



INVENTORY FOR THE STRATEGY

Denise Elliott NIAB

March 2020



Contents

1. Introduction.....	3
2. WRAP's vision for the EU circular economy to 2020	5
3. National policy	6
UK – Current situation of policy and strategies	6
Belgium – Current situation of policy and strategies	8
The Netherlands – Current situation of policy and strategies	11
4. Existing Policies – what is and isn't working:	13
UK.....	13
Belgium	16
Netherlands	18
0.1 General view	18
0.2 Development of the Biobased economy in the regions	18
0.3 Biobased developments at companies	19
0.4 Biobased knowledge development.....	19
0.5 Biobased material flows.....	20
5. Inventory of BBE barriers.....	21
6. Discussion.....	23
Comparison with Europe	24
Appendix 1: WRAP's vision for the UK circular economy to 2020	28
Appendix 2: UK Policy and Strategies.....	30
Appendix 3: Comparison of UK, BE and NL Policies and Strategies	36
Appendix 4: Notes on WRAP 28 Courtauld Commitment, 2025 - Reducing food supply chain emissions and waste	

1. Introduction

The BioBoost Strategy document is one of the most important parts of the project as it will be a culmination of research gained from the inventory, discussions at partner meetings, ideas gained from other work packages, and desk based strategy research. In an earlier phase of the BioBoost project, a large inventory was produced to assess the state of horticultural bio-economy in the three regions of Flanders (Belgium), Westland (Netherlands) and Lea Valley (UK) that has been published on the BioBoost website. This has served as input for a project strategy to provide a joint basis for the partnership to shape effective actions to stimulate the future biobased circular economy in horticulture within these regions. The information gathered from the large inventory will be used to produce a Strategy document of which this Strategy Inventory is the initial stage. The Inventory for the Strategy aims to act as a signposting document highlighting where to find information about the circular economy in the three regions, including current policy, what is working and what is not working. It aims to be complimentary to the Strategy Document.



General perspective on international strategy

More than 50 countries and international organisations worldwide are currently working on strategies and policies to promote a transition to a Bioeconomy. This economic system centres on a sustainable use of bio- and renewable resources to guarantee sustainability. Although many contributions have been made to the field of Bioeconomy, most focus on a science perspective (e.g. chemistry, engineering, technology, biomedicine or biology). This inventory presents a systematic review of academic contributions to the field of Bioeconomy from a social and scientific standpoint. Despite the significant importance of social and economic issues for a Bioeconomy transition, studies from a social science perspective are largely lacking. The results reveal the need for an in-depth analysis of the challenges and opportunities that the Bioeconomy faces in social and economic terms (Transition to a Bioeconomy: Perspectives from social sciences, 2019. [AlexiaSanz-Hernández^a](#) [EncarnaEsteban^b](#) [PiedadGarrido^c](#)). A 2050 vision for a sustainable future is also being promoted by WBCSD (<https://www.wbcsd.org/>) which is a global, CEO-led organisation of over 200 leading businesses working.

In the UK, The Waste and Resources Action Programme (which operates as **WRAP** <https://www.wrap.org.uk/>) is a registered UK Charity that acts as a catalyst for positive economic and environmental action. They work uniquely, and by design, in the space between governments, businesses, communities, thinkers and individuals – forging powerful partnerships and delivering groundbreaking initiatives to support more sustainable economies and society. They have produced various initiatives about promoting the circular economy and reducing food waste along the whole supply chain including the Food Waste Reduction Roadmap, https://wrap.org.uk/sites/files/wrap/food-waste-reduction-roadmap-toolkit_0_0.pdf.

WRAP are responsible for the Courtauld 2025 agreement supporting the UK governments' policy goal of a 'zero waste economy', working in partnership with leading retailers, brand owners, manufacturers, suppliers and growers who sign up and support the delivery of the targets. It was launched in 2005 and is now in its third stage: <https://www.wrap.org.uk/content/what-is-courtauld>.

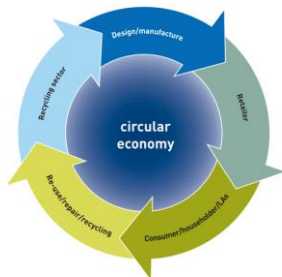
WRAP also work globally with 167 organisations: <http://www.wrapglobal.org/> using their expertise and evidence to create a world where resources are used sustainably with governments, businesses and NGO including giving advice and guidance.

WRAP's vision for the EU Circular Economy up to 2020 is shown in Figure 1 on the following page. Also see Appendix 1 for WRAP's vision for the UK circular economy to 2020.

2. WRAP's vision for the EU circular economy to 2020

What is a circular economy?

A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.



Why a circular economy is important

As well as creating new opportunities for growth, a more circular economy will:

- reduce waste
- drive greater resource productivity
- deliver a more competitive UK economy.
- position the UK to better address emerging resource security/scarcity issues in the future.
- help reduce the environmental impacts of our production and consumption in both the UK and abroad.

WRAP's vision is a world in which resources are used sustainably.

WRAP works with governments, businesses and communities to deliver practical solutions to improve resource efficiency.

Our mission is to accelerate the move to a sustainable, resource-efficient economy by:

Fig 2. Source – Taken from WRAP website.

- re-inventing how we design, produce and sell products,
- re-thinking how we use and consume products, and
- re-defining what is possible through re-use and recycling. Further information about the WRAP vision can be found in appendix 1.

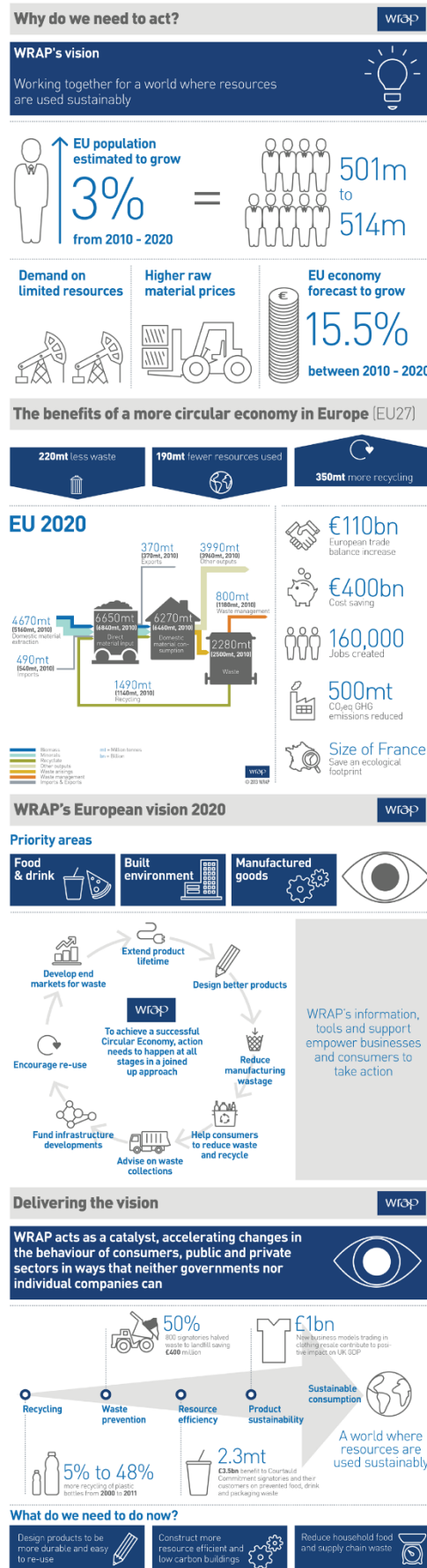


Figure 1: WRAP's vision for the EU circular economy for 2020

3. NATIONAL POLICY

UK – Current situation of policy and strategies

The UK's key government body for Bioeconomy governance in horticulture is the Department of Environment, Food and Rural Affairs (DEFRA). Current biobased Bioeconomy strategies and roadmaps include:

- Bioeconomy strategy: 2018 to 2030
(<https://www.gov.uk/government/publications/bioeconomy-strategy-2018-to-2030>)
- A Green Future: Our 25 Year Plan to Improve the Environment (2018)
- Industrial Strategy: Building a Britain fit for the future (2017)
- Evidencing the Bioeconomy: An assessment of evidence on the contribution of, and growth opportunities in, the Bioeconomy in the United Kingdom (2016)
- The Age of Bioscience Strategic Plan, BBSRC (2014)

In the first document: Bioeconomy strategy 2018 – 2030, it gives a vision that in 2030 that the UK is a global leader in developing, manufacturing, using and exporting biobased solutions. Its strategic four goals are:

1. Capitalise on our world-class research, development and innovation base to grow the Bioeconomy
2. Maximise productivity and potential from existing UK Bioeconomy assets
3. Deliver real, measurable benefits for the UK economy
4. Create the right societal and market conditions to allow innovative bio-based products and services to thrive

The UK government intend to deliver these goals by 'delivering change' by working together to meet the needs of society in health and well-being, food, energy, materials and chemicals. For example they state that "they will engage with a wide range of organisations covering the length and breadth of the UK to support this transformation, from our research councils and universities, through to regional and national government agencies and industrial leaders". The UK government also states, "By working together under a shared strategy, we will support growth and generate greater economic returns through faster to market technologies and the successful commercialisation of ideas". The project consortium shares in a mission to provide a supportive policy environment in which businesses, developers and researchers can responsibly realise the full potential of the Bioeconomy to develop and deliver of biobased solutions to every day challenges.

Delivering Actions for Change

Following publication of this strategy, the next phase will be for the existing Bioeconomy strategy consortium to develop an appropriate delivery mechanism to realise the actions set out in this strategy. Enquiries about the publication should go to enquiries@beis.gov.uk.

Discussions could be carried out between partners as to how we can introduce BioBoost and influence the UK government plan for a biobased economy in horticulture.

In summary, there is very little actual policy in the most recent UK Agriculture Bill or elsewhere relating to waste, food waste, food surplus, co-products, by-products or circular economy. Key points are detailed in the table below but there does seem to be the intent as shown in the Bioeconomy Strategy

2018 - 2030. Policy and research on waste reduction and use of co-products is devolved to UK agencies or independent organisations which themselves commission work from UK experts groups. One of the key agencies is WRAP. Other relevant organisations include the levy organisations that sit below the umbrella organisation AHDB (Agricultural and Horticultural Development Board). Research and policy is commissioned by each organisation within this group. A table in Appendix 2 summarises policy in the UK.

Some other Bioeconomy strategy documents for various industries are also shown below:

UK Synthetic Biology Strategy Plan “Biodesign for the Bioeconomy” (2016)
 “Building a high value bioeconomy: opportunities from waste” (2015) “Biorefinery Roadmap”
 Scotland (2015)
 “Science and Innovation Strategy for Forestry” (2014)
 “Agri-tech Industrial Strategy” (2013)
 “High-value Manufacturing Strategy” (2012)
 “UK Bioenergy Strategy” (2012)
 “Natural Environment White Paper” (2011)
 “UK Biomass Strategy” (2007)

Notes on WRAP Courtauld Commitment 2025 – Reducing food supply chain emissions, and waste is shown in appendix 1. Further summary and document links for UK policy are shown in appendix 2, European policy comparisons in appendix 3

LOCAL POLICY

Epping Forest District Council produced a Lea Valley Task Force Report in May 2018 called ‘Closing the Gap’. A PDF version is available: <http://www.efdclocalplan.org/wp-content/uploads/2019/04/EB615-The-Final-Report-of-the-Lea-Valley-Food-Task-Force-Lea-Valley-Food-Task-Force-May-2018.pdf>. On 23 May 2018, Epping Forest MP the RT Hon Eleanor Laing hosted a highly successful event at the Houses of Parliament for the launch of the report by the Lea Valley Food Board and key UK partners. The visit and report brought BioBoost to the attention of government officials as well as horticultural development in the Lea Valley area.

Some of the findings in the report included *“More research, development and investment should be considered for urban, closed-loop vertical system ‘sheds’ which offer a joined up approach to address current challenges”*. In addition, *“There remains willingness to work together; however issues around regulation and enforcement have been challenging, together with lack of leadership/funding from Central Government”*. The report also highlighted lack of joined up planning, or energy or employment policy with regard to the area under glass. The outcome concluded that *“This remains one of the most critical issues shaping the ability to maintain and expand glasshouse growth. Attempts to agree a common planning policy across District/County boundaries have not progressed. A Task Force bid for a Food Enterprise Zone from DEFRA was unsuccessful. However the EFDC local plan now recognises the importance of the industry with policies designed to underpin growth. Issues of key worker accommodation to support the industry remain problematic. With production costs comprising 30% energy, as yet there is no apparent joined up approach to this cost driver and carbon generator. Although energy networks are being delivered in London, these do not extend outside the capital”*.

Belgium – Current situation of policy and strategies

The circular economy is of importance for everyone. Hence, policies and strategies at all levels, not only at EU level, should be developed to support its development (Fig. 3). Especially for Belgium, this is relevant as responsibilities are divided between federal, regional and local governments. As Flanders is part of the Interreg2Seas program, we focus on this region.

EEN ZAAK VAN IEDEREEN

Circulair gaan doe je niet alleen. Een circulaire economie is haast per definitie een multi-level en multi-actor project. Ook voor het beleid.



Figure 2. EU legislation to support the future Bio- and Circular economy should be complemented with policies implemented at other levels.

Of course there's also attention for the Circular and Bio-economy at other policy levels in Belgium. The Federal Belgian governments describes the aims of the circular economy as following:

- the maintenance, repair and reuse of products;
- products which are designed differently, with the aim of repairing, and fully or partially reusing their components at the end of their life;
- the manufacture of new products from parts, components or downgraded products;
- the recycling of industrial, agricultural or household materials and waste;
- the efficient use of resources during the production and consumption stages

The federal Belgian government defined 21 measures, to be implemented before the end of 2019, to support innovation, increased competition of the companies, the protection of the consumer and the protection of the environmental capital.¹

In Flanders, a Circular Economy Policy Research Centre was established to streamline policy-related research into policy measures for the circular economy in this region.

Circular Flanders² is a partnership of governments, companies, civil society and academia that will take action together. It is the result of the merger of Plan C. the Flanders' Materials Programme and the Sustainable Materials Management policy research center (SuMMa) and the government of Flanders has set the circular economy as one of the seven transition priorities in its transversal policy paper, 'Vision 2050' (http://www.jiip.eu/mop/wp/wp-content/uploads/2018/10/BE_Circular-Economy-Flanders_BirdTuerk.pdf). The document describes objectives, resources and management, outputs and including major changes / turning points of the initiative:

¹ The 21 measures of the federal government for a circular economy "[Ensemble faisons tourner l' économie en développant l' économie circulaire en Belgique](#)" (Let's make the economy work by developing the circular economy in Belgium) (f) (n) (2016)

² <https://vlaanderen-circulair.be/en>

An important turning point was the embedding of the Flemish Material Programme in Vision 2050. This aims a social, open, resilient and international Flanders that creates prosperity and well-being. To achieve a broader societal impact, Flanders Circular was founded to reach out to a large range of stakeholders. The description of the flexibility mechanism / policy adaptation measures shows that Flanders Circular mostly provides incentives. So far, there is no comprehensive set of specific policies. The Flanders Materials Programme (FMP) combines an ambitious long-term vision, a 45-item plan of concrete actions and the development of policy-relevant research. It aims to streamline the many public and private initiatives in the field of sustainable materials management into a coherent whole the FMP focuses on closing materials cycles among economic clusters and in providing enabling functions. Economic clusters are chosen for their potential for improvement from a primary resources and materials perspective and for the expertise in these domains present in Flanders. Of the 45 actions in the Agenda 2020 plan, 10 are run by OVAM, which focusses on encouraging action in larger organisations, 20 by industry associations such as FEBEM (Federation of Environmental Companies), Vlaamse Confederatie Bouw, (Flemish Construction Federation), Essenscia Flanders (Federation for Chemistry and Life Sciences industries) and Agoria (Federation for the Technology Industry) and 15 by other organisations, including the Department of Economy, Science and Innovation, the Flemish Institute for Technological Research (VITO) and the Bond Beter Leefmilieu (Federation for a Better Environment). (<https://www.ellenmacarthurfoundation.org/case-studies/belgium-flanders-materials-programme>).

The Government of Flanders has set the circular economy as one of the seven transition priorities and appointed the Flanders Agency for Public Waste, Materials & Soil (OVAM) as the initiator of Circular Flanders and responsible for day to day operation. On 13 June 2019, the Flanders Today paper reports that the government approves the vision for Flanders 2050 and have nominated ministers who will carry out the long-term strategy for the region. (<http://www.flanderstoday.eu/politics/government-approves-vision-flanders-2050>). The next phase of Visie 2050 will work out a broad plan of approach that will establish a time-frame and generate public support for the programme. The plans are also due to be submitted to the Flemish Parliament for approval.

More specifically for biomass and by-products and waste fractions from the agrifood chain, OVAM together with actors and stakeholders involved in Bio- and Circular Economy, is also developing a novel Action Plan for the Sustainable Management of (Residual) Biomass Streams, to replace the current one³. The aim of this action plan is to further stimulate the prevention, separate collection and recycling of (residual) biomass streams with a view to cost, (raw) material and energy savings. The plan offers opportunities for the authorities and the industries to jointly shape the sustainable management of (residual) biomass streams in Flanders and implement it over the next years.

In addition, specific interdepartmental working groups (IWG) are established in which different policy domains are collaborating. The IWG on Food loss⁴ is relevant to mention, as well as the IWG on Bio-economy⁵. In the IWG Food Loss, actors and stakeholders with the ambition to reduce food waste work together to set up research project, interact with policy makers, companies, NGOs etc. In the IWG bio-economy similar work is done to promote the transition to the circular economy.

3

<https://www.ovam.be/sites/default/files/atoms/files/Action%20Plan%20for%20the%20Sustainable%20Management%20of%20Biomass%20Streams%202015-2020.pdf>

⁴ <http://www.voedselverlies.be/>

⁵ <https://www.ewi-vlaanderen.be/onze-opdracht/ondernemende-economie/bio-economie>

Also in the other Belgian regions, there's attention for the Circular and Bio-economy of the Future. In March 2016, Brussels Capital Region adopted a **Regional Program for Circular Economy** including for Flanders. It aims to turn environmental objectives into economic opportunities, to optimise resource and territorial use while creating added value locally, and to create more jobs.

More information can be found in the following links:

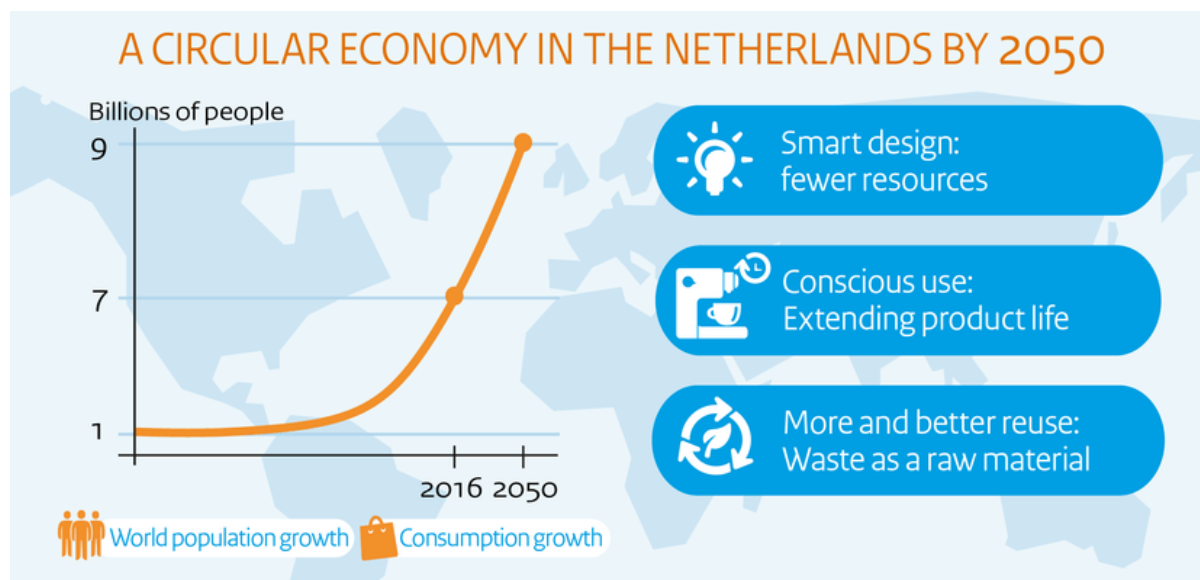
- EU In-depth case studies – Circular Economy Flanders (Belgium) http://www.jiip.eu/mop/wp/wp-content/uploads/2018/10/BE_Circular-Economy-Flanders_BirdTuerk.pdf
- FPS Economy, "[Vers une Belgique pionnière de l'économie circulaire](#) (link is external) " (Towards a Belgium as pioneer in the circular economy) (fr) (2014)
- RDC Environment, "[L'obsolescence programmée : politiques et mesures belges de protection du consommateur](#) (link is external)" (Planned obsolescence: Belgian policy and measures to protect consumers) (fr) (Mai 2017)
- The European Commission, "[Closing the loop - An EU action plan for the Circular Economy](#) (link is external)" (2015)

The Netherlands – Current situation of policy and strategies

The Dutch government has set up transition programmes for five major raw material chains including food and biomass and they aim to ‘develop a circular economy in the Netherlands by 2050’ which is described in a PDF on the Government of the Netherlands website

(<https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050>). This also includes visions, strategic goals, economic opportunities, policy approach, direction and market incentives but doesn’t seem to have any concrete policies yet. A summary of the paper is described as follows: Currently, we still use our raw materials and fossil fuels too often as if they are inexhaustible. We make products as cheap as possible and too frequently throw them away after use. In a circular economy, we will deal with our resources in a much smarter way. We will use and consume as little as possible, and we will maximise the reuse of raw materials. We will develop products that are more durable and find new, smart ways to produce them. In addition, we will use them more intelligently by sharing them and passing them on. By doing that, we will build a circular economy together. They also state that by 2050, this circular economy must be a reality in the Netherlands and in a letter to parliament on a government-wide programme for a circular economy, the Minister for the Environment and the Minister of Economic Affairs outline their vision. (<https://www.government.nl/documents/parliamentary-documents/2016/09/14/letter-to-parliament-on-a-government-wide-programme-for-a-circular-economy>)

The Dutch Government is freeing up 27 million euros for improved waste separation and has made agreements with the Dutch business community, government authorities, and NGOs aimed at realising a one hundred percent circular economy. Minister Kamp: ‘The ambition of the Cabinet is to adopt a more effective, smarter, and more profitable approach to the utilisation of scarce raw materials and residual flows, together with the business community, knowledge institutes, and government authorities.



Ministry of Infrastructure and the Environment, September 2016

Figure 3: https://investinholland.com/nfia_media/2016/09/circular-economy.png

Further publications and links include:

<https://hollandcircularhotspot.nl/en/>

<https://hollandcircularhotspot.nl/en/wcef-2019-blog/>

“Groene Groei: voor een sterke, duurzame economie” (2013)

“Groene Groei – Van Biomassa naar Business” (2012)

“Framework memorandum on the Biobased Economy” (2012)

“Green Deal Program” (2011)

4. Existing Policies – what is and isn't working

UK

There are some policies and plans for a bio economic future in the UK as shown in the documents above. In the UK, various SME's and innovative companies such as NIAB have been taking the lead in demonstrating what can be doing for a future circular economy. The government are starting to take these ideas on board but they still need to be developed further. This is where BioBoost can help by demonstrating the positive outcomes in the work carried out over the duration of the project and suggesting the policies already in place in Europe. For example, Belgium adopted a Regional Program for Circular Economy in 2016, aiming to turn environmental objectives into economic opportunities. It has developed a Circular Economy Policy Research Centre in Flanders.

It is clear that some UK companies running existing businesses are making bio economic solutions work for them but as our government have only just started to write proposals for a bio based economy in the future, it is not possible to currently say what policy is working or not in the UK.

Examples of where policies are working are as follows:

Defra funding:

The government has awarded more than £4 million to four redistribution organisations across England to help overcome barriers to getting food currently going to waste onto people's plates (<https://www.gov.uk/government/news/food-waste-fund-4-million-awarded-to-cut-food-waste>).

The successful bids – from FareShare, Company Shop Group, The Felix Project and Food Works Sheffield – will receive funding through the first tranche of a [£15 million scheme](#) launched in January by Environment Secretary Michael Gove.

The projects will enable existing food redistribution companies to take more surplus food from manufacturers and retailers and stop it going to waste. As part of the selection exercise, the projects had to put forward their proposals on how they would do this. Solutions include developing new supply routes from growers and local distributors, funding new lines and additional staff and increasing capacity for repackaging and labelling.

[The WRAP Courtauld Commitment, 2025](#) – Promoting a circular economy and reducing food waste along the supply chain from the farm through to retailing. In their annual review of 2017 WRAP have said the meeting the Courtauld 2025 targets could deliver £20bn in savings and 156 organisations (representing 93% of food sales in the UK) are working collaboratively to take action. Recognising that they need to go further and faster in building a more sustainable food system, Courtauld 2025 expands the range of stakeholders taking action along the entire food chain, and widens the environmental benefits. Zero Waste Scotland have also collaborated with partners across the food and hospitality industries to make progress and lay the groundwork for future action. Through conferences, the commitment is also enabling communication and discussion between the large stakeholder signatories, which has to be a good thing. Reducing food waste along the whole supply chain recommendations for the industry, on which NIAB worked on with WRAP, revealed some interesting findings and contributed to stakeholder collaboration, ideas and discussion. The Annual Review in 2017-18 says that through the agreement they have already helped reduce food waste by over 3.5 million tonnes in the UK; a saving worth £5billion.

In October 2017 REFRESH launched a digital network to encourage collaboration and bring together expertise from across Europe and beyond in a focused response to the global issue of food waste. The Community of Experts (CoE) provides a platform on which to share important initiatives and best practice, and brings together food waste experts across businesses, NGOs, governments in the food waste fight. Experts can register as users to share their own research results, tools and innovative approaches, as well as take part of the contributions of other experts. WRAP was lead partner and helped launch the CoE in October 2017. Courtauld 2025 resources that are signposted in the CoE are helping businesses and policy makers worldwide to learn from the UK's success.

The Resources and Waste Strategy

The key milestones of the Resources and Waste Strategy are shown in Figure 4

KEY MILESTONES

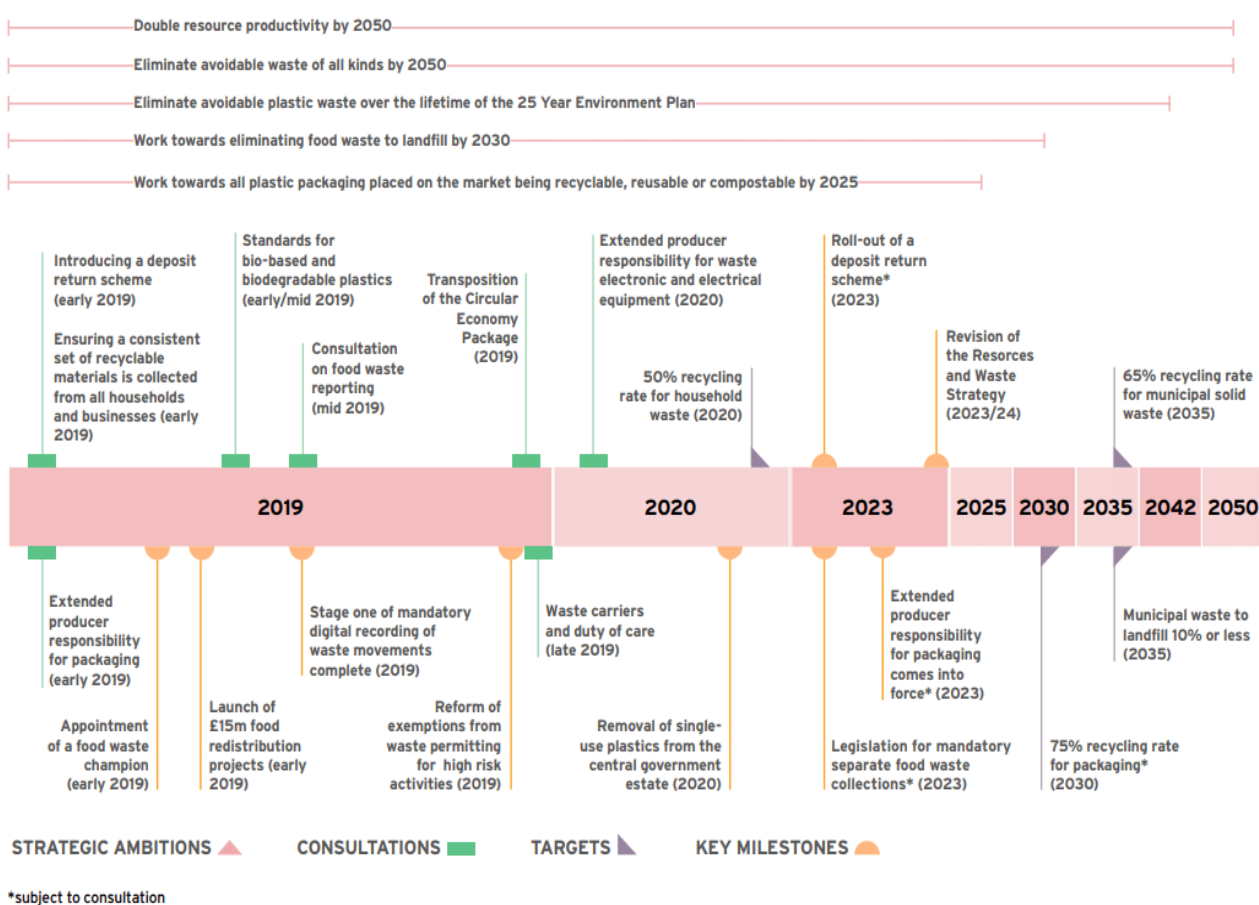


Figure 4 - Our Waste, Our Resources: A Strategy for England

(<https://www.gov.uk/government/news/gove-launches-landmark-blueprint-for-resources-and-waste>)

According to the timeline, we should have fulfilled the Transposition of the Circular Economy Package (2019). It is difficult to find out if that has happened as the only official updates online are from 2016-17. There are articles by Burges & Salmon: <https://www.burges-salmon.com/news-and-insight/legal-updates/resources-and-waste-strategy-our-reaction/> and Circular for resource and waste professionals: <https://www.circularonline.co.uk/news/defra-publishes-resources-strategy-consultations-response/> which allude to more policy on the horizon. Many are set out in the Draft

Environment (Principles and Governance) Bill 2018 and updates, and 25 Year Environment Plan Progress Report January 2018 to March 2019: <https://www.gov.uk/government/publications/draft-environment-principles-and-governance-bill-2018#history>.

The Resources and Waste Strategy is focused on recycling or disposing of difficult or bulky items and dealing with packaging, reduction and better management of processor and household food waste but it may affect horticulture by requiring producers to pay the full net costs of disposal or recycling of the packaging they use for products placed on the market. It is not really considering circular economic possibilities that could be carried out as showcased in BioBoost and by SME's at the Hub.

In conclusion, projects that involve collaboration, knowledge sharing and discussion such as Courtauld 2025 and the Eastern Agri-Tech Innovation Hub are examples of where the Circular Economy principles are working. The resources and waste strategy by the UK government does not seem to have quite achieved that yet but as a working document, these policies could still be influenced and changed to promote a sustainable Bioeconomy in UK.

Examples of where policies are working - Belgium

Similar to 5 other European countries (Spain, France, Luxemburg, Germany and Finland)⁶, Belgium has a dedicated Bioeconomy strategy⁷, towards a sustainable and competitive Bioeconomy in 2030. This Bioeconomy Strategy includes a SWOT analysis. Based on the SWOT, strategic objectives were built up.

- S** knowledge base (biotechnology, process technology), (modern) agriculture, strong industry (food, chemistry, energy), well-developed logistic (land and waterways, port infrastructure), forerunner in collecting and recycling waste ;
- W** little area, densely populated, high environmental pressure, poor exploitation of research, fragmented research landscape, extensive regulation and complexity of the Belgian constitution, few funding programmes aimed at developing biobased applications;
- O** existing policies and initiatives, the IWG (interdepartmental working group) on food losses, innovation steering groups, cooperation with the Netherlands;
- T** little own technological development, growing competition from the cooperation of European clusters without the involvement of Flanders and other pilot installations, insufficiently coordinated regulations and policy.

This SWOT analysis, based on the analysis of different studies, identifies the existing policies and initiatives as one of the opportunities related to policies in the Bioeconomy in Flanders.

Belgium is actively involved in Bioeconomy and the Belgian Bioeconomy innovation technology system includes the key government interventions, research institutes, networks and finance instruments⁸, offering new opportunities:

- **Legislation** with the Flemish climate plan 2013-2020
- **Governance** with the IWG consisting of representatives of some Flemish departments and their agencies aiming at linking policy, sectors and stakeholders to develop a coherent policy for bio-economies in Flanders (similar to the Bio-economy Panel for Europe). The goal is the development of an integrated cross-policy approach to a sustainable and competitive Flemish bio-economy
- **Strategies and roadmaps** including, among others, the Bioeconomy in Flanders for a Bioeconomy in 2030; the vision 2050 document for a long-term strategy for Flanders and the action plan for sustainable management of biomass streams 2015-2020.
- **Financers:** Belgium offers tax reductions to some innovators, and additionally, Flanders supports different projects, PhD's and SME innovation and growth with Flanders Innovation and Entrepreneurship (VLAIO), Research Foundation Flanders (FWO), Flemish Investment Company (PMV) and Business Angels Network Vlaanderen (BAN Vlaanderen).
- **Pilot plants:** Bio Base Europe Pilot Plant and the ILVO Food Pilot
- **Network and clusters** including spearhead clusters for sustainable chemistry and plastics, for materials, for energy, for Agri-food and for blue growth; the Flanders Biobased Valley;

⁶ <https://www.rvo.nl/sites/default/files/2018/02/Monitoring%20Biobased%20Economy%20NL%202017.pdf>

⁷ <https://www.vlaanderen.be/publicaties/bioeconomy-in-flanders-the-vision-and-strategy-of-the-government-of-flanders-for-a-sustainable-and-competitive-bioeconomy-in-2030>

⁸ https://www.nweurope.eu/media/4659/180369_biobase4sme_2luik_belgium_v4_lr.pdf

Innovative Company Networks; Flanders Cleantech Association and Vlaanderen Circulair. These network and clusters are supported by the cluster policy

- **Industry stakeholders**
- **University centres and research institutes**

Biobased economy in Flanders accounted for (directly and indirectly) 2.6% of the gross margin and for 1.4% of the FTE of the Flemish economy (2014) ^{9,10}.

Next to the opportunities, some hurdles⁵ became clear in the past years:

- Lots of industrial clusters do exist but an umbrella is still missing and sectors therefore often miss collaboration and opportunities
- Flemish industries are not enough participating in European programmes such as BBI
- Strong competition with neighbouring countries profiling themselves in the field of bio-economy
- No organisations are representing the Flemish SME's in Europe and therefore the link with Europe is not strong enough
- Biobased economy should be integrated as a horizontal theme in the policy initiatives of the Flemish government
- The Belgian constitution is complex and regulations are extensive
- Regulations and policies are insufficiently coordinated. IWG is working on that.

To get insight on and tackle hurdles, the Flemish Government developed a 'Reporting point obstructed regulations'¹¹ at the request of the minister. The goal is to make an inventory and analyse encountered difficulties and search for solutions. Complaints concerning unclear policies are welcome on this site.

⁹ https://www.ewi-vlaanderen.be/sites/default/files/2.carrez_studie_waardecreatie_vl_bbi.pdf

¹⁰ <https://www.vlaanderen.be/publicaties/duurzaam-gebruik-van-en-waardecreatie-uit-hernieuwbare-grondstoffen-voor-de-biogebaseerde-industriële-productie-zoals-biomaterialen-en-groene-chemicaliën-in-vlaanderen-beperkte-actualisering-van-de-studie-van-2012>

¹¹ <https://www.ewi-vlaanderen.be/wat-doet-ewi/ondernemende-economie/bio-economie/meldpunt-belemmerende-regelgeving>

Examples of where policies are working - Netherlands

0.1 General view

The biobased economy is an important pillar within green growth and the circular economy. The use of renewable raw materials leads to new economic opportunities and contributes to a sustainable "low carbon economy". A report called "Monitoring biobased economy in Nederland 2017" by Rijksdienst voor Ondernemend (RVO.nl) Nederland (please see the following link: [This report](#)) describes the progress of the biobased economy and in part, the circular economy in the Netherlands. In the accompanying report, RVO.nl has followed the same methodology as in previous years, whereby data on projects from the RVO.nl programs are bundled with data from projects from the region. This mainly concerns subsidized projects that can be classified as biobased, but the database is now also being expanded to include Bioeconomy and Circular Economy projects. The data has been processed up to and including 2016 in the report and it shows that both business and government are actively taking the development and implementation into account. During the development, the emphasis is on biobased chemicals and materials, while for the time being the implementation mainly takes place in the field of bioenergy.

A total of 1433 biobased projects are counted over the past 6 years. 237 projects have been added and 87 completed projects have been removed, so that the net increase amounts to 150 projects. The increase is less strong than in 2015, so that there is currently more of a constant situation. In addition, 93 Bioeconomy and 39 circular economy projects are included in the database.

Many provinces address the biobased economy as part of the circular economy. The regional scale fits in perfectly with the biobased economy. Companies, governments and knowledge institutions in the region reinforce each other's activities in this area, so that a good knowledge infrastructure is created within which innovative biobased (semi) products are developed. Often the large industries that are already present (such as the sugar industry, potato industry, dairy industry, chemical industry or paper industry) determine the direction in which a region specializes within the BBE.

The total project investments are mostly in sustainable energy projects, but the projects with biomaterials and bio-chemicals and nutrient recovery are also substantial with 355 projects with a total of more than € 425 million in planned investments.

Subsidies in the later phase of the s-curve are mainly energy-related and these subsidies are missing from the material-related projects, which hinders market growth.

The scope of the efforts of companies and knowledge institutions that are financed from their own resources, ie without government subsidies, is not visible in this monitoring.

0.2 Development of the Biobased economy in the regions

Within the regions there is a lot of cooperation between knowledge clusters and market parties in order to achieve biomass valorisation through applied research. Every region has universities and colleges that specifically support these partnerships within the region. This guarantees a high-quality transition at market parties and also makes an important contribution to training for biobased applications. In various regions (Limburg, Groningen, the Biobased Delta), biobased activity can mainly be found in science parks where companies and research work together on innovation. The emphasis so far is more on development than actual biobased production. Through financing instruments and innovation brokers, SMEs and start-ups are specifically supported and encouraged to achieve biobased conversion in the market.

Within most regions, there is currently an integrated approach to the circular economy (CE) and biobased economy (BBE). There is good cooperation between the regions, with Energy Valley in the north focusing more on energy applications, and in the south with Limburg and the Biobased Delta the emphasis is more on chemical applications.

0.3 Biobased developments at companies

The Monitoring biobased economy in Nederland 2017 report counts 1258 organizations that are active in the biobased economy (a growth of 13% compared to 2015). About 80% appears to be SMEs. There are 285 companies that deal specifically with biobased materials and chemicals, 122 of which are in the chemical sector.

That year the regions have presented new examples (shop window projects), of which everything can be considered circular and about half as biobased. All companies are clearly still at the start of the marketing. First batches or products have been delivered and a lot of work has already been done. However, the quantities produced are still small. Innovation takes a lot of time and therefore money. In order to be able to compete as a newcomer to the market, a level playing field in which the climate benefits of biobased (semi) products are valued could mean support, for example by pricing CO₂ emissions. An important stimulus in the market is biobased purchasing. Based on the examples, it appears that this has a good start, but is clearly at the beginning. The size of biobased purchases is still small (in the order of tons) and requires a considerable stimulus and growth in the coming years. Much has been done in terms of knowledge and experience development, a Biobased Signpost has been completed and various procurement processes with, for example, coffee cups or construction of roads with biobased raw materials are known as examples.

0.4 Biobased knowledge development

The Dutch patents show that the growth from 2010 for almost all subjects has changed to a small decrease since 2013. In 2016, the BBE companies invested € 215 million in manpower for biobased research and development work (R&D) and in spending on R&D investments. With the WBSO, the government contributed € 38 million to this by means of a deduction for wage tax and national insurance contributions. The largest share of companies active in the field of biobased economy within the WBSO is in Gelderland, Limburg and Zeeland. The R&D expenditures for BBE are highest in South Holland, Limburg and Noord-Holland.

Financing via top sectors (starting in 2012) led in 2016 to support of € 46.1 million for biobased R&D. Because the industry may have used both WBSO and TKI in projects, this must be seen as a surplus value, and with these instruments, it has invested in BBE in a bandwidth of between € 215 and € 317 million.

Various programs at research institutes are funded directly by the government, and the sum of this contribution appears to be slightly lower in 2016 than in 2015 and amounts to € 14.5 million.

This means that in 2016 the central government made a total of € 98.6 million available through tax exemption, top sectors and research institutes. That is an increase of 11% compared to 2015.

Instrument	Effort BBE companies M€					Contribution government M€				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Fiscal										
Top sector	175,0	210,0	231,0	196,0	215,0	24,6	34,8	34,0	30,0	38,0
Fundamental	76,3	37,8	51,8	74,3	102,2	37,5	16,4	27,0	37,8	46,1
						14,1	17,4	17,1	21,1	14,5
Total	251,3	247,8	282,8	270,3	317,2	76,2	68,6	78,1	88,9	98,6

Figure 5: Table showing Total BBE R&D effort by companies via RVO.nl schemes and beyond in 2012 - 2016

0.5 Biobased material flows

The study on the size of biobased material flows 2016 was picked up in 2017 with a new methodology. This has been used by the experience gained in 2016 with the monitoring on a European scale based on EUROSTAT data by the NOVA Institute and was commissioned by the CBS with CE Delft agency in 2017, commissioned by the CBS agency CE Delft. of RVO.nl. This new approach leads to new possibilities, in which more biobased flows can be mapped, but it also shows that the data in the CBS database do not seem to be sufficiently focused on identifying the complete size of all flows. There have still been major differences between last year's reporting and this year, based on these two different methodologies. The recommendation is to make a choice in 2018 in the context of the circular economy monitoring on the methodology to be applied to measure the size of circular and biobased material flows. However, the 2016 data analysis shows that there is no evidence that the situation has changed dramatically compared to 2015, so that we maintain the specified values for 2015 for the time being of approximately 13 million tonnes of dry Biomass.

5. Inventory of BBE barriers

The current non-agro-based industry and economy is based to a large extent on fossil resources. In the biobased economy (BBE), a start is made in part of these fossil raw materials by the use of biomass, manure and residual flows to close the value chains. The Netherlands wants innovation and collaboration from different sectors to give the economy a boost with green raw materials. The transition from an economy based on fossil resources and unsecured value chains to one BBE with closed value chains is a complex and lengthy process. In addition to technical challenges and innovations, national and international regulations create barriers to this transition, stand out or even prevent at points. In this research there are obstacles in the regulations and inventory and analysis of implementation processes. In consultation with the relevant departmental departments the solution directions are summarized. To facilitate the transition to the BBE, it is of great importance removing the barriers and quickly tackling new bottlenecks. In the investigation is the current approach to resolving the barriers in the BBE and its conclusions drawn about this approach. The research is based on a desk study and discussions with key stakeholders.

69 obstacles in policies and regulations that limit the development of BBE

In the inventory, the business community and the government put forward more than 200 obstacles in the BBE. These were merged into a further analysis of the cause of the obstruction to 69 unique barriers, subdivided into:

1. 23 operational barriers (on paper) that have been resolved, although entrepreneurs are still insufficient to experience.
The operational bottlenecks are characterized by the fact that they can be solved during implementation. The regulations do not have to be adjusted for this but only to be correctly applied by the business community and the local authorities and implementing organizations involved in granting of permits, subsidies, monitoring or other procedures.
2. 14 structural obstacles, the departments are working on a solution.
The structural barriers have the feature that a change is needed to resolve them of the regulations or specific judgment about the implementation of the policy is required. The structural barriers have the characteristic that a regulatory change or targeted ruling on the implementation of the policy is required to resolve it. It is therefore about solutions that, will take time.
The government started to work with these barriers, whether or not they have been consultation with the industry and / or local authorities. In addition, the Interdepartmental Accelerator team Green Gas looks to the obstacles related to energy and transport fuels.
3. 23 fundamental obstacles, which are being addressed by the Interdepartmental Program Directorate BBE together with the professional departments. The fundamental obstacles hinder the further development of BBE in the Netherlands. This concerns obstacles that cannot easily be removed by adjusting of regulations, but for which the Dutch and European governments make policy choices have to make. To fully integrate the fundamental obstacles that stand in the way of the BBE transition in the Netherlands be summarized in five themes:
 - i. Innovations within BBE are not always financially feasible for business.
 - ii. Certification of BBE and lack thereof obstructs opportunities for BBE.

- iii. No use of GMO limits BBE possibilities.
 - iv. Excise duties and import duties limit BBE transition.
 - v. Level playing field due to lack of consistent regulation and policy between sectors and between countries.
4. 9 clashing obstacles are not removed.
- The clashing obstacles conflict with the social interests of the Dutch government guarantees. With the implementation of current legislation and regulations, these become specific social interests and an exception could not be made for the BBE.

6. Discussion

From June 3 – 5 2019, the World Circular Economy Forum 2019 (WCEF) was held in Finland which brought together circular economy thinker and doers from around the world. All of the presentations and information can be found at <https://www.sitra.fi/en/projects/world-circular-economy-forum-2019/>. This is a very positive initiative and the first speaker gave an example that the average person in USA had 300,000 items in their home. There were many positive messages, and although not every video has been studied into detail, there did not seem to be an item specifically dedicated to food products.

The EU Economy Action Plan is now fully completed (as of 4 March 2019) and its 54 actions have been delivered even if the work on some of them continues beyond 2019 (http://ec.europa.eu/environment/circular-economy/index_en.htm). The key documents include:

- [Report on the implementation of the Circular Economy Action Plan - press release - questions and answers](#)
- [Staff working document with details on the 54 actions included in the action plan](#)
- [Staff working document on Sustainable Products in a Circular Economy](#)
- [Staff working document on the assessment of the voluntary pledges under Annex III of the Strategy on Plastics](#)
- [Guidance and promotion of best practices in the mining waste management plans](#)
- [Summary Report of the Public Consultation on the interface between chemicals, product and waste legislation](#)
- [Report on improving access to finance for circular economy projects](#)
- [Report on Horizon 2020 R&I projects supporting the transition to a Circular Economy](#)
- [A circular economy for plastics – Insights from research and innovation to inform policy and funding decisions](#)
- [Eurostat press release: Circular Economy in the EU](#)

These EU Economic Action Plans demonstrate a positive response for putting in place a green horticultural policy for the future. Internationally, we need to come together for better collaboration and cooperation at a national level. The completed strategy document will be based on the findings, which were carried out and practiced throughout the BioBoost project regarding ways and methods to effectively stimulate developments towards a horticultural bio economy. It intends to show ways and methods to effectively stimulate developments towards a horticultural bio economy.

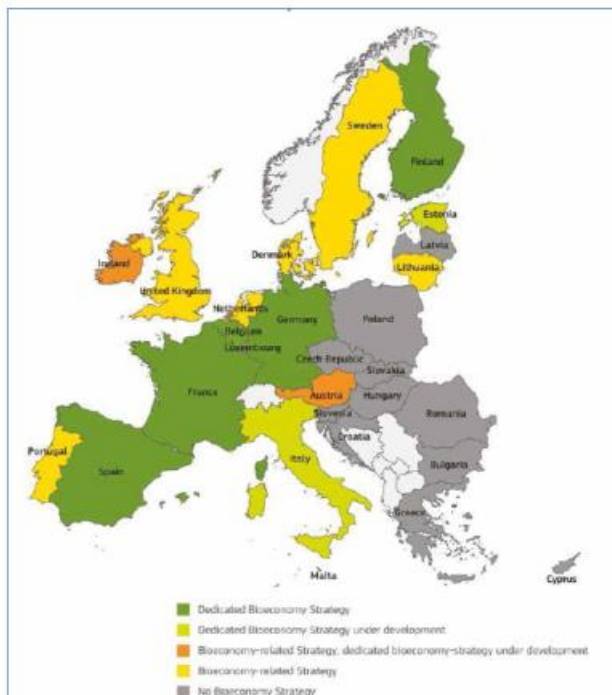
In the UK WRAP are having success with [Love Food Hate Waste](#) is delivered in partnership with major UK supermarkets. The campaign gives individuals the information they need to recognise and tackle food waste. This groundbreaking work is now reaching international audiences in the UK, Canada, Australia, New Zealand and Saudi Arabia.

Regarding National Policy in the UK, unfortunately, beyond May 2018 very little has been done to be able to generate policies on the back of the 'Closing the Gap' report recommendations. On a regional level Essex County Council has announced it is following through on a new green agenda by setting up a Climate Change Commission, along with a multi-million pound tree planting initiative. Funds for this commission are expected to be £250,000 which could rise depending on the demands it faces. It is unclear what Epping Forest's role will be in conjunction with Essex County Council's work here and it is also unclear whether Essex County Council will look at enacting policies beyond tree-planting and

rewilding and focus also on the circular economy. <https://www.bbc.co.uk/news/uk-england-essex-49973933>

Epping Forest is leading on an initiative entitled the 'Green Arc' which is a partnership seeking to promote tree-planting within the Green Belt area running from the Thames to Barnet and up to Stansted. This again is in its early stages and it is unclear whether such a group would take forward issues around circular economy policymaking. <https://greenarc.org/>

Another area of interest is a business called Villa Nurseries which operates within Roydon, Epping Forest has built a partnership with a clean energy (biomass) energy producer called AMP Clean Energy (see link:



<https://www.energylivenews.com/2019/05/14/case-study-villa-nursery-amp-clean-energy/>). The low carbon measures have reduced Villa Nursery's gas spend by £200,000 and cut CO₂ by more than 1800 tonnes per year. It signals that some glasshouses are really putting an effort into finding zero carbon futures- which in turn could drive down production costs and allow for more innovative investments in circular economy solutions. However, it looks like approaches like these are siloed with no leadership from central or regional government policies on this issue as the report mentioned.

Comparison with Europe

In 2016, a workshop was attended at the EU Joint Research Center (JRC) monitoring methodologies are coordinated. The NOVA Institute has made an estimate of the size of the Biobased Economy in the Netherlands last year reported. Together with Statistics Netherlands and the CE Delft agency, this method is one in 2016 done for the Netherlands (see above).

The JRC has done a monitoring for the Bioeconomy in Europe for 2016:

- ☐ Five EU countries have a focused Bioeconomy strategy (green on the map), while 6 others, including the Netherlands, have a Bioeconomy-related strategy (more biobased oriented, yellow on the map).
- ☐ The evaluation of the Bioeconomy Strategy shows that also in Europe through research and research development progress booked but there financing is needed for capital intensive integrated biorefineries, which alone becomes available in one stable policy environment, where biobased part of the Circular Economy.
- ☐ The EU supports the development with € 4.2 billion from Horizon 2020 program, of which € 1 billion for the JTI Biobased Industries.
- ☐ In the Bioeconomy are 18.6 million jobs, and becomes one turnover of € 2.2 trillion achieved, 9% of the economy (2014),
- ☐ Monitoring is crucial to establish progress with regard to the set climate Figure 6: monitoring for the Bioeconomy in Europe for 2016 by JRC

And sustainable development goals (SDG) and to adjust where necessary.

The Netherlands appears to be participating well within the European research programs. In 2016, Dutch partners invested € 66 million in European biobased projects, of which € 31 million came from subsidies from the EU.

Also in relation to The Netherlands, an article about Biobased business in a circular world can be found at: [Interview BBE](#) and partly translated to English as below:

The government has long been aware that BBE is going to play an important role, so a lot of money goes to stimulate biobased initiatives. In 2016, a total of 300 million euros were spent on biobased projects from the business community. The central government contributed 100 million via the WBSO and incentive programs (see box). What do the annual millions of businesses provide? "What we see," says Kees Kwant is that more and more companies are active in biobased projects. However, many of those companies are in the technical investigation phase. What we keep calling and that is also clear from the example projects that the provinces propose, is that while companies are active, marketing is a problem. The size of the market is small and we still earn little from it. The implementations are not there yet and the market conditions are not what they should be. That is awkward. " That is also the experience of Rob Voncken of Green PAC, a hot spot for chemical innovation in Emmen that focuses on biobased and circular materials. "In five years of Green PAC, we have involved more than 70 SMEs in projects, of which about 40 in BBE projects. These are now mainly small projects. A lot of money has been invested in research and development. I think that after all investments and delays, biobased projects are technologically ready to break through. We now have to find those business cases that are competitive with fossil competitors. Here and there you see successful business cases such as biomass residues that are processed for heat production or roadside grass for paper and composites. However, many applications are not yet cost-effective. The point is now that demand will pick up. "In Limburg, Source B is a driver of biobased initiatives as part of Brightlands. "The biobased ecosystem is growing," said Deputy Joost van den Akker. SMEs are increasingly hooking up. A few dozen SMEs are involved in our projects, ranging from explorations to pilot and demo projects. It goes step by step. A number of front runners are commercially successful and that works like a flywheel. To make it wider, we still have to make a move. We are in the construction phase. There are of course mature sectors such as the paper, cardboard and wood industry and the bioenergy sector, but the industry for biomaterials and biochemicals is still small. Although the vigor is enormous.

In the meantime, countless SMEs are entering the biobased path. Often the projects have not yet led to a market breakthrough. Let alone that there is a real biobased economy. Are all those money flows from the government to the business world worthwhile? Kwant: "Say it. We do the right thing. Biobased can yield something. We are now investing so as not to miss the boat, but it should not take too long. There is some degree of impatience. We must accelerate market introduction. Companies need to be more aware of this. Fortunately, some take the lead. The fact that it doesn't go faster is up to the government and consumers. "

Voncken disputes the idea that it would be a waste of money. "We have done an impact study and score well. Entrepreneurs are going to make innovative products, it provides employment, and students start their own business and the knowledge flows back into education. It is a very efficient use of government money. "That is also the opinion of Van den Akker:" It is certainly effective. They are not only government resources, but also a lot of private money is used. It is logical that you as a government need extra stimulation in the beginning. "

The question remains whether the government can also use its money and energy more effectively. "The problem is not in the supply," is Zoetemeyer's conviction, "but in the lack of demand. A government that buys biobased products helps the best to boost the market. There are plenty of biobased products: we have a whole collection with dozens of products that you can simply buy. Go take it now, you will help SMEs with that. If governments include preferred biobased products in their procurement policy, they can intrinsically show that they stand for biobased." This is also recognized by Zoetemeyer, who supports around 150 large and small entrepreneurs with the Biobased Delta. "That does not happen enough, with the exception of the province of Zeeland and the municipality of Bergen op Zoom." "According to Voncken, that role of buyer is even more essential than that of lender. "You see in projects such as the biocomposite bicycle bridge, in which we participate as Green PAC, that you will not get it off the ground if the government does not act as a launching customer. That role of the government is often more important than giving a subsidy. "The size of biobased purchases is still small, in the order of tons, and requires a considerable stimulus and growth in the coming years, we read in the monitor. Kwant: "Green purchasing by companies and governments is quite successful. Rijkswaterstaat that buys biobased shelters or green bitumen. Or Mars uses those biobased wrappers. That is a conscious choice, although it is more expensive. These are encouraging signals, which we also try to stimulate with our programs.

□ There are more reasons why market introduction is faltering and in which the government can play a more guiding role as a financier. And that is scaling up. "Creating a market is mainly about scale-ups," says Zoetemeyer. "After all, they are the ones who first come up with something new. Upscaling takes time, often more than expected." He mentions the example of a plant pot for greenhouses that digests over time. "That worked well until the customer said, "Do you have 10,000 for me? "Then you need large machines that you need to set up properly. Bioplastic simply comes loose from a mold other than polystyrene. You do not just scale up. "

Scaling up not only takes time but also a lot of money. Certainly because increasingly expensive process equipment is required for each step. "In the Netherlands a lot of money goes to technology development, so to start-ups," says Zoetemeyer. "It is much harder to get money for scale ups. Biobased scale ups are not enough for a few thousand euros from TKI BBE and not even for a subordinated loan of one million euros from a regional development company. You don't have a factory yet. A demo factory can easily cost a few million euros. Banks are only interested in commercial factories. The government should set up a scale-up fund for the interim phase. The Province of Noord-Brabant is working in that direction." In addition to small-scale financing, Limburg established a Brightlands agro venture fund a year ago. Van den Akker: "Not everything has been explored yet, but such an investment fund helps with the upscaling process. It is now moving slowly but surely. "

With such a scale-up fund, entrepreneurs could market biobased products faster, according to Zoetemeyer. "The time they spend on a pitch for dozens of people cannot be spent on scaling up their product."

Doesn't it take too long? Is there no pressure from governments and other stakeholders to come up with results? "I don't have that feeling," says Van den Akker. "We are well on course. A transition process is simply not realized from today to tomorrow." The impatience is much more with the companies themselves. "It is difficult to involve SMEs in long-term projects," Voncken notes. "They reason from the perspective of a good, fast business case. That is a logical focus. Once you have them on board, the involvement and appreciation is great. That difference in perspective naturally also applies to other sectors, but with biobased you try to get something off the ground that does

not automatically pay off economically. "You only have to refer to Agro & Chemistry and you see that projects are delayed. Innovation simply takes more time than expected. You have to persevere, be creative, and take new paths. "Managing expectations is also important, according to Zoetemeyer. "I notice impatience with entrepreneurs. They are too optimistic. They think they are ready for a demonstration when they actually have only one prototype. Then they think they will be on the market in 2 years, while it will take another 4-5 years, with all the pitfalls that go with it. You have to go through that learning curve. The sense of reality can go up a bit. Because if the business plan is too optimistic, the financier will also become impatient if it takes longer. "

In addition to financial support, companies also receive business support from Biobased Delta, BBD, Green PAC and Source B. They organize theme meetings, make contacts with other entrepreneurs, financiers, municipalities and provinces. Is that needed? "Yes," says Zoetemeyer, "because companies have to fight against optimized fossil products and a conservative buyer public. SMEs cannot do it alone. They must compete against an industry that has been organized and promoted for 100 years. We help by promoting biobased products and biobased purchases. "

"The business community cannot do it on its own," Voncken also assures. "Then it will take much longer. You must work together as partners to set up new value chains. Our task is to connect, to define projects in such a way that they create value for entrepreneurs, to convince them that results are interesting in the long term. "Collaboration with various partners is necessary, Van den Akker confirms. "You have to look for unexpected combinations to get as high as possible in the value chain. That is why we work from different angles to help SMEs: from the Brightlands campuses to make knowledge accessible and from the province by offering financial support. "

Kwant also recognizes that. "We must all do it together. SMEs are advised to seek cooperation with knowledge institutions. They can help to develop innovations. Cooperation between universities, higher professional education and SMEs is good, certainly regionally. As long as there is enough attention to put biobased products on the market. This is where the new BioBoost Platform https://www.google.com/search?q=bioboost+platform&rlz=1C1GCEU_enGB821GB821&oq=Bio&aqs=chrome.1.69i57j69i59l2j0j69i60j69i65j69i60l2.3318j0j7&sourceid=chrome&ie=UTF-8 will be invaluable as will Hub's supporting SME's such as the Eastern Agri-Tech Innovation Hub.

Appendix 1

WRAP's vision for the UK circular economy to 2020

The adoption of a circular economy offers considerable economic benefits; Defra calculates that UK businesses could benefit by up to £23 billion per year through low cost or no cost improvements in the efficient use of resources, whilst McKinsey estimates that the global value of resource efficiency could eventually reach \$3.7 trillion per year.

The diagrams below shows how the UK economy could be transformed by 2020, were it to really embrace the concept of the Circular Economy model and build it into the heart of its thinking:

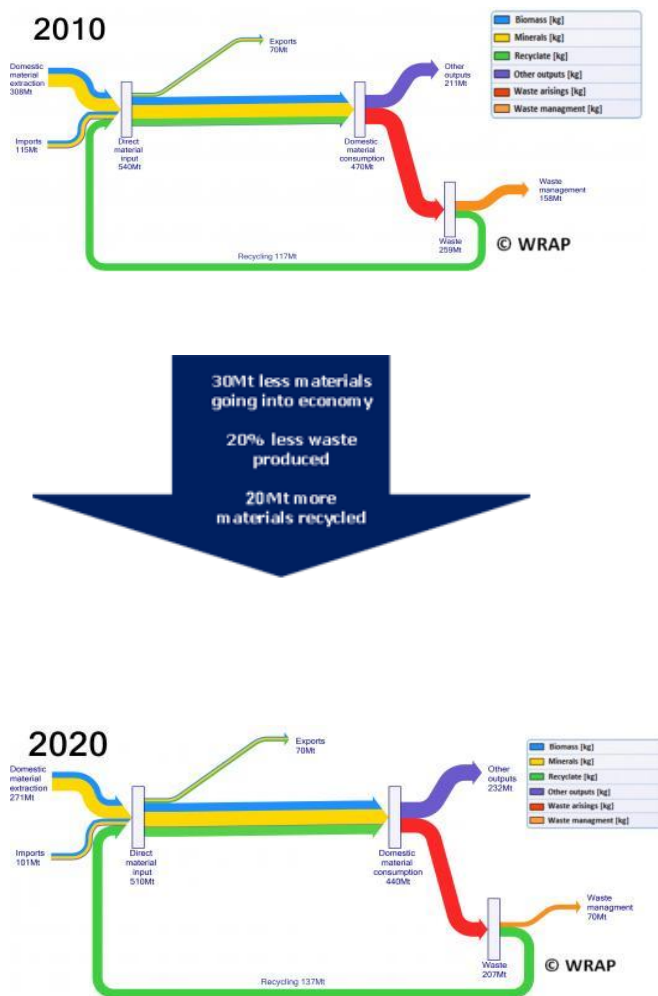


Figure 7 Sankey diagram - source WRAP

We would like to note that the materials flows on the 2010 Sankey diagram is not completely consistent around the bottom of the loop. This is because the waste arisings and waste management numbers are taken from completely different datasets, which do not overlap in terms of source or geographic range.

- Our vision for UK's economy by 2020 assumes (compared to a 2010 baseline):
- **30Mt fewer** material inputs into the economy

- **20% less** waste produced (50Mt less waste)
- **20Mt more** materials recycled back into the economy
- Based on 2011/12 actuals, the Office for Budget Responsibility's forecast for 2013-17, and assumptions of 2% per annum GDP growth for 2018-20, current economic data suggests that **GDP will grow between 15 -20%** in the 2010-20 decade.
- The Office for National Statistics predicts that **UK population will grow by 8%** in the decade.
- The headline 30Mt less materials going into the economy is close to WRAP's 2010 research [Securing the Future: The Role of Resource Efficiency](#). This identified potential savings of 38Mt for selected materials by 2020 based on quick win resource efficiency actions. This included several materials considered as being of strategic importance, such as rare earths.
- Four key ways of realising these savings are:
 - **lean production** (i.e. making goods with a lower material requirement);
 - **reducing waste** in manufacture and commerce;
 - reducing the amount of working **products thrown away**, and;
 - **goods to services** (i.e. increasing the proportion of some products which are leased).
- The increase in waste recycled (20Mt) is less than for the 2000 to 2010 decade (70Mt). **We suggest that the easy wins in recycling have been achieved**, especially with the landfill tax escalation during the decade and greater business awareness of the economic benefits of diverting waste from landfill.
- 20% less waste produced is about 50Mt less waste. **This will require ambitious waste prevention plans from all nations** to set the framework for business and public sector to take action.

Appendix 2

UK Policy and Strategies

Figure 8 Table summarising UK policy and strategies – compiled and researched by Denise Elliott

Source document(s)	Policy or Statement	National, Regional or local Policy or advisory	Discussion
Health and Harmony: The future for food, farming and the environment in a Green Brexit Feb. 2018 (Cm9577)	A case study on AB Agri, which uses co-products from British Sugar p24	National /local advisory at present	Legislation and policy is lacking both at national and local government levels in the UK. Many companies are trying to develop and implement sustainable activities, but there is as yet no government imperative or policy
As above – Sustainable farming P25	{Government} will work with the Agriculture and Horticulture Development Board (AHDB) to encourage a focus on stronger resource efficiency and sustainable growth.	National: Advisory	AHDB is the official government supported umbrella organisation for all farm producers
As above – policy on interaction with Producer Organisations (PO's) and Producer Cooperation	{Government} encourage farmers to benchmark themselves against the best and commit to Continuing Professional Development (CPD). They will be encouraged to invest in new technologies and processes	Advisory	There is an important role for knowledge sharing, producer cooperation, and farmer-to-farmer learning to kick-start a wider culture of excellence. Agriculture and horticulture are increasingly high-tech, capital-intensive industries. This will serve to increase their profitability, tackle plant and animal diseases and improve animal health.
	{Government} propose to maintain the special status of POs, including derogations from competition rules.	policy	Collective decision-making is not the traditional model for UK farmers, but the modern supply chain means attitudes have to change. Farmers could benefit from recognising how much more strength they can achieve through cooperation.
A Green Future: Our 25 year Plan to Improve the Environment Circular Economy	Our Industrial Strategy promotes the move towards a regenerative, circular economy. The economy exists within the natural world, and	National	A series of public engagement activities for 2019 will link to initiatives on waste reduction, cleaner air or other aspects of pro-environmental behaviour. Advisory comments on P82. Also P83 but this just talks

Source document(s)	Policy or Statement	National, Regional or local Policy or advisory	Discussion
	cannot be separated from it. P84		
WRAP www.wrap.com the Courtauld Commitment 2025 - emerging voluntary Bioeconomy Strategy by signees	Reducing food supply chain emissions and waste - Government is working to make the way we eat and drink in this country more sustainable. The aim is to cut by 20% the greenhouse gas intensity of food and drink consumed in the UK, and per capita UK food waste by 2025.	National, Advisory And Policy	This will set the UK on a path to meet an even more ambitious UN target of halving per capita global food waste at retail and consumer levels by 2030. Government has pledged to “Continuing to work closely with WRAP, food businesses, local authorities and other organisations to meet Courtauld 2025”
AS above:- relating to by-products - Increasing resource efficiency and reducing pollution and waste	We need to make data more available to support processes such as industrial symbiosis	Funded initiatives; advisory	Where two or more industrial facilities or companies join up and the wastes or by-products of one become the raw materials of another. We must also develop business models that challenge inefficient production practice. We will work with industry to explore options for making waste tracking data universally digitised.
https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england	Resources and waste strategy for England	Strategy/ Advisory	We will: “Make sure that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental impacts by promoting reuse, remanufacturing and recycling”. “Work towards eliminating all avoidable waste by 2050 and all avoidable plastic waste by 2042”.
https://www.gov.uk/government/publications/25-year-environment-plan Text from p89- 90	UK Government 25 Year Environment Plan on Food Waste	National Strategy	UK Government will “work with the Research Councils to help develop a standard for biodegradable plastic bags as part of emerging work on a national Bioeconomy Strategy (while also recognising the need to avoid micro plastics pollution).”
www.WRAP.com	WRAP is working to develop a new cross-sector (business, government and NGOs) commitment to tackle plastic waste	Strategy National	This will align with the Ellen MacArthur Foundation’s New Plastic Economy and have an initial focus on plastic packaging
www.WRAP.com	The Government is working to make the way we eat and drink in this country more sustainable. The aim is	National Strategy & policy	This will set the UK on a path to meet an even more ambitious UN target – halving per capita global food waste at retail and consumer levels by 2030.

Source document(s)	Policy or Statement	National, Regional or local Policy or advisory	Discussion
	to cut by one fifth the greenhouse gas intensity of food and drink consumed in the UK, and also per capita UK food waste by 2025		WRAP/Courtauld Group will work towards no food waste entering landfill by 2030
'Our Waste, Our Resources: A Strategy for England'	Creating waste or by-products during manufacturing processes cannot always be avoided. But one company's rejects can be another's raw materials. We want to incentivise businesses to do this.	Strategy national	To achieve this (UK Government) will develop a model for realising resource efficiency savings, working with businesses through 'resource efficiency clusters'
www.gov.uk	Funding for charities	Policy national and regional	To redistribute surplus food from food businesses to those in need
https://www.nfuonline.com/cross-sector/environment/waste/	NFU - National Union of Farmers policy; Current activity includes response to government consultations	National; policy	<i>The NFU has built strong networks with Defra, the Environment Agency and the European Commission to ensure any regulation is consistent and proportionate. Much of the activity is currently focused on plastic use; e.g. Plastic Packaging Tax and Reform of the UK Packaging Producer Responsibility System</i>
NFU	The NFU has joined major British retailers and food companies in pledging to help halve food waste by 2030.	National Strategy	UK Government launched its 'Step up to the Plate' campaign in May 2019, at a special event held in London; it built on a number of innovations put forward by UK Government in the Resources and Waste Strategy.
UK launched landmark Resources and Waste Strategy Dec. 2018	Businesses and manufacturers will pay the full cost of recycling or disposing of their packaging waste, under a UK government strategy launched by Environment Secretary Michael Gove	National policy	The move will overhaul England's waste system, putting a legal onus on those responsible for producing damaging waste to take greater responsibility and pay for it.
The Extended Producer Responsibility (EPR)	Waste reduction will be funded by industry; they will pay higher fees if their products are harder to reuse, repair or recycle	Policy national	EPR will encourage sustainable design, subject to consultation. EPR for packaging will raise between GBP500 million (≈ EUR 556.2 million) and GBP1 billion (≈ EUR 1.11 billion) annually for recycling and disposal.

Source document(s)	Policy or Statement	National, Regional or local Policy or advisory	Discussion
AHDB Horticulture https://horticulture.ahdb.org.uk/search/node/waste	Safe disposal of waste produce is covered by series of advisory documents supported by research	Advisory	No actual strategy exists within the AHDB or the AHDB horticultural group at present.
The Resources and Waste Strategy	Legislation that sets out how the government will		
Growing the Bio-economy; Improving lives and strengthening our economy: A national bio-economy strategy to 2030 UK government 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/761856/181205_BEIS_Growing_the_Bioeconomy_Web_SP_.pdf	Reducing plastic waste and pollution by developing a new generation of advanced and environmentally sustainable plastics, such as bio-based and biodegradable packaging and bags (whilst avoiding microplastic pollution)		

Source document(s)	Policy or Statement
Health and Harmony: The future for food, farming and the environment in a Green Brexit Feb. 2018 (Cm9577)	A case study on AB Agri, which uses co-products from British Sugar p24
As above – Sustainable farming P25	{Government} will work with the Agriculture and Horticulture Development Board (AHDB) to encourage a focus on stronger resource efficiency and sustainable growth.

Source document(s)	Policy or Statement
As above – policy on interaction with Producer Organisations (PO's) and Producer Cooperation	{Government} encourage farmers to benchmark themselves against the best and commit to Continuing Professional Development (CPD). They will be encouraged to invest in new technologies and processes
	{Government} propose to maintain the special status of POs, including derogations from competition rules.
A Green Future: Our 25 year Plan to Improve the Environment Circular Economy	Our Industrial Strategy promotes the move towards a regenerative, circular economy. The economy exists within the natural world, and cannot be separated from it. P84
WRAP www.wrap.com the Courtauld Commitment 2025 - emerging voluntary Bioeconomy Strategy by signees	Reducing food supply chain emissions and waste - Government is working to make the way we eat and drink in this country more sustainable. The aim is to cut by 20% the greenhouse gas intensity of food and drink consumed in the UK, and per capita UK food waste by 2025.
AS above:- relating to by-products -Increasing resource efficiency and reducing pollution and waste	We need to make data more available to support processes such as industrial symbiosis
https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england	Resources and waste strategy for England
https://www.gov.uk/government/publications/25-year-environment-plan Text from p89- 90	UK Government 25 Year Environment Plan on Food Waste
www.WRAP.com	WRAP is working to develop a new cross-sector (business, government and NGOs) commitment to tackle plastic waste
www.WRAP.com	The Government is working to make the way we eat and drink in this country more sustainable. The aim is to cut by one fifth the greenhouse gas intensity of food and drink consumed in the UK, and also per capita UK food waste by 2025
'Our Waste, Our Resources: A Strategy for England'	Creating waste or by-products during manufacturing processes cannot always be avoided. But one company's rejects can be another's raw materials. We want to incentivise businesses to do this.
www.gov.uk	Funding for charities
https://www.nfuonline.com/cross-sector/environment/waste/	NFU - National Union of Farmers policy; Current activity includes response to government consultations

Source document(s)	Policy or Statement
NFU	The NFU has joined major British retailers and food companies in pledging to help halve food waste by 2030.
UK launched landmark Resources and Waste Strategy Dec. 2018	Businesses and manufacturers will pay the full cost of recycling or disposing of their packaging waste, under a UK government strategy launched by Environment Secretary Michael Gove
The Extended Producer Responsibility (EPR)	Waste reduction will be funded by industry; they will pay higher fees if their products are harder to reuse, repair or recycle
AHDB Horticulture https://horticulture.ahdb.org.uk/search/node/waste	Safe disposal of waste produce is covered by series of advisory documents supported by research
The Resources and Waste Strategy	Legislation that sets out how the government will
Growing the Bio-economy; Improving lives and strength-ening our economy: A national bio-economy strategy to 2030 UK government 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/761856/181205_BEIS_Growing_the_Bioeconomy_Web_SP_.pdf	Reducing plastic waste and pollution by developing a new generation of advanced and environmentally sustainable plastics, such as bio-based and biodegradable packaging and bags (whilst avoiding microplastic pollution)

Appendix 3

Comparison of UK, BE and NL Policies and Strategies

Comparison of the different European bio-economy strategies (source:

<https://www.vlaanderen.be/publicaties/duurzaam-gebruik-van-en-waardecreatie-uit-hernieuwbare-grondstoffen-voor-de-biogebaseerde-industriële-productie-zoals-biomaterialen-en-groene-chemicaliën-in-vlaanderen-beperkte-actualisering-van-de-studie-van-2012>)

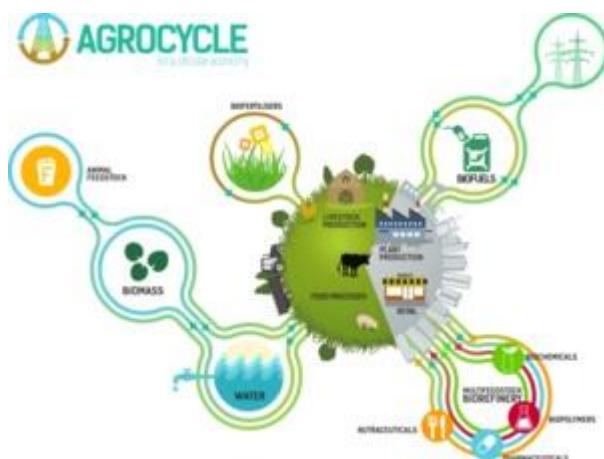
	European Union
<i>Strategy</i>	Innovating for Sustainable Growth: a Bio-economy for Europe (European Commission, 2012)
<i>Framework and objective</i>	The production of renewable resources of land, fisheries and aquaculture and their conversion into food, products or energy. An innovative and low-emission economy, reconciling demands for sustainable agriculture and fisheries, food security, and the sustainable use of renewable biological resources for industrial purposes, while ensuring biodiversity and environmental protection.
<i>Main actions</i>	Investment in research, innovation and skills for the bio-economy; Development of markets and competitiveness in bio-economy sectors; reinforced policy coordination and stakeholder involvement.
<i>Focus</i>	R&D, sustainability, innovation, competitiveness, job creation, economic growth, coherent policy framework, stakeholder participation.
<i>Coordination</i>	The European Bio-economy Panel

The Netherlands	Belgium (Region of Flanders)	UK
Hoofddlijnennotities Biobased Economy (Dutch Cabinet, 2012)	The vision and strategy for a sustainable and competitive bio-economy in 2030 (Flemish Government, 2013)	Building a high value bioeconomy (UK Government, 2015).
The transition of the economy from fossil raw materials towards an economy based on renewable biomass as a raw material. From a "fossil based" towards "biobased" economy.	The production of biomass and the various ways in which this biomass and its residual streams are subsequently used. To become one of the top regions in Europe for innovation and research relating to the bio-economy, where the available biomass streams will be used according to an accepted cascade.	Producing energy, fuels and chemicals from waste derived feedstocks.
Sustainable use of biomass, an integrated policy, knowledge and innovation, clear and transparent sustainability criteria.	A coherent policy that supports a sustainable bio-economy; Excellent education, training, and research and innovation in bio-economy; To produce and use biomass optimally and sustainable across the entire value chain; Strengthening of markets and competitiveness.	To support the transition towards a more circular economy, encouraging a more sustainable and efficient approach to resource use and management; Support R&D of technologies and biorefineries, continuing to encourage investment in the development and demonstration of technologies, processes and facilities; Development of a skilled workforce; Support businesses by ensuring the right policy and incentives framework is in place, ensuring that actions are coordinated across Government.
Sustainable use of biomass and agricultural biomass production, sustainable production processes, innovation, integrated policy.	Sustainability, innovation, market introduction, competitiveness education, integrated policy.	Innovation, skills, economic growth, policy, sustainability
The High Level Group Biobased Economy	Interdepartmental Working Group (IWG)	Industrial Biotechnology Special Interest Group (IB-SG)

Notes on WRAP 28 Courtauld Commitment, 2025 - Reducing food supply chain emissions and waste

Recycling food waste is also a key priority. WRAP/Courtauld Group will work towards no food waste entering landfill by 2030. Many local authorities have introduced separate collection of food waste and we will work to support an increase in numbers so that the amount of food waste sent to landfill declines. We will also take action to support the redistribution of unsold edible and nutritious surplus stock from food businesses to individuals in need. In 2018 WRAP announced a new £0.5m fund for charities who redistribute surplus food from food businesses to those in need.

AgroCycle's main aim is to achieve a 10% increase in the recycling and valorisation of agricultural waste by 2020. The project will further develop, demonstrate and validate novel processes, practices and products for the sustainable use of agricultural waste, co-products and by-products (AWCB). The systems will be tested and evaluated from technical, environmental and socio-economic perspectives, including their impact on the sustainability of agricultural systems, thereby contributing to the creation of sustainable value chains in the farming and processing sectors.



AgroCycle is a 3 year project funded by the EU commission's research arm Horizon 2020. It involves over 60 researchers from 26 institutes across Europe and China, and across the value chain from academia and industry. NNFCC is one of five UK partners, working alongside Harper Adams, Agrii, Exergy, and Innovation for Agriculture.

This month, there is one obvious standout story, dealing with food packaging. As far as plastic waste is concerned, packaging is one of the applications under greatest scrutiny, as manufacturers pursue policy's demands for greater rates of recycling. Some biobased plastics offer a unique solution to this problem, through being compostable. These form an ideal material for use in food packaging, as they can be disposed of in the same way as food waste, meaning no separation of product and packaging need take place before disposal. These biobased plastics can also have interesting additional properties which further increase their suitability as food packaging: we have previously reported on chitosan packaging made from seafood waste that can act as an oxygen-absorber, extending the shelf-life of food. This month, seafood is once again involved, as we have a story about another ground-breaking biobased plastic for food packaging. A research team in Thailand has developed a polymer film that seafood can be dipped in before storage. The film is, first-and-foremost, edible, and thus needn't be removed before consumption (nnfcc <https://www.nnfcc.co.uk/publications/review-biobased-products-january-2019>)

