

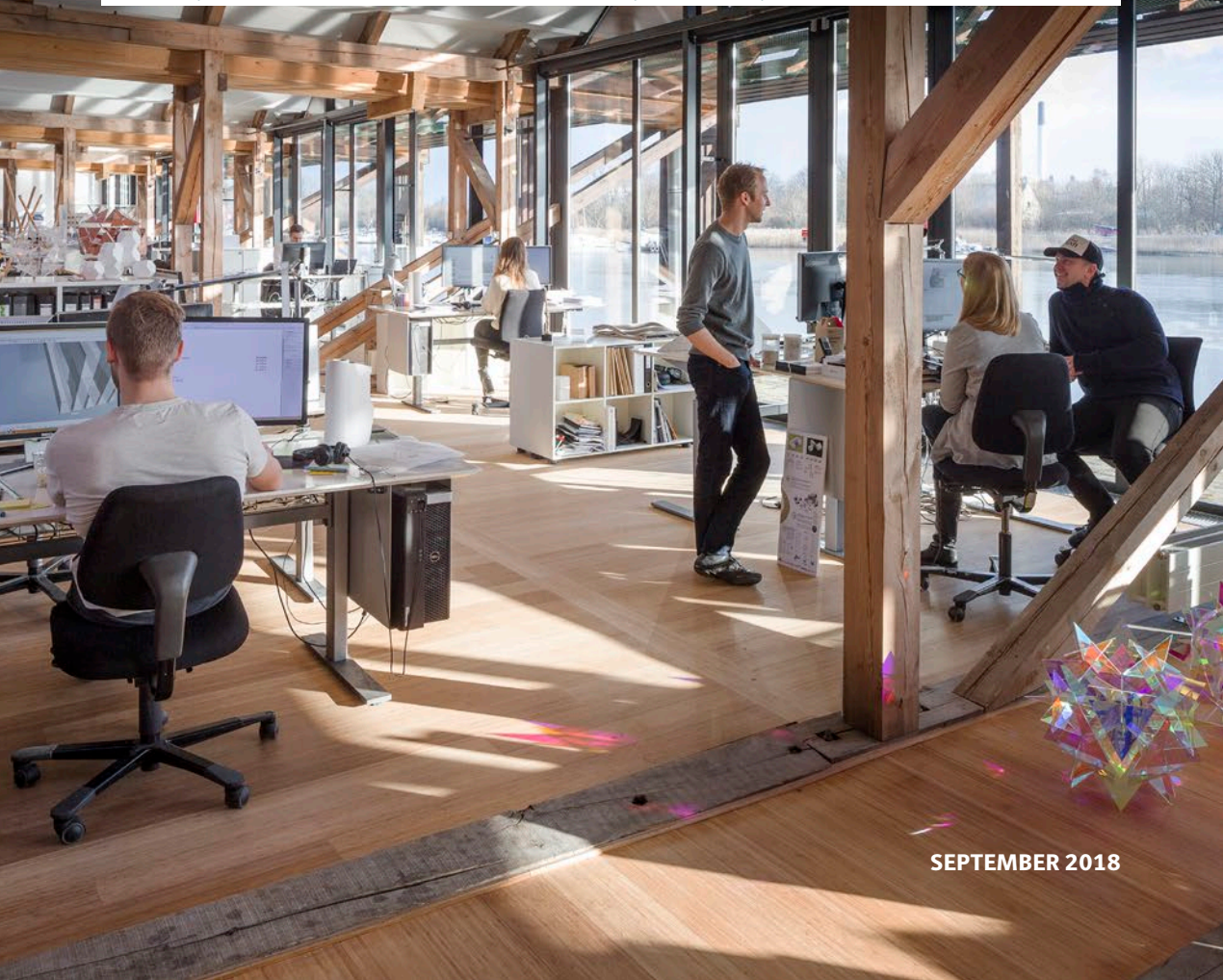


THE DANISH GOVERNMENT

Strategy for Circular Economy

**More value and better environment
through design, consumption, and recycling**

Ministry of Environment and Food and Ministry of Industry, Business and Financial Affairs



SEPTEMBER 2018

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Preface

Economic growth has lifted historically many people out of poverty and given millions of people access to material goods to an unprecedented extent. This is really positive. However, increasing wealth and more people having access to a standard of living comparable to what we know in Denmark mean that our consumption of natural resources is very high. It also means that we must view our consumption with a more critical eye.

Circular economy is all about making growth sustainable. It means using our natural resources and designing our products in a way that extracted raw materials are used as sensibly and as many times as possible. They should not end up in a dump, but in a new product.

A transition to a more circular economy holds major potentials, not only for the environment, but also for the competitiveness of Danish enterprises.

By using less materials and increasing recycling rates, enterprises can get more value out of less.

Also, a transition to a more circular economy is an important and necessary step in the government's plan of action for contributing ambitiously to the attainment of the 17 UN Global Goals.

These are the potentials that the government's Strategy for Circular Economy is to reap hand in hand with enterprises, consumers, and public institutions.

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Minister for Environment and Food

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and Financial Affairs*

Initiatives of Strategy for Circular Economy

- 1.** Promoting circular business development in 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 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 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

Transition to a more circular economy

A transition to a more circular economy holds major potentials for the environment and may potentially improve the competitiveness of Danish enterprises. More circular enterprises may reduce their costs up to a certain point by utilising their production capacity better, using less materials in design and production, and by increasing their rate of recycling and reducing waste arisings. Enterprises may create more value from the same volume of materials through better product design, remanufacturing, and by selling products in the form of services.

In order to ensure that Danish enterprises can maintain a high level of competitiveness and supply solutions contributing to a sustainable management of natural resources and continuous economic growth in Denmark, the government wishes to promote a rethinking of our way of producing and consuming. A more circular economy is called for.

In a circular economy materials and products are recirculated, their value is fully utilised, and wastage is minimised. Buildings and products are designed for reuse, repair, and recycling instead as for being discarded. It is easy to share and get access to products and services without owning them. Biomass is used for pharmaceuticals, bio-based products, and food ingredients instead of mere energy recovery. Problematic chemicals are phased out in order that waste

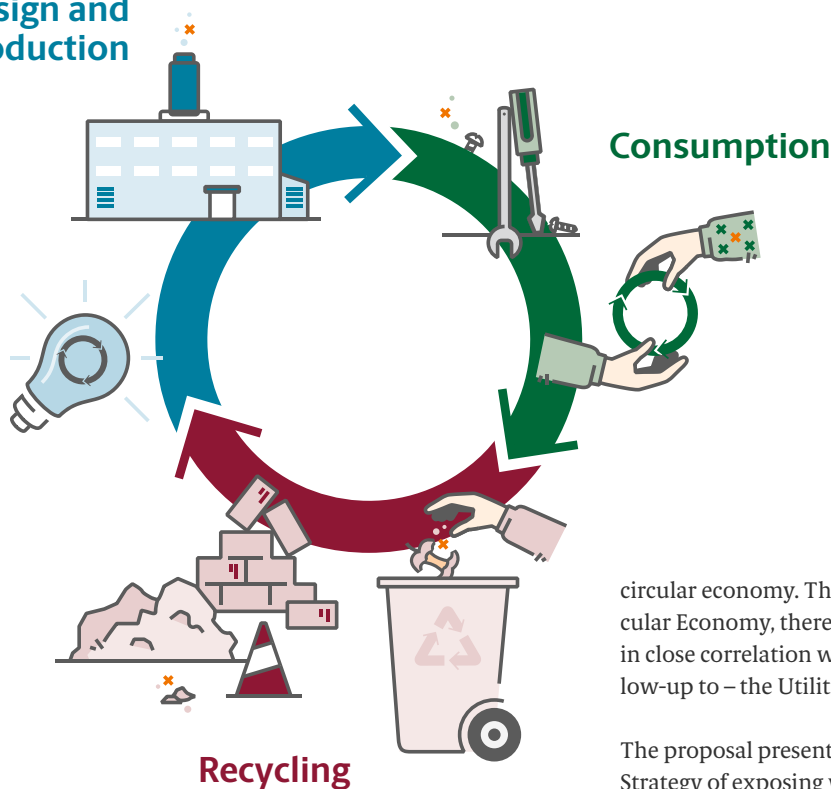
and wastewater can be recirculated as raw materials of high quality. Surplus production and wastage from one enterprise is used as a valuable raw material in another enterprise. All in all, a more circular approach in our production and consumption can ease the pressure on our natural resources and improve the environment to the benefit of future generations.

However, in some cases it will be expedient from an environmental and economic point of view to incinerate or landfill the waste instead of recycling it – among others to avoid recirculation of substances of concern.

A circular approach may open up for an accelerated transition to new business models aimed at a rapidly growing global market for green technologies and services. Circular economy presents an evident option for expanding Danish strongholds within, among others, bio-economy, sustainable construction, and resource-efficient production. Thereby, Denmark has the option of becoming a frontrunner within development and export of new circular technologies and solutions accelerating the transition.

Denmark has already taken some important steps towards a more circular economy. Parts of the Danish business community already work according to circular thinking, as there is a considerable economic potential in circular

Design and production



product design, new business models, and increased recycling. Many public institutions have started working actively to promote circular economy in their building and procurement activities. Even if we still incinerate a relatively large proportion of our waste, we become better and better at recycling. Also, Denmark is among those countries that send the lowest volumes of waste to landfill.

Competition exposure of the waste management sector

In September 2016 the government launched a Utilities Strategy promoting, among others, better utilisation of waste. Thus, the Utilities Strategy constitutes a key contribution to creating a more

circular economy. The Strategy for Circular Economy, therefore, must be seen in close correlation with – and as a follow-up to – the Utilities Strategy.

The proposal presented in the Utilities Strategy of exposing waste incineration to competition challenges many years of favouring waste incineration in the Danish waste management sector: high municipal investments in waste incineration plants and the local authorities' position to assign household waste and commercial waste to those plants have created an incentive to fill up the plants at the expense of diverting more waste for recycling.

The proposal of the Utilities Strategy regarding better access to recyclable waste will break down the barriers to establishing large sorting plants liable to increase the segregation of recyclable waste. In addition, the proposal aiming to abolish citizens' duty of using municipal services will make it easier for enterprises to establish take-back schemes and pursue new innovative solutions of recycling, cf. the below box.

Government's Utilities Strategy

– Competition exposure of the waste management sector

In line with the Advisory Board for Circular Economy, the government in its Utilities Strategy has proposed to expose waste incineration and management of recyclable waste to competition. The government wishes to give consumers and enterprises the option to contribute to the circular transition and to secure a more efficient waste management to the benefit of households and enterprises.

Enhanced incentives for recycling before incineration

The economic regulation of the waste management sector gives a higher incentive to the incineration of waste at the expense of recycling. The regulation of the waste management sector may result in excess capacity, and local authorities have an incentive to assign waste to their own facilities in order to fill up the plants, despite the fact that some of this waste might have been recycled, and even if other plants might charge lower fees for incinerating this waste. This may be a contributory cause of the relatively high share of waste incineration in Denmark compared to other EU Member States, and it prevents enterprises from seeking the best solution for disposing of their waste.

Therefore, the government in its Utilities Strategy has proposed that local authorities must put out for tender their household waste suitable for incineration. This is meant to ensure that all parties have equal access to the waste and thus that enterprises finding value in recycling this waste can do so, while waste that cannot be recycled is incinerated at the most efficient facilities. In addition, the government has proposed that municipal and private waste incineration plants must compete on equal terms, which will reduce the risk of excess capacity in the incineration industry.

Better access to recycling of waste

The regulation of recyclable waste entails a division under which local authorities treat parts of the recyclable waste, while private enterprises treat others. This division of waste streams may keep some enterprises from, e.g., establishing new large sorting plants liable to reduce costs of recycling and thereby pave the way for a larger rate of separation of recyclable materials. In addition, there is a risk of private investments in recycling avoiding the Danish market. This is a limiting factor for competition, innovation, and development that would otherwise support a more circular economy.

Therefore, in its Utilities Strategy the government has proposed a full competition exposure for the treatment of recyclable waste streams: this will create a security in the market and a larger volume of waste streams in a way that it will be profitable to establish new large sorting plants separating a larger proportion of the waste.

Today, citizens are under the obligation to use municipal services for the collection of waste. This means that citizens cannot legally take their end-of-life bicycle, e.g., to a scrap dealer who might create value by recycling the materials into new products. This is a barrier to enterprises taking back and receiving products at their end of life, so as to create as much value as possible from the waste.

Therefore, with its Utilities Strategy the government has proposed that local authorities' right of assignment and citizens' duty of use of municipal services are abolished. This is meant to give enterprises a better opportunity to contribute to the new circular transition through, e.g., take-back schemes or new innovative business models for recycling.



Government's objective and six areas of effort for circular economy

We have come far, but there is still a large potential for accelerating the transition to a more circular economy in which the greater value creation generates more positive environmental impacts. To support the realisation in the Danish business community of the full potential from the transition to a more circular economy, the government's Advisory

Board for Circular Economy presented 27 specific recommendations on 7 June 2017, along with a vision, objectives, and points of orientation for the Danish business community.

As a follow-up to these 27 recommendations the government with this strategy wishes to pave the way for the Danish

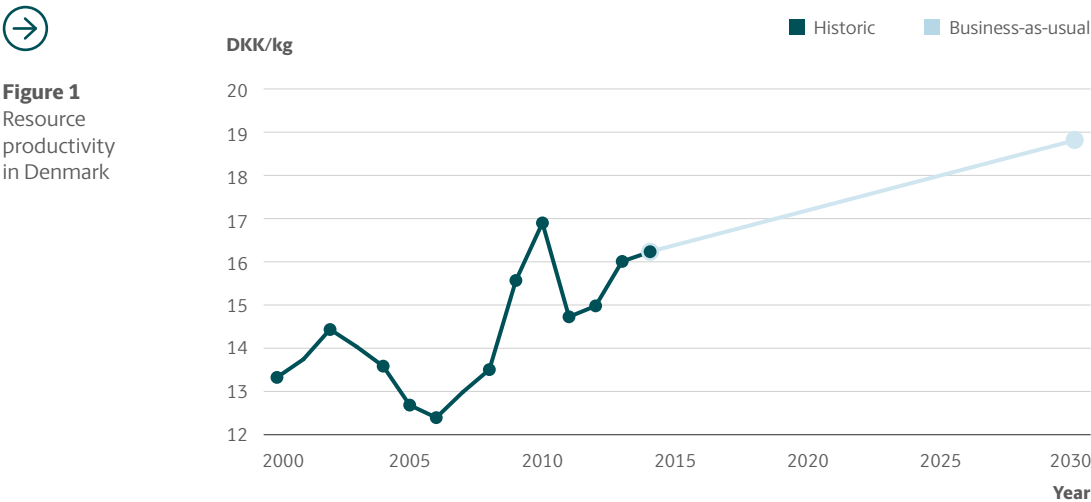


It is the objective of the government to promote circular economy, including better use and recycling of resources and the prevention of waste.

¹ Cf. the government's plan of action for the UN Global Goals the indicators for this objective are Denmark's resource productivity (DMC/GDP which will be replaced by RMC/GDP) as well as the share of recycling of total waste arisings (excl. soil and mineral waste, cf. Eurostat).

business community driving the circular transition. It also wishes to create such framework conditions that support the realisation of economic and environmental benefits of the circular economy in a joint effort among Danish enterprises, consumers, and public institutions. It is the objective of the government to

promote circular economy, including better use and recycling of resources and the prevention of waste. In order to follow progress, Denmark's resource productivity (Figure 1) and the share of recycling of total waste arisings¹ (Figure 2) are used as indicators.

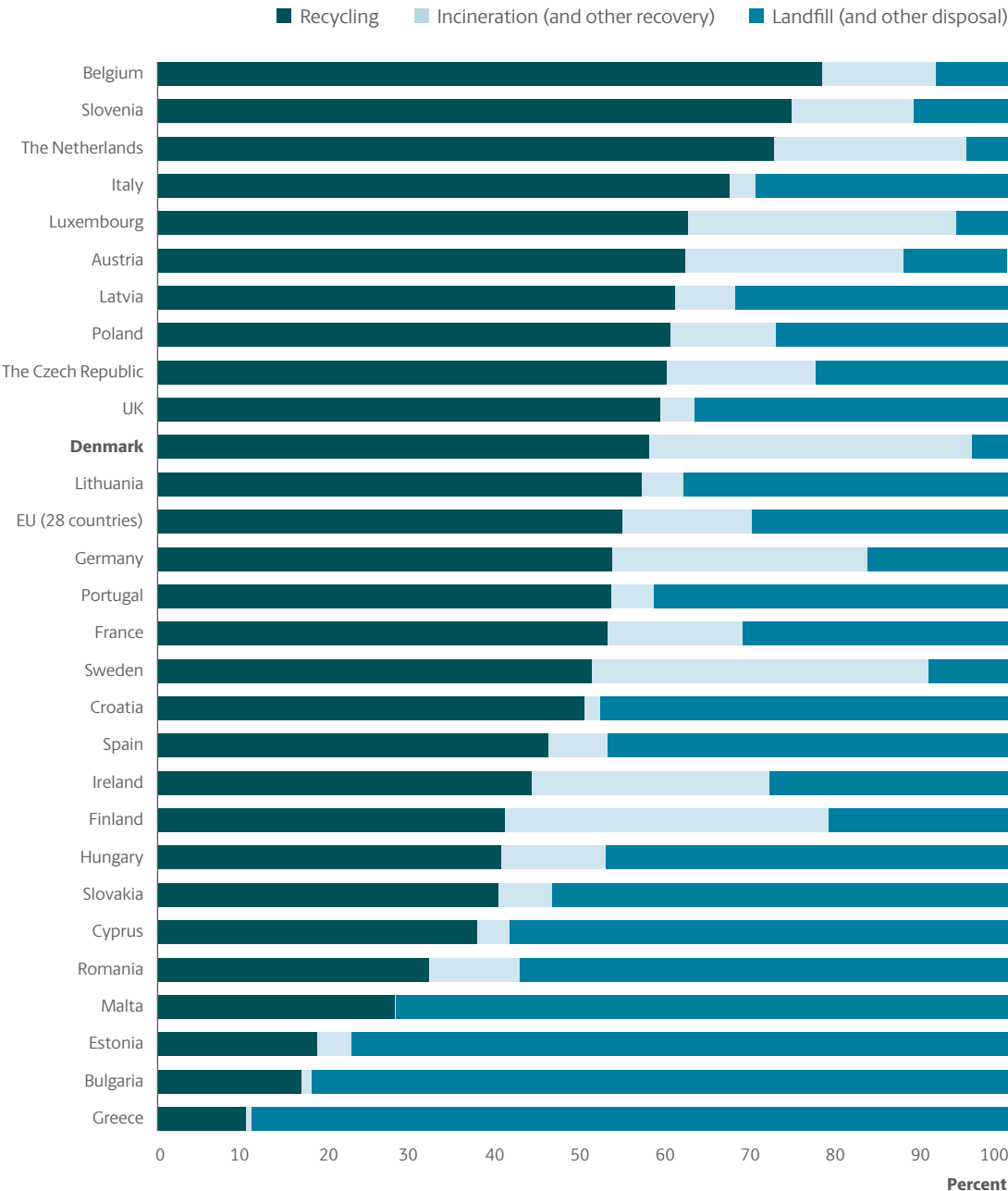


Source: Statistics Denmark, Eurostat (historic data), Danish Environmental Protection Agency, Environmental Project no. 1838 (2016)
Note: Resource productivity is an indicator for how much economic value is generated from the materials used in the production of products and services. Here, resource productivity is based on domestic material consumption (DMC) in relation to economic growth (GDP).



Figure 2

Waste treatment in the EU



Source: Eurostat

Note: the statement shows total waste excl. soil and mineral waste cf. Eurostat's waste indicator. The statement of total waste in Denmark in 2014 has been adjusted by the Danish Environmental Protection Agency, and updated figures are not yet available in the Eurostat database. "Landfill (and other disposal)" covers all forms of landfilling and incineration without energy recovery. "Incineration (and other recovery)" covers incineration with energy recovery and backfilling (backfilling is limited, since soil and minerals are not included in this dataset). "Recycling" covers recycling of inorganic and organic materials.

To support the transition to a more circular economy the government will launch initiatives distributed on six areas of effort.

In brief, the government will:

- 1.** Strengthen enterprises as a driving force for circular transition
- 2.** Support circular economy through data and digitalisation
- 3.** Promote circular economy through design
- 4.** Change consumption patterns through circular economy
- 5.** Create a proper functioning market for waste and recycled raw materials
- 6.** Get more value out of buildings and biomass

Broad backing of circular transition

Circular economy is a very wide agenda, also crossing borders. Therefore, it is important to ensure a common European approach with harmonised framework conditions making it possible to exploit the new opportunities without creating unnecessary burdens in the form of distortion of competition for the Danish business community. The government supports, therefore, an offensive EU approach to circular economy in which efforts are made to create harmonised framework conditions among EU Member States. The European Commission's plan of action and legislative package for the promotion of circular economy in the EU constitutes an important contribution to increased competitiveness, resource productivity, job creation, security of supply, and sustainable use of natural resources in Europe. Also, a transition to a more circular economy is to contribute to realising the government's plan of action for the 17 UN Global Goals.

The government considers enterprises as being the primary driving force in the transition to a circular economy. It is a precondition that the right framework conditions are in place and that the business community commits to this task by being frontrunners. However, only if all players in society – public along with private ones – support this agenda can we succeed in reaping the huge environmental and economic potentials to be gained from the transition to a more circular economy. The public authorities must create a framework allowing private enterprises to grab the new opportunities found within circular business models.

In June 2017 the government met in a circular summit with the Confederation of Danish Industry, the Danish Chamber of Commerce, the Danish Construction Association, and the Danish Agriculture & Food Council; here, the parties committed mutually to lift this agenda. The Advisory Board for Circular Economy – backed by, i.a., these four industry associations – has set up an objective of increasing resource productivity by 40 percent from 2014 to 2030, and of increasing recycling in the same period from 58 percent to 80 percent. These objectives are exclusively the business community's own ones.

With this strategy the government delivers on its promise to accelerate the circular development. At the same time, the strategy contributes to meeting the ambition in the government programme for an ambitious and sustainable green transition, in which the regards for competitiveness and jobs go hand in hand with regards for our nature and environment. We now invite the business community, local authorities, regions, organisations, knowledge institutions, and citizens to join forces and contribute actively to pulling Denmark in a more circular direction.

Enterprises as a driving force for circular transition

² University of Southern Denmark, 2015: Potentials of material savings in Danish industries. Factor of conversion into labour costs based on Copenhagen Economics, 2013: resource productivity and competitiveness in Danish industries.

The Danish business community already has a relatively high resource productivity, but there is still ample scope for improvement. Costs of raw materials and processed materials make up a good half of production costs in Danish industries, cf. Figure 3.

With the optimal use of existing technologies industry can reduce material costs by DKK 21 billion, corresponding in labour costs to savings of DKK 50 per work hour². In order to increase access to new markets and enhance competitiveness, enterprises will benefit from focusing on the development of circular solutions and services. Enterprises may improve their business by designing

products and components in a way that they have a long useful life and are readily repaired, reused, and recycled. Enterprises may create more value from the same volume of materials, for instance through more efficient use of materials in their production, sharing economy, remanufacturing, and product-as-a-service models under which they sell the access to using products, while the enterprises maintains ownership of them.

Large enterprises, in particular, have already ventured into the circular transition. But for many small and medium-sized enterprises it is difficult to realise the potential of the development of more circular business models.



Figure 3
Production costs
in Danish industries



52% Costs of raw materials and processed materials

7% Costs of energy

18% Costs of services, water, etc.

23% Costs of labour, etc.

Source: Statistics Denmark
Note: Production costs in Danish industries in 2014

³Epinion, 2017

This is due, among others, to lack of knowledge, time constraints, sufficient venture capital, and to the fact that it may be relatively more cost-intensive for small enterprises to go through the transition. Therefore, the government will launch the following initiatives to strengthen enterprises as the driving force for circular transition:

Initiative 1: Promoting circular business development in SMEs

Many SMEs have a lack of knowledge, competencies, and capacity to reap the potential benefits found in circular

product design, production processes, and business models. A survey of 610 small and medium-sized enterprises³ shows that 88 percent of enterprises have a positive attitude to circular economy, while 51 percent find that they do not have sufficient knowledge about circular economy for using it in their enterprise. Lack of advisory services etc. is stated as a barrier to the development of circular business models. So despite the fact that Danish enterprises see the potential in thinking in more circular terms, lack of knowledge and resources is a huge challenge for them when incorporating circular economy into their core business and strategic management.



How the government promotes circular economy through higher education, research, development, and demonstration:

Educational and research institutions support the transition to a more circular economy by, among others, offering curricula matching the needs of the target group, including within the transition to circular economy. The Ministry of Higher Education and Science will discuss the recommendations from the Advisory Board for Circular Economy with the management of higher educational institutions. Circular economy has a predominant place in the government's RESEARCH2025-catalogue that forms the basis for strategic investments in research of the future. A concrete example of measures in the research field is Aarhus University where a centre for circular bioeconomy was established in 2017. In addition, further to the political agreement between the government and the Danish Social Democratic Party, the Danish People's Party, the Danish Social-Liberal Party, and the Danish Socialist People's Party

about the distribution of the research reserve in 2018 and the Finance Act of 2018 a total of just below DKK 1 billion has been allocated for research – funds that may be used, among others, within circular economy. The funds are distributed on the following programmes:

- DKK 186 million in 2018 within the themes of “green growth” and “bioresources” under the auspices of Innovation Fund Denmark.
- DKK 88 million in 2018 and approx. DKK 25 million a year in 201920 to the Danish Eco-Innovation Programme.
- DKK 180 million a year in 201820 to the Green Development and Demonstration Programme.
- DKK 380 million in 2018 and approx. DKK 180 million a year in 201920 to the Energy Technology Development and Demonstration Programme.
- 31 million DKK in 2018 to Innovayt – a market maturing programme.

To overcome these barriers a national effort will be launched to promote circular business development, implementation, and upscaling of circular business models in SMEs. Concretely, a programme will be established under which enterprises are offered 50 percent co-financing for the procurement of consultancy from private experts about where and how they may develop, implement, and upscale circular business models and, if necessary, also co-financing of the procurement of supporting machinery and equipment. This is to give SMEs access to exactly that knowledge and those resources that can help them convert their enterprise to the use of a more circular business model.

Initiative 2: Setting up a single point of entry to the authorities for enterprises with circular business models

Enterprises working with circular economy meet new – and often more – regulatory barriers than other enterprises. This is due, among others, to the fact that circular business models are innovative, and that regulation often does not take into account enterprises working across existing value chains and regulation. In addition, enterprises find that it may often be time-consuming for authorities to give an evaluation whether new business models can be applied under current legislation. This leads to an insecure investment climate and means that enterprises either give up using new innovative circular technologies and business models, or they choose to establish abroad instead of in Denmark.

Therefore, the government will create one point of entry to authorities for enterprises with circular business models, so they can

get a faster clarification whether a new technology, business model, or production method can be applied under current regulation.

Initiative 3: Expanding the access to financing of circular business models

Already today we have public and private investment funds with focus on green investments, such as the Danish Green Investment Fund, the Danish Growth Fund, and Innovayt. In addition, Innovation Fund Denmark grants subsidies for the development of knowledge and technology leading to an enhancement of research and innovative solutions to the benefit of growth and employment in Denmark. This means that capital is available for enterprises with different levels of maturity, also circular ones, provided they have a business model that is sufficiently attractive for investors and subsidy funds. Also, a number of private initiatives have focus on building bridges between circular business ideas and investors. Today, the Danish Green Investment Fund is not authorised to provide guarantees; this instrument is available to other state funds.

Therefore, the government will make it possible for the Danish Green Investment Fund to provide guarantees. Thereby, the fund will be in a position to finance more types of projects. This will give new green enterprises, including circular ones, more options for finding the necessary financing for the creation, development, and maturing of their business model.

Data and digitalisation in a circular economy

Digital solutions will increasingly become part of enterprises' business models, public core services, and citizens' daily life. Digitalisation entails the opportunity for storing and analysing huge amounts of data. Every day 2.5 sextillion bytes of data are generated, and 90 percent of all data have been generated within the last two years.

The digitalisation and the large volumes of data may contribute to supporting the transition to a more circular economy. This may, for instance, be through reduced wastage thanks to the use of 3D print and sensors, by smarter consumption through Big Data, InternetofThings, and digital sharing economy platforms. Finally, more and better recycling may be achieved by increasing traceability and sorting of materials using BlockChain and robots. Also, public and private players may increasingly use environmental data to qualify and improve decisions.

The government, therefore, will launch the following initiatives to support circular economy through data and digitalisation:

Initiative 4: Supporting digital circular options by commercial use of data and challenges

Technological developments in the digital field and opportunities for developing new business models move faster and faster. The increased use of digital sensors, InternetofThings solutions etc. that are used, among others, to measure material consumption, quality, and quantity has meant that massive amounts of data are generated constantly about different material flows. These data are potentially valuable information for enterprises, since data among others can contribute to creating transparency about which materials are found in concrete products and buildings, where they are found, and which substances they contain. Data may also work as a driver of innovation in terms of developing new solutions and services contributing to an optimisation of material flows. For instance, it is possible to reduce transport costs and thus increase the economic profit from recycling, if the waste bin can tell the waste collector when it needs to be emptied. In addition, better utilisation of excess capacity through



sharing of, e.g., production equipment between enterprises may contribute to increased productivity and savings for each enterprise.

However, it may often be difficult for enterprises to get access to relevant data, and to get a grasp of the potential of a single data set or identify it in the multitude of constantly increasing data volumes. Therefore, it entails a certain risk to buy data, especially for small and medium-sized enterprises that only have limited resources available for experiments.

The government will therefore initiate an analysis of public and private data with a potential to support circular business development, and whether there are public or private data that are concretely in demand among enterprises, but difficult to get access to. The analysis will also study the potential from using data to promote circular business models. If the analysis shows a major potential from making specific data sets available, two to three pilot projects will be launched in dialogue with experts and key public and/or private data owners. In addition, the government will

expand the existing challenge platform with special focus on green challenges that may, among others, generate innovative solutions within the utilisation of excess capacity in the business community, such as buildings, idle machinery, etc. or public

surplus equipment, such as end-of-life hospital equipment, construction materials, etc. The government will also expand the statistics of Denmark's resource productivity.



Government Strategy for Denmark's digital growth

In January 2018, the government presented a strategy for Denmark's digital growth; it will support good framework conditions for Danish enterprises when they are to utilise the opportunities given by digitalisation and new technology. This will be done, among others, by following up on the recommendations from the Digital Growth

Panel. The Growth Panel has recommended to enhance digitalisation in Danish enterprises through a broad effort within, among others, enhanced digital growth environments, agile and future-proof regulation, stronger digital competencies, a digital boost of SMEs, as well as better use of data and IT security.



Government Strategy for growth through sharing economy

In October 2017 the government launched a Strategy for growth through the sharing economy with the following objectives:

- Denmark must utilise the potential of the sharing economy, both as a driver for growth and innovation and as a lever for better utilisation of the stock of fixed capital and resources.
- A clearer framework for the sharing economy must support proper functioning markets with good conditions for trust, more options, and competition to the benefit of the citizens of Denmark and growth.

- Taxes must be paid in accordance with tax regulations.
- Denmark must keep up with developments and be ready for a future in which the sharing economy must contribute to growth in a sustainable and smart manner.

The objectives for the sharing economy are supported, among others, by a broad effort of guidance, a digital reporting solution for sharing economy, and simplified tax deductions for rental of summer houses and permanent residences.

Circular economy through design

⁴ European Commission, 7th Environmental Action Programme to 2020

The design of products is crucial for the transition to a circular economy, since choices in the design phase of, e.g., materials and chemicals are decisive for the lifetime of the product, and whether components and materials can be used again with a high value. In addition to the economic potentials in a more circular design, 80 percent of the environmental burden of a product is decided in the design phase⁴. The design of circular solutions is all about maximising the value of materials, products, and services through a focus on limiting material consumption and wastage, increasing the lifetime, and making repair and recycling easier.

The government, therefore, will launch the following initiatives to promote circular economy through design:

Initiative 5: Incorporating circular economy into product policy

Many products are not designed in view of repair, dismantling, and recycling. The European Commission has decided to a higher extent to incorporate requirements promoting circular economy in the environmental requirements for energy-related products in the EU Ecodesign Directive. Also, the European Commission is working on a new method of measurement of a product's environmental qualities. Both issues may potentially give a competitive advantage for Danish enterprises, since they can market their products on more equal terms all over the EU and better visualise their products' relatively low environmental burdens. The Nordic Swan



The government works for a design of products in a way that they are part of a circular economy to a higher extent while maintaining a high level of protection of the environment and public health.

eco-label and the EU Flower set up circular economy requirements in some areas for labelled products and services. The eco-labels thereby make it easier for consumers, enterprises, and public authorities to purchase in a circular manner thereby contributing to a market-driven transition to a more circular economy.

The government works for a design of products in a way that they are part of a circular economy to a higher extent while

maintaining a high level of protection of the environment and public health. To secure Danish interests the government will enhance efforts in relation to EU work on requirements for circular economy for energy-related products and accounts of products' environmental qualities. Also, the government will support the dissemination of the Swan and the Flower eco-labels, and it will work for eco-labels promoting even more the circular economy agenda.



How the government works with circular product policy in the EU

The government works for a coherent product policy in the EU, setting requirements for both energy efficiency and circular economy for all product groups for which an overall assessment indicates a considerable improvement potential. In addition, the government works for a phasing out of the use of

substances of concern that entail or may entail a risk for human health or the environment and cause problems in their reuse or recycling. Finally, the government works for eco-labels promoting even more the circular economy agenda.

Initiative 6: Boosting Danish participation in European work on circular standards

The development of new international standards may contribute to the promotion of the transition to a circular economy in Denmark. Thus, standards may create trust and transparency in the market, compatible products and solutions, as well as better access to international suppliers and buyers. At present, Denmark is only represented in half the working groups of the present European standardisation work within circular economy, expected to be completed by 2019-20. These European working groups are now developing generic methodological standards for circular economy that will contribute to forming the guidelines for future legislation, requirements for enterprises, methodological approaches for the frameworks of the circular economy, and altogether affect the future standardisation work for other products.

An enhanced Danish effort in this standardisation work will make it possible to communicate knowledge from the European working groups on standards for circular economy to Danish enterprises who may be interested in having influence on the standardisation work. Therefore, the government will work for increasing the Danish influence in the European work on the development of standards for circular economy. The aim is to promote circular economy and to protect Danish enterprises' interests as much as possible. Denmark will seek to take the lead in the work of developing specific circular product standards in order that Danish influence is as strong as possible. Therefore, the government will ensure that the Danish Standards Association can increase their involvement in the work of developing circular standards at EU level and it will work for assuming secretariats and presidencies for working groups on the development of circular standards.



Political agreement on Joint Chemical Effort 2018-21

The political agreement on a joint chemical effort between all the parties of the Danish Folketing contains several elements in support of a circular product policy. DKK 4 million has been allocated to having more products covered by the eco-label scheme along with efforts to increase knowledge about it. In addition, DKK 4.1 million has been allocated to efforts regarding circular economy and chemicals in plastics aimed specifically at a follow-up to the EU Plastics Strategy,

and DKK 4 million to an enhanced effort towards harmful substances in PVC, including substitution with other types of materials. Finally, DKK 6.1 million has been allocated to an effort supporting enterprises' innovation with regard to substitution of undesired chemicals in production and products with better alternatives – among others to avoid that chemicals with adverse effects on human health and the environment become a barrier to circular economy.

New consumption patterns through circular economy

With changed consumption and consumption patterns enterprises, citizens, and the public sector can support the market for circular solutions. By leasing and sharing products – or buying a service instead of a product providing this service – it is possible to increase the utilisation rate. By demanding circular solutions it is possible to save money and increase recycling. At the same time it becomes more attractive for designers and producers to think in circular terms, and by repairing and maintaining continuously it is possible to expand the lifetime of purchases.

The government, therefore, will launch the following initiatives to create new solutions through circular consumption:

Initiative 7: Promoting circular procurement

In their procurement of products and services enterprises and public institutions can contribute to pulling the market towards a more circular economy. By demanding circular solutions it becomes more attractive for designers and producers to offer circular products and services. However, procurers often lack knowledge about how to incorporate relevant circular requirements for suppliers and how to design tender documents to promote circular products and services. In addition, procurers often lack knowledge about the economic and environmental benefits associated with procuring circular solutions. Finally, the dialogue between procurers and enterprises ahead of a purchase or a tender is often limited, as there is also a

lack of tools making it easier for procurers to set the relevant circular requirements.

The government will ensure that Denmark continues to be among the frontrunners in green and circular public procurement. This will be done, among others, by extending and developing the Partnership for green public procurement and the Forum on sustainable procurement that have recently been given a joint Secretariat for procurement in order to ensure co-thinking and coordination. Also, the portal “The responsible procurer” will be further developed, again with increased focus on circular procurement, a competency boost

among procurers, and transparency and knowledge-sharing among enterprises and public players. The Task force on green procurement will be developed to focus more on circular economy and it will be expanded to aim – in addition to public institutions – also at private enterprises. Finally, an analysis of environmental and economic consequences of procuring in a circular manner in various fields will be conducted. The analysis will, among others, study where it makes most economic and environmental sense to procure green and circular products and services.



How the government promotes circular economy through teaching

Already today, circular economy is part of the curricula of children, young people, and adults in the primary and secondary schools as well as in refresher and vocational training.

- In primary school, teaching in natural, social, and domestic sciences covers skills and knowledge about circular economy, including sustainability and resource use.
- In high school, circular economy may be taught in natural, technical, social, and economic sciences.
- In vocational schools and in labour market training, circular economy may be included in the curricula where relevant.

The government will initiate that circular economy is further included in curricula when new teaching and inspirational materials are developed. This will cover, among others, the new preparatory basic education for which educational curricula and curriculum programmes setting up the concrete contents and targets of the subjects will be established in 2018. The government will also pursue a dialogue with the Council of adult and vocational training (so-called VEU council) about how to give circular economy a larger role in vocational and refresher training.



Raising of repair limit for cars

In September 2017, the government entered an agreement with the Danish People's Party on a conversion of car taxes. The agreement entails, among others, a raising of the repair limit – i.e. how large a proportion of the value of, e.g., a traffic-damaged car may be repaired without triggering a new registration tax. The repair limit for cars is raised from 65 percent in 2018 to 70

percent in 2019 and 75 percent from 2020 onwards. In the statement of the repair cost a deduction is made of DKK 5,120 if one or more airbags are to be replaced. In addition, a general de minimis threshold of DKK 25,000 is introduced for the statement of the repair cost. By repairing cars the production of a new car is postponed and scrapping of the old car is avoided.

Initiative 8: Increasing focus on total cost of ownership in public procurement

In connection with public procurement focus is often on the purchase price instead of total costs of procurement, operation, maintenance, and waste management or resale. The same applies to public building, even though today there is a requirement for total cost of ownership calculations for buildings exceeding a certain size.

The government works for including to a higher extent total costs and life cycle assessments in the decision-making basis for public procurement and building, so that the public procurer and developer make their decisions based on total costs of ownership instead of the purchase price

alone. Therefore, the government will prepare a number of new total cost and life cycle tools, and it will incorporate costs or revenues from waste management and resale in existing and new tools. In addition, the government will analyse the issue in more detail, prepare guidelines, and integrate total costs of ownership in the future digital strategy for building.

More dissemination and development of total cost of ownership and life cycle assessments may contribute to ensuring a better decision-making basis for public procurers and developers in relation to long-term economic conditions and environmental impacts of the solutions to be chosen. The guidelines will contribute to a maturing of the market, and a more valid foundation will be created for the use of total cost of ownership calculations.

A proper functioning market for waste and recycled raw materials

Even if we design, produce, and consume according to circular principles, waste will still be generated. In order to support a more circular economy public authorities must give the right incentives for recycling waste and ensuring high-quality recycling, in order that it creates the highest possible value and the lowest possible environmental burden. A waste management sector exposed to competition and a proper functioning market for waste and recycled raw materials may have a catalysing effect on circular economy, since it gives enterprises better access to valuable wastes, opportunities for economies of scale, and competition for the best solutions. Also, more harmonised conditions and enforcement of rules will create a level playing field for enterprises all over the country.

The government, therefore, will launch the following initiatives to create a proper functioning market for waste and recycled raw materials:

Initiative 9: Promoting more harmonised collection of household waste

Today, we have an unharmonised waste management system in which every local authority designs its collection schemes for household waste and sets up its own sorting criteria. This means that private waste collectors and waste treatment operators must adapt to different local solutions, and this creates a fragmented market. The result is lack of economies of scale when waste is treated, limited competition, sub-optimal solutions in waste collection and in the communication with citizens.

The government wants to have more uniform waste collection in view of securing an environmentally superior waste management, at the same time releasing business economic profits from a more efficient waste collection through a larger and more proper functioning market. Therefore, the government in close cooperation with, among others, local authorities, industry associations, and the business community

will prepare common guidelines on sorting criteria and collection schemes for household waste. The guidelines must take into consideration, among others, differences between urban and rural communities, blocks of flats and single-family homes, as well as the ambition level for recycling.

Initiative 10: Creating a level playing field on the market for waste and recycled raw materials

Enterprises state that waste regulations are administered in an unharmonised way by the local authorities. In practice this means that something that is classified as waste in one municipality is not necessarily seen as waste in the neighbour municipality, or the same waste is classified as recyclable in one municipality and suitable for incineration in the neighbour municipality. Also, municipal supervision of enterprises' waste management varies much and is in many cases limited. The unharmonised administration and supervision creates an unlevel playing field among enterprises across municipal borders. This reduces competition and constitutes a barrier to the development of new

innovative business models with which enterprises get the optimum benefit out of the waste. It also reduces the incentive to manage waste correctly. Finally, it is difficult for enterprises to attain economies of scale and to establish efficient solutions for higher rates of recycling when they are active in several municipalities under different framework conditions.

The government wishes to create equal terms of competition for enterprises irrespective of the municipality they are domiciled in. At the same time, the government will promote a more proper functioning market for waste and recycled raw materials without compromising requirements for quality, public health, and the environment. Therefore, the government will create a more harmonised administration and enforcement of the rules for waste and recycled raw materials – both in Denmark and internationally. This will be done, among others, by investigating how administration and supervision tasks for waste and recycled raw materials can be gathered in one unit. In addition, waste management supervision will be aimed at enterprises with the highest risk of violation of rules, and where the environmental risk of non-compliance with the waste rules is highest.



National plastics action plan and expansion of the deposit-return system

In autumn 2018 the government will launch a national plastics action plan. The plastics action plan will cover, among others, an expansion of the deposit-return system to cover also bottles used for fruit juices and fruit concentrates; this is expected to lead

to the recycling of 52 million more bottles. Plastics is a very useful product and in many cases essential. It is therefore difficult to imagine a daily life without plastics, but they must be used smarter and more consciously and in a cleaner quality.

Initiative 11: Liberalising WEEE management

WEEE contains a number of valuable metals and other materials, but the business economic potential is far from utilised today. This is due, among others, to the fact that up to 50 percent of collection takes place outside the official collection system and that the reuse value is lost, since collection has focus on recycling. In addition, the present market structure gives a low risk appetite for investments in the necessary technology development.

The government wishes to liberalise management of WEEE in a way that utilises the value of materials to a higher extent. The government will therefore give certified enterprises the opportunity to collect WEEE from households for reuse and recycling, making it easier to choose a legal waste management and simpler to supervise the legal collection. In addition, a gentler collection of WEEE must be introduced in order to preserve the reuse potential.

Initiative 12: Establishing a pool for the handling of regulatory barriers to circular economy

A pool will be established for regulatory measures promoting circular economy. The pool may be used, among others, for a focused follow-up to analyses of, e.g., waste and bioeconomy. The pool will also allow for prioritising later any needs for further analysis and implementation in connection with, e.g., the Utilities Strategy, which is assessed to contain key initiatives for the promotion of circular economy.



⁵ In a specific Danish context it is important to note that municipal waste = household waste and similar waste from other sources (in Danish: husholdningsaffald og lignende affald fra andre kilder)

Six revised waste directives with new targets for recycling

In May 2018 six revised waste directives were adopted at EU level; they contain, among others, a number of ambitious and binding objectives for recycling of waste in each Member State.

The recycling of municipal waste in all Member States must attain at least 55 percent in 2025, 60 percent in 2030, and 65 percent in 2035⁵. The recycling

of packaging waste must attain at least 65 percent in 2025 and 70 percent in 2030.

The waste directives also contain a number of new requirements for, among others, source-separation of organic waste from 2023 and extended producer responsibility for packaging waste from 2025.

Circular economy in buildings and biomass

The building and construction sector and the food industry have some of the largest economic and environmental potentials for circular economy in Denmark. The building and construction sector alone accounts for around one third of all waste arisings in Denmark, and large parts of the waste from this sector are recovered today at a very low value. The market for recycled raw materials can be strengthened by separating those wastes that contain substances of concern and by getting hold of the valuable materials arising when buildings are demolished and disassembled. In the food industry biomass – for instance residues from agriculture, forestry, fishery, and food manufacture – can be converted into biological components that can be recovered for various purposes. For example, through biorefining of biomass it is possible to produce sugar, lignin, methane, fat, and proteins that can enter the production of pharmaceuticals, food, feed, materials, and energy.

The government, therefore, will launch the following initiatives to get more value out of buildings and biomass:

Initiative 13: Developing a voluntary sustainability class

The building sector is challenged by a relatively high consumption of new raw materials for the production of construction materials and contents of substances of concern in buildings. The limited traceability of construction materials deteriorates the opportunities for recycling and reuse of high value. The embedded energy for new buildings can constitute up to 50 percent of the energy consumption over the entire life of the building. Today, no requirements are made for including construction materials' so-called "embedded energy" – i.e. the sum of all energy used for production and waste management – in buildings' energy calculation.

If at some point of time an international building passport is developed, it will give better opportunities for the recycling of construction materials and a reduction of costs for maintenance and renovation. Also, better opportunities can be created for more systematic management and removal of construction materials containing substances of concern.

The government wishes to strengthen circular economy in the building sector without compromising public health, safety, durability, productivity, and terms of competition. Therefore, a voluntary sustainability class will be developed in the building regulation, and it must be investigated in this work, among others, whether construction material's embedded energy must be included. The future voluntary sustainability class may increase resource efficiency in the building sector as well as the extent and value of reuse and recycling of construction materials. In the development work it must also be investigated whether the sustainability class can contribute to an acceleration of the phasing out of substances of concern in buildings, to an increase in extent and value of reuse and recycling of construction materials, and to a reduction of total energy consumption.

Also, analyses will be commissioned relating to embedded energy to be used in connection with the energy framework calculation for buildings. In view of improving the traceability for substances of concern in the building sector, increasing the value of construction materials, and reducing maintenance costs and environmental and human health risks, the government will commission an analysis in order to ensure an early safeguarding of interests in connection with a future international standard for building passports.

Initiative 14: Propagating selective demolition

Already today enterprises have an obligation to source-separate their waste so it can be recycled. But far from all enterprises comply with the rules. In fast and relatively unplanned demolitions construction materials are often mixed, which makes it difficult to separate the valuable parts of the waste. It also increases the risk that substances of concern are recycled or recovered instead of being managed safely in a landfill. Where existing rules focus on recycling, so-called "selective demolition" leads to a higher focus on the reuse of construction materials.

The government wishes to promote the reuse of construction materials in new buildings and reduce the loss of value in connection with demolition. This will be done, among others, by making it simpler for developers to comply with existing rules, making communication with authorities smoother, and expanding the practise of selective demolition. Also, the government wishes to create a level playing field for the many enterprises that comply with the rules today. Therefore, the government together with the business community will look at ways to make standardised demolition plans and training. Based on an analysis of economic and environmental consequences it will be agreed in dialogue with the business community which buildings and renovations should be covered by selective demolition. Initiatives must be in accordance with the government's burden stop. In addition, the government will improve the traceability of construction waste.



Initiative 15: Getting more value out of biomass

More biorefining can create market opportunities for new types of crops and cropping systems that utilise photosynthesis a larger part of the year and produce larger volumes of biomass. In addition, preventing food waste in the entire value chain can bring down the environmental burden from the entire food industry and reduce costs for enterprises and citizens.

The government wishes to create adequate framework conditions for utilising the value of biomass as much as possible. Therefore, the government will analyse whether all relevant externalities have been considered in the present subsidy structure. The analysis can constitute part of the basis for a future national Bioeconomy strategy setting the long-term direction for the development of bioeconomy in Denmark. The government

wishes in cooperation with the business community to contribute to creating new market-driven value chains in view of increasing volumes as well as the value of a sustainable biomass production. The government will also work for establishing a think-tank for food waste with private players in order that the work of preventing food waste is anchored broadly in society. Projects conducted in the think-tank will be co-financed with private funds. Initially, the think-tank will be established for a four-year period and will be evaluated regularly. The aim is to make the think-tank self-financing in the longer term perspective. Inspired by the UN Sustainability Goals about food waste the think-tank will, among others, enhance the knowledge level and cooperation across the value chain and disseminate knowledge to a broad range of public and private players in view of making Denmark among the international frontrunners regarding prevention of food waste.



Other government measures promoting bioeconomy

In June 2017 DKK 8 million was allocated to a pilot plant for the biorefining of green biomass promoting the use of agricultural crops with more positive climate and environmental impacts than, e.g., cereal crops. The biorefining of clover grass produces juice for biogas, press cake for cattle feed, and protein concentrate for high-performance feed. The purpose of such a pilot plant is to qualify, optimise, and demonstrate this technology. The aim is to reduce the price of such facilities and create a market pull and to survey expected effects.

In addition to this, with the political agreement on focused regulation from January 2018 DKK 25 million was allocated to the development and commercialisation of biorefining, for instance the establishment of green biorefining plants around the country. Further, with the agreement between the government, the Danish Social-Liberal Party, and Danish People's Party about business and entrepreneur initiatives a fund of DKK 20 million a year in the period 2019-25 was allocated for the production of sophisticated biofuels.

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