

Circular economy country profile 2024 – Denmark



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Introduction

The European Commission requested the EEA to produce EU country profiles that offer an updated view of the following elements:

- what circular economy policies are being implemented at a national level with a particular focus on elements that go beyond EU mandatory elements, and
- what are best practices with a focus on policy innovation.

With the EU Circular Economy Action Plan (CEAP 2020) "the Commission [...] encourages Member States to adopt or update their national circular economy strategies, plans and measures in the light of its ambition".

These country profiles originate in the work leading to the EEA More from less report (2016)¹, that presented an overview of approaches to material resource efficiency and to circular economy in thirty-two European countries. The More from Less report was followed by the 2019 EEA Report 'Resource efficiency and the circular economy in Europe 2019 – even more from less: An overview of the policies, approaches and targets of 32 European countries'².

It presented an updated and extended assessment of approaches and identified trends, similarities and new directions taken by countries in the connected policy areas of resource efficiency and the circular economy.

These reports, comprising a compilation of extensive survey responses from countries, were accompanied by 32 country profiles.

In the second quarter of 2022 a new survey with questions and guidelines was launched. Based on information reported by the Eionet network, in particular, the Eionet Group on Circular Economy and Resource Use, and after review and editing by the European Topic Centre on Circular economy and resource use (ETC CE), the 30 2022 CE country profiles³ were published alongside the EEA report 'Circular Economy policy innovation and good practice in Member States'⁴ (2022).

These 2024 CE country profiles are an update of the 2022 ones and based on the responses of 29 countries to the survey questions and guidelines that were launched in March 2024. The information in the countries' responses was again reviewed and edited by the European Topic Centre on Circular economy and resource use. A selection of Eurostat data was made to further complement these country profiles.

The main objectives of these assessments and its updates are to: • stimulate exchange of information and share good practice examples among country experts; • support policymakers in Eionet countries, the European institutions and international organisations by providing an updated catalogue of circular economy actions being undertaken in European countries.

This circular economy country profile is based on information reported by the Eionet network and, in particular, the Eionet Group members on Resource Efficiency and Circular Economy in the second quarter of 2024. Proposals for the further development or amendment of policies represent the view of the reporting country. For Denmark, all input was provided by the Danish Ministry of Environment. The information was reviewed and edited by the European Topic Centre on Circular economy and resource use. A selection of Eurostat data was made to further complement this country profile.

¹ [More from less – material resource efficiency in Europe – European Environment Agency \(europa.eu\)](https://europea.europa.eu/en/press-releases/2016/06/16-06-2016)



² [Resource efficiency and the circular economy in Europe 2019 – European Environment Agency \(europa.eu\)](https://europea.europa.eu/en/press-releases/2019/06/19-06-2019)

³ [Country profiles on Circular Economy in Europe – Eionet Portal \(europa.eu\)](https://europea.europa.eu/en/press-releases/2022/06/22-06-2022)

⁴ [draft-report-for-dg-env_final.pdf \(europa.eu\)](https://europea.europa.eu/en/press-releases/2022/06/22-06-2022)

The information is current as of September 2024, when members of Eionet verified the content of this profile.

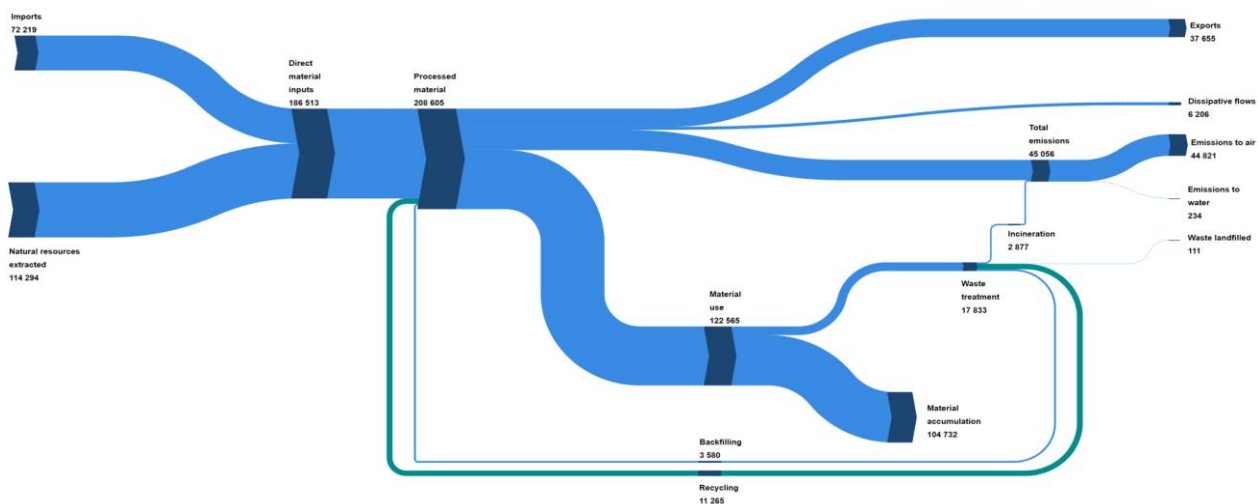
Denmark – facts and figures

| | |
|--|--|
|   | <p>GDP: EUR 376.4 billion (2.2 % of EU27 total in 2023)</p> |
| | <p>GDP per person: EUR 63,290 (purchasing power standard) (127.9 % of EU27 (from 2020) total per person)</p> |
| | <p>Use of materials (domestic material consumption (DMC)) 148.9 million tonnes DMC (2.3 % of EU27 total in 2022) 25.2 tonnes DMC/person (177.2 % of EU27 average per person in 2022)</p> |
| | <p>Structure of the economy (2023): Agriculture: 0.9 % Industry: 26.5 % Services: 72.7 %</p> |
| | <p>Employment in circular sectors: 36,207 people employed in CE sectors (0.8 % of EU total in 2021) People employed expressed as a percentage of total employment: 1.2 % (compared to 2.1 % for EU average in 2021)</p> |
| <p>Surface area: 42,924 square kilometres (1.0 % of EU27 total)</p> | |
| <p>Population: 5,932,654 (1.3 % of EU27 total in 2023)</p> | |

Note: all definitions and metadata used in this profile are taken, as shown, from Eurostat

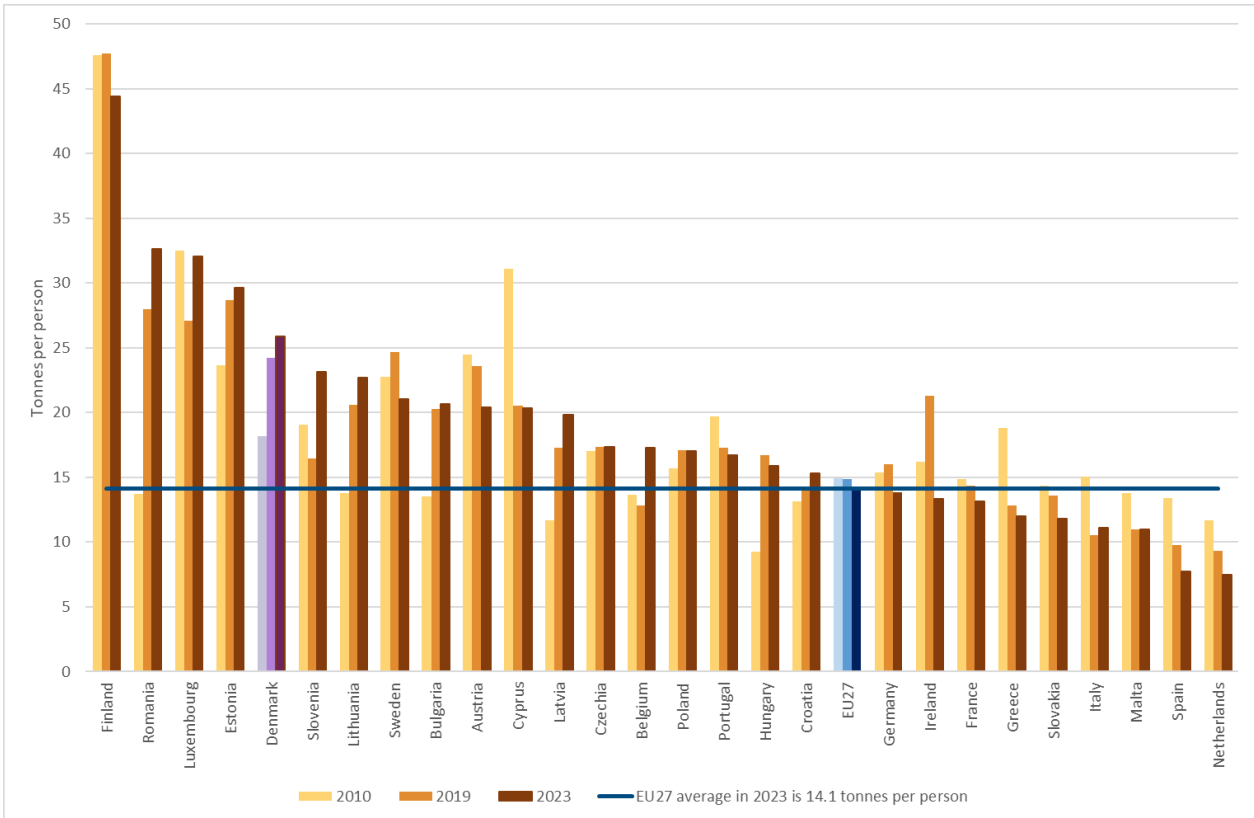
Source: Eurostat datasets, EU27 2022 EU27 2022 and EU27 2023 (accessed 21 August 2024)

Figure 1 Material flow diagram for Denmark in 2022, thousand tonnes



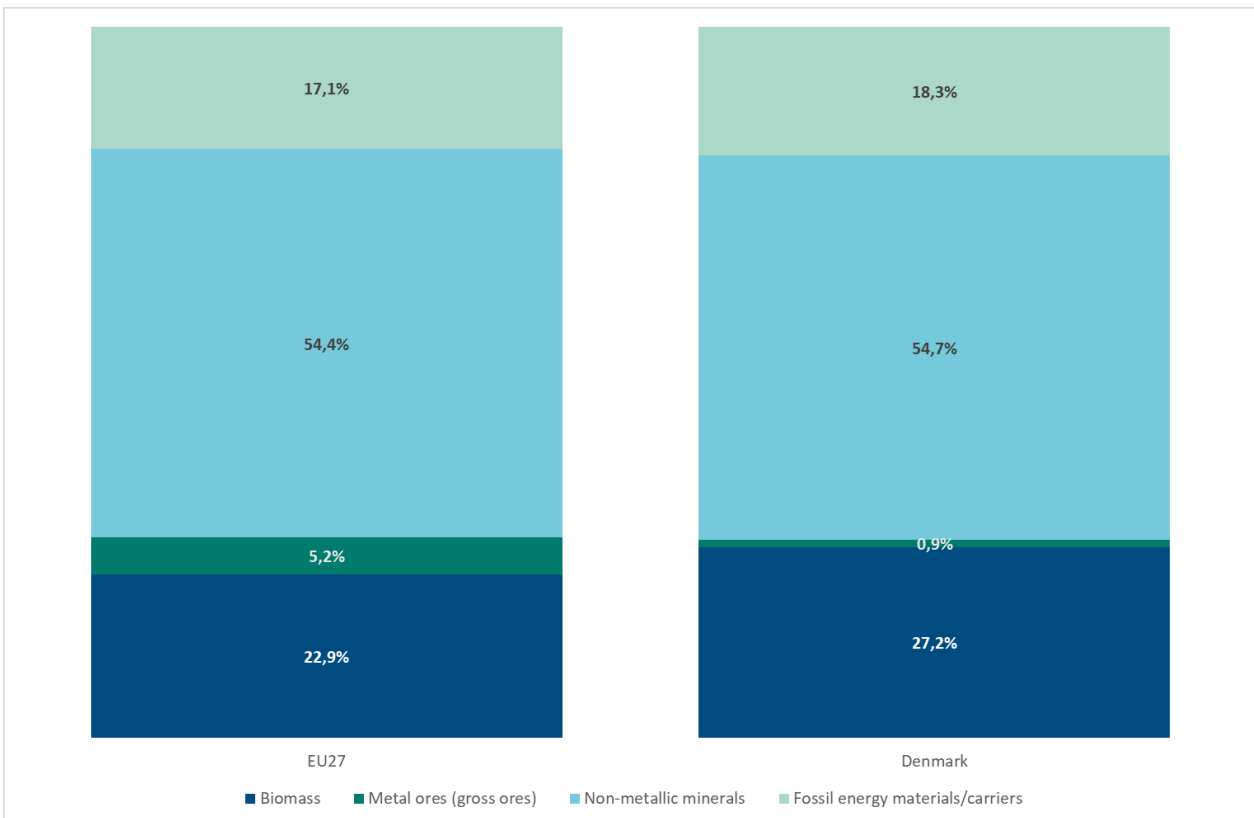
Source: Eurostat (2024) [env_ac_mfa], [en_ac_sd], [env_wassd] (accessed 21 August 2024)

Figure 2 Material footprint (raw material consumption), 2010,2019 and 2022, tonnes per person



Source: Eurostat (2024) [env_ac_rme] (accessed 21 August 2024)

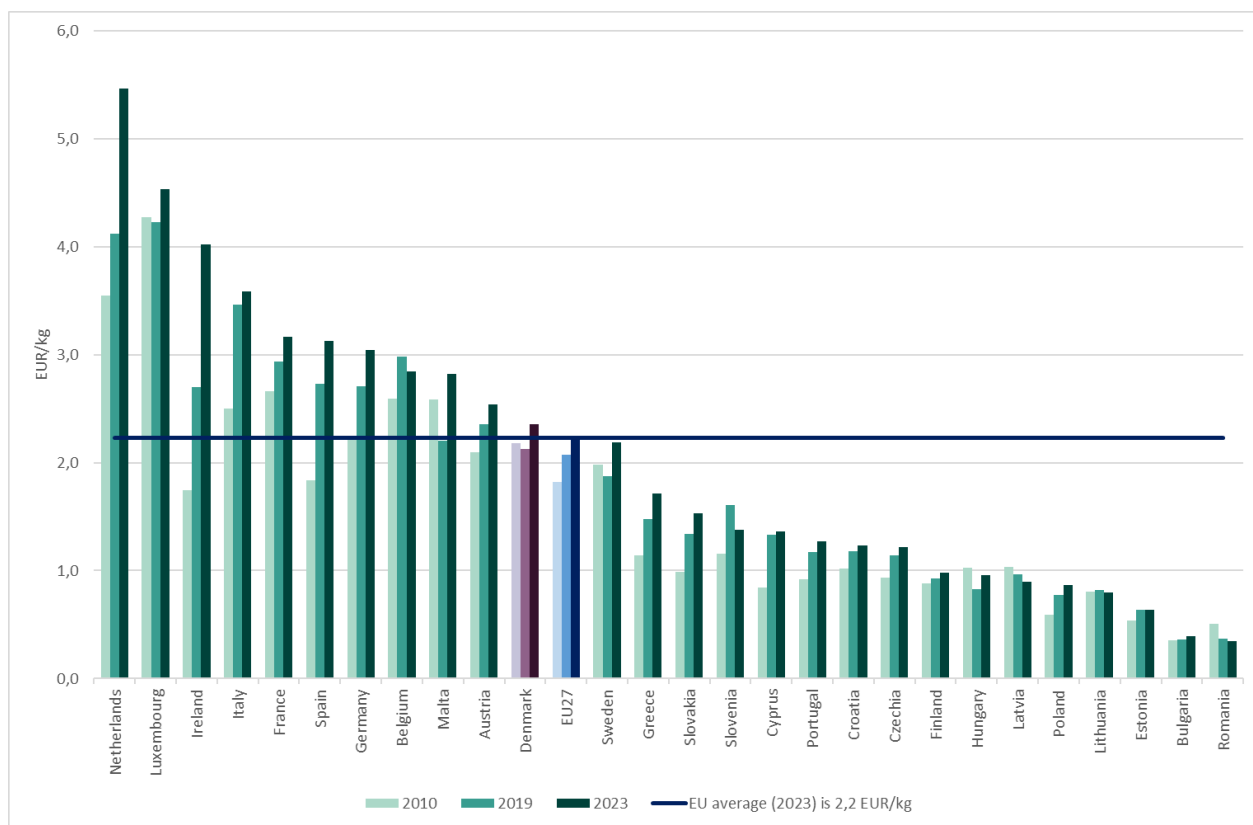
Figure 3 Domestic material consumption by selected material category, EU and Denmark, 2022, per cent



Note: totals may not sum to 100 % due to rounding

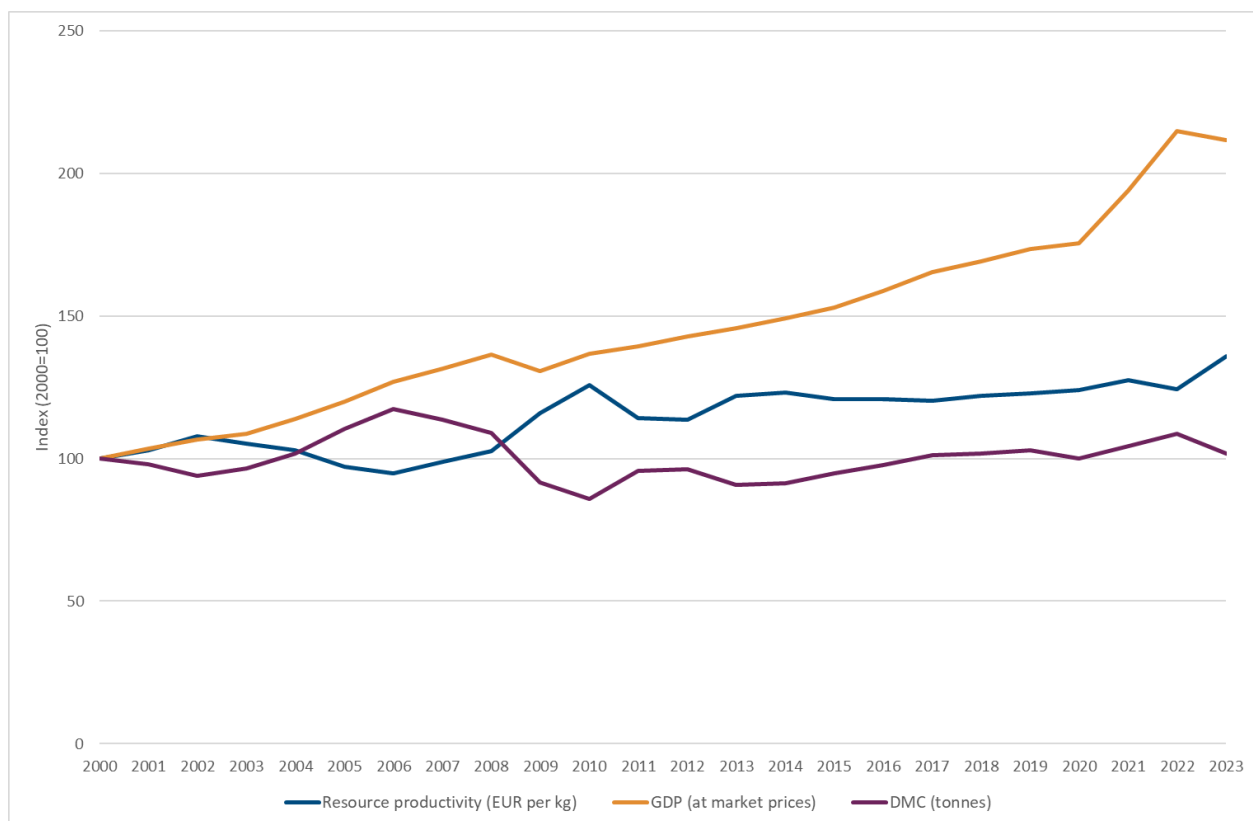
Source: Eurostat (2024) [env_ac_mfa] (accessed 21 August 2024)

Figure 4 Resource productivity (gross domestic product/domestic material consumption), EU27, 2010, 2019 and 2022, EUR per kilogramme



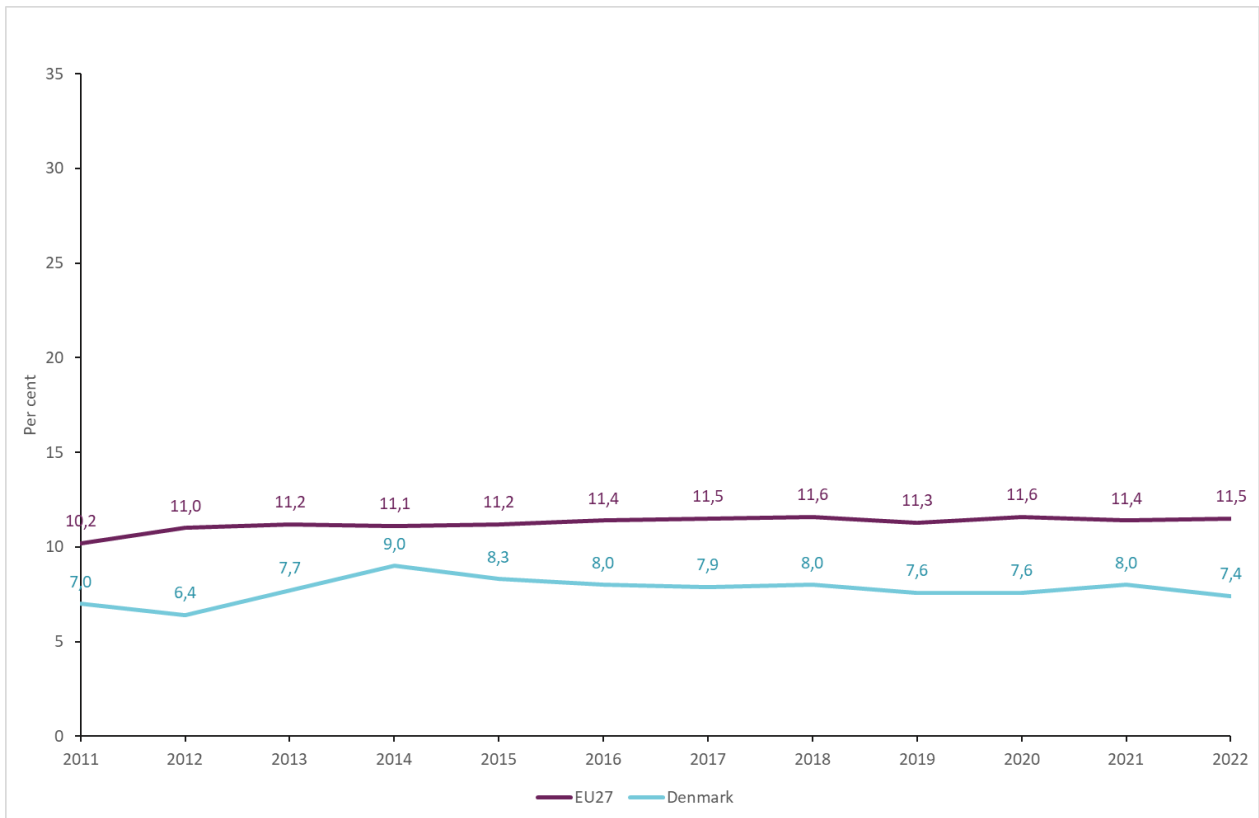
Source: Eurostat (2024) [env_ac_rp] (accessed 21 August 2024)

Figure 5 Gross domestic product, domestic material consumption and resource productivity trends, Denmark, 2000–2022, index (2000=100)



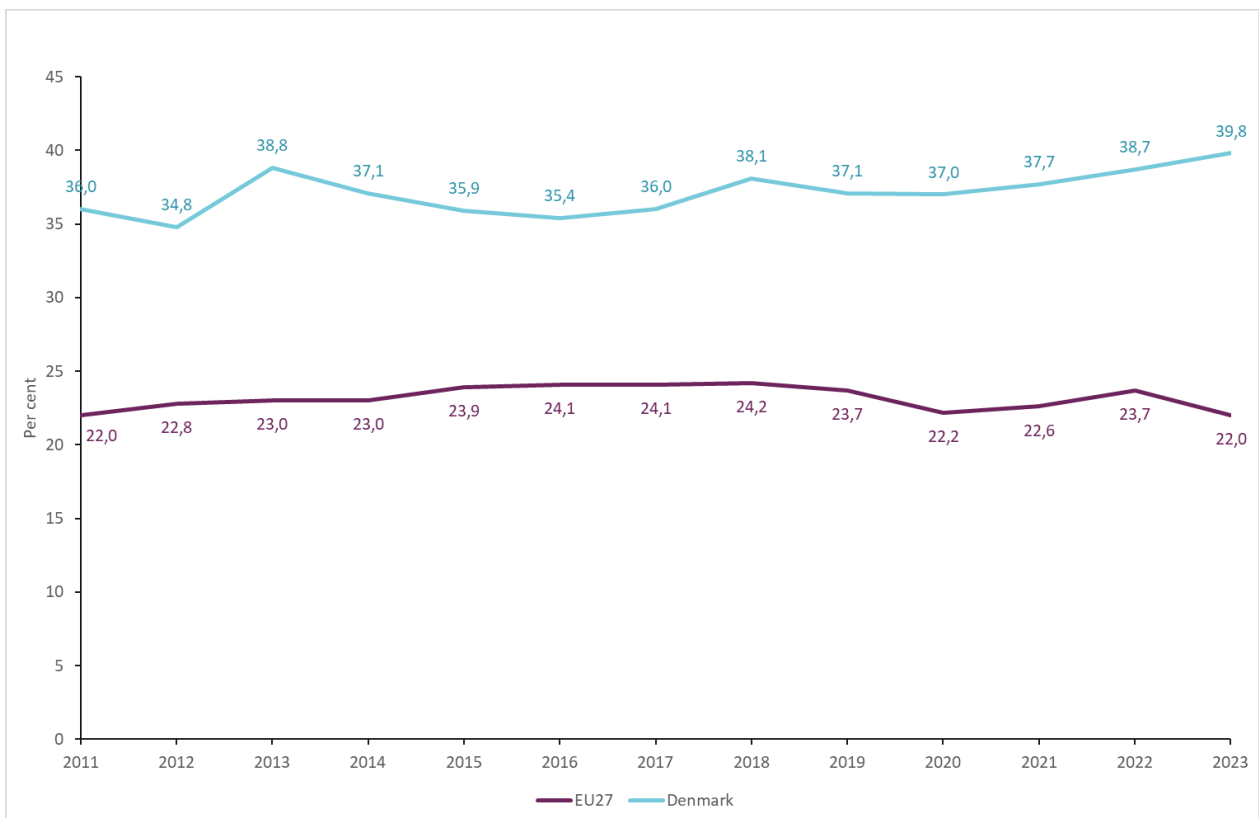
Source: Eurostat (2024) [env_ac_mfa], [env_ac_rp] & [nama_10_gdp] (accessed 21 August 2024)

Figure 6 Circular material use rate in Denmark, 2011–2022, per cent



Source: Eurostat (2024) [env_ac_cur] (accessed 21 August 2024)

Figure 7 Material import dependency in Denmark, 2011-2022, per cent



Source: Eurostat (2024) [cei_gsr030] (accessed 21 August 2024)

Existing policy framework

Dedicated national and/or regional and/or local strategy, roadmap or action plan for circular economy

The [Danish Government's Action Plan for Circular Economy](#) (from July 2021, in Danish) constitutes the national plan for the prevention and management of waste for 2020-2032. The Action Plan describes the Danish targets, indicators, policies and initiatives along the entire circular value chain, from design through consumption to waste from which natural resources are recycled into new products and materials. In addition to several initiatives along the value chain in general, the Action Plan focusses on three areas with significant environmental and climate impact: **biomass, construction and plastics**. The Action plan for Circular Economy contains 129 national initiatives – many of which are still under implementation. At the time of data collection, 79 initiatives had been completed, 20 were on schedule, 29 were delayed, and 1 had been cancelled.

A new initiative that has been implemented is the mandatory door-to-door collection of household textile waste in all Danish municipalities from 1 July 2023. Denmark has chosen to introduce this ahead of the EU-requirement for 2025, and with a door-to-door collection or similar collection systems close to the households in order to maximize the impact on recycling.

In Denmark, many of the initiatives regarding circular economy and waste prevention are housed in other ministries than the Ministry of Environment. The Danish Government's Action Plan for Circular Economy has initiatives run by 7 different ministries. This contributes to a **broad collaboration of actors and sectors**. There is still room for improvement in terms of adapting the institutional set-up to mainstream circularity further across sectors and actors.

A noteworthy successful approach includes the new environmental and climate-economic-CGE-model “Green Reform” that has been developed by the Danish Government⁵. The model will be used to assess the environmental impact of economic activity as well as the economic effects of environmental, energy and climate policies. Underpinning the impact assessments in GreenReform is an LCA-based model, which will enable the projections on the circular economy under different policy and technology scenarios. The model is dependent on Green National Accounts (following the UN standard) and is anchored in the Ministry of Finance – in cooperation with the relevant ministries (such as Environment, Food, Climate and Transport).

Circular Cities

The Region of Central Denmark has participated in the Circular Cities And Regions Initiative (CCRI). In addition, many Danish municipalities are ambitious when it comes to circular economy. For example, the municipality of Copenhagen has set circular economy targets in their “Resource and Waste Plan” for 2024⁶.

⁵ <https://fm.dk/nyheder/nyhedsarkiv/2020/oktober/danmark-i-spidsen-for-internationalt-samarbejde-om-groenne-regnemodeller/> (in Danish)

⁶ <https://www.kk.dk/politik/politikker-og-indsatser/klima-og-miljoe/cirkulaer-koebenhavn-ressource-og-affaldsplan> (in Danish)

The draft-version of the 2030-plan for Copenhagen is available at https://www.kk.dk/sites/default/files/agenda/4c2ace22-b3ad-4eae-8a00-7fea405ffd51/c9f94d92-06ad-4320-8c91-e6022246f487-bilag-2_0.pdf (in Danish)

Circular economy policy elements included in other policies

| Circular economy policy element | Included in policy |
|--|---|
| <p>Streamlined pictogrammes, sorting criteria and collection schemes for household waste, including:</p> <ul style="list-style-type: none"> - Mandatory waste pictograms for collection bins. - Mandatory sorting criteria for ten fractions of household waste. - Public and private companies are also obliged to use the same pictograms and sorting criteria for their municipal waste. - Door-to-door collections have become mandatory for ten waste fractions – food, paper, cardboard, glass, metal, plastics, food and drink cartons, textiles, hazardous waste and residual waste. | <p>Climate Plan for a Green Waste Sector and Circular Economy (in Danish)</p> |
| <ul style="list-style-type: none"> - 15 initiatives to support the reduction of food waste - The initiatives are divided in the following 4 tracks: involvement of actors and simplification of rules across the food value chain; more knowledge on effective means of action; communication and access to tools; international engagement | <p>Denmark’s national food waste strategy 2024-2027 (in Danish)</p> <p>Summary of strategy and launch (in Danish)</p> |
| <p>New requirements (01/07/24 + 1 year transition period) on selective demolition when demolishing buildings with a size of 250 m² or more. The requirements include planning, a mapping of resources, and specific competencies.</p> | <p>Climate Plan for a Green Waste Sector and Circular Economy (in Danish)</p> |
| <ul style="list-style-type: none"> - Update the Building Regulations with elements from the voluntary sustainability standard - Introduce increasing limit values for climate footprint from buildings - Develop the existing Danish LCA- and LCC-tools for buildings into design-tools | <p>The National Strategy for Sustainable Construction (in Danish)</p> |
| <ul style="list-style-type: none"> - Mandatory use of ecolabels in state procurement for specific product groups. - Mandatory use of total cost of ownership in state procurement for specific product groups. | <p>National Strategy for green public procurement</p> |
| <p>A new environmental and climate-economic model, Green Reform has been developed. The model will be used to assess the environmental impact of economic activity as well as the economic effects of environmental and climate policies. Underpinning the impact assessments in GreenReform is an LCA based model, which will enable the projections on the circular economy under different policy and technology scenarios.</p> | <p>Green national accounts (modelling of environment-economy linkages)</p> |

Monitoring and targets

Assessment of circular economy performance

The European Commission has set up a [monitoring framework](#) to keep track of progress towards a circular economy. This framework provides a holistic view as it:

- measures direct and indirect benefits of 'becoming circular' and
- values the contribution of a circular economy in living well within the limits of the planet
- addresses energy and material supply risks.

It consists of **5 thematic sections** with a total of **11 statistical indicators**, some of which have additional sub-indicators. In some cases policy targets exist which should be achieved in the future, and the indicators monitor progress towards these targets. The current monitoring framework is a revision of the original framework which was set up in 2018.

This section elaborates on the assessment of Denmark its progress in terms of observed trends over the last 5 years and what country characteristics or policy actions may explain differences between the country its performance and the average EU performance.

Production and consumption:

- Material footprint has increased at a higher rate in 2021 compared to a more steady increase in the previous years. It continues to be above the EU average.
- Waste generation has remained relatively steady and decreased from 2018-2022⁷.

Waste management:

- The recycling rate of municipal waste has been increasing steadily, however between 2019-2022 there have been some fluctuations. It is slightly higher than the EU average.

Secondary raw materials:

- The circular material use rate is slightly decreasing, and below the EU average.

Competitiveness and innovation:

- Data for indicators related to private investments, persons employed and gross value added show a relatively steady state in recent years.

Global sustainability and resilience:

- The consumption footprint has remained relatively stable between 2018-2021, but increased relatively more in 2021. It is higher than the EU average.
- GHG emissions from production activities have been steadily decreasing, with a small spike in 2020. It lies above the EU average.
- The material import dependency has remained stable, but is also higher than the EU average.

What may explain differences between Denmark's performance and average EU performance:

- High recycling rates (relative to the EU average) can be linked to increasing curbside collection of more fractions of household waste by municipalities.
- The high material and consumption footprint may be linked to (amongst other factors) high income levels and associated high consumption levels. This may also link to the relatively high material import dependency in Denmark.

Circular economy monitoring frameworks and their indicators beyond the ones from Eurostat

The Danish circular economy monitoring framework ⁽⁸⁾ (including indicators and targets) is presented in Table 1.

⁷ According to the latest waste statistics on page 8, available at:

<https://www2.mst.dk/Udgiv/publikationer/2024/08/978-87-7038-639-5.pdf> (In Danish)

⁸ <https://mim.dk/media/12ppwzvm/alle-faktaark-engelsk-nyeste.pdf>

Key:

| | |
|----------------|---|
| bil. | billion (10 ⁹) |
| mil. | million (10 ⁶) |
| kg | kilogram |
| DMC | domestic material consumption |
| WEEE | waste electrical and electronic equipment |
| m ³ | cubic metres |
| DGNB | Deutsche Gesellschaft für Nachhaltiges Bauen |
| LEED | Leadership in Energy and Environmental Design |
| BREEAM | Building Research Establishment Environmental Assessment Method |

Unverified translations of the table below are included in the annex.

| Målsætninger og indikatorer | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | EU-mål |
|---|---------|---------|---------|---------|---------|---------|---|
| Affaldssektorens samlede CO ₂ e udledning (mio. tons) | 2,5 | 2,5 | 2,4 | 2,4 | 2,4 | 2,4 | - |
| Mindre affald og bedre udnyttelse af naturressourcerne | | | | | | | |
| Mængden af husholdningsaffald og lignende affald fra andre kilder (Municipal Waste) per indbygger (kilo) | 798 | 779 | 774 | 807 | 813 | 754 | - |
| Materialeforbrug (RMC per indbygger) (tons) | 23,3 | 22,9 | 23,2 | 24,2 | 25,7 | 26,7 | - |
| Ressourceproduktivitet (BNP/RMC) (2010 kr. per kilo) | 14,91 | 15,55 | 15,56 | 15,05 | 13,80 | 14,13 | - |
| Antallet af svanemærkede produkter og services | >11.000 | >12.500 | >14.500 | >16.500 | >18.500 | >21.000 | - |
| Omsætningen af svanemærkede produkter og services (mia. kr.) | 8,3 | 8,3 | 8,7 | 9,1 | 9,6 | 13,9 | - |
| Andelen af genanvendelse (og anden endelig materialenyttiggørelse) i det indenlandske materialeforbrug (DMC) | 8,0% | 7,9% | 8,0% | 7,6% | 7,6% | 8,0% | - |
| Klimaaftryk af offentlige indkøb (mio. tons CO ₂ e) | - | - | - | 14,3 | 15,1 | 16,0 | - |
| Alle offentlige indkøb skal være miljømærkede i 2030 | | | | | | | |
| - | | | | | | | |
| Mere og bedre genanvendelse | | | | | | | |
| Genanvendelsen af husholdningsaffald og lignende affald fra andre kilder (Municipal Waste) | - | - | - | - | - | 46% | >55% i 2025 >60% i 2030 >65% i 2035 |
| Deponi af husholdningsaffald og lignende affald fra andre kilder (Municipal Waste) | 1% | 1% | 1% | 1% | 1% | 1% | <10% i 2035 |
| Genanvendelse af emballageaffald | - | - | - | 62% | 63% | 65% | >65% i 2025 >70% i 2030 |
| Genanvendelse af glasemballageaffald | - | - | - | 82% | 84% | 84% | >70% i 2025 >75% i 2030 |
| Genanvendelse af papir- og papemballageaffald | - | - | - | 69% | 69% | 71% | >75% i 2025 >85% i 2030 |
| Genanvendelse af jern- og metalleemballageaffald | - | - | - | 61% | 65% | 66% | >70% i 2025 >80% i 2030 |
| Genanvendelse af aluminiumsemballageaffald | - | - | 70% | - | 70% | 77% | >50% i 2025 >60% i 2030 |
| Genanvendelse af træemballageaffald | - | - | 42% | 88% | 88% | 88% | >25% i 2025 >30% i 2030 |
| Genanvendelse eller forberedelse med henblik på genbrug af udtjente køretøjer | 89% | 92% | 90% | 95% | 95% | 83% | >85% |
| Indsamlet til genanvendelse, forberedelse med henblik på genbrug eller anden nyttiggørelse af udtjente køretøjer | 97% | 100% | 98% | 103% | 103% | 94% | >95% |
| Særskiit indsamling af elektronikaffald (WEEE) | 58% | 59% | 57% | 63% | 53% | 50% | >65% |
| Bærbare batterier (DPA) | - | - | 49% | 55% | 59% | 56% | >45% |
| Reducere mængden af marint affald væsentlig | | | | | | | |
| - | | | | | | | |
| Mere værdi fra fornybare råvarer | | | | | | | |
| Andelen af biomasse i det indenlandske materialeforbrug (DMC) | 31% | 32% | 29% | 31% | 31% | 30% | - |
| Mængden af genanvendt bioaffald (kilo per indbygger) | 198 | 196 | 194 | 206 | 209 | 208 | - |
| Genanvendelse for fosfor fra spildevand og spildevandsslam | 73% | 73% | 76% | 67% | 72% | 74% | - |
| Reducere mængden af madaffald i alle led af værdikæden for fødevarer | | | | | | | |
| Mængden af madaffald fra primærproduktion (1000 tons) | - | - | 59 | - | 66 | 56 | - |
| Mængden af madaffald fra fødevarerindustri (1000 tons) | - | - | 529 | - | 597 | 608 | - |
| Mængden af madaffald fra detail og engros (1000 tons) | - | - | - | 99 | 100 | 100 | - |
| Mængden af madaffald fra restauranter (1000 tons) | - | - | 71 | - | 63 | 72 | - |
| Mængden af madaffald fra husholdninger (1000 tons) | - | 456 | - | - | 461 | 507 | - |
| Reducere miljøbelastningen fra byggeri og nedrivning | | | | | | | |
| Mængden af indvundne mineralske råstoffer på land og hav inkl. nyttiggjort materiale (1000 m ³) | 28.886 | 30.560 | 31.051 | 29.847 | 33.216 | 33.472 | - |
| Andelen af byggeri, der er eller har en igangværende certificering med svanemærket, DGNB, LEED eller BREEAM certificeringsordninger | - | 7% | 16% | 29% | 32% | 43% | - |

| | | | | | | | |
|---|-----|-----|-------|-----|-----|-----|----------------------------|
| Genanvendelse eller forberedelse med henblik på genbrug af bygge- og anlægsaffald | - | - | 38% | 34% | 33% | 36% | - |
| Genanvendelse, forberedelse med henblik på genbrug eller anden endelig materialenyttiggørelse af bygge- og anlægsaffald | 85% | 85% | 89% | 87% | 87% | 86% | >70% |
| Reducere forbruget og forbedre genbrug og genanvendelsen af plastik | | | | | | | |
| Mængden af markedsført plastikemballage (1000 tons) | 215 | 201 | 248 | 217 | 234 | 227 | - |
| Mængden af visse engangsplastikprodukter (tons) | - | - | 6.272 | - | - | - | - |
| Genanvendelse af plastemballageaffald | | | 14% | 20% | 23% | 23% | >50% i 2025 >55% i 2030 |
| Andelen af genanvendt plastik i nye plastikflasker | - | - | - | 28% | 33% | 52% | >25% i 2025 >30% i 2030 |
| Særskilt indsamling af plastikflasker | - | - | - | 94% | 96% | 95% | >70% i 2025 >90% i 2029 |

There are no current plans to develop more indicators, and they do not include social aspects. The results of the monitoring will be published once every year on the Ministry of Environment's website.

Circular economy targets

Denmark works to ensure compliance with quantitative targets set by the EU. As such, there are no national quantitative targets.

Denmark is still awaiting data that can showcase the effects of the newly harmonised waste management system on recycling, which has been gradually implemented from 2021 to 2023.

Furthermore, Denmark's status on reaching the EU-defined circular economy targets is currently being calculated using the new EU recycling rate methodology where technical adjustments are still being made.

Innovative approaches and good practices

Examples of public policy initiatives (national, regional or local)

➔ *Good practice example: Green/Circular/Sustainable public procurement*

Mandatory use of ecolabels and total cost of ownership in public procurement ⁽⁹⁾

In 2022 it became mandatory to choose an **eco-labelled product** or a product that meets similar requirements when procuring for the state for product groups where the government assesses that there is adequate competition and no significant price difference. Initially, it will be mandatory for the following products to be eco-labelled or meet similar requirements: paper and printed matter, cleaning and cleaning agents, soap and some hygiene products, standard batteries and indoor painting. The list of product groups with requirements for eco-labelled procurement will be updated once a year and expanded on an ongoing basis.

Furthermore, the government is making it mandatory to use **total cost of ownership (TCO)** as an economic price parameter in connection with state procurement where possible and appropriate. In this way, the focus will shift from the acquisition price to costs throughout a product's life cycle. The requirement will initially apply to the 25 product groups where official tools are available to assess the total cost of ownership. In addition, the government is **strengthening its efforts to develop TCO tools** for even more procurement areas and to make existing tools even more user-friendly.

The two initiatives are implemented through a Statutory Order on environmental and energy considerations in public procurement, which is currently expected to enter into force ultimo 2024. The initiatives aim to reduce the environmental impact of the state's consumption and to contribute to the

⁹ <https://oes.dk/indkoeb/strategy-for-green-public-procurement/>

development and marketing of less environmentally harmful products through the conscious involvement of environmental aspects in procurement.

➔ *Good practice example: Institutional and regulatory arrangements to support the transition towards a resource-efficient CE*

Streamlined pictograms, sorting criteria and collection schemes for household waste ⁽¹⁰⁾

Until recently, Denmark had an unharmonized waste management system in which every local authority designed its own pictograms and collection schemes for household waste, and set up its own sorting criteria. This meant that private waste collectors and waste treatment operators should adapt to different local solutions, which created a fragmented market. This resulted in lack of economies of scale when waste was treated, limited competition, sub-optimal solutions in waste collection and in the communication with citizens.

Since July 2021, pictograms, sorting criteria and collection schemes for household waste have been **streamlined nationally**. The Statutory Order of Waste includes mandatory waste pictograms (for collection bins) and mandatory sorting criteria for ten fractions of household waste. Similar waste from public and private companies are obliged to use the same pictograms and sorting criteria. Door – to door collections has become mandatory for 10 waste fractions (food, paper, cardboard, glass, metal, plastics, food- and drinking cartons, textile, hazardous waste and residual waste). If door – to - door collection is not possible, collection points must be placed within ‘a short walking distance’.

Co-mingling is only allowed in the following combinations:

- paper/cardboard
- metal/glass
- metal/plastics
- metal/plastics/food- and drinking cartons
- plastics/food- and drinking cartons

Green national accounts (modelling of environmental and economic linkages ⁽¹¹⁾

The Danish government has developed GreenReform, a new **environmental and climate-economic CGE-model** (computable general equilibrium model) for the Danish economy. The modelling framework will supplement existing macro-economic models with the aim of an **integrated and consistent assessment** of the environmental and climate effects of economic policies, as well as the socioeconomic effects of environmental, energy and climate policies. The development of GreenREFORM is focused on developing sub-models, which among other things describe the energy, transportation, agriculture and waste management sectors.

On top of these sub-models, a main model is being developed in the form of a CGE-model, which describes the total economic activity in Denmark, and combines the results of the sub-models. GreenREFORM is being designed as a **fully integrated model system**, where all of the sub-models and the main model interact and are solved simultaneously. Thereby, GreenREFORM **shows the impact** on e.g. waste generation and recycling, when implementing a specific economic policy or a policy in e.g. the transportation sector. The model is depending on Green national accounts (following the UN standard) and is anchored in the Ministry of Finance – in cooperation with the relevant ministries (such as environment, food, climate and transport).

¹⁰ <https://mst.dk/affald-jord/affald/affaldsfraktioner/de-ti-affaldsfraktioner/> (in Danish)

¹¹ <https://dreamgroup.dk/economic-models/greenreform>

Report in English:

https://dreamgroup.dk/Media/638493769228252341/Development_of_the_GreenREFORM_model.pdf

There is an ongoing EU-financed project with the Ministry of Finance in Austria, Finland and Italy, as well as national agencies in Belgium and Poland, in order to develop environmental-economic CGE-models inspired by GreenReform¹².

This innovative approach to modelling is being followed closely internationally (¹³).

Decreasing threshold limit values for climate footprint from buildings (¹⁴)

With the National Strategy for Sustainable Construction¹⁵, the Government introduces in the Building Code a decreasing mandatory threshold limit value for **climate footprint for new buildings**. A mandatory threshold limit is introduced for all new buildings from 2025 (¹⁶). From here, the limit value will be introduced gradually according to the indicative proposal below:

-
- From mid-2025: Maximum 7.1kg CO₂e/m²/year (all new buildings)
- From mid-2027: Maximum 6.4kg CO₂e/m²/year (all new buildings)
- From mid-2029: Maximum 5.8kg CO₂e/m²/year (all new buildings)

Examples of private policy initiatives (sectoral)

The State of Green describes how circular economy practices are implemented across various sectors in Denmark (¹⁷). This includes descriptions of specific circular economy solutions(¹⁸), of which 3 will be highlighted in this section.

→ *Good practice example: New business models*

Industrial Symbiosis: a model for Growth in Circular Economy (¹⁹)

Industrial symbiosis is a method for using scarce materials effectively and sustainably, representing a way for companies to lower environmental impact and production expenses.

Through the “Sustainable Synergies” project facilitated by Port of Aalborg, Aalborg University and energy cluster House of Energy, 25 Danish companies have exchanged residual and surplus products such as water, energy, or materials.

The project was designed to improve the competitiveness of SMEs in Aalborg East by developing green business models that would improve energy efficiency and resource efficiency through a facilitated industrial symbiosis. The companies involved in the symbiosis have experienced a range of benefits. For example, an exchange of surplus resources has resulted in direct benefits, such as reduced waste

¹² https://commission.europa.eu/document/download/685c0d7a-353f-4e50-ac02-4328d58ebaa7_en?filename=C_2024_1817_1_EN_annexe_acte_autonome_nlw_part1_v2.pdf page 35-36

¹³ <https://fm.dk/nyheder/nyhedsarkiv/2020/oktober/danmark-i-spidsen-for-internationalt-samarbejde-om-groenne-regnemodeller> (in Danish)

¹⁴ https://im.dk/Media/637602217765946554/National_Strategy_for_Sustainable_Construktion.pdf

¹⁵ <https://www.sbst.dk/Media/638248402790994130/National%20strategi%20for%20b%C3%A6redygtigt%20bygge-ri.pdf> (In Danish)

¹⁶ https://www.sm.dk/Media/638525928477219508/Till%3%a6gsaftale_om_stramning_af_CO2e-krav_til_bygninger.pdf (In Danish)

¹⁷ <https://stateofgreen.com/en/focus-areas/circular-economy/>

¹⁸ <https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/>

¹⁹ [Industrial Symbiosis: a model for growth in the circular economy \(stateofgreen.com\)](https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/)

management and materials procurement costs. Additionally, extra income was generated through product innovation and new products, as well as creating new markets and/or customer groups.

Additionally, several positive environmental results have been achieved:

- Energy consumption was reduced by 11.000 gigajoules
- Materials consumption was reduced by approximately 2.600 tonnes of FE-equivalents
- Each company saved 264 MWh of energy – corresponding to the energy consumption of eight households
- The collaboration contributed to a reduction of annual CO₂ emissions by 10,000 tonnes
- Each symbiosis created reduced CO₂ emissions by 800 tonnes – corresponding to CO₂ emissions of 100 Danish residents

→ *Good practice example for other sector/value chain*

Denmark's first circular social housing project ⁽²⁰⁾

With the building industry responsible for a sizeable amount of global CO₂ emissions (approximately 39% in total), the need for a circular approach to construction and design is required. One way to do so is to recycle or reuse building materials, thereby maximising their lifespan and reusability.

A prime example of this is The Circle House, which is expected to be completed north of the Danish city of Aarhus in 2023. The Circle house project, led by 3XN Architects, is devised to be a **blueprint for circular construction in Denmark**, with 90% of its building material able to be demounted and reused or resold without loss of value.

Additionally, besides using concrete and cement as the main building material, the building project is set to minimize its CO₂ footprint by using alternative materials, such as:

- Cork and old newspapers, that are used for the façade of the buildings
- Eelgrass and granules, which will provide insulation in the buildings
- Used car tyres for the flooring's underlay

Once completed, the Circular House will be the **world's first social housing project constructed according to circular principles**. The hope is that the Circle House will create **valuable learnings** on how circular buildings function in daily life, as well as provide a way of reducing carbon footprint within the construction sector. It is estimated that a circular approach to buildings will reduce CO₂ emissions from materials used in the built environment by 38% by 2050. Furthermore, it is estimated that Denmark has the economic potential in implementing a circular economy in its building industry amounting to approximately € 7.75 billion per annum up to 2035.

Recycling of Wind Turbines ⁽²¹⁾

The turbines of the wind industry's early days are reaching their end of life. Some are life extended while others will be decommissioned during the next years. To combat this problem, the DecomBlades innovation project has committed to try to find a **sustainable way to dispose the wind turbines** with respect to the environment, health and safety of workers. Today, significant progress has been made as the project has succeeded in **extracting and processing high-quality glass fibres**, the principal wind blade component, from retired 37-meter tall wind turbines.

The DecomBlades project is funded by Innovation Fund Denmark with MAKEEN Energy having developed the large-scale pyrolysis test plant. Following the successful quality approval of glass fibres obtained from decommissioned wind turbine blades, the material was subjected to remelting at 3B's facility in Norway

²⁰ <https://stateofgreen.com/en/solutions/denmarks-first-circular-social-housing-project/>

²¹ <https://stateofgreen.com/en/news/new-project-achieves-breakthrough-in-recycling-wind-turbine-blades/>

this past September. In a **collaborative effort** alongside DTU Wind and Energy Systems, both 3B and DTU will now examine and verify the properties of the generated glass fibres with remelted content.

The way forward

Identifying and addressing barriers and challenges

According to European Commission/JRC Denmark's consumption footprint is not within planetary boundaries (²²), and Denmark's material footprint is much higher than the European average. This is mainly explained by consumption of food, cars and buildings.

These challenges in high consumption of e.g. food, cars and buildings are best overcome by ambitious policies at a European level such as:

Implementing the following:

- Ecodesign for Sustainable Products Regulation (ESPR) (proposed in March 2022, entry into force July 2024)
- Packaging and Packaging Waste Directive (proposed in November 2022)
- the Construction Products Regulation (proposed in March 2022)

Completing negotiations on:

- The End-of-life Vehicles Directive (Proposed in July 2023)
- Binding food waste reduction targets in the revised Waste Framework Directive (proposed in July 2023)
- Green Claims Directive (Proposed in March 2023)

New EU legislation

- Binding targets for consumption and material footprint (follow up on EAP8, article 3(s))
- Expanding waste hierarchy with focus on high quality recycling and differentiated waste prevention.
- Binding recycling targets for construction and demolition waste in the revised Waste Framework Directive

Future policy plans

Denmark's **national reform programme**(²³) from 2023 dedicates one of its chapters to "*Climate, Environment and Circular Economy*". The publication refers to already existing circular economy initiatives in Denmark, such as:

- A plastic action plan to reduce the quantity of plastic in nature (underway)
- An extended producer responsibility for packaging and single-use plastic products (underway)
- Requirements for wastewater cleansing so that the spread of environmentally damaging materials – including PFOS/PFAS – is minimized, and make it easier for water supply companies to establish biogas, pyrolysis and lime cleaning as well as other green solutions (underway)
- A raw material plan that supports sustainable mining of sand and aggregate as well as more reutilization of building materials (underway)

²² <https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>

²³ [Denmark's National Reform Programme 2023 – MAJ 2023 \(fm.dk\)](#)

Annex

| Targets and indicators | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | EU-mål |
|--|---------|---------|---------|---------|---------|---------|---|
| Total CO₂e emissions from waste sector (Mio. tons) | 2,5 | 2,5 | 2,4 | 2,4 | 2,4 | 2,4 | - |
| Waste reduction and better use of natural resources | | | | | | | |
| Volume of municipal waste and similar waste from other sources per capita (kilo) | 798 | 779 | 774 | 807 | 813 | 754 | - |
| Material footprint (RMC per capita) (tons) | 23,3 | 22,9 | 23,2 | 24,2 | 25,7 | 26,7 | - |
| Resource productivity (BNP/RMC) (2010 DKR. per kilo) | 14,91 | 15,55 | 15,56 | 15,05 | 13,80 | 14,13 | - |
| Number of Swan certified products and services | >11.000 | >12.500 | >14.500 | >16.500 | >18.500 | >21.000 | - |
| Turnover of Swan certified products and services (billion DKR) | 8,3 | 8,3 | 8,7 | 9,1 | 9,6 | 13,9 | - |
| Share of recycling (and other final use of resources) in domestic resource consumption (DMC) | 8,0% | 7,9% | 8,0% | 7,6% | 7,6% | 8,0% | - |
| Climate footprint of public procurement (Mio. ton CO₂e) | - | - | - | 14,3 | 15,1 | 16,0 | - |
| All public procurement must be environmentally certified by 2030 | | | | | | | |
| More and better recycling | | | | | | | |
| Recycling of municipal waste | - | - | - | - | - | 46% | >55% i 2025 >60% i 2030 >65% i 2035 |
| Landfilling of municipal waste | 1% | 1% | 1% | 1% | 1% | 1% | <10% i 2035 |
| Recycling of packaging waste | - | - | - | 62% | 63% | 65% | >65% i 2025 >70% i 2030 |
| Recycling of glass packaging waste | - | - | - | 82% | 84% | 84% | >70% i 2025 >75% i 2030 |
| Recycling of paper and cardboard packaging waste | - | - | - | 69% | 69% | 71% | >75% i 2025 >85% i 2030 |
| Recycling of iron and metal packaging waste | - | - | - | 61% | 65% | 66% | >70% i 2025 >80% i 2030 |
| Recycling of aluminium packaging waste | - | - | 70% | - | 70% | 77% | >50% i 2025 >60% i 2030 |
| Recycling of wood packaging waste | - | - | 42% | 88% | 88% | 88% | >25% i 2025 >30% i 2030 |
| Recycling or preparation for reuse of end of life vehicles | 89% | 92% | 90% | 95% | 95% | 83% | >85% |
| Collection for recycling or preparation for reuse of end of life vehicles | 97% | 100% | 98% | 103% | 103% | 94% | >95% |
| Separate collection of electronic waste (WEEE) | 58% | 59% | 57% | 63% | 53% | 50% | >65% |
| Portable batteries (DPA) | - | - | 49% | 55% | 59% | 56% | >45% |
| Reduce amount of marine waste significantly | | | | | | | |
| More value from renewable resources | | | | | | | |
| Share of biomass in domestic material consumption (DMC) | 31% | 32% | 29% | 31% | 31% | 30% | - |
| Volume of recycled biowaste (kilo per capita) | 198 | 196 | 194 | 206 | 209 | 208 | - |
| Recycling of phosphorus from waste water and sludge | 73% | 73% | 76% | 67% | 72% | 74% | - |
| Reduce volume of food waste in all parts of the food value chain | | | | | | | |
| Volume of food waste from primary production (1000 tons) | - | - | 59 | - | 66 | 56 | - |
| Volume of food waste from food processing industry (1000 tons) | - | - | 529 | - | 597 | 608 | - |
| Volume of food waste from distribution and sales (1000 tons) | - | - | - | 99 | 100 | 100 | - |
| Volume of food waste from restaurants (1000 tons) | - | - | 71 | - | 63 | 72 | - |
| Volume of food waste from households (1000 tons) | - | 456 | - | - | 461 | 507 | - |
| Reduce environmental impact of construction and demolition | | | | | | | |
| Volume of extracted mineral resources from land and sea including reused materials (1000 m³) | 28.886 | 30.560 | 31.051 | 29.847 | 33.216 | 33.472 | - |
| Share of construction with Swan certificate or DGNB, LEED or BREEAM | - | 7% | 16% | 29% | 32% | 43% | - |
| Reuse of preparation for reuse of construction waste | - | - | 38% | 34% | 33% | 36% | - |
| Reuse, preparation for reuse or other final use of construction waste | 85% | 85% | 89% | 87% | 87% | 86% | >70% |
| Reduce consumption and improve reuse and recycling of plastic | | | | | | | |
| Volume of marketed plastic packaging (1000 tons) | 215 | 201 | 248 | 217 | 234 | 227 | - |
| Volume of certain single use plastic products (tons) | - | - | 6.272 | - | - | - | - |
| Recycling of plastic packaging | - | - | 14% | 20% | 23% | 23% | >50% i 2025 >55% i 2030 |
| Share of recycled plastic in new plastic bottles | - | - | - | 28% | 33% | 52% | >25% i 2025 >30% i 2030 |
| Separate collection of plastic bottles | - | - | - | 94% | 96% | 95% | >70% i 2025 >90% i 2029 |

European Topic Centre on
Circular economy and resource use
<https://www.eionet.europa.eu/etcs/etc-ce>

The European Topic Centre on Circular economy and
resource use (ETC-CE) is a consortium of European
institutes under contract of the European
Environment Agency.

