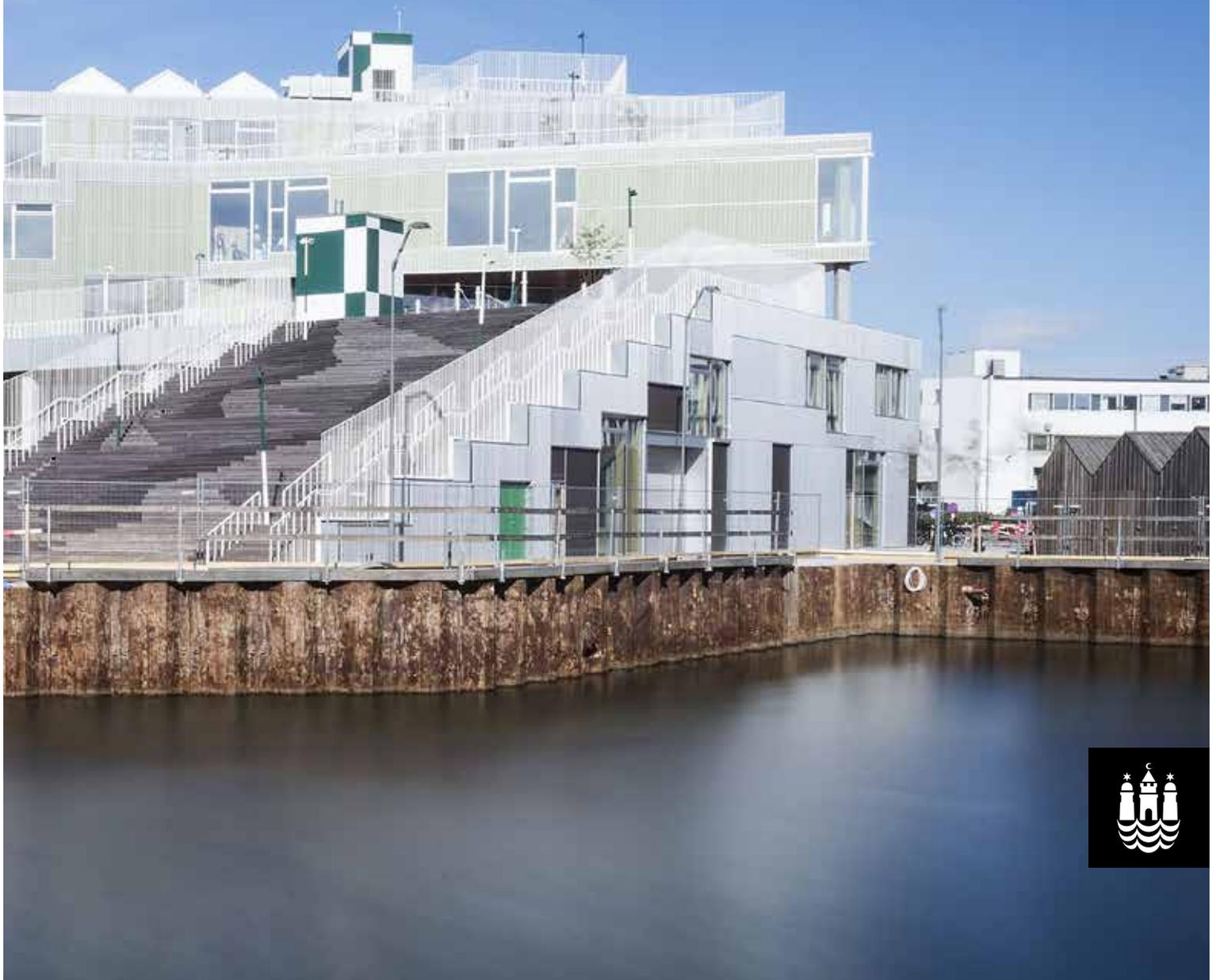


SUSTAINABILITY IN CONSTRUCTION AND CIVIL WORKS

2016



INTRODUCTION

SUSTAINABILITY IN CONSTRUCTION AND CIVIL WORKS 2016

The purpose of Sustainability in Construction and Civil Works 2016 is to ensure that the substantial investments by the City of Copenhagen in construction and civil works are managed in an environmentally responsible way. The City has therefore chosen to take the lead with environmental requirements that go beyond the existing laws. These requirements apply only to construction and civil works commissioned or supported by the City.

The environmental requirements will help to implement a number of political strategies in the environmental and climate field, including the KBH 2025 Climate Plan, the Resource and Waste Management Plan 2018 and the Copenhagen Climate Adaptation Plan.

Sustainability in Construction and Civil Works 2016 took effect when it was adopted by the City Council on 12 February 2016. This edition is the fifth generation of Sustainability in Construction and Civil Works, which was first published in 1998.

DOCUMENTATION

Documentation of compliance with requirements has to follow defined procedures in order to allow follow-up and dissemination of useful experience.

At www.kk.dk/miljoe-byggeri-anlaeg, you can find useful information on this, and retrieve the necessary forms.

Note that legal requirements for construction and civil works must still be met, and permits obtained, independently of Sustainability in Construction and Civil Works 2016.

The City also hopes to inspire private developers to use Sustainability in Construction and Civil Works 2016.

THIS PUBLICATION

This booklet provides an overview of all 33 requirements, broken down into six subject-areas as shown on the next page.

Essentially, Sustainability in Construction and Civil Works applies to six project areas commissioned or supported by the City of Copenhagen:

- City of Copenhagen, Development Department
- Social housing
- Housing renewal
- City of Copenhagen, Construction projects
- Copenhagen Courtyard gardens
- Craftsman services

As these areas have different means of complying with the additional environmental requirements set out in Sustainability in Construction and Civil Works, the number of requirements varies for each area. Each requirement in this booklet is therefore marked with a coloured dot to indicate who is required to comply with it.

MORE INFO

A description of procedures and the latest version of the forms for working with Sustainability in Construction and Civil Works can be found at:

www.kk.dk/miljoe-byggeri-anlaeg

1

ELECTRICITY, WATER AND HEAT

The City of Copenhagen has adopted a Climate Plan with the aim of attaining CO2 neutrality by 2025. Among other things, this is to be achieved by improving the energy efficiency of buildings. Sustainability in Construction and Civil Works 2016 therefore lays down stricter requirements for energy optimisation compared to the current building regulations. There is also a focus on energy management, optimised operational settings, lighting and connection to district heating.

The City of Copenhagen has a vision whereby no more drinking water can be extracted than is recycled. Installing water meters makes it possible to focus on, and thereby reduce, the consumption of water in residential buildings.



1.01



BUILDING CLASS 2020

New buildings and extensions with vertical boundaries must conform to Building Class 2020.

1.02



ENERGY UPGRADE IN SMALL RENOVATION PROJECTS

In small building renovations, the implementation of cost-effective energy upgrades according to the energy rating report has to be considered.

Cost-effective energy upgrades are measures with a profitability ratio greater than 1.33.

In implementing the requirement, it should also be considered whether the building element is fit for renovation and worth preserving.

The requirement may be met by implementing 1.03 instead.

1.03



ENERGY UPGRADE IN MAJOR RENOVATION PROJECTS

The objective is that:

1. Buildings with an energy rating of B, C or D must be improved by one level.
2. Buildings with an energy rating of E must be improved to C
3. Buildings with an energy rating of F must be improved to D
4. Buildings with an energy rating of G must be improved to D

In implementing the requirement, account should be taken of profitability, and whether the building element is fit for renovation and worth preserving.

1.04



METERING AND MONITORING OF ENERGY CONSUMPTION

Individual metering of electricity, water and heat must be installed for each tenant.

Main meters must be set up for remote reading by the supply company with the possibility of exporting data to Københavns Ejendomme's energy management system.

The number of secondary meters must be agreed with Københavns Ejendomme (the municipal real estate company).

Web-based building control systems must be established in heating and ventilation plants in line with Københavns Ejendomme's requirements specifications for building automation.

1.05



ENERGY MANAGEMENT AND BEHAVIOUR

In new buildings and major renovations, secondary meters must be established for each heating sub-station.

1.06



ENERGY-EFFICIENT LIGHTING

In the case of major changes to indoor lighting systems in shared areas in buildings, energy-efficient solutions must be chosen in accordance with the latest version of the Danish Energy Agency's green procurement recommendations for lighting.

1.07



CLOTHES DRYING FACILITIES

In new buildings and major renovations, secondary meters must be established for each heating sub-station.



Sundholm Syd, AlmenBolig+, Social Housing Association 3B (photo: Peter Kærhus Sørensen)

1.08



DISTRICT HEATING

Buildings must be connected to and draw off district heat in district heating zones so as to exploit the efficient and environmentally-friendly energy from combined heat and power production.

1.09



FACILITIES STAFF TRAINING

Facilities staff in all administrations must be trained in operating and running quality checks on the installed technical facilities.

There should be targeted training of staff in the use of the specific facilities when new and renovated buildings are handed over.

1.10



OPTIMISED OPERATIONAL SETTINGS

A systematic follow-up of operational settings in heating and ventilation plants and equipment has to be undertaken on handover and at the time of the 1-year and 5-year inspections.

1.11



METERING OF DOMESTIC WATER

New buildings must be equipped with individual hot and cold water meters.

When existing domestic water installations are renovated in the course of modernising kitchens and bathrooms, individual hot water meters must be installed. Individual cold water meters must be installed if the number can be limited to two per housing unit.

2 MATERIALS

Construction and civil works produce around 35 per cent of the waste in the City of Copenhagen. Since the municipality established the agenda for energy savings in construction with the KBH 2025 Climate Plan, greater attention has to be given to the resource efficiency of the materials, i.e. on a wider range of environmental impacts and on the whole lifecycle.

More sustainable, clean materials and a greater degree of reuse can contribute to a competitive construction sector and to the development of resource-efficient buildings. The City wishes to strengthen innovation towards a circular economy in the construction sector.

Existing building materials must be reused to the highest possible quality, which is why knowledge of contamination of the building materials and communication on materials for reuse to possible buyers are important initiatives. Requirements to avoid harmful chemicals, to label materials and carry out whole-life assessments will reduce the stress on the environment and build knowledge of the environmental effects of the individual products.

The aim is that new designs should reuse materials or use new products that do not contain harmful chemicals or anything else that could turn the building materials into problematic waste at the end of their lives.



Facade made of reused bricks, new middle school building for Katrinedal School (photo: Torben Eskerod for JJW Arkitekter)

2.01



LIFE-CYCLE ASSESSMENT (LCA)

In new building projects, a life-cycle assessment (LCA) of building elements has to be conducted in order to qualify the choice of designs with the least possible environmental impact.

At least two variants of one of the building elements listed below must be assessed for comparison:

1. Building basis
2. Exterior walls
3. Interior walls
4. Floors, stairs, ramps, balconies, ceilings
5. Roofs
6. HVAC

The following indicators should be assessed:

1. Environmental impact:
 - 1.1. Global warming
 - 1.2. Ozone depletion
 - 1.3. Photochemical ozone formation
 - 1.4. Acidification
 - 1.5. Eutrophication
2. Primary energy consumption
 - 2.1. Consumption of non-renewable primary energy
 - 2.2. Total consumption of primary energy
 - 2.3. Proportion of renewable primary energy

The final choice of the assessed variants of the building element has to be explicated.

2.02



HARMFUL CHEMICALS

No products and materials may be used that contain substances on the Danish Environmental Protection Agency's List of Undesirable Substances (LOUS). This requirement may only be waived if there are no suitable products that can meet the requirement. If requirement 2.03 on environmental labelling is met, this requirement will also be satisfied for the product in question.

2.03



ENVIRONMENTAL LABELLING

Building materials must satisfy the criteria for one of the environmental labels: The Nordic Ecolabel, the EU Ecolabel, The Danish Indoor Climate Label or equivalent.

The requirement applies only to the following building material categories: Engineered boards, ceiling and wall systems, floors and floor coverings, paint, glue, putty and sealant. This restriction is made for accommodating the limited market for environmentally labelled building products.

This requirement may only be waived if there are no suitable products that can meet the requirement. In this case, a low environmental and human impact should be documented in some other way.

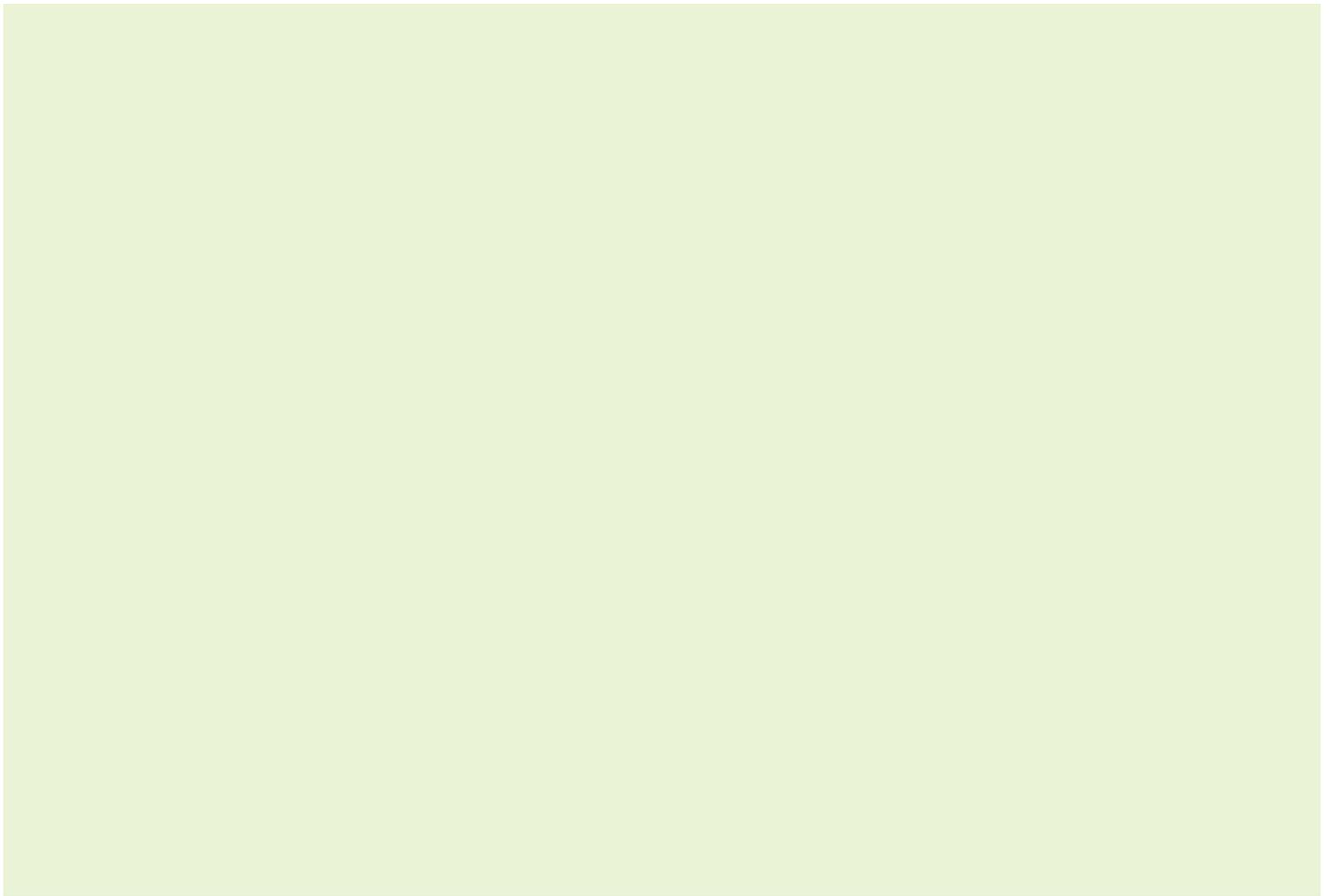
If this requirement is met, requirements 2.02 on harmful chemicals and 2.05 on wood-based building materials will also be satisfied for the product in question.

2.04



PAINT

Only paint products with the lowest MAL code, equivalent to 00-1, may be used. In special cases, there may be a need to use paints with a higher MAL code. If so, this must be justified.



Terrace of heat-treated wood, Sydhavnen School (photo: Jonas Lodahl)

2.05



TIMBER

This requirement aims at any product for civil works and buildings, fixed equipment and playgrounds, which contains wood or wood-based materials. The included wood must originate from sustainable forest management or being labelled environmentally friendly according to requirement 2.03.

This requirement may be met in two ways:

1. Sustainable wood

Follow the national rules for public procurement of sustainable timber.

An additional requirement is that wood may not be impregnated with environmentally harmful substances, including biocides and heavy metals.

Træ må ikke være imprægneret med miljøskadelige stoffer, herunder biocider og tungmetaller.

2. Environmentally labelled wood products

By presenting a valid licence for the Nordic Ecolabel or the EU Ecolabel or equivalent, which lay down requirements for sustainable forestry and chemicals contained in the product.

If requirement 2.03 on environmental labelling is met, this requirement will also be satisfied for the product in question.

2.07



REUSE OF CRUSHED BUILDERS' RUBBLE

Road-building works must use crushed builders' rubble as a substitute for base gravel, provided that this is technically or economically sustainable. Requirements for environmental quality have to be met.

The crushed rubble must not contain any bricks, tiles or concrete that could be reused instead.

2.07



ASSESSMENT OF REUSABLE BUILDING COMPONENTS

Before any building is demolished or renovated, there must be an analysis to show which building elements are suitable for reuse. This applies, for example, to bricks, doors and windows that could have economic value as secondary materials.

2.08



IDENTIFICATION OF ENVIRONMENTALLY HARMFUL SUBSTANCES

When buildings are to be demolished or renovated, a screening for environmentally harmful substances has to be conducted. If the screening finds any such substances, a detailed analysis report on the property is required.

2.09



RECYCLING OF MATERIALS

In construction or civil works that involve demolition and/or renovation, all materials suitable for recycling should be sorted at source and cleaned. This will ensure that the materials can be reused or recycled and not sent to landfill.

Untampered construction rock material must be crushed and reused on site, unless the Municipal Environmental Protection Department determines that this is not acceptable for the local environment.

2.10



PLAN FOR SORTING BUILDING WASTE

Before a construction project starts, a plan for handling construction waste must be submitted. The plan must specify which waste fractions are to be sorted at source on site, how the waste is to be stored, and where the waste containers are placed.

3 INDOOR CLIMATE

Renovations may provide an opportunity to improve the indoor climate.

The noise requirement in Sustainability in Construction and Civil Works 2016 should help to achieve the City of Copenhagen's aim to reduce noise pollution. Considerations of outdoor noise should inform the choice of windows.

The municipality considers that the thermal and visual indoor climate is adequately regulated in the 2015 building regulations.

There are other requirements laid down in Sustainability in Construction and Civil Works 2016 that should help to improve the indoor climate indirectly.

For example, the requirement for building materials without harmful chemicals exceeds the building regulation's requirement for indoor air quality. As another example, the included retrofit energy requirements may indirectly lead to an improved indoor climate by eliminating draughts, condensation and mould formation due to better insulation and ventilation.



3.01



NOISE REDUCTION

Replacing windows in residential buildings must lead to a reduction of the indoor noise level from outside traffic to a level lower than a weighted average (L_{den}) of 38 dB.

4 RAINWATER AND URBAN NATURE

Buildings and civil works have an important function in the process of climate adaptation of the city, safeguarding it against flooding from cloudbursts while also creating more and better green and blue urban spaces for the benefit and pleasure of local residents and visitors to the city, and enhancing biodiversity. These green and blue areas should also help to provide calm and balance in the city.

Existing natural assets in areas covered by construction and civil works projects should be preserved or developed wherever possible.

Cloudburst protection and 'local diversion of rainwater' (LAR) provide for climate adaptation by reducing the risk of flooding of buildings and urban spaces to the benefit of all of the city's inhabitants.



4.01



HANDLING OF RAINWATER

In new buildings and major renovations, wherever technically, environmentally and economically feasible, rainwater from roofs and paved public areas must be reused locally, allowed to soak away according to the principles of 'local diversion of rainwater' (LAR) or, if possible, routed to a watercourse, a flood way or a holding basin.

The following set of measures have to be assessed for implementation in the given priority:

1. Collection and use of roof water for e.g. flushing toilets, communal laundries, watering or car washing
2. Green roofs and/or plant-based LAR solutions which also contribute to urban nature
3. LAR solutions in the form of e.g. soakaways, covered holding basins, diversion to watercourses or storm drains
4. Connection to drains

Points 2 and 3 may well be combined.

4.02



CLOUDBURST PROTECTION

In areas that are particularly susceptible to flooding from cloudbursts, buildings and civil works should be equipped to withstand water up to ten centimetres above street level.

4.03



ROAD SURFACE WATER

Surface water from roads with annual average daily traffic (AADT) below 5,000 vehicles should be cleaned and routed to watercourses or allowed to seep away. Surface water from roads with AADT below 5,000 vehicles could also be diverted directly to the sea via a sand trap and oil separator.

If it is not possible to divert surface water from roads to watercourses, it should be routed to the public drainage system.

Surface water from roads with AADT greater than 5,000 vehicles should be routed to the public drains.

4.04



URBAN NATURE

Prior to any construction or civil works project, the percentage of urban nature relative to built-on and paved areas should be determined.

Construction and/or civil engineering projects should assess whether it is possible to maintain or increase the proportion of urban nature.

5 RESOURCES AND WASTE

In the City of Copenhagen, resources should be used in the best possible way, so as much as possible is reused and the least possible waste is burnt or taken to landfill.

It is therefore necessary to change the approach from waste disposal to resource usage. The materials should no longer be discarded and go to waste, but should remain in circulation for as long as possible.

According to the municipality's strategy in its Resource and Waste Management Plan 2018, the material resources should retain the maximum possible value in the waste hierarchy.

The waste requirements in Sustainability in Construction and Civil Works 2016 therefore focus on reducing the quantity of waste and providing for effective sorting at source, so enabling increased reuse and recycling.



Green waste shelter in courtyard garden (photo: Copenhagen Courtyard gardens)

5.01



OUTDOOR WASTE SORTING FACILITIES

The following requirements for sorting waste at source in courtyards belonging to private homes and institutions must be adhered to:

1. Hazardous waste: There must be a special cabinet set up on the property to collect hazardous waste. These can be obtained from NEM Affaldsservice (www.kk.dk/artikel/tilmelding-af-ejendom-til-nem-affaldsservice-og-indsamlingsordning).
2. Garden waste: Properties with the possibility for using compost shall compost their garden waste in open spaces on their own plot. Alternatively, garden waste containers can be obtained from NEM Affaldsservice.
3. Space for large items of waste: Each property should set aside approx. $\frac{1}{2}$ m² per household in e.g. shelters, rooms or the like for large items of waste such as bulky refuse, wood for recycling and large electronic waste, including fridges. The actual space to be allocated will require a case-by-case assessment based on the number of homes, the condition of the site etc. You can register for the bulky refuse scheme by contacting NEM Affaldsservice.
4. Direct reuse: exchange options within the property: Steps should be taken to ensure that the options for direct reuse and waste reduction are in place by allowing residents to exchange items, possibly on special exchange shelves which could be installed in a bulky refuse room, a cellar etc. Space should be set aside for this.

In properties with very small outdoor spaces, or where special consideration needs to be given to the working environment, an alternative waste management solution must be found in collaboration with the City of Copenhagen.

5.02



PLACING OF WASTE CONTAINERS

In residential buildings, it should be possible to place the waste containers either in waste rooms in the building, in shelters or in the open air.

If the collection place for waste is placed in the open, the containers should be placed more than five metres away from domestic or kitchen windows.

The containers should be easily accessible to all and the refuse collectors.

The City of Copenhagen will assess, based on drawings and descriptions of the waste management solution, whether the solution is easily accessible.

5.03



WASTE SORTING IN KITCHENS

Kitchens in dwellings should be set up so waste can be sorted at source into at least four fractions.

5.04



WASTE SORTING IN INSTITUTIONS

Waste sorting facilities in institutions should be easy to use, accessible and adequately sized.

There should be space to set up adequate facilities for outdoor storage of waste so the waste can be collected easily.

Waste extraction systems for residual waste may not be installed in municipal institutions located in residential properties.

6 BUILDING SITE

The construction process accounts for much of the environmental impact over the lifecycle of buildings and installations.

As almost all sites in the city are classified as slightly contaminated, the municipality is especially concerned with safe handling of contaminated soil.

Air pollution, such as from construction vehicles, has significant negative effects on human health and well-being with substantial socio-economic consequences. Requirements for approved particle filters on non-roadgoing machinery in Sustainability in Construction and Civil Works 2016 are intended to bring about cleaner air, not least on building sites.



6.01



SOIL POLLUTION

If a case of soil contamination poses an environmental or health problem, the contamination must be removed.



6.02

ADDED SOIL AND FILLING MATERIALS

Added soil and other filling materials must be shown to be clean when they are spread on unpaved areas.

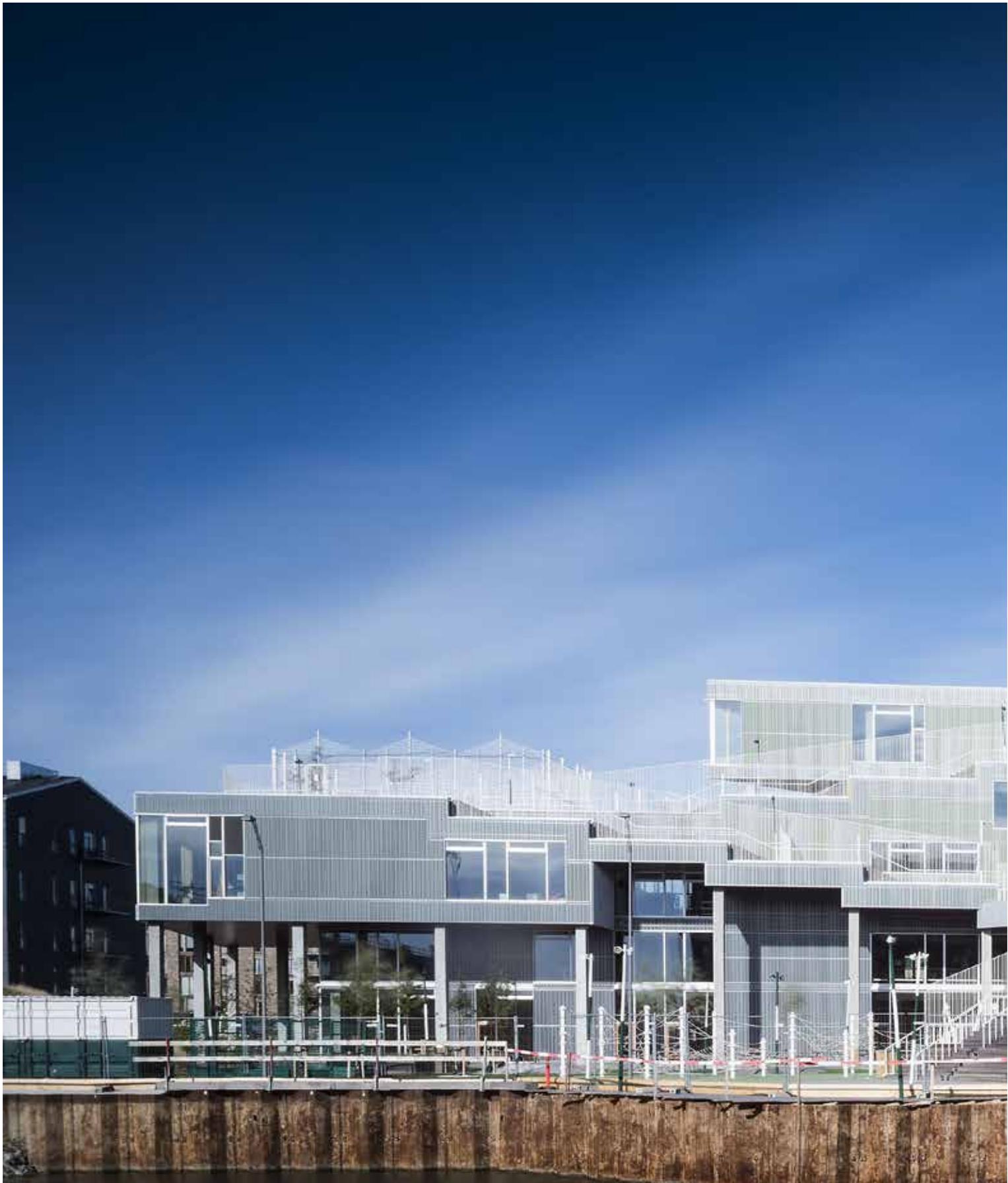
6.03



PARTICLE FILTERS

Non-road-going machinery must meet the requirements for 'Stage IIIb' or more recent European stage requirements.

Older non-roadgoing machinery equivalent to 'Stage IIIa' or below, which are larger than 19 kW, must be fitted with approved particle filters.



February 2017

COPENHAGEN TOGETHER

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Cover: School in Sydhavnen (photo: Jonas Lodahl)

