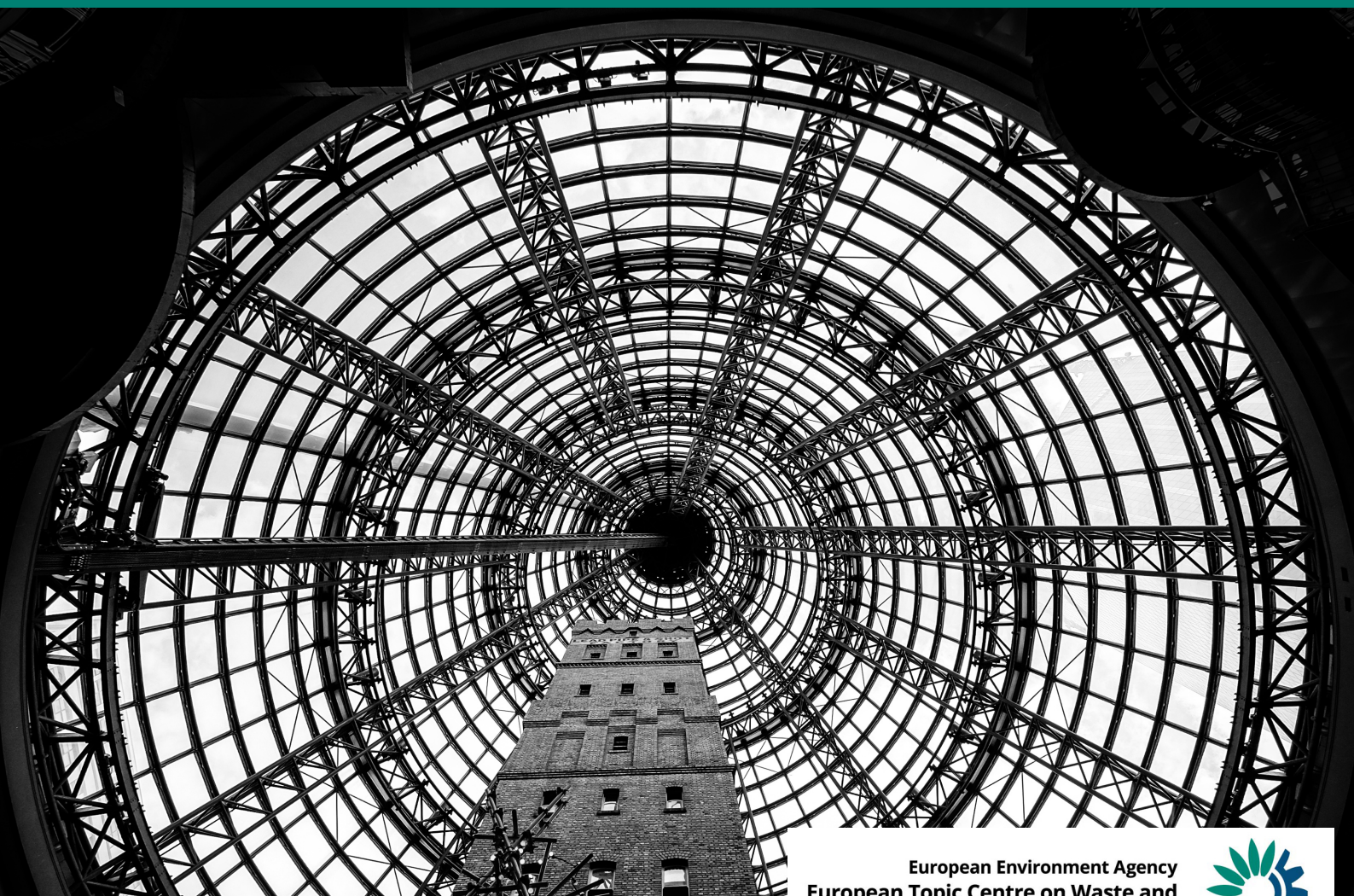


Resource efficiency and circular economy in Europe – even more from less

An overview of policies, approaches and targets of Denmark in 2018



European Environment Agency
European Topic Centre on Waste and
Materials in a Green Economy



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Acknowledgements

This country profile is based on information reported by the Eionet network and, in particular, the National Reference Centres on Resource Efficiency and Circular Economy. The information is current as of March 2019, when members of Eionet verified the content of this profile.

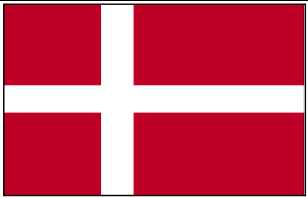

This country profile was prepared as part of the 2019 EEA review of material resource efficiency, circular economy and raw material supply policies, which aimed to collect, analyse, and disseminate information about experience with the development and implementation of these policies in EEA member and cooperating countries.

At the time of writing, a summary report is being finalised. The report reflects on trends, similarities and differences in policy responses, showcases selected policy initiatives from member countries and identifies possible considerations for the development of future policies.

These country profiles were compiled and finalised by members from the European Topic Centre on Waste and Materials in a Green Economy, namely Bart Ullstein, Bettina-Bahn Walkowiak, Jeroen Gillabel, Margareta Wahlström, Jutta-Laine Ylijoki, Dirk Nelen, Theo Geerken, Veronique Van Hoof and Evelien Dils. The responsible EEA project managers for the work were Pawel Kazmierczyk and Daniel Montalvo.

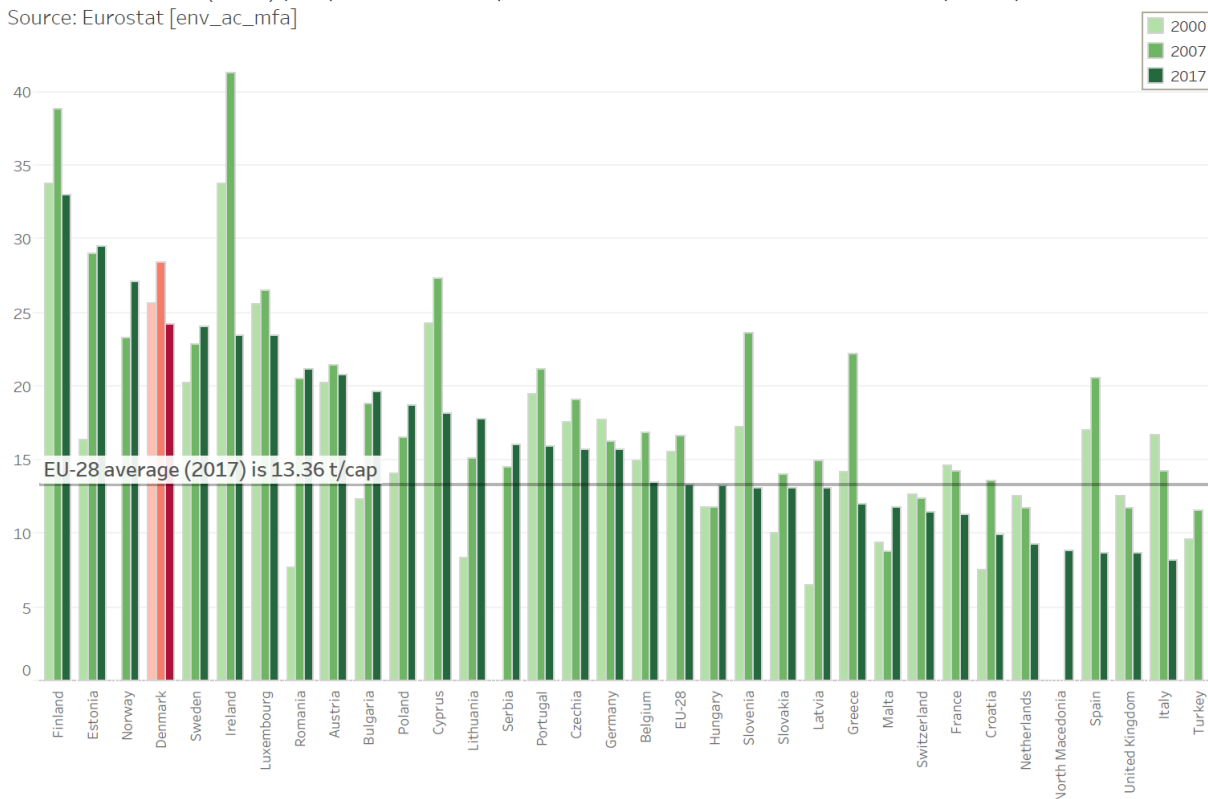
Denmark, facts and figures

Note: data in this section was sourced from Eurostat databases, except where noted otherwise

	<p>GDP: EUR 292.8 billion (1.8 % of total EU28 in 2017)</p> <p>GDP per capita: EUR 50,800 (purchasing power standard) (169.1 % of EU28 average per capita figure in 2017)</p> <p>Use of materials (domestic material consumption (DMC)) 139.5 million tonnes DMC (2.0 % of EU28 total in 2017) 24.2 tonnes DMC per capita (181.1 % of EU28 average per capita in 2017)</p> <p>Structure of the economy: agriculture: 1.6 % industry: 23.1 % services: 75.2 %</p> <p>Surface area: 42.9 thousand square kilometres (km²) (0.96 % of total EU28)</p> <p>Population: 5.7 million (1.1 % of EU28 total in 2017)</p>
	

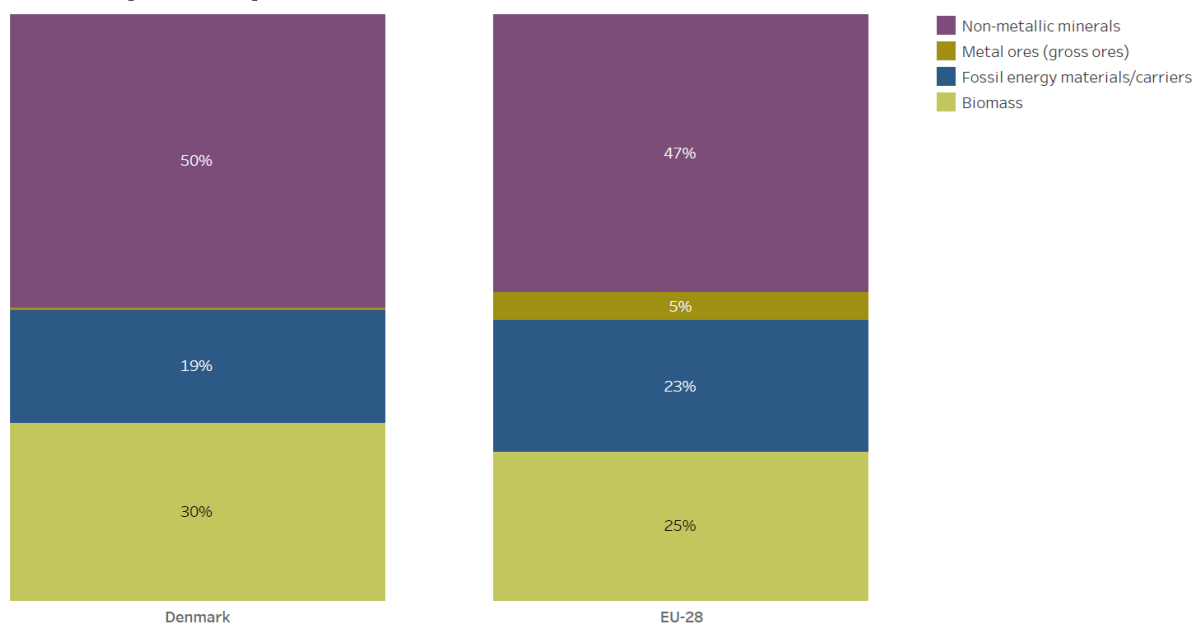
Use of materials (DMC) per person in Europe, 2000, 2007 and 2017, tonnes DMC per capita.

Source: Eurostat [env_ac_mfa]



Denmark & EU-28. Domestic Material Consumption by material category, 2017.

Source: Eurostat [env_ac_mfa]



Note: The domestic material consumption categories 'other products' and 'waste for final treatment and disposal' are excluded from the figure.

Denmark. Trends in domestic material consumption by category, 2002-2017.

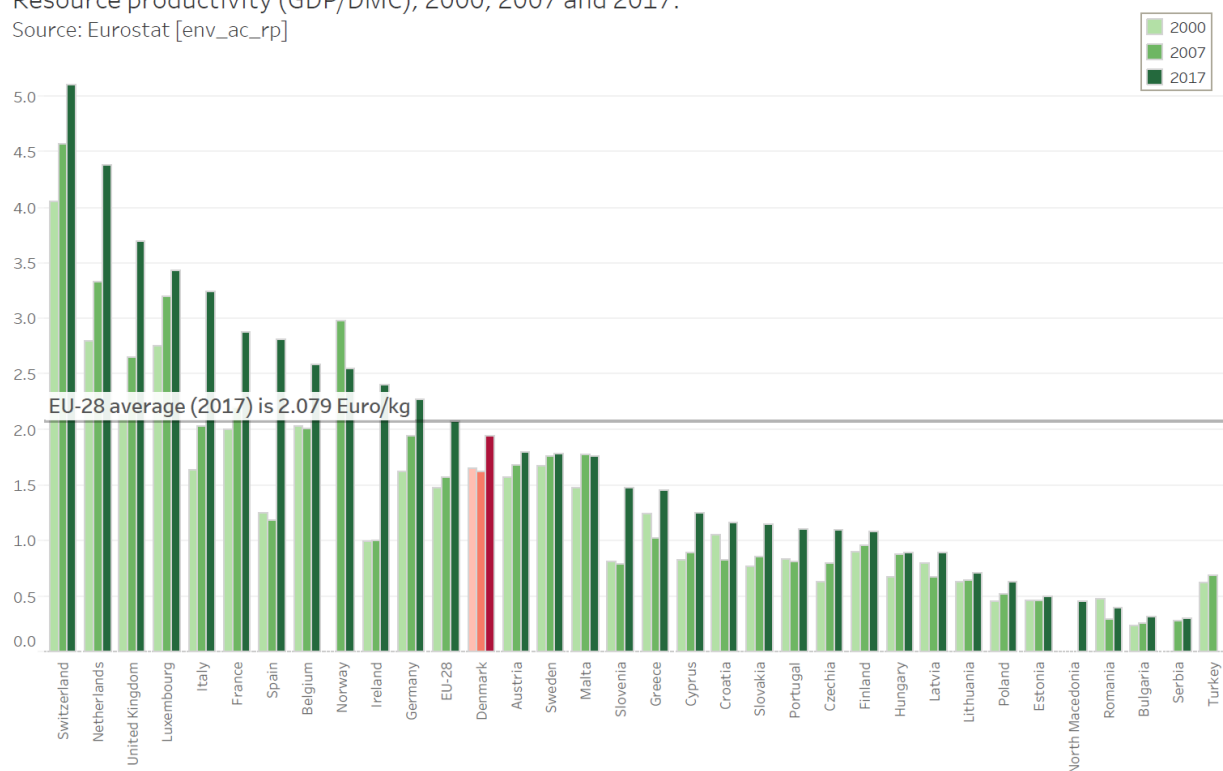
Source: Eurostat [env_ac_mfa]



Note: The domestic material consumption categories 'other products' and 'waste for final treatment and disposal' are excluded from the figure.

Resource productivity (GDP/DMC), 2000, 2007 and 2017.

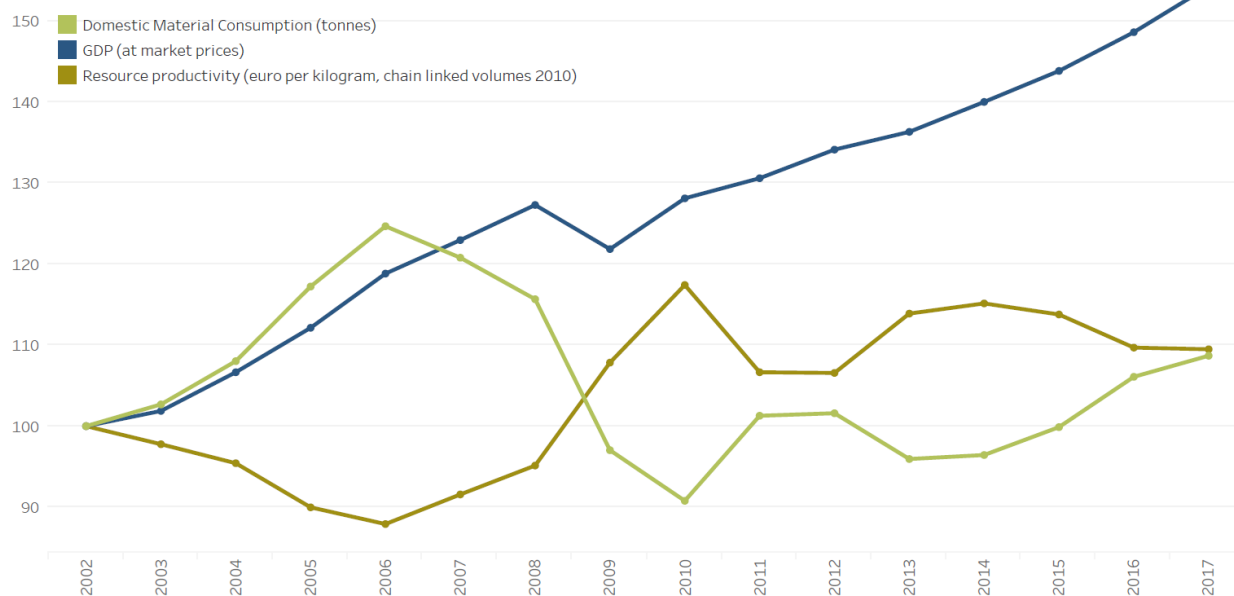
Source: Eurostat [env_ac_rp]



Note: GDP expressed in chain linked volumes 2010.

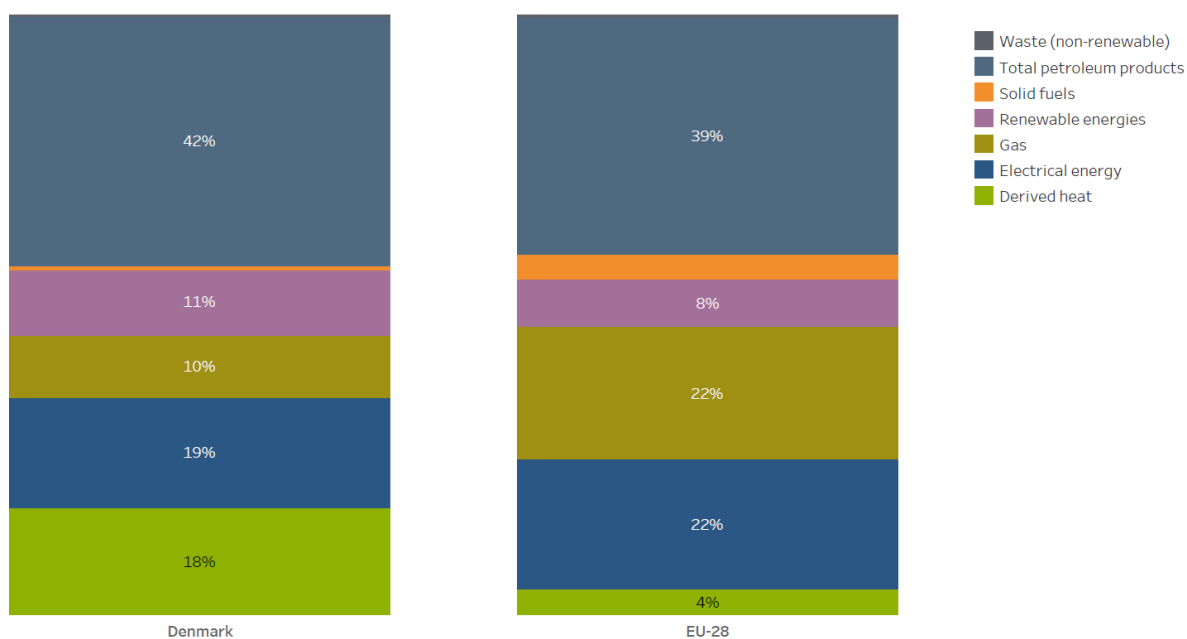
Denmark. GDP, DMC and resource productivity trends, 2002-2017, index 2002=100.

Source: Eurostat [env_ac_mfa], [env_ac_rp] & [nama_10_gdp]



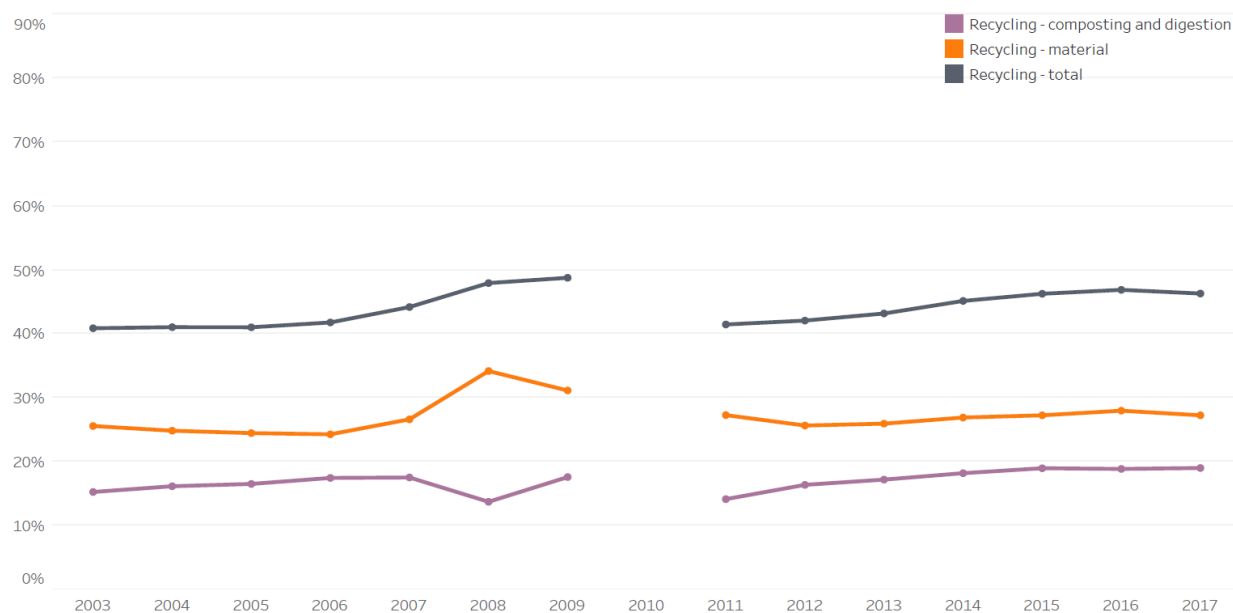
Denmark & EU-28. Primary energy consumption by energy product, 2016.

Source: Eurostat [nrg_100a]



Denmark. Recycling of municipal waste, 2003-2017, as share of total waste treatment.

Source: Eurostat [env_wasmun]



Note: The amount of municipal waste treatment is reported for the treatment operations incineration (with and without energy recovery), recycling, composting and landfilling.

Policy framework

Driving forces for material resource efficiency and circular economy

Material resource efficiency and circular economy policies and strategies in Denmark are closely related to considerations of job creation and employment, competitiveness, growth, ensuring the sustainable use of natural resources and reducing environmental impacts.

A specific driver for Denmark Without Waste strategies was an ambition to increase recycling and waste prevention, due to the uncertainty of access to and price fluctuations of raw materials.

Material resource efficiency in companies is primarily driven by cost savings (Southern Danish University, 2015: Potentials for material savings in Danish industry¹). Other possible drivers for companies are less dependency on volatile prices of materials and fuels, export of resource-efficient solutions such as for water and food production, and lower environmental impacts due to regulation.

Dedicated national strategies or roadmaps for material resource efficiency and for circular economy

Denmark does not have a dedicated national resource efficiency strategy or action plan. Rather it has adopted a resource strategy and plan for waste management, Denmark Without Waste, Recycle More – Incinerate Less in November 2013 and a waste prevention strategy, Denmark Without Waste II, Strategy for Waste Prevention in April 2015. Both strategies partly cover the theme of more efficient use of resources.

Denmark Without Waste, Recycle More – Incinerate Less² foresees Denmark protecting its resources and materials, and recycling more household waste, while incinerating less. This will entail more materials being retained in the economic cycle, with benefits for the environment. At the same time, it is important to organise efforts cost-effectively and appropriately in a societal context.

Denmark Without Waste II, Strategy for Waste Prevention³ contains 72 initiatives closely linked to the circular economy. This strategy has two cross-cutting topics, transition in Danish businesses and green consumption, and five action areas: avoidable food waste, construction, clothing and textiles, electrical and electronic equipment, and packaging.

In September 2018 the Danish Government adopted the Strategy for a Circular Economy, More value and better environment through design, consumption, and recycling⁴. The Strategy supports the acceleration the circular development.

The Strategy for Circular Economy has the potential to increase economic growth and the transformation to a circular economy will, *inter alia*, result in up to a DKR 45 billion increase in gross domestic product (GDP) and a reduction in carbon dioxide (CO₂) emissions from between 3 and 7 per cent (see fact sheet⁵).

The Strategy for Circular Economy includes 15 initiatives divided into 6 overarching objectives. The six objectives are:

¹ Potentialer ved materialebesparelser i dansk industri

https://static.sdu.dk/Flexpaper/aspnet/Flex_document.aspx?doc=/sitecore/media%20library/Files/epage/Om_SDUCentre/Ci2M/ForskningsrapportMaterialebesparelseridkindustripdf?sc_database=web&doc=/sitecore/media%20library/Files/epage/Om_SDUCentre/Ci2M/ForskningsrapportMaterialebesparelseridkindustripdf?sc_database=web (Danish with a summary in English)

² http://eng.mst.dk/media/mst/Attachments/Ressourcestrategi_UK_web.pdf (English)

³ http://eng.mst.dk/media/164923/denmark-without-waste-ii_wasteprevention.pdf (English)

⁴ <https://mfvm.dk/publikationer/publikation/pub/hent-fil/publication/strategy-for-circular-economy/> (English)

⁵ https://mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Cirkulaer_oekonomi/CO_faktaark.pdf (Danish)

1. strengthen enterprises as a driving force for a circular transition;
2. support the circular economy through data and digitisation;
3. promote the circular economy through design;
4. change consumption patterns through the circular economy;
5. create a proper functioning market for waste and recycled raw materials;
6. get more value out of buildings and biomass.

The 15 initiatives are:

1. promoting circular business development in small and medium-sized enterprises (SMEs);
2. setting up a single point of entry to the authorities for enterprises with circular business models;
3. expanding the access to financing of circular business models;
4. supporting digital circular options by commercial use of data and challenges;
5. incorporating the circular economy into product policy;
6. boosting Danish participation in European work on circular standards;
7. promoting circular procurement;
8. increasing focus on total cost of ownership in public procurement;
9. promoting more harmonised collection of household waste;
10. creating a level playing field on the market for waste and recycled raw materials;
11. liberalising waste electrical and electronic waste (WEEE) management;
12. establishing a fund for the handling of regulatory barriers to circular economy;
13. developing a voluntary sustainability class;
14. propagating selective demolition;
15. getting more value out of biomass.

The Strategy for Circular Economy is the outcome of work that the government began in autumn 2016 when it launched an Advisory Board on the circular economy, with 12 Danish business leaders representing small and large companies as well as old and new ones. It was chaired by Flemming Besenbacher, chairman of Carlsberg, and served by a joint secretariat formed by the Ministry of Environment and Food and the Ministry of Industry, Business and Financial Affairs. The Danish Environmental Protection Agency (EPA) and the Danish Business Authority were also part of the secretariat.

The Advisory Board's recommendations were delivered to the government in June 2017⁶.

Overview of dedicated national or sectoral strategies for raw materials

Denmark does not have a national strategy for raw materials. The five regions of the country develop their own planning and management strategies for the extraction of raw materials in their own areas. Extraction of raw materials from the sea is managed by the state and national legislation. There is no national plan for the extraction of raw materials from the sea.

Denmark does not have a strategy on securing access to resources that are needed for the economy and which cannot be obtained through domestic extraction.

Policies which include elements of material resource efficiency

Although Denmark does not have a dedicated material resource efficiency strategy, several strategies and policies are in place which address material resource efficiency and the circular economy among other topics. These include the following.

⁶ https://www.regeringen.dk/media/3506/advisory-board-for-cirkulaer-oekonomi_rapport.pdf (Danish)
http://en.mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Cirkulaer_oekonomi/Advisory-Board-for-Circular-Economy-Report-2017-Content_Single_pages_WEB.pdf (English)

1) **Denmark Without Waste – Recycle More, Incinerate Less** (November 2013)⁷.

Resources strategy for waste management, which focuses on more recycling and the more efficient use of raw materials.

2) **Denmark Without Waste II – Strategy for Waste Prevention** (April 2015)⁸.

Focuses on waste prevention. Contains 72 initiatives aimed at getting companies and consumers to prevent the production of waste.

3) **National Strategy for Intelligent Public Procurement (Strategi for intelligent offentligt indkøb)**, October 2013⁹

The Strategy focuses, among other aspects, on increased use of tools for calculating the total cost of ownership and sustainability criteria in public procurement.

4) **The Strategy for Circular Economy**

The Strategy for Circular Economy also gives priority to green and circular public procurement, by extending and developing the Partnership for Green Public Procurement and the Forum on Sustainable Procurement, as well as developing new tools for total cost of ownership (TCO).

The Partnership for Green Public Procurement¹⁰ is a collaborative effort of public organisations who are committed to making extra efforts in partnership with other organisations to reduce their environmental impact from their procurement action and drive the market in a greener direction.

The Forum on Sustainable Procurement¹¹ consists of three levels:

- a steering group consisting of invited political organisations;
- a number of themed network/working groups;
- ordinary members.

See also the Dedicated national strategies or roadmaps for material resource efficiency and for circular economy section.

5) **The Action Plan on Plastics**

In December 2018, the Danish government adopted an Action Plan on Plastics (Plastikhandlingsplanen [DA]¹², Plastic Without Waste, which is a dedicated policy instrument on plastic waste prevention and the efficient use of plastics.

The Action Plan on Plastics sets a focus on all essential parts of the challenge: less plastic in nature, smarter production and consumption, more cooperation in the value chain, better waste management, a strengthened knowledge base and much more recycling.

It includes 27 initiatives including the creation of a National Plastic Knowledge Centre that will function as the focal point for the Danish initiatives under the action plan. The work of the National Plastic Knowledge

⁷ https://mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Ressourcestrategi_UK_web.pdf (English)

⁸ https://eng.mst.dk/media/164923/denmark-without-waste-ii_wasteprevention.pdf (English)

⁹ <http://www.fm.dk/nyheder/pressemeddelelser/2013/10/ny-regeringsstrategi-vi-skal-spare-penge-og-fremme-innovation-og-baeredygtighed-ved-at-koebe-klogere-ind/> (Danish)

¹⁰ <https://eng.mst.dk/sustainability/sustainable-consumption-and-production/sustainable-procurement/partnership-for-green-public-procurement/> (English)

¹¹ <https://eng.mst.dk/sustainability/sustainable-consumption-and-production/sustainable-procurement/forum-on-sustainable-procurement/> (English)

¹² https://mfvm.dk/fileadmin/user_upload/MFVM/Publikationer/NY_Regeringens_plastikhandlingsplan_full_version_FINAL_0123-2019.pdf (Danish)

Centre will, *inter alia*, involve establishing value chain collaborations and guiding companies in transition towards circular plastic consumption, building knowledge about plastic and act as intermediary for citizens and companies, mapping barriers to recycling and plastic recycling in Denmark, etc.

6) Danish Bio-economy Council

The Danish Minister for Environment and Agriculture relaunched the Danish Bio-economy Council in August 2017. The setup and aim of this Council are elaborated in the next section.

Link to recommendations from the National Bioeconomy Panel¹³:

7) The Danish Action Plan on the United Nations Sustainable Development Goals (2017)¹⁴

See section on Resource efficiency, circular economy and the 2030 Sustainable Development Goals.

8) Strategy on the Sharing Economy (October 2017)

The National Strategy on the Sharing Economy¹⁵ was launched in October 2017 with the aim of giving the sharing economy room to grow in Denmark. The Strategy contains 22 initiatives on promoting a sharing economy. Central to it is making it easier to be both a citizen and a sharing economy business. The government wants to lower taxes on income generated from renting out accommodation or cars when the rental is done through a platform that ensures reporting of revenues to the tax authorities. A new website, <https://deleoeconomien.dk/> (Danish), will make it easy for citizens and businesses to find answers to their questions about the sharing economy, and the government wants to create a partnership with social partners to discuss how the labour market can best prepare for the future challenges that the sharing economy might bring.

9) A Sustainable Denmark – Balanced Development (October 2014)¹⁶

In 2014, the government presented a sustainability strategy with 23 targets for the economic, social, green and international areas. A Sustainable Denmark – Balanced Development describes the government's vision for a sustainable Denmark and policy in the economic, social and green areas.

Institutional setup and stakeholder engagement

Material resource efficiency and circular economy policies are addressed by a number of different ministries in Denmark: Environment and Food; Business; Transport, Building and Housing; Energy, Utilities and Climate; Taxation; and Finance. These work closely together on an *ad hoc* basis on developing policies and regulation on material resource efficiency and the circular economy.

In Denmark, public consultations are an integral part of the process of developing and revising policies and regulations. A number of partnerships between stakeholders in value chains are being set up to increase resource efficiency. Among others, these include partnerships on food waste, recycling and the prevention of construction waste (see section 'Examples of good practice and innovative approaches').

Recently, the government-established **Advisory Board on Circular Economy** has consulted a large number of stakeholders in their work on the development of vision, targets and recommendations for a circular economy¹⁷.

¹³ https://mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Biooekonomi/Recommendations_from_the_National_Bio_economy_Panel_Proteins_for_the_future_PDF_.pdf (English)

¹⁴ https://www.regeringen.dk/media/3242/150517-handlingsplan-for-fn-verdensmaalene_web.pdf (Danish)

¹⁵ <https://www.regeringen.dk/media/4151/strategi-for-vaekst-gennem-deleoekonomi.pdf> (Danish)

¹⁶ <http://www.fm.dk/publikationer/2014/et-baeredygtigt-danmark-udvikling-i-balance> (Danish)

¹⁷ <https://mfvm.dk/miljoe/strategi-for-cirkulaer-oekonomi/anbefalinger-om-cirkulaer-oekonomi/> (Danish)

The recommendations and the work of the Advisory Board on Circular Economy has been fundamental to the now adopted Strategy for Circular Economy (see the Dedicated national strategies or roadmaps for material resource efficiency and for circular economy section).

The Danish Minister for Environment and Agriculture relaunched the **Danish Bioeconomy Council** in August 2017. The Council consists of members from business, commerce associations and universities with a broad and in-depth knowledge of the bioeconomy. The Council's aim is to support the development of new value chains that are resource efficient and sustainable, and have the prospect of supporting growth, employment, the environment and climate. Its first themes are new protein value chains and imports of materials.

The Council is supported by a secretariat from the Ministries of Environment and Agriculture; Industry, Business and Financial Affairs; Higher Education and Science; and Energy, Utilities and Climate.

Link to recommendations from the National Bioeconomy Panel¹⁸:

Approaches to resource efficiency and circular economy policy evaluation

Prior to introducing new policies in general, a kind of *ex-ante* policy evaluation is carried out. This includes calculation of economic and environmental effects on society and especially the economic effects and administrative burden on business.

Mid-term evaluations of some strategies are carried out by external consultants. A mid-term evaluation on the Denmark Without Waste Strategy, Recycle More – Incinerate Less, for example, was carried out and published in 2017. The evaluation concludes that the target of 50 per cent recycling of household waste in 2022 (see section Targets for resource efficiency and circular economy) will be achieved. Not all of the other expected effects (see section Targets for resource efficiency and circular economy), however, will be achieved, with some needing extra focus and some additional initiatives¹⁹.

For grant programmes, *ex-post* evaluation is often carried out by external evaluators.

The Danish Eco-Innovation Programme (see section Examples of good practice and innovative approaches) promoting new, efficient environmental solutions including the circular economy, was established in 2016–2017.

The evaluation concludes that enterprises included in the Eco-Innovation Programme have a higher rate of creating new jobs than others. A large number of projects are not finished, which makes it difficult to evaluate environmental effects, turnover, etc. The enterprises in the Programme expect, on average, to increase their turnover by DKK 6 million (EUR 800 000) for each DKK 1 million (EUR 134 000) received in grants one year after finalisation of the project²⁰.

Monitoring and targets

Targets for resource efficiency and circular economy

The Denmark Without Waste strategy contains a national 2022 target for household waste covering seven focus waste streams, a number of expected effects for waste from the service sector, and for waste from all other sectors.

¹⁸ https://mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Biooekonomi/Recommendations_from_the_National_Bioeconomy_Panel_Proteins_for_the_future_PDF_.pdf (English)

¹⁹ http://mst.dk/media/133157/eval-af-ress-strategi_samlet-rapport-ekskl-bilag.pdf (Danish)

²⁰ <http://ecoinnovation.dk/media/187290/evaluering-2017-rapport-final-31-oktober-2017.pdf> (Danish)

- 1) Recycling of organic waste, paper, cardboard, glass, wood, plastic and metal waste from households, including packaging: the target is to reach 50 per cent by 2022. With the Resources Strategy, Denmark will meet the EU objective of separating 50 per cent of dry household waste, such as paper, cardboard, glass, plastic and metal, in 2020. However, the strategy is setting an even more ambitious national goal as wet organic waste is also included.
- 2) Collection of WEEE from households: this is expected to reach 75 per cent by 2018 – a national ambition.
- 3) Recycling of paper, cardboard, glass, metal and plastic packaging from the service sector: this is expected to reach 70 per cent by 2018 – while this is a national ambition, it is also linked to the EU Packaging Directive.
- 4) Recycling of organic waste from the service sector is expected to reach 60 per cent by 2018 – a national ambition.
- 5) Energy recovery from garden waste in dedicated biomass treatment facilities is expected to reach 25 per cent from all sectors by 2018 – a national ambition.
- 6) Collection of WEEE from all sectors is expected to reach 65 per cent by 2018. This is the same as in the EU Waste Electrical and Electronic Equipment (WEEE) Directive, but brought forward a year to 2018 rather than 2019 as stated in the Directive.
- 7) Collection of batteries from all sectors is expected to reach 55 per cent by 2018 – a national ambition.
- 8) Recovery of shredder waste from all sectors is expected to reach 70 per cent by 2018. This is a national ambition but will also contribute to the EU End of Life Vehicle Directive.
- 9) Recycling of phosphorus in sewage sludge from all sectors is expected to reach 80 per cent by 2018 – a national ambition.

Indicators to monitor progress towards a resource-efficient circular economy

- 1) Monitoring of recycling in order to follow the implementation of Denmark Without Waste, Recycle More – Incinerate Less, is done through the Danish EPA's waste database and the annual production of waste statistics²¹.

Denmark Without Waste, Recycle More – Incinerate Less (2013–2018) was evaluated in 2017²².

Statistics Denmark, supported by the Danish Business Authority and the Danish EPA, has developed a number of indicators to assess resource efficiency at a sectoral level. The objectives are:

- to measure resource productivity at a more detailed level;
- to have better and more reliable data on resource productivity at a sectoral level;
- to combine data available from different sources cheaply – mainly economic data.

The methodology is based on using data available from Statistics Denmark and the EPA. It mainly uses data from national accounts together with additional data from the databases on the purchase and sale of goods in industry and general company statistics. It uses similar sectoral divisions as the national accounts – five different levels of sectors/NACE codes: 10, 19, 36, 69, 117 sub-sectors.

The indicators include, among others, gross value added (GVA)/input (DKK), purchase of input materials (DKK) as a percentage of turnover (DKK), intensity of energy use in gigajoules (GJ) and waste production (kilograms) per unit of GVA. These give detailed information for different sectors. Some of the indicators are used in the annual growth and competitiveness publication which in recent years,

²¹ The annual report on waste statistics website:

<http://mst.dk/service/publikationer/publikationsarkiv/2017/jun/affaldsstatistik-2015/> (Danish)

²² http://mst.dk/media/133157/eval-af-ress-strategi_samlet-rapport-ekskl-bilag.pdf (Danish)

among other aspects, includes an indicator on the creation of value compared to material costs in industry²³.

In addition, the sectoral indicators will also be used as indicators in the Danish waste prevention strategy, Denmark Without Waste II.

- 2) At a national level Denmark also uses DMC to measure material resource use in tonnes²⁴.
- 3) The Danish Action Plan on the SDGs (2017) includes monitoring of the 37 objectives²⁵. Of specific interest for the circular economy are objectives 24–26 (see section Resource efficiency, circular economy and the 2030 Sustainable Development Goals), the indicators for which are:
 - resource productivity (DMC/GDP), which will be changed to raw material consumption (RMC)/GDP;
 - recycling of total waste (excluding mineral waste);
 - number of companies covered by best available technology (BAT) standards according to the EU Industrial Emissions (IE) Directive;
 - production of green goods and services in Denmark, based on statistics from Statistics Denmark;
 - avoidable food waste in households, based on national mapping of avoidable food waste in households every four years;
 - resource productivity in the food sector, based on the statistics developed for resource productivity described above.
- 4) The Circular Economy Strategy's objective is to accelerate the transition to a more circular economy. The indicators for this objective are²⁶:
 - Denmark's resource productivity (DMC/GDP which will be replaced by RM C/GDP), and
 - the share of recycling of total waste generated (excl. soil and mineral waste, cf. Eurostat).

Resource efficiency, circular economy and the 2030 Sustainable Development Goals

The Danish Action Plan on the SDGs (2017)²⁷ is the government's follow-up to the United Nations Sustainable Development Goals (SDGs) and is closely linked to initiatives in Denmark on resource efficiency and the circular economy. The government will make an ambitious contribution to the global achievement of the SDGs through national and international follow-up.

In the Action Plan, resource efficiency and circular economy policies are mentioned as a tool for achieving the SDGs (Goals 2, 8, 9, 12 and 13).

The Danish Action Plan on the SDGs includes 37 objectives. Of specific interest for the circular economy are objectives 24–26:

24. promote circular economy including the better use and recycling of resources and waste prevention;
25. sustainable companies and products;
26. sustainable food.

²³ <https://em.dk/publikationer/2017/redegoerelse-om-vaekst-og-konkurrenceevne-2017/> (Danish)

²⁴ <http://www.statistikbanken.dk/statbank5a/default.asp?w=1280> (Danish)

²⁵ <https://www.regeringen.dk/publikationer-og-aftaletekster/handlingsplan-for-fns-verdensmaal/> (Danish)
<http://www.dst.dk/da/Statistik/dokumentation/statistikdokumentation/groenne-varer-og-tjenester> (Danish)

²⁶ See pages 11-12 in the [Strategy for Circular Economy: https://mfvm.dk/publikationer/publikation/pub/hent-fil/publication/strategy-for-circular-economy/](https://mfvm.dk/publikationer/publikation/pub/hent-fil/publication/strategy-for-circular-economy/)

²⁷ <https://www.regeringen.dk/publikationer-og-aftaletekster/handlingsplan-for-fns-verdensmaal/> (Danish)

Examples of innovative approaches and good practice

Examples of good practice and innovative approaches

Denmark implements a number of initiatives that support a circular economy. Examples of good practices include:

- 1) The main purpose of the **Danish Eco-Innovation Programme**²⁸ (MUDP) is to support the development and application of new environmental and resource-efficient solutions addressing prioritised environmental challenges. Further, the ambition is to boost and strengthen cooperation between companies, knowledge-based institutions and partners in the EU within the field of environmental technology. The MUDP is a public subsidy scheme with a general focus on the circular economy; recycling waste; water; climate change adaptation; cleaner air; less noise; fewer hazardous chemicals; industry's environmental performance; and ecological and sustainable construction. The budget in 2017 was approximately DKK 120 million (EUR 16 million), in 2018 and 2019 the budget was approximately DKK 90 million (EUR 12 million).
- 2) **The Danish Green Investment Fund**²⁹ (Danmarks grønne investeringsfond) is an independent state loan fund with the purpose of co-financing economically viable projects that facilitate and support the sustainable development of society. Private companies, non-profit housing associations and public-sector companies and institutions (with budgets separate from municipalities, regions and the state) may apply for a loan. The Fund seeks to bridge the gap between traditional bank financing and equity capital. Individual loans have a maximum maturity of 30 years, and the Fund is generally able to finance up to 60 per cent of the total costs associated with the given project. The Fund has a net capital of up to DKK 200 million (EUR 27 million) as well as a state-guaranteed lending limit of DKK 5 billion (EUR 670 million) in capital.
- 3) **Public procurement** as a circular economy enabler. Initiated by the Danish government, the programme aims to shift public procurement to support the transition to a circular economy. Through the Partnership on Green Public Procurement³⁰ (GPP), members work to integrate procurement policies that emphasise circular economy criteria, such as the use of non-toxic chemicals, extended product lifespan, and the cycling of biological and technical materials. The Partnership on GPP is a collaborative initiative between Danish regions, municipalities and the Ministry of Environment and Food. The current 16 partners have committed to integrate green goals in their procurement policies as well as greening their procurement on 11 specific product groups. The value of the Partnership's total procurement is significant – EUR 6.7 billion.
- 4) **The Forum for Sustainable Procurement**³¹ is a national initiative targeting all stakeholders with an interest in procurement, aimed at both business and public stakeholders. The key activities of the Forum revolve around collaboration, capacity building and sharing knowledge and experience. Recently, the Forum has focused on circular procurement through a thematic group – it hosted a national conference on circular procurement in June 2017 and guidelines for public circular procurement have been published³². Thematic groups of 2019 focus on the SDG's and procurement as well as plastics.
- 5) **Circular Company** (Cirkulær virksomhed)³³ is a **digital portal** that gives SMEs information, inspiration and tools for promoting the circular economy in their businesses. Eight tools are included, which in an easy and clear way promote voluntary efforts for the benefit of the company's operations, product

²⁸ <http://eng.ecoinnovation.dk/> (English)

²⁹ <http://gronfond.dk/en/om-fonden/> (English)

³⁰ <https://ansvarligeindkob.dk/partnerskab/> (Danish)

³¹ <http://www.ansvarligeindkob.dk/> (Danish)

³² https://ansvarligeindkob.dk/wp-content/uploads/2018/09/pdf_cirkulaer_indkoebsguide.pdf (Danish)

³³ <https://cirkvirk.dk/> (Danish)

development or communication with the outside world. The main idea of the tools is that they are easy to use, relevant, and adaptable to the needs of individual companies. The tools thus provide companies with a quick overview of how they can promote the circular economy and how to get started. The portal was launched in September 2017.

- 6) In November 2017, the Danish EPA launched a new website **My Environment** (Mit miljø)³⁴ with information and advice for citizens on how to make more environmentally friendly choices in their daily lives. It will have more than 120 short articles in eight categories: house, food, children, sharing economy, consumption, garden, vacation and nature.
- 7) **The Growth Programme for Small and Medium-sized Enterprises** (Vækstprogram for små og mellemstore virksomheder)³⁵ focuses on automation, digitalisation and resource efficiency. Up to 1,000 small and medium-sized production companies will be given a growth check, carried out by an external consultant, with a view to achieving greater productivity and competitiveness, for example through increased automation, digitisation and resource efficiency.
- 8) **Circular Business** (Cirkulær Forretning)³⁶ is a grant programme for business organisations that works for the circular economy education and qualifications of their SME members. The organisation has set itself specific targets and milestones for their work, for example the number of companies that have participated in education on the circular economy.
- 9) **The Partnership on Sustainable Construction and Waste Prevention** was a national initiative with the aim of facilitating the shift to a more circular approach within the construction and demolition sector. The Partnership initially had two focus areas, selective demolition and incentives to enhance the market for secondary raw materials within the sector. The outcome of this partnership was an analysis on how to enhance selective demolition within the construction sector which has been published³⁷, and an analysis on markets for secondary raw materials within the sector which was published in December 2017³⁸.
- 10) Since 2014, the **Partnership on Avoidable Food Waste**³⁹ has existed as a national initiative challenging different stakeholders throughout the entire value chain to come up with common solutions to avoidable food waste. In association with this initiative, the government is running the second round of its subsidy scheme for projects aiming to reduce avoidable food waste.
- 11) The Danish EPA, together with the Danish Business Authority, has been a member of the Ellen MacArthur Foundation's **CE100 Government & Cities Programme** for a number of years. In 2014–2015 Denmark was selected as a pilot country for the development of a step-by-step guide to help policymakers enable a transition to a circular economy, *Delivering the circular economy – a toolkit for policymakers*⁴⁰.

³⁴ <http://mitmiljo.dk/> (Danish)

³⁵ <https://regionalt.erhvervsstyrelsen.dk/vaekstprogram-smaa-og-mellemstore-virksomheder> (Danish)

³⁶ <https://mst.dk/service/publikationer/publikationsarkiv/2018/apr/mudp-towards-circular-business-models/> (Danish)

³⁷ <http://mst.dk/service/publikationer/publikationsarkiv/2017/okt/selektiv-nedrivning/> (Danish)

³⁸ <https://mst.dk/media/152164/markedsanalyse-raastofomraadet-cowi.pdf> (Danish)

³⁹ <http://mst.dk/affald-jord/affald/affaldsforebyggelse-strategi-aktiviteter/mindre-madspild/partnerskab/> (Danish)

⁴⁰ https://www.ellenmacarthurfoundation.org/assets/downloads/government/Delivering_the_circular_economy_A_toolkit_for_policymakers.pdf (English)

The Danish case study, *Potential for Denmark as a circular economy*⁴¹, demonstrated that the circular economy has a positive effect on GDP, employment and the environment while highlighting significant opportunities to be unlocked in Denmark.

- 12) **MATChE**⁴² is a research project aimed at supporting Danish industry in the transition to Circular Economy (CE). MATChE aims to assess the industry's current readiness for CE and works to establish effective transition paths for CE based on this, which can lead to increase the industry's competitiveness, growth and job creation. This effort is supported through the MATChE platform, where knowledge, tools and guidance for the transition is provided.

Seeking synergies with other policy areas

Denmark has put some initiatives in place that deliberately seek to create synergies and co-benefits between resource efficiency, the circular economy, and other policy areas.

One example of synergies sought between policies on environmental impact reduction/resource efficiency and policies on growth/job creation is the **Green Development and Demonstration Programme (GUDP)** for the food and agriculture sector⁴³. The GUDP is a business support scheme to solve challenges for the food industry and society. The challenges are to achieve greater sustainability while solving some of the climate and environmental problems facing society, as well as ensuring that the economy continues to improve, so that the food sector can generate growth in Denmark and secure jobs which support, for example, the transition of businesses to resource-efficient production and other waste prevention.

Denmark signed the two **Amsterdam Declarations** in December 2015 at a global value chain conference held by the Netherlands prior to their EU Presidency. The focus of the two declarations is: 1) eliminating deforestation from agricultural commodity chains with European countries; and 2) support for a fully sustainable palm oil value chain by 2020.

In addition to Denmark, France, Germany, the Netherlands, Norway and the United Kingdom signed the declarations.

As examples of Danish efforts contributing to the fulfilment of the objectives of the Amsterdam Declarations, the Ministry of Environment and Food participates in a Palm Oil Task Force under the Confederation of Danish Industry, which aims to increase demand for responsibly produced and certified palm oil. In addition to this, the Ministry of Environment and Food has ongoing dialogues with other companies and trade associations about the responsible sourcing of raw materials by the food industry, focusing particularly on soy and palm oil.

The Ministry of Environment and Food has regularly commissioned research reports on soy and palm oil from Aarhus University and the University of Copenhagen, aiming at establishing a credible knowledge base for all key stakeholders on the challenges and possible solutions (including their credibility and expected costs). One example of a report in English is: *Soy and palm oil – Certification schemes for documenting production sustainability*⁴⁴.

The Ministry of Foreign Affairs supports sustainable forest management and the elimination of illegal logging through various initiatives. For example, Denmark supports the effort of IDH Sustainable Trade to promote sustainability in global value chains.

⁴¹ https://www.ellenmacarthurfoundation.org/assets/downloads/government/20151113_DenmarkCaseStudy.pdf (English)

⁴² <https://www.matche.dk/en/> (English)

⁴³ <http://lfst.dk/tvaergaende/forskning/groent-udviklings-og-demonstrationsprogram-gudp/> (Danish)

⁴⁴ <http://web.agrsci.dk/djfpublikation/djfpdf/dcarapport-38.pdf> (English)

Public procurement of sustainable wood⁴⁵. A new government circular and guide to the public procurement of wood came into force on 1 July 2014. In state procurement, all furniture, office supplies, paper and raw wood must come from sustainably managed forestry.

Ecolabels. Both the EU Ecolabel, the Flower, and the Nordic Ecolabel, the Swan, contain criteria that seek sustainable sourcing, for example from sustainable forest management of wood and paper products. Another area is textile and textile-related products with regard to more sustainably produced fibres (cotton, wool or other natural fibres), for example organic cotton or wool, or cotton or wool produced using less pesticide.

Resource efficiency and circular economy policy initiatives from subnational to local level

The Central Denmark Region is a front-running region on the circular economy in Denmark. It is proactively promoting and spreading knowledge of the potential of a circular economy as a means of addressing global challenges and resource scarcity. This gives rise to new product and service design, new payment models and alternative partnership models for public and private players.

The region has implemented a number of support programmes for SMEs regarding resource efficiency and circular economy. The **Rethink** business programme⁴⁶ has supported SMEs in developing new business models for the circular economy and the **Design for Disassembly** programme is currently supporting SMEs in designing their products for a circular economy.

The region is now working on initiatives addressing a more systemic approach. One of these aims to ensure that stakeholders along a material stream cooperate in order to enhance the circular economy, as creating value for all stakeholders along a material stream is crucial to unlocking the potential of the circular economy. The initiative addresses stakeholders from procurement, manufacture and logistics, users and recyclers. The methodology looks at one selected material stream, plastic packaging at hospitals, in order to develop building blocks for a new business model that enhances a focus on the circular economy.

The project is based at Aarhus University Hospital and works with the hospital and its suppliers as a living lab. The first step has been to analyse the plastic packaging found at the hospital and to identify suppliers. The results were used to gain an insight into which hazardous or other materials needed to be replaced to make a higher profit from recycling. As the main suppliers of medical equipment are international companies, the dialogue with suppliers and the analyses of the environmental impact is carried out at four levels: Aarhus University Hospital; Denmark as a whole; the EU28; and globally. The results have already had an impact on tenders at a national level.

The initiative will run for three years during which a variety of methods will be tested to ensure that the methodology can be scaled up to other areas and material streams⁴⁷.

Another initiative is addressing Circular City Innovation in three areas: new materials and methods, reuse of materials and new ways of cooperating in the built environment.

The municipality of Samsø is self-sustaining in renewable energy and has adopted the vision of becoming circular by 2027. Its main focus is on the biological circle⁴⁸. The municipality has a roadmap, a list of principles and goals in their public procurement policy, and a range of specific initiatives including the

⁴⁵ <https://www.retsinformation.dk/Forms/R0710.aspx?id=164028> (Danish) and <https://www.retsinformation.dk/Forms/R0710.aspx?id=164102> (Danish)

⁴⁶ <http://rethinkbusiness.dk/> (Danish)

⁴⁷ <http://www.auh.dk/presse/information-om-auh/nyheder/2017/aarhus-universitetshospital-til-kamp-mod-plastaffald/> (Danish) and film website: <https://www.youtube.com/watch?v=msmJ-URhVAo> (Danish)

⁴⁸ <https://www.visitsamsøe.dk/en/inspiration/waste-becomes-important-part-islands-circuit/> (English)

training of all the businesses in the municipality. Citizens have been involved in developing the initiatives for obtaining a circular bioeconomy⁴⁹.

At **Kalundborg Symbiosis** public and private companies buy and sell waste from each other in a closed cycle of industrial production⁵⁰. A variety of by-products are traded, such as steam, ash, gas, heat and sludge that can be physically transported from one company to another.

Driven by increased costs of materials and energy for businesses, exchanges between companies are initially assessed on the basis of economic gains in saving resources or money.

Kalundborg Symbiosis is the world's first well-functioning example of industrial symbiosis and, within the academic discipline of industrial ecology, has become a textbook example of effective resource saving and cycling of materials in industrial production.

The vision for Kalundborg Symbiosis is to be a world champion in circular production. New investments in renewable energy, biogas plants, heat pumps, etc., will power Kalundborg Symbiosis by renewable energy in 2019. A new report about regional growth demonstrated that the increase in added value by companies in Kalundborg is considerably higher than the average for the country. From 2011–2015 added value increased by 32 per cent for companies in Kalundborg on average, while it was 4 per cent for Denmark in general⁵¹.

Other resources

Examples of policies which go beyond “material resources”

Initiatives on water efficiency in production are included in the Growth Plan for Water, Bio and Environmental Solutions (March 2013). In November 2012, the Growth Team for Water, Bio and Environmental Solutions presented its recommendations, and in the wake of this, a Growth Plan for these areas was developed in early 2013. The Growth Plan contains a total of 40 main initiatives. As many of these consist of several sub-components, a total of 88 initiatives were to be followed up. Almost all these were either implemented in 2013 as described in the Growth Plan or are currently being implemented⁵².

In Denmark Without Waste there is a target to recycle 80 per cent of the phosphorus in sewage sludge. Utilisation of resources from wastewater is stipulated in the Danish Water Sector Act, so that water companies can invest in resource utilization⁵³.

The way forward

Reflections on future directions of policies on resource efficiency and circular economy

The business community is the main driver for the circular economy/resource efficiency. The role of policy makers is mainly to create enabling conditions and set the direction of a transition to the circular economy. The Strategy for Circular Economy (see section Dedicated national strategies or roadmaps for material resource efficiency and for circular economy) will be setting the direction of the circular economy in Denmark.

⁴⁹ Film website: <https://vimeo.com/211159294> (English)

⁵⁰ <http://www.symbiosis.dk/en/> (English)

⁵¹ https://issuu.com/vaeksthus/docs/v_kstvilkr_2017_-_kalundborg (Danish)

⁵² <https://www.regeringen.dk/tidligere-publikationer/danmark-i-arbejde-vaekstplan-for-vand-bio-miljoeloesninger/> (Danish)

⁵³ <https://mst.dk/affald-jord/affald/affaldsfraktioner/spildevandsslam/> (Danish)

Although many of the circular economy opportunities identified in Denmark have sound underlying profitability, there are often non-financial barriers either limiting further scale-up or holding back the pace of development. Both policy makers and industry players can play important roles in helping businesses overcome these barriers. To this end, close collaboration is needed between governmental bodies, businesses and other societal stakeholders, including citizens and consumers, labour unions, environmental organisations and the scientific and educational community who should be engaged.

In a Danish context the key barriers to implementation of a circular economy are the unintended consequences of existing regulations, such as interpretations of import/export regulations for waste; social factors such as a lack of experience among companies and policymakers to detect and take advantage of circular economy opportunities; market failures such as imperfect information, including for businesses to repair, disassemble and remanufacture products; and unaccounted, negative externalities including carbon emissions.

Denmark has taken the first initiatives to overcome some of these barriers, for example the Task-Force for Increased Resource Efficiency (see section Policies which include elements of material resource efficiency).

In many cases, EU-level policy interventions are needed to complement national Danish policies, as the value chains of many sectors extend across borders. Product policy and promoting the market for secondary raw materials are just two examples that should be coordinated at the European level in order to simplify and reduce the cost of doing (circular) business.

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