed to be operated without significant impact on the health and safety of its operating staff or of the public living around the stations. To this end it is subject to an extensive routine programme of inspection and maintenance. Its behaviour in normal operation and a wide range of abnormal circumstances have been analysed (the 'Nuclear Safety Case') to show that the station will either be able to continue operation safely or be brought to a safe shutdown condition. The resulting limits on the allowed operating parameters (such as temperature and pressure) and the availability of backup systems are incorporated into operating instructions which control all aspects of operation and direct the action to be taken if these limits are approached. Our staff are rigorously trained in the requirements of the safety case and operators in control are individually examined and authorised to the role. The adequacy of the safety case, the monitoring and maintenance regime and the control of operations is evaluated continually and is formally assessed in comparison to the latest standards every 10 years.

To give early warning of any deterioration, whether in plant or operating standards, and to facilitate our goal of continuous improvement every deviation from the expected plant status or the management system procedures is required to be reported into our Corrective Action Programme (CAP). Within the CAP each report is considered by a committee of experienced staff, categorised and allocated a priority. Notifications to affected parties, both inside and outside the company are made according to the assigned category. The priority guides the depth of investigation some events are simply collected to allow a statistical evaluation of trends, others are investigated in detail to find and eliminate the basic causes. Corrective actions are determined and assigned then followed up to ensure completion. The final step is an effectiveness review to check that the action has had the desired effect.

In addition to these routine processes the company has detailed plans for the action to be taken if, despite all these precautions, things should go wrong and the public be threatened. We perform regular emergency exercises to test the procedures, facilities, systems and equipment, and enable everyone to practise their role. These are also the main way that we demonstrate the effectiveness of our emergency arrangements to external agencies and the public.

The application of the company's safety standards reduces to a very low level the chance of an accidental event which might lead to the release of even small amounts of radioactivity. Nevertheless we have plans and procedures for dealing with an accident or emergency and protecting both our workforce and members of the public. Many of our staff in addition to their normal job are also assigned roles in the emergency organisation. They are trained in these roles, practice them regularly and periodically demonstrate them both to internal assessment teams and to the Office for Nuclear Regulation.

The emergency organisation is assigned activities and responsibilities to achieve the following objectives:-

a) To activate the site emergency arrangements.
b) To issue appropriate warnings at the correct time and ensure the safe withdrawal of all persons on site to pre-arranged assembly points.
c) To notify rapidly all persons and external organisations concerned with implementing remedial actions
d) To assemble and deploy, when necessary, emergency teams to assess and minimise the consequences of the accident.
e) To assess the risk and extent of any potentially hazardous situation and ensure timely advice is given on appropriate measures to safeguard the public and that appropriate measures are taken to safeguard station personnel.
f) To protect the environment, steps taken to protect public health may also provide environmental benefits. Nevertheless, attention is paid to the environmental harm which could result from emergency intervention activities.
g) To minimise and then terminate any release of radioactivity and make the affected plant safe.
h) To provide authoritative specialist advice to the Police, Local Authorities and other organisations responsible for taking the necessary action to protect the public. This advice will be provided initially by the Emergency Controller and

subsequently by the EDF Energy Nuclear Generation Ltd Company Adviser or until relieved of the responsibility by the Government Technical Adviser.

i) To provide accurate and timely information for the Local Authority to inform the public via the news media.
j) To maintain an accurate record of events for later analysis.
k) To ensure the safety of unaffected plant.

If an event should ever occur resulting in a release to the environment of significant quantities of radioactive material then, in addition to our own staff, many off-site organisations would be involved and called upon to take actions to protect the public. These organisations include the Police and other Emergency Services, Local Authorities, Government Departments and Agencies, each of which has its own emergency responsibilities and procedures. These procedures are co-ordinated in the Off-Site Emergency Plan by the Local Authority, which fulfils the requirements under the Radiation Emergency Preparedness and Public Information Regulations (REPPIR).

Risk and Nuclear Safety assessments

Our primary focus is to ensure nuclear safety through positive control of reactivity, core cooling and containment of the contents of the core and all by-products of nuclear power plant operations whether in reactor, during movement, disposal or storage.

Safe nuclear operation is achieved by:

- Plant that is well designed, well operated and well maintained;
- Processes that are robust and focused on problem identification and resolution;
- People who are well trained, follow procedures, demonstrate a questioning attitude, uphold the highest standards and who coach each other to improve those standards;
- A learning organisation that strives for excellence by continuous improvement;
- An organisation that has a positive Nuclear Safety Culture.

The safety of the Company's nuclear power stations was determined prior to construction through use of best contemporary advice, including national and international standards and guidelines and is also assessed as issues arise, and periodically there is additionally a systematic review, known as the Periodic Safety Review, of all the constituent parts of the nuclear safety case. The main objectives in the reviews are to risk assess potential faults arising within the reactor and reactor support systems and compare the results against Nuclear Safety Principles in order to:

- confirm that the installation is adequately safe for continued operation within the current safety case/safety assessment;
- identify and evaluate any factors which may limit the safe operation of the plant in the foreseeable future;
- identify any safety enhancements which are reasonably practicable.

The assessment encompasses not only all radiological risks from the reactor, but also considerations of criticality safety, the fuel route and radioactive waste treatment plant. The assessment covers plant based faults, internal hazards such as steam release and external hazards such as seismic, high winds, climate change leading to rising sea levels and flooding amongst others. The assessment encompasses current national and international standards which set industry best practices e.g. IAEA. The review also considers operating experience gained within the company, the global nuclear industry e.g. Fukushima and through global high hazard industry events.

The term 'safety enhancements' referred to in the above paragraph can apply to:

- Developments in the safety arguments, e.g. by additional analysis
- Improved operating or emergency procedures
- Implementation of plant safety modifications
- Or a combination of some or all of these features.

The Nuclear Safety Principles have been defined taking into account the document issued by the Health and Safety Executive (HSE) entitled 'The Tolerability of Risk from Nuclear Power Stations' (TOR) and subsequently developed further in ‘Reducing Risks, Protecting People’ (R2P2), which reflects current thinking on tolerable levels of risk, both to individuals and to society as a whole. In common with TOR and R2P2, the concept of reasonable practicability is also an important feature of the Nuclear Safety Principles.

Nuclear safety reviews employ:

a) Expert assessment of the design and system of operation including all relevant scientific, technical and human factors, good engineering practice, and take into consideration accepted precedents and recognised codes and standards.

b) Structured safety arguments demonstrating the acceptability of the topic under review by assessment against Deterministic Principles and, where relevant, against the Probabilistic Principles, the Doses to Workers Principle, and Methods for Supporting Safety Case Claims.

c) Appropriate quality assurance arrangements for the design, procurement, construction, installation, commissioning, and operation of structures, systems and components. Similarly, appropriate arrangements are required for the production of nuclear safety documentation of adequate quality.

Maintain Design Integrity policy

The Maintain Design Integrity policy ensures that the design intent is met and that, where changes are made to the design, this is done in a controlled manner and rigorous configuration control is maintained over the reference plant documentation.

Plant changes may result for a number of reasons, including: self modification (ageing), obsolescence, operating experience, periodic reviews (e.g. safety system reviews or Periodic Safety Reviews) or enhancements.

Design changes may arise in a number of other company processes, including: asset management, risk management, outage management, emergency preparedness, procurement and materials management, waste management, environmental management, operational experience, security, radiation protection, human performance, industrial safety or corrective action.

Some plant design changes are identified and scheduled well in advance of the work whereas other plant changes result in plant breakdown requiring urgent action. Irrespective of the motivation for the work, any change to plant and/or safety case will be subject to the Maintain Design Integrity Process.

The key processes included within the Maintain Design Integrity are summarised below:

Modifications

The Modification Process (nuclear site licence condition 22) s used to control changes to the plant and/or safety case, subject to the following overriding principles:

- All changes identified as being design and/or safety case changes will be subject to the modifications process
- Design and/or safety case changes which potentially modify the design intent will be subject to the agreement of the Design Authority
- Users of the modification process shall meet prescribed standards of training and experience, and satisfactory performance will be subject to ongoing review
- Risks associated with the modification process are identified and managed through use of a barrier model which provides a framework for use in future investigations in the event of process failure and provides a framework for risk assessment when operating the process. The barriers include verification, independent assessment and oversight.

Periodic Safety Review

The Periodic Safety Review (nuclear site licence condition 15) process is a periodic holistic review of the condition of the plant and of any changes to standards that is used to justify continued operation. The review encompasses not only all radiological risks from the reactor, but also considerations of criticality safety, the fuel route and radioactive waste treatment plant. The assessment covers plant based faults, internal hazards such as steam release and external hazards such as seismic, high winds, climate change leading to rising sea levels and flooding amongst others. The assessment encompasses current national and international standards which set industry best practices e.g. IAEA. The review also considers operating experience gained within the company, the global nuclear industry e.g. Fukushima and through global high hazard industry events. Part of the benefit of the review is that it confirms that the aggregate effect of minor design changes has not become significant. It also acts as a check that plant documentation is up to date and accurately reflects the plant design.

The PSR is carried out on approximately ten-yearly intervals. The reviews identify issues to be addressed, grading of their significance and priority and addressed through systematic business processes. The PSR is provided to the Government's nuclear regulator who accepts the findings and monitor progress of the identified improvements

It should be noted that there are other processes which complement the Periodic Safety Review process, but which differ in scope and have increased frequency, for example the System Health Review process. The Periodic Safety Review and complementary processes provide inputs to the Modifications Process.

Nuclear Safety Committee (NSC) process
The NSC process (nuclear site licence condition 13) sets out the arrangements for the compliance with Licence Condition 13. The most significant design changes and other significant safety matters are referred to the NSC for advice.

Strategic programme
The strategic programme process consists of the arrangements used to manage the strategic programme. The programme is made up of many separate activities, which have been selected to mitigate specific technological risks and as such they develop new knowledge that may be required to ensure plant integrity can be maintained into the future.

Maintain standards
The Maintain Standards process consists of the arrangements used to ensure that standards are periodically reviewed and updated as appropriate. This process deals directly with some standards but interfaces with Technical Governance for those standards controlled by Engineering Systems Health.

Oversight Arrangements
The Oversight Arrangements process consists of the arrangements that Design Authority uses to ensure that the Maintain Design Integrity process is effective, to report on the health of the process, and to identify and drive opportunities for improvement. These arrangements consist of collating information gathered across the organisation to provide insight into the effectiveness of the Maintain Design Integrity process across the fleet and at relevant corporate functions.

Engineering Change Training and Accreditation
All safety case role holders will meet specified levels of training and accreditation as defined by this process. Capability is the subject of ongoing review and re-accreditation.

The main supporting processes for Maintain Design Integrity are summarised below:

Work Management
This process provides the systematic framework for implementation of plant modifications. As such, it ensures that the modification is safely and effectively implemented to the specification.

Document Control
This process provides the means to control changes to documents that describe the safety case and design intent.

Records Management
This process ensures that any records generated by the Maintain Design Integrity process are retained.

System Health
This process provides the vital link to activities that ensure that plant and safety case remain aligned or identify situations where this is not the case and initiate remediation. This link to the stewardship of the plant is essential support to the Maintain Design Integrity process.

Technical Governance
This process ensures that appropriate engineering policies, codes and standards are provided and applied.

DESIGN AND SAFETY ASSESSMENT

Engineering principles

If a fault occurs at a nuclear power station the installed safety systems are required to operate and fulfil their safety function. An example of a safety function might be the supply of cooling water to the boilers following a reactor trip. It may be that one running pump is sufficient for this purpose. However, if this one pump failed, cooling would be lost. The situation can be improved by adding a further pump in parallel with the first. The addition of items of plant over and above what is required in foreseeable circumstances is known as redundancy. The concept of redundancy is built in to the design of safety systems installed at nuclear power stations. For example, there are many more control rods than are needed to shutdown the reactor, there are more pumps to supply water to the boilers / steam generators than are needed to fulfil the safety function of removing the decay heat from the primary coolant.

To take an example, suppose it is required to have a probability of less than one in one million of there being no cooling water for the boilers after a reactor trip. Suppose one pump on its own can supply sufficient water to the boilers to remove the decay heat, but that the pump has a probability of failure of one in 100; with three pumps the probability that all three will fail randomly is one in one million and hence a 3-pump system should meet the reliability target.

However, it is unwise to assume that the three pumps will only be subject to random failures. They may all suffer from a common fault, in which case the probability that all three might fail simultaneously could be much higher than is calculated on the basis of random failures. For example, in cold weather they may all have a tendency to stall, or they may all possess a weak component which may fail under a particular operating condition. Such potential failure mechanisms are known as common cause or common mode failures.

To overcome this problem, it is necessary to build diversity into the systems providing each safety function. In the example of the pumps above, this may mean introducing a different type of pump made by a different manufacturer.

Merely providing further types of pumps does not in itself eliminate all sources of common cause failure. In the event of a fire, or a loss of electrical supplies, all pumps at the same location and fed from the same power source could be affected. It is therefore necessary to introduce segregation. This can be provided by locating pumps and any supporting auxiliary equipment in different buildings and by supplying them with power along different cable routes and from different electrical distribution boards. It is particularly important to provide adequate segregation when considering the defences against hazards, such as fires, dropped loads and earthquakes.

The principles of redundancy, diversity and segregation are built into nuclear power station design. These are examples of deterministic (engineering) safety provisions. A further important safety provision is the single failure criterion. This requires that no single random failure within a safety system should be able to cause the loss of a safety function.

Common mode cut-off

Common mode failures may be difficult to identify. It is therefore assumed that, however much redundancy a system possesses, its reliability is limited to one failure per 10,000 demands, or in exceptional circumstances one in 100,000.

Protection requirements for frequent and infrequent faults

Faults which are expected to occur more than once every 1000 years are classified as frequent. Infrequent faults are ones that have a lower frequency of occurrence than this.

The implication of the common mode cut-off is that a single line of protection is insufficient for a frequent fault. The dose-frequency staircase effectively requires that the frequency of a fault, multiplied by the probability that it results in a major release, must be no more than 10^{-7} per year (one in ten million). Taking into account the common mode cut-off, the combined frequency of a frequent event (for example at 10^{-2} per annum) followed by a failure of the protection (at 10^{-4} per demand) would be more than 10^{-7} and therefore does not meet the requirements. Hence a diverse line of protection (trip, shutdown and post trip cooling) is provided.

For infrequent faults, however, a single line of protection will suffice, provided it is sufficiently reliable.

For all faults, one line of trip, shutdown and post cooling is provided. The provision of additional reactor protection is considered in an ALARP framework. In reality two lines of protection are provided for most frequent faults.

Hazards

A hazard to a plant item is defined as anything outside that item which could cause it to fail. Hazards are classified as external or internal. An external hazard is something imposed on the station site from outside, such as an extreme wind or an earthquake. An internal hazard is something caused by a plant failure within the site, such as fire, flooding caused by the breach of a water pipe or a major steam release. Hazards constitute potential common causes of multiple plant failures.

At first sight it might appear consistent to seek to justify the survival of a line of protection against the worst external hazards expected to occur at a one in ten million per year frequency. This is not however practicable, since quantified data for external hazards, such as weather or seismic disturbances, is only available over the last 100 to 200 years. This is insufficient for a statistical determination of the one in ten million per year event. The Office for Nuclear Regulation's Safety Assessment Principles accept that the uncertainty of data may prevent reasonable prediction of events for frequencies less than once in 10,000 years. The required approach is therefore to demonstrate that there are comfortable margins to survival of each relevant hazard at the one in 10,000 year level for a single line of protection. An additional line of protection is justified for less severe hazards at the one in 1000 year (frequent) level.

Frequencies for internal hazards are easier to quantify, since data are available for the reliability of items such as pipes and valves.

Appropriate measures are in place to limit the potential effects of hazards to an acceptable level. Maintenance procedures are also biased towards plant which poses a hazard to safety related items.

There are some safety functions for which redundancy and diversity of protection is not possible. For example there is only one concrete pressure vessel surrounding an AGR reactor. In such cases failure of the component has to be made so low that it is essentially regarded as incredible. In order to sustain a claim of incredibility of failure, particularly high standards of design, construction and inspection are needed.

Beyond design basis faults

It is recognised that there are certain extreme fault conditions for which there is no specific design provision. These are termed beyond design basis faults. There are also unlikely combinations, or sequences, associated with design basis faults that fall into this category.

An example of the first type of fault would be major failure of the primary coolant circuit. The frequency of such faults is so low that it is unnecessary to study their consequences in detail. This is true also of some hazard conditions such as major flooding caused by failure of the sea wall defence. In this situation the redundancy, diversity and segregation in the station design will provide a degree of protection.

The second type of beyond design basis faults are those in which post trip cooling plant has failed, and the assumed minimum cooling requirements for a particular fault have not been met. In all such cases for AGRs there is a long time available before fuel pins began to fail. For example, in a pressurised fault the reactor and boiler structures (and the fuel pins) will survive several hours with no external cooling at all. In most cases long term integrity is assured under natural circulation conditions. This is because of the large thermal capacity of the core, boilers and supporting steelwork. Even in the event of a depressurisation with loss of cooling, fuel pins would not fail in significant numbers for one or two hours after the trip.

Such situations have been analysed to confirm that there are large margins available within the design basis fault studies. In particular, it has been shown that there are no "cliff edges" which would result in the fuel safety limits being exceeded in the majority of beyond design basis situations analysed. Therefore even though specific studies have not been carried out for all possible events, scoping studies have shown the plant to be capable of maintaining safe conditions.

It is very difficult to provide detailed instructions to the Reactor Desk Operator covering all the different extreme situations which may arise at very low levels of probability. The types of actions which would be most beneficial in these remote circumstances have nevertheless been considered, and this has resulted in the issue of two sets of additional instruction known as Symptom Based Emergency Response Guidelines (SBERGs) and Severe Accident Guidance (SAG).

The SBERGs give advice in a developing fault situation, for which the normal instructions are not valid. This advice concentrates on the symptoms of the fault rather than on specific failures in any one plant system. The SBERGs supply guidance on the most appropriate actions which would be needed to preserve and reinforce the critical safety functions, such as reactor cooling.

The SAG advises on the management of the reactor after a severe fault. They concentrate on actions to establish the critical safety functions and to minimise the release of radioactivity from the core and plant.

Radiation exposure (to workers and the general public)

Radiological protection is identified as one of the 15 principle processes within our Company.

We have dedicated radiological protection personnel and a radiological protection programme in place to set standards, measure compliance and drive continuous improvement. Many of the improvements that have been introduced over the last five years would not have been possible without management support and financial investment in the radiological protection programme.

We have adopted a 'programme of health' based on WANO's performance objectives and criteria, together with a set of performance metrics that are reviewed and reported quarterly. Regulatory compliance is monitored by an internal control process linked to the 'programme of health'. Anomalies that are identified are analysed, reported and addressed.

Our radiological protection improvement plan focuses on processes, training, instrumentation, manpower and benchmarking. The plan is aimed at addressing performance gaps and replicating best practices across the fleet. We measure delivery and station implementation.

Independent corporate surveillances are undertaken at stations to assess the adequacy of radiological protection outage programme control measures and to assess progress to implement radiological protection improvement plans to the fleet standard.

Radiological protection of workers is paramount in the planning and execution of work involving ionising radiation. Work is fully justified in terms of its net benefit and risks from work with ionising radiations are assessed within a formal process linked to all work performed. A radiological risk assessment is performed for each task performed inside the Radiological Controlled Area by a radiation safety engineer and radiological safety work permits are issued to personnel that specify radiological precautions. All work activities are planned, specified and implemented in such a manner as to ensure that individual and collective radiation doses are maintained as low as reasonably practicable (ALARP).

Training and instruction is provided to equip workers with the knowledge required to work safely in Radiological Controlled Areas. Workers undergo induction training and job orientation. In addition, simulator training has been developed to train personnel and contractors to an agreed standard covering fundamental requirements for working in and exiting contamination areas. Mock up training facilities have also been provided which simulate the reactor and plant. These help to train workers to safely execute work in high risk radiological areas. This training has resulted in improved standards and has contributed to reducing the radiation dose that workers receive.

Controls and supervision are provided to oversee the safety of persons required to enter Radiological Controlled Areas. A 'meet and greet' programme has been implemented at the entrance to Radiological Controlled Areas to assess whether workers fully understand the radiological safety requirements for their intended work.

Coaching is encouraged in Radiation Controlled Areas to correct sub-standard practices and behaviours and radiological protection coaching cards and a coaching database have been introduced.

Workers are expected to adhere to radiological protection rules, minimise the dose they accrue, limit the generation of radioactive waste and to correctly use Personal Protective Equipment and monitoring instrumentation.

Any workers who purposely disregard radiological protection rules or instructions will, in the interest of their own and other workers' safety, be barred from entering Radiological Controlled Areas until their management has instituted remedial action to prevent a recurrence.

Whenever practicable, engineered and physical control measures are employed to minimise radiological risks in the work place.

Adequate radiological protection monitoring instrumentation and Personal Protective Equipment is provided to ensure the safety of workers. An instrumentation replacement programme was instigated, for installed and portable radiation and contamination instrumentation, to provide an improved monitoring capability. Obsolescent personal contamination exit monitors will be replaced at all sites by the end of 2011. The new exit monitors are far more sensitive and their settings are aligned to international standards.

Portable radiological protection instrumentation has systematically been replaced to a common fleet standard. Improved Personal Protective Equipment for work in Radiological Controlled Areas is progressively being replenished by all stations.

All sites use an Electronic Personal Dosemeter which measures radiation dose and warns the wearer if pre-determined dose levels are exceeded. Teledosimetry systems, which can be used to remotely monitor the dose received by workers, have been introduced for work in high radiation dose rate areas.

Tool stores are being established to limit the quantity of equipment taken into the Radiological Controlled Areas. This improvement reduces the manpower required to monitor and clear the equipment from the areas and lowers the risk of inadvertently releasing contaminated equipment.

Together with our contract radiography companies there is alignment with new standards for radiography, that incorporates industry best practices (such as close proximity radiography) with training and learning points from past radiography events. Currently 84% of radiography inspection work is undertaken by close proximity radiography which significantly reduces the radiation risk from this type of work.

Corporate and station ALARP committees periodically review radiological performance with the objective of improving radiological protection standards and reducing radiation dose to workers.

We have never had an incident resulting in a significant uptake of radioactivity by a worker and no worker has received a radiation dose above the legal limit. In the unlikely event that a worker be exposed to a dose above the statutory dose limit reporting procedures are in place and specialist staff would be engaged in counselling the individual about the dose received. However at these levels no specialist treatment would be required. Should the dose to the individual be truly excessive then there are specialist hospitals designated for the treatment of casualties exposed to very high levels of radiation and the individual would be referred to one of these for treatment.

EDF Energy station collective radiation dose performance is among the best in the international nuclear industry.

Radiation dose to the public

We identify and plan those operations that are associated with the identified significant environmental aspects consistent with its environmental policy, objectives and targets, in order to ensure that they are carried out under specified conditions by:

- Establishing, implementing and maintaining a documented procedure(s) to control situations where their absence could lead to deviations from the environmental policy, objectives and targets;
- Stipulating operating criteria in the procedure(s); and
- Establishing, implementing and maintaining procedures related to the identified significant environmental aspects of goods and services used by EDF Energy Nuclear Generation and communicating applicable procedures and requirements to suppliers, including contractors.

Each operational site has Environmental Specifications (ESPECS) that are the mechanism for satisfying the above requirements in the Central Control Room. These cover both radiological and non-radiological processes.
Each operational site has an Environmental Maintenance, Inspection and Testing Schedule (EMITS) associated with environmentally sensitive plant and significant aspects.

We subscribe to a number of other non-legislative other requirements e.g. The Nuclear Sector Plan (a collaborative project between the Environment Agency and the whole nuclear industry that plans to reduce the impact of the nuclear sector on all aspects of the environment, going well beyond the requirements of environmental legislation), ISO14001 and Biodiversity Action Plans.

The company's Environmental Management System (EMS), and all its supporting specifications, forms part of the Company Management System and utilises recognised company processes where practicable.

Broadly there are two types of environmental documents that make up the EMS. The first type describes specific environmental processes that are generally applicable to all environmental regimes e.g. maintenance and operation of equipment and training of staff. The second type specifies how the company complies with particular "major" environmental legislation.

Each site maintains documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant environmental impact.

The procedure(s) include the recording of information to monitor performance, applicable operational controls and conformity with the Company's environmental objectives and targets.

Centrally, the Environment Department monitor, measure and report each sites' and the overall fleet environmental performance.

Security

EDF Energy Nuclear Generation takes security seriously and recognises that people working in our industry and the public at large, are entitled to a safe and secure environment. Our security staff are routinely trained, exercised and developed and our security systems are subject to regular and routine review and evaluation.

The framework for Nuclear Security in the UK is provided by the Office for Nuclear Regulation (Civil Nuclear Security); who is the security regulator for the UK's civil nuclear industry.

ONR conducts its regulatory activities on behalf of the Secretary of State for Energy and Climate Change (DECC) under the authority of the Nuclear Industries Security Regulations 2003 (NISR 03) - as amended 2006. It works in close conjunction with nuclear security policy officials in DECC and with other government departments and agencies, and with overseas counterparts. It is responsible for approving security arrangements within the industry and ensuring compliance with NISR 03 which is enforced in the form of a Security Policy Framework, based upon a specialist Technical Requirements Document for physical security and ISO 27002 controls with specialist modifications for Information and IT Security.

Through our Nuclear Generation Corporate Security function, we have implemented a management system, comprising physical, logical and personnel controls, supported by processes, standards and guidelines, which meet both our business and regulatory commitments. Staff are made aware of, and appropriately trained in, this management system; in particular in terms of their individual security responsibility, regulatory compliance and event reporting. The system also demonstrates how EDF Energy Nuclear Generation achieves compliance with nuclear site licence conditions and applicable security regulatory and legal requirements as well as meeting the prime security requirements of the business.

Our approach to security is risk based and designed to make certain that appropriate and proportionate controls are implemented; to ensure a safe and secure environment is maintained. The perceived security risks are subjected to regular internal review. The risk profile covers all the perceived security threats to the business from normal crime and malicious behaviour through to protestor disruption, cyber security and terrorism. As part of our process of continuous improvement, the security regimes are routinely reviewed and developed in the light of operational experience at home and abroad and make appropriate use of developing technologies, capabilities and processes.

Nuclear waste policy

General and operational waste

EDF Energy's number one priority is safety and we strive for a Zero Harm Record, in order to ensure this is achieved our policy is to be compliant with the UK law at all times and to conform to UK Government policy. The nature of EDF Energy Nuclear Generation's business in the UK and its historic government link mean that the strategy for spent fuel and radioactive waste management from EDF Energy Nuclear Generation's power stations is owned and managed by the Nuclear Decommissioning Authority. This does not mean that EDF Energy does not have policies to continually improve and minimise the spent fuel and waste arisings but this is done through our wider safety, sustainability and environmental policies.

EDF Energy Nuclear Generation's Environmental Policy

EDF Energy Nuclear Generation has implemented an Environmental Management System (EMS) across the entire scope of the business which is certified to the ISO14001 standard.

This Environmental Management System is built around an Environmental Policy which includes a policy statement that seeks to reduce the generation of all types of waste, both conventional and radioactive, to a practicable minimum.

As a business whose prime activity is the generation of electricity from nuclear power, EDF Energy Nuclear Generation must demonstrate high standards of performance in the way we ensure safety and protect the environment. Recognising our duty to care for the environment, we have a special obligation to assure our nuclear power stations are operated in a manner that safeguards the public and the environment.

Our goal is to achieve excellent environmental performance throughout EDF Energy Nuclear Generation. We recognise that compliance with regulations is not enough on its own to achieve excellence and we hold ourselves to a higher standard.

EDF Energy Nuclear Generation will seek continuous improvement in our environmental performance and comply with all applicable legal and other requirements, by:

1. Reducing the environmental effect of our activities, products and services to a practicable minimum by the prevention of pollution, **reduction of waste** and the efficient use of resources;
2. Promoting the efficient use of energy;
3. Continuing to develop a sense of environmental responsibility among staff and contractors;
4. Openly reporting performance against environmental targets;
5. Assessing the impact of our operations on biodiversity and implementing opportunities for enhancement.

To remain certified to the ISO14001 standard EDF Energy Nuclear Generation must periodically demonstrate that they have taken action to improve the performance of their environmental management system.

As far as reasonably practicable from a technical and economic standpoint the following key areas to meet our commitments are also implemented:

- Use of reprocessed uranium in our existing fleet of power stations.
- Reduction of generated radioactive waste and spent fuel

EDF Energy is committed to working on future improvements in spent fuel and waste management and as such a working group including EDF SA, Nuclear Generation and Nuclear New Build has been established reporting to the CEO of EDF Energy. The mission of this group is to

- Share experience for a better management, by both EDF SA and EDF Energy of their respective national issues,
- Constructing a common knowledge base that will be required for defining future larger group strategies.

Two key areas of interest at present are the reprocessing and/or long term storage option for spent fuel and the potential for different waste management options including VLLW (Very Low Level Waste). These areas are reviewed as technologies and capabilities develop. EDF Energy continues to review the options for reuse of spent fuel material in future reactor designs and is continuing to work with our nuclear partners investing in possible technologies.

EDF Energy is committed to continuous improvement in all areas of its business including its Nuclear Fuel and Waste Management.

Spent fuel

EDF Energy is committed to applying the principles of sustainable development to all its activities. Within Nuclear Spent Fuel this means.

- Giving the highest priority to safety and to protecting people and the environment, and playing a leading role in the drive for continuous improvement in these areas across the worldwide nuclear industry.
- Maintaining responsibility for managing our wastes including working with Government, NGO's and others to demonstrate real progress towards implementing a long term UK radioactive waste solution for the industry
- Ensuring there is both the funding and know how available to future generations to deal with the decommissioning and waste management needs of our stations
- Being open and transparent in these businesses and demonstrating we can be trusted to act to the highest professional standards in relation to nuclear security issues
- Not allowing nuclear materials from our business to be used for non-peaceful purposes. – This is a legal requirement in the UK.
- Supporting development within the UK of the skills necessary to sustain these nuclear businesses through our work with schools, universities and other bodies.

EDF Energy Nuclear Generation is demonstrating the above through numerous programmes of work and control systems, these include:

- Continuous learning though the active engagement in a Corrective Action Programme (CAP), Operational Experience (Opex), Self Assessment and Benchmarking programmes to support our continuous improvement across our entire nuclear business.
- Research and development of new fuel types and designs to improve efficiencies and fuel utilisation to minimise spent fuel arisings.
- Investment in Post Irradiation Examination (PIE) of fuel and components to ensure our plants are operated as safely and efficiently as possible.
- Nuclear Material Accountancy, which ensures that all EDF Energy nuclear material is accounted for at all times.
- Supporting our Nuclear Power Academy through provision of expert knowledge for training of our staff, contract partners and other organisations who are involved in the handling, transportation, storage and management of spent fuel and waste.

Decommissioning and waste

The company as owner operator and licensee is responsible for ensuring the safe decommissioning of all our power station sites. The company decommissioning policy, strategy and plans have evolved over a number of years and have been developed using multi- attribute decision analysis to ensure that the Best Practicable Environmental Option (BPEO) is being pursued. The strategy and plans taking due consideration of the nuclear, industrial and environmental safety implications. The company policy and strategy objective of decommissioning is to return the power station sites to a state suitable for unrestricted alternative use.

It should be emphasised that EDF Energy remains responsible for the decommissioning of our existing power station sites. The responsibility for discharging all aspects of the decommissioning works and management of the associated wastes rests with EDF Energy. (The decommissioning responsibility **does not** transfer to the Nuclear Decommissioning Authority (NDA) following end of generation). The role of the NDA, as agent for UK Government/ SoS, is to administer the Liabilities Management Agreements, including the approval of Nuclear Liabilities Fund (NLF) payments for decommissioning and waste management.

The funding for EDF Energy Nuclear Generation power station Decommissioning and waste management coming from the

- Nuclear Liabilities Fund (NLF)
- EDF Energy /EDF Group Accounts

The decommissioning strategy, policy and plans are subject to regular review. At minimum, a 5 yearly review of the plans is undertaken. In practice, to date, the review /revision has been on a greater frequency. This commitment to review ensures the plans reflect best practice, take advantage of Operational Experience (OPEX) from ongoing decommissioning projects and remain consistent / aligned with national and international policy, legislation and best practice.

The strategy and plans reflect the relevant OPEX from decommissioning of other power stations in the UK and internationally. In developing our decommissioning plans and strategy EDF Energy has worked with experienced contractors involved in Magnox fleet decommissioning and international decommissioning projects. We aim to ensure OPEX on decommissioning relevant to our Nuclear Generation Fleet is reflected in our associated plans and approach. Hence, the company also actively participates in a range of Industry decommissioning forums, including those focussed on associated research and development into decommissioning and waste management.

It should be noted that, no decommissioning has yet been carried out for any of our EDF Energy Nuclear Generation power station sites. Power station decommissioning, following a planned end of generation, remains some years off. However, detailed baseline decommissioning plans for each of our power stations are in place. These plans have been developed over a number of years / iterations and have been formally approved by our regulators and NDA.

The detailed Baseline Decommissioning Plans (BDPs) include sites specific detail on each individual decommissioning activity and process including the requirements to transition from an operational site to a decommissioning site following end of generation. The transition from operation to decommissioning includes consideration of the associated resourcing and training requirements.

The BDPs include detailed decommissioning work scope, schedules, costs and include a comprehensive decommissioning radioactive waste inventory – which is the basis for the company's annual inventory return. The inventory of decommissioning waste being reported in the national UK radioactive waste inventory, the latest edition being "The 2010 UK Radioactive Waste Inventory - Main Report, NDA/ST/STY(11)0004, February 2011".

The estimates of decommissioning waste inventory are robust and based on comprehensive waste assay and characterisation. The decommissioning waste inventory will be maintained and formally reported throughout the decommissioning period to reflect the actual, in practice, waste inventory as it arises. This OPEX will be used to refine any subsequent decommissioning waste estimates.

It should be noted that a programmatic approach to the decommissioning of the Nuclear Generation sites has been developed to ensure synergies and opportunities for cost and waste reduction, etc across the fleet are enabled.

The potential impacts of the company's operational activities on decommissioning are a key consideration. For example all engineering changes to plant or processes are formally assessed to consider the potential implications to decommissioning, decommissioning wastes and the associated liabilities. In addition, the company carries out an annual review of any potential impacts of power station operations on decommissioning and liabilities and formally reports this to the NDA within the Annual Liabilities Report: Part 1" (ALR1),. The ALR1 provides a formal route for recording changes in our Nuclear Generation decommissioning and waste liabilities which may have occurred over the previous financial year. Any impacts of engineering changes, operational changes and events etc, during the operational period are assessed for potential to impact on decommissioning.

The company is focused on ensuring that there is no breaches in minimum performance standard which would potentially result in a detrimental impact to decommissioning (increase cost, wastes etc)

Decommissioning and waste in the context of Nuclear New Build (NNB)

EDF Energy is developing plans to build 4 European Pressurised Water Reactors (EPR) in the UK through NNB GenCo, a consortium with Centrica plc. All new nuclear build undertaken by the Company will be subject to a corporate decommissioning policy and strategic objectives.

The decommissioning requirements (including radioactive waste management) of our proposed EPR power stations are a key consideration for their design, construction and operation. EDF Energy / NNB GenCo is committed to construction, operation and the ultimate decommissioning of new build power stations in a manner which minimises its impacts on workers, the public and the environment.

EDF Energy / NNB GenCo will ensure environmental optimisation through the application of Best Available Techniques (BAT), which will be applied at all stages of the project lifecycle from design and procurement through operation to decommissioning and site restoration.

The new build power stations will be designed and built with maintenance and decommissioning in mind, enabling radiation doses to workers and radioactive waste quantities to be minimised when decommissioning takes place. More specifically the design incorporates a number of features which will

- minimise the activity level of irradiated components;
- reduce worker dose during decommissioning;
- permit easy decontamination;
- minimise the spread of contamination;
- facilitate the access of personnel and machines for decommissioning and the removal of waste from the reactor building;
- minimise the volume of radioactive waste;
- reduce the operator intervention time; and
- minimise the toxicity of the waste.

EDF Energy / NNB GenCo will ensure that wastes generated at all stages of the project lifecycle from design and procurement through operation to decommissioning and site restoration will be minimised through application of the waste hierarchy and in accordance of the principles of integrated waste management .

EDF Energy / NNB GenCo will develop a documented integrated waste strategy which will include the management of all wastes and discharges, both radioactive and non-radioactive, arising from the full range of activities planned over the whole lifecycle of the site.

EDF already undertakes extensive reviews of operational experience and feedback with respect to waste management. NNB will continue this process into the construction and operational phases of the EPR and eventually into decommissioning. This will include not only reviews of performance at the installation but comparison with other PWRs operated by EDF, the EDF Energy Nuclear Generation fleet in UK and other reactors worldwide.

Nuclear waste management systems

Operational waste

The responsibility for radioactive waste management on the EDF Energy Nuclear Generation nuclear licensed sites rests with EDF Energy Nuclear Generation Limited as Licensee. The safe management of radioactive waste on nuclear licensed sites in the UK is regulated by the Health and Safety Executive's (HSE) Nuclear Installations Inspectorate (NII) under the Nuclear Installations Act 1965 (as amended). The disposal of radioactive waste is regulated by the Environment Agency (EA) in England and in Scotland by the Scottish Environment Protection Agency (SEPA). The Office for Nuclear Regulation (ONR) grants a Nuclear Site Licence for each nuclear site, a number of conditions of which are relevant to the management of radioactive waste.

In the UK, nuclear waste is classified under three headings: Low Level Waste (LLW), Intermediate Level Waste (ILW) and High Level Waste (HLW). Examples of LLW are redundant equipment and waste from maintenance activities, plastic, rubble and damaged protective clothing from nuclear power stations. It is either sent for treatment (e.g. volume reduction by supercompaction) or disposed of at the Low Level Waste Repository (LLWR) in Cumbria, and a small amount of combustible waste is sent for incineration at Hythe. Intermediate level waste includes such things as sludges and resins arising from the treatment of radioactive liquids and filters from active ventilation systems. The ILW produced at our power stations is stored for the medium term in safe, purpose built facilities at our stations while we await a longer term National solution. Under historic contractual arrangements spent fuel from our Advanced Gas-cooled Reactors (AGRs) is transported to Sellafield for reprocessing or storage, and spent fuel from our Pressurised Water Reactor (PWR) remains on our site. HLW comes from the reprocessing of our AGR spent fuel at Sellafield. HLW contains high levels of radioactivity which generates large amounts of heat. It is initially produced in liquid form and is converted into glass blocks for safe, long term storage at Sellafield, there is no HLW stored at any of our sites. Spent nuclear fuel is not currently classified as a waste since it can be reprocessed and re-usable uranium and plutonium can be extracted. However, unreprocessed spent fuel will require disposal in a similar way to HLW because of the amount of heat that it creates. At our Sizewell B PWR station, the spent fuel is stored on site and we are planning to build a further storage facility to allow us to continue to safely store all of the spent fuel that will be generated over Sizewell B's life.

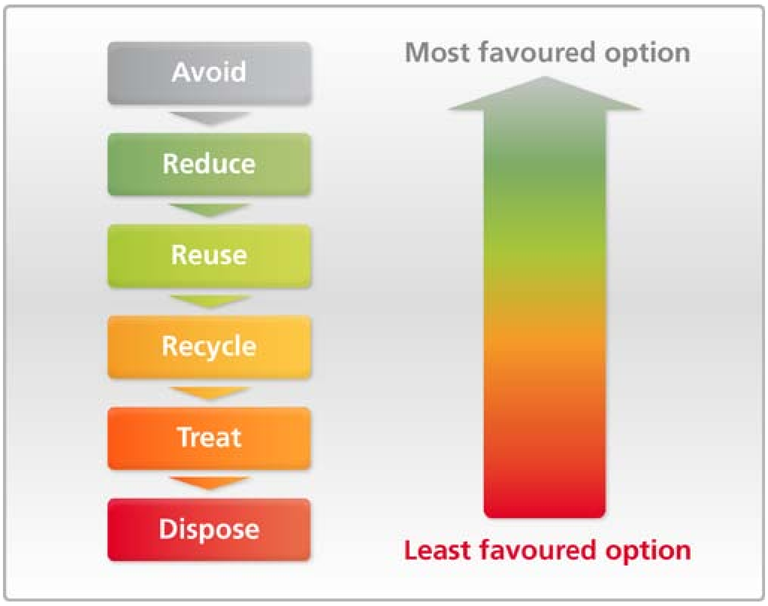
EDF Energy Nuclear Generation has developed two key documents which form part of the Environmental Management System and together define the fundamental arrangements for radioactive waste management.

The first document defines the waste management techniques that will aid EDF Energy Nuclear Generation's sites to minimise the production and disposal of lower activity radioactive wastes, predominantly those that are LLW. This document presents information on available treatment and disposal routes for lower activity radioactive wastes and makes recommendations for:

- Minimising waste arisings and use of the waste hierarchy;
- Segregation and streaming of waste;
- Processing and treatment techniques;
- Storage, packaging and transport requirements;
- Waste radioactivity assessment procedures.

The waste hierarchy is commonly used by EDF Energy Nuclear Generation to inform decisions on matters of radioactive waste management. The hierarchy goes beyond the requirement to minimise the generation of waste but also ensures that any wastes that do arise are sent down the most appropriate route according to the hierarchy (see Figure 3):

Figure 3: Diagram of the Waste Hierarchy



The most favoured option is to look for ways to avoid creating waste in the first place, however, if waste needs to be created then it is important to minimise the overall amounts that need to be managed. Items should always be used again wherever possible, for example certain items can be used only during outages, but rather than dispose of them at the end of the outage they are stored and then re-used again at the next outage.

Once an item comes to the end of its life it is important to see if the waste can be recycled, and in the case of some radioactive metals, this is now possible. Energy recovery from the waste would be the next preferred option, though very limited options to do this exist, and there are none currently that the Company has access to. The final and least desirable option is to dispose of the waste, there are however, a variety of options available depending upon the waste type and its characteristics and many wastes can be treated prior to final disposal, for example to reduce the final amounts that are disposed of.

The second document outlines the strategy for the management of all radioactive waste streams generated by EDF Energy Nuclear Generation's sites and provides guidance to ensure that a consistent safe approach is adopted in the taking of decisions on radioactive waste management matters. This covers material from the point where it is initially classified as waste, through to final disposal, through some or all of the following steps:

- Waste Arising
- Accumulation
- Storage
- Retrieval
- Conditioning
- Interim Conditioned Storage
- Transport
- Disposal

The document sets out the following objectives:

- To maintain radiation doses to the workforce and the general public from radioactive waste management operations, including disposal, within legal limits and As Low As Reasonably Practicable (ALARP).
- Apply best practicable means (BPM) to ensure the generation of radioactive wastes is minimised as far as is reasonably practicable.
- To dispose of all wastes as soon as practicable where a safe and economic route has been established.

- To maintain adequate safety cases for all waste management activities including handling, accumulation and storage of wastes on Nuclear Generation sites.
- To develop the technology and processes required for the safe retrieval, treatment, packaging, and interim storage of wastes.
- To co-operate with other UK waste producers on radioactive waste policy and strategy issues, and manage major stakeholder relationships effectively.
- To maintain an inventory and records of radioactive waste arisings accumulations.

And the following principles:

- Waste will at all times be adequately controlled and/or contained so that it cannot leak or escape
- Waste will be accumulated and stored in a manner that is safe and consideration will be given to the benefits of passive safety
- Waste will be characterised in terms of the rate of arising, the chemical, physical and radiochemical composition and inventory records will be maintained
- Waste with different chemical, physical and radiochemical properties will be segregated where practicable
- Volume reduction and decontamination techniques will be employed where practicable
- Waste for which there is no available disposal route will be accumulated, conditioned and stored as appropriate pending the availability of a disposal route
- The condition of accumulated waste will be monitored in accordance with site licence requirements
- For each waste stream the optimum method and timing for the retrieval, processing and packaging will be determined, taking account of safety, costs, the availability of a disposal route, the decommissioning strategy, and non foreclosure of future options
- Methods of packaging and conditioning wastes are expected to be acceptable for final disposal

In addition to complying with and maintaining a certified Environmental Management System EDF Energy Nuclear Generation dedicates resource specifically to driving improvement in the area of radioactive waste management; the principle objectives being to:

- Optimise the onsite management and processing of waste.
- Station radioactive waste management facility and equipment improvements
- Implementation of training
- Ensure optimal use is made of existing treatment and disposal routes.
- Incineration
- Waste processing services offered by the supply chain
- Metals recycling
- Supercompaction
- Collaborate with providers of radioactive waste management services to establish new improved waste disposal routes
- Determine the Best Practicable Environmental Option (BPEO) for new waste streams
- Update existing radioactive waste management strategies to ensure that they remain the BPEO
- Collaborate with the regulator and other government organisations to aid implementation of the UK radioactive waste policy
- Reduce volumes of radioactive waste stored at EDF Energy Nuclear Generation locations

Recent successes in this area have included:

- The introduction of a new waste processing route which enables the decontamination of radioactively contaminated metal. This substantially reduces the volume of waste being sent for final disposal at the UK LLWR in Cumbria by up to 95%. The decontaminated metal is clean enough to be recycled and sold for general use. This route has been utilised by three of EDF Energy Nuclear Generation's power stations and is being rolled out across the remainder of the fleet.
- EDF Energy Nuclear Generation's Advanced Gas Cooled Reactors (AGR) are cooled by Carbon Dioxide (CO_2) which must be must be maintained within set moisture concentration parameters in order to comply with the safety case. Moisture control is performed by drying towers which require periodic desiccant replacements. The options for managing spent desiccant were reviewed in 2009. This review, which was supported by laboratory scale and full-scale trials, identified a new method for processing and disposal that reduced the final disposal volume by approximately 50%. Further

improvements were identified during 2010 reducing the final disposal volume by a further 20%. EDF Energy Nuclear Generation is in year 2 of a programme of work to implement this improved waste management strategy at its gas-cooled power stations. Work is currently being undertaking to identify / improve the waste disposal methods for several other waste streams in 2011.

To the extent EDF Energy Nuclear Generation carries out activities relating to waste management – e.g. minimisation, handling and packaging prior to shipment, these activities are carried out by Suitably Qualified and Experienced Personnel. These personnel receive training specific to their duties. This training would include use of Best Available Techniques (BAT) to minimise Waste and Radiological risks. Waste metrics and reduction goals are set, reviewed, and monitored regularly thereby demonstrating a commitment to continuous improvement in the area.

EDF Energy has plans to build a new generation of nuclear power plants in the UK. Prior to any investment decision in new plants, EDF Energy would seek to ensure that the plant designers have taken into account BAT in order to minimise the nuclear waste arising from future decommissioning of their plant designs.

Spent fuel

The responsibility for spent fuel on the EDF Energy Nuclear Generation nuclear licensed sites rest with EDF Energy Nuclear Generation Limited as Licensee. The safe management of spent fuel is a primary focus in delivering safe operation and our Zero Harm targets.

Spent Fuel is handled under carefully controlled conditions and the process is managed and operated by suitably qualified and experienced personnel (SQEP). The spent fuel management on station includes dismantling, cooling, temporary storage, containment, loading for transport and finally despatch off-site. The processes for spent fuel management on station are unique to individual stations to maximise safety and efficiencies on site, the operation and maintenance of the transport flask is set and controlled via the Package Operations and Maintenance Manual (POMM) the requirements of which are incorporated into station working documentation.

All of these processes are carried out under controlled procedures to ensure safety and compliance at all times. The processes are constantly reviewed by the SQEP individuals carrying out the tasks and any improvements are identified via the EDF Energy Nuclear Generation CAP system.

The participation in the CAP, OPEX, Self Assessment and Benchmarking processes underpins the continuous improvement which is present in all Nuclear Generation activities including Spent Fuel Management.

The Operational Experience from the EDF Energy Nuclear Generation business is not only used internally but shared with the rest of the global nuclear industry to ensure that lessons are learned and the opportunity for improvement is a global opportunity. EDF Energy Nuclear Generation also actively reviews Operating Experience from not only the UK Nuclear Industry but also the rest of the world and we have nominated individuals to ensure that these areas of learning and opportunities for improvement are maximised. Operating Experience is available via internal IT systems and is also discussed at Pre-Job brief and regular team briefings.

Changes to the management system for spent fuel can often have an impact on other companies and organisations and so the changes to the system are communicated to other organisations and EDF Energy Nuclear Generation actively participates in training of not only our own staff and contract partners but also in the training of other organisations by providing both training material and SQEP individuals to deliver training and support.

A process for loading, cleaning and monitoring the flasks to verify that they are radiologically compliant is followed. These processes are carefully carried out and documented to ensure that safety, security and compliance is maintained at all times.

Spent Fuel from our fleet of AGR stations is transported to Sellafield for either reprocessing or long term storage in line with the government policy managed via the Nuclear Decommissioning Authority (NDA). The transport of this fuel represents a key activity as the fuel enters the public domain. The operation and maintenance manual for the transport flask is a centrally controlled document to ensure safety and compliance of the transport flask and its contents at EDF

Energy Nuclear Generation sites, Sellafield and in the public domain. All personnel operating the flasks are trained to do so and any changes to the required procedures are briefed and appropriate training provided. A specialist role exists for personnel who consign radioactive materials; this role requires specific training on a nationally recognised training course. EDF Energy Nuclear Generation has a dedicated central team to manage the logistics of movements of fuel and the maintenance and compliance of the transport flasks. This team of SQEP individuals is trained in all aspects of the movement of fuel transport flasks and is focused on safety, security and compliance issues.

Regular inspections of these processes are undertaken not only by EDF Energy Nuclear Generation's internal regulation but also by the UK Regulator for nuclear material transport.

EDF Energy also participates in Nuclear Industry working groups to investigate and address industry opportunities for improvement in both the management of spent fuel and its transportation.

EDF Energy monitors performance of the systems described above and the performance and progress is reported internally and to the relevant Regulator.

Decommissioning and waste

Spent Fuel Management during decommissioning

Currently all spent fuel from the Advanced Gas-cooled Reactors (AGR) is transferred off-site to Sellafield for long-term storage or reprocessing. For Pressurised Water Reactors (PWR) (Sizewell B) the current long-term spent fuel management plans include a purpose built facility at Sizewell site. The spent fuel will be stored on site until national facilities are available for off-site disposal of fuel.

Radioactive wastes that arise during decommissioning will either be stored or disposed of depending on the availability of appropriate disposal routes, in accordance with Government policy that radioactive wastes will be disposed of where a disposal route exists.

The Low Level Waste Repository (LLWR) site near Drigg in Cumbria is currently available for the disposal of operational and decommissioning LLW within the constraints of its acceptance criteria and is expected to remain operational until at least 2050. It is Government intent that a National Repository (Geological Disposal Facility (GDF)) for ILW will be constructed, although it is presently not expected to be available before 2040.

EDF Energy's decommissioning plans detail the sequence for dismantling the stations and calculate the amounts of radioactive and non-radioactive material that will be created. These plans use sustainability and recycling principles to ensure materials created are stored, recycled and disposed in manner consistent with safety and environmental legislation. In this context "disposed of" reflects the strategic end point assumption for the waste when the waste has been conditioned /packaged, emplaced within the GDF and the GDF facility is closed. For the waste strategic end point - waste disposed of to GDF - there are no alternative strategic options - this is the end state.

The inventory of materials projected for EDF Energy during decommissioning periods is contained in the latest publication of the National Inventory Statement (The 2010 UK Radioactive Waste Inventory - Main Report, NDA/ST/STY(11)0004, February 2011).

Management systems description

EDF Energy document (BEG/ICP/NFL/001, January 2011) specifies the arrangements by which decommissioning of our power stations will be controlled to ensure compliance with all statutory and mandatory requirements. It describes the regulatory compliance (Site Licence), interface requirements and arrangements necessary for managing decommissioning at EDF Energy Nuclear Generation's power stations.

Radioactive wastes will be managed in accordance with the Corporate Radioactive Waste Management Strategy and the BEG Integrated Company Practice for Environmental Compliance and Management.

EDF Energy Nuclear Generation is accredited to ISO 14001 for all of its power stations. In addition, the Sizewell B plant has attained registration to the European Eco-Management and Audit Scheme. This demonstrates that environmental concerns are fully integrated in EDF Energy's business, and within the Company there are a number of teams and specialists whose role it is to investigate and define environmental policies, strategy, standards and procedures. Others monitor the compliance against targets and provide advice on best practices to achieve them.

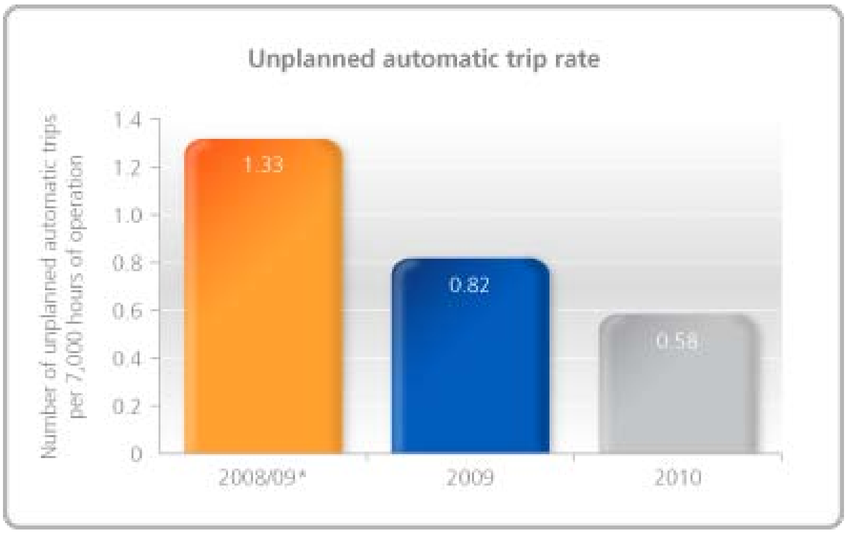
The Company's environmental policy will continue to apply to its decommissioning sites.

Nuclear safety and waste data

Safety

Unplanned plant shutdowns

The unplanned automatic trip rate (UATR) is the number of unplanned automatic trips per 7,000 hours of operation as defined by the World Association for Nuclear Operators (WANO). A low figure indicates that the reactor is controlled well within its safety limits and is operating reliably.



**British Energy reported its CSR data based on its financial year ended 31 March. EDF Energy reports its performance based on the calendar year.*

Following the indications of a deteriorating trend in our 2008/2009 UATR performance, a comprehensive fleet level review was conducted into the reasons for this adverse outcome and improvements plans were put in place. This has resulted in significant improvement. The overall UATR for all our nuclear stations at the end of the calendar year 2010 was 0.58. The long term trend since 2003/2004 continues to improve.

Incidents and events

Over the last 5 years, the reactors operated by EDF Energy Nuclear Generation have seen an overall safety improvement linked to a major effort to upgrade the facilities and a strong emphasis on further improving equipment reliability and operational focus. The rate of occurrence of events related to the INES level events and Nuclear Reportable Event indicators is less than one event per reactor-year of operation - and represent minor failures in very reliable plant and management systems to protect safety and maintain legal compliance. Fluctuations from year to year in the number of such events are expected and efforts to improve our arrangements and reduce the incidence of these events further are continuing.

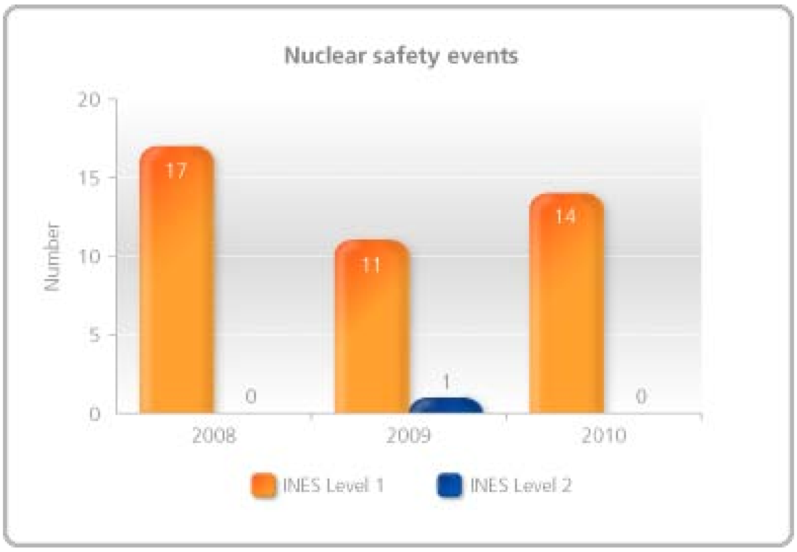
Number of Nuclear Safety Events

The International Nuclear Event Scale (INES) is a rapid alert system used for consistent communication of events across the nuclear industry. These are categorised between Level 1, which is an anomaly with no impact on the safety of the general public or workforce, and Level 7 which represents a major accident. There has been no nuclear safety events rated above INES Level 2 from EDF Energy Nuclear Generation's power stations.

During 2009 we had one nuclear safety event rated INES Level 2 which is classed as an incident with minor consequences to people or facilities, but where the measures put in place to prevent or cope with accidents did not operate as intended.

The INES Level 2 incident occurred at our Dungeness B power station during the construction of a new fuel assembly. Whilst a fuel assembly is the completed series of fuel components used in the core of an Advanced Gas Cooled Reactor Power Station, the incident did not concern the reactor in any way. In the process of connecting a new fuel assembly to the supporting fuel plug unit a piece of rubber was, on a procedural check, found trapped in the coupling preventing the two sections from joining correctly. As part of the recovery process polyurethane foam was injected below the suspended fuel assembly to minimise the potential drop height in the event of a de-latch. Subsequent analysis of the foam showed that its use was not permitted under the power station's operating arrangements. The foam did not come into contact with the fuel assembly and the coupling did not fail.

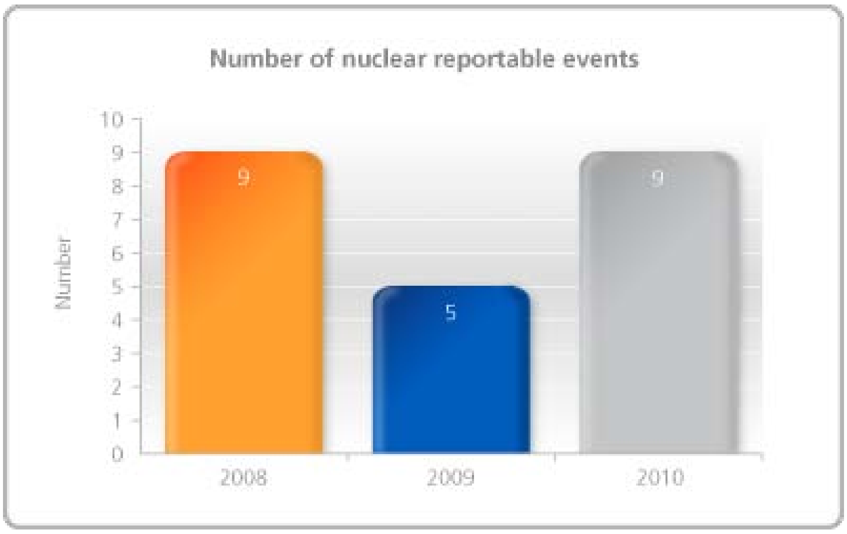
There was no impact on the safety of the workforce at the station or the public at large. There was no release of radioactivity or any damage to the plant. This incident was reported to the safety Regulator, with which the operator has co-operated, and has been thoroughly investigated. Company wide improvements have since been made.



Nuclear Reportable Events

Our site licences require comprehensive arrangements for reporting and investigating incidents occurring at our power stations to our regulator, the Office for Nuclear Regulation (ONR). The most significant of these are known as Nuclear Reportable Events (NRE).

The NRE and the events rated at Level 1 or 2 on the INES are distinct but overlapping sets of events. Within EDF Energy Nuclear Generation a vast number (~50,000) of 'conditions adverse to quality' are reported each year. Each of these reports is categorised and sentenced either to immediate action, to further investigation or for data trending. A very small number of events are identified as requiring formal reports to the ONR under our Site Licence Compliance arrangements or the reporting requirements of responsible government departments. These are the 'Nuclear Reportable Events'. Each such event will be rated on the INES but because the reporting is determined by the type of event rather than its severity some may be rated at INES Level 0. A wider range of events are notified to the ONR and / or other interested parties and all such events whose descriptions are potentially public receive an INES rating. This means that some events which are not 'Nuclear Reportable' may nevertheless be rated at INES Level 1.



Radiation exposure (to workers and the general public)

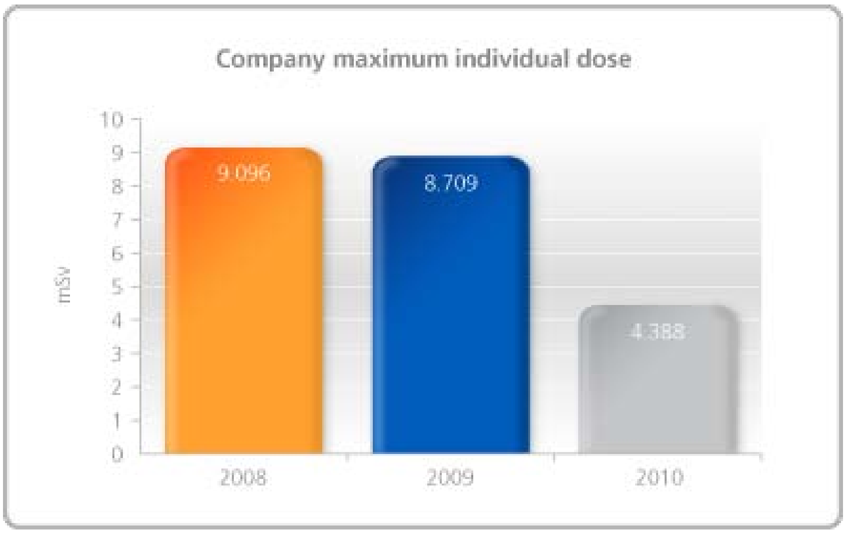
Collective Radiation Exposure (Dose)

We operate to strict procedures to minimise, reduce and control the radiation doses received by all our employees and contractors at all of our nuclear power stations. Any worker required to enter a radiological controlled area is issued with an electronic personal dosemeter which measures radiation dose and warns the wearer if pre-determined dose levels are exceeded. Radiation dose is measured in units of milliSieverts (mSv). The legal dose limit is 20 mSv per year and we operate to a Company Dose Restriction Level of 10 mSv.

In calendar year 2010, the average individual dose received by all our employees and contractors on our sites was 0.042 mSv (this is 0.21% of the legal limit).

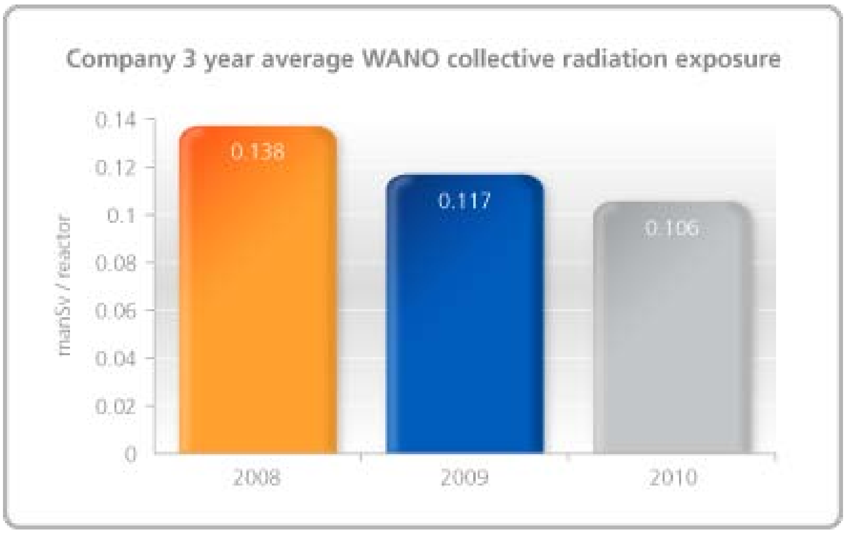
The trend reduction for 2009 compared to 2008 was improved worker practices and control primarily for Advance Gas-cooled Reactor (AGR) in vessel work. The significance of the reduction in 2010 was due to no in-vessel work at Hinkley Point B and Hunterston B. This applies to both the Company average and maximum individual dose statistic reports. AGR in-vessel work will take place in 2011, where average and highest individual doses will be higher than in 2010.

The highest individual dose received on our sites was 4.388 mSv in calendar year 2010 (this is 22% of the legal limit), which is about half the value for 2009. In AGR vessel outage years we will incur higher individual dose due to the nature of the work being performed.



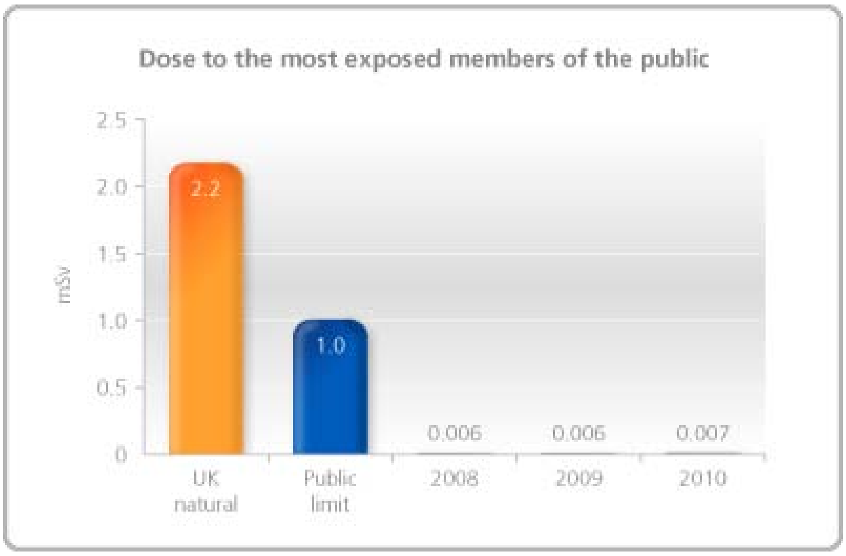
The three year average yearly WANO Collective Radiation Exposure (dose) for EDF Energy Nuclear Generation at the end of 2010 was 0.106 manSv/reactor compared to 0.117 manSv/reactor in 2009 and 0.138 in 2008. There is no legal or international limit on this measure. We are striving to show a continuous improvement (reduction) in this key performance record, with a target to reach 0.085 manSv/reactor by end of 2015.

The 2010 levels are higher than were anticipated due to emergent repair work at both Sizewell B and Heysham 2. The Company's performance in this area remains amongst the best when compared to nuclear reactors worldwide.



Dose to the Most Exposed Members of the Public

We are required to assess the radiation dose to the most exposed members of the public in the vicinity of our sites using the results of environmental monitoring. However, this does not distinguish between the impact of our discharges and those of neighbouring operators. Discharge modelling is used to make a conservative assessment of the impact of our discharges on the local population; the assessment for the three years 2008 to 2010 is given below.



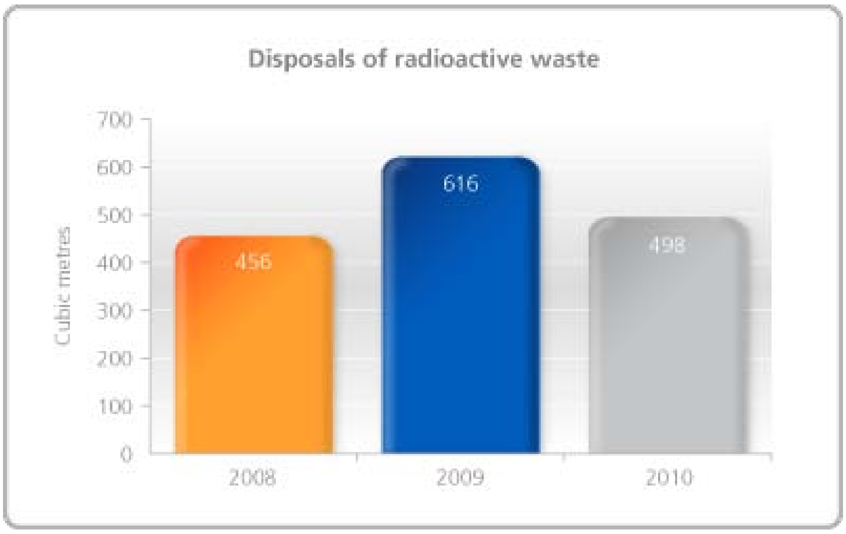
Doses to the public are a very small fraction of the legal limit and the average radiation dose due to natural background in the UK. The maximum dose received (0.007 mSv in 2010) is equivalent to the natural radiation dose received during a single flight from London to Rome.

The consistent level of very low public dose from 2008 to 2010 is evidence of the Company's successful efforts to employ best practicable means to minimise the impact of its discharges on the public (a formal requirement of our discharge permits).

Waste

Type and tonnes waste / year

LLW definition
The total amount of radioactive waste (Low Level Waste (LLW) or waste that will be disposed of as LLW) that was sent from all Nuclear Generation sites.



ILW Definition
The ILW Indicator is derived from the UK's 2010 radioactive waste inventory produced by the Nuclear Decommissioning Authority (NDA). It provides an estimate of the annual arising volume of waste that will be classified as ILW at the end of the sites life. The waste volume is given as a packaged waste volume based on proposed waste package types. All ILW is stored on power station sites pending a national decision on final disposal.

Trend explanation LLW / ILW
Radioactive waste production depends on operating and maintenance patterns so longer-term trends are a better indicator than year-to-year comparisons. Annual values depend much on the amount of maintenance carried out on the plant within the year. Higher volumes of waste are loosely correlated to increased levels of maintenance or are indicative of a particular waste management project that may have been undertaken in addition to routine waste arisings.

Spent fuel

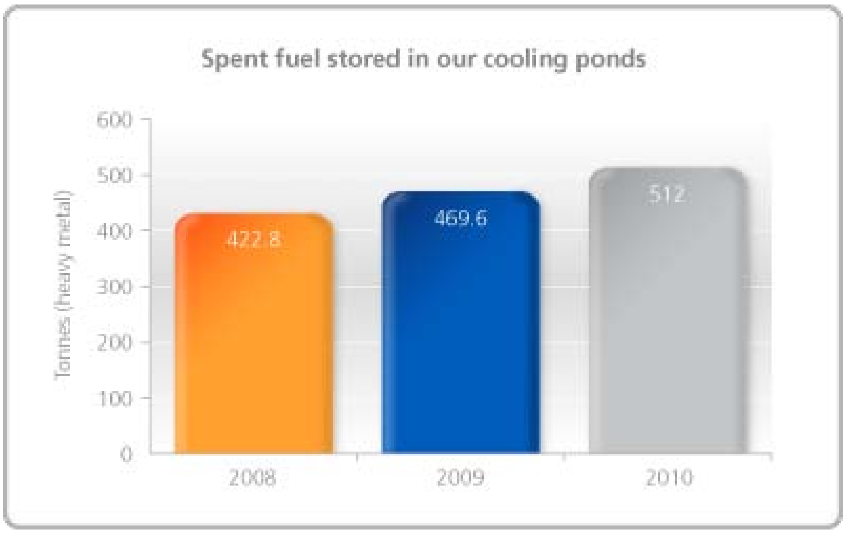
High level waste (HLW) arises from the reprocessing of our spent Advanced Gas-cooled Reactor (AGR) nuclear fuel at Sellafield. The spent AGR nuclear fuel is transported to Sellafield in specially designed flasks. The spent fuel from our AGRs can be temporarily stored in cooling ponds on site. Spent fuel at our Pressurised Water Reactor (PWR) at Sizewell remains in storage on the site.

We have contracts with Nuclear Decommissioning Authority (NDA) for the management of our spent AGR fuel and we monitor the performance and progress of the management by the NDA (and its subcontractor, Sellafield Ltd), of materials created from our fuel. Under our contracts, the NDA determine whether spent fuel is reprocessed to separate uranium and plutonium for possible future use or stored for the longer term. Spent fuel is not considered a waste until a decision has been taken to dispose of it. In either case safety and protection of the environment are paramount.

Spent Fuel sent off site will vary from year to year due to numerous factors which include cooling times, optimising transport arrangements and operation capabilities within the UK Nuclear Industry.

British Energy reported its CSR data based on its financial year ended 31 March. EDF Energy reports its performance based on the calendar year.

Spent Fuel stored in our cooling ponds is a function of electricity generation and will generally show an increasing trend as PWR spent fuel remains stored on site.



Decommissioning and waste

EDF Energy has no nuclear power stations at the decommissioning phase. Once its plants cease operation and move into the decommissioning phase, EDF Energy will report on the progress of its decommissioning plans and the wastes arising from decommissioning activities. During the enactment of decommissioning, regular review and reporting of the actual waste inventory of arisings will include a comparison of the estimates used in planning the activities. This information will be used to refine subsequent estimates.

EDF Energy Nuclear Training

Site Licence Condition 12, as directed by the UK nuclear regulating body, Office for Nuclear Regulation (ONR), requires EDF Energy to only use Suitably Qualified and Experienced Personnel (SQEP) to independently perform safety related work. This requirement has been achieved through the implementation of a systematic approach to training which:

- Ensures only qualified staff can work independently.
- Ensures training is targeted at maintaining and improving performance
- Included significant investment in infrastructure
- Nuclear power academy at Barnwood
- Training buildings and training departments at each power station.
- New and enhanced simulators at each power station.
- Included development of a nuclear professionalism programme covering nuclear safety culture and human performance.
- Establishment of an independent training standards accreditation board reporting into the Nuclear Generation Board to oversee the process.

A training policy statement (BEG/POL/005) sets the direction and approach. This policy lays the foundations for utilising training for performance improvement, the implementation of the systematic approach to training, line ownership, establishment of training committees and accreditation against internationally recognised training objectives and criteria.

Our training vision is to:

- Create world leading nuclear professionals.
- Equip our people with the knowledge, skills and behaviours to support a high performing business.

Our training mission is to:

- Provide the right training to the right people at the right time.

EDF Energy recognises that training plays a key role in supporting safe and reliable plant operation via the knowledge and skills of its employees. EDF Energy is committed to and accountable for developing and sustaining training programmes that meet organisational and personnel needs.

Within EDF Energy the Systematic Approach to Training is essential to ensure that:

- Training needs are accurately identified through job and task analysis.
- Training objectives are defined according to job performance requirements.
- Training materials, methods and instructor lesson plans are developed to address learning objectives.
- Training is effectively delivered to the right audience and line managers are integrally involved.
- Training is evaluated using the 'Kirkpatrick Model' which includes: trainee feedback, assessments at end of training sessions to determine objectives of training have been met (such as examination), post training in the field evaluations to ensure knowledge and skills have been transferred to the workplace, and performance evaluations to confirm business improvements have occurred.

While the training organisation owns this process, managers and supervisors have a responsibility to be involved and to support all phases of this process in order to achieve quality training for their workforce.

As noted in BEG/POL/005, *Training Policy,* "All personnel within the organisation have a responsibility and a role to play in the Systematic Approach to Training to deliver these key elements." Below is a table of responsibilities for the Managers and Supervisors:

Table 1: Training responsibilities for Managers and Supervisors

SAT Process	Managers/ Supervisors Role
Analysis	Communicate expectations Monitor performance Address performance shortfalls Provide recommendations Internalise SAT fundamentals Identify training needs
Design	Lead training committees Approve learning objectives Review tests and related materials
Development	Approve selected training materials Support 'dry run' sessions
Implementation	Conduct pre-training briefs, post-training debriefs and kick-offs Observe training and provide feedback Evaluate instructor performance Evaluate worker and staff performance Attend continuing training Facilitate exercise critiques Select On-Job Trainers and Task Performance Evaluators Monitor task performance evaluations Enforce qualification standards Award qualifications Apply qualifications to work assignment
Evaluation	Provide critical feedback Sponsor self-assessments Ensure timely corrective actions Integrate training and line indicators Support timely revisions Provide oversight

Training Organisation

A 'Nuclear Power Academy' provides a focus for the company wide improvements, with the role of:

- Setting the fleet standards.
- Developing and delivering the initial technical training programmes for engineering, maintenance and operations.
- Developing and delivering a fleet certified instructor programme.
- Managing the accreditation programme.
- Coordinating the fleet training improvement programme and providing governance.
- Establishing a central apprentice programme for the fleet.
- Each power station and central engineering has established:
    - A training department and training facilities (classrooms, workshops with simulators/rigs) with a mandate to provide training which maintained/enhanced staff capability.
    - Line management led training committees to drive the training improvement programmes.

Management of Training

EDF Energy Nuclear Generation has adopted a hierarchy of committees at each of its power stations and centrally, to guide and monitor the training function and to address the various levels of training oversight and ownership. The committee's goal should always be optimising training to improve performance.

The Strategic Training Committees (STC) involve the highest level of leadership at the station and in Central Engineering, concentrating on strategic issues, such as ensuring that training is improving staff and plant performance, and promoting ownership and stewardship of training by line management.

Training Advisory Committees focus on one particular training programme and include the Training Programme Owner and CRC chairs as members. It is the committee's responsibility to promote excellence in training and to evaluate the programme's effectiveness.

The Curriculum Review Committee (CRC) establishes and reviews training plans, approves learning objectives, reviews course feedback and determines the details of content, scheduling, delivery and evaluation of training programme events.

The use of self assessments is a tool used by the organisation to identify areas for improvement or opportunities for replication of good practices. A programme of training self assessments is undertaken by each area of the business to determine alignment with the training objectives and criteria. The output from these form a key input to the training committees.

Accreditation Process

There are two key phases to the accreditation process. The Accreditation team visit (ATV) followed by the Training Standards and Accreditation Board (TSAB).

The purpose of an Accreditation Team Visit (ATV) is to ascertain how plant training and personnel qualification programmes implement the systematic approach to training and address the accreditation objectives. The team is comprised of independent experts who can provide an objective view of the conduct of training. The output from this visit is a primary input into the TSAB Meeting.

The TSAB will be solely concerned with making accreditation decisions on the training programmes within the scope of the process. The decisions will be based on a combination of evidence provided via the previous relevant TSAB Report, the Stations self assessment, the ATV Report, the ATV Team Leader's verbal report, and the TSAB questioning of the site representatives at the meeting.

The TSAB members sit in judgement of the capability and demonstrated performance of the evaluated line and training organisations to ensure nuclear personnel are being trained and qualified to perform their assigned activities safely, reliably, and efficiently.

By granting accreditation or accreditation renewal, the TSAB is making a judgement on the ability of the site to carry out effective training for the next four years.

In conclusion, EDF Energy considers training an effective tool to improve the professional performance of individuals and, as a consequence, maintaining and improving safety, reliability and efficiency of EDF Energy's operating nuclear power plants.