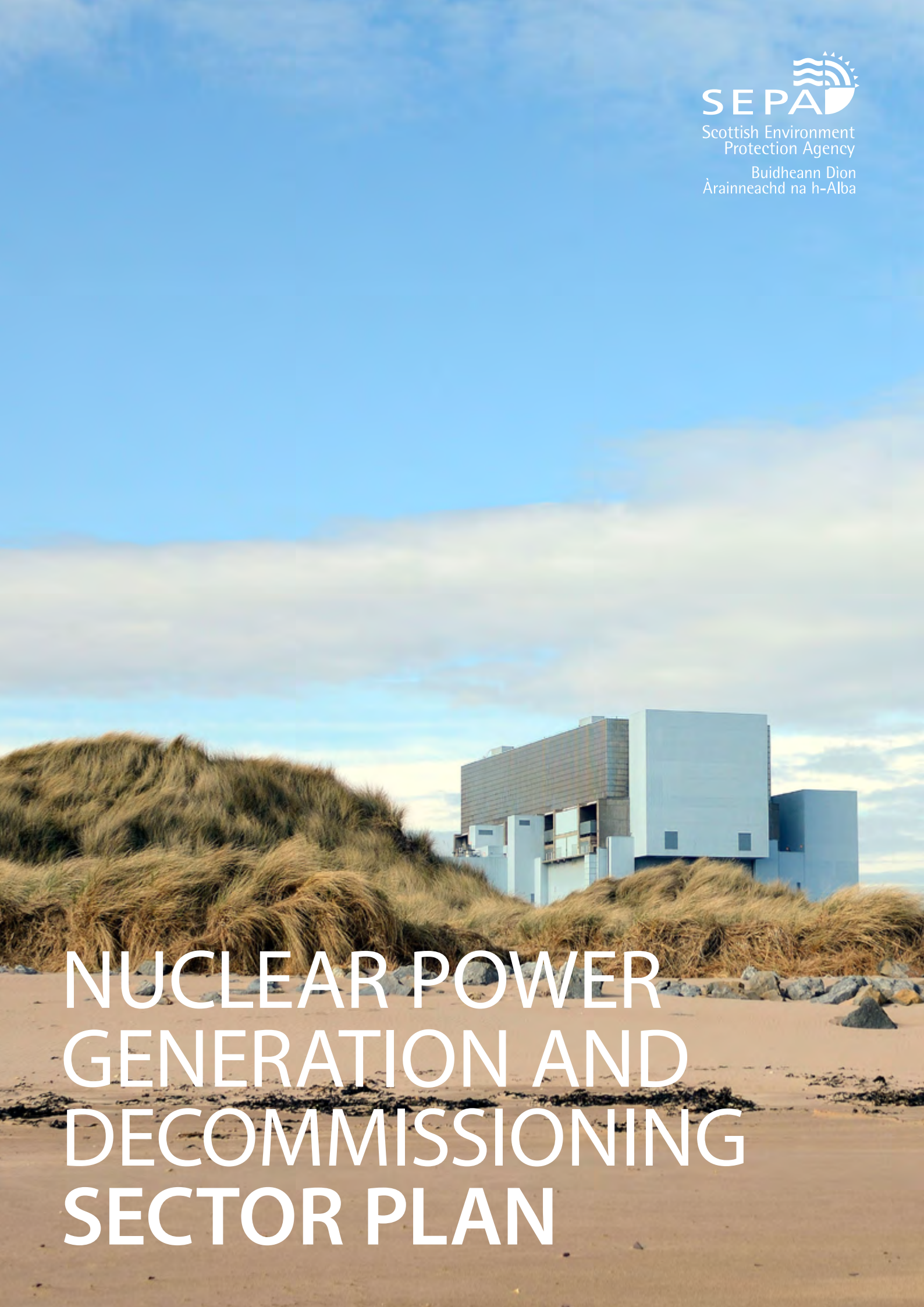

SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

NUCLEAR POWER GENERATION AND DECOMMISSIONING **SECTOR PLAN**

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Preface

SEPA has a strong track record of regulating to improve the Scottish environment. We are proud of what we have achieved since we were set up just over two decades ago in 1996. We know we need to do more over the next two decades to build on this success. Much more.

The mounting scientific evidence about climate change, plastics in our oceans, the pressure on our freshwater and more shows us that humanity must rise to tackle major environmental challenges. This scientific knowledge underpins SEPA's strategy for how we will regulate - One Planet Prosperity. If everyone in the world lived as we do in Scotland, we would need three planets. There is only one.

So, we will regulate to help Scotland prosper within the means of our one planet. Successful businesses in future will be those that use low amounts of water, materials and carbon-based energy and create little waste. Prosperous societies will be comprised of these businesses. This can be Scotland.

In every sector we regulate this means we will have two simple aims. We will:

1. ensure that all businesses fully meet their environmental compliance obligations;

2. help as many businesses as possible move beyond their environmental compliance obligations.

This sector plan outlines how we will do this in regulating the nuclear power generation and decommissioning sector.

The nuclear power generation and decommissioning sector, as would be expected, is a tightly regulated sector. In Scotland, there are very high levels of compliance with environment protection laws. SEPA is determined that this compliance performance will continue. We are also keen to help the sector explore further innovation in other areas, for example, water and solid waste management. We will also be focusing on future activities such as planned decommissioning processes.

That is why this sector plan is so important. It explains how we intend to play our role as Scotland's environment protection regulator to (a) ensure there is no slippage at all in relation to compliance and (b) help the sector do even better than the legal standards where possible.

Our plan is ambitious. It spells out how we will use traditional environmental protection agency (EPA) regulatory tools, such as permits and enforcement, in clearer and more powerful ways. It sets out some completely new ways, such as novel partnerships, that we will develop and use to support innovation in this sector.

Terry A'Hearn
SEPA Chief Executive Officer

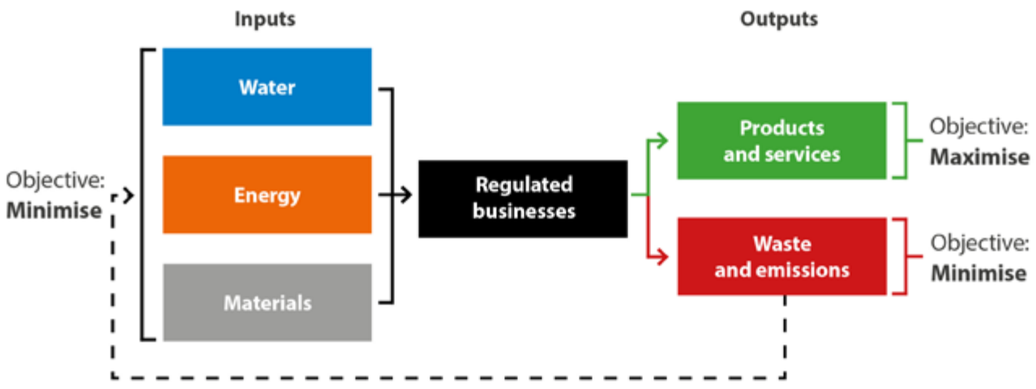
1. Introduction

SEPA's statutory purpose is to protect and improve the environment in ways that, as far as possible, create health and wellbeing benefits and sustainable economic growth. To help create a prosperous Scotland that lives within the means of our one planet, we need to radically change the way we work. In the past our approach to regulation has been grounded in different sets of rules to protect the environment. This has helped us to deliver, for example, improvements in water quality. However, it will not enable us to make the transformational changes needed to tackle today's problems.

We are moving instead to ground our approach to regulation by working across whole sectors. In this way we can systematically identify the compliance issues that need to be tackled by the sector. However, mere compliance and small scale incremental change will not be enough. We want to help businesses and sectors to implement successful innovation and support them in their ambitions to do more than they are required to by regulation. We call this **moving beyond compliance**: helping already high performing businesses to do more for the environment because it makes sense for them to grow in a sustainable manner. Many businesses in the nuclear power generation and decommissioning sector are already moving beyond compliance, for example recycling materials and protecting and enhancing wildlife around sites. We can also identify where the biggest opportunities are for us to help the sector to go beyond compliance. In both ways, this will help regulated businesses operate successfully within the means of one planet.

All businesses that we regulate in a sector use water, energy and raw materials to produce the products and services they sell. In doing so, they also create waste and emissions. We can think of these as environmental flows that need to be managed by the business (Figure 1).

Environmental flows (Figure 1)



We want to help as many businesses as possible to manage these flows effectively. Reducing their use of natural resources and reducing the creation of waste, will enable them to meet their legal obligations, drive further improvements and operate their business successfully. To facilitate this, we are preparing sector plans for every sector that we regulate.

Sector plans are at the heart of everything we do, shaping the interactions with every sector and the businesses in them. Through them, operators will get the relationship that their attitude and performance earns. Those that demonstrate a commitment to good environmental performance and to delivering solid outcomes will receive powerful support through guidance and advice. Those that demonstrate behaviour which leads to significant or chronic non-compliance can expect SEPA to use the most appropriate enforcement tools to bring them into compliance.

Sector plans are strategic documents, their aims and aspirations will evolve over time. Implementation of the plans will take account of opportunities for example to work across different sectors, improve communications and develop partnerships. We will also consider the relative corporate priority of different work areas.

Scope of the nuclear power generation and decommissioning sector plan

This is our plan for the nuclear power generation and decommissioning sector. It details how we are going to regulate the sector and work with it to protect and improve the environment. The plan focuses on the civil nuclear sites in Scotland, which are the two power stations that generate electricity using a nuclear reactor, and three former power stations and research facilities that are undergoing decommissioning because they have reached the end of their working life. It explains how we will work directly with operators and sites, and includes ways that we will use our shared influence to improve environmental performance throughout the industry supply chain.

Other industries that manage radioactive materials and radioactive waste but that are not in the nuclear power generation and decommissioning sector are referred to as "the non-nuclear industries" and are not included in this sector plan. Nuclear activities carried out by, or on behalf of, the Ministry of Defence are also excluded from the nuclear power generation and decommissioning sector plan.

The sector already has a good level of compliance and in some areas goes significantly beyond compliance. This plan builds on this foundation to achieve our vision for the sector.

2. Our vision for the nuclear power generation and decommissioning sector

- **Minimising environmental impacts and choosing to go beyond compliance is ingrained in the nuclear power generation and decommissioning sector's operations and is achieved by strong environmental leadership.**
- **The best practicable environmental and social outcome is sought for each nuclear site during operation, decommissioning and after final site clearance.**
- **There is a high level of transparency in how SEPA regulates the nuclear power generation and decommissioning sector.**
- **Waste materials from the nuclear power generation and decommissioning sector are reused and recycled wherever possible.**
- **The generating sites continue to produce low-carbon energy efficiently and safely.**

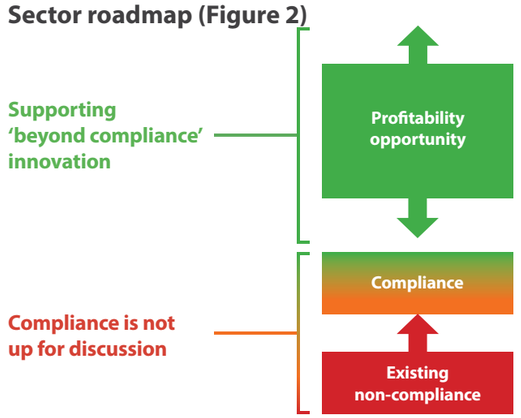
Our objectives

The objectives of the nuclear power generation and decommissioning sector plan are to:

- ensure that all businesses fully meet their environmental compliance obligations;
- help as many businesses as possible move beyond their environmental compliance obligations.

This is illustrated by the sector roadmap (Figure 2):

Sector roadmap (Figure 2)



This sector plan sets out how we will work with the nuclear power generation and decommissioning sector. For our vision and objectives to be achieved, we will work with partners and facilitate liaison between them and the sector to create opportunities that link business success with environmental success.

As well as helping businesses to reduce their impacts on the environment, SEPA's sector plans will deliver the ambitions set out in many SEPA and Scottish Government policy frameworks and strategies including for example, the River Basin Management Plan[1], the Waste to Resources Framework[2], the Energy Framework[3], the Climate Change Commitment Statement[4] and Flood Risk Management Strategies[5]. We want to bring together skilled, experienced and innovative people from across the sector to understand key challenges and opportunities to create innovative solutions. If we get this right, it will mean that the environment is not seen as a constraint, but a platform on which economic and social success can be built, putting the nuclear power generation and decommissioning sector on a pathway to becoming a one planet sector.

1 https://www.sepa.org.uk/environment/water/river-basin-management-planning/the-current-plans/
2 https://www.sepa.org.uk/media/219528/one-planet-prosperity-a-waste-to-resources-framework.pdf
3 https://www.sepa.org.uk/media/383806/sepa_energy_framework.pdf
4 https://www.sepa.org.uk/media/369292/climate-change-commitment-statement.pdf
5 http://apps.sepa.org.uk/FRMStrategies/

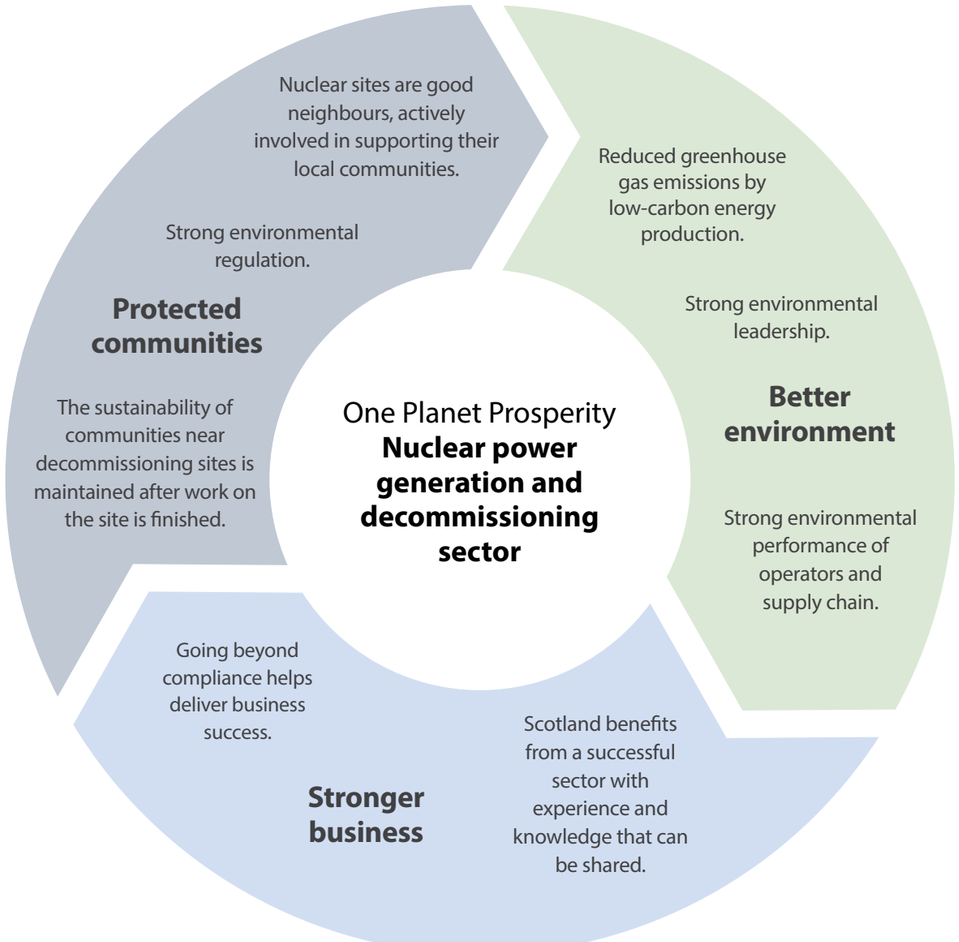
3. Outcomes

If we achieve the vision set out in this plan, we expect that we will help to:

- **protect and improve the environment;**
- **protect communities;**
- **further enable businesses to operate effectively and successfully in their markets.**

The figure below shows the outcomes we would like to help the nuclear power generation and decommissioning sector achieve, these are linked to actions that we will take as outlined in Section 6 of the plan and all contribute towards achieving United Nations (UN) Sustainable Development Goals and targets set in the Scottish National Performance Framework[6].

Outcomes (Figure 3)



6 https://nationalperformance.gov.scot/

4. The nuclear power generation and decommissioning sector

The nuclear power generation and decommissioning sector comprises two power stations that generate electricity using a nuclear reactor as well as a research facility and two former power stations that are undergoing decommissioning because they have reached the end of their working life.

The Scottish Government has a policy[7] that does not allow any new nuclear power stations to be built in Scotland under current technologies, so there are no anticipated new sites in this sector.

There are two nuclear power stations in Scotland that generate electricity: Hunterston B in Ayrshire which started generation in 1976 and is planned to cease operation in 2023; and Torness in East Lothian which started generation in 1988 and is planned to cease operation in 2030 (Figure 6). In 2016 nuclear power stations provided 42.8%[8] of the electricity produced in Scotland.

Both sites are owned by EDF Energy, and each site generates electricity using two advanced gas-cooled reactors (AGRs). Both sites are 100% baseload stations which means that they contribute to the minimum amount of electricity that the grid needs.

When a nuclear reactor reaches the end of its working life, its nuclear fuel is removed. It is then decommissioned to remove the reactor and associated facilities, during which all waste is responsibly disposed of so that eventually it no longer needs to be regulated and can be used for a different purpose.

Decommissioning can take a long time because of the complexity of operations and the time it takes for some radioactive substances to decay to a level that makes the radioactive waste safer to manage. At some sites, radioactive waste may be managed over the long-term in interim stores until a final disposal option becomes available. So it may be several hundred years before a site is fully and finally released from regulatory control.

After the initial decommissioning, some sites may enter a stage of care and maintenance when most of the structures, associated facilities and waste have been removed and only a few key structures remain to allow the radioactive waste contained in them to decay to a level which makes it safer to manage; the care and maintenance stage may last for several decades.

If there is a care and maintenance stage in the decommissioning programme, this will be followed by a phase of final site clearance where the remaining structures will be removed from the site. When sites have been fully decommissioned, either by a continuous process or including a period of care and maintenance, they may become strategic infrastructure and will be addressed under that sector plan.

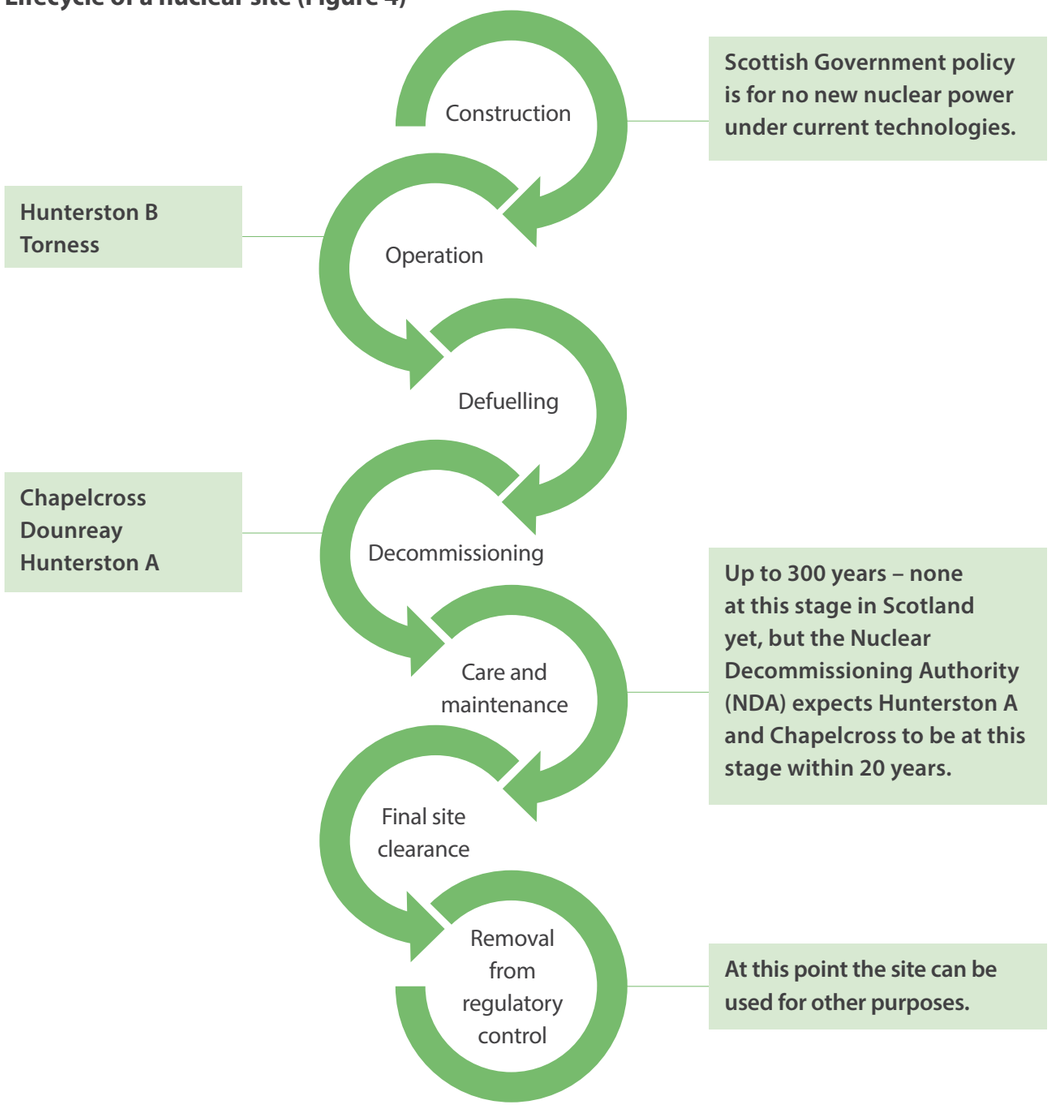
The lifecycle of a nuclear site is shown in Figure 4.

7 https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/
8 Energy in Scotland 2018 Key Facts, https://www2.gov.scot/Resource/0053/00531699.pdf

How does a nuclear power station work?

All power stations generate electricity in a similar way by heating water to create steam that is used to drive a turbine which generates electricity. In a nuclear reactor, the heat is generated by radioactive fuel elements that are contained within a graphite core; the amount of energy created is moderated by control rods that can be raised and lowered to increase or decrease the amount of heat created and therefore the amount of electricity generated.

Lifecycle of a nuclear site (Figure 4)



There are three sites in Scotland that are in the decommissioning phase: Dounreay in Caithness; Hunterston A in Ayrshire and Chapelcross in Dumfries and Galloway (Figure 6).

The decommissioning of these sites is overseen and funded by the Nuclear Decommissioning Authority (NDA) which is a non-departmental public body set up under the Energy Act 2004. The NDA owns the facilities and the waste and is responsible for the decommissioning and cleaning up of nuclear facilities and ensuring that radioactive and non-radioactive wastes are managed safely. The NDA does not have a hands-on role in the actual decommissioning of nuclear sites but it appoints Site Licence Companies (SLCs) to manage the decommissioning.

Dounreay is managed by Dounreay Site Restoration Limited (DSRL) and Hunterston A and Chapelcross are managed by Magnox Limited.

Figure 5 illustrates some of the key facts of the nuclear power generation and decommissioning sector.

Facts and figures (Figure 5)

2

The number of sites that generate electricity

3

The number of sites being decommissioned

£ 1 billion

The amount contributed to the Scottish economy per year

4,000

Jobs in Scotland supported by the industry

42.8%

The amount of electricity generated in Scotland in 2016

3 million

Energy produced is equivalent to powering 3 million homes in 2018

4.3 $MtCO_2e$

The amount saved from the production of energy via nuclear in 2018*, which is the equivalent to taking over 75% of passenger cars registered in Scotland off the road

800 tonnes

The amount of solid radioactive waste generated from decommissioning sites in 2017

11,500 tonnes

The amount of solid non-radioactive waste generated in 2017

£ 10.5 billion

The total cost to decommission sites no longer in operation

3.5%

Maximum dose to a member of the public compared to 1mSv annual limit

2030

Estimated end of generation from current nuclear power stations in Scotland

*When compared to direct emissions of combined cycle gas turbines

Location of civil nuclear sites included in this sector plan (Figure 6)

5. Potential environmental impacts and how they are managed

Potential environmental impacts during the lifecycle

The nuclear power generation and decommissioning sector carries out a wide range of operations on its sites that involve radioactive substances activities and conventional activities. Conventional activities include transport, operation of diesel generators, air conditioning and demolition operations. These activities can have as much, if not more, of an environmental impact than that caused by radioactive discharges. Not all activities have an adverse environmental impact, the clean-up of contaminated land is beneficial, decommissioning reduces the long-term visual impact and many waste materials removed from the site are reused or recycled. Potential environmental impacts are assessed and measures put in place to reduce them so far as is reasonably practicable. Nuclear power provides low carbon electricity, saving several million tonnes of greenhouse gas emissions compared to power generated by conventional gas turbines.

Some of the potential environmental impacts are shown in Figure 7.

Environmental impacts (Figure 7):

Generating sites	■ Reduction in air quality from discharges to air. ■ Reduction in surface water quality from spills, leaks, and turbid water. ■ Reduction in groundwater and soil quality from spills and leaks. ■ Impact on climate change and increased risk of flooding from emissions of greenhouse gases. ■ Increased exposure to radiation from nuclear fuel and radioactive waste. ■ Increased noise from operation of the sites. ■ Production of low carbon electricity.
Decommissioning sites	■ Reduction in air quality from discharges to air. ■ Reduction in surface water quality from spills, leaks and turbid water. ■ Reduction in groundwater and soil quality from spills and leaks. ■ Impact on climate change and increased risk of flooding from emissions of greenhouse gases. ■ Increased noise, vibration and dust from decommissioning operations. ■ Increased exposure to radiation from radioactive waste. ■ Disturbance of wildlife during decommissioning operations (biodiversity impacts). ■ Improved land quality from remediation of contaminated land. ■ Reduction in the visual impact from removal of buildings and other structures.
Sites in care and maintenance	■ Increased exposure to radiation from radioactive waste. ■ Improvement to biodiversity as wildlife will be undisturbed. ■ Reduction in site boundary - brownfield site available for future land-use.
Site clearance	■ Temporary increase in visual impact from site clearance operations, e.g. cranes.

Environmental regulation of the nuclear power generation and decommissioning sector

We manage the potential environmental impacts of the nuclear power generation and decommissioning sector by regulating its activities.

SEPA regulates the nuclear power generation and decommissioning sector for its radioactive substances activities involving the management of radioactive waste under the Environmental Authorisations (Scotland) Regulations 2018 (EASR).

Under EASR we permit nuclear sites to manage radioactive waste that may include the receipt of radioactive waste from other sites, the treatment, storage, transfer and disposal of radioactive waste. Permits contain standard conditions and other conditions that aim to minimise environmental harm and protect human health. As well as these general aims, we include conditions that implement international obligations, European Directives and domestic legislation and policies.

All permits for nuclear sites include a requirement to achieve an optimal level of protection of the environment and the public and require the authorised person to use the best practicable means to ensure that no unnecessary radioactive waste is generated.

We have an obligation to ensure that annual radiation doses to the public from regulated sources are less than one milli Sievert[9] (1 mSv) and we achieve this through setting limits on the discharge of radioactive waste into the environment. We carry out monitoring for radioactivity in the environment and food and publish the results annually in the Radioactivity in Food and the Environment report series[10].

Any contaminated land that may be left on sites may be regulated under Part IIA of the Environmental Protection Act 1990.

Nuclear sites are large infrastructure units which have a significant workforce and supporting work activities. Nuclear sites may have water treatment works, oil backup generators, waste streams for both recycling and landfill. Once decommissioned, nuclear sites may become strategic 'utilities' infrastructure and may be regulated according to that sector plan. Nuclear sites need to address the issues relating to the chemicals and manufacturing; landfills; metals; water and waste water treatment sector plans. These cross cutting issues will be addressed in the implementation plan. The impact of nuclear sites in these areas mean that some sites are also regulated under:

- the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) for the abstraction and discharge of cooling water, the discharge of sewage, trade and surface water and dewatering;
- the Pollution Prevention and Control (Scotland) Regulations 2012 (PPC) for emergency diesel generators, auxiliary boilers and waste oil burner and other gaseous discharges;
- the Waste Management Licensing (Scotland) Regulations 2011 (WML) for transfer station and disposal activities.

Due to the presence of hydrazine and hydrochloride, some nuclear sites are also regulated under the Control of Major Accident Hazards Regulations 2015 (COMAH).

The two generating sites are regulated under the European Union Emissions Trading Scheme (EU ETS) which covers all combustion sources producing carbon dioxide emissions. All sites are regulated under the Fluorinated

9 Environmental Authorisations (Scotland) Regulations 2018, Schedule 8, paragraph 26(2)
10 https://www.gov.uk/government/publications/radioactivity-in-food-and-the-environment-rife-reports

Greenhouse Gases Regulations 2015 and the Ozone-Depleting Substances Regulations 2015 for emissions arising from air handling and chiller units.

Some nuclear sites are located on valuable aquifers, traversed by rivers or are close to other aquatic systems. Groundwater is a valuable natural resource and as such is protected from deterioration and pollution under CAR. This is particularly important for groundwater-dependent ecosystems and for the use of groundwater in water supply for human consumption.

As well as being regulated by SEPA, the nuclear power generation and decommissioning sector is regulated by the Office for Nuclear Regulation (ONR) for safety, security, transport and nuclear safeguards. SEPA and ONR work closely together to ensure that we apply a consistent and joined-up approach to the regulation of the nuclear power generation and decommissioning sector.

SEPA also works closely with other regulators such as Food Standards Scotland, local authorities and Scottish Government on the regulation of the sector.

The Duty of Care provides for the safe management of non-radioactive waste throughout the supply chain. It is a set of legal obligations[11] which apply to everyone who produces or manages non-radioactive waste.

Businesses are required to take reasonable steps to ensure their waste is managed correctly through its complete journey to disposal or recovery. This means storing it securely and separating out recycling when waste is produced; also to ensure that when waste is passed on to another business they are authorised to accept it. Businesses can find out more about their obligations, and get practical advice, by reading the Scottish Government's statutory guidance – "Duty of Care: A Code of Practice"[12].

Duty of Care compliance is important as it promotes good environmental practice at all stages of the waste management chain. It ensures that waste goes to the right place, avoiding illegal disposal and environmental harm, and promotes high quality recycling.

The Duty of Care provisions are replicated as standard conditions for radioactive waste in EASR permits.

EU exit

Around 80% of environmental legislation in Scotland originates from the European Union. As the UK leaves the EU and the Euratom Community, changes will, where necessary, be made to domestic legislation to ensure that the standards of environmental protection we enjoy today and the principles upon which they are based are maintained. Therefore, while some of the detail of the legislation we use to regulate may change, our work to protect Scotland's environment will not. Our commitment to tackling non-compliance with environmental laws and, where necessary, taking enforcement action will not diminish as a result of the UK leaving the EU.

11 https://www.legislation.gov.uk/ukpga/1990/43/section/34
12 https://www2.gov.scot/resource/0040/00404095.pdf

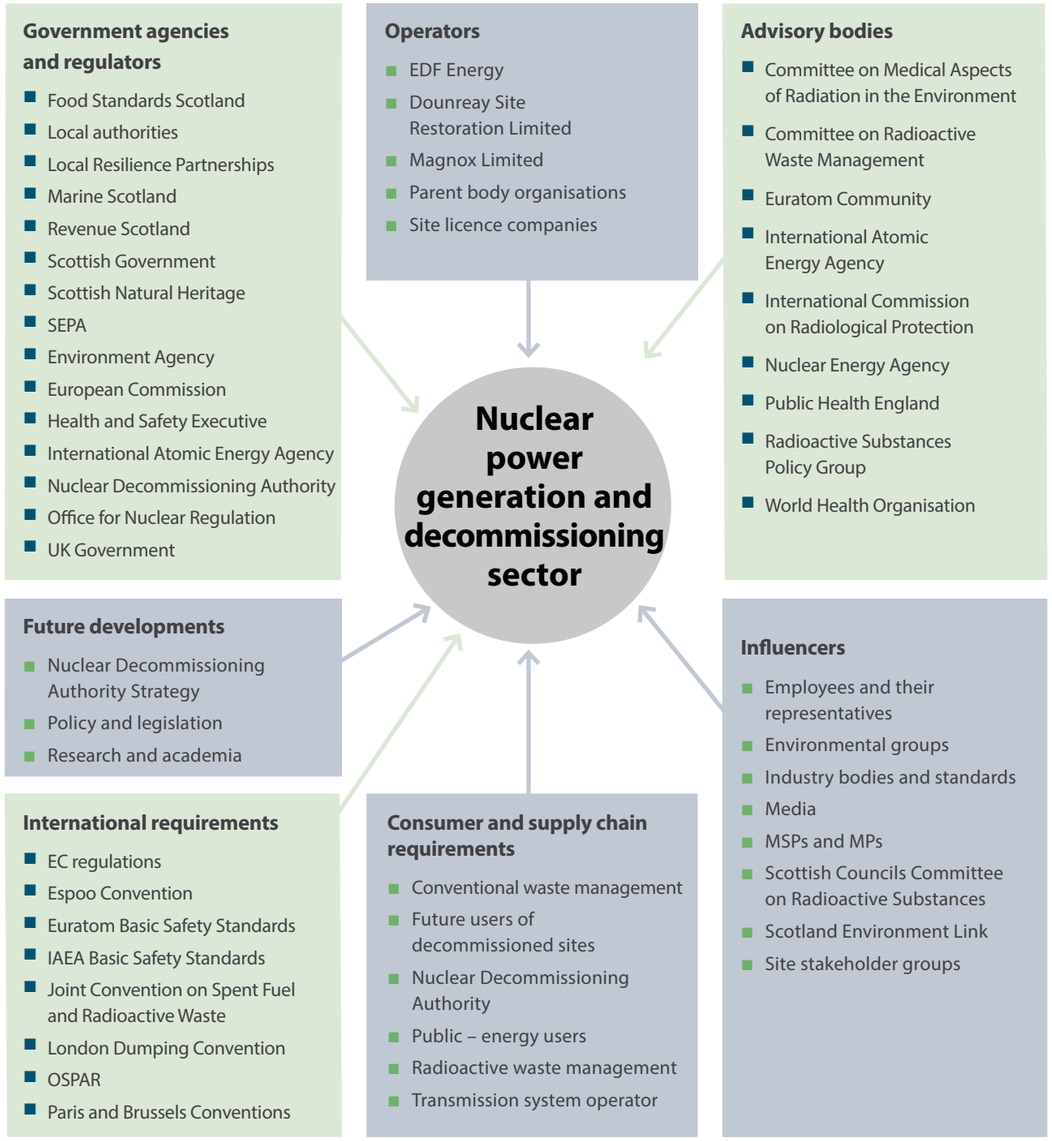
Wider influences on environmental performance of the nuclear power generation and decommissioning sector

Full compliance with environmental regulations will not, by itself deliver the transformational change required to secure our One Planet Prosperity objectives. The nuclear power generation and decommissioning sector plan needs to further unlock the potential for businesses to gain strengths in resource efficiency and environmental innovation that will help them to succeed in their markets.

To secure full compliance and help as many businesses as possible to move beyond compliance we will develop our relationships with partners and other stakeholders.

Figure 8 summarises the main organisations that influence and are influenced by operators in the nuclear power generation and decommissioning sector. It also identifies those that we may work with in both the short and longer term. As we implement the plan we will consider the opportunities these relationships provide and how we would like them to develop.

Key influences on the nuclear power generation and decommissioning sector (Figure 8)



6. Tackling non-compliance and taking opportunities to go beyond

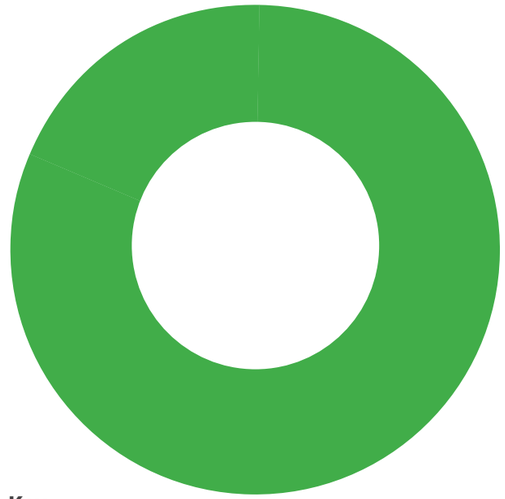
Compliance[13] with environmental law is non-negotiable and regulated businesses in the sector need to comply.

Compliance in the sector

The nuclear power generation and decommissioning sector has a good record of compliance across all the regimes we regulate it under and in 2017 achieved 100% compliance (Figure 9). This compares to an average compliance rate of 90.97% across all businesses that SEPA regulates.

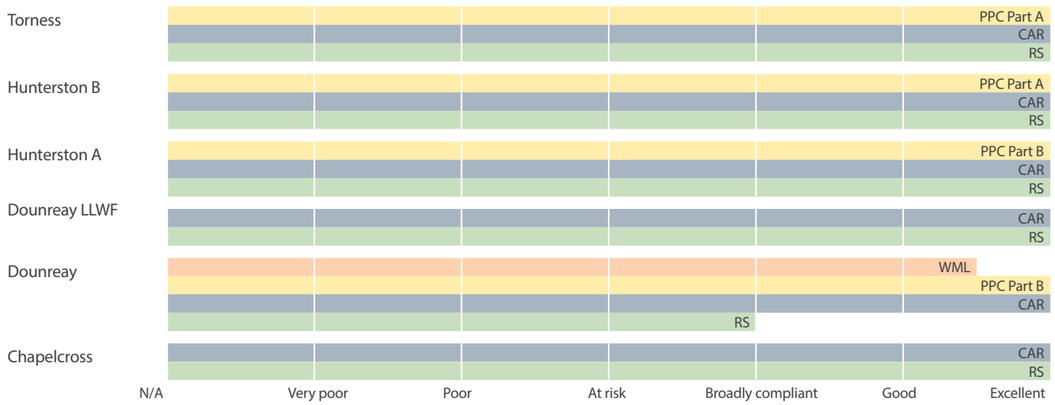
Only one site did not achieve a compliance rating of 'Excellent' and this was mainly due to failures in complying with its management procedures (Figure 10).

Compliance summary for the sector in 2017 (Figure 9)



13 Compliance with environmental authorisations is currently measured by our Compliance Assessment Scheme. This scheme is currently being reviewed.

Compliance ratings for the nuclear power generation and decommissioning sector in 2017 (Figure 10)



We will help responsible compliant businesses to operate by making it significantly harder and more expensive for those who persistently fail to comply with environmental legislation to operate. We will achieve this by increasing scrutiny, prescription, fees and the use of enforcement and monetary penalties for those who fail to comply.

We will work with the sector to maintain compliance and ensure that we regulate consistently.

SEPA will:

- maintain the programme of environmental monitoring around the nuclear sites and publish information on doses to the public in the Radioactivity in Food and the Environment (RIFE) report series;
- provide support and guidance to the sector on implementing their simplified permits;
- work with Scottish Government to ensure that legislation is integrated so that regulation is harmonised;
- ensure that SEPA has sufficient experienced staff to regulate the nuclear power generation and decommissioning sector and support compliance and beyond, enabling all environmental regulation at nuclear sites to be carried out consistently.

Where are the opportunities to go further?

We believe that those societies and economies that are low resource use, low energy use, low water use and low waste will be the most successful in the 21st Century. Businesses that are the most innovative will best rise to the challenges of our time, such as over use of resources and climate change and create sustainable economic growth.

In this section we describe opportunities and our aspirations to help businesses do more for the environment by building upon current good practices and choosing to move beyond compliance because it makes sense for them to grow in a sustainable manner. Many of these opportunities will also help improve compliance by businesses in the nuclear power generation and decommissioning sector.

The nuclear power generation and decommissioning sector already goes beyond compliance and commits to this in the operators' policies:

- Hunterston B and Torness – The Better Plan;
- Chapelcross and Hunterston A – Environment, Health, Safety and Quality Policy Statement;
- Dounreay – Safety, Health, Environment and Quality Policy.

Other examples of how the nuclear power generation and decommissioning sector goes beyond compliance include:

Contributing to protected communities by providing funding for local charities and projects, providing and supporting education initiatives and having socio-economic plans to support sustainable communities when decommissioning is complete.

Case study

There is a Chapelcross site-focussed economic development initiative 'CX Project' that is being led by Dumfries and Galloway Council in partnership with the NDA and Scottish Enterprise. The CX Project is exploring opportunities for future development of the site as decommissioning progresses. The CX Project is linked with the wider Borderlands Growth initiative; future potential use of the Chapelcross site will be part of the considerations of this development initiative.

Contributing to a better environment
by having biodiversity action plans, protecting and enhancing sites of special scientific interest (SSSI) adjacent to nuclear sites and committing to ensuring that environmental impacts are minimised from its actions.

Case study

EDF Energy has been awarded the Biodiversity Benchmark by the Wildlife Trust for its work to protect and enhance the unique and diverse wildlife around its sites at Hunterston and Torness. At Hunterston B a new wildlife pond was created, which attracts teal in winter. Invasive, non-native species, such as rhododendron have been removed. The Biodiversity Benchmark enables organisations to enhance biodiversity in support of the Scottish Biodiversity Strategy.

Contributing to stronger business
by providing staff on secondment to share specialist skills with others, funding local regeneration projects and funding research students.

Case study

Dounreay and its parent companies provide staff with specialist skills on secondment to support other companies such as Wick Harbour for the Beatrice offshore windfarm and harbour high water gate projects.

The nuclear power generation and decommissioning sector not only goes beyond compliance itself, but encourages its supply chain to do so as well by requiring suppliers to demonstrate their sustainability credentials and meet appropriate ISO standards, including environmental.

We will support the nuclear power generation and decommissioning sector in going beyond compliance and help it develop further opportunities wherever possible.

Water

Water in the right place, in the right amount and of the right quality underpins Scotland's society and economy. Our water environment provides us with vital supplies for drinking and food production; supports business, industry and tourism; maintains places that benefit the health and wellbeing of communities and sustains wildlife.

The sector plans aim to ensure we live and prosper within our environmental water limits; maximising the efficiency of its use; reducing the input of waste; creating better places for people to thrive and protecting and restoring habitats for wildlife. By doing so, our plans will support and complement the ambitious targets set out in Scotland's River Basin Management Plans (RBMPs) and Flood Risk Management Plans (FRMPs).

SEPA is committed to reducing the impacts of flooding. We have a central role in identifying and promoting the most sustainable actions to help deliver a flood resilient Scotland. We are developing a Flood Strategy that describes how we will work with partners to manage flood risk now and in the future. SEPA will continue to promote avoidance of flood risk as the priority. If risk can't be avoided then adaptation and defence is key. Where it is not possible to completely avoid or eliminate the flood risk then SEPA will give communities and emergency responders advance notice of flooding to help them prepare and protect themselves. To understand areas at greatest flood risk SEPA will use the best available evidence. SEPA will continue to work with partners to improve Scotland's FRMPs. Early and strong links between this sector plan and flooding will strengthen opportunities and necessitate engagement and communication between key partners.

The OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic has a Radioactive Substances Strategy. The objective of this strategy is to prevent pollution of the OSPAR maritime area from ionising radiation through progressive and substantial reductions in discharges of radioactive substances with the ultimate aim of concentrations in the environment close to zero for artificial radioactive substances.

The generating nuclear sites use sea water for cooling and all sites discharge aqueous waste into the marine environment.

SEPA's aspirations are to:

- Support government and contribute to the ongoing review of the OSPAR Strategy for 2020-2030;
- Continue to require the nuclear power generation and decommissioning sector to use best practicable means to minimise its impacts on the water environment;
- Work with sector partner organisations to ensure that the sector is resilient to climatic changes, especially around flood risk and water scarcity issues.

Energy

Energy is an essential resource that enables social and economic development and is one of the most important aspects of the transition to a sustainable low carbon economy. However, electricity and heat production, transmission, storage, and use can have significant environmental impacts. SEPA's Energy Framework[14] recognises that how we use and manage our energy resources is central to our ability to live within the resources of our planet. Cost savings and other benefits for businesses can be made by improving energy efficiency and making use of low carbon sources of energy.

EDF Energy, that operates Torness and Hunterston B, is already committed to being an efficient, responsible electricity company and champion of low-carbon affordable energy. It is committed to leading the UK's transition to a safe, low-carbon energy system and publishes its vision in 'The Better Plan'.

The nuclear power generation and decommissioning sector already takes action to minimise its energy usage, for example minimising energy usage by moving to LED lighting.

For the current generating sites, efficient low-carbon energy generation is the core of their business. However, for the decommissioning sites the use of energy is essential to maintain safety of the plant and protection of the public and environment.

SEPA's aspirations are to:

- Share best practice in using energy resources efficiently;
- Encourage sites to review their energy usage and assess if further energy savings can be made;
- Reduce the use of fluorinated gases by substituting with lower global warming gases or alternatives to F gases.

Case study

Torness recognises that one of the key environmental impacts in the supply chain is transport so tries to minimise this by using local suppliers and organising batch deliveries to minimise the amount of transport needed.

14 https://www.sepa.org.uk/media/383806/sepa_energy_framework.pdf

Materials

SEPA views the circular economy as a game-changing opportunity to manage resources within planetary limits. Our Waste to Resources Framework[15] recognises that reducing the harms associated with waste management can create economic opportunities. We must dramatically cut waste production across the economy, recover more and dispose of only the very minimum. If waste is produced, we will encourage its productive use within a framework of strong environmental protection.

Resource efficiency can improve productivity and reduce costs for business. It can also bring environmental improvements and reduce our reliance on virgin raw materials.

The nuclear power generation and decommissioning sector already reuses and recycles much of its waste. Some is segregated at source and some is segregated by waste contractors. For example:

- 100% of scaffold boards from Chapelcross are recycled into chipboard once they can no longer be used;
- Over 90% of non-radioactive waste from Hunterston A is recycled;
- Torness has a Freecycle option where items no longer needed can be claimed by staff before they become waste (e.g. office furniture);
- Hunterston B has recycled over 40 m^3 of metal in the last three years;
- Dounreay recycled 274 tonnes of steel from the demolition of a support complex attached to the Dounreay Materials Test Reactor;
- 3 000 tonnes of metal were recycled at Chaplecross in 2017, of this, 2 600t were recycled at a local scrap management site and 400t were sent to Cycliff for re-smeltering.

As sites move from generating to decommissioning, they will generate significant amounts of waste materials. SEPA's aspirations are to work co-operatively with the nuclear power generation and decommissioning sector to encourage and enable the reuse and recycling of materials wherever possible including using aggregate from demolition on site to infill voids.

Case study

50 tonnes of steel recycled from sodium tank decommissioning

Around 50 tonnes of steel have been sent for recycling after two sodium storage tanks were cut up and removed as part of the decommissioning of Dounreay's Prototype Fast Reactor.

After removing high hazard residual sodium, the steel plates were size-reduced using gas burning cutting techniques.

The steel structures were originally part of a sodium tank farm housing four tanks that contained sodium residues from the operation of the reactor. The clean-up work was carried out in a hazardous radioactive environment by specialist contractors.

15 https://www.sepa.org.uk/media/219528/one-planet-prosperity-a-waste-to-resources-framework.pdf

Future land use

Nuclear sites must be decommissioned in a manner that allows their sustainable after-use.

SEPA's aspiration is to work co-operatively with the nuclear power generation and decommissioning sector, communities and partners to promote and develop sustainable land uses for nuclear sites that have been decommissioned and undergone site clearance. Our approach will include:

- Working with operators, developers and partners to ensure that the most appropriate post-decommissioning opportunities are realised;
- Developing clear guidance so that operators, potential developers and partners understand the legislative surrender requirements. Ensuring that our requirements are proportionate to the risk posed by the site and are consistent with those of other regulators;
- Ensuring a smooth transition to other uses following partial and full site clearance.

7. Summary of actions and aspirations

The following table summarises the actions that we have described in previous sections to maintain high levels of compliance in the sector and aspirations to help businesses take opportunities to go beyond compliance. These are described according to the key outcomes introduced in Section 3 that we would like to achieve for this sector.

The table combines actions to address compliance and to help achieve beyond compliance. This is because the same action can often both improve compliance and help a business to move beyond compliance. Similarly, actions that businesses choose to take to move beyond compliance can improve their compliance with environmental regulations.

We will prioritise them alongside those in other sector plans and progress powerful actions that contribute towards achieving our one planet prosperity goal for Scotland.

Outcome sought	Actions and aspirations
Protected communities	1. Maintain the programme of environmental monitoring around the nuclear sites and publish information on doses to the public in Radioactivity in Food and the Environment (RIFE). 2. Provide support and guidance to the sector on implementing their simplified permits.
Better environment	3. Maintain Scotland's reputation as a world leader on the environmental regulation of nuclear sites. 4. Ensure that SEPA has sufficient experienced staff to regulate the nuclear power generation and decommissioning sector and support compliance and beyond, enable all environmental regulation at nuclear sites to be carried out consistently. 5. Work with Scottish Government to ensure that legislation is integrated so that regulation is harmonised.
Stronger business	6. Continue to build and maintain relationships and share information and best practice with the sector through workshops, meetings, conferences and events. 7. Explore opportunities to support the sector in going beyond compliance. 8. Explore opportunities for other sectors to learn from the nuclear power generation and decommissioning sector in achieving compliance and going beyond compliance. 9. Work within the sector and partner organisations to ensure that the sector is resilient to climatic changes, especially around flood risk and water scarcity issues.

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