RESOURCE AND WASTE MANAGEMENT PLAN 2018

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CONTENTS

PREFACE

Waste not, want not! This old saying reminds us to think twice before discarding anything.

Some may see waste as something worthless; all we care about is to get rid of it in the easiest possible way. But the resources of the world are not infinite. Therefore we must strive to consume less in our everyday lives. And what we decide to discard should be given a second life as far as possible.

Consuming less does not necessarily mean making sacrifices or having a lower standard of living. It means doing things smarter. Technology has already made much progress that makes our everyday lives easier, allowing us to consume fewer resources. Today the newspaper and music can be downloaded onto our tablet or phone so we can bring it with us wherever we go. This development will continue through innovation and technology.

Even if we have already started doing things smarter and consuming fewer resources, our waste bags still fill up rapidly. We make countless trips down to the backyard to find the containers for our recyclables. For most people today it is a matter of course to recycle cardboard, paper, and glass. In the future we will have more containers in the yard for recycling even more kinds of waste.

A survey has shown that Copenhageners point to recycling as one of the fields where each citizen should do good for the environment and climate. The same survey indicates that Copenhageners want to have more options for waste separation. The City of Copenhagen wishes to give this option to Copenhageners.

The City's efforts to turn waste into a resource are explained in this plan. When the plan is fully implemented in 2018 I hope that Copenhageners will say: Waste not, want not!

Waste is far too valuable to waste.
I wish you a pleasant reading!

Ayfer Baykal
Mayor of the Technical and Environmental Administration

VISION AND OBJECTIVES

IN THE CITY OF COPENHAGEN WE WILL UTILISE WASTE BETTER SO THAT AS MANY RESOURCES AS POSSIBLE ARE RECYCLED AND THE LEAST POSSIBLE VOLUME IS LED TO INCINERATION. WE WILL REDUCE QUANTITIES OF WASTE FOR INCINERATION BY 20 % AND ENSURE THAT AT LEAST 45 % OF HOUSEHOLD WASTE IS RECYCLED IN 2018.

Waste is a resource
One of the largest challenges of the future will be to attain a better utilisation of resources. We need to make more with less. For example, organic waste is rich in the vital nutrient phosphorus; waste electronics contain increasingly scarce metals such as aluminium and copper. In the incineration or landfilling of waste these valuable resources are lost.

In the future it will be necessary to use all available measures: we need to make a policy shift from waste disposal to exploitation of resources. Materials must no longer be discarded and wasted; they must circulate in the cycle as long as possible.

In the City of Copenhagen we see this challenge as an opportunity: We will turn Copenhagen into a resource efficient metropolis in which we no longer see waste as a problem but as a resource that has not yet been fully exploited. In this way new paths will appear for the waste management system of the future – or rather the resource management system. This will not happen overnight, but we take the first step with the Resource and Waste Management Plan 2018.

Resource and Waste Management Plan – points of orientation
For many years the City of Copenhagen has established an efficient waste management system that has been improved continuously in areas where technological developments and new legislation have called for action. To secure the best possible utilisation of resources it is important that the City has clear points of orientation indicating the direction in which the waste management system should develop.

Copenhageners should:
- generate less waste
- increase direct reuse
- recycle more
- incinerate less

Waste incineration has been essential in making the Copenhagen waste management system one of the best in the world; energy recovered through incineration has been used in the district heating network of the City. However, in connection with the conversion of Copenhagen's energy supply into more sustainable energy – and in line with the national and European objectives of a better exploitation of resources – the time has now come to find alternative solutions with resource consciousness in focus.

Incineration will continue to be an important part of an efficient waste management system and of our energy supply, but we only wish to incinerate materials when there is no better option for resource utilisation. This will not only lead to environmental benefits, but also economic benefits for the City, our citizens, businesses, and society as a whole. The benefits come from the fact that due to the future scarcity of resources raw material prices will increase – both when it comes to virgin and recycled materials.

The City of Copenhagen cannot assume this task by itself. But in our capacity of the largest municipality of Denmark we will take the lead, and in cooperation with Copenhageners, the City's businesses, and other collaborators we will develop an innovative resource and waste management system to the benefit of growth in the entire region. Therefore, with this plan we wish to invite all players to create the solutions of the future together with us.

VISION COPENHAGEN 2050: A ZERO WASTE CITY

Imagine living in a city with no waste. A city where what you can no longer use can be used by others. When you leave your home in the morning you make sure that your used objects are placed in the resource containers of your block. These objects are resources that will turn into new products. You walk by a silent collection vehicle on your way to work. It is fuelled by gas from the biowaste you placed under the sink a few days ago. After work you go shopping. Most of what you buy is food; most of your objects at home are leased and taken back after use by the producers so that they can reuse them in new production. For the weekend you make sure to download a good book, a few movies, and some good music. Your home is constructed with reusable materials and when it is to be demolished one day all materials are reused in new houses. You live in a city that does not drain the resources of the rest of the world, but where resources are circulated and thus maintain their value.

THAT CITY IS COPENHAGEN YEAR 2050

FORMAL FRAMEWORK

The Resource and Waste Management Plan 2018 has been drawn up in accordance with rules and frameworks set up by the EU and the Danish government. According to the EU, 50 % of household waste must be recycled in 2020, and a roadmap for a resource efficient Europe in 2050 has been established. At the national level we will see a resource strategy indicating that in the future we must consider waste as a resource to be utilised much better than today.

Resource and Waste Management Plan and its interplay with other plans and strategies of the City
The Resource and Waste Management Plan concerns waste from households, municipal institutions, and businesses – including the construction and demolition sector. The waste management system interplays with citizens, businesses, the energy system, soil management, urban planning, the public space, etc. The Resource and Waste Management Plan must therefore be seen in conjunction with other plans and strategies. These are, for instance, the Agenda 21 Plan, Municipal Plan 2011, Metropolis for People, the Ecometropolis, and not least the Climate Plan aiming to have a zero carbon Copenhagen by 2025.

Waste hierarchy
The waste hierarchy guides the efforts described in the Resource and Waste Management Plan 2018. The purpose is to lift waste management in Copenhagen as high up the hierarchy as possible. The waste hierarchy derives from the EU Waste Directive; the general idea is that the best thing is to prevent waste from being generated and to landfill as little waste as possible. The waste hierarchy sets the priorities in the management of waste as follows:

It is possible to deviate from the waste hierarchy if a lifecycle analysis shows that the overall environmental benefits are larger by treating waste at a lower level of the hierarchy.

TOPICS AND FLAGSHIPS

The vision and overall objectives reflected in the Resource and Waste Management Plan are ambitious and call for focused, persistent, and long-term efforts.

The efforts of the City for a more resource efficient waste management system fall under four topics each with a specific target and a number of measures and concrete initiatives. Each topic furthermore contains a flagship project. This is a special focused effort that is characterised, among others, by setting the agenda and having a significant environmental effect.

Together, our four flagship projects divert around 45,000 tonnes of waste away from incineration to recycling and reuse. This is about half of the 90,000 tonnes that all initiatives in the plan divert away from incineration by 2018.

INTERPLAY BETWEEN TARGETS, TOPICS AND FLAGSHIPS

TOPIC 1: **LESS WASTE**	TOPIC 2: **BETTER SEPARATION AMONG CITIZENS AND BUSINESSES**	TOPIC 3: **MORE EFFICIENT AND ENVIRONMENTALLY FRIENDLY WASTE COLLECTION**	TOPIC 4: **BETTER WASTE TREATMENT**
FLAGSHIP: **SYDHAVN RECYCLING CENTRE**	FLAGSHIP: **COPENHAGENERS SEPARATE WASTE**	FLAGSHIP: **BIOWASTE AND BIOGAS FUELLED HEAVY TRANSPORT**	FLAGSHIP: **RECYCLING AND PREVENTION OF PLASTICS**

OUTLINE OF ALL MEASURES AND INITIATIVES

TOPIC 1: LESS WASTE	
MEASURES	**INITIATIVES**
MORE REUSE The City of Copenhagen will ensure the best possible conditions for reuse. For instance, by extending the useful life of furniture and bricks many resources are saved.	1. More items to the swap facilities of the local recycling hubs. 2. Three new local recycling hubs. 3. Reuse of bricks
LESS FOOD WASTE The potential for reducing food waste is large. Through information and dialogue with citizens and businesses the City will reduce the amounts of food turning into waste.	4. Cooperation with retailers on reduction of food waste. 5. Campaign for reduction of food waste from households.
RESOURCE CONSCIOUSNESS PROCUREMENT The City cannot assume this task by itself. Therefore, we will enter into partnerships with private players to prevent plastic waste. We will also ensure that waste prevention is integrated into municipal procurement policies.	6. Deposit-refund schemes for packaging - such as reusable cups. 7. The City of Copenhagen includes requirements in the procurement policies.
FLAGSHIP: SYDHAVN RECYCLING CENTRE The City will establish a centre for innovation, knowledge, and green growth in the resource and waste field. The recycling activities of the centre will work as a laboratory for new measures with focus on waste as a resource.	o Separation of items for reuse. o An asset for the local community. o A multifunctional recycling centre. o Resource education in the schools. o Innovative partnerships. o Jobs in the reuse sector.

TOPIC 2: BETTER SEPARATION BY CITIZENS AND BUSINESSES	
MEASURES	**INITIATIVES**
BETTER SEPARATION OPTIONS IN BLOCKS OF FLATS The easy access to waste separation for citizens in blocks of flats should continue. The City will optimise schemes, improve signs, and provide containers for better separation.	8. Containers for plastics, metal, and small electronic items. 9. Increased collection of hazardous waste. 10. Better labels and signs. 11. Review and optimisation of waste schemes. 12. Higher recycling rates through trials among citizens.
MORE OPTIONS FOR SEPARATION IN SINGLE-FAMILY HOUSES For families in single-family houses separation of waste should be easier. The City will provide containers for plastics and metal and collect all containers at the property.	13. Collection of plastics and metal. 14. Better service in waste collection. 15. Voluntary cardboard container.

MEASURES	INITIATIVES
INTEGRATION OF INNOVATIVE WASTE SOLUTIONS IN THE URBAN SPACE The City will establish waste solutions in the public space, that are adapted to the specific area. For new building projects, developers should have easier access to information about possible waste solutions in the different districts.	16. More separation options in Inner City. 17. Multifunctional waste solutions in the public space. 18. Clear common guidelines for waste solutions.
MORE SEPARATION IN BUSINESS COMMUNITY The City's business community is the source of a very large quantity of recyclable materials. Through dialogue and information the City of Copenhagen will ensure that more waste from businesses and institutions is separated for recycling.	19. Information for new businesses. 20. Cooperation with industrial organisations. 21. Intensified supervision and enforcement. 22. Customization of recycling centres. 23. Better separation in municipal institutions.
CLEANER CONSTRUCTION AND DEMOLITION WASTE Hazardous substances should be separated from the construction waste so the clean building materials can be reused and recycled. The City will ensure the best possible management of demolition waste through cooperation with the construction sector and surveys of own buildings.	24. Environmental survey of municipal buildings and PCB strategy. 25. Stricter requirements for municipal construction projects. 26. Control of waste streams.
FLAGSHIP: COPENHAGENERS SEPARATE WASTE The City will make waste separation a natural part of everyday life in the capital. We must all become better at separating our waste where it is generated: at home, at school, at our workplaces, in businesses, and at construction sites.	o Changing attitudes. o Establishment and maintenance of caretaker networks. o Clear and coherent waste system. o Analyses of residual waste. o Day-care centres: Rubbish hero. o Schools: Resource manager training. o Children's waste and resource show. o External learning facilities - inspiration in nature. o Zero waste school. o Waste collectors tell about waste management.

TOPIC 3: MORE EFFICIENT AND ENVIRONMENTALLY FRIENDLY WASTE COLLECTION	
MEASURES	**INITIATIVES**
NOISE-FREE AND ZERO CARBON WASTE COLLECTION The City of Copenhagen will reduce emissions of CO_2 and noise nuisances from collection vehicles. This will be done through trials of alternative fuels and smarter collection methods.	27. Trials of collection vehicles running on alternative fuels. 28. Development project "Smarter and noise-free waste collection".

MEASURES	INITIATIVES
WASTE COLLECTION TO IMPROVE RECYCLING Collection methods play a role in the rate of recycling. Collection of bulky waste must be organised so that more wood and other materials are recycled.	29. Collection of bulky waste in fractions. 30. Fewer bulky waste containers. 31. Separate collection of Christmas trees.
FLAGSHIP: BIOWASTE AND HEAVY TRANSPORT FUELLED WITH BIOGAS The City will utilise resources contained in biowaste better and ensure that nutrients remain in circulation. The City has two scenarios to choose between regarding biowaste treatment. The solutions must be surveyed in detail and decisions must be made as to which solution to choose.	• Assessment of options. • Option 1: Establishment of traditional biogas plant. Separate collection of food waste from single-family houses. • Separate collection of food waste from blocks of flats. • Option 2: Establishment of REnescience plant. Efforts directed at businesses. • Collection vehicles fuelled with biogas.

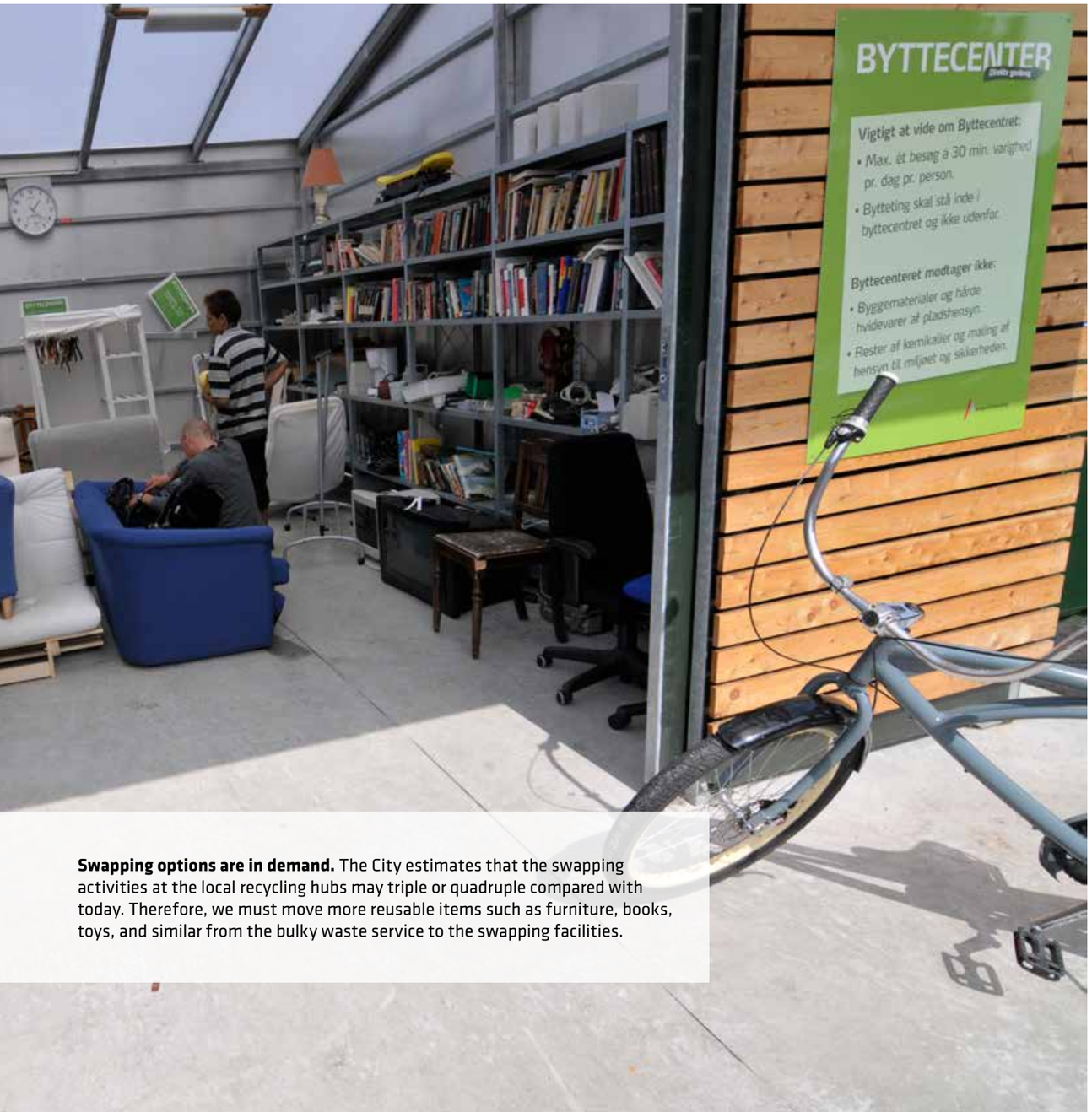
TOPIC 4: BETTER WASTE TREATMENT	
MEASURES	**INITIATIVES**
NEW WASTE TREATMENT CENTRE IN AMAGER In cooperation with the waste management company of ARC the City will strive to make the new facility in Amager part of an innovative and eco-efficient waste management centre that presents options for separation and recycling in addition to its waste incineration activities.	32. More reception control and fines at the incineration plant. 33. Sorting plant at the waste treatment centre.
BETTER CONTROL OF WEEE WEEE contains many valuable substances. Together with relevant players the City will survey WEEE streams and make a special effort to avoid illegal transports of WEEE from the City of Copenhagen.	34. Survey of WEEE streams, treatment and export. 35. More supervision and information efforts. 36. The City of Copenhagen's own WEEE
MORE WASTE OUTLETS AND DEVELOPMENT OF NEW TREATMENT OPTIONS The City of Copenhagen deals with large quantities of recyclable materials. Therefore, in our capacity of an authority we must contribute to driving development towards even better exploitation of resources.	37. Stricter requirements in tenders for collected waste. 38. Influence on private sorting and treatment plants. 39. Survey of new recycling options.
FLAGSHIP: PREVENTION AND RECYCLING OF PLASTIC WASTE The City wants to divert plastic waste away from incineration to separate collection and reprocessing into a quality allowing for the manufacture of new plastics. This benefits environment and climate alike.	o Roadmap. o Prevention of plastic waste. o Collection and recycling of plastic waste. o Use of secondary plastics. o Advising businesses about better separation of plastic waste. o Manual for inclusion of waste prevention in public procurement.

To make sure that we follow the right direction in respect of objectives this list of initiatives may be revised in the future.

Waste in urban spaces. The City of Copenhagen will establish more waste bins in the public space where residents and by-passers can drop their waste. The bins must fit in with the surroundings and may, for instance, be placed underground.

TOPIC 1: **LESS WASTE**

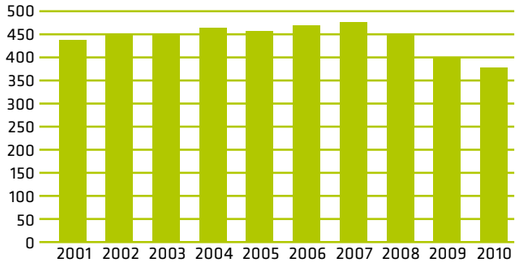
BY 2018 THE CITY OF COPENHAGEN WILL HAVE REDUCED WASTE ARISINGS WITH SOME 6,000 TONNES THROUGH MORE DIRECT REUSE, LESS WASTAGE, AND BY SUPPORTING THE DEVELOPMENT OF CLEANER PRODUCTS THROUGH PARTNERSHIPS.



Swapping options are in demand. The City estimates that the swapping activities at the local recycling hubs may triple or quadruple compared with today. Therefore, we must move more reusable items such as furniture, books, toys, and similar from the bulky waste service to the swapping facilities.

Less consumption of raw materials and resources
Denmark holds the world record of waste generation per capita. In Copenhagen we generate altogether 820,000 tonnes of waste per year, of which around 200,000 tonnes comes from households. This amount corresponds to an annual waste generation of around 400 kilograms per Copenhagener. This is a decrease compared with previous years and below the national average, but we can still make an effort to reduce these quantities.

Household waste per capital in the City of Copenhagen



Waste prevention is at the top of the waste hierarchy, and the government and the City have worked for years to minimize waste arisings. With the latest EU Waste directive waste prevention gets even more focus. The EU Member States must draw up national plans of action for waste prevention. The Danish plan of action will be part II of the national resource strategy.

A lower consumption of raw materials and resources is key in the conversion into a sustainable society. The best way to utilise resources is to avoid generating waste in the first place and to make sure that products already produced are used over and over again. In this way raw materials and resources used to produce the goods are preserved.

New thinking in demand
Today many of our products end their useful life prematurely. To secure the conversion into a resource efficient society we must change our consumption patterns and develop products that are designed for easier dismantling so the components can be reused. Much of this cannot be done at the municipal level but calls for national efforts. We have many opportunities: Better deposit and return systems for different forms of packaging, economic instruments, and good options for renting and leasing products urging producers to manufacture products with a long useful life.

The City of Copenhagen can also contribute. We will focus on how best to utilise resources contained in the waste and how to save resources by generating less waste. Being close to citizens and businesses puts us in an advantageous position to contribute with measures that make it easier for each citizen or business to act in a resource conscious manner.

MEASURE:
MORE FOR REUSE

Waste arisings must be reduced by promoting direct reuse, allowing products to remain in circulation for a longer time before they place a burden on society by becoming waste that must be managed. In this way resources for the manufacture of new products are saved and less CO_2 is emitted.

The City of Copenhagen will make it easier for citizens and businesses to reuse materials and products, for instance by expanding the swapping options at the local recycling hubs and recycling centres. Already today, the City guides citizens wishing to establish swapping facilities in their courtyards. Surveys show that if 150 courtyards establish swapping facilities we save 85 tonnes of waste and the City saves money for collection and treatment of the items. Another survey shows that 98% of the City's citizens find that it is okay if other people reuse items they have discarded.

1. More items to the swapping facilities of the local recycling hubs
The swapping facilities at the local recycling hubs are very popular and it is assessed that the demand for secondhand items is much larger than the supply. Therefore, the City sees a potential in diverting more reusable items such as furniture, books, toys, and similar from the bulky waste service to the swapping facilities of the local recycling hubs. The City will survey how to implement such diversion in practice. This may be by requirements for waste collectors or by involving and inviting caretakers and citizens to use the swapping facilities and to offer facilities that make it easier to separate (such as pushcarts and carrier cycles). Against this background we estimate that the swapping activities of the local recycling hubs can be increased three or fourfold compared with the present level.

2. Three new local recycling hubs
Local recycling hubs are an asset for the City – they supplement the collection schemes at households and are a showroom for the municipal waste solutions. In addition, they are gathering points for citizens wishing more information and to make a special effort for the environment. A large part of the activities at the local recycling hubs is the swapping concept. It is assessed that more than half of the visitors at the local recycling hubs are there to bring or collect items on the shelves.

Today, the City has six local recycling hubs. The City of Copenhagen will establish a further three local recycling hubs, among others to make the swapping facilities accessible to even more citizens. The location of the local recycling hubs must be decided in cooperation with the local committees and other local players. In view of exploiting the limited free space in the City to the best possible extent future local recycling hubs must be designed to interplay with other functions such as small parks, playgrounds, and ballparks. Also, the local recycling hub must be designed in a way that makes it possible to utilise the area for other purposes when the recycling hub is closed.

3. Reuse of bricks
There is no need to spend resources on crushing old bricks. Methods are available for cleaning bricks so they can be reused in new buildings. Cleaning is made without the use of chemicals or water. Thus, there is no discharge of hazardous substances from the cleaning process. For each 2,000 cleaned bricks we save the environment for 1 tonne of CO_2; 500 grams of CO_2 emissions are saved for each reused brick compared with the production of a new brick. The City of Copenhagen will promote the reuse of bricks. This will be done, among others, by placing special containers for bricks at the recycling centres. The opportunities for reusing bricks in connection with the refurbishment of municipal buildings must be investigated. The investigation will clarify, among other issues, the burden to the environment and economic issues.

In cooperation with players in the construction sector the City will establish a demonstration project to show how to preserve – through good waste management – reusable bricks and other construction materials in new buildings. The objective is to construct a new building with the materials from a demolished building. The new building must also be made of materials not containing problematic substances. Thereby, the building will serve as an inspiration in new municipal construction and demolition projects.

MEASURE: **LESS FOOD WASTE**

Despite the fact that an increasing number of Copenhageners seek to act otherwise, large quantities of food are discarded from shops and households every year. In Copenhagen alone around 21,000 tonnes of food is discarded from the households every year. This corresponds to around 1.5 kilograms per household per week. In addition, the quantities of edible food products discarded in shops and catering kitchens amount to some 10,000 tonnes just in Copenhagen.

This is a waste of resources and it causes unnecessary environmental impacts and CO_2 emissions when food products are produced, but not consumed. Also, there are significant economic costs associated with the treatment of food waste. Small changes in shopping and cooking habits can reduce food waste substantially. The City will make an active effort towards citizens and retailers to reduce food waste.

4. Cooperation with retailers on reduction of food waste
The City of Copenhagen has joined the Ministry of the Environment's Charter on less food waste that commits participating businesses and institutions to launch activities reducing food waste. In this connection, the City will initiate cooperation with a major Danish grocery chain and various knowledge institutions. The purpose of the cooperation is to develop models and cases for effective reduction of food waste from stores. Subsequently, these cases will be used to further the efforts against food waste in the entire retail trade.

5. Campaign for reduction of food waste from households
When it comes to householders' food waste the City of Copenhagen will launch a campaign focusing in particular on the resource loss from food waste, giving citizens good tips for how to reduce food waste.

MEASURE: **RESOURCE-AWARE PROCUREMENT**

Generating less waste is not just about saving and keeping products in the cycle. Less waste can also be triggered by growth – as long as it is the right growth. Waste management must be designed into the products from the outset. Many of the processes preventing waste take place long before the products appear as waste. This applies, among others, to the manufacture of eco-friendly products without the use of hazardous substances and unnecessary use of materials. It also applies to the design of the products, facilitating their dismantling and reuse or replacement of components, thus avoiding discarding the entire product. Another option is to design products with a longer useful life, thus avoiding planned obsolescence. One of the instruments for preventing waste is therefore to affect the production stage and think through the products from cradle-to-cradle. The City of Copenhagen has a role to play in relation to our own procurement and to entering partnerships with businesses and organisations wishing to assume responsibility for better future utilisation of resources.

6. Deposit-refund schemes for packaging - such as reusable cups
The reuse of plastic cups at concerts, football matches, and other major events is a field in which the City of Copenhagen sees an option for reducing waste arisings. Instead of using disposable plastic cups a deposit-refund scheme must be introduced to ensure washing and reuse of the cups. Since 1998 Tivoli has had such a scheme; and it has been proved that if the reusable cups are used twice they have less environmental impact than single-use cups. The City of Copenhagen will contact event makers in view to establish a partnership on a deposit-refund scheme for reusable cups. If this deposit-refund scheme proves to be a success the measure may be enlarged to other product groups such as ice cream cups and fast food containers.

7. The City of Copenhagen sets up requirements in their procurement
The City of Copenhagen buys goods and services for around 1.2 billion of euro every year. Among others, the City has entered a "Partnership for public green procurement" together with the Ministry of the Environment and five other cities. In this way the City will set up requirements for procurement of food, transport, and construction.

However, it is a challenge for the City to map the waste streams with special potential for waste prevention. There may be product types purchased in large quantities that generate much waste and are harmful to health and the environment at the end of their useful life. There may also be products where it is possible to save resources by designing them in another way. For these product types there is a special potential for waste prevention and here the City must take the lead and set up requirements for design, take-back schemes, etc. Also, options for lease and rental as an alternative to procurement should be investigated.

FLAGSHIP:
SYDHAVN RECYCLING CENTRE

THE CITY OF COPENHAGEN WILL ESTABLISH A NEW RECYCLING CENTRE IN SYDHAVN THAT IS EXPECTED TO RECEIVE AROUND 22,000 TONNES OF WASTE A YEAR. OF THIS, AROUND 10 % WILL BE REUSED DIRECTLY IN 2018.

In recent years we have seen more requirements for separation of specific waste products from households and businesses. In this context, the recycling centres of the City of Copenhagen play a key role. Recycling centres have developed into being one of the best services for the collection of specific waste products. Recycling centres make it possible to separate waste so the quality of waste resources in general are better whether they move on for recycling, incineration, or landfilling.

Focus on resource utilisation

In 2015 the City of Copenhagen will open yet another recycling centre – this time in the district of Sydhavn. The City will expand the concept; it will no longer just be a traditional recycling centre, but a recycling centre with much more focus on utilising resources contained in waste. Sydhavn Recycling Centre will become the City's centre for innovation, knowledge, and green growth in the resource and waste field. The recycling activities of the centre will work as a laboratory for new measures with focus on waste as a resource; through partnerships it will contribute to creating new green jobs. Some of the activities will be interlinked with municipal employment projects.

In addition to the recycling facilities, Sydhavn Recycling Centre will consist of a number of activities supporting direct reuse:

- A gate at the arrival point where staff will make sure that as many reusable items as possible are separated and brought to the secondhand shop or the workshop.
- A workshop for the repair of defect items that are too good to discard.
- A secondhand shop selling items from the gate or the workshop.
- Teaching facilities for schools, institutions, staff, etc.
- Trials and projects on better utilisation of resources contained in waste – for instance collection of special waste fractions such as expanded polystyrene and paints for reuse.
- Partnerships with secondhand shops on more reuse of e.g. construction materials and cooperation with different parties wishing to receive specific products – such as wood for woodwork classes in our schools.

All these activities will turn Sydhavn Recycling centre into a place that gives new life to many of the effects received; this will support moving waste treatment up the waste hierarchy.

A multifunctional recycling centre

The idea behind the recycling centre is that it should be used in many different contexts by citizens, institutions, and businesses. Sydhavn Recycling centre will be dynamic and innovative; it will be adapted to the area to the benefit of users and neighbours alike. It will be a spot where people can organise various events such as weekend outings for their families, flea markets, and waste art exhibitions.

The buildings and the interior will, as far as possible, be living examples of how to incorporate reused materials and environmental respect in connection with new constructions and decoration of buildings.

TOPIC 2: **BETTER SEPARATION AMONG CITIZENS AND BUSINESSES**

BY 2018 ALL CITIZENS IN THE CITY OF COPENHAGEN MUST HAVE ACCESS TO SEPARATION OF THE MOST ORDINARY TYPES OF WASTE NEAR THEIR HOME, AND ALL INSTITUTIONS OF THE CITY WILL SOURCE-SEPARATE THEIR WASTE.

Better waste separation – more recycling
Efficient source-separation is one of the keys to higher recycling rates, optimal utilisation of resources, and the removal of more environmentally hazardous substances from the cycle. Source-separation gives better environmental and economic results than when waste is mixed and subsequently sorted. This implies that we must all become better at separating our waste where it is generated – at home, at school, at our workplaces, in businesses, and at construction sites.

When waste is source-separated we get the best quality out of it and thereby better options for utilisation of materials. This is necessary if we are to be able to meet demands for materials also in the future. With increasing raw material prices it is also good business to separate more. Copenhagen will be a resource supplier, and therefore waste must be separated correctly.

COLLECTION EFFICIENCY	2010	2018
Cardboard	41%	63%
Newspaper/ magazines	60%	75%
Glass and bottles	62%	86%
Hard plastics	1%	23%
Biowaste	0%	33%
Ferrous and non-ferrous metals	28%	28%
Metal packaging	0%	34%
Waste electronics	32%	70%

More room for separation
Both citizens and staff in businesses and at construction and demolition sites must join in. Separation of waste should be a habit and an integrated part of everyday life. However, source-separation is not without its problems in a dense city like Copenhagen. Waste management takes up space, and space is a rare commodity. Therefore, the City, property owners, and developers must work together to secure that we have the infrastructure we need in the future. In some cases it will be necessary to use public space so all citizens get access to good separation options. Here we must have a holistic approach so that eco-friendly waste management and good urban life do not compete for the areas, but supplement each other.

As part of the strategic effort for street cleaning it should also be studied whether separation in public bins is possible. In other cases a central sorting plant will be the solution, for instance, for subsequent separation of plastics and metal. The technological development of sorting plants will in the longer term perspective open up for new options of higher quality recycling. The City of Copenhagen will follow developments closely.

Higher quality in waste from commercial and industrial activities
Businesses must, just like Copenhageners, separate their waste. There is still scope for improvement here. The City will strive to secure that we achieve even better separation of waste for recycling so that resources are utilised better and the share going to incineration is reduced. This is not least the case for the 800 institutions owned by the City – in addition to contributing to a better exploitation of resources we will take the lead and show how to do it in practice.

MEASURE: **BETTER SEPARATION OPTIONS IN BLOCKS OF FLATS**

To increase source-separation Copenhageners must have easier access to dropping off their separated waste. The City will ensure this by offering better and more separation options close to the citizens and by adapting equipment and collection frequencies so that citizens will not find filled or defect containers when dropping off waste.
In particular, the City will focus on collection of more hazardous waste and more batteries from blocks of flats; today, too much of this waste is incinerated instead of being collected for correct treatment.

Furthermore, the City will inform about indoor separation solutions in order to make it easy for citizens to separate waste already before bringing it down to the containers in their yard.

8. Containers for plastics, metal, and small electronic items
Citizens should have more separation options, and the Copenhagen City Council has decided that containers must be available for separation of rigid plastics, metals, and small electronic items from blocks of flats. With 260,000 housing units this is a major task. Containers will have differently coloured lids for the three new waste fractions to make it easier for users to quickly see which containers to use.

9. Increased collection of hazardous waste
Much hazardous waste from households is not separated and ends up in the domestic waste bin. Better collection of hazardous waste will be achieved by making it mandatory for blocks of flats to have a service for hazardous waste and a battery container. Today the so-called Caretaker Scheme is voluntary; it is used in around 1,900 blocks. The service is primarily directed at and used in large blocks. The scheme is only available for blocks that have designated a responsible person. For smaller blocks, often with no persons responsible for the service, the City wishes to establish an alternative scheme that does not require this; furthermore, the present hazardous waste vehicle scheme is discontinued. The aim is to make it easier for all citizens - also in small blocks - to dispose of hazardous waste and thereby to increase collected quantities of hazardous waste.

10. Better marks and signs
When citizens enter the yard they must not be uncertain about where and in which containers their waste should be dropped. Therefore, the visual appearance of containers in the yards should be consistent and recognisable. We will implement several measures in this respect, such as differently coloured lids for the different fractions to make it easy to distinguish one container from the next. Signs should be improved to provide adequate and comprehensible information about how to separate waste at all times. There must be signs in the yards that are consistent with other information that citizens receive from the City. It must be just as easy to understand and use the system for the newcomer as for the one who has always used it.

11. Review and optimisation of waste schemes
There are still a number of housing blocks where recycling schemes do not work optimally; either because the service is not available or because there is not sufficient equipment for the different waste fractions in the block. To remedy this situation, the city will be reviewed to get as many blocks as possible to join the different waste services and to adapt volumes and collection frequency in the blocks that are already using the services. In this way the services become accessible to more residents and overfilling can be avoided.

The City will also provide additional equipment for cardboard and plastic film in connection with new homes ready for occupation; large quantities of these waste types occur in these situations. Finally, the City will look into the possibilities of making it easier to close down waste chutes - this benefits occupational health and recycling alike.

The garden waste service will be available to more residents. The service is voluntary for blocks of flats, and only few blocks have signed up for it. Studies show that around 4,800 tonnes of garden waste from blocks of flats are incinerated annually instead of being collected for composting. Focus will be on collecting much more garden waste from blocks of flats. This is done, among other things, by launching a focused information effort about the service to blocks with much garden waste.

Today, it is voluntary for blocks to have a glass container in the yard. Many blocks already have containers for glass. When more blocks join the scheme more citizens will have easy access to separation of glass waste. Caretakers or other responsible persons are key players; they must sign up the block for the service and place the glass container on the pavement on the day of collection. Focused information efforts will therefore be launched for caretakers. In addition, it must be surveyed whether there are areas in the city where there is a need to make it easier to drop off glass in the public space.

12. Higher recycling rates through trials with citizens
The City will involve citizens in the development of new waste solutions in the yards. Through the use of trials the aim is to improve recycling options based on information from citizens, local committees, and businesses. Focus must be on innovative solutions to increase separation in the different blocks. The City of Copenhagen will assist with advice and resources for the concrete projects based on proposals for im-provements of local waste management. This initiative is also part of the municipal Agenda plan called “A Greener and Better Everyday Life, Local Agenda 21 Plan for Copenhagen 2012-2015”.

MEASURE: **MORE OPTIONS FOR SEPARATION IN SINGLE-FAMILY HOUSES**

Challenges for single-family houses are different than those for blocks of flats. Typically, in single-family homes there is a deeper sense of ownership of waste management since they do not share containers with others. However, home owners must remember to take out containers for recyclable waste and bulky waste for collection. Home owners are typically also keen to use recycling centres which is not the case to the same extent for residents in blocks of flats.

13. Collection of plastics and metals
The City will implement a solution for separation of plastics and metals directed at single-family houses. Having a container at home instead of needing to go to the recycling centre makes it easier for citizens to separate plastics and metals. Based on trials in our neighbouring cities of collection of recyclable fractions in multi-compartment containers the City of Copenhagen will decide on the most expedient way to collect plastics and metals from single-family houses.

14. Better service in waste collection
Today, home owners must take out bulky waste and containers for paper, hazardous waste, and garden waste for collection. Waste is collected at different times and it may be difficult to remember when what is collected. This has an impact on recycling. In the future, the City will collect all containers for recyclable waste (apart from garden waste) at the bin location; we will also offer an SMS service reminding home owners a few days in advance that it is time to take out bulky waste, large waste electronic items, etc. for collection. The SMS service will be expanded with other services.

15. Voluntary cardboard container
Cardboard is collected with bulky waste from single-family houses four times a year at present. To make it easier for home owners to dispose of cardboard and carton, the City of Copenhagen will introduce a voluntary container scheme for cardboard in single-family houses. The container for cardboard will be collected from the location in line with other containers for recyclable waste. In the longer-term perspective it will be assessed whether to make the voluntary cardboard scheme mandatory.

MEASURE: **INTEGRATION OF INNOVATIVE WASTE SOLUTIONS IN THE URBAN SPACE**

The districts of Copenhagen have different challenges in relation to waste solutions. New urban areas are often designed without enclosed yards where waste containers can be placed. Also, different kinds of waste equipment make different requirements on space, access, and pick-up. Waste solutions must therefore be adapted to the specific urban spaces and be considered early on in the local planning processes. Only then is it possible for architects, urban planners, and developers to make solutions that comply with the City’s requirements for separation while still appearing attractive and user-friendly for the City’s residents.

16. More separation options in Inner City
In the Inner City district waste collection is hampered by small yards or no yards. Therefore, waste containers will be located in the public space for residents and bypassers to separate their waste. The bins must fit in with the surroundings and may, for instance, be placed underground with only a small visible inlet. To begin with containers are located in a few places after which the need for more capacity will be assessed.

17. Multifunctional waste solutions in the public space
The City must seek innovative separation solutions in those areas of the city where it is not possible to locate containers very close to the blocks. In these cases the City will have to use the public space. It is a challenge to make sure that waste solutions do not crowd out the primary activities of the urban spaces; they should be incorporated in the spaces with respect to function and aesthetics. The City will test three innovative solutions to facelift local waste management and renew the urban spaces in an attractive and different manner, for instance in the form of a skate court with a number of inlets at one end for glass, paper, metals, plastics, pizza boxes, and residual waste.

In parks the City will also make it possible to separate waste - for instance by locating “mini recycling centres” at some of the gates. The idea is that the waste you bring into the parks must be taken out and separated in the different containers. Similar measures may be established in the streets and squares of the city as well as during major events.

18. Clear common guidelines for waste solutions
To be at the cutting edge of the different challenges in the districts, the City of Copenhagen will cooperate with, among others, local committees to prepare guidelines for the individual districts; this should make it clear to citizens and contractors how to manage their waste in each district. This will also make case handling easier during new building and redevelopment of blocks. Guidelines must contain a map showing which guidelines apply to which districts and which separation options and waste solutions are available to citizens of the different districts. The guidelines are to ensure that all citizens can separate all waste fractions, be it in the form of traditional containers, underground containers, vacuum systems, or otherwise. In the plan there must be guidelines for, among others:

- In which areas can stationary vacuum systems be established
- Which criteria should be met to establish underground containers
- How long should the maximum distance be, for instance, to a glass container

MEASURE: **MORE SEPARATION IN THE BUSINESS COMMUNITY**

It is assessed that around 30% of the industrial and commercial waste that ends up in incineration plants today should be recycled. With the liberalisation of recyclable industrial and commercial waste in 2010 it is not possible for the City to follow this waste as closely as we used to. The City no longer assigns recyclable industrial and commercial waste and does not collect waste from businesses.

Generally, the City must ensure higher recycling rates from businesses. Many businesses are not aware of the rules governing waste separation. The City must improve our information for businesses so they have more knowledge, enabling them to comply with legislation.

For small businesses located in residential blocks separation can be made easier by giving them the possibility to sign up for the City's services for recyclable waste. This will also reduce heavy transport in the city. However, this cannot be done without amending national legislation.

19. Information for new businesses
The City of Copenhagen aims to promote business development and create new jobs. It must be easier to start a new business in Copenhagen (Municipal plan 2011); but the environment must not be compromised. The City must contact businesses as soon as they are established in the city; good separation practices should be an integral part of day-to-day life of the new business from the outset. Often, businesses' first contact with the City will be with Copenhagen Business Service and a natural part of their introduction to the City should be waste management.

20. Cooperation with industrial organisations
Copenhagen has around 33,000 businesses of which around 17,000 generate waste in noticeable quantities. These businesses make up a very mixed group. We have relatively few genuine industrial companies left in Copenhagen. The largest group both in terms of number of companies and number of employees is found within trade and offices. Next in line are hotels and restaurants. Naturally, it is difficult for the City to reach all businesses with information campaigns. The City will therefore intensify cooperation with industrial organisations so they can disseminate information and guide their members about waste regulations.

21. Intensified supervision and enforcement
Most major industries separate recyclable waste. The challenges lie in the service sector, primarily among offices, hotels, and restaurants. The City will first of all prepare a supervision strategy so our efforts are focused on sectors and types of businesses with the largest potential for achieving a better separation of recyclable waste. Then for a period of time the City will make an extra effort to follow up on the strategy and visit the businesses to attain a better separation.

At the same time we will make a larger effort to control the waste we receive at the incineration plants. The City will launch a cooperation with our two incineration plants (Amager Resource Centre and Vestforbrænding); and we will invest more resources in following up on the cases where waste contains unacceptable amounts of recyclable industrial and commercial waste.

22. Customization of recycling centres
Liberalisation of the waste management sector has meant that businesses in Copenhagen must pay to use the municipal recycling centres by signing up for this service. Before, businesses paid over their property tax to have free access to the recycling centres. This change seems to have led to fewer businesses using the recycling centres and to decreasing amounts of industrial and commercial waste at the recycling centres. Our aim is to continue to offer good service for businesses with small amounts of waste also in the future. Developments must be followed in the coming years and the recycling centres must be customized continuously to reflect demand. This customization may take the form of other opening hours, reducing the number of recycling centres, or operating with other waste fractions than today so that recycling centres are better adapted to their users.

23. Better separation in municipal institutions
The City of Copenhagen is responsible for correct separation in our own institutions. The City's own waste is collected under a separate contract; this gives the City better possibilities to design collection for the waste types generated in larger amounts in institutions compared with ordinary households. This applies to plastics and hazardous waste, among others. The City will ensure that all institutions in the city separate these waste types. Large quantities of packaging waste are generated in the municipal schools food service (EAT). The City will survey whether the service in the future should be designed in another way or whether in the next tender requirements should be set up for using packaging materials that can be recycled more.

MEASURE: **CLEANER CONSTRUCTION AND DEMOLITION WASTE**

Construction and demolition waste makes up around 45 % of the City's total waste; around 87 % is recycled. Many buildings contain substances that are harmful to human health and the environment: asbestos, lead, and PCB to mention a few. In demolition and renovation projects it is therefore important to identify and remove waste containing such substances so they do not become part of new products or get spread in nature if construction materials are recycled. The City of Copenhagen has had focus on segregation of problematic substances in construction waste for several years. Today, for instance, you can drop PCB-containing window frames in a special container at the recycling centres.

To secure a constant high recycling rate of construction and demolition waste it is important to have a clear picture of waste streams and demolition processes. Therefore, the City of Copenhagen will secure a better separation of construction waste from businesses in the city and contribute to the identification and removal of problematic substances contained in construction and demolition waste.

24. Environmental survey of municipal buildings and PCB strategy
Each year the City generates construction waste from demolition and renovation of municipal buildings. The City will take the lead and map problematic substances in our own buildings before demolition or renovation. In an environmental mapping buildings affected by renovation/demolition will be reviewed in view of identifying problematic substances found in the building. Subsequently, these substances will be removed in a way that secures environmentally correct recycling of the remaining construction waste.

The City of Copenhagen will also draw up a PCB strategy for municipal buildings. Focus will be on buildings used by children and young persons; the strategy will contain an identification of buildings with risk profile, indoor air measurements, outline and description of relevant remedial actions and their financial implications, as well as a guide for pre-investigations.

25. Stricter requirements for municipal construction projects
The City of Copenhagen is working on a number of projects - and will launch even more - to gather lessons learned from demolition of municipal buildings. The purpose is to investigate how to recycle in an efficient and eco-friendly manner as many materials as possible from demolition and renovation projects. Experience from municipal demolition projects will be incorporated as the City's requirements for management of construction and demolition waste in "Environmental aspects of building and construction projects".

It is important to have focus on choice of materials and building methods in connection with new building or renovation in order to cause the least possible burden to the environment and minimize resource wastage when the buildings are to be demolished or renovated in the future. As far as possible - and based on dialogue with the construction sector - we will also incorporate stricter requirements for selection of materials and methods in new building and renovation projects in "Environmental aspects of building and construction projects".

26. Control of waste streams
In dialogue with construction sites and reception facilities the City of Copenhagen will ensure that as much construction and demolition waste as possible is recycled and that waste containing problematic substances is segregated and managed in a correct manner. Steps aimed at construction and demolition waste must be directed at the entire flow - from the construction site over the reception facility to the next place of use which may often be a new construction site.

Experience from the environmental survey will be used in connection with visits at the construction sites; it will also be used to check whether requirements for separation are sufficiently precise in environmental approvals. This should secure that demolition takes place as prescribed and that construction waste is separated correctly. In this context the City of Copenhagen will draw up fact sheets as a guideline for classification of waste. In this way, better recycling of the waste is secured and it will be made clear when there is free access to recycling and when the waste in question is slightly contaminated, requiring authorisation before recycling.

Supervision and environmental approvals of the reception facilities must ensure that the facilities (including recycling centres) manage waste in a way that does not deteriorate quality or the environment – which may otherwise happen if clean construction waste gets mixed with contaminated waste.

Since construction and demolition waste is transported across municipal borders the City of Copenhagen will cooperate with other municipalities to harmonise the requirements set for management of waste at the reception facilities.

FLAGSHIP:
COPENHAGENERS SEPARATE WASTE

THE CITY OF COPENHAGEN WILL MAKE WASTE SEPARATION A NATURAL PART OF EVERYDAY LIFE IN THE CAPITAL. AN AIM IS, AMONG OTHERS, THAT BY 2018 4,500 PUPILS HAVE HAD CLASSES IN BETTER RESOURCE MANAGEMENT.

Copenhagen is facing a huge conversion. We must utilise resources contained in waste better, we must incinerate less, more waste must be separated for recycling and reuse, and resources already in circulation must be used with care - again and again. If this conversion is to be a success it is important that Copenhageners back the initiative.

It is a precondition that citizens, businesses, and institutions become better at separating our waste, and not only knowledge and easily accessible solutions are called for. It is just as much habits and attitudes that are at stake. Habits are formed as we grow up. Habits are often cultural and we are affected by the people we socialise with and the environments we live in. So there are several issues to target when it comes to changing our separation habits.

In the City of Copenhagen we will work to create a culture in the capital where source-separation is a matter of course and a natural habit - just as it has now become natural to use the bike for transport and go for a swim in the harbour baths. The fact that Copenhagen has been praised as the world's best bicycle city and that swimming in the harbour has become a draw shows that Copenhageners are open to changes and measures benefiting the environment.

Waste separation - a common concern
Better waste separation in Copenhagen calls for radical changes in attitudes and behaviour. Waste separation must become a common concern that is not just the responsibility of the caretaker, the waste collector, or 'the others'. It is a common responsibility, be it at school, at home, at work, or with the kids at the playground.

Often it is through personal contact that it is possible to change people's habits. Caretakers have the daily contact with the citizens and must therefore be involved in the efforts to develop better separation habits amongst citizens.The City will also cooperate with other cities, waste management companies, national organisations, voluntary green organisations, etc. to establish a foundation with the purpose of launching campaigns focusing on waste separation.

It must be profitable to behave in an eco-friendly way. Therefore, the City will introduce a waste fee structure giving economic incentive to separate waste.

Kids and youngsters as resource managers
Kids and youngsters make up around 20% of the city's residents and they are crucial to future green growth in Copenhagen. Since good and bad habits are formed in childhood we must reach kids and youngsters while they are curious and open to do things in new ways. Kids and youngsters today also have a major influence on the family's decisions and they can therefore be good ambassadors for waste and resource management

The City of Copenhagen already gives children classes in the climate field. This effort must be expanded to also cover the resource and waste fields. In addition to supporting existing measures we will make a special effort to introduce kids and youngsters to the resource way of thinking as early as in day care centres and at school. They must be involved actively at school and after school in solving concrete waste issues.

The younger generations are heavy consumers of, for instance, electronic equipment such as smartphones that are very sensitive to resource scarcity. If we are to break the code of resource scarcity and keep resources in the cycle, kids and youngsters must have knowledge and skills to live up to the responsibility as resource managers of the future.

TOPIC 3: **MORE EFFICIENT AND ENVIRONMENTALLY FRIENDLY WASTE COLLECTION**

IN 2018 AT LEAST 60 % OF THE COLLECTION VEHICLES OF THE CITY OF COPENHAGEN WILL BE FUELLED WITH ALTERNATIVE FUELS.

Many requirements for waste collection
Collection of waste is an important element of the City of Copenhagen's waste management system. Waste collection is crucial for waste to be taken to the correct treatment plant and subjected to the correct treatment. It is also the most visible part of the waste management system - it takes place close to citizens every day.

We have many requirements for waste collection. It must be efficient and supportive of maximum recycling. At the same time it must be safe and low-noise, offer a good service level, and be done in a manner that places the least possible burden on the environment. In addition, it must not be a nuisance to traffic, and waste collectors must have good working conditions.

The City of Copenhagen has already done much to secure the best possible waste collection. For instance, all collection vehicles were replaced in the period 2009-2011 with new vehicles complying with the most stringent requirements for environment, working environment, and safety for cyclists and pedestrians. Yet the City wishes to do more.

Innovation and new thinking
Waste collection is an obvious innovation platform. For instance, there is development potential in reducing CO_2 emissions from waste collection even more and in making it less noisy. The City of Copenhagen therefore will launch various trials of different fuels for the collection vehicles.

To support maximum recycling the City will rethink the way we collect bulky waste so that the products can either have a longer useful life or have a higher rate of recycling.

MEASURE: **NOISE-FREE AND ZERO CARBON WASTE COLLECTION**

Today the City of Copenhagen has requirements, among others, to the effect that all new collection vehicles must have EURO norm 5 engines and that the entry of the cabs must be low in order to prevent injuries due to the frequent movements in and out. But as long as collection vehicles in Copenhagen are fuelled with diesel oil CO_2 particles will be emitted from both traditional collection vehicles and vehicles for vacuum systems. Also noices from waste collection in the public space bothers some Copenhageners. The City of Copenhagen will seek to remedy these problems in the coming years.

27. Trials of collection vehicles running on alternative fuels
In many places in Scandinavia and the rest of Europe collection vehicles are fuelled with gas or other alternative fuels; this contributes to lower CO_2 emissions and a cleaner urban environment. These are well established and reliable technologies that have not as yet been introduced in Denmark. Copenhagen wishes to take the lead and test alternative fuels.

The aim is that by 2020 all collection vehicles (with the exception of mobile vacuum systems) collecting household waste will run on alternative fuels such as gas, electricity, or hydrogen. The target will be achieved in cooperation with the waste management sector, various knowledge institutions, and suppliers of collection vehicles and logistic solutions. The vehicles must be filled at publicly available filling stations so that other types of heavy transport in the Copenhagen area will also get access to alternative fuels. This effort will contribute to the introduction of alternative fuels in the region and on the Danish market as it will be used as a platform for the expansion of an infrastructure of filling stations in the Copenhagen area.

The initiative will start with a trial of gas vehicles with some of the City of Copenhagen's waste collectors. Next step is a trial of ethanol vehicles. As part of the trial of gas vehicles a filling station will be established to supply natural gas to the collection vehicles. In the longer term perspective the facility will also be used for biogas (see the flagship "Biowaste and heavy transport fuelled with biogas"). The trials will be supplemented with trials of electric collection vehicles or hybrid collection vehicles if it is possible to find collaborators and external co-financing. The trials serve several purposes: They must contribute to identifying barriers to alternative fuels; they must be used for collecting operating data for Copenhagen for the different vehicle types; and they will be showcases and platforms for the cooperation with waste collectors, vehicle suppliers, fuel suppliers, knowledge institutions, and NGOs.

Data on different fuel solutions will be gathered in a literature study supplemented with the operating data collected during the trials. Collected data and information will subsequently be used to design a requirement and evaluation model to be used no later than in the tenders for household waste collection starting in 2016, 2019, and 2020.

28. Development project "Smarter and noise-free waste collection"
In the future, citizens will have more options for source-separation of waste. Consequently, there will be more transportation, higher collection costs, and a larger environmental impact from collection. The City will adapt collection and make it more efficient so as to make it as cost-effective and environmentally friendly as possible. The City of Copenhagen will test how satellite vehicle solutions, registration of emptying, fill rate meters in containers, and more efficient route planning, among others, can be used to reduce transport.

In the City of Copenhagen we are responsible for an environmentally friendly system for household waste collection of high quality. Collection as such is carried out by private waste collectors and the City sets up requirements in our tenders for the services to be delivered.

In order to set up the right requirements for collection systems the City must have detailed knowledge of developments in the market and in waste technologies. We will follow developments in operating technologies, new methods, and innovation in the waste transport field. The City will also study which types of incentives should be incorporated in the municipal contracts to promote development of environmentally friendly collection of waste. The study must be made in cooperation with waste collectors, suppliers of transport logistic solutions, and knowledge institutions.

In addition, together with waste collectors and suppliers of trucks, compactors, and containers, methods should be developed for noiseless/noise-free collection of waste. The results from this development work should be used to adapt the execution of collection work and the design of collection vehicles.

The City of Copenhagen is part of the project "City logistics" with the aim to create a green and innovative transport and logistic solution. This solution should reduce heavy traffic, noise nuisances, emissions of greenhouse gases, and air pollution from freight transport in the Inner City. The project is part of the City of Copenhagen's vision to become the world's Eco-metropolis in 2015.

Most shops have goods delivered several times a week. The same applies to other businesses in the Inner City. The principle behind City logistics is that the Inner City is served from a city freight terminal located outside the central part of Copenhagen. Suppliers and transporters can deliver directly to the terminal. By gathering more deliveries to shops in the same area and by transferring goods to more environmentally friendly vehicles distribution becomes more efficient and the number of heavy vehicles in the Inner City is reduced. The City of Copenhagen will seek to have waste collection incorporated in the City logistics project - for instance in the form of take-back of empty packages from businesses when goods are delivered.

As part of the reduction of heavy transport in the city, we will also continue to grant approvals for crushing of clean building materials on site when it does not cause unnecessary nuisance to citizens. These materials can be used in the construction of new buildings on the same site.

MEASURE: **WASTE COLLECTION TO IMPROVE RECYCLING**

Both the waste producer's efforts to source-separate waste and waste collection are important elements in the quality and recycling potential of the waste.

Waste collectors are often citizens' first contact when they have questions regarding waste and separation. Thus, waste collectors play an important role regarding higher rates of recycling. They are the link between the City and our citizens and between the citizens and the treatment facility; and they are in a position to pass on useful information securing better exploitation of resources. Also, their feedback to the City can be used to optimize waste collection.

With the right collection equipment and collection methods the way we collect waste can contribute to higher recycling rates. This could be, for instance, by changing the City's bulky waste service in a way that clean wood can be collected for recycling instead of incineration. Or it could be by replacing bulky waste containers with other collection methods that may reduce the proportion of incorrectly separated bulky waste, such as residual waste, WEEE, and recyclable materials that often end up in the bulky waste containers.

29. Collection of bulky waste in fractions
Bulky waste contains many materials that are suitable for recycling - such as large amounts of wood. Before waste is led to incineration, ferrous and non-ferrous metals are segregated. But today most other recyclable bulky waste fractions are incinerated.

Studies of bulky waste show that it contains as much as 30 - 40% of wood in the form of furniture, bookshelves, tables, and similar; much of this is suitable for recycling, for instance in the manufacture of chipboard. Around 22,000 tonnes of bulky waste is collected every year. This means that the City of Copenhagen can recycle a further 5,000 tonnes of wood a year by establishing separate collection of wooden bulky waste.

Collection of bulky waste will take place in the future in a way allowing for more recycling of this waste. In the collection stage the following items will be kept separate: wood, bulky waste suitable for incineration, and bulky waste suitable for recycling (such as plastics, furniture, or other composite products). The aim is to increase the proportion of bulky waste for recycling from around 15 % to 40 % by 2018.

30. Fewer bulky waste containers
Experience and studies show that bulky waste collected in containers is typically not separated as correctly as bulky waste collected in bulk. For instance, waste in containers holds relatively large proportions of WEEE and cardboard.

In 2011 the Technical and Environmental Committee decided to reduce options for having containers for bulky waste as they often contain other waste types hampering recycling of this waste. Instead, bulky waste must be placed in bulk in a designated area. In consideration of the occupational health of the waste collectors, however, it may still be possible to order temporary containers in special situations where problems relating to space or access conditions call for it; or in blocks of flats with particularly large quantities, such as in the event of clearing of attics and basements. This change is expected to lead to better separation and higher recycling rates.

31. Separate collection of Christmas trees
In Copenhagen Christmas trees are collected with domestic waste during January; they are led to incineration. This applies to single-family houses and blocks of flats alike. A special collection scheme for Christmas trees will be established, taking them directly to composting during January. In this way it will be possible to divert 500 tonnes of waste away from incineration to composting.

PHOSPHORUS MUST BE LED BACK TO AGRICULTURAL LAND.

FLAGSHIP: BIOWASTE AND BIOGAS FUELLED HEAVY TRANSPORT

THE CITY OF COPENHAGEN WILL UTILISE RESOURCES CONTAINED IN BIOWASTE. THE TARGET IS TO HAVE AT LEAST 25,000 TONNES OF BIOWASTE SEPARATED FOR ANAEROBIC DIGESTION BY 2018.

Organic materials are becoming an increasingly valuable resource as the world's phosphorous deposits are depleted. Phosphorus is an important nutrient, among others for agriculture; by utilising resources contained in biowaste it is possible to keep nutrients in circulation.

Separation of biowaste is not a novelty. In the agricultural societies of the past biowaste was a natural element of the resource loop. Later, in the 1990s, many trials of collection and treatment of biowaste were conducted in Copenhagen and in other cities. However, the utilisation of biowaste was not without problems. In Copenhagen it was relatively expensive to collect this waste separately, and treatment technologies were not yet fully developed.

Since then technologies have become mature and in Copenhagen biowaste will be utilised in the future for soil improvement. Biowaste makes up around 40 % (50,000 tonnes) of the domestic waste led to incineration from households today. By separating biowaste from the rest of our waste we can recycle the nutrients, decreasing the need for incineration; this will generate biogas that can be used as a fuel in the City's collection vehicles or in other heavy transport. Alongside this the national energy agreement, which was entered in March 2011, improves the operating profitability of biogas plants.

Use of new technologies

The City has two scenarios to choose between regarding biowaste treatment. One scenario means that citizens must contribute by separating biowaste from the rest of the waste after which biowaste is digested and composted so it can subsequently be used as a fertiliser on agricultural land.

The other technology - REnescience - treats domestic waste so that citizens need not segregate their bio-waste. In this method the organic materials are extracted by mixing domestic waste with enzymes and water. In the process waste is segregated in a solid and a liquid part. The liquid part is then digested and can afterwards be spread on agricultural land as a fertiliser. Some of the solid part can be recycled while the remaining part is incinerated.

The City of Copenhagen will study the potential of the two technologies during 2013. The aim is to attain the largest possible resource efficiency, operational reliability, and environmental benefit. Also, economic issues - investment needs, operating costs, and job potentials - will be part of the decision-making basis. Whether the City chooses the one or the other solution, utilisation of biowaste in a new plant will be an asset for Copenhagen and open up for green technology export.

Commercial biowaste must be utilised

Businesses must also make an extra effort. Very large quantities of food from, for example, supermarkets and restaurants are discarded. The City will make a larger effort to secure separation of biowaste from this sector. In this context the City will participate in the efforts to find solutions on how to utilise packaged food as a biowaste.

TOPIC 4: **BETTER WASTE TREATMENT**

BY 2018 THE CITY OF COPENHAGEN WILL HAVE ESTABLISHED A HIGH-TECH WASTE TREATMENT CENTRE AND A SORTING PLANT THAT CAN SEGREGATE RECYCLABLE MATERIALS FROM INCORRECTLY SEPARATED LOADS.

More recycling – less incineration. The Copenhagen waste management system must be designed for the recycling of more materials and the incineration of less. In this way we produce less CO_2 emissions and achieve higher recovery of natural raw materials.

New challenges in waste treatment
It is not enough that the citizens and businesses of Copenhagen separate correctly and that materials are collected in an environmentally friendly manner. It is also important that the City possesses or uses a system for waste treatment that utilises the resources contained in the waste in the best possible way. This applies to waste for recycling as well as waste for incineration or landfilling.

Since the mid 1970s waste incineration has been the preferred treatment option for the major part of household, industrial, and commercial waste in Copenhagen. It was a major leap forward compared with landfilling, and Copenhagen is known for our integrated energy system in which heat from waste incineration is part of the district heating system.

The future holds new challenges. Waste is no longer just a health-related problem. In a future with scarcity of resources and increasing raw material prices it is necessary to keep resources in the cycle.

Apart from the increasing global pressure on resources the City of Copenhagen has the ambition to become a zero carbon city by 2025; this is an additional challenge that sets further requirements for our waste management. For most materials there are overall savings in CO_2 when we recycle instead of leading waste to incineration. This naturally is an additional driver in our choice of waste management systems promoting recycling.

More recycling may create green growth
Higher recycling rates are not just good for the environment. According to an EU report from 2011 on green growth and recycling, recycling contributes much more than incineration to innovation and new jobs. Copenhagen should take advantage of this fact. Through partnerships with private companies and cooperation with waste management companies the City must promote the use of new technologies that exploit resources better. This applies to sorting plants for certain waste types, pre-sorting before incineration, and development of biogas plants for utilisation of biogas. These are fields in which new thinking and innovation may generate green growth and more jobs in Copenhagen.

Developments in new recycling technologies can be promoted at the national level. Differentiated and higher taxation on waste incineration making it more expensive to incinerate recyclable materials will increase the economic incentive for finding new solutions.

MEASURE: **NEW WASTE TREATMENT CENTRE IN AMAGER**

Together with other municipalities owning I/S Amager Resource Centre the City of Copenhagen has decided to establish a new incineration plant. More materials must be recycled in the future, but there will still be residual fractions that need to be incinerated. The future facility must secure the best possible utilisation of the energy contained in waste and the least possible emission of harmful substances.

The plant will be constructed for the incineration of 560,000 tonnes of waste a year, but a politically binding agreement between the owner municipalities means that the plant will not incinerate more than around 400,000 tonnes a year. In addition, the plant may only incinerate waste from the owner municipalities unless in cases where neighbouring waste management companies are in lack of own capacity for a period of time. It means that the plant will not import waste from abroad despite the fact that it is now possible freely to import and export waste from commercial and industrial activities suitable for incineration.

Further, incineration will not be a stand-alone solution; the facility will be integrated in a modern context in which more control and new technologies for separation and recycling ensure that recyclable waste is not incinerated. Experience from Denmark and abroad shows that a large incineration capacity may be a barrier to better recycling and exploitation of resources. Along with this, the energy system of the future rests on a more flexible energy production with different energy sources, so the challenge in Copenhagen will be to integrate the different energy technologies all while exploiting waste in the best possible way.

Up to 2022 the plant can incinerate low-quality biomass (roots, stumps, etc.), but only where it cannot be burned more efficiently in a combined power and heating plant. In the political agreement focus has been on the goal that waste that can be recycled is actually recycled and not incinerated; the new facility interplays with the City's objective of being a zero carbon city by 2025. This means that the new plant will gradually reduce emissions of CO_2 by 40 % up to 2030. Funds will be used to survey recycling technologies, and by 2020 technologies will be developed to avoid exports of flue gas cleaning residues. Based on the agreement's focus on recycling the name of the waste management company changes from I/S Amagerforbrænding (i.e. incineration plant) to Amager Resource Centre. The new plant is expected to be ready for operation in 2017.

More recycling – less incineration. The Copenhagen waste management system must be designed for the recycling of more materials and the incineration of less. In this way we produce less CO_2 emissions and achieve higher recovery of natural raw materials.

32. More reception control and fines at the incineration plant
Much of the waste delivered today in the bunkers of Amager Resource Centre and Vestforbrænding should have been recycled. For example, we see large volumes of paper, cardboard, plastics, wooden pallets, and WEEE. Economic incentives may sometimes have a positive effect in terms of better separation. Therefore, the City of Copenhagen will make an effort to get incineration plants to put more economic pressure on hauliers and waste producers through control and separation fees; in this way the quantity of recyclables ending up in the plants may go down. The agreement on the new incineration plant in Amager is a step in this direction; it states that "gate fees and reception control will be designed as an incentive for correct separation". A substantial part of industrial and commercial waste led to incineration is pre-crushed in other plants. A similar control should be introduced at these plants before crushing. The same applies to the considerable amounts of waste exported from these plants.

As it is apparent from the agreement on the new incineration plant in Amager the reception of incorrectly separated waste must be refused. This means that sorting plants technically must be able to separate commingled waste. Together with supervisory authorities and private businesses the City of Copenhagen will study whether such sorting plants may be a solution for the future. Waste delivered at the incineration plant of Vestforbrænding should be controlled in the same manner as at the Amager plant.

33. Sorting plant at the waste treatment centre
There is a potential for increasing the recycling rate of waste led to incineration from households and businesses. For instance, according to private collectors 30-50% of waste from trade and commerce which can be separated from waste suitable for incineration make up the majority of businesses in Copenhagen. In addition to waste incineration at the Amager Resource Centre, funds have been granted to a study of various technologies such as biogas/REnescience for treatment of organic waste (see also the flagship "Biowaste and heavy transport fuelled with biogas") and sorting technologies for plastics and other waste types. For instance, sorting technologies using photo recognition/NIR scanners are seeing a rapid development; they may become part of the range of treatment technologies in Amager.

Together with research institutions, waste management companies, private players, etc. the City of Copenhagen will study the potential for a sorting plant for either household waste or industrial and commercial waste to secure a pre-sorting that is liable to bring down volumes for incineration and may create green growth. It is important to clarify whether a sorting plant for industrial and commercial waste must be part of the same organisation as the incineration plant or whether there are better ways of organising such a plant, for instance in a Public Private Partnership.

MEASURE: **BETTER CONTROL OF WEEE**

Waste electronics is an area in which it is of particular importance for recycling technologies to develop constantly. Many of the substances used in electrical equipment - such as rare earth metals and other scarce raw materials such as indium, gallium, and cobalt - are often hard to replace and they are not infinite. A large number of the more ordinary metals such as copper, zinc, and tin are also scarce resources. The consumption of electronic and electrical equipment has been on the increase for many years; it is assessed that with current consumption raw material reserves will be exhausted within a period of 40 years. Therefore, there is much potential in keeping substances in the cycle instead of incinerating or exporting waste electronics to countries where there are no facilities for extraction of substances.

The treatment of WEEE is a challenge; it typically consists of many components and many substances harmful to human health and the environment. For many years special attention has been given to the health and environmental aspects associated with the management of WEEE. The City of Copenhagen will continue to secure an environmentally acceptable management of WEEE, but we will also have more focus on how to keep the critical raw materials in the cycle.

The City cannot lift this task alone and will therefore cooperate on an expansion of the infrastructure for management and treatment of WEEE together with the national authorities and relevant partners in the electronics sector. Producers of electrical and electronic equipment have the responsibility for treatment of WEEE, but the City of Copenhagen is responsible for the collection of WEEE from our citizens and wishes to collect more in the future. In addition, the City will participate in a survey of WEEE streams and study whether resource recovery from the City's own WEEE can be improved.

34. Survey of WEEE streams, treatment and export
The City of Copenhagen will cooperate with, among others, DPA-System and the Danish Environmental Protection Agency to strengthen knowledge-building relating to critical raw materials, examine the potential for alternative treatment forms, and create a better overview of WEEE streams. Today we can only account for around half of WEEE compared with the quantities placed on the market. It is unclear whether the other half is incinerated or exported. We must also clarify which types of WEEE hold the largest potential for improved recycling. The result of the mapping must form the basis for future efforts relating to collection of WEEE.

35. More supervision and information efforts
Together with the Danish Environmental Protection Agency, among others, the City cooperates on the control of electronics exported from Denmark; we will also make an effort in regard to the companies in charge of waste shipments. However, it is important that this effort directed at export does not stand alone. Therefore, we have a challenge in continuing to inform our citizens and businesses about the importance of separating WEEE from waste for incineration with a view to increasing the recycling rate and reducing pollution caused by incineration. In addition, the City must make a larger effort at the incineration plants to control and follow up if the waste input contains WEEE.

36. The City of Copenhagen's own WEEE
The City of Copenhagen will clarify how to organise management of our own WEEE in the most environmentally friendly manner. Under the producer responsibility system the user may take over responsibility for disposal of WEEE; the City will survey whether resource recovery may be improved by taking over the responsibility for WEEE and in the longer-term perspective creating a green growth potential in the form of new methods for managing different types of WEEE.

MEASURE: **MORE WASTE OUTLETS AND DEVELOPMENT OF NEW TREATMENT OPTIONS**

The City of Copenhagen is responsible for materials collected from households. It is important that the materials supplied by the City to the resource chain are of a quality that makes it attractive to others to use in their production. It is important to avoid unnecessary "downcycling" in which the quality and thus the value of materials decrease progressively so that in the end they can only be used for secondary products and not as raw materials in a new production.

The City will enter into a closer dialogue with the recycling industries and set up more stringent requirements in our tenders for easier tracking of recyclable resources; in other words, it must be possible to see where materials end

up after having been delivered from the City to further recycling. The City will enter into a closer cooperation with the recycling industries in order to contribute to the development of new methods and technologies with a view to constantly improving efficiency and the quality of recyclables.

37. Stricter requirements in tenders for collected waste
The City of Copenhagen will ensure an efficient and responsible recovery of resources in the cooperation and sales agreements we enter with treatment plants and buyers of recyclables. By keeping abreast with developments in waste treatment technologies and resource markets the City will act as a professional collaborator and secure even better resource utilisation than today.

The City will stay in close dialogue with the market and actively follow developments of new treatment technologies. By setting up precise requirements in tenders and working with incentive models and development partnerships the City will ensure high security of supply and a better quality of recycling.

To make treatment and sales agreements as attractive as possible and with a view to creating a volume that makes it profitable to develop new technology, the City will, whenever possible, seek to tender waste treatment together with other cities and waste management companies. In addition, the City will investigate the possibility, in cooperation with other cities and waste management companies, of establishing a reception and transfer station for recyclable materials in the Copenhagen region. This will give a more efficient and environmentally friendly transport of recyclables.

Finally, the City will set requirements for the highest possible traceability to secure that materials sold by the City on the market are managed in a way minimising downcycling and maximising the quality of recycling.

38. Influence on private sorting and treatment plants
Waste coming from private sorting plants for incineration must be separated better. From a technical point of view it is possible to separate more for recycling; however, due to economy, traditions, and uncertainties in the classification of recyclable materials not all of them are separated at the plants. For instance, there is an unused potential with regard to plastics since plastics are only separated to a very limited extent today. Likewise, plaster is only separated very little. This must change, among other reasons in view of emissions of sulphur dioxide from incineration.
The City will, in cooperation with other cities, secure better separation of waste from commercial and industrial activities at treatment plants through dialogue and supervision. In addition, requirements for separation must be set up at plants pre-treating waste suitable for incineration, and the City must clarify when waste suitable for incineration can be classified as recyclables. If it is possible to increase recycling by separating a commingled "dry" fraction at a sorting plant the City will contribute to investigating this option. However, it is important that the quality of recycled materials is not deteriorated.

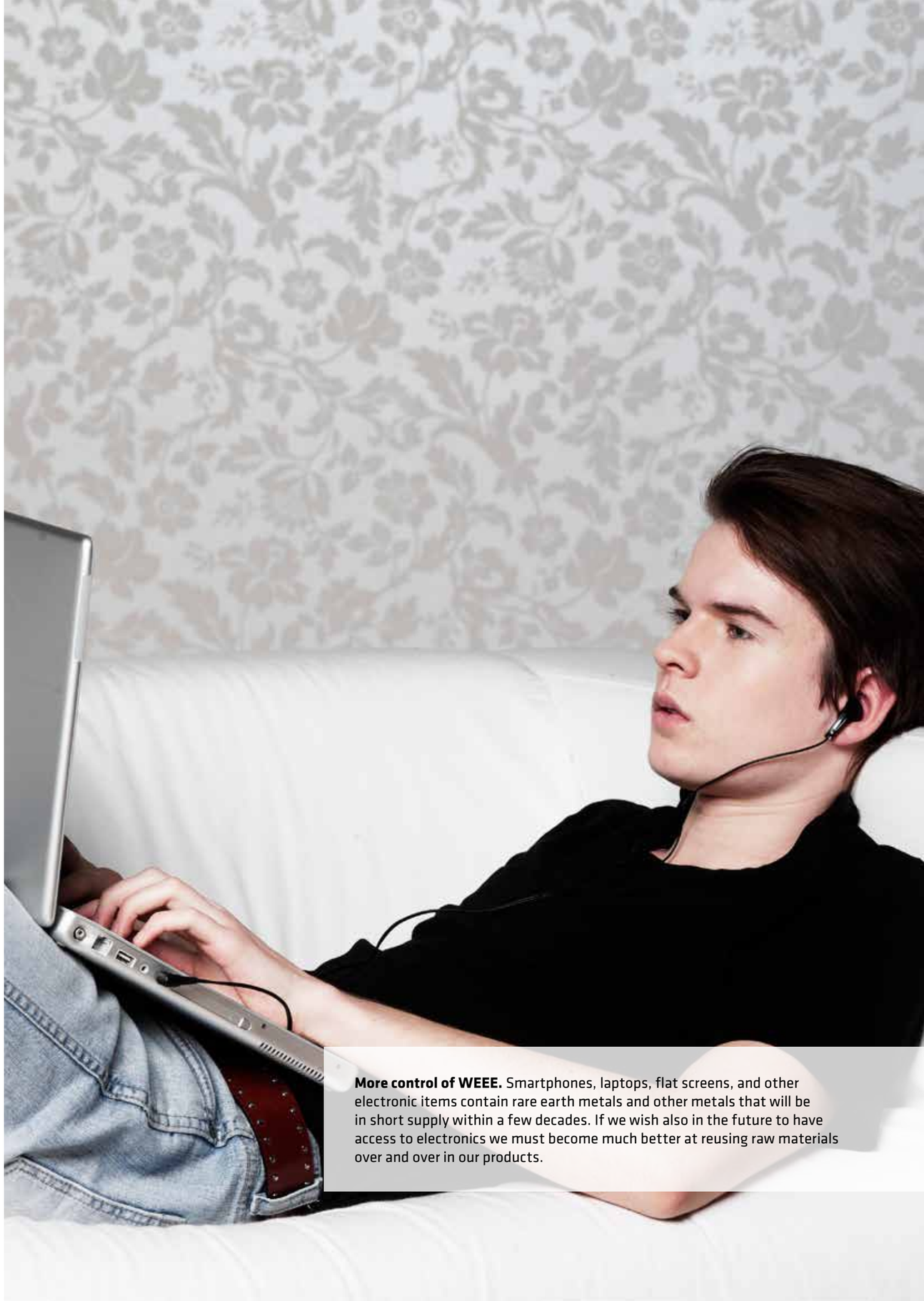
39. Survey of new recycling options
The City of Copenhagen has focus on diverting more recyclable waste away from incineration - not only the ordinary recyclable waste fractions such as cardboard, paper, and plastics, but new fractions such as milk cartons, textiles, expanded polystyrene, roofing felt, and insulation materials. So far, the City has not introduced collection schemes for these waste fractions; this is due to the fact that it is uncertain whether suitable recycling technologies are available. Furthermore, environmental impacts and outlets for this waste are unclear.

Based on recent years' technological developments and experience with these waste fractions in other countries and cities, the City will investigate whether there is basis for introducing collection and recycling services for one or more of these fractions. This depends, among other issues, on the environmental result, whether there is an outlet, and whether the economy associated with these new services allows for it.

Several of the countries that have higher recycling rates than Denmark recycle their milk cartons. Therefore, it is obviously to investigate the City's recycling potential for this waste fraction together with relevant partners.

According to a new analysis from the Innovation network for environmental technologies there is a potential for higher recycling rates for textiles, although there are a number of challenges associated with the establishment of an economically and environmentally sustainable system for recycling textiles. Increasing prices of natural cotton contribute to an awakening interest among textile industries in the utilisation of this potential.

Where major potentials are identified the City will seek to establish collection and treatment options with potential for green growth. This applies primarily to expanded polystyrene, rockwool, and milk cartons.



More control of WEEE. Smartphones, laptops, flat screens, and other electronic items contain rare earth metals and other metals that will be in short supply within a few decades. If we wish also in the future to have access to electronics we must become much better at reusing raw materials over and over in our products.

A TOTAL OF 1.5 TONNES OF OIL AND GAS IS SAVED FOR EACH TONNE OF PLASTICS RECYCLED. WE CAN ALSO SAVE CAPACITY AT THE INCINERATION PLANTS.

FLAGSHIP:
RECYCLING AND PREVENTION OF PLASTIC WASTE

THE CITY OF COPENHAGEN WISHES TO DIVERT PLASTIC WASTE AWAY FROM INCINERATION. THE TARGET IS TO SEPARATE AROUND 35 % OF THE PLASTICS CONTAINED IN WASTE SUITABLE FOR INCINERATION BY 2018 (15,000 TONNES).

Not only should plastics be separated from waste going to incineration; it must also be processed into a quality allowing for the manufacture of new plastics, producing benefits to environment and climate alike. By recycling 15,000 tonnes of plastics we save 22,500 tonnes of CO_2 for the manufacture of new plastics and 39,000 tonnes of CO_2 from the incineration of plastics.

Analyses show that waste suitable for incineration contains around 12% plastics, corresponding to around 40,000 tonnes of plastic waste every year in the City of Copenhagen. This waste comes from households, businesses, and construction sites. By collecting and processing plastic waste into a quality allowing for its use as a substitution for new raw materials we save oil and energy used for the manufacture of virgin plastics. We can also save capacity at the incineration plants.

Many different types of plastics

Plastics are not just plastics. Plastics come in many different types, and if we aim to recycle plastics in a way that they can substitute virgin raw materials it is necessary to separate the different types of plastics. It is not simple to distinguish the different types of plastics from each other. Plastics must be separated in a special plant that is capable of "reading" the different types. It is estimated that around half of Copenhagen's plastic waste, which is incinerated today, is suitable for recycling. Technologies for sorting and treatment of plastics are developed and improved continuously so in time the share of plastics that can be recycled will increase. The City of Copenhagen will together with other players make an effort to establish a plant near Copenhagen for the sorting of rigid and flexible plastic waste from households.

Knowledge turning into action

If the City of Copenhagen is to be a zero carbon city in 2025 all plastics must be removed from waste suitable for incineration. The City of Copenhagen is currently investigating how to attain this objective and which instruments should be used. The City has launched a three-year project with the aim to clarify how best to prevent and recycle plastic waste. Through this project the City will get much information that must afterwards be turned into concrete measures. The project receives support from the EU LIFE+ programme and is conducted together with four foreign cities and waste management companies, as well as I/S Amager Resource Centre and the University of Aalborg.

The purpose of the project is:

- to utilise resources more efficiently
- to reduce emissions of CO_2 from the incineration of plastics
- to develop a green industry with jobs in the waste management sector

CITY OF COPENHAGEN
The Technical and
Environmental Administration