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

DAIRY PRODUCTION SECTOR PLAN

June 2019

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SEPA

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 practice efficient resource use, successfully minimise the use 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 dairy production sector.

As the world's population grows beyond seven billion people and the global and local stresses on our environment increase, the challenge of how humanity feeds itself will be a tough one. In producing milk, as in all agriculture production, we will need to continue to look for ways to minimise environmental impact while ensuring successful production. Excellence in stewardship and the search for new forms of innovation will be the hallmarks of a vibrant dairy production sector.

Dairy production is an important sector in the Scottish economy. SEPA has developed a good working relationship with the sector over the past few years. Producers in this sector have made efforts to improve their environmental performance, but significant non-compliance challenges remain.

The plan sets out how we will build on our established relationships to work hard to ensure the dairy production sector becomes compliant. Many opportunities for good practice and technology enhancement exist that will help the sector make further progress and, ultimately, should they wish, go beyond compliance.

Our plan is ambitious. It spells out how we will use traditional environmental protection agency (EPA) regulatory tools, in clearer and more powerful ways.

As SEPA is not the main influencer in the dairy production sector, we need to work extensively in partnerships, which we will further 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 the different set 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.

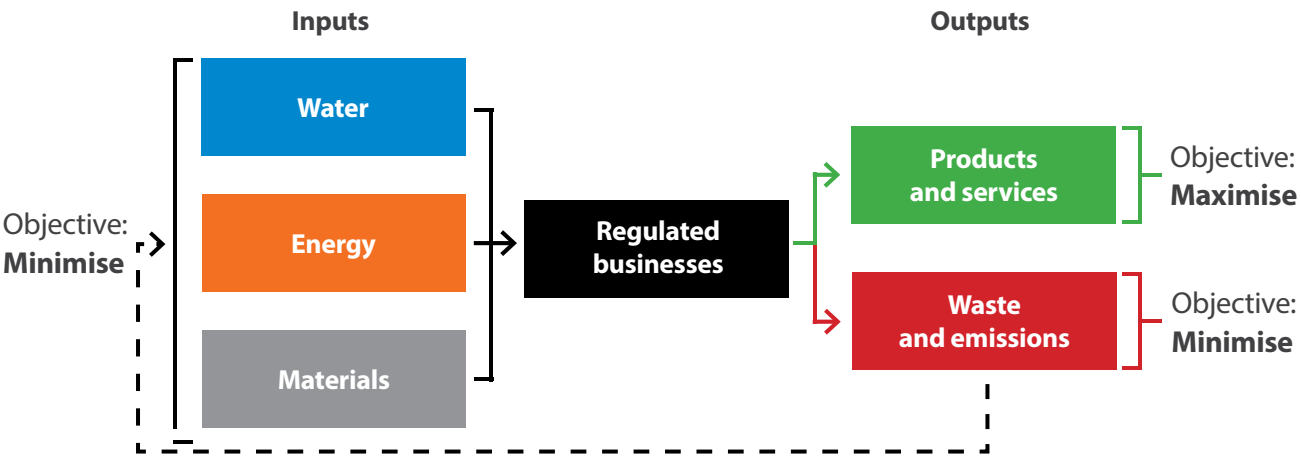
We are moving instead to ground our approach to regulation by working across whole sectors. This new way of working by SEPA started in 2017. It is being rolled out across all sectors we regulate and will mean we deliver our duties efficiently within existing budgets. All SEPA regulated activities will fall within a sector plan by March 2021. The dairy production sector is one of the first agricultural plans.

However, mere compliance and small scale incremental change will not be enough. The dairy sector is continuously improving the efficiency of its operation and this plan wants to support this. Efficiency must be rooted in a healthy environment and thus ensure a long-term sustainable industry and society. Further change needs to focus on the most pressing issues, such as climate change, and the best opportunities in the short and longer term. 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. 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.

Within this plan the reference to move beyond compliance simply means good farming practice, voluntary action or activities which involve going beyond the legal minimum and often include win-win situations for farmers and the environment. Focused funding can help facilitate uptake. Many farmers regularly practice farming techniques or management that do this. This may be due to the financial savings the activity will provide (e.g. soil testing) or how the action or investment will contribute to the long-term viability of their business (e.g. carbon audits). In many cases, it may just be because they feel it is the right thing to do for the environment or their local community.

Environmental flows (Figure 1)



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).

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. SEPA will also consider the relative corporate priority of different work areas.

Scope of the Dairy production sector plan

This is our plan for the dairy production sector. It details how we are going to regulate the sector and work with it to protect and improve the environment. The dairy production sector plan includes all on-farm activities that are necessary for the production of milk from the farming of dairy cows. This includes growing grass, keeping livestock, maintaining cattle sheds and milking parlours, managing manure and slurry and recycling and optimising reuse of a farm's resources. We are working closely to ensure that actions and innovations within the crop production sector plan[1] are shared with dairy producers.

The dairy production sector is currently not fully compliant with SEPA's environmental legislation; however, we are encouraged by the improvements that have been made to date by the sector working collaboratively with SEPA. It is in everyone's interest we work together ensuring those in the sector become compliant and identify opportunities for those who want to operate beyond compliance. This includes working with dairy producers across their supply chain.

As well as this dairy production sector plan, we are also producing a dairy processing sector plan[2]. This focuses on activities beyond the dairy production sector, as milk is uplifted by hauliers from the farm. We are working closely to ensure that actions and innovations within the dairy processing sector plan are shared with dairy producers. We are aware of the influence that processors have on producers, for example through pricing, accreditation and the need for close collaboration.

This plan covers dairy production from cows as they dominate the dairy production sector in Scotland. However, many of the actions will be the same for producers of milk from sheep, goats and buffalo.

1 Sector plans are available from sectors.sepa.org.uk
2 Sector plans are available from sectors.sepa.org.uk

2. Our vision for the dairy production sector

All dairy producers are compliant with environmental law; working with SEPA, other agencies and their local communities to fulfil their role as custodians of the land and water.

Dairy producers have realised the full value of their resources and the wastes they produce, minimising their use of raw materials, energy, and water; resulting in thriving efficient businesses, which produce a high quality product.

The dairy production sector benefits Scotland's environment, livestock, farmers, communities and businesses. They work together to identify and take up innovative opportunities that are mutually beneficial.

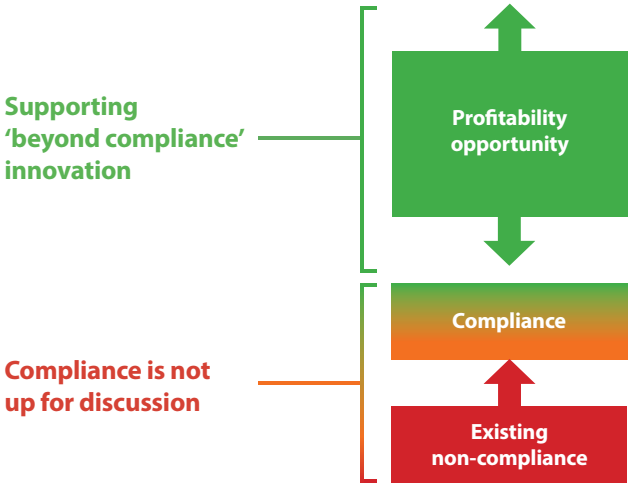
Our objectives

The objectives of the dairy production 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 dairy production sector. For our vision and objectives to be achieved, it is essential to build on our work with partners and identify win-win opportunities that benefit farm businesses and the environment.

Efficiency is already central to the dairy production sector as this reduces the resource need per unit of produce, and this will be fundamental to help 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 plans[3], the Waste to Resources Framework[4], the Energy Framework[5], the Climate Change Commitment Statement[6] and the flood risk management strategies[7]. 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 dairy production sector on a pathway to becoming a one planet sector.

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


602948

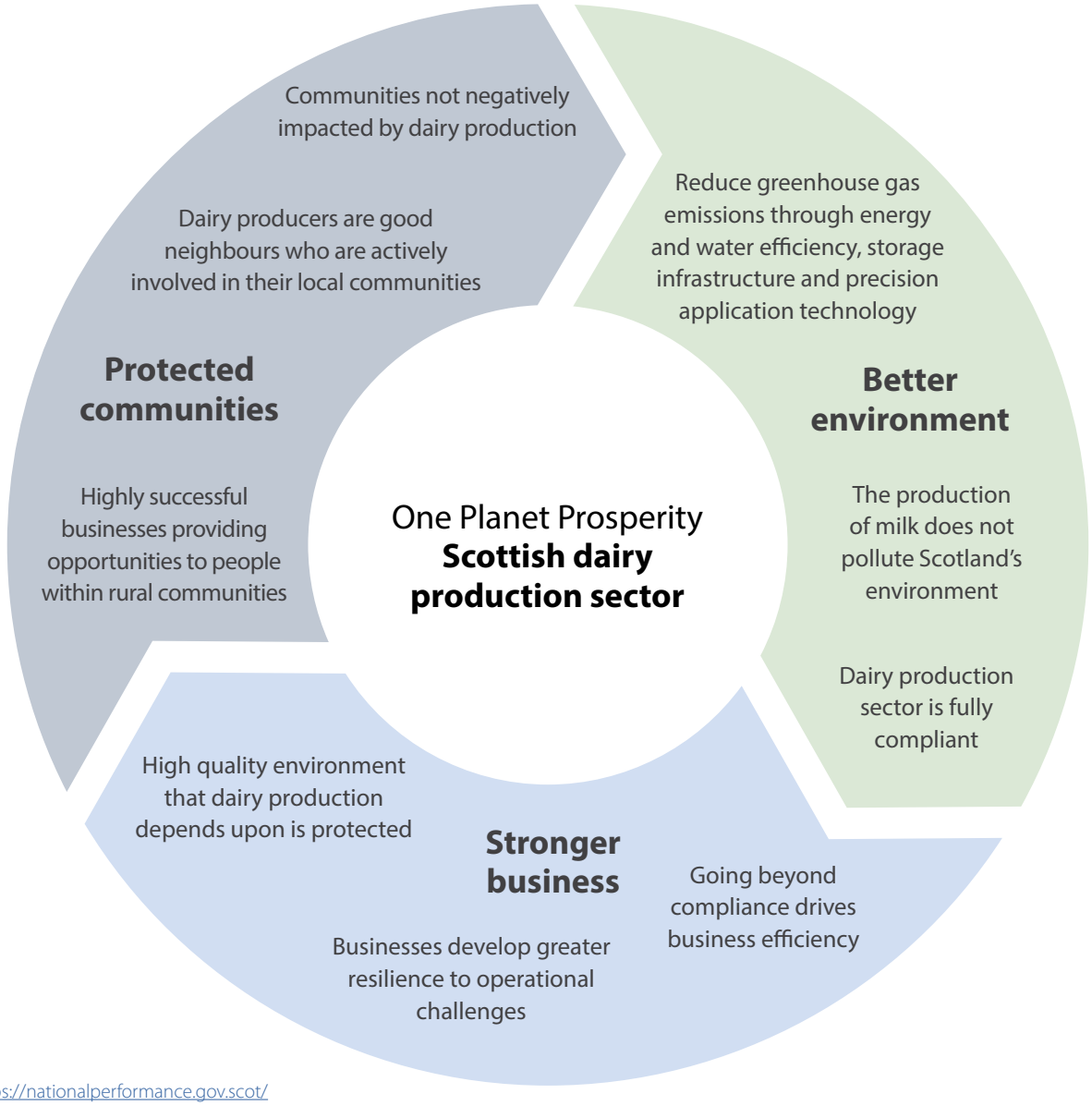
3. Outcomes

If we achieve the vision we have 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 achieve for the dairy production sector. These are linked to actions that we will take as outlined in Section 6 and 7 of the plan and contribute towards achieving United Nations (UN) Sustainable Development Goals (SDGs) and targets in the Scottish National Performance Framework[8].

Outcomes (Figure 3)



8 https://nationalperformance.gov.scot/

4. The dairy production sector

Currently there are less than 900 dairy herds in Scotland, which the NFUS website reports is 9% of the UK dairy herd. Based on farm gate price of milk we estimate that dairy production in Scotland is worth over £400 million to Scotland's rural economy. The sector provides jobs including hired labour, casual labour and occupier/spouse. In 2013, the Scottish Government estimated this to total 3,600 people[9].

The majority of dairy producing farms in Scotland are concentrated in the South West with approximately 80% of herds located in Dumfries and Galloway, Ayrshire and the Clyde Valley. There are also small pockets of dairy producers across the north east of Scotland (Figure 4).

Scotland's dairy producers are concentrated in regions that have a higher than average rainfall and are conducive to grass growth. The climate in the west of Scotland is well suited to grazing systems and dairy production, and Scotland's natural resources contribute to sustaining a successful sector.

These areas often drain towards some of the most popular beaches in Scotland, contributing to faecal contamination at designated bathing waters, potentially affecting local economies.

Dairy production units in Scotland are diverse in size with business models ranging from small family farms milking 60 cows to more intensive units milking over 1,000 cows. The Scottish Dairy Cattle Association website gives the average herd size in Scotland as 203 milking cows.

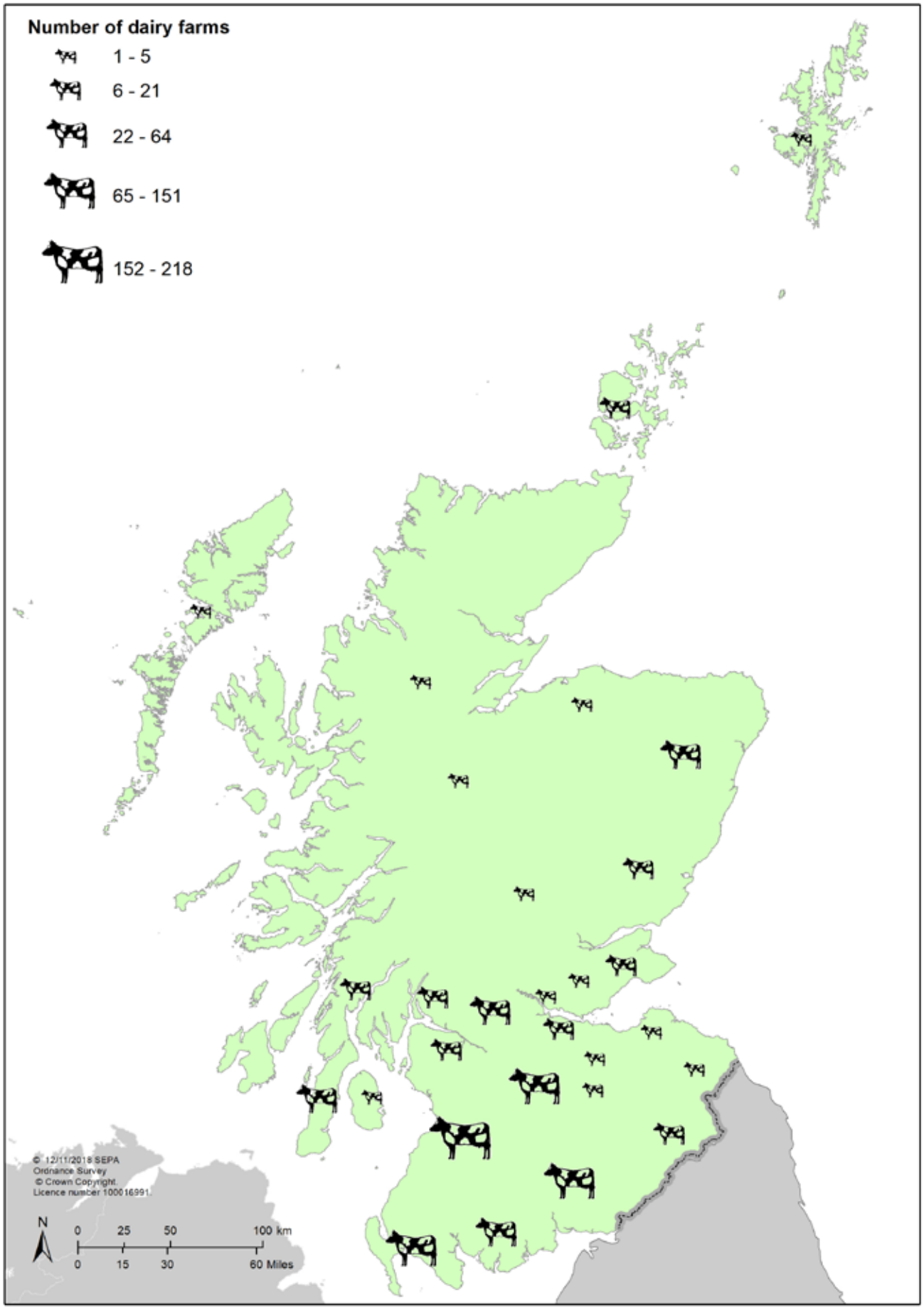
The main dairy breeds milked in Scotland are Holstein/Friesian, Ayrshires and Jerseys. Other breeds are also milked, including Shorthorns and Brown Swiss. Dairy cows are very efficient at converting grass into protein and butterfat, and these five breeds work well in Scotland. In order to maintain high milk production, a dairy cow must produce a calf every year.

Agricultural Facts and Figures 2018[10], published by the Scottish Government Rural & Environment Science & Analytical Services, reported the 2017 annual costs for an average dairy producer is in the order of £450,000 per farm. The equivalent cost for an average beef producer is £150,000, which emphasises the capital and variable costs associated with these farming sectors. Volatility in the prices of milk, forage and bedding also impact on industry stability and cause uncertainty about long-term profits and business investment.

Dairy farmers survive with relatively low profit margins and rely heavily on subsidies. According to the Scottish Government's Agricultural Facts and Figures 2018, the dairy farm average yearly income was £34,696 (net of costs) and subsidies were £35,294. This represents a significant change on 2015–2016 figures, when the average yearly dairy farm income was £1,968 compared to subsidies, which were £31,011. This impacts investment within the sector and can make major capital investment challenging for some farmers.

9 The Scottish Government, Economic Report on Scottish Agriculture 2017 Edition
10 https://www.gov.scot/publications/agriculture-facts-figures-2018/

Dairy producers in Scotland (Figure 4)



The methods used on farm vary from business to business, with some dairy producers having embraced innovation and technology (e.g. utilising robots), some farming using ethical farming methods while the majority remain largely unchanged from the traditional dairy farming system of livestock grazed outside during the summer.

The 2016 edition of the Economic Report on Scottish Agriculture, noted that dairy producers in Scotland sell approximately 1.5 billion litres of raw milk to dairy processors, who then convert the raw milk into products such as liquid (fresh) milk, cheese, butter, ice cream and powdered milk.

The majority of milk produced by Scotland's dairy producers is processed by Scottish-owned processors and multinational processors with Scottish sites. A small proportion of milk is transported to England for processing and can end up in a number of products including powder and cheese. How we work with processors is outlined in the dairy processing sector plan. Each dairy producer enters into a contract with a processor and each contract is slightly different, locking the dairy producer into certain requirements that are set by the processor. There are also some dairy producers who engage in on-farm processing, using a percentage of their milk to make products such as cheese, yoghurt, and ice-cream.

Dairy production requires a lot of energy, nutrients and water. There is no national average available for Scotland, but the UK headline value is that it takes about eight litres of water to produce one litre of milk[11].

Dairy producers handle a number of materials such as manures and slurries, fertilisers, effluents, oils, cleaning chemicals and vet medicines, all of which must be managed to minimise their impact on the environment. Water is needed for feed production, for the animals to drink and to wash down buildings. Electricity is required to milk livestock, store milk, to light farm buildings and to cool the milk to 3°C in the bulk tank. Electricity used in the milking parlour accounts for 85% of total electricity used on a dairy farm[12].

The consumption of resources can vary greatly from farm to farm. Simple measures can reduce resource consumption and increase resource reuse on a farm. Dairy production is a high energy use, water use and waste producing sector and we will build on our work with the sector to minimise their use of resources and emissions, meeting regulatory requirements and producing a high value product.

11 Cranfield University, Report Dairy Co. The Volumetric Water Consumption of British Milk Production, 2012
12 Shortall et al 2018

Facts and figures about dairy production in Scotland[13] (Figure 5)

1.5 billion

Litres of milk produced in Scotland per year

180,293

Dairy cows milked in Scotland daily

888

Scottish farms producing milk

£ 400 million

Estimated industry's worth to Scottish economy

100,000 hectares

Of Scotland used in dairy production

200 litres

Of water used per cow per day for drinking, washing up, milk cooling

13

Milk buyers operating in Scotland

4.2 billion

Litres of slurry produced by Scotland's milking herd and spread on Scottish dairy farms

3,600

People directly employed by the industry, all in rural areas of Scotland

£74

The undiluted slurry nutrient value of a $10m^3$ (2,000 gallons) slurry tanker when applied in summer

13 Data for Figure 4 sourced from the following:
- Agriculture fact and figures 2018 (Scottish Government);
- Scottish Dairy Hub;
- Scottish Dairy Cattle Association;
- Standard industry figures from the Scottish Government website:
- A&M Jones Consulting

5. Potential environmental impacts and how they are managed

As Scotland's environmental regulator, we protect the environment from impacts of the dairy production sector. This sector produces materials and gases that have the potential to pollute water, land and air. These emissions have a role to play in addressing causes and solutions to climate change. The sector must work to minimise the impact of these emissions and reduce the sector's carbon footprint as it produces a high value product.

The environmental impacts of dairy production can vary greatly from farm to farm depending on the way on-farm activities are carried out. Approaches to farming practice at key stages during dairy production can have a huge impact on the amount of pollution released into the environment.

By properly managing on-farm nutrients, impacts can be offset and minimised. We already work closely with dairy producers, and the organisations that represent them, to highlight the key stages in the dairy production supply chain that have the potential to have detrimental impacts on the environment.

In a traditional grazing system, for example, an increase in numbers within a herd can result in additional pressures and impacts on our soils due to livestock poaching in fields and bankside damage along watercourses. Since 2007 the average Scottish dairy herd size has increased from 136 to 201 cows. Figure 6 provides more detail on the key environmental impacts at various stages in the lifecycle of milk production on a farm.

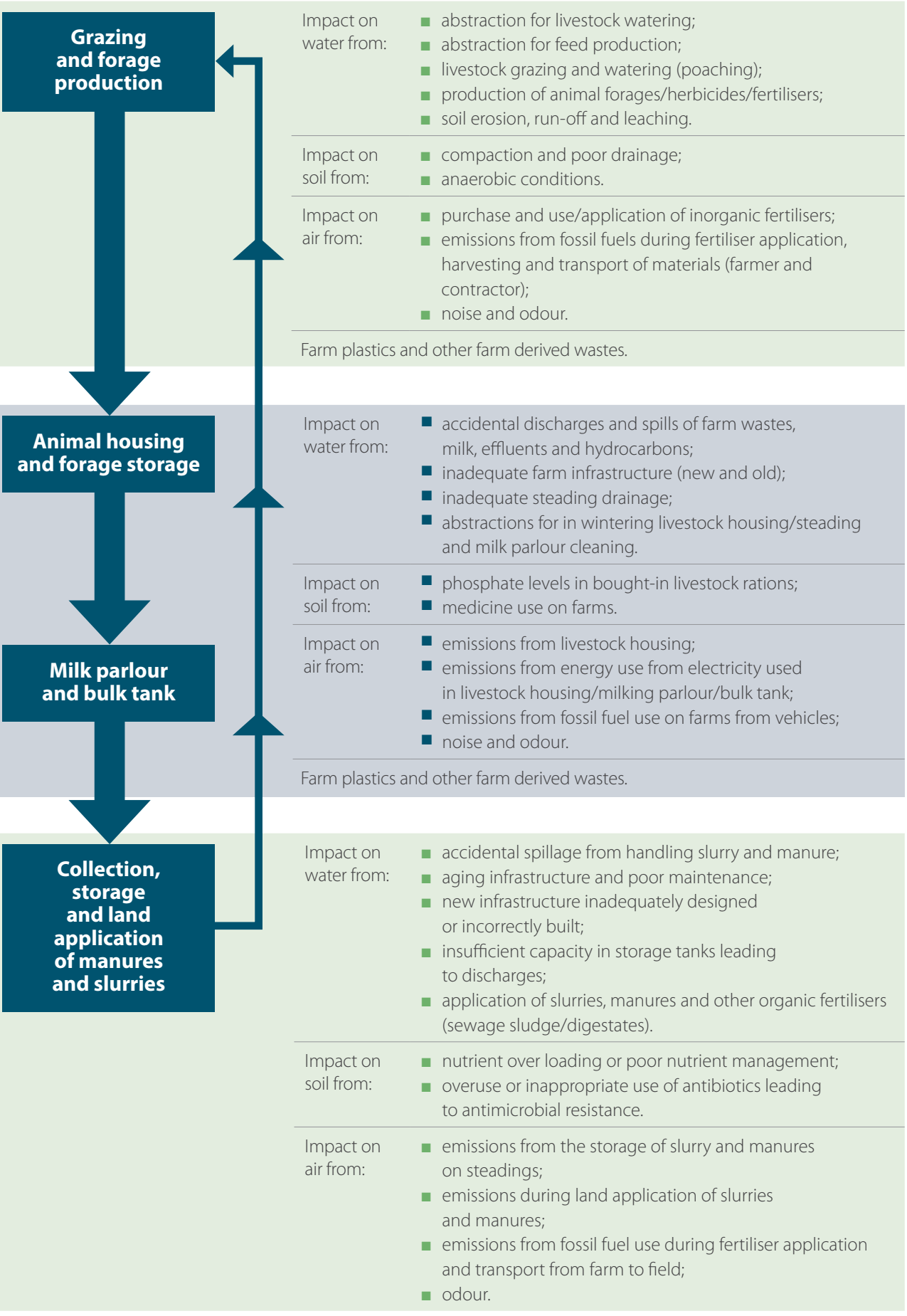
Environmental Impact: significant poaching

Before and after the implementation of measures relating to GBR 19 (keeping of livestock)

Before: significant poaching within 5m of water environment

After: voluntary beyond compliance measures in place to mitigate poaching

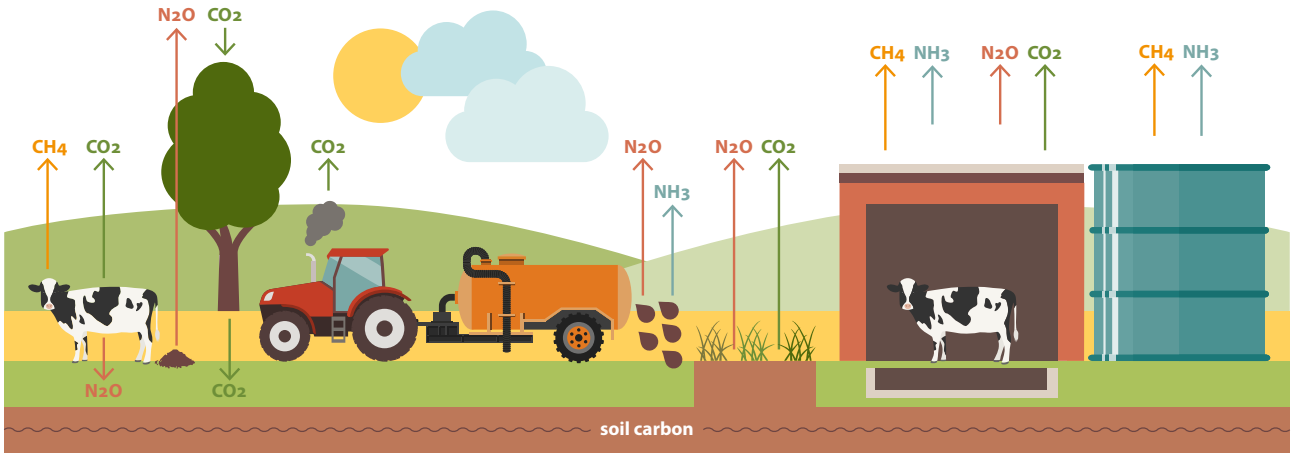
Overview of environmental impacts associated with dairy production (Figure 6)



Dairy production requires the use of energy to cultivate the land, produce and store milk before entering the supply chain. SEPA does not regulate the use of energy on farms, or many of the opportunities for energy generation on the farm. However, there is significant potential to make cost savings by using less energy, using resources more efficiently and looking for opportunities to produce more energy on-farm. The Farming for a better climate initiative[14] already shows practical ways to move towards profitable and low carbon farming and SEPA will continue to play our part in this. In addition the Climate Change Plan for Agriculture[15] sets out the path to a low carbon economy while helping to deliver sustainable economic growth and secure the wider benefits to a greener, fairer and healthier Scotland in 2032.

Scottish Dairy Supply Chain Greenhouse Gas Emissions: Main Project Report 2011 estimated that 3% of Scotland's direct greenhouse gas emissions are associated with the Scottish dairy supply chain. Although this includes processing, it stated that greenhouse gas produced during 'grass to farm gate' stages of the life cycle, e.g. dairy production, made up 80%. Most of the greenhouse gases emitted from dairy production come from the cows and their feed, the storage of manure and the use of energy in the milking parlour (Figure 7).

Greenhouse gas emissions from dairy production (Figure 7)



CH4: methane
CO2: carbon dioxide
N2O: nitrous oxide
NH3: ammonia

14 The Farming for a better climate initiative
15 Climate Change Plan for Agriculture

Environmental regulation of dairy production sector

The dairy production sector plan will focus on compliance under the regulations that SEPA is responsible for enforcing. We will work in partnership with other organisations to help them to deliver their requirements.

Unlike other intensive agriculture sectors (e.g. pigs and poultry), Scotland's dairy production sector is not permitted or licenced directly as a distinct activity, instead it must comply with a suite of legislation. A brief summary of how SEPA and partner organisations regulate the sector is set out in the following section. Dairy farmers must comply with all of these regulations.

SEPA has direct responsibility for regulating all activities as set out under the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003 (SSAFO). This governs the design, location, construction and maintenance of silage and slurry storage facilities on farms. It is not specific to dairy farming.

We also regulate land-based activities undertaken during the course of dairy production under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR), known as the General Binding Rules for rural diffuse pollution. A small number of producers may hold registrations or licences under CAR for the abstraction of water, for livestock watering, washing up and milk cooling, and for various river engineering activities.

Some producers use sewage sludge as an organic fertiliser. The Sludge (Use in Agriculture) Regulations 1989 control the application of sewage sludge to agricultural land and require testing of sludge and soils to prevent soil contamination from heavy metals.

Some producers also operate activities under the Waste Management Licensing Scotland Regulations 2011 exemptions for application of beneficial organic wastes to land, and reuse of material to make farm tracks and gate access. Duty of care compliance is important within the dairy production sector as it promotes good environmental practice at all stage of the waste management chain avoiding illegal deposits and environmental harm.

Some dairy producers above a certain threshold will be regulated under the Fluorinated Greenhouse Gases Regulations 2015 and the Ozone Depleting Substances Regulations 2015.

New farm buildings and storage facilities are subject to control through the planning system. Planning authorities are responsible for making planning decisions and SEPA is a statutory consultee in this process.

SEPA has a biodiversity duty under nature conservation legislation and works with Scottish Government, Scottish Natural Heritage (SNH) and stakeholders to drive towards more biodiversity friendly farming.

Dairy producers are also required to comply with legal obligations enforced by other organisations that we work in partnership with, such as the Scottish Government Rural Payments and Inspection Directorate (SGRPID) for the Common Agricultural Policy (Cross Compliance) (Scotland) Regulations 2014, and the Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008. Our staff check compliance with these regulations and if any non-compliance is observed it is reported to SGRPID. The legal obligations that dairy producers must comply with are summarised in Figure 8.

EU exit

Around 80% of environmental legislation in Scotland originates from the European Union. As the UK leaves the EU, environmental legislation is being corrected to make sure the law keeps working as it has been 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 and to work with as many businesses as possible to help them to go further will not diminish as a result of the UK leaving the EU.

Environmental legislation used by SEPA and partner organisations to regulate the dairy farming sector (Figure 8)

Environmental regulation used by SEPA

- Water Environment Controlled Activities (Scotland) Regulations (CAR) 2011 – General Binding Rules, registrations, licences:
  - diffuse pollution;
  - oil storage;
  - abstraction;
  - engineering;
  - pesticides.
- The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003 (SSAFO)
- The Sludge (Use In Agriculture) Regulations 1989
- Environment Protection Act 1990 (EPA 90) Waste Management Licenses:
  - farm burning;
  - imported wastes.
- Waste Management Licensing (Scotland) Regulations 2011
- Waste Management exemptions
- The Fluorinated Greenhouse Gases Regulations 2015
- The Ozone Depleting Substances Regulations 2015
- Nature Conservation (Scotland) Act 2004
- Wildlife and Countryside Act 1981 as amended
- Conservation (Natural habitats, &c.) Regulations 1994 as amended
- Regulatory Reform (Scotland) Act 2014
- Wildlife and Natural Environment (Scotland) Act 2011

Environmental regulation used by the Scottish Government and local authorities

- The Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 2008
- The Common Agricultural Policy (Cross Compliance) (Scotland) Regulations 2014
- Animal Health and Welfare (Scotland) Act 2006
- The Food Hygiene (Scotland) Regulations 2006
- The Town and Country Planning (General Permitted Development) (Scotland) Order 1992
- The Building (Scotland) Regulations 2004
- Nature Conservation (Scotland) Act 2004
- Wildlife and Countryside Act 1981 as amended
- Conservation (Natural habitats, &c.) Regulations 1994 as amended
- Regulatory Reform (Scotland) Act 2014
- Wildlife and Natural Environment (Scotland) Act 2011

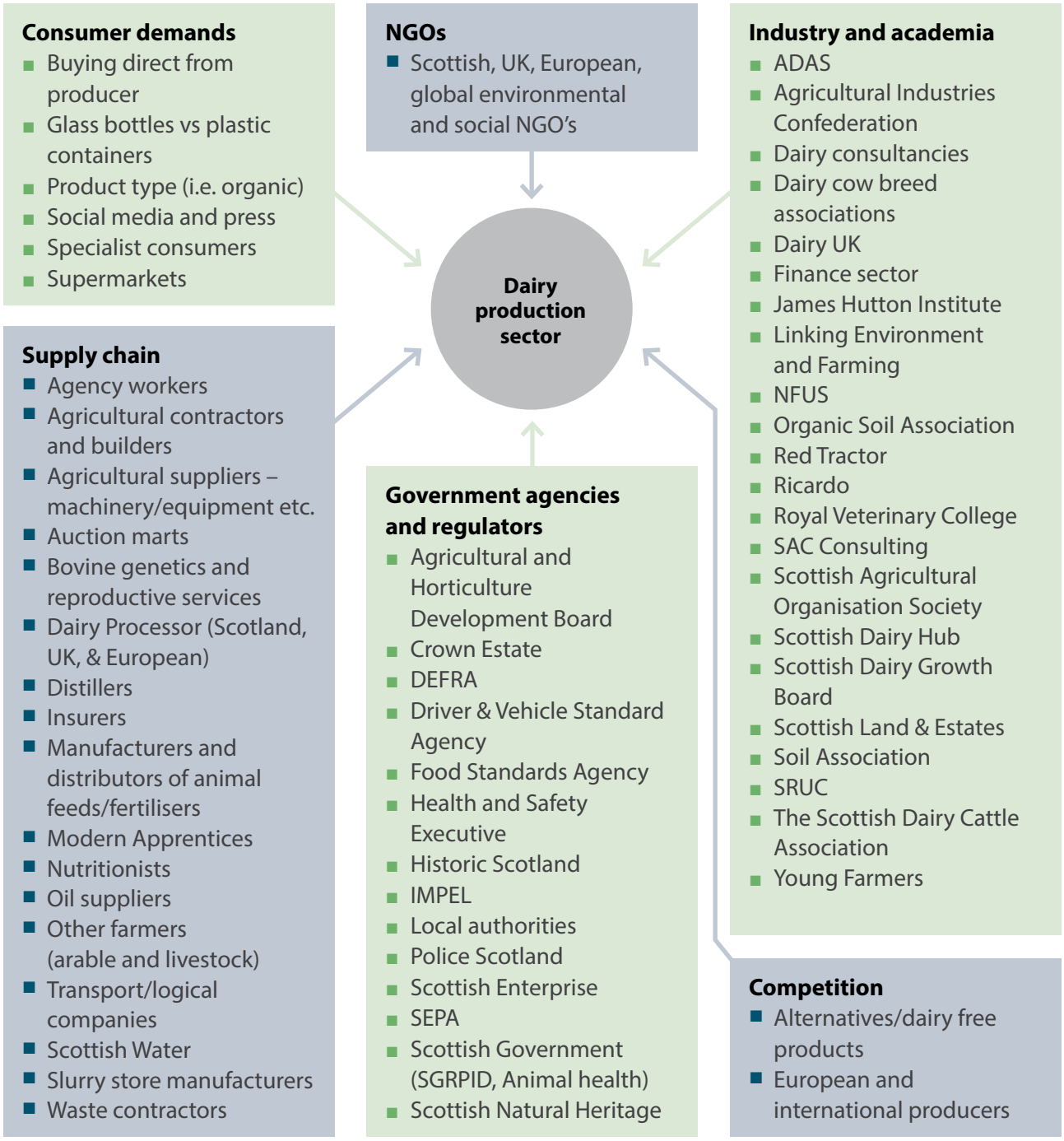
Wider influences on environmental performance of the dairy production sector

Full compliance with environmental regulations will not, by itself deliver the transformational change required to secure our One Planet Prosperity objectives. The dairy production 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 who want to move beyond compliance we will develop our relationships with partners and other stakeholders.

Figure 9 summarises the main organisations that influence and are influenced by dairy producers in the 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 dairy production sector (Figure 9)

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

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

Compliance in the sector

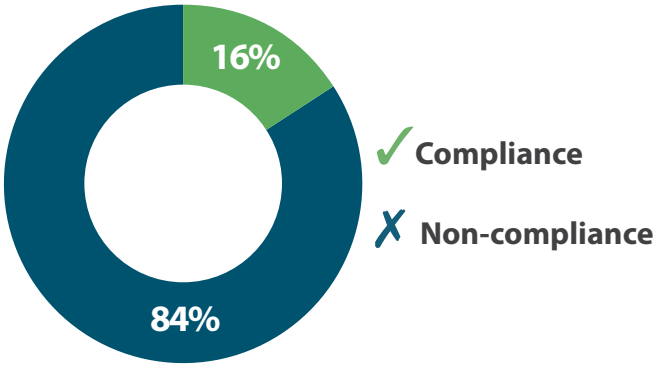
Through the river basin management plans[16], we have set out how we are working to tackle rural diffuse pollution from agriculture. The priority catchment approach was agreed in partnership with the Diffuse Pollution Management Advisory Group[17] as a solution to diffuse pollution impacts from agriculture and forestry sources. Members of this group include key stakeholders within the sector. Priority catchments were identified because monitoring of failures in bathing waters and shellfish waters indicate that these are a result of faecal bacteria entering rivers. Agricultural activities within the catchments were identified as the most likely source.

We are currently gathering detailed evidence through an intensive monitoring programme in livestock catchments to demonstrate the positive effect of compliance on water quality, and highlighting how reducing soil and nutrient losses can improve farm efficiency. This evidence can also help to identify high risk periods and activities to help target further action and evaluate the plan.

We know from Scotland's rural diffuse pollution priority catchment work that the majority of the dairy production sector is not currently doing all that they are required to do to be fully-compliant with environmental legislation. When non-compliance issues were highlighted on-farm, the sector worked with SEPA to put a plan in place to become compliant. We are confident that this is representative of the sector as a whole. Over 5,000 farms have been visited, 400 of which are dairy producers. Priority catchment work will continue beyond 2021, and additional dairy producers will be assessed when the catchment they farm in is visited.

Since 2011, we have been actively working with those 400 dairy producers in priority catchments. When dairy producers were first visited through the priority catchment work the compliance rate was only 16%, as shown in Figure 10. This meant that the majority of the sector was not complying with environmental law.

Environmental compliance rate of dairy producers at initial SEPA visit in Scotland's diffuse pollution priority catchments (Figure 10)



Key issues contributing to non-compliance:

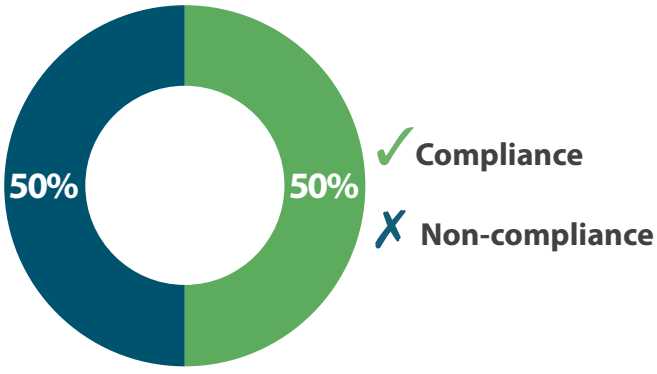
- insufficient storage capacity for farm slurries and manures;
- effluent discharges from farm steadings;
- run-off from land application of slurries and manures;
- significant livestock poaching of river banks;
- inadequate steading drainage arrangements.

16 www.sepa.org.uk/environment/water/river-basin-management-planning/
17 www.sepa.org.uk/environment/water/river-basin-management-planning/who-is-involved-with-rbmp/dpmag/

Engagement, through work in priority catchments, tells us that the most common reason for low levels of compliance is a lack of understanding about what is required to meet minimum legislative requirements. We also know from work in priority catchments that working with the dairy production sector to inform and support them to make changes to farm practices results in significant improvements in compliance.

Figure 11 shows that within 12 months of their visits, the compliance rate for the 400 priority catchment dairy producers increased to half with the remaining still non-compliant, but taking action to work towards compliance. We will take enforcement action, including fixed monetary penalties, on those dairy producers who decide not to change their practices on farm.

Environmental compliance rate of dairy producers 12 months after initial SEPA visit in Scotland's diffuse pollution priority catchments (Figure 11)



Key issues contributing to improvement in non-compliance:

- dairy producers more aware how to comply following initial visit;
- increased investment in farm infrastructure;
- better collaboration between sector, its representative and SEPA;
- education material available via Farming and Water Scotland.

How will we work with the sector to achieve compliance?

From our work in priority catchments we have identified the most common environmental non-compliances. These will be tackled as part of this sector plan through our action plan to help all dairy producers become compliant.

Working with partners and the Diffuse Pollution Management Advisory Group we have already helped dairy producers within priority catchments to achieve compliance, and will continue to support all dairy producers as long as they are willing to work with us. Where necessary we have taken enforcement action, but through our experience in priority catchments we have established a successful supportive approach.

We are encouraged by the evidence from this work, which shows us that clear explanations of what is required on farm, delivered directly to the farmer, works. We will apply this approach across the sector.

We will continue to work with our partners to deliver this successful cooperative approach. We will also help responsible compliant businesses to operate by making it significantly harder and more expensive for those who persistently fail to comply with environmental regulation to operate.

We will achieve this by increased scrutiny, and the use of enforcement and monetary penalties for those who fail to comply.

Common non-compliance the sector must address (Figure 12)

Infrastructure or activity on farm	Resulting non-compliance	Examples of non-compliances from farm visits to dairy farms in priority catchments[18]
Farm infrastructure	■ Poorly managed or incorrectly maintained aging farm infrastructure can lead to uncontrolled spillages, overflow or leaks of farm effluent which can cause pollution of the water environment.	■ cracks/holes in silage pit floors; ■ undersized and overflowing silage effluent tanks; ■ use of structures (middens and silage pits) with no formal effluent collection tank; ■ leaking slurry tanks.
Drainage issues	■ Poor management of clean and dirty water drainage on farm, exacerbated by lack of any formal farm drainage plan can lead to water pollution.	■ roof rones and downcomers discharging clean water onto dirty yards increasing slurry production.
Livestock slurry	■ Insufficient on farm slurry storage leading to poor slurry management resulting in slurry applications being undertaken on the wrong field at the wrong time, in the wrong conditions and with the wrong application rate can lead to water pollution.	■ 66% of dairy farms visited by SEPA have less than 6 months slurry storage with 33% of these farms having less than 3 months slurry storage; ■ spreading slurry within 10m of the water environment; ■ spreading on waterlogged and frozen ground; ■ point source discharges from overflowing slurry tanks.
Livestock poaching	■ Intensification within the dairy production sector has increased the pressures on farm soils due to livestock poaching. ■ The most common non-compliance within this sector is significant poaching within 5m of the water environment leading to bank side erosion and faecal contamination of water due to no restriction on livestock entering watercourses.	■ 65% of dairy farms visited by SEPA had one or more significant poaching areas within 5m of the water environment.

18 Priority catchment visit 2010-2019.

We will prioritise actions so that the dairy production sector is fully compliant. We feel that delivering Scotland's diffuse pollution priority catchment approach to all dairy producers in Scotland will help the sector become compliant. Through previous experience of working with the sector we have identified a need to improve on farm understanding of the environmental risks associated with their businesses. By assessing compliance on farm and working with those identified as non-compliant we can build their understanding of environmental risks and work with them to become compliant. We will revert to enforcement action where our actions don't achieve the desired result. We will continue to invest in SEPA staff so they can provide knowledgeable, consistent and pragmatic support to dairy producers. We will also work to improve guidance for dairy producers in respect of new on farm infrastructure and deliver clarity and accessibility to dairy farmer guidance.

We will work with partners to deliver business efficiency guidance to on farm dairy processors in relation to waste minimisation. For example, we feel that the value from organic fertilisers (manures and slurries) produced on farms is not currently maximised. We will continue to work in partnership with the Scottish Government and industry to make the Scottish dairy farming sector a global leader for best practice in handling, storing and applying to land of organic manures and slurries. We will continue to engage with agricultural colleges and universities to ensure our future dairy producers are fully equipped to deal with the environmental challenges they face. We also feel that discussions during farm visits can introduce the opportunities to go beyond compliance; highlighting the environmental and business case for taking such actions.

The future holds many challenges for the dairy production sector, not least of which will be the new agricultural policy and climate change. To be ready for future challenges and to be in a position to take advantage of future opportunities, it is important the sector is as robust and as resilient as possible.

SEPA will:

- deliver Scotland's diffuse pollution priority catchment approach to all dairy producers in Scotland and in doing so will:
    - visit dairy farms across Scotland to check compliance and share any non-compliance issues found;
    - work with dairy producers to identify an action plan to tackle non-compliance putting measures in place to meet requirements.
- take enforcement action where a dairy producer remains non-compliant and is not making changes to ensure compliance;
- continue to invest in SEPA staff so they can provide knowledgeable, consistent and pragmatic support to dairy producers;
- work to improve guidance for dairy producers in respect of new on-farm infrastructure and deliver clear and accessible guidance to dairy farmers;
- continue to work in partnership with Scottish Government and industry to make the Scottish dairy farming sector a global leader for best practice in handling, storing and applying to land of organic manures and slurries.

Where are the opportunities to go further?

We believe that those societies and economies that use resources efficiently, and successfully minimise energy and water usage while also minimising wastes 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 to improve compliance by businesses in the dairy production sector.

For the dairy production sector the reference to move beyond compliance could also be described as good farming practice, voluntary action or activities that involve going beyond the legal minimum. Many farmers regularly practice farming techniques or management that do this. This may be due to the financial savings the activity will provide (e.g. soil testing and nutrient budgeting) or how the action or investment will contribute to the long-term viability of their business (e.g. carbon audits). In many cases, it may just be because they feel it is the right thing to do for the environment or their local community. Many of the opportunities to go beyond compliance are also opportunities for the businesses to generate business efficiency improvements; save resources, reuse and maximise nutrients and make better use of antibiotics and veterinary medicines.

Other examples of beyond compliance activities on dairy farms are:

- the roofing of silage pits, slurry stores and middens to reduce the amount of clean water to be handled and spread on land;
- collecting/harvesting roof water or reuse of water from plate cooler for washing down collection areas;
- fencing off watercourses and providing alternative watering for livestock;
- using trailing hose or shoe when applying slurry to land;
- utilising renewable energy on-farm (solar, AD and wind);
- using energy efficient lighting in livestock sheds;
- insulating water tanks, pipes and utilising heat from milk cooling;
- increased use of technology to improve animal welfare increasing on-farm productivity.

There are also opportunities to tackle the big issues, such as greenhouse gas emissions and climate resilience, and reliance on and consequences of antibiotic use. These opportunities are summarised below under three themes: water; materials; and energy. We will use our influence, experience and knowledge to help the dairy production sector to identify these opportunities to go beyond compliance whilst working with them to reach compliance.

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.

Our 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 we will give communities and emergency responders advance notice of flooding to help them prepare and protect themselves. To understand areas at greatest flood risk, we will use the best available evidence. We 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 dairy production sector is a significant water user, relying on an available supply of good quality water (mains/private) to produce milk for processing. The sector also has the potential to impact on groundwater, and surface water quality and quantity through poor steading management, livestock grazing, application of organic and inorganic fertilisers to land and abstraction. We will work with the sector to protect Scotland's water quality, reduce water demand and build resilience to climate change.

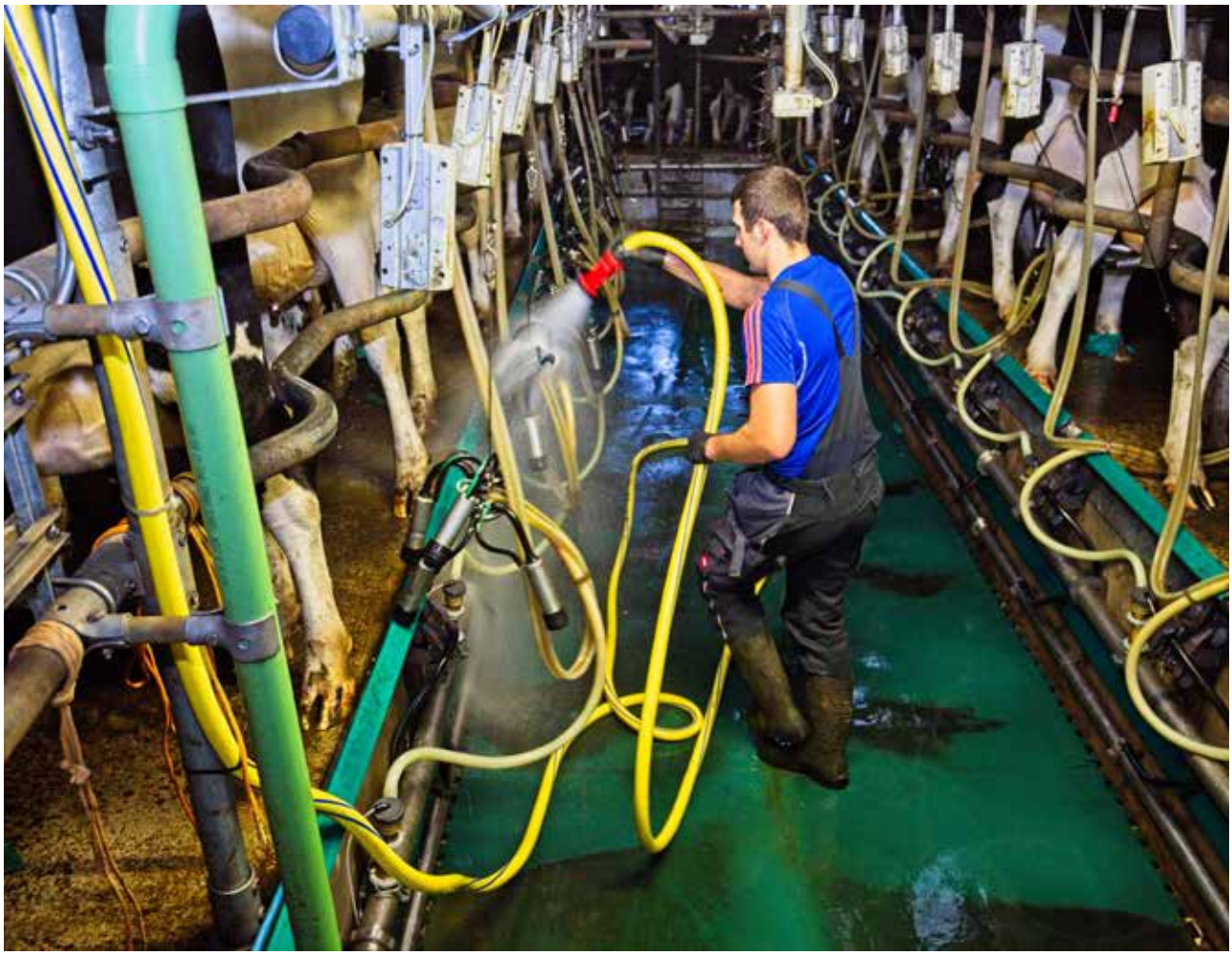
SEPA's aspirations are to support those businesses within the sector who want to go beyond compliance. We will achieve this by:

- bringing together experts from the dairy processing sector and other industries to share best practices in minimising water use, water treatment, water capture and reuse;
- working with the Scottish Government and industry representatives to encourage the uptake of precision application techniques for slurry spreading, minimising the potential for pollution from land run-off and emissions of greenhouse gases;
- working in partnership to actively promote the environmental and livestock benefits of woody riparian zones and agro-forestry.

Good practice examples: water collection and treatment

(1) Constructed farm wetlands (CFW) treat lightly contaminated drainage from around farm steadings. By taking winter run-off from yards and silage pits to a CFW, they free up capacity within existing slurry storage facilities, build slurry resilience and minimise the likelihood of pollution from yard drainage. These systems have been in use for the last 10 years throughout Ireland and are now being considered and installed in Scotland.

(2) Reducing the amount of water collected and disposed of can reduce costs, particularly energy and labour costs, so effective management of dirty water can be a good opportunity to save money.[19]



19 Agriculture and Horticulture Development Board (AHDB), Efficient use of water on a dairy farm, 2015

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[20] 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.

Dairy production is energy intensive. The milking process uses significant amounts of electricity for cooling and storing milk. In addition, electricity is required for heating water, lighting and ventilating the milking parlour and cubicle housing. Vehicles used for feeding livestock, spreading slurry and manures, and cutting/hauling silage also use energy.

We will work with the sector, Scottish Government and partners to help encourage delivery of the future of energy in Scotland. The future ambitions are contained in the Scottish Energy Strategy,[21] the Scottish Government's Climate Change Plan[22] and SEPA's Climate Change Commitment Statement.[23] On dairy farms this will mean changing management practices, investing in new technologies and switching to low carbon and renewable energy sources. Dairy producers are already changing how they operate due to the increasing cost of electricity and oil.

SEPA's aspirations are to support those businesses within the sector who want to go beyond compliance. We will achieve this by:

- working in collaboration with the Scottish Government and industry to promote cost effective measures to reduce energy consumption on dairy farms and encourage alternatives to fossil fuels;
- contributing to discussion on rural funding for on-farm renewable energy production;
- contributing to discussions into opportunities for use of non-fossil fuel driven farm vehicles;
- working with industry (producers, processors, consultants) to promote farm scale energy benchmarking and using this to promote opportunities for Scotland's dairy producers to adopt energy efficient practices and technologies.

Good practice examples: using technology to reduce energy

(1) Retrofitting a variable speed drive to the vacuum pump on a dairy farm, could save around £5,500 over 10 years based on 2014 energy prices. [Agri-renewable strategy for Scotland]

(2) The dairy production sector is already adopting new technology and agri–renewable technology to reduce on farm energy costs. For example: investment in wind turbines, solar panels on cubicle houses and in fields, anaerobic digestion and wood fuelled biomass.

20 https://www.sepa.org.uk/media/383806/sepa_energy_framework.pdf
21 Scottish Energy Strategy
22 Scottish Government's Climate Change Plan
23 SEPA's Climate Change Commitment Statement

Materials

SEPA views the circular economy as a game-changing opportunity to manage resources within planetary limits. Our Waste to Resources Framework[24] recognises that by 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 dairy production sector uses and produces a significant amount of materials. By materials we mean both natural and manmade materials, including soils, animals, fertilisers (organic and inorganic), forage, antibiotics and other veterinary medicines, and plastics. Dairy production needs healthy soils that can utilise the slurries and manures produced on the farm to stimulate the growth of grass for livestock feeding. The sector must cut waste production and seek to keep materials in use for as long as possible. Where waste is produced, we will always seek to facilitate the productive use within a framework of strong environmental protection.

Soil has limits to the amounts of phosphates it can hold; beyond this it starts to release it to the wider environment causing pollution. There is an opportunity to consider how slurries could be further treated to produce fertilisers for other agricultural sectors in an easily transportable form. The crop production sector plan[25] has identified an action to explore this opportunity. Recycling slurries and manures through land treatment has the potential to deliver significant financial savings for the farm business as well as making more sustainable use of resources, and reducing greenhouse gas emissions.

Milk production requires happy, healthy livestock, which are efficient in converting forage and water into milk. Research in the dairy sector[26] is increasingly recognising the value of biodiversity for healthy and resilient dairy systems. This includes the benefits that having diverse flower rich swards and hedgerows can have to animal health, reducing antibiotic use, and the improved quality of milk for example milk protein levels. Some dairy processors have started to increase what they will pay to farmers who invest in their farm biodiversity in recognition of the benefits of reducing antibiotic use and improved protein content.

Good practice example: low emission spreading equipment

Low emission spreading equipment can reduce odours and improve dispersion of fertilisers, compared to a broadcast application. Adoption of a trailing hose or trailing shoe will reduce ammonia emissions to air from slurry application by between 30%-60%.[27]

24 https://www.sepa.org.uk/media/219528/one-planet-prosperity-a-waste-to-resources-framework.pdf
25 Sector plans are available from sectors.sepa.org.uk
26 Resilient Dairy Landscapes – The Project
27 DEFRA Code of Good Agricultural Practice (COGHAP) for reducing ammonia emissions

SEPA's aspirations are to support those businesses within the sector who want to go beyond compliance. We will achieve this by:

- collaborating with industry throughout the supply chain (producers, processors, retailers and consultants), the Scottish Government and academics to identify innovative solutions to slurry resilience across the sector;
- encouraging new steading infrastructure and application techniques to drive down greenhouse gas emissions from livestock handling, slurry storage and spreading;
- working with partners to improve understanding within the sector of the importance of good soil health for crop growth;
- contributing to research to optimise and support improvements in animal nutrition, thereby driving down emissions of greenhouse gases and nutrients, and reducing inappropriate use of antibiotics on dairy farms;
- working with partners to encourage active nutrient management planning and carbon off-setting by dairy producers;
- working with stakeholders across the supply chain to minimise plastic use across the sector, to improve the collection and recycling of farm plastics and to support the market to introduce a minimum recycled content of new plastic materials;
- exploring opportunities to produce fertiliser for the crop sector from slurries (via SEPA's crop production sector plan);
- exploring opportunities to work with dairy producers and processors to invest in diverse swards and hedgerows to improve quality of the product, reduce antibiotic use and improve security for farmers making these investments (in conjunction with the dairy processing sector plan).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7. Summary of actions and aspirations

"Before I moved to Scotland to join SEPA as its Chief Executive in April 2015, I was constantly told about the great approach that SEPA had adopted in the way it worked with the farming community in Scotland. It was one of the best 'assets' existing at SEPA when I took up the reins. This sector plan entrenches this approach – we will continue to provide helpful support and guidance to farmers and use enforcement powers only in those cases where it is necessary to achieve compliance outcomes. We are also keen to help those farmers who want to move 'beyond compliance'. This is a 100% voluntary area of work in which enforcement has no place at all. Instead, this beyond compliance work is where SEPA is ready to help farmers explore 'win-win' opportunities that make farms more profitable through sound environmental practice."

Terry A'Hearn
SEPA Chief Executive Officer

The following table summarises the actions that we have described in previous sections to address non-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 following 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 achieve 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.

Better environment	
Outcome sought	Actions to achieve compliance and aspirations beyond compliance
Dairy production sector is fully compliant	■ Extend diffuse pollution priority catchment programme to all dairy producers. This will include assessing compliance and working with those identified as non-compliant. We will revert to enforcement action where our actions don't achieve the desired result. ■ Invest in SEPA staff so they can provide knowledgeable, consistent and pragmatic support to dairy producers. ■ Work with partners to deliver business efficiency guidance to on-farm dairy processors in relation to waste minimisation. ■ Discuss opportunities to move beyond compliance during priority catchment farm visits, including examples of best practice. ■ Support those businesses willing to work with us to deliver beyond compliance.
Maximum value is derived from organic fertilisers (manures and slurries) produced on farms	■ Work in partnership with the Scottish Government and industry to make the Scottish dairy farming sector a global leader for best practice in handling, storing and application of organic manures and slurries. ■ Develop, in collaboration with industry and dairy processors, case studies demonstrating the benefits of using precision slurry spreading technology. ■ In collaboration with industry, promote the benefits of dairy producers actively utilising nutrient budgeting, undertaking regular soil testing and slurry analysis. ■ Encourage and support the adoption of farm-scale or community anaerobic digestion developments.
Reduce emissions from dairy production – SEPA's climate change commitments	■ Extend diffuse pollution priority catchment programme to all dairy producers. Work to ensure that all dairy farmers are aware of and are complying with refrigeration emissions and burning of farm wastes. ■ Work with the Scottish Government and other partners to encourage dairy producers to reduce greenhouse gas emissions from the storage and spreading of organic fertilisers. ■ Work with partners to actively encourage dairy producers to use expert advice to optimise feed plans, which are directly linked to reducing livestock emissions. ■ Work with dairy farmers, the Scottish Government, researchers and other stakeholders to help reduce the incidence and prevalence of diseases in cows, increase milk production and reduce inappropriate use of antibiotics and other veterinary medicines. ■ Work with partners to actively encourage willing dairy farmers to manage their land in a way that maximises biodiversity and contributes to restoring natural catchments. ■ Continue to support research and disseminate best practice low carbon dairy farming.

Stronger business	
Outcome sought	Actions to achieve compliance and aspirations beyond compliance
Sector specific training and guidance	■ Produce sector guidance to help dairy producers understand the environmental risks associated with their businesses. ■ Engage with agricultural colleges and universities to ensure our future dairy producers are fully equipped to deal with the environmental challenges they face. ■ Work with SEPA staff to improve guidance for dairy producers in respect of new on farm infrastructure. ■ Create an easily accessible, regularly maintained dairy production intranet page for officers working with dairy producers. ■ Work with NetRegs to deliver clarity and accessibility to dairy producer guidance. ■ Work with industry representatives to deliver improved guidance on environmental compliance, agro-forestry, water minimisation and reuse, energy efficiency and agri-renewables.
Increase energy efficiency on farm	■ Work with partners to actively encourage dairy producers to become more energy efficient in relation to water use, lighting, reuse of heat, biomass and electricity. ■ Explore with Scottish Government, industry representatives, dairy processors and partners the opportunities for dairy producers to move into agri-renewables energy. ■ Work with partners and dairy producers to phase out the use of fluorinated gases in refrigerant systems.
Supply chain sustainability and incentives	Working with the dairy processing sector plan to: ■ Engage with dairy processors and supermarkets and accreditation schemes to explore what opportunities there may be for influencing or incentivising dairy producers to deliver beyond compliance actions. ■ Work with dairy processors, research institutions and farming representatives to explore opportunities around reducing antibiotic use within dairy production. ■ Work with research institutions and farming representatives to explore opportunities to reduce the amount of wastes arising on farm and to develop the technology to get better value from wastes.

Protected communities	
Outcome sought	Actions to achieve compliance and aspirations beyond compliance
Natural flood management reduces the risk of flooding	■ Extend diffuse pollution priority catchment programme to all dairy producers. Where straightened water courses are present on dairy farms work in partnership to outline the benefits of restoring natural river function and objectives under river basin planning. ■ Work with partners to actively encourage dairy farmers to manage their land in a way that maximises biodiversity and contributes to restoring natural catchments.
Prosperous and resilient dairy farms supporting local communities and workforce	■ Extend diffuse pollution priority catchment programme to all dairy producers. Stop diffuse pollution from dairy farming impacting on catchments, bathing waters and protected species e.g. Salmon. ■ Work with the Scottish Government to ensure future agricultural support is outcome focussed and helps deliver Scotland's environmental objectives and flood risk management. ■ Explore opportunities to encourage cooperation between groups of farmers for landscape scale action (flooding, abstraction, diffuse pollution and biodiversity). ■ Work with our key stakeholders such as NFUS and Quality Assurance Schemes to understand how together we can have the most influence within the sectors' supply chain to help promote sustainable and resilient farming.

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