NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

City of Copenhagen

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Table of Contents

Summary

Copenhagen's Climate City Contract describes how Copenhagen intends to be among the first cities to become CO_2 neutral by 2030. Copenhagen is in the process of completing the current CPH 2025 Climate Action plan and is in parallel preparing an overarching Energy Strategy and the next Climate Action 2035 plan. Consequently, this Action Plan includes current and indicate upcoming climate action initiatives, barriers and opportunities, key stakeholders, and the overall enabling framework. It describes how the City of Copenhagen in cooperation with citizens, neighbouring municipalities, the private sector, utility companies, and other key stakeholders will implement the initiatives and meet the ambitious goal.

This Climate City Contract reflects that Copenhagen is in a transition phase where the current climate action plan will be replaced by a new and even more ambitious plan starting by January 2026. The overarching goal of the present CPH 2025 Climate Action plan was to reach climate neutrality by 2025 and the plan's initiatives were carefully designed with that goal in mind. However, due to the delay of key initiatives, for financial and technical reasons, climate neutrality cannot be met by 2025. The Climate City Contract is therefore primarily based on those elements from the current CPH 2025 Climate Action plan that are expected to be fully or partly continued towards 2030, as well as capitalises on the ongoing preparations for the upcoming Climate Action 2035 Plan that is expected to be approved by the City Council towards the end of the second quarter of 2025.

List of figures

List of tables

Abbreviations and acronyms

Abbreviations and acronyms	Definition
ARC	ARC manages everything to do with waste and helps the public and companies to dispose of their waste in a way that's best for the environment and climate. ARC manages waste for our five owner municipalities including Copenhagen.
AI	Artificial intelligence
BBR	Building's register (Danish Property Assessment Agency)
BIOFOS	BIOFOS is Denmark's largest wastewater utility, treating the wastewater from 1.2 million inhabitants in the Copenhagen metropolitan area at our three treatment plants.
Building Energy Management Systems (BEMS)	Building Energy Management Systems are used by building owners, operators, and end-users to improve the energy performance of buildings. This is achieved by providing users with measurement, recording, trending, and alarming capabilities, and diagnosis of unnecessary energy use.
C40	C40 is a global network of nearly 100 mayors of the world's leading cities that are united in action to confront the climate crisis. Mayors of C40 cities are committed to using an inclusive, science-based and collaborative approach to cut their fair share of emissions in half by 2030, help the world limit global heating to 1.5°C, and build healthy, equitable and resilient communities.
Capital Region of Denmark	Capital Region of Denmark [*Hovedstadsregionen*] organises municipalities located on the eastern part Zealand and around Copenhagen.
Cerius	Distributor of electricity outside Copenhagen.
Citizen's Climate Assembly	The citizens' Climate Assembly [*Klimaborgertinget*] consists of 36 representatively selected Copenhageners who, based on expert presentations and debates, make recommendations on climate change to the City Council.
Climate Alliance	The Climate Alliance [*Klimaalliancen*] is a partnership established by the Local Government Denmark (KL), Danish Regions, and RealDania and constitutes a common framework for the implementation of municipalities' climate action plans.
C4 (Copenhagen Carbon Capture Cluster)	C4 is a cluster cooperation project in the capital that collaborates on carbon capture and storage. The collaboration was established in February 2021. Altogether, there is a potential to reduce carbon emissions by 3 million tonnes a year using carbon capture and storage. The members represent the entire value chain from energy production to the procurement of surplus heat in the district heating network and the shipping of captured carbon to a storage site. The participating members of the C4 cluster: ARC, ARGO, BIOFOS, Copenhagen Malmö Port, CTR, HOFOR, Vestforbrænding, VEKS and Ørsted.

CMP (Copenhagen Malmö port)	Copenhagen Malmö Port (CMP) is one of Scandinavia's largest port operators, and a full-service port in the Oresund region. We receive a vast variety of goods and have an infrastructure customised for all types of vessels.
CONCITO	CONCITO is Denmark's green think tank aiming to translate relevant knowledge into climate action and thereby accelerate the green transition. Through scientific and knowledge-based analyses and information, the aim is to show how it is possible to create a climate-neutral and climate-resilient society.
CO-PI	The Centre for Public-Private Innovation (CO-PI) is a national centre created by the government, The Local Government Denmark, and Danish Regions.
CPH City & Port	CPH City & Port is a development and operating company that delivers long-term and holistic urban development and takes responsibility for creating coherent and well-functioning urban neighbourhoods. CPH City & Port Development is 95% owned by the City of Copenhagen and 5% by the Danish state. As an urban development company, landowner, and port authority, CPH City & Port Development has a special position and responsibility in Copenhagen.
CTR	In the Greater Copenhagen Area five municipalities have joined forces to implement and operate a common district heating system. The Metropolitan Copenhagen Heating Transmission company - known as CTR – was formed in 1984.
Danish Energy Agency	[*Energistyrelsen*]. The Danish Energy Agency is responsible for tasks linked to energy production, supply and consumption, as well as Danish efforts to reduce carbon emissions. The Agency is also responsible for supporting the economical optimisation of utilities that in addition to energy includes water, waste and telecommunication.The Danish Energy Agency is an agency under the Ministry of Climate, Energy & Utilities.
Danish Intelligent Energy Alliance	The mission of the Danish Intelligent Energy Alliance: is to establish the Danish platform for key players among DSOs, industry, research institutions, advisors and municipalities (including the City of Copenhagen) which are all essential to effectively roll-out an intelligent energy system. From the Alliance' perspective an intelligent energy system includes everything from a smart grid to the full integration of energy systems (electricity, gas, heating, water, and waste).
DCE	Danish Centre for Environment and Energy. DCE is Aarhus University's central unit for knowledge exchange within the areas of nature, environment, climate and energy. DCE delivers science-based consultancy and solutions that help greening of the economy and promote sustainable growth at both local, national and international scale.
DI	DI is a private business and employers' organisation representing approximately 20,000 companies in Denmark.
District Committees	Members of the District Committees [*Lokalråd*] are elected every four years. There are 12 of these district committees in Copenhagen. The District Committees support and develop the local environment by inspiring and engaging Copenhageners, companies, and organisations in the district to actively participate in environmental projects.
DSB	DSB is an independent public railroad corporation owned by the Danish Ministry of Transport.
DSO	Distribution system operators are the operating managers (and sometimes owners) of energy distribution networks, operating at low, medium and, in some member states, high voltage levels.
Energinet	Energinet is an independent public enterprise owned by the Danish Ministry of Climate, Energy and Utilities. Energinet owns, operates, and develops the transmission systems for electricity and gas in Denmark
Energy Leap partnership	The Energy Leap partnership [*Energispring*] focuses on energy savings in buildings and represents 56 real estate companies and organizations and almost 40% of the building stock in Copenhagen. It addresses energy challenges in

	buildings collectively, share valuable insights and experiences, and develop innovative solutions thereby reducing energy consumption, lowering carbon emissions, and creating a more sustainable future for Copenhagen. Energy Leap | Energispring (kk.dk).
Fit-for-55 package	The Fit-for-55 package includes the following adopted or agreed proposals: reform of the EU Emissions Trading System (ETS) and the Market Stability Reserve (MSR); a new, self-standing ETS for buildings, road transport and fuels for additional sectors (ETS2); revised Effort Sharing Regulation (ESR); the Carbon Border Adjustment Mechanism (CBAM); the Social a revised Land Use, Land-Use Change and Forestry (LULUCF) Regulation; updated CO2 emission standards for cars and vans; the Alternative Fuel Infrastructure Regulation (AFIR); FuelEU Maritime; ReFuelEU Aviation; the Energy Efficiency Directive (EED); Renewable Energy Directive (RED); the Regulation on methane emissions reduction in the energy sector; and the associated revision of the Regulation on Fluorinated Greenhouse Gases. The Fit-for-55 and associated proposals that are still under negotiation with the co-legislators at the time of drafting this report are: the Energy Performance of Buildings Directive (EPBD); the Hydrogen and decarbonised gas market package; the proposal for a revised Energy Taxation Directive; and the revision of the Regulation on CO2 emission standards for heavy-duty vehicles.
Green Power Denmark	Green Power Denmark is a non-commercial business organization gathering around 1,500 members from across the green energy value chain. Green Power Denmark represents companies in the renewable energy industry, owners and developers of renewable energy systems, electricity companies, distribution system operators (DSOs), energy trading companies, and companies that work to refine, convert, and store green electricity.
HOFOR	Greater Copenhagen Utility. HOFOR is supplying 1.1 million customers in the Copenhagen metropolitan area with: Drinking water, district heating, district cooling, town gas, and disposal of wastewater.
KEJD	KEJD manages the City of Copenhagen's property portfolio with a focus on long-term needs for the benefit of citizens, companies, and employees. KEJD manages and rents 2.6 million m^2 spread over approx. 3500 buildings and is responsible for approx. 830 properties, including: Administration buildings, Copenhagen City Hall, cultural centres, libraries, institutions, nursing homes, schools, and sports facilities.
KL (Local Government Denmark)	The Local Government Denmark [*Kommunernes Landsforening*] is an association and interest organization of the 98 Danish municipalities, safeguards common interests of the municipalities, assist individual municipalities with consultancy services, and ensure that the local authorities are provided with up-to-date and relevant information.
LCA	Life cycle assessment.
Metroselskabet	Copenhagen's metro is managed by Metroselskabet that is owned the City of Copenhagen (50%), the Danish state (41,7%) and the municipality of Frederiksberg (8,3%).
Movia	Movia is Denmark's largest mobility company. Every year, Movia carry approximately 180 million passengers in buses, local trains, and flex traffic. Movia is owned by the 45 municipalities and two regions on Zealand.
NZC	The NetZeroCities project supports Europe and in particular European cities to drastically cut down greenhouse gas emissions through climate action to achieve 'climate neutrality', one of the biggest challenges our societies face today.

Radius	Radius operates the electricity grid that supplies 1 million homes and businesses in the Copenhagen area, in North Zealand and in parts of Central Zealand.
RealDania	Is a non-profitmaking, charitable association that supports large and small projects that contribute to creating quality of life for all through the built environment, i.e. large and small towns and cities, villages as well as urban spaces, parks, buildings and built heritage.
VEKS	VEKS delivers secure, efficient, and environmentally sound district heating to local district heating systems.
Vestforbrænding	Denmark's largest waste and energy company. Vestforbrænding wants to mitigate climate change with CO_2 capture, expansion of the district heating network, recycling and more and better waste sorting.

1 Introduction

Copenhagen's Climate City Contract describes how Copenhagen intends to be among the first cities to become CO_2 neutral by 2030. This Action Plan includes current and upcoming climate action initiatives, barriers and opportunities, information on key stakeholders, the overall enabling framework, and describes how the City of Copenhagen in cooperation with citizens, the private sector, neighbouring municipalities, utility companies, and other key stakeholders will implement the initiatives and meet the ambitious goal.

The Climate City Contract is first and foremost based on those elements of the current CPH 2025 Climate Action plan that are expected to be continued towards 2030 but will also anticipate the overall goals and initiatives of the upcoming Climate Action 2035 plan that are currently being prepared. A first version of the Climate Action 2035 plan will be presented to the City Council towards the end of 2024 and is expected to be finalised and approved before the end of the second quarter of 2025.

Therefore, new initiatives and targets (i.e., in addition to those already presented in the CPH 2025 Climate Action plan) included in this Climate City Contract must be regarded as provisional until the required formal decisions have been made by the City Council. The new climate action plan will commence by January 2026.

The CPH 2025 Climate Action plan has an overall goal of reaching climate neutrality by 2025. Although emissions have be reduced considerably since the onset of the current plan, climate neutrality is not achievable by 2025 due to financial and technical reasons. It is therefore meaningful to base this Climate City Contract primarily on approved and key delayed initiatives from the CPH 2025 Climate Action plan, lessons learnt during the implementation of the current plan, and a provisional description of main initiatives assumed to be included in the Climate Action 2035 plan.

For simplicity and to support a seamless transition from the current to the new climate action plan, the Climate City Contract is organised around four main fields of action i.e., reducing energy consumption, fostering green mobility, building a green energy system, and carbon capture activities. These four fields of action will provide the structure for part 2 and 3.

Table I-1.1: Climate Neutrality Target by 2030			
Sectors	**Scope 1**	**Scope 2**	**Scope 3**
Stationary energy	X	X	-
Transport	X	X	-
Wastewater Waste	X	Not applicable	X
IPPU	X	Not applicable	-
AFOLU	X	Not applicable	-
Geographical boundary	**Same as city administrative boundary**	**Smaller than city administrative boundary**	**Larger than city administrative boundary**
	X		

Table 1. Climate neutrality target by 2030

The current CPH 2025 Climate Action plan include emission reduction targets and initiatives concerning scope 1, 2, and 3 (waste) in accordance with the City Mission's requirements, see Table 1, and comprise the full geographical area of the City of Copenhagen, see Figure 1. Map of Copenhagen. The area of Copenhagen is 90,9 km^2.Figure 1.

To further support the presentation of the CO_2 inventory and Copenhagen's high level energy strategy, the main power plants in Copenhagen are shown in Figure 3.

Figure 1. Map of Copenhagen. The area of Copenhagen is 90,9 km^2.

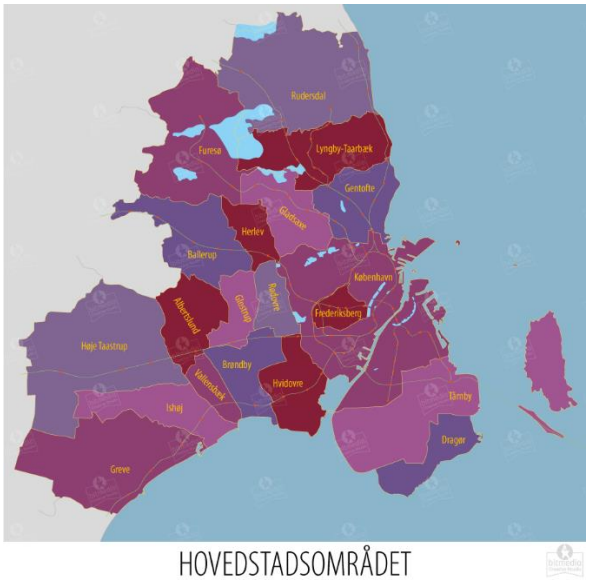


Figure 2. Copenhagen Metropolitan Area. Credit Bitmedia.

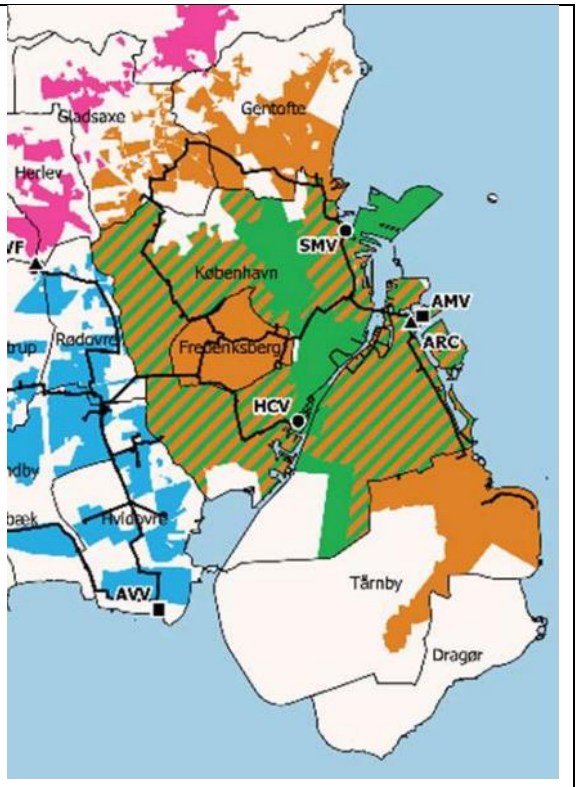


Figure 3. Main power plants in Copenhagen. Black circle = peak load installations; Black square = Amagerværket power station; Black triangle = Amager Bakke waste-to-energy plant. Credit: FFH50.

2 Part A – Current State of Climate Action

2.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

The CO_2 inventory for 2021 comprises the area of the City of Copenhagen and includes greenhouse gas emissions and removals from sources physically located within the City of Copenhagen (e.g. oil boilers, passenger cars, buses, industrial plants, trees – also referred to as scope 1) and emissions due to consumption of grid-supplied energy (electricity, district heating, steam, district cooling – also referred to as scope 2). In addition, a few consumption-based emission sources (also referred to as scope 3) are included, which are included as emission sources in KL's CO_2 calculator and are therefore also included here (e.g. domestic flights).

The inventory covers one calendar year (January to December 2021) and includes the greenhouse gases CO_2, methane (CH_4) and nitrous oxide (N_2O), as well as industrial gases (HFCs, PFCs, SF6 and NF3) to the extent possible.

All greenhouse gases are converted to CO_2 equivalents (CO_2e) based on the global warming potential (GWP) of the gases in accordance with the Intergovernmental Panel on Climate Change (IPCC) fifth assessment report.

The accuracy of the calculated CO_2 emissions depends on what activity data are available. The applied data are classified according to level of detail and precision in alignment with the guidelines provided by the IPCC. The applied three levels of activity data are summarised here:

- Tier 1: Typical country emission (information from DCE) x number of inhabitants in the municipality/number of inhabitants in Denmark or other relevant metrics.
- Tier 2: Consumption (municipal data) x emission factor, such as the number of homes in the municipality with oil as an energy source and an average heat consumption per dwelling.
- Tier 3: As Tier 2 but based on concrete information on individual sources (such as traffic counts and known emission factors for the different types of vehicles).

The inventory below describes Copenhagen's emissions for 2021 as reported to C40 in accordance with the provisions. Inventories since 2005 and the most recent inventory (in Danish) are available from the City of Copenhagen here.

The baseline inventory for the CPH 2025 Climate Action plan (2010) is available here.

Supporting data used to construct the inventory, i.e., emission factors and activity data, are presented in Table 3 and Table 5.

In summary, total emissions for 2021 amounted to approximately 947.000 tons/CO_2e or around 38% of the baseline year (2010) emissions, see Table 4 and Figure 4. The main emitting sectors are transport - total (44%), transport - road traffic (34%), electricity consumption (36%), district heating (16%). It should be emphasised that, as can be seen in Table 6 and Table 7, the energy mix for electricity respectively district heating is already 80% and 85% CO_2 neutral.

Please note, however, that from 2022 onwards Energinet decided to apply regional CO_2 emission factors for electricity. Copenhagen uses the emission factor for the eastern part of Denmark. Consequently, the total emission for Copenhagen for 2021 has been re-estimated to 824.337 tons CO_2e. This change will be reflected in the next C40 report. Table 8, Figure 4, Figure 5 and Figure 6, show the recalculated emissions whereas the information in Table 2 to Table 7. Energy mix used for thermal (heating/cooling) consumption.is identical to the publicly available C40 report.

The implementation of the CPH 2025 Climate Action plan has led to a significant decrease of Copenhagen's emissions, e.g., CO_2 emissions per capita went from 4,7 tCO_2e in 2010 to 1,3 tCO_2e in 2022 and is expected to get below 1,0 tCO_2e by 2025. Thus, Copenhagen is clearly on a good trajectory towards climate neutrality in 2030.

However, please note that the CPH 2025 Climate Action plan considers the contribution from renewable energy production taking place on facilities situated within or outside the city limits and are fully or partly owned by the City of Copenhagen. Using this approach, Copenhagen's CO_2 emission level is reduced even further. In 2022, this reduction amounted to approximately 250.000 tons CO_2 leading to a CO_2 emission per capita of 0,8 tCO_2e. Progress reporting and climate inventories related to the CPH 2025 Climate Action plan therefore include emission numbers with and without the contribution from renewable energy production.

The results (e.g., Figure 4, Figure 5, Figure 6) presented below do not include the contribution from renewable energy production in alignment with the method of calculation adopted for Copenhagen's next climate plan.

A-1.1: Final energy use by source sectors			
Base year	2021		
Unit	MWh/year		
	Scope 1	Scope 2	Scope 3
Buildings	130.840	6.360.443	-
Transport	-	98.049	-
Waste	-	-	-
Industrial Process and Product Use (IPPU)	-	254	-
Agricultural, Forestry and Land Use (AFOLU)	-	-	-

Table 2. Final energy use by source sector.

A-1.2: Emission factors applied					
Data from the 2021 inventory.					
Electricity: **District heating**: **Individual heating**: **Town-gas**: **Road traffic**: **Trains (fossil fuel)**: **Trains (electric)**:	163,0 kg CO_2e/MWh. 35,2 kg CO_2e/GWh. 205 kg CO_2e/MWh (natural gas); 267 kg CO_2e/MWh (fossil fuel). 81 tons CO_2e/GWh. 184,4 g CO_2e/km (cars); 258,8 g CO_2e/km (vans); 969,6 g CO_2e/km; (trucks); 604,0 g CO_2e/km (busses); 917,6 g CO_2e/km (other busses); 97,0 g CO_2e/km (motor bikes). 3.161 g CO_2e/km (passenger trains); 11.293 g CO_2e/km (cargo trains). 163 g CO_2e/kWh.				
The City of Copenhagen uses the CO_2 calculator, developed jointly in 2008 by the Ministry of Climate and Energy and Local Government Denmark and is based on IPCC guidelines.					
Carbon Dioxide (CO_2)	Methane (CH_4)	Nitrous Oxide (N_2O)	F-gases (hydrofluorocarbons and perfluorocarbons)	Sulphur hexafluoride (SF_6)	Nitrogen trifluoride (NF_3)
X	X	X	X*	X*	X*

Table 3. Emission factors applied. *) when applicable.

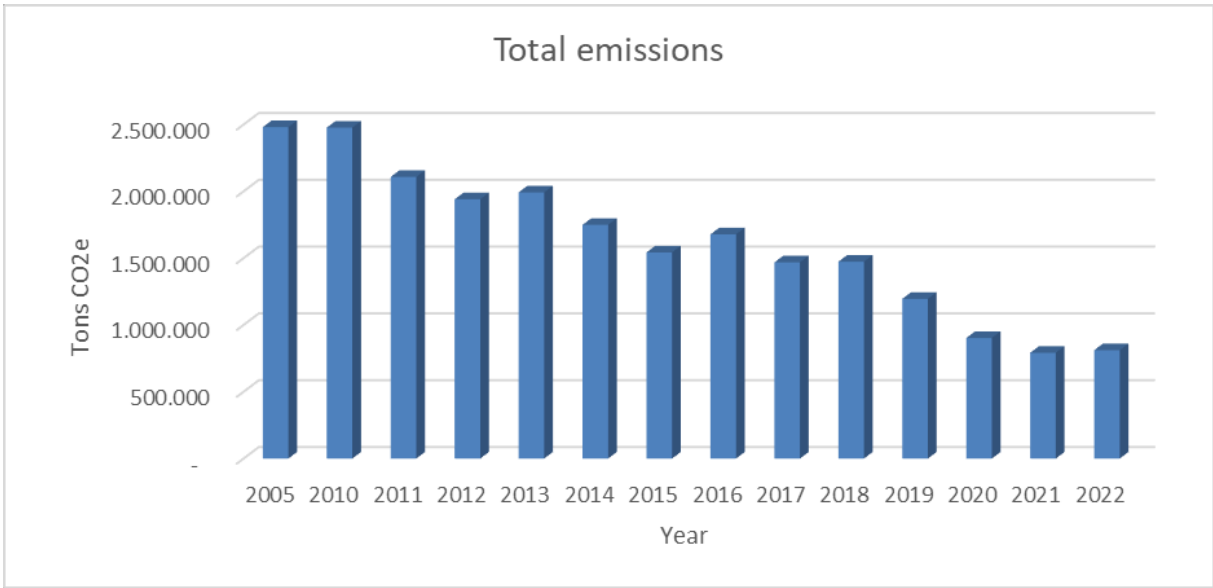


Figure 4. Copenhagen's total annual CO_2e emissions 2005 to 2022.

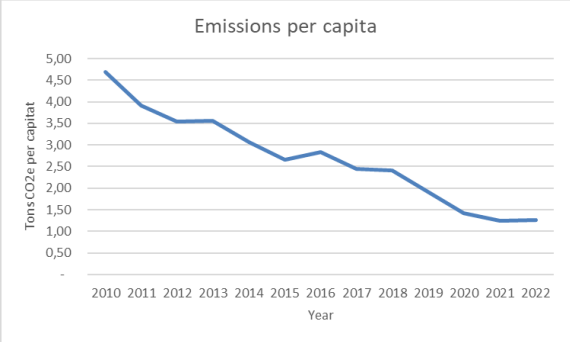


Figure 5. Copenhagen's CO_2e emissions per capita for 2010 to 2022.

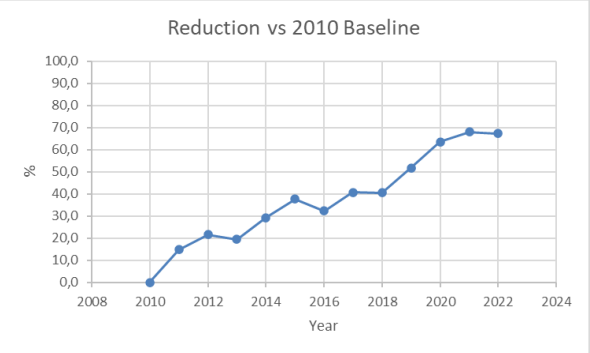


Figure 6. Per cent reduction obtained vs the 2010 baseline.

A-1.3: GHG emissions by source sectors						
Base year		2021				
Unit		Tons CO_2e/year				
		Scope 1	Scope 2	Scope 3	Total	%
Buildings		11.592	493.156		504.748	53,2
Transport		396.273	15.982	8.600	420.855	44,3
Waste		3.810		750	4.560	0,4
Industrial Process and Product Use (IPPU)		18.500			18.500	1,8
Agricultural, Forestry and Land Use (AFOLU)	Sources (positive emissions)	70			70	0,3
	Sinks (negative emissions)	-1683			-1683	
Total		428.562	509.138	9.350	947.050	100,00

Table 4. GHG emissions by source sector.

A-1.4: Activity by source sectors			
Year: 2021			
	Scope 1	Scope 2	Scope 3
Buildings (electricity consumption)			
Residential building		371.833 MWh/y	
Commercial and institutional buildings and facilities		1.430.719 MWh/y	
Manufacturing industries and construction		200.197 MWh/y	
Energy industries		101.441 MWh/y	
Buildings (heat consumption)			
Residential buildings	34.342 MWh/y	2.900.000 MWh/y	
Commercial and institutional buildings and facilities	41.000 MWh/y	366.000 MWh/y	
Manufacturing industries and construction	55.000 MWh/y	990.000 MWh/y	
Transport			
Passenger cars		1.214,0 million km/y	
Delivery vans		217,0 million km/y	
Trucks		27,6 million km/y	
Busses		20,7 million km/y	
Motor bikes		10,5 million km/y	
Passenger trains		750.591 km/y	
Freight trains		4.019 km/y	
S-trains		40.621,8 MWh/y	
Metro		32.406,3 MWh/y	
Passenger trains		23.081,5 MWh/y	
Freight trains		1.639,6 MWh/y	
Waste			481.857 tons
Industrial Process and Product Use (IPPU)		254 MWh/y	
Agricultural, Forestry and Land Use (AFOLU)	-	-	168 hectares

Table 5. Activity by source sector.

Source of energy	(%)	
Coal	11,2	
Gas	5,2	
Oil	0,8	
Nuclear	2,3	
Hydropower	11,7	
Bioenergy (biomass and biofuels)	18,6	
Wind	41,8	
Solar	3,9	
Waste to energy (excluding biomass component)	2,1	
Other renewable sources	2,5	

Table 6. Energy mix used for electricity consumption.

Source of energy	(%)
Coal	0,2
Gas	6,6
Oil	1,3
Bioenergy (inc. biomass and biofuels)	70,3
Waste to energy (solid waste excluding biomass)	7,1
Other renewable sources	14,3

Table 7. Energy mix used for thermal (heating/cooling) consumption.

Figure 7. Air quality monitoring stations in Copenhagen[1]. Red dots 1-5.

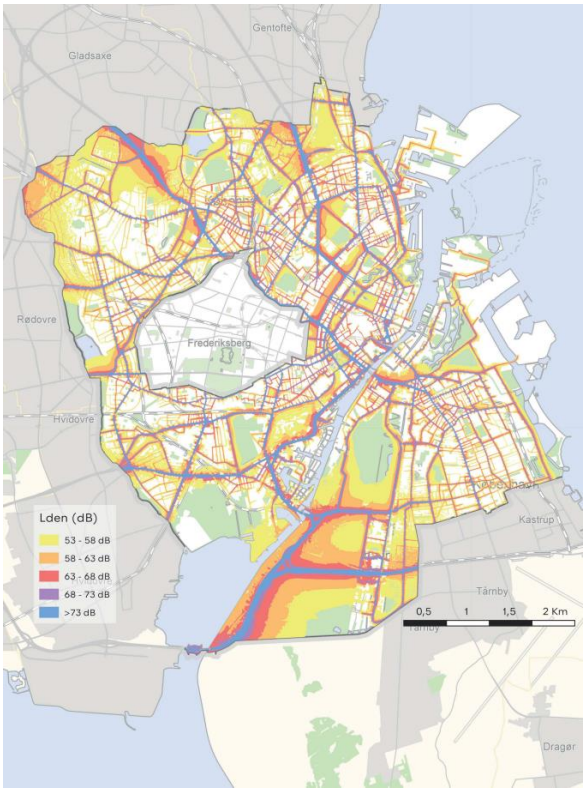


Figure 8. Distribution of noise in Copenhagen. Day time values. Approximately 170.000 buildings (336.000 inhabitants) experience noise values above the recommended limit of 58 dB. Almost 38.000 building (72.000 inhabitants) are severely impacted (i.e. noise level above 68 dB).

One obvious co-benefit of reducing emissions is the resulting improved level of air quality. In Denmark, air quality limits are set by the EU air quality directives. However, the City of Copenhagen aims at complying with the WHO guidelines for PM2.5, PM10, and NO_2 by 2030. In 2022, air quality measurements from the five monitoring stations (Figure 7) were below the EU maximum values for NO_2 and PM2.5. Nevertheless, the WHO guidelines for annual average values of NO_2 and PM2.5 were exceeded at all five measuring stations, except for the NO_2 annual mean on the Backersvej station. The WHO guidelines for daily average values of NO_2 and PM2.5 were also exceeded at all measuring stations.

As regards another potential co-benefit – reduced noise from road traffic - the municipality has prepared a proposal for an Action Plan for Road Noise 2024-2029. The action plan describes the status of the traffic noise and sets the framework for how to reduce noise from road traffic in the coming planning period. The plan contributes to reducing the proportion of noise-affected areas (Figure 8) and improve citizens' health due to noise reduction measures where the need is greatest. The plan is now in public consultation and the final action plan will be submitted to the City Council in Q3 2024[2].

Copenhagen's ambition to comply with WMO air quality guidelines by 2030 and to reduce noise from road traffic is closely linked to the successful implementation of climate actions in particular as regards actions focusing on the transport sector. The City of Copenhagen's goal to improve the quality of life for

[1] Overvågning af luftkvalitet i Københavns Kommune (kk.dk)
[2] d375650c-d58a-43eb-8493-b3f15406b0f7-bilag-3_1.pdf (kk.dk)

Copenhageners requires that key elements, such as air quality and noise, are carefully considered from a coordination, implementation, and monitoring perspective. Achieving these co-benefits and others are a valuable outcome of climate action that should be highlighted and communicated to underpin the importance of reaching climate neutrality.

2.2 Module A-2 Current Policies and Strategies Assessment

As in all other areas of government, the municipalities' climate efforts take place in interaction with the regions, the state, and the EU. The state and the EU frame the municipalities' room for action through legislation, regulations, and directives. However, international climate agreements and national climate laws often require local implementation efforts before concrete results can be achieved. Consequently, municipalities play an important role as agents of change that effectively contribute to climate action and the fulfilling of both local and national climate goals.

2.2.1 EU and national level

The Danish government's Climate law, approved June 2020, provides the overarching legislative framework for climate policies and actions at national level and consequently also for the City of Copenhagen. The purpose of the Climate Law is for Denmark to reduce greenhouse gas emissions in 2030 by 70% compared to the level of emissions in 1990 and Denmark wants furthermore to become a climate neutral society by 2050 at the latest in line with the Paris Agreement target of limiting the global temperature rise to 1.5 degrees Celsius. To monitor and document the implementation of the Climate Law and related legislation, the Minister for Climate, Energy and Utilities annually prepares a climate status and projection. The Climate Law has since been supplemented by several dedicated agreements focussing on energy, transport, waste, CO_2 capture and storage, and PtX fuels. The present government has agreed to bring forward the goal of climate neutrality to 2045 and reduce greenhouse gas emissions by 110% in 2050 compared to 1990.

The Danish government's ambition of 1 million green cars, greener fuels, and a significant CO_2 reduction of 2.1 million tonnes, which brings Denmark a big step closer to the 2030 climate target, will also positively impact the number of electric cars acquired and used by Copenhageners and the transition towards fossil-free road transport by 2030 in Copenhagen.

The Heating Supply Act regulates the overall framework for heat supply planning in Denmark. The purpose of the Act is to promote the most socio-economic and environmentally friendly use of energy for heating and hot water supply to buildings and, within this framework, to reduce the dependence of energy supply on fossil fuels. The Act's provisions stipulate that the organisation of heat supply shall be carried out, in accordance with the objectives and with a view to promoting as far as possible the cogeneration of heat and electricity.

Policies and strategies developed and implemented by the Danish state and municipalities, including Copenhagen, are strongly inspired by, and linked to the EU's climate ambition and target enshrined in the EU Climate Law and realised via the Fit for 55 legislative package that aims at reducing EU's net greenhouse gas emissions by at least 55% by 2030. For Copenhagen, the revised EU energy efficiency directive aiming at reducing final energy consumption at EU level by 11.7% in 2030, compared to projections made in 2020; the revision of the energy performance of buildings directive to make buildings in the EU more energy efficient by 2030 and beyond; and the new CO_2 emission standards for cars and vans and other relevant directives and regulations will enable and positively strengthen and impact the implementation of the City of Copenhagen's Climate Action plans.

The Danish government has recently launched a new initiative regarding carbon capture and storage (CCS). With the initiative, the government has presented a roadmap and a financing model for how CCS can contribute with 3.2 million tons of CO_2 reductions in 2030. It signals that CCS facilities that will capture, transport and store CO_2 must be operational by 2029. In addition, the government underlines that CO_2 must be stored permanently rather than converted into fuels and emitted again. This initiative is expected to underpin Copenhagen's desire to establish one or two CCS installations before 2030.

2.2.2 Regional level

Copenhagen Metropolitan Area (see Figure 2) is primarily situated within the Capital Region of Denmark and Region Zealand, consists of 18 municipalities. As of 1 January 2022, this area had a population of 1.336.982.

The City of Copenhagen is actively involved in the coordination and cooperation with other municipalities at national and regional level regarding the development and implementation of climate action plans. This cooperation is organised by the Local Government Denmark and Capital Region of Denmark. Additionally, the Climate Alliance supports the development and implementation of the municipalities' climate action plans, optimise efforts across municipalities and regions, and aims to document the impact of climate efforts and establish a common monitoring system.

Resource efficiency constitutes a key element of the Regional Development Strategy of the Capital Region of Denmark. Targeted investments in this area will contribute to reaching the Capital Region's goal of being resource efficient, with at least 80% of its waste being recycled by 2035.The strategy has been followed up by an action plan to ensure broad regional cooperation in realising the strategy during the coming years.

The Capital Region of Denmark is working for a greener and cleaner environment including a significant reduction in CO_2 emissions to avert climate change. It is seen as vital to switch the energy and transport sector over to using renewable energy and to utilizing energy efficiently. Green transport choices open to the individual citizen must be attractive and easy to use. The switch calls for large investments and targeted coordination, i.e., initiatives must be cost-efficient to implement and as cheap as possible for citizens in the Capital Region.

The Local Government Denmark's CO_2 reduction initiative is the municipalities' joint proposal vis-à-vis creating a better framework for local climate action and local climate leadership. The proposal contains 48 specific recommendations for reducing CO_2 emissions.

2.2.3 Local level

Several of the City of Copenhagen's policies, strategies, and plans are supporting and enabling the efficient implementation of the CPH 2025 Climate Action plan, serve as basis for the upcoming Climate Action 2035 plan, and collectively constitute the foundation allowing Copenhagen to become CO_2-neutral by 2030.

The important coordination of this eco-system of policies, strategies, and plans ensuring efficient alignment and achievement of synergy effects is secured through cross-cutting coordination at city administration level primarily between the Technical and Environment and Finance Administrations, and the Mayors' Climate Forum (political level).

Copenhagen's current overall climate strategy and key actions are formulated in the CPH 2025 Climate Action plan and further detailed in three consecutive roadmaps setting specific goals and actions for limited periods of 3-4 years. The overall goal of CPH 2025 Climate Action plan is to reach climate neutrality by 2025 (detailed goals are shown in Table 14). The latest roadmap focuses on the period from 2021 to 2025 and completes the current climate action plan.

Copenhagen's next climate action plan. The City of Copenhagen is currently working on the next climate strategy and plan. The Climate Action 2035 plan is being prepared considering the three high-level targets formulated back in 2021 by the City Council namely: Copenhagen aims to be climate positive by 2035, Copenhageners' consumption-based emissions should be reduced by 50% by 2035, and emissions caused by the City of Copenhagen's procurement activities should be reduced by 50% by 2035, and. These are ambitious goals that will require sustained, innovative, and targeted actions. The assumption is that the Climate Action 2035 plan will be approved by the City Council towards the end of the second quarter of 2025, and that it will start by January 2026.

A new central vision for 'Our Copenhagen' has been prepared by the Technical and Environmental Administration and endorsed by the City Council January 2024. This new vision formulates high-level

objectives that will guide Copenhagen's climate actions during the next ten years, and puts emphasis on co-creation, cooperation, and engagement. Inter alia it is stated that: urban development of Copenhagen will always take climate and biodiversity issues into account - both as regards new buildings and when rethinking existing buildings and urban spaces; Copenhagen wishes to preserve the city's existing buildings rather than tear down and build new ones - and when building new, it should be done with recyclable or long-lasting climate-friendly materials; that the City of Copenhagen sets ambitious climate requirements for the municipality itself, Copenhageners and partners and choose climate-friendly solutions as regards operation, construction, and planning; the green choice should always be the easy choice indicating options for a more climate-friendly behaviour for Copenhageners, businesses, stakeholders, and guests. The City Council's endorsement of the new vision was also the starting point for a thorough review and analysis of existing climate related policies, strategies, and action plans with a view to simplifying the portfolio and adapting them to the vision's objectives.

Circular Copenhagen is the City's 'Resource and Waste Management Plan 2024'. The plan was adopted in 2019 and contains three specific targets: 70% of household waste and light commercial waste is recycled in 2024; direct carbon emission from waste is reduced by 59,000 tonnes; and recycling is tripled. The plan contributes to the climate target by separating waste and by making better use of plastic and biological waste. See also Circular Copenhagen for information about current initiatives. The City of Copenhagen is presently preparing a new resource and waste management plan for the period 2025 to 2030.

Copenhagen's Municipal Plan 2019 'A Responsible World city' – outlines the framework for the City of Copenhagen's development over a 12-year period. In several areas, the Municipal Plan frames how the Climate Action plan is being implemented, particularly in terms of physically planning the City's development within frameworks for housing development, parking, and the location of energy facilities. This plan is under revision. A new plan is expected to take effect from January 2025.

Copenhagen's tree planting policy 2018-2025. The policy's overall goals for 2025: 75% of Copenhageners experience Copenhagen as a green city; the total number of trees in Copenhagen shall increase; good growth conditions for both existing and new trees in the city shall be ensured; and 20% of Copenhagen's total area is covered by tree crowns. In addition, the CHP 2025 Climate Action plan stipulates that 100.000 new trees should be planted before the end of 2025.

Copenhagen's Planning Strategy 2023. The strategy contains an overall vision for Copenhagen's development; "The climate-friendly capital of the future". The vision is translated into concrete proposals for the physical area development of the City of Copenhagen for the coming years. Copenhagen must continue to be a green and climate-friendly capital that takes the lead in the green transition and sets ambitious goals for the future that can inspire other cities. This must be accompanied by investments that promote sustainable mobility and more new green spaces and parks that contribute to the health and leisure of Copenhageners. Copenhagen must be a green city and work to increase biodiversity in the city for the benefit of Copenhageners. The town plan strategy provides the basis for a revision version of the Copenhagen's Municipal plan.

Underlying planning basis for Mobility actions, the underlying planning basis for the mobility sector comprises a wide variety of plans and programmes. Copenhagen's Cycling Strategy 2011-2025 (2011), the Cycling Track Prioritisation Plan 2017–2025 (2017) and the Prioritisation Plan for Bicycle Parking 2018–2025 (2018) stipulate targets and a planning basis for cycling-related actions, while the Green Mobility Action Plan stipulates actions to promote green mobility in general. Going forward, this planning basis is supplemented by new action plans for an electric vehicle charging infrastructure, traffic safety and car-sharing, and a new parking strategy.

The digitalisation strategy enforces that technology and data shall underpin climate actions and includes climate relevant activities such as smart green vehicle fleet management to reduce CO_2 emissions from the municipality's van and construction machinery; collecting, using, and exhibiting data to identify and implement initiatives leading to reduction of the municipality's CO_2 emissions and energy consumption; strengthen the municipality's green profile in relation to IT procurement, IT hardware, and support green IT behaviour and consumption by employees; new and existing digital technologies to support the municipality's goals of green transition within construction, building operations, maintenance,

construction projects and vehicles; development of a management tools for implementation of Climate Action plan 2035 and Resource Plan 2030.

Other plans closely linking to the CPH 2025 Climate Action plan are the Resource and Waste plan, the Wastewater plan, Copenhagen's Biodiversity strategy, and the plan for planting 100.000 new trees in Copenhagen. In addition, there are several strategies and plans that foster green mobility and therefore help reduce transport sector CO_2 emissions e.g., Copenhagen's bicycle strategies, the Action Plan for Green Mobility, and the Action Plan for Car Sharing.

2.2.4 The challenge towards climate neutrality

To quantify the challenge of reaching climate neutrality by 2030, Table 8 presents the recent 2021 inventory together with the expected estimated scenarios for 2025 and 2030 and the resulting residual emissions.

The actions leading to climate neutrality by 2030 can be divided into two groups i.e., the actions supposed to be completed by 2025, and actions that are expected to be part of the upcoming Climate Action plan 2035, i.e., delayed or not fully completed key actions from the CPH 2025 Climate Action plan as well as new actions.

The emission reduction actions carried out under the CPH 2025 Climate Action plan have resulted in a reduction of almost 70% by 2022 compared to the 2010 baseline (Figure 6). The expected total emissions by end of 2025, considering the planned actions carried out as part of the 2021-2025 roadmap, amounts to approximately 660.000 tons CO_2e or almost a 75% reduction.

Further, the emission scenario for 2030 (Figure 9) is estimated based on the following assumptions:

- A frozen policy scenario is assumed,
- The population projection for Copenhagen (see Figure 12),
- Known (long-term) effects of initiatives included in the CPH 2025 Climate Action plan (see paragraph 3.2.1),
- Evolution of fossil free road traffic in Copenhagen projected in accordance with the Danish Energy Agency's forecast (see Figure 13),
- Expected evolution of the energy mix (electricity) in accordance with the Danish Energy Agency's forecast,
- Town gas will be 100 % carbon neutral by 2027,
- All public busses (including harbour busses) will be 100 % fossil-free by 2026,
- Shore-side electricity (full capacity available in 2028) in compliance with AFIR (EU Regulation, Deployment of alternative fuels infrastructure) and in accordance with CPH City & Port's planning.

The Climate Action 2035 plan is under preparation, and specific initiatives will not be finally endorsed by the City Council until quarter 2 of 2025. However, the main initiatives that are expected to result in a further reduction and compensation of (scope 1 and 2) emissions, i.e., compared to the estimated emissions by 2030 shown in Table 8, may provisionally be summarised as follows:

- Reduction of fossil-fuel based district heating peak load production, e.g., introduction of large-scale heat pumps, electric boilers, and heat storage facilities (heat storage reduces the need for peak load production),
- Initiatives that will facilitate the introduction of additional electric passenger cars and vans and reduction of road traffic in general, i.e., as compared to the current forecast,
- Initiatives related to the revised Energy Performance of Buildings Directive (EPBD) i.e., reduction of the average primary energy use of residential buildings by 16% by 2030,
- Additional renewable electricity production,
- CCS facilities in operation by 2030.

The inclusion (last column of Table 8) of the effect of these and other additional initiatives would need to await their final definition and implementation schedule. The full effect of initiatives included in the Climate Action 2035 plan will be estimated in connection with its finalisation.

However, it may be concluded that the frozen policy scenario in combination with the foreseen CCS initiative will lead to climate neutrality by 2030.

	2021 CO_2 inventory	**2025 estimated emissions (current plan)**		**2030 estimated emissions (Frozen policy scenario)**		**Estimated residual emissions**	
	tCO_2e/year	tCO_2e/year	(%)	tCO_2e/year	(%)	tCO_2e/year	(%)
Buildings	425.448	282.813	42,5	128.951	29,4	TBD	
Transport	341.939	322.056	48,4	258.723	59,1	TBD	
Waste	4.560	3.273	0,5	1.432	0,3	TBD	
IPPU	53.610	59.522	8,9	50.689	11,6	TBD	
AFOLU	-1.220	-1.811	0,3	-1.858	0,4	TBD	
Total	824.337	665.854	100,0	437.938	100,0	TBD	

Table 8. CO2 inventory for 2021 and estimated emissions for 2025 and 2030.

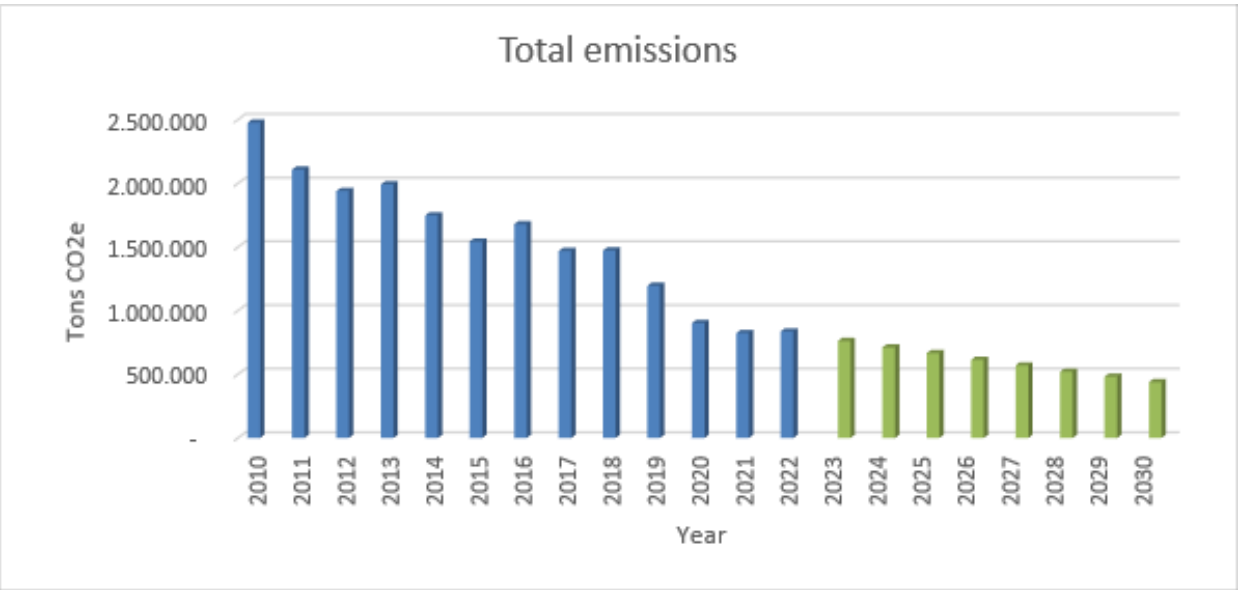


Figure 9. Copenhagen's total annual CO_2e emissions 2005 to 2022 and the prognosis for the remaining period until 2030.

2.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

To secure robust decision-making and estimation of effects, the City of Copenhagen has, in close collaboration with stakeholders, performed an analysis for each of the four pillars that constitute the framework of the CPH 2025 Climate Action plan. The analysis identifies critical areas that could significantly negatively impact meeting the CPH 2025 Climate Action targets.

This analysis is now being repeated during the preparation of the Climate Action 2035 plan. The analysis is performed for these nine key activity areas included in the scope of the Climate City Contract:

- The role of biomass in the future energy system,
- The role of waste in the future energy system,
- The role of buildings in the future energy system,
- Carbon Capture Use / Storage,
- Decentral energy supply,
- Renewable energy – wind and solar,
- Energy supply and mobility,
- Future green peak load solutions,
- and the potential use of certificates.

Below, barriers and opportunities are described per field of action to clarify the connection to the initiatives presented in chapter 3. These barriers and opportunities are considered relevant vis-à-vis both the current CPH 2025 Climate Action plan and the forthcoming Climate Action 2035 plan. However, please note that as regards the Climate Action 2035 plan the analysis of barriers and opportunities is work in progress.

2.3.1 Reducing energy consumption

Barriers and opportunities re public, municipal, commercial, and residential buildings.

Opportunities

- The City of Copenhagen can act as a role model by setting clear principles and targets for energy consumption and savings as regards its own buildings,
- Engage building owners and residents through awareness raising and information campaigns, and by fostering Renewable Energy Communities initiated around local electricity production (e.g., roof-top photovoltaic solar panels) and energy efficient consumption of energy,
- The foreseen advent of low temperature district heating, a direct consequence of the partial substitution of biomass with heat pumps, will lead to increased focus on energy reduction activities in (old) buildings,
- Promote smart solutions and maximise the distribution and use of building energy management systems,
- Provide guidance and continue or expand grants and subsidy options, e.g., to analyse the potential and support energy saving or retrofitting projects,
- Commitment through co-ownership of local production of renewable energy can strengthen support for the green transition in general, but also contribute to further acceptance of the transition processes, construction work, and other activities,
- Targeted retrofitting of buildings may lead to a better indoor climate, cost reductions of up to 25%, and consequently lower energy bills. This may provide an important incitement to invest in renovation projects,
- Develop and manage local district plans that prioritise and facilitate climate friendly solutions,
- Facilitate and support knowledge exchange, collaboration between stakeholders, and partnerships, e.g., by further expanding the Energy Leap partnership or establishing new forums targeting other types of key stakeholders such as craftsmen and consultants. These

partnerships could enable knowledge sharing and initiate pilot projects that develop and test best practise solutions, e.g., vis-à-vis energy efficient operation of buildings,
- Increase and maintain skills of facility manages to ensure optimal maintenance and operation of local energy systems and intelligent building energy management systems,
- Foster behavioural change by mobilising and engaging citizens through access to data and information, giving them insight and ownership of their energy consumption and incitements to lower or optimise energy consumption,
- Innovative initiatives such as Copenhagen's NZC pilot city project, Flexumers4Future, that focuses on how flexible district heating can decrease CO_2 emissions may foster city wide mobilisation of citizens in support of low carbon transitions pathways and provide essential knowledge and systemic tools,
- Required use of building energy management systems (and AI solutions) in large buildings from 2025, and provisions in the Planning act allowing the City of Copenhagen to e.g., limit the size of apartments when preparing new local plans are elements that may reduce energy consumption.

Barriers

- There are structural barriers that complicate and, in the worst case, prevent actors from investing in climate friendly renovation and solutions,
- New climate friendly installations such as smart solutions and intelligent energy monitoring and controlling, installation of photovoltaic solar panels, retrofitting, and improvement of buildings' climate envelope all require substantial investments. Building owners may lack interest in and willingness to make the necessary investments,
- The national transposition of the Renewable Energy Directive may limit renewable energy communities' exploitation of solar PV and energy sharing options,
- A proper LCA of relevant energy renovation initiatives in buildings may turn out negative due to building materials' CO_2 footprint,
- Residents' ability and willingness to accept higher costs related to energy optimisations and other climate related changes,
- Unjust or anti-social transition initiatives and non-affordable solutions may increase resistance against energy reduction initiatives in general,
- Non-optimal regulatory processes leading to unreasonably delay complicating or preventing initiatives from being initiated in an efficient way,
- Lack of sufficient skills, at local level, to optimally operate district-heating units, ventilation systems, and intelligent building energy management systems. It is particularly demanding to ensure efficient operation of the district heating substations in buildings,
- Discontinued or reduced EU, national, or local public, and private financing and subsidy options,
- Non-optimal legislation, ownership models, and profitability (business case) e.g., re the installation of photovoltaic solar panels,
- The technical challenges preventing or limiting the integration of buildings in the overall energy system.

Stakeholders

Residents, building owners, public institutions, private sector, HOFOR, Ørsted, CTR, Cerius-Radius, RealDania, KEJD, CPH City & Port, Energy Leap partnership, and Intelligent Energy Alliance, the Flexumers4future consortium.

2.3.2 Fostering green mobility

Barriers and opportunities vis-à-vis the transport sector i.e., road and non-road transport, passenger cars, light and heavy vehicles, trains, and ships.

Opportunities

- National and local political support will ease the transition to a greener transport sector. The City Council agreed in 2023 to aim for making transport in Copenhagen fossil-free by 2030,
- Change transport behaviour and culture by making emission-free options more attractive. Promote and sustain biking, walking, and public transportation as the preferred transport option within Copenhagen,
- Improve public transportation and make it attractive to more people. This can be done by raising the level of service, reducing travel time, attractive price models, and by ensuring better accessibility and good connections between the different modes of transportation both to, from, and in Copenhagen,
- Long-term strategic planning of urban spaces underpinning green mobility solutions,
- Optimise the distribution of key functional units within Copenhagen such as shopping, schools, educational institutions, and health to minimise distance of travel for citizens,
- Enhance coordination of efforts and collaboration with neighbouring municipalities to enhance the effect of mobility initiatives,
- Introduction of zero emission zones, road pricing, or similar approaches could significantly underpin efforts to reduce carbon emissions from road traffic and reduce the danger of migrating emissions to neighbouring municipalities,
- Regulation of traffic through further introduction of speed limits, traffic barriers, super block, one-way streets, and elimination or redistribution of parking lots,
- Reduce the number of private vehicles via availability of options such as car sharing and Mobility as a Service,
- Electrification of non-road machinery has been a long-term goal for the City of Copenhagen and offers a sizeable reduction potential, Guidance of municipally owned companies, financial instruments, and targeted tender specifications are possible opportunities to follow,
- Ensure broad involvement of stakeholders. The City of Copenhagen has an important role in activating both business and civil society broadly. To reach a fossil-free transportation in Copenhagen, it is particularly important that many different perspectives and values are actively involved.

Barriers

- The complexity of the transport system, substantial cross-border dependencies, the long phasing-in period for many initiatives, and consequently the delay between initiation and effect may complicate the design and acceptance of efficient initiatives,
- The planned transition of the transport sector may pose a problem for vulnerable and disabled persons that may not have the means or time to make the required changes,
- National legislation or lack thereof may inhibit or delay relevant initiatives such as the introduction of road pricing nationwide or in Greater Copenhagen that would underpin efforts to reduce carbon emissions from road traffic and significantly reduce the danger of migrating emissions to neighbouring municipalities,
- In some cases, mobility related changes must be evaluated and approved by the police authorities which may delay or render impossible the implementation,
- National legislation currently limits the number of zero emission zones to one per municipality,
- The transition to fossil-free transport will significantly increase the demand for electricity and put significant requirements on the capacity of the electrical grid,
- The success and acceptance of initiatives such as zero emission zones, reduction of parking lots, and the introduction of speed limits may require that efficient and attractive public transportation options are made available,
- Lack of sufficient electricity at construction sites may delay the introduction of fossil-free non-road construction machinery,
- Insufficient number and uneven distribution of (accessibility to) charging stations may negatively impact the transition from fossil fuel-based to electric passenger cars.

Stakeholders

Car owners, charging station operators, construction companies, neighbouring municipalities, Capital region of Denmark, the Danish Road Directorate, transport companies, DSB, Metroselskabet, and Movia, the trans-municipal bicycle path cooperation.

2.3.3 Building a green energy system

Barriers and opportunities related to building a multi-source energy system.

Opportunities

- The City of Copenhagen can support the establishment of decentral electricity and heating supply installations through targeted city development plans and efficient regulatory processing of building permits,
- Copenhagen can deliver green energy to the grid via off-sea wind farms established by municipally owned utility companies,
- The City of Copenhagen could proactively coordinate installation plans among actors such as electricity distribution companies, utility companies, city planners, and landowners,
- The City Council decision to reduce the share of biomass in the heat consumption mix of the municipality will rely on the electrification of the district heating system. It is considered that large-scale heat pumps, heat storage, and electric boilers constitute the most favourable alternatives to the use of biomass. Finding locations for these new decentral energy production units is therefore a necessity for reducing biomass consumption,
- Through dialogue and sharing of plans, the City of Copenhagen can seek to influence decisions nationally (e.g., vis-à-vis Energinet), and regionally, so that everyone works towards an integrated energy system in the region. At the same time, it puts the municipality in a better position to intervene constructively in situations where other municipalities within the region struggles to find suitable locations for decentralised energy production facilities,
- The potential role of buildings and houses in the future overall energy system emphasises the importance of individual behaviour and the need to minimise individual solutions such as the installation of batteries or individual heat pumps,
- The introduction of low temperature district heating will necessitate that more focus is put on energy retrofitting of the (old) building stock,
- The City of Copenhagen may guide the evolution of the energy system through the preparation of strategic guidelines for utility companies fully or partly owned by the city.

Barriers

- The foreseen electrification of district heating and transport and consequently growing demands for electricity may put the electricity production and distribution systems under pressure,
- It is a challenge to find suitable locations within Copenhagen where large-scale heat pumps, electric boiler and heat storage can be established,
- Heat pumps are large installations and must be installed in accordance with the local planning and without creating inconveniences in the urban environment e.g., vis-à-vis noise, aesthetics, and other facilities that the city needs to establish,
- The consequences of liberalisation of the waste sector are difficult to assess,
- Shortage of skilled workers, e.g., plumbers and other technicians,
- Fossil fuel based peak load plants are still in operation and constitute an important component of the district heating system. Because of times with high electricity prices, it is considered unfeasible to convert fossil peak load plants to 100% electric boilers for security of supply reasons and potential high cost of electricity,
- The City Council decision to reduce the biomass component may negatively affect neighbouring municipalities' demand for district heating capacity and thereby delay the replacing of individual fossil fuel based (e.g., natural gas) heating installations,

- Deployment of more electricity-based district heating components shall be aligned with the expansion of the electrical grid capacity.

Stakeholders

Energinet, Radius/Cerius, Ørsted, KEJD, Energinet, ARC, HOFOR, Movia, Metroselskabet, DSB, CTR, Neighbouring municipalities, the Region of Greater Copenhagen, Clever and ShareNow. Energy Agency.

2.3.4 Carbon capture activities

CCS is required to fulfil the climate-neutrality ambition.

Opportunities

- The City of Copenhagen is working with HOFOR (Greater Copenhagen Utility) and ARC (Amager Resource Centre) to establish Carbon Capture and Storage (CCS) facilities in Copenhagen,
- In the short term, the most realistic solution is to store the carbon underground,
- In the government's proposal, two large CCS pools are combined into one pool. It is planned to hold a tender in each 2024 and a tender in 2025, both of which must deliver full effect in 2029. This is positive and gives clarity to the players as to when the tenders will come and when they must be ready to capture, transport and store CO_2.

Barriers

- Insufficient matureness of CCS technology and lack of regulation,
- Uncertainty re transactions of certificates and captured CO_2 may negatively impact the business case,
- The business case will depend on the future role of and regulation affecting biomass and waste in the energy system,
- The current regulatory framework re CO_2 capture, storage, and use and insufficient clarity concerning funding options may delay the establishment of a CCS facility.

Stakeholders

HOFOR, ARC, and C4.

3 Part B – Pathways towards Climate Neutrality by 2030

The CPH 2025 Climate Action plan's initiatives are under implementation and will be completed by the end of 2025. Consequently, most of the gap closing initiatives, i.e., from 2026 to 2030, will be part of the coming Climate Action 2035 plan. The portfolio of gap closing activities will be composed of key activities continued from the CPH 2025 Climate Action plan as well as new activities. Module 3.1 will therefore focus on the framing conditions for the Climate Action 2035 plan, whereas chapter 3.2.1 will present the status of the CPH 2025 Climate Action plan, and chapter 3.2.2 will focus on provisional initiatives being developed for the Climate Action 2035 plan.

3.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

The Climate Action 2035 plan builds on the overarching targets formulated and decided by the City Council. The portfolio of actions will be concretised, subject to public consultation, and the final Climate Action 2035 plan will be approved by the City Council during the second quarter of 2025. A brief

presentation of the focus areas compatible with the scope of the Climate City Contract that are under development is given in the subsequent paragraphs.

The individual actions are developed and qualified via a structured process that involves several actors from the Technical and Environmental Administration, the Finance Administration, other Administrations, and multiple relevant external stakeholders.

Climate justice and ensuring a just transition in line with C40 recommendations on just climate transition, are key principles and considerations when developing new climate action initiatives. District Committees representing multiple communities who are at greatest risk of disproportionately poor social outcomes will be involved both during the development and implementation of new climate actions.

The City of Copenhagen acknowledges, that initiatives to mitigate and adapt climate change may risk being socially skewed. However, if the social aspects are integrated into the development of the initiatives, it is possible to ensure social balance and equity. This is also demonstrated in C40's new framework for the member cities' climate plans, which was published in December 2023. Considerations regarding social balance and equity will be part of the Climate Action Plan 2035. Therefore, the City of Copenhagen, together with a small number of other cities, is in the process of testing C40's new framework.

Furthermore, to support the City of Copenhagen efforts to integrating the social aspects of fairness and reasonableness, the Technical and Environmental Administration is developing a tool to support the Administration assessment of the social impact of climate initiatives. Both positive in terms of possible added value and synergy effects, but also negative in terms of distortion of burden and benefit distribution. The tool will initially be used to assess and qualify the initiatives in the Climate Plan 2035, but the goal is for the tool to be widely used in the City of Copenhagen's (climate) plans and strategies, on existing and new initiatives.

The Climate Action 2035 plan development process is organized in accordance with the Design Thinking approach and involves a large group of development and planning activities and value chain workshops, see Figure 10 for an illustration of some of the main areas of focus and the many involved stakeholders.

Design Thinking is an innovation process approach that focuses on solving complex (wicked) problems in a creative and user-centric way. The approach aims to create innovative solutions that meet the needs and wishes of the people who will depend on and use the solution.

As an integrated part of the Climate Action 2035 plan, the Technical and Environmental Administration is developing an Energy Strategy together with the Finance Administration and several external key stakeholders (HOFOR; Cerius/Radius; CTR; Ørsted; ARC; and Energinet). The process is steered and guided by the Energy Strategic Forum chaired by the Technical and Environmental Administration and ensures coordination and information exchange across the different actors, and harmonisation of ideas and plans.

The energy strategy shall serve as a shared basis for the evolution of the energy system towards 2035, and that it can help driving the development of the energy system in a common direction. Furthermore, the City of Copenhagen participates in several interdisciplinary collaborative activities focusing on energy and climate topics and challenges, and members of the City Council are represented on the board of utility companies fully or partially owned by the City of Copenhagen. Ownership strategies for municipally owned companies are regularly updated; the next update is expected by 2026.

The rationale for developing an Energy Strategy is the expected increased complexity and changing nature of the future multi-source energy system (2026-2035). It is expected that several new technologies will be developed and new and amended legislation will emerge (e.g. in relation to CCS, CO_2 infrastructures, geothermal energy, large-scale heat pumps, etc.). The concrete solutions and needs are still being analysed, but it is clear new solutions and large investments will be required to meet the requirements for a future green, reliable, and cost-effective energy system.

The aim is to develop a visionary and unifying strategy supporting reduction of biomass, climate-friendly transitions, and security of supply. The strategy will serve as a common guideline for the medium to long-term evolution of the energy system. The energy strategy will allow the City of Copenhagen to constructively influence the overall design of the energy system to the benefit of Copenhageners and in line with the goals of the climate action plans.

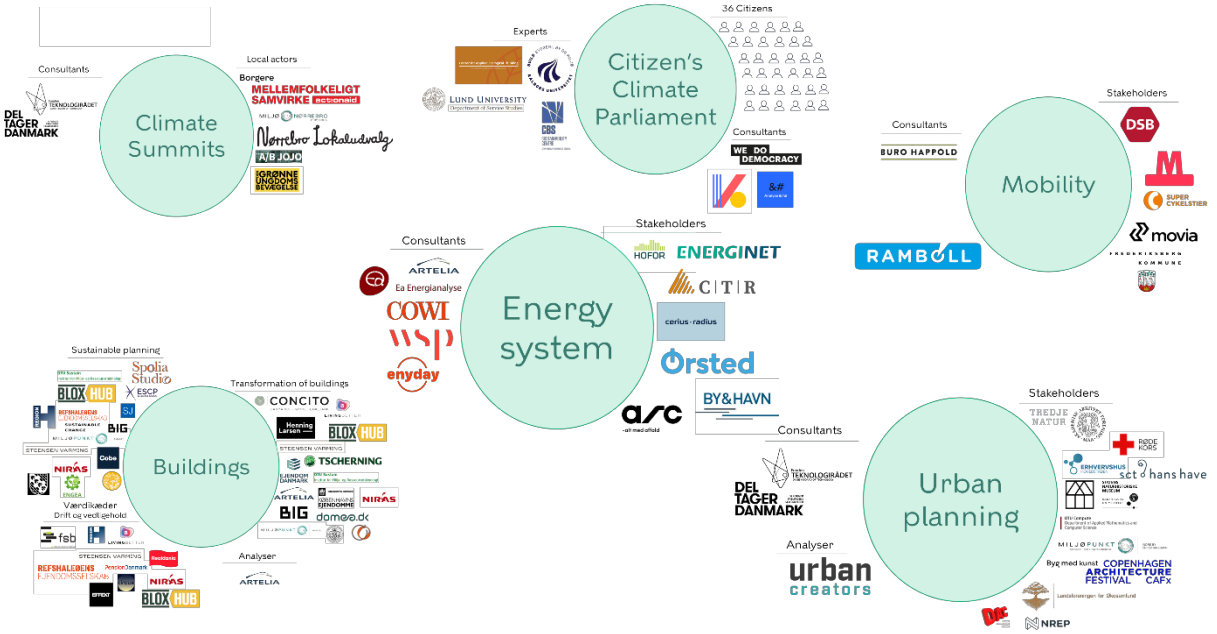


Figure 10. An illustration of some of the activities carried out to co-create the Climate Action 2035 plan together with stakeholders.

The transition towards the Climate Action 2035 plan is ongoing and will result in an ambitious portfolio of new initiatives as well as continuation of key initiatives from the CHP 2025 Climate Action plan.

The new climate plan will reduce greenhouse gas emissions from the remaining sources of emissions in the city, especially as regards transport, energy efficiency, and carbon capture. Some of the key elements of the Climate Action 2035 plan, that are aligned with the scope of the Climate City Contract, are:

- Reduction of energy consumption in buildings and change buildings' role in the energy system, i.e., facilitate the transition towards a more active role, higher flexibility, and local electricity production,
- Gradual reducing the use of biomass in power plants while phasing in new green technologies considering energy balancing, security of supply and affordability, and increase the share of locally produced energy, such as photovoltaic solar panels, heat pumps, and geothermal energy,
- Mobility and transport solutions that are more efficient, space-saving, and with lower negative climate, environmental, and health impact. This will be done in close cooperation with neighbouring municipalities and state authorities,
- Introduction of Carbon capture and storage solutions.

Additionally, the City of Copenhagen will also include ambitious consumption-based emissions reduction targets in the Climate Action 2035 plan: the aim is to reduce Copenhageners' consumption-based emissions by 50% before 2035, and reduce emissions related to City of Copenhagen's procurement activities by 50% before 2035. Please note, however, that consumption-based emission reduction initiatives will not be part of this version of Copenhagen's Climate City Contract.

The design of Copenhagen's pathway towards climate neutrality is determined or shaped by several factors, e.g., the overarching climate targets endorsed by the City Council, national and EU legislation, availability and maturity of technical solutions, availability of appropriate financial instruments, and the expected increase in the demand for green electricity. The evolution of some of the driving factors shaping the Climate Action 2035 plan are shown in Figure 11, Figure 12, and Figure 13. The figures indicate that the population is expected to grow from 666.014 (2025) to 695.544 (2030) (approx. a 4,5% increase) or approx. a 30% increase compared to the base year 2010; and regarding mobility: the fraction of electric cars in Copenhagen is expected to grow from 14% (7% electric + 7% hybrid) (2024) to 30% in 2030 (22% electric + 9% hybrid).

Copenhagen is therefore facing an imminent future where the green electrification of the district heating system and transport sector; the first steps towards a more integrated energy system, and the establishment of a CCS facility will be key factors enabling Copenhagen to reach climate neutrality by 2030.

The following paragraphs describe the conditions and key elements that constitute the overarching design criteria for the four selected fields of action and associated initiatives.

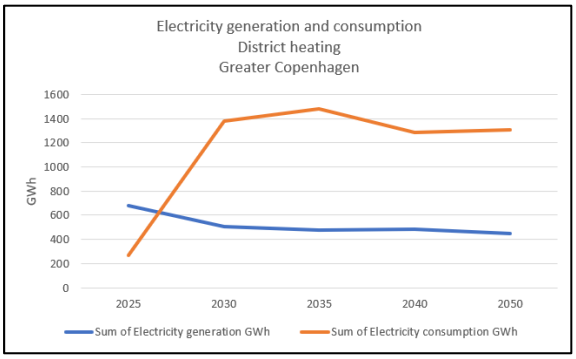


Figure 11. Estimated electricity generation and consumption in Greater Copenhagen's district heating system. The production of electricity decreases due to the gradual phasing out of biomass towards 2035.

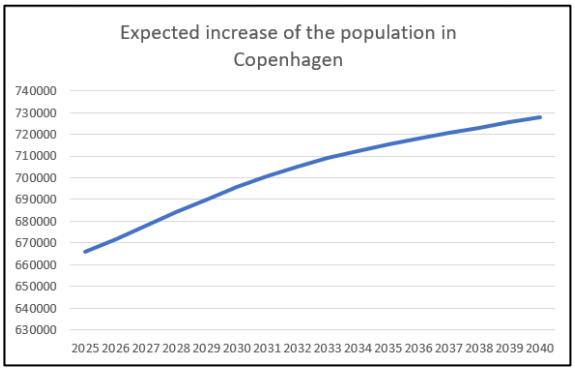


Figure 12. Expected increase of the population in Copenhagen.

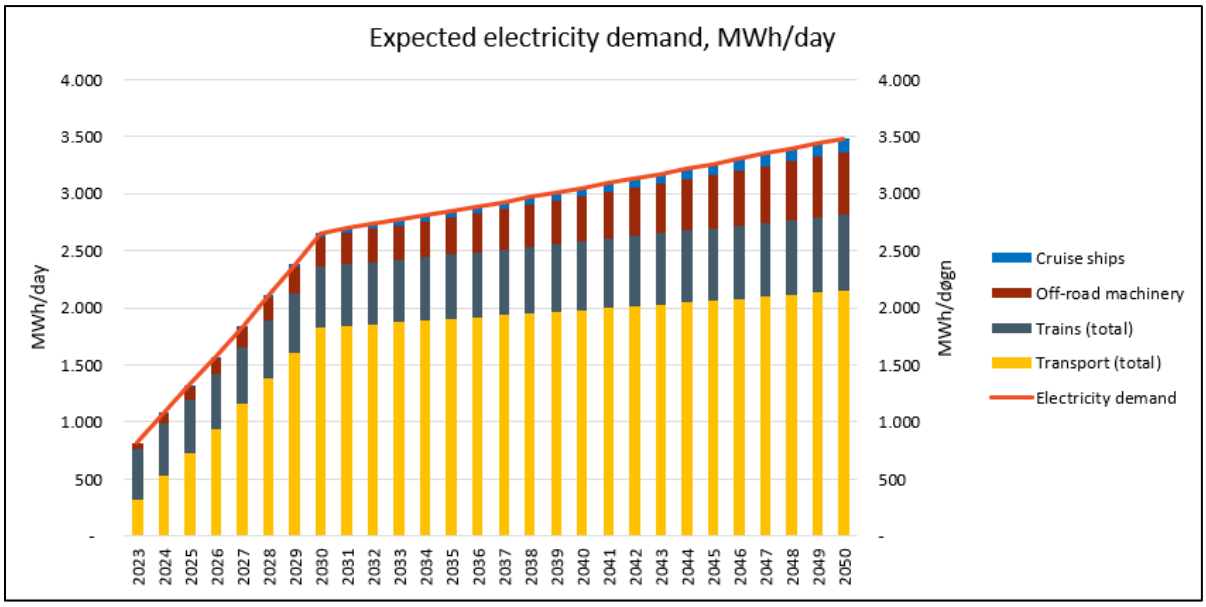


Figure 13. Estimated electricity capacity demand (summer scenario) due to electrification of the transport sector.

3.1.1 Reducing energy consumption

Energy efficiency should be an essential element in every plan for sustainable energy transition. By reducing energy consumption, the change to non-emitting power sources can be done with greater cost effectiveness and resource efficiency. The greenest energy is the one we do not use, leading to lower costs and less need for production capacity.

Reducing energy consumption in Copenhagen is crucial for the long-term development of the energy infrastructure and energy production. Buildings must be retrofitted to better exploit the energy when there is a surplus of fossil-free energy in the system, i.e., consumption must be adapted to production, rather than the other way around. This makes energy savings and flexible energy consumption key components of a long-term energy system change.

Given the right incentives, building owners and residents are often interested in supporting the transition and will play a key role in the process leading to CO_2-neutrality in 2030. However, the responsibility for meeting the reduction goals is shared between several stakeholders: utility companies; both professional and non-professional private building owners; residents and tenants (public institutions; private sector); and the City of Copenhagen. To succeed, utility and energy distribution companies should consider how best to facilitate and give room for citizen's initiatives e.g., price- and tariff structures and renewable energy communities.

Buildings may be seen as local components of the future multi-source energy system as they will interact with the central energy production systems in terms of local production, flexibility, storage, and release of energy. Buildings in Copenhagen and the energy system are interconnected in many ways and several topics should be considered: optimal use of energy in buildings; intelligent energy control and building management; energy labelling of buildings, minimising use of peak fossil load capacity; adaption to low temperature district heating; production and storage of green energy, and efficient maintenance, operation, and control of electrical and heating systems,

Further, energy efficient buildings and adapted district heating substations is a prerequisite for lowering the temperature in the district heating system which is a precondition for making use of large heat pumps an economical and technical viable solution.

In general, renovation of buildings will demand large private and public investments, and coordination and cooperation between several stakeholders, professionals, and citizens. The impact will not be

immediate; the change and implementation will take time and the transition needs to be just and socially balanced.

Early changes: The important work of the Energy Leap partnership will continue to engage and guide building owners thereby providing energy efficiency gains. The NCZ pilot city project Flexumers4Future and similar activities will increase awareness and introduce methods to reduce energy consumption in private and public buildings. Early changes are expected for buildings owned by the City of Copenhagen.

Late outcomes: Based on the tested methodologies and the obtained results selected actions will be scaled up to include a larger faction of the building stock. The wider use of efficient building energy management systems, the effect of insulation and other energy saving actions, and the advent of additional Renewal energy communities may, if regulation allows, in the long-term reduce consumption and production respectively.

Direct impacts: The status of on-going initiatives is shown in Table 14; the expected impact of initiatives to be part of the Climate Action 2035 plan is being analysed.

Co-benefits: Better indoor climate, job creation in the building renovation and management sector, and economic benefits (lower energy bills).

3.1.2 Fostering green mobility

Fossil-free transportation will increase. However, in 2030 a considerable number of vehicles may still be using fossil fuels. It has been estimated that approx. 30% of passenger cars will be electric or hybrid in 2030 (22% electric + 9% hybrid) in a frozen policy scenario.

Nevertheless, the City Council's goal is to reach fossil-free mobility in Copenhagen by 2030. However, analysis has demonstrated that current legislation may need to be adapted to meet this ambitious target.

The emissions from the transport sector comprise approximately 45% (2021) of the total emissions within Copenhagen. Since the forecasted fossil-free part of the transport sector amounts to only approximately 30% by 2030, the transport sector's share is likely to increase in pace with the greening of the energy production sector. However, the gradual move from primarily fossil fuels based to electric vehicles will increase the demand for green electricity and the number and distribution of charging stations and will consequently have implications re the electrical grid's capacity.

The per capita road traffic emissions of Copenhageners fell by roughly 18% from 2010 to 2019, but as Copenhagen's population and per capita car ownership rose during the same period, the total carbon emissions from road traffic only fell by 4%. Many trips are still made by car, especially across city limits, including recreational trips. Passenger cars are responsible for most of road traffic's carbon emissions (70%).

Nevertheless, the number and use of passenger cars remain central to the mobility challenge. This can be explained by the fact that cars and road areas are very visible in the urban space and are therefore cognitively perceived as dominant. Thanks to its flexibility and versatility, passenger cars also have a wider range of applications that make it feel like a natural choice. Mobility is an area where daily choices and habits of individual citizens make an immediate difference.

Early changes: The status of on-going initiatives is shown in Table 14. Increased availability of charging stations, improved conditions for cyclists, and climate friendly urban planning leading to more green spaces and less traffic. 100 % carbon neutral public busses are expected by 2026. Shore-side electricity for five quay spots for cruise ships by 2028.

Late outcomes: The gradual substitution of fossil fuel-based transportation towards 2030 will considerably reduce emissions from the transport sector and this tendency will continue beyond 2030.

Direct impacts: According to the projection shown in Table 8 the emissions from the transport sector are decreased by approx. 100.000 tCO_2e/year by 2030. Additional reductions are expected due to new initiatives that will be launched as part of the Climate Action 2035 plan (TBD).

Co-benefits. Reduced noise, safer roads, reduced air pollution, reduced traffic congestion, and improved health and quality of life for citizens.

3.1.3 Building a green energy system

Since the adoption of 2021-2025 Roadmap, the national framework conditions for energy supply systems have substantially changed, affecting several of the planned initiatives, e.g.:

- The Climate Agreement for Energy and Industry has prompted changes to the Heat Supply Act, as well as to subsidy and taxation structures that promote for instance heat pumps and other electric heating technologies. The agreement lays the groundwork for changes to the district heating connection obligation, which could eventually lead to a rising percentage of individual heating solutions in Copenhagen. However, individual heating solutions are still required to be based on renewable energy,
- The Climate Agreement for Waste Management. The agreement provides a stronger national focus on the separation of plastic and biowaste and it is expected to reduce the fossil content of Danish household waste. The agreement also lays the basis for significant liberalisation of the waste sector with the aim to optimise capacity.

The City Council has a desire of reducing the use of certified biomass used to generate district heating in Copenhagen. Biomass represents today (2023) almost 65% of the produced district heating in the Greater Copenhagen area. The ambition will be to gradually reduce the use of biomass towards 2035 in pace with the introduction of alternative energy sources and the phasing out of aging installations. A complete discontinuation is, however, not possible, or advisable due to excessive costs and the risk of negatively impacting energy supply security. Further, a one-sided reduction of biomass-based production capacity may negatively impact the transition from individual fossil-based solutions to district heating in neighbouring municipalities.

It is expected that the electrification of the transport and district heating sectors will lead to a demand for more electricity and therefore require an expansion of the electrical grid capacity; and consequently, an enhanced dependency on electricity price fluctuations. It is the City of Copenhagen's ambition to promote continued high security of heat supply at a reasonable socio-economic price. The electrical grid within Copenhagen cannot be treated in isolation, thus a regional (and national) planning perspective should be adopted. However, an increased demand for electricity should not be met exclusively by expansion of capacity, but also by better balancing consumption over time to avoid unnecessary peaks.

Copenhagen's district heating system is expected to gradually change from few large, combined heat and power installations to a network of smaller decentralised heat installations. The future district heating load distribution approach should also be flexible enough to compensate for price fluctuations through the use of heat storage, i.e., the idea is to store district heating when it is cheap to produce via heat pumps and electric boilers, and conversely, release the stored heat when it is expensive to produce due to high electricity prices.

The waste sector in Denmark is being liberalised – the effect of this on generation of district heating is still unknown. The use of waste could be considered (prioritised) on equal terms with other energy sources to obtain the most economically and sustainable energy mix which meet the demand for a stable and secure supply. Although the waste incineration plants will still be responsible for the environmental task of burning the waste regularly, which may hinder an optimal heat generation.

The City of Copenhagen's development of a pathway towards a more flexible and green energy system considers a set of main boundary conditions and trends:

- The design of the future flexible energy system will need to consider the overall complexity of the energy production system and the integration of new elements such as heat pumps, electric boilers, geothermal energy, increased electrical grid distribution capacity, better use of surplus heat, adaptation to low temperature district heating, introduction of more flexible energy

management and storage solutions, increased separation of plastic waste, and more use of biogas,

- The production of heat and electricity will be greener towards 2030, i.e., the remaining use of non-renewable electricity is expected decrease further towards 2030 from today's situation (2021) approx. 15% (district heating) and 20% (electricity). Already today 98% of Copenhageners' heating needs are covered by district heating,
- Concerning the district heating system, approximately one third of the energy stems from waste, two thirds from biomass and around 5% is secured by activation of peak load plants. However, 50% of the emissions are due to the use of fossil-fuel based peak load plant,
- The overall goal is to replace fossil fuel-based peak load production with electrically powered heating solutions,
- The demand for green electricity will grow in pace with the electrification of the district heating system and the transport sector. Consequently, the capacity of the electrical grid will need to be adapted to higher demands,
- There is a need to establish additional renewable energy installations, both within (roof-top solar PV) and outside (wind and solar PV farms) the boundary of Copenhagen. The electricity production capacity in Copenhagen is expected to fall in line with a political desire to reduce co-generation production based on biomass. Thus, Copenhagen will increasingly be dependent on production of green electricity taking place outside Copenhagen,
- Efficient and cost-effective solutions will need to be developed in collaboration with neighbouring municipalities and at national level,
- The City Council's desire to reduce the amount of biomass used for energy production will necessitate the installation and use of heat pumps and boilers, and necessitate the adaption of buildings to low temperature district heating,
- The growing need to find suitable areas for installation of large heat pumps put emphasis on long-term urban planning and collaboration with neighbouring municipalities, energy utilities, and other stakeholders,
- Efficiency improvements, introduction of flexible consumption patterns, and savings are important to avoid activating peak load heat production.

In addition, some of the anticipated key elements in Copenhagen's future multi-source energy system are:

Large-scale heat pumps and geothermal energy. The plan is to use heat pumps, geothermal energy, and electric boilers to electrify the heating system. There are various sources of energy including geothermal, seawater, air, surplus heat, and groundwater that can all contribute. Large-scale heat pumps have the potential to make up a very substantial share of the total heat production in the future. In the long term, they will be able to reduce the need for power plant capacity, especially due to the high resource efficiency and the smaller input required to produce the heat. Efficient and timely establishment and use of heat pumps is dependent on targeted city planning and allocation of urban space for setting up and integrating heat pumps close to consumers and energy sources.

Low temperature district heating. Low-temperature district heating will provide significant savings in heat production costs and allows for the integration of decentralised heating solutions. Converting the existing district heating network to a lower heating temperature will reduce heat production and increase system efficiency but will also open for the possibility of integrating more decentralised heat sources, for example heat pumps and surplus heating solutions. Hence, in parallel with the integration of heat pumps in the district heating system, consumers' heating systems will need to be adapted to tolerate that the transmission and distribution networks will deliver heating with a lower temperature compared with the present system, i.e., energy renovation of buildings, introduction of building energy management systems, and upgraded district heating stations.

Flexible storage and management. Heat storage and flexible consumption are essential to deal with the large amount of fluctuating electricity from renewable sources and the goal of electrifying the city. Storage and flexibility of consumption lower the requirements for total capacity on the production side,

increase security of supply and make it easier to achieve the lowest possible costs. An increased flexibility re production, storage, and consumption of energy will lead to a more optimal utilisation of electricity and heat production. Potentially, this could reduce the need for peak load production. Increased flexibility is also related to the connection between the electricity and district heating systems, as electricity is converted into heat. This creates synergy effects across the electricity and heating systems ensuring reliable operation and general cross-system optimisations. Storage is also necessary to facilitate optimal balanced utilisation of heat pumps and surplus heat. The district heating network is not limited to municipal boundaries, nor should the flexibility of the system.

Incineration of biomass and waste. Today, the biomass used in Copenhagen's power plants is sustainable and certified. The upcoming EU directive on renewable energy proposes to change the definitions and tighten the requirements. There is a risk of pressure on biomass supplies, making it difficult to buy up the necessary quantities at a low price. A reduction in the quantities used is an important part of the prerequisite if sufficient and safe access to biomass is to be ensured in the future. Plastic and food waste is separated from the rest of the waste, which will in aggregate increase the energy content of the waste (by removing wet waste) and lower the carbon content (because the petrochemical-based plastic is removed).

Electrical grid capacity. The electrification of primarily the transport and district heating sectors will require that the capacity of the electrical grid is upgraded to accommodate the increased demand. The connections between Copenhagen and the national and regional networks must be dimensioned in accordance with demand. At the same time, it will ensure the basis for the best solutions across municipal and regional borders, e.g. in relation to the allocation of areas for new facilities and the involvement of local actors who can offer flexibility.

Surplus heat. A better utilization of surplus heat helps to ensure that Copenhagen utilizes energy and resources in an optimal way. The scale and size of surplus heat sources may vary, but the focus should be on larger companies, carbon capture facilities, and buildings where the possibility for a sound technical solution and a positive business case is high.

Early changes: The status of on-going initiatives is shown in Table 14. Significant changes cannot be introduced in the energy system overnight. Thus, expected early changes after 2025 will most likely be limited to urban planning decisions, i.e., allocation of suitable areas for large scale heat pumps and other infrastructure elements.

Late outcomes: Moving closer to 2030 outcomes are expected to be quite fundamental, e.g., in terms of increased electrical grid capacity, electrification of part of the district heating system, decreased need for fossil fuel-based peak load capacity, and further preparations for low temperature district heating being completed.

Direct impacts: The energy mix will be greener, and use of fossil-fuel based peak load facilities is expected to decrease (TBD).

Co-benefits: Reduced air pollution, improved energy supply security, and creation of new jobs in the energy sector.

3.1.4 Carbon capture activities

The City of Copenhagen is working with HOFOR and ARC to establish Carbon Capture and Storage (CCS) facilities in Copenhagen. The overall effect of these projects could make the power plant carbon negative and contribute to net absorption of atmospheric carbon. Carbon capture processes also generate surplus heat, which can be used cost-effectively in the district heating system and thereby contribute to reducing costs. In the short term, the most realistic solution is to store the captured carbon underground. In the long term, once technologies have matured further, it may be possible to use the captured CO_2 for the production (Power-to-X) of for instance synthetic fuels.

The envisioned carbon capture facilities face several uncertainties related to technology and plant design but particularly as regards to the financing of the facilities.

Nevertheless, is fair to state that the installation of one of the planned CCS facilities is a prerequisite for reaching climate neutrality by 2030 (and for being climate positive by 2035), the ,establishment of a CCS plant in Copenhagen will require large investments; and CCS surplus heating should be re-used in the district heating system (which is facilitated by the transition to low-temperature solutions and energy renovation of buildings).

Early changes: A CCS test facility has been installed at ARC and results obtained during the coming years will underpin future large-scale installations. No other significant early changes expected.

Late outcomes: It is expected that the first large-scale CCS facility will be operational before the end of 2030.

Direct impacts: If both HOFOR and ARC successfully manage to install CCS facilities in Copenhagen up to 1.500.000 tCO_2 will be captured and stored annually.

Co-benefits: Creation of new jobs in the CCS sector; accumulation of valuable technical knowledge and experience with installing and operating large scale CCS facilities.

3.2 Module B-2 Climate Neutrality Portfolio Design

The current portfolio of ongoing initiatives is part of the CPH 2025 Climate Action plan and further outlined in the 2021-2025 Roadmap. These activities are briefly described below in chapter 3.2.1. However, in parallel with the execution of the last part of the CPH 2025 Climate Action plan, the City of Copenhagen is developing its next climate action plan. A sketch of considered key coming initiatives is given in chapter 3.2.2.

3.2.1 CPH 2025 Climate Action plan initiatives

The Technical and Environmental Administration is currently managing a portfolio of more than sixty initiatives under the CPH 2025 Climate Action plan umbrella. The estimated impact of the portfolio is equal to an almost 80% reduction of Copenhagen's 2025 CO_2 emissions compared to the 2010 baseline.

The overall objective of the CPH 2025 Climate Action plan was to achieve climate neutrality by 2025. This objective will, however, not be met mainly because mobility related initiatives resulted in less reductions than expected and due to the delay of the planned large-scale CCS facility.

The activities are closely related to the four pillars in the CPH 2025 Climate Action plan namely energy consumption (18 initiatives), energy production (15 initiatives), mobility (13 initiatives), and the City of Copenhagen's administration (16 initiatives).

In the tables below an overview of the portfolio and four selected examples of ongoing actions are given. These actions will be completed and evaluated by the end of 2025. The continuation or amendment of selected actions included in the CPH 2025 Climate Action plan is being considered in the frame of the preparations of the Climate Action 2035 plan.

B-2.1: Description of action portfolios		
Fields of action	Portfolio description	
	List of actions	Descriptions
Reducing energy consumption	Energy efficient buildings. Renovation of existing buildings. Proliferation of photovoltaic solar panels. Sustainable public procurement. Intelligent energy control.	The following initiatives are included: • Funds for energy screening, • Energy efficiency improvement through data, • Energy efficiency improvement through data, • Efficient operation of district heating in single-family houses, • 'Energy optimization of 500 E-, F- and G-energy rated buildings,

		• Life Cycle Assessments in the public housing sector, • Funds for energy efficiency projects in district refurbishment projects, • LED street lighting
Fostering green mobility	Road traffic. Public transportation. Ship traffic. Construction machines.	The following initiatives are included: • 100% zero-emission busses in 2025 (including harbour buses), • Reduce carbon emissions from road traffic by 10,000 tonnes*, • Shore-side power for cruise ships, • Conversion of non-road machinery used in the city to low emissions fuels.
Building a green energy system	CO_2 neutral district heating. CO_2 neutral power generation. Separation of plastic waste.	The following initiatives are included: • Continued securing of sustainable biomass, • Reduction in the need for peak load production, • Renewable energy-based town gas system, • Development of district cooling, • Afforestation on water catchment areas, • Carbon neutral wastewater treatment, • Wind power expansion, • Establishment of a waste sorting plant (Dirty MRF), • Increased waste sorting in households and retail.
Carbon capture activities	Carbon Capture & Storage. Tree planting.	The following initiatives are included: • Establishment of a carbon capture facility at ARC (on hold due to lack of sufficient funding). • Planting of 100,000 trees within Copenhagen.
Cross-cutting activities	Energy Leap partnership. Awareness raising & education. Climate Task Force.	The following initiatives are included: • The Climate Task Force aims to help four vulnerable urban areas get started with the green transition through dialogue and networking, • Energy Leap partnership focuses on energy savings in buildings and represents currently almost 40% of the building stock in Copenhagen, • The Climate Ambassador Study Programme (education of secondary school children).

		• The Energy & Water Science Centre of Copenhagen is an innovative and experimental environmental school, which offers teaching courses within the themes of sustainable energy and water supply in the past, present and future.

Table 9. Description of the CPH 2025 Action plan portfolios.

B-2.2a: Individual action outlines		
Action outline	Action name	Reducing emissions from road traffic
	Action description	The goal is to introduce 100% zero-emission busses in Copenhagen by 2025 (including harbour buses). Initiatives to promote a shift away from fossil-fuelled vehicles, e.g., generally reducing the speed limit throughout the road network, is estimated to reduce carbon emissions by approximately 10,000 tons.
Reference to impact pathway	Field of action	Fostering green mobility
	Systemic lever	Technology /infrastructure. Governance & Policy. Democracy / participation.
	Outcome (according to module B-1.1)	Road traffic: 16.500 tons CO_2e (Emission free buses) 10.000 tons CO_2e (speed limits).
Implementation	Responsible bodies/person for implementation	City of Copenhagen, Technical and Environmental Administration.
	Action scale & addressed entities	Private cars and public transportation at city level.
	Involved stakeholders	Neighbouring municipalities, Movia, car owners driving in Copenhagen, and citizens.
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is part of the CPH 2025 Climate Action plan and will end by end of 2025. The City of Copenhagen considers if parts of this action shall be included in the Climate Action 2035 plan.
Impact & cost	Generated renewable energy	N/A
	Removed/substituted energy, volume, or fuel type	Fossil fuel
	GHG emissions reduction estimate (total) per emission source sector	26.500 tons CO_2e (Total) 16.500 tons CO_2e (Emission free buses) 10.000 tons CO_2e (speed limits)
	GHG emissions compensated (natural or technological sinks)	N/A
	Total costs and costs by CO2e unit	Please consult the Investment Plan.

Table 10. Action outline: Reducing emissions from road traffic.

B-2.2b: Individual action outlines		
Action outline	Action name	CO_2 neutral district heating
	Action description	• Continued supply of sustainable biomass, • Development of the future district heating system with reduced need for peak load production and development of production technologies. The CPH 2025 Climate Action plan includes initiatives that will help reduce emissions and facilitate the transition to carbon neutral district heating and carbon neutral utilities. Efforts to ensure a sustainable, carbon-neutral district heating are focused on reducing, and ultimately phasing out, the use of fossil fuels in the supply of district heating, at the same time as new initiatives are developed and deployed in the district heating system, such as heat pumps, electric boilers, geothermal solutions, low-temperature district heating, heat storage and flexible consumption.
Reference to impact pathway	Field of action	Building a green energy system.
	Systemic lever	Technology /infrastructure. Governance & Policy.
	Outcome (according to module B-1.1)	9.000 tons CO_2e.
Implementation	Responsible bodies/person for implementation	HOFOR.
	Action scale & addressed entities	Energy production and transmission systems at city level.
	Involved stakeholders	Neighbouring municipalities, utilities, and transmission companies such as ARC, HOFOR, and CTR.
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is part of the CPH 2025 Climate Action plan and will end by end of 2025. The City of Copenhagen considers if elements of this action shall be continued as part of the Climate Action 2035 plan.
Impact & cost	Generated renewable energy	N/A
	Removed/substituted energy, volume, or fuel type	Fossil fuel.
	GHG emissions reduction estimate (total) per emission source sector	9.000 tons CO_2e
	GHG emissions compensated (natural or technological sinks)	N/A
	Total costs and costs by CO2e unit	Please consult the Investment Plan.

Table 11. Action outline: CO2 neutral district heating.

B-2.2c: Individual action outlines		
Action outline	Action name	CO_2 neutral power generation.

	Action description	The installation of photovoltaic modules and installation of wind turbines contributes to the green transition of the electricity system and to achieving a production of electricity based on biomass and wind that exceeds the city's total electricity consumption. The current target for the wind power programme is to reach 560 MW installed capacity by 2025. HOFOR is working to install wind turbines and photovoltaic modules both within and outside the city limits of Copenhagen. HOFOR intends to achieve the target through a series of projects aimed at establishing both onshore and offshore wind power and photovoltaic power stations.
Reference to impact pathway	Field of action	Building a green energy system.
	Systemic lever	Technology /infrastructure. Governance & Policy.
	Outcome (according to module B-1.1)	-
Implementation	Responsible bodies/person for implementation	HOFOR.
	Action scale & addressed entities	Energy production and transmission systems at city level.
	Involved stakeholders	Neighbouring municipalities, utilities, and transmission companies.
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is part of the CPH 2025 Climate Action plan and will end by end of 2025. The City of Copenhagen considers if elements of this action, e.g., delayed wind farm projects, should be continued as part of the Climate Action 2035 plan.
Impact & cost	Generated renewable energy	N/A
	Removed/substituted energy, volume, or fuel type	Natural-gas and fossil fuel.
	GHG emissions reduction estimate (total) per emission source sector	CO_2 neutral power generation: 15.000 tons CO_2e (for 370 MW Wind + Solar which is the current expectation for 2025)
	GHG emissions compensated (natural or technological sinks)	N/A
	Total costs and costs by CO2e unit	Please consult the Investment Plan.

Table 12. CO2 neutral power generation.

B-2.2c: Individual action outlines		
Action outline	Action name	Energy Leap partnership
	Action description	The City of Copenhagen has set ambitious climate goals with its CPH 2025 Climate Action plan, and one crucial area of focus is energy consumption in buildings. Buildings

		play a significant role in achieving these goals, as they account for approximately 70 % of total energy consumption. As the municipality owns and operates about 5 % of the building stock, it cannot meet the targets alone. That's why partnerships like Energy Leap are crucial, bringing together key stakeholders in the real estate sector to lead the way in the green transition. The Energy Leap partnership addresses energy challenges in buildings collectively, share valuable insights and experiences, and develop innovative solutions thereby reducing energy consumption, lowering carbon emissions, and creating a more sustainable future for Copenhagen. The Energy Leap partners achieved a 9 % reduction in heat consumption from 2021 to 2022.
Reference to impact pathway	Field of action	Building a green energy system.
	Systemic lever	Technology /infrastructure. Governance & Policy.
	Outcome (according to module B-1.1)	-
Implementation	Responsible bodies/person for implementation	City of Copenhagen, Technical and Environmental Administration.
	Action scale & addressed entities	Reduction of energy consumption in buildings at city level.
	Involved stakeholders	Energy Leap is a partnership between 56 real estate companies and organizations in Copenhagen representing almost 40 % of the building stock in Copenhagen.
	Comments on implementation – consider mentioning resources, timelines, milestones	This action is part of the CPH 2025 Climate Action plan and will end by end of 2025. The Energy Leap partnership will be continued as an important part of the Climate Action 2035 plan.
Impact & cost	Generated renewable energy	N/A
	Removed/substituted energy, volume, or fuel type	Natural-gas and fossil fuel.
	GHG emissions reduction estimate (total) per emission source sector	1100 tons CO_2e.
	GHG emissions compensated (natural or technological sinks)	N/A
	Total costs and costs by CO2e unit	Please consult the Investment Plan.

Table 13. Action outline: Energy Leap partnership.

3.2.2 Looking towards the Climate Action 2035 plan

Below is included a provisional list of concrete initiatives under consideration for inclusion in the final version of the Climate Action 2035 plan. The final set of initiatives and implementation schedules are subject to available funding and approval by the City Council and municipality owned companies.

3.2.2.1 Reducing energy consumption

The main goal is to further reduce energy consumption in public and private buildings through the application of new technology, information, and knowledge sharing, and by actively cooperating with energy utility companies, property owners, residents, property managers etc. to find efficient and affordable energy reduction solutions.

The City of Copenhagen owns approximately five percent of the building stock in Copenhagen and will continue to reduce energy consumption in existing buildings and to build in accordance with the city's climate and circular economy strategies. Proven activities such as energy efficient operation of buildings, innovative renovation, integrated urban renewal, and the Climate Task Force may therefore be important components of the Climate Action 2035 plan and could continue to serve as demonstration and role models for other building owners.

The Energy Leap Partnership, which has turned out to be a successful outcome of the CHP 2025 Climate Action plan, will be continued and strengthened in the Climate Action 2035 plan. The Partnership has demonstrated the value of creating a forum where public and private building owners can develop common objectives, coordinate, and exchange ideas and results.

The Climate Action 2035 plan will also include initiatives focusing on enabling residents, individually or jointly, to make climate friendly decisions as regards energy consumption. There is a clear need for finding ways to establish a fruitful dialogue with residents and make energy reduction guidance and information available to non-professionals, probably in cooperation with both utility companies and property managers.

Most buildings in Copenhagen are heated via the district heating system and will need to adapt to the planned introduction of low temperature district heating. This calls for smart digital solutions to optimise the operation of district heating substations and radiators in buildings with the ambition to make the building stock a flexible component of the energy system and in some cases also insulation of buildings.

In this regard, the City of Copenhagen leads the NetZeroCity Pilot City project Flexumers4Future. From May 2024 to April 2026 Flexumers4Forture will focus on contributing significantly to sustainable urban solutions while building on and supporting the goals of the Energy Leap partnership.

Flexumers4Future focuses on how flexible district heating will decrease CO_2 emissions and provide essential knowledge and systemic tools that can be replicated across other energy sectors, enhancing district cooling and electrical systems. The goal is to implement and test multidisciplinary and cross-sector cooperation, merging diverse expertise from various city administrations as well as external stakeholders including the project partner, HOFOR.

District heating in Copenhagen is almost entirely based on renewable resources – one exception being the oil-based peak load capacity needed during heat demand peaks. Specifically, Flexumers4Future intends to implement flexible heating in 1,000 multi-family buildings including: 300 municipally owned buildings; 400 'professionally run' private buildings enrolled through the Energy Leap partnership that encompasses some of the largest building administrators in Denmark; and 300 'non-professionally run' buildings including private and social cooperative housing associations.

The assumption is that 1,000 flexible buildings will lower the need for using oil-based peak load capacity. The Flexumers4Future project aims to verify this assumption and to develop a business concept that permits activating this flexibility.

3.2.2.2 Fostering green mobility

Looking toward the year 2030, the City of Copenhagen envisions a shift in its mobility sector. Central to this vision are two key objectives:

- Elevating the use of green transportation modes, including public transport, cycling, and walking
- Diminishing the fossil mobility within the city

To promote green transportation modes, Copenhagen will focus on enhancing the cycling and pedestrian infrastructure as well as passability. This may entail enhancements to the existing trans-municipal bicycle path network.

Furthermore, the City of Copenhagen aims to improve transportation junctions to facilitate transitions between different modes of transportation, thereby fostering a more cohesive mobility infrastructure. In line with a cohesive mobility infrastructure, the City of Copenhagen aims to make a concerted effort to improve public transport within Copenhagen, presumably with a particular focus on increasing the passability of city buses.

In its effort to diminish fossil mobility, Copenhagen will explore strategies to reduce the fossil vehicles driving in the city. First, the city aims to develop a comprehensive strategy to ensure widespread access to charging stations, supporting an increasing number of electric vehicles. Second, the city will examine opportunities to bolster car-sharing initiatives with the aim of expanding its availability and usage.

3.2.2.3 Building a green energy system

Introduction of new components in the district heating system. Heat pumps, electrical boilers, and energy storage solutions are identified as the technically most viable solutions allowing the required reduction of biomass and replacement of fossil fuel-based peak load installations.

These new facilities must be located where there are suitable heat sources such as wastewater and seawater. The facilities must fit the surrounding environment, e.g., vis-à-vis noise, aesthetics, and urban life and be close to both the electricity and district heating networks. Efforts are being made to integrate these facilities into the city's functions and urban spaces, and to ensure that they become sufficiently attractive for the owners and acceptable for the users of the identified areas. The utility companies and the City of Copenhagen work together to realise the establishment of these facilities through sharing of goals and coordinated planning.

The City of Copenhagen will proactively facilitate the coordination between neighbouring municipalities, electricity grid companies, heating companies, urban planners (Financial Administration), local planners (Technical and Environmental Administration) and landowners to ensure a medium/long-term alignment of expectations and plans. This could be achieved through setting up a coordination forum.

Extraordinary heat demand is typically met with use of fossil fuel-based peak load production. Other solutions should be explored such as using energy optimized buildings more actively as an integrated part of the energy system, and the use of heat storage and electricity-driven peak load production like electric boilers.

About ten new heat pumps are planned in different places of the city. The two largest heat pumps in Nordhavn and at Lynetten wastewater treatment plant, will together have a production capacity of 170-200 MW – corresponding to approx. 18 per cent of district heating consumption in Copenhagen. Three medium-sized heat pump projects will together be able to deliver approx. 70 MW. Together, all the new heat pumps will create a capacity of up to 300 MW of heat.

In the current CHP 2025 Climate Action plan, HOFOR has a target of 560 MW of wind and solar PV. However, current planning suggests that 370 MW will be established by 2025. The current plan is to

install wind farms at Nordre Flint and Aflandshage east of Copenhagen with a total capacity of 460 MW. The two proposed wind farms will supply up to 460,000 households with green power. One of the wind farms, Nordre Flint, is located approximately 12 km east of Copenhagen and is expected to have an output of up to 160 MW. The second park, Aflandshage, is located approximately 10 km from the southern tip of Amager and is expected to have an output of up to 300 MW.

Energinet is responsible for supply of electricity towards Copenhagen. The largest planned expansion towards 2030 is Bellahøj-Ejby, which will provide an additional approx. 180 MW capacity. With this expansion, the capacity towards the city will be approx. 840 MW with a short-term peak capacity of 1.300-1.400 MW.

Radius-Cerius plans to invest in an expansion of the electricity distribution grid capacity within Copenhagen towards 2030.

3.2.2.4 Carbon capture activities

Reaching climate neutrality by 2030 will require investment in carbon capture capacity,

ARC is working towards making the waste-to-energy plant Amager Bakke CO2-neutral. With a full-scale plant for carbon capture, Amager Bakke will be capable of capturing 500,000 tons of CO_2 annually.

HOFOR owns Denmark's biggest emitter of biogenic CO_2 (Amagerværket). A CCS facility is estimated to capture up to 900.000 tons of CO_2 annually.

The City of Copenhagen will continue to plant more trees in the city.

3.2.2.5 Cross-cutting activities

Awareness raising activities, efficient coordination and monitoring, information exchange, and strong involvement of citizens and stakeholders will be essential for the successful implementation of Copenhagen's Climate Action 2035 plan. These elements should therefore constitute part of the field of actions and underlying initiatives. Several initiatives are under consideration include those already actively pursued under the current plan:

- The Technical and Environmental Administration aims to ensure close cooperation and coordination of climate actions and related activities across the City of Copenhagen administrations involved in climate actions and urban development,
- The Energy Leap partnership focuses on energy savings in buildings and represents currently almost 40% of the building stock in Copenhagen,
- The Climate Ambassador Study Programme (education of secondary school children).
- The Energy & Water Science Centre of Copenhagen is an innovative and experimental environmental school, which offers teaching courses within the themes of sustainable energy and water supply in the past, present and future.

3.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

The current sub-targets (Table 14) were defined as part of the preparation of the CPH 2025 Climate Action plan. The completeness and adequacy of the sub-targets were evaluated when a new multi-year roadmap was specified and amended or changed as appropriate. The sub-targets listed in Table 14 are therefore linked to the initiatives described in chapter 3.2.1.

A progress report is for all initiatives is prepared on a six-monthly basis and presented to the Technical and Environmental Committee. A detailed CO_2 inventory for all sectors is produced annually including an overview of the sub-targets' status. The progress is analysed in detail by the Technical and Environmental Administration's Climate Secretariat and the initiatives' content and goals are adapted accordingly. Furthermore, the consolidated progress analysis serves as basis for the development of the Climate Action 2035 plan.

In Table 14 target values are compared to the 2010 baseline. The monitoring methodology, indicators, and the targets for 2035 are currently being discussed and verified and will be part of the Climate Action 2035 plan. When the Climate Action 2035 plan has been approved by the City Council, Copenhagen's Climate City Contract may be updated to include the final targets including targets transferred from the CPH 2025 Climate Action plan.

B-3.1a: Impact Pathways				
Fields of action	**Indicator No.**	**Sub-target**	**Sub-target values 2025**	**Status per 2022**
Reducing energy consumption	CPH2025-1	Reduction of heat consumption.	-20%	Consumption in 2022 was identical to 2010 despite a population increase of 22%
	CHP2025-2	Reduction of electricity consumption by service and commerce.	-20%	Consumption is 17% higher (partly due to change of data source)
	CPH2025-3	Reduction of electricity consumption by households.	-10%	As planned.
	CPH2025-16	City of Copenhagen's buildings built according to low-energy rating from 2015 and building code from 2020		Goal is achieved. New building code supersedes subtarget.
	CPH2025-15	Reduce energy consumption in the City of Copenhagen's buildings.	-40%	23% lower.
	CPH2025-18	Reduction of energy consumption – streetlights.	-50%	Goal is achieved.
Building a green energy system	CHP2025-6	Energy production generated by photovoltaic solar panels.	3% of electricity consumption in 2010	Production reached 0,7%.
	CPH2025-7	Installation of photovoltaic solar panels on the City of Copenhagen's buildings.	60.000 M^2	10.862 m^2.
	CPH2025-5	Energy status of district heating.	Climate neutral	85% climate neutral
	CPH2025-6	Electricity production based on biomass and wind.	Larger than Copenhagen's total electricity consumption	Renewable energy accounted for 69%
	CPH2025-7	Separation of plastic waste from households.	-	33% of household plastic separated in 2022
	CPH2025-8	Bio gasification of organic waste.	-	26% of organic fraction separated in 2022
Fostering green mobility	CPH2025-9	Fraction of trips carried out by walking, bike, or public transportation.	75% of all trips	74%.
	CPH2025-10	Fraction of trips to work or education carried out by bike.	50% of all trips	45%.
	CPH2025-11	Number of passengers using public transportation.	20% more	9% increase.

	CPH2025-12	Energy status of public transportation.	Climate neutral	51% of all busses.
	CPH2025-13	Use of new sustainable types of fuel by light vehicles.	20-30%	5% (passenger cars); 3,5% (vans)
	CPH2025-14	Use of new sustainable types of fuel by heavy vehicles.	30-40%	Not achievable.
	CPH2025-17	Number of vehicles owned by the City of Copenhagen using electricity, hydrogen, or biofuels.	100%	45%.

Table 14. Status of CPH 2025 Climate Action plan indicators.

B-3.2: Indicator Metadata	
Indicator Name	CPH2025-1. Reduction of heat consumption.
Indicator Unit	GWh
Definition	20% reduction compared to 2010. Target annual consumption in 2025: 3.384,093 GWh
Calculation	Monitoring of district heating consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Reducing energy consumption.
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by HOFOR.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-2. Reduction of electricity consumption by service and commerce.
Indicator Unit	MWh
Definition	20% reduction in electricity consumption in commercial and trade sectors relative to base year 2010.
Calculation	Monitoring of electricity consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes

If yes, which action and impact pathway is it relevant for?	Reducing energy consumption
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by Energinet.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-3. Reduction of electricity consumption by households.
Indicator Unit	MWh
Definition	10% reduction in electricity consumption in households relative to base year 2010.
Calculation	Monitoring of electricity consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Reducing energy consumption
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by Energinet.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-15. Reduce energy consumption in the City of Copenhagen's buildings.
Indicator Unit	MWh
Definition	Total energy consumption in the City of Copenhagen is reduced with 40% or more in 2025 compared to the base year 2010.
Calculation	Monitoring of total energy consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes

If yes, which action and impact pathway is it relevant for?	Reducing energy consumption
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Data compiled by the City of Copenhagen Finance Administration.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-18. Reduction of energy consumption – city lights.
Indicator Unit	MWh
Definition	50 % reduction of energy consumed by city lights in 2025 compared to the base year 2010.
Calculation	Monitoring of total city lights energy consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Reducing energy consumption
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Data from the City of Copenhagen.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-4. Energy production generated by photovoltaic solar panels.
Indicator Unit	MWh
Definition	Solar power installations in the city corresponding to 3% of 2010-electricity consumption.
Calculation	Monitoring of energy produced by photovoltaic solar panels in Copenhagen.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes

If yes, which action and impact pathway is it relevant for?	Building a green energy system
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by Energinet.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-19. Installation of photovoltaic solar panels on the City of Copenhagen's buildings.
Indicator Unit	m^2
Definition	Photovoltaic solar panels cover an area equal to 60.000 m^2 in 2025.
Calculation	m^2 of photovoltaic solar panels installed.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Reducing energy consumption
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Data from the City of Copenhagen.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-5. District heating in Copenhagen is CO2-neutral
Indicator Unit	MWh
Definition	Percentage of CO2-neutral heat production in 2025: 100%
Calculation	Monitoring of district heating consumption.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Building a green energy system

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by HOFOR
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	-
Indicator Name	CPH2025-6. Electricity production based on biomass and wind
Indicator Unit	MWh
Definition	Electricity production is based on wind and biomass and exceeds total electricity consumption in 2025
Calculation	Monitoring of renewable energy produced.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Buildings
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Building a green energy system
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by Energinet.
Is the data source local or regional / national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-7. Separation of plastic waste from households.
Indicator Unit	Tons of plastic waste
Definition	86% of potential plastic waste from households in 2025 is sorted out.
Calculation	Plastic waste collected, then percentage of collected plastic relative to total estimated potential for collection in 2025.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Waste
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Building a green energy system

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by ARC.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-8. Bio gasification of organic waste.
Indicator Unit	Tons of organic waste
Definition	70% of organic waste out of the total estimated organic waste in 2025 is turned into biogas.
Calculation	Tons organic waste collected, then percentage of collected organic waste relative to total estimated potential for collection in 2025.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Waste
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Building a green energy system
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Data delivered by ARC.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	CDP reports, Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-9. Fraction of trips carried out by walking, bike, or public transportation.
Indicator Unit	Km
Definition	Car traffic in 2025 must make up a maximum of 25% of all trips made in Copenhagen. In addition, the number of trips will be distributed between at least 25% walking, 25% cycling and 25% public transport by 2025. Applies to all trips to, from, and within the geographical delimitation of the City of Copenhagen in one year calendar year.
Calculation	Number of km travelled based on data from transport habit surveys.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No

Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	The City of Copenhagen. Annual mobility report and data from transport habit surveys to calculate trip shares.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-10. Fraction of trips to work or education carried out by bike.
Indicator Unit	Number of trips
Definition	50 % of all trips to work or educational institutions in Copenhagen are made by bicycle.
Calculation	Number of km travelled based on data from transport habit surveys
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	The City of Copenhagen. Annual mobility report and data from transport habit surveys to calculate trip shares.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-11. Number of passengers using public transportation.
Indicator Unit	Number of passengers
Definition	20% more passengers use public transportation in 2025 compared to 2009.
Calculation	Number of passengers using public transportation (Busses, metro, and trains) on workdays.
Indicator Context	

Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Passenger data are delivered by DSB, Movia, and the Copenhagen Metro.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-12. Energy status of public transportation
Indicator Unit	Number of hours
Definition	Public transportation (busses and harbour busses) is CO2-neutral in 2025.
Calculation	Number of hours according to Movia's time schedule.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Movia's environmental reports.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-13. Use of new sustainable types of fuel by light vehicles.
Indicator Unit	Number of vehicles.
Definition	20-30% of light vehicles are powered by electricity or hydrogen.
Calculation	An absolute target for 2025, covering registered light vehicles in Copenhagen. New fuels are defined here as vehicles powered by electricity and hydrogen..
Indicator Context	
Does the indicator measure direct impacts	Yes

If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Statistics Denmark. Local data.
Is the data source local or regional/national?	National
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-14. Use of new sustainable types of fuel by heavy vehicles.
Indicator Unit	Number of vehicles.
Definition	30-40% of heavy vehicles are powered by electricity or hydrogen.
Calculation	An absolute target for 2025, covering registered heavy vehicles in Copenhagen. New fuels are defined here as vehicles powered by electricity and hydrogen.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Statistics Denmark. Local data.
Is the data source local or regional/national?	National
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No
Indicator Name	CPH2025-17. Number of the municipality's vehicles using electricity, hydrogen, or biofuels.
Indicator Unit	Number of vehicles.
Definition	100% of heavy vehicles are powered by electricity or hydrogen.

Calculation	An absolute goal for 2025. Applies only to the municipality's cars, vans, and small buses, but not trucks, buses, and off-road vehicles.
Indicator Context	
Does the indicator measure direct impacts	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts	No
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Fostering green mobility
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Data from the City of Copenhagen.
Is the data source local or regional/national?	Local
Expected availability	Good
Suggested collection interval	Annual
References	
Deliverables describing the indicator	Publikationsdatabase (itera.dk)
Other indicator systems using this indicator.	No

Table 15. CPH 2025 Climate Action plan indicators' metadata.

4 Part C – Enabling Climate Neutrality by 2030

The City of Copenhagen is developing and applying several tools or enablers to meet the climate neutrality goal by 2030. Many of these enablers have been created and applied in connection with the implementation of the CPH 2025 Climate Action plan. These will be further improved and adapted to the Climate Action 2035 plan and additional new tools will be developed.

The forthcoming Climate Action 2035 plan is being prepared by the Technical and Environmental Administration and the Climate Secretariat in cooperation with several internal and external stakeholders. The plan will be approved by the City Council summer 2025 after a public consultation phase.

Due to the remaining decision-making process regarding the Climate Action 2035 plan, the final state of the plan and the first implementing roadmap is not yet completed. The exact nature of the governance framework and stakeholder initiatives is consequently not known in detail and information regarding the Climate Action 2035 plan presented in the following sections should therefore be regarded as provisional. This holds also true as regards the purpose and type of new stakeholder initiatives and to which extent current initiatives will be continued.

The City of Copenhagen's governance model regarding climate actions is sketched in section 4.1, whereas the main enablers re involvement and engagement of citizens and other stakeholders are briefly outlined in section 4.2 below.

In relation to climate action, the roles that the City of Copenhagen can take are different in nature and have different effects. However, it is important to acknowledge that all these roles in combination will be required to reach climate neutrality by 2030. Figure 14 illustrates the different roles and the associated reduction potential.

Company: The municipality can act directly as operator and consumer by, for example energy renovating its buildings, replacing its fossil-based car fleet, and by implementing climate friendly procurement policies.

Authority: The municipality act as an authority regarding planning and approval, e.g., regarding spatial planning, heat planning, waste planning, and transport planning.

Partnership owner: City of Copenhagen co-own's companies, such as utilities or transport companies. Through dialogue, ownership strategies, or as board members municipalities can influence the company's direction and choices. However, the companies are independent entities, and the municipality does not have powers of direction.

Facilitator: Finally, the City of Copenhagen can act as a facilitator and catalyst for the transition through awareness raising, communication, co-creation, experiments, innovative tenders, public-private collaboration, and partnerships. It will often be in this role that the municipality has the fewest direct instruments, but also here that the municipality can influence the most sources of emissions and create so-called social tipping points. This is also where the municipality can engage and collaborate with the private sector.

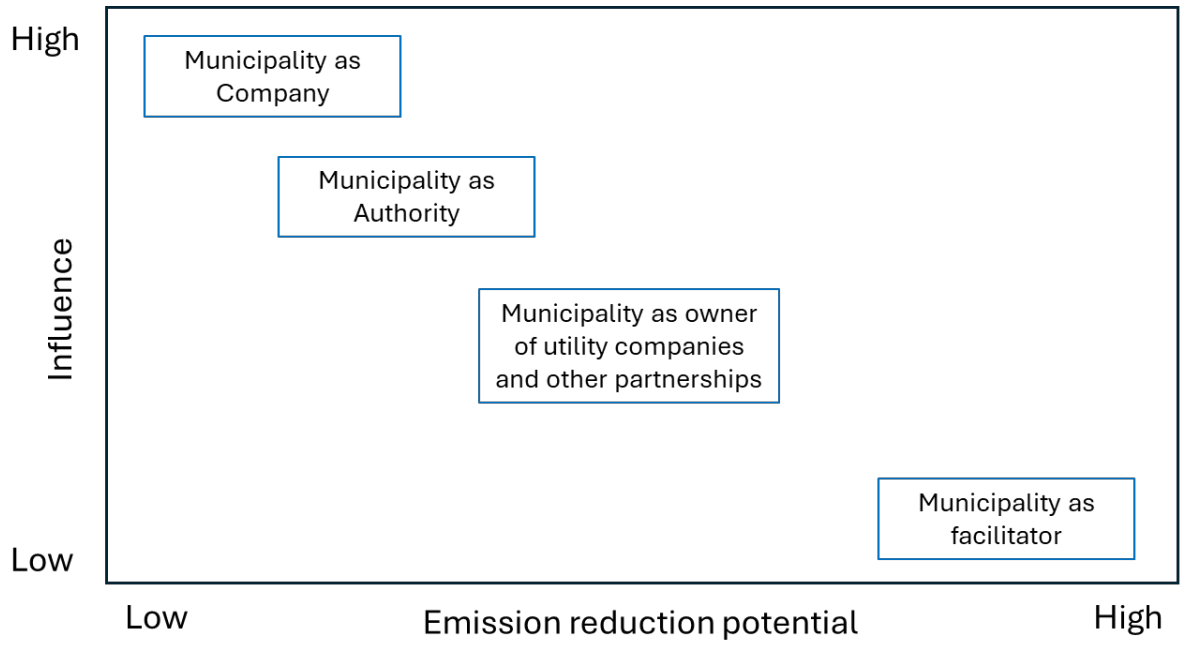


Figure 14. The role and influence of the City of Copenhagen as regards reduction potential. Model developed by CONCITO.

4.1 Module C-1 Governance Innovation Interventions

4.1.1 Efficient execution and planning

The Climate Action plan is developed and operates within the legislative framework composed of EU directives and regulations, i.e., the EU Climate Law, European Green Deal, and the Fit-for-55 package; international agreements; national legislation, provisions, and policies (e.g., the Climate Law); and City Council decisions, e.g., the overarching vision (Our Copenhagen), and related policies, strategies, and guidelines.

The current CPH 2025 Climate Action plan is owned by the City Council and is implemented through a series of multi-annual roadmaps under the responsibility of the Technical and Environmental Administration and the Climate Secretariat. Further, at the political level, the Mayors of Copenhagen including the Mayor of Technical and Environmental Affairs meet regularly to discuss climate related issues, plans, and budget.

To carry out the initiatives carefully and efficiently, monitor progress, and introduce mitigating actions as necessary, the City of Copenhagen applies a dedicated multi-level governance model and decision-making process. The model is composed of four main components: (a) efficient and targeted internal

coordination and planning; (b) cooperation with other municipalities to achieve synergy effects, proper accounting, and avoid migration of emissions; (c) cooperation and coordination with municipally owned companies and private sector stakeholders, and (d) engagement and involvement of citizens in the implementation process. Together these four components form the basis for the activities carried out by the Copenhagen's transition team.

The overall responsibility for realising the Climate Action plan objectives lies with the Technical and Environmental Administration and Climate Secretariat. This involves the implementation of initiatives under direct control by the municipality in cooperation with other Administrations and the coordination and monitoring of initiatives carried by municipally owned companies, building owners, other private sector actors, and citizens.

Although the Technical and Environmental Administration is overall responsible for the preparation and implementation of the climate action plans other administrations, and particularly the Finance Administration, are deeply involved in planning and carrying out several of the initiatives.

The Climate Secretariat, embedded within the Technical and Environmental Administration, plays a key role concerning the overall coordination of initiatives and schedules, preparation of progress reports, development of multi-annual roadmaps and initiatives, and preparation of additional analyses in support of initiatives as required. Importantly in this context, the Climate Secretariat also follows, supports, and evaluate the impact of the many initiatives that are put in place to engage and involve stakeholders. This ensures that the initiatives are linked to the climate action plans and underpin Copenhagen's overarching and specific goals.

Central to Technical and Environmental Administration is the Copenhageners' ability to contribute to the city's development. Whether the Administration actively invites Copenhageners to provide input or Copenhageners themselves approach with suggestions and input, it is crucial that the opportunity to contribute exists. In addition, Copenhageners should be involved in ways that make sense for them, for the Administration, and for the city in general.

The CPH 2025 Climate Action plan aims at strengthening the quality of life for the municipality's citizens, among other things by using the goal of CO_2 neutrality as a lever for changed behaviour, innovation, new jobs, and investments. It is therefore central to the climate plan that the goals are achieved through cooperation and strategic partnerships with authorities, universities, and companies.

Similarly, as part of an overall strategic goal to directly involve and engage key stakeholders, the City of Copenhagen has developed a suite of dedicated initiatives involving citizens, associations, and the private sector among others in a meaningful and inclusive way with the aim of preparing and subsequently implementing the Climate Action 2035 plan. Each of these initiatives has a particular purpose and stakeholder focus (see Table 16 and Table 17), but collectively they form a strong basis and prerequisite for fulfilling Copenhagen's ambitious climate goals for 2035. These key initiatives will be presented in the sections below.

Primary purpose	Provide input and recommendations to the climate action plan	Engage stakeholders	Facilitate and enable local action	Compile and transfer knowledge
Citizens' Climate Assembly	X	X		X
District Climate Summits	X	X	X	X
Value Chain Cooperation	X	X		X
Climate Ambassadors	X	X		X
Climate Task Force (Integrated Urban Renewal)	X	X	X	X
Energy Leap Partnership	X	X	X	X
District Committees	X	X	X	

Table 16. The primary purpose of some engagement and involvement activities.

Primary stakeholder focus	Citizens	Young citizens	Private sector Commerce Business associations	Housing, cultural, and sports associations	Educational and R&D institutions
Citizens' Climate Assembly	X	X			
District Climate Summits	X	X	X	X	X
Value Chain Cooperation			X		X
Climate Ambassadors		X			X
Climate Task Force (Integrated Urban Renewal)	X		X	X	
Energy Leap Partnership			X	X	
District Committees	X		X	X	

Table 17. The primary stakeholder focus of some engagement and involvement activities.

4.1.2 Involving citizens in the decision-making process

The upcoming climate action plan will make Copenhagen climate-positive and a global green role model for other cities. This requires both new ideas and collaboration. Everyone in Copenhagen – citizens, civil society, business, and the municipality – needs to pull in the same direction to succeed with the radical changes that the climate crisis requires.

Copenhageners are directly and primarily involved in the feedback and decision-making process via three mechanisms: District Committees, the Citizens' Climate Assembly, and the public consultation phase. These stakeholder involvement mechanisms deliver primarily proposals and recommendations vis-à-vis the Climate Action 2035 plan. Moreover, the citizens of Copenhagen have an online[3] option to submit responses to e.g., strategies and plans prepared the City of Copenhagen. During the consultation phase (Q1 2025) the next Climate Action 2035 plan will be made available through this online tool.

Members of the 12 *District Committees* in Copenhagen are elected every four years. They support and develop the local environment by inspiring and engaging Copenhageners, companies, and organisations in the district to actively participate in environmental projects that integrate the environment with the social, health, culture, urban planning, economy, and integration. The district committees bring local interests and needs to the City Council to create coherence between the municipality's overall and local efforts and help qualify the decision-making basis for the City Council's standing committees. The City Council has decided that local climate summits will be held in four selected districts of Copenhagen to support district partnerships that can ensure the necessary future CO_2 reductions and a better urban life within the district.

The *Citizens' Climate Assembly* consists of 36 representatively selected Copenhageners who, based on expert guidance and debates, make recommendations to the City Council. During the first session focus was on a future Copenhagen with far less CO_2 emissions from the consumption of food, housing, and transport. The second session will focus on these key questions: how to achieve a new everyday life in Copenhagen through communities to reduce the climate footprint stemming from consumption; and how to increase motivation, opportunities and skills supporting the reduction of emissions from housing, transport, and food. The Citizen's Climate Assembly's recommendations will serve as input to the Climate Action 2035 plan.

The Climate Citizens' Assembly will meet during three sessions to take place from 2023 to 2026.

The recommendations from the Citizens' Climate Assembly will have a particular important role to play concerning behavioural change and consumption-based emissions. Thus, the Citizen's Climate Assembly may shape the foundation for long-term involvement of Copenhageners thereby underpinning the City Council's ambition to reduce the emissions from Copenhageners' consumption with 50% by 2035.

[3] blivhoert.kk.dk |

The design, process and handover of the Citizens' Climate Assembly have followed the OECD's international principles for well-functioning and impartial processes - "Good Practice Principles for Deliberative Processes for Public Decision Making".

These principles have been adhered to on several levels including inviting 50,000 citizens through electronic postbox (e-Boks), arm's length and objectivity regarding the stratified draw, the use of an independent third-party secretariat, the implementation of an open, public, and transparent process, the involvement of independent experts and knowledge, an appropriate time frame for the consultation, and evaluation of the process. Importantly, the Citizens' Climate Assembly has a strong mandate, where the Technical and Environmental Committee and the City Council undertake to receive, respond to, and publish the recommendations without editing.

The Citizens' Climate Assembly and its influence is established through the mandate:

- The Citizens' Climate Assembly is tasked with advising the City Council and, in the first session, preparing recommendations that answer the questions given by the politicians.
- The City Council gives the Citizens' Climate Assembly a mandate to prepare impartial and independent recommendations within the framework of the Citizens' Climate Assembly's core task.
- All members of the Citizens' Climate Assembly will have the opportunity to make minority statements.
- The Citizens' Climate Assembly's task is to advise and make recommendations - not to design or decide.
- The City Council undertakes to receive and process the recommendations in connection with the Climate Plan 2035, as well as to receive and process an evaluation of the process and the administration's proposals for further work on recommendations and core issues.
- The Citizens' Climate Assembly will be presented with what the politicians have chosen to proceed with and have not chosen to proceed with, no later than two years after the submission of the recommendations.
- The City Council is not obliged to politically follow or adopt all recommendations.
- The Citizens' Climate Assembly is one of several tracks that will contribute to Climate Plan 2035.

Citizens Climate Assembly has selected four principles that will apply to the first session and guide the choices that must be made in Copenhagen to achieve the climate goals and reduce consumption. The principles are benchmarks for what is important for Copenhagen and Copenhageners in the future:

Community. We believe that we must develop the solutions together. Good solutions emerge when we work together - and we will not reach the goals without each other. To meet the challenges, we must together create a change in how we see the good life. Small communities can take responsibility if they are given the opportunity to make decisions in and about the community.

Responsibility. Citizens, politicians, and companies must take joint responsibility for the green transition where it is possible. For example, it can be the companies' and institutions' offering of choice of food in their canteens. In the area of transport, it may be larger companies' offer of transport services between the train/bus station and the company. On a personal level, it could be considerations about one's private consumption.

Nature. Build less, plant more. We want more green oases that both create a good city life, cleaner air, a sense of the changing seasons, and create a connection between us and nature, which has been lost. Promoting the connection to nature will also provide an increased sense of responsibility for taking care of the planet.

Generations. It is important that we create long-term solutions that focus on the good life in Copenhagen and are not just driven by short-term financial choices. Copenhagen is diverse, and there must be opportunities for the good life for both children, young people, families, singles, and the elderly.

The first deliverable prepared by the Citizen's Climate Assembly during its first session includes a wide set of recommendations such as: we need to live on fewer square meters, use bicycles more, eat more vegetables, establish more repair workshops at the recycling centres, more co-housing for both seniors and families with children, and car-free bicycle boulevards. These are examples among the many recommendations from the Citizen's Climate Assembly that were discussed and developed with a view to improve citizen's urban life while at the same time lowering consumption-based CO_2 emissions. All recommendations (in Danish) are available here.

4.1.3 Facilitating cross-border and international cooperation

Copenhagen cannot act and implement climate solutions in isolation from the surrounding municipalities and developments taking place in Europe and internationally.

Copenhagen is therefore actively involved in several national and international cooperation and coordination initiatives. Some of them are briefly presented below.

Copenhagen is actively engaged in the *Climate Alliance* to foster synergy effects, allow that common (cross-border) solutions are identified and efficiently implemented, and to ensure prober coordination and knowledge exchange with other municipalities in Denmark. The Climate Alliance is a partnership established by the Local Government Denmark, Danish Regions, and RealDania and constitutes a common framework for the implementation of municipalities' climate action plans. This framework builds on C40's Climate Action Planning framework and supports the development and implementation of the plans, optimise efforts across municipalities and regions, aims to document the effects of climate efforts, and establish a common monitoring system. The Climate Alliance allocates funds to initiate cross-cutting development or demonstration projects in which municipalities, regions, and others join forces to explore and develop ambitious solutions to specific challenges, e.g. within areas of transport and energy consumption. The green think tank CONCITO together with the international urban network, C40, participate as knowledge partners.

Copenhagen Carbon Capture Cluster (C4) is a cluster of actors collaborating on carbon capture and storage related activities. The collaboration was established in February 2021. Altogether, there is a potential to reduce carbon emissions within Greater Copenhagen by 3 million tons a year using carbon capture and storage. The members represent the entire value chain from energy production to procurement of surplus heat in the district heating network, and the shipping of captured carbon to a storage site. The participating members of the C4 cluster are ARC, ARGO, BIOFOS, Copenhagen Malmö Port, CTR, HOFOR, Vestforbrænding, VEKS, and Ørsted.

Since April 2022 Copenhagen has been part of the EU Mission "*100 Climate-Neutral and Smart Cities in 2030*".

Copenhagen[4] is a member of the *C40 city network*, which works to ensure that the world's big cities meet the climate requirements of the Paris Agreement. As a green pioneer, Copenhagen participates in several professional networks in C40, where the cities' experts come together to develop solutions and share best practice within areas such as energy efficiency, climate adaptation and construction. Copenhagen hosted the C40's 2019 summit, where world's leading mayors met to share ideas and experiences to take a united lead in the fight against the global climate crisis. As the host, Copenhagen had invited all Danish municipalities to attend the summit. During the summit a large business forum was also arranged as the first C40 step towards extensive involvement of the private sector in the fight against the climate crisis. Through its active participation in C40, Copenhagen is making sure that cities have a powerful voice in international climate discussions.

Furthermore, Copenhagen[5] is member of the *Carbon Neutral Cities Alliance* (CNCA). CNCA is a collaboration of leading global cities working to achieve carbon neutrality in the next 10-20 years – the

[4] Lord Mayor of Copenhagen elected to C40 Cities Steering Committee - C40 Cities

[5] Copenhagen – CNCA (carbonneutralcities.org)

most aggressive GHG reduction targets undertaken anywhere by any city. CNCA member cities are globally influential, have demonstrated deep carbon reductions, and are vocal leaders and risk takers. Member cites are characterised by having carbon neutrality goals across sectors; a community-wide implementation plan; dedicated budget and staff for implementation; and are committed to active participation in the Alliance.

4.2 Module C-2 Social Innovation Interventions

Involvement of Copenhageners is a core task for the City of Copenhagen and essential to make Copenhagen climate neutral by 2030. An engaging and transparent dialogue across different areas of interests, city districts, and citizens with different demographic, social, and cultural background creates a firm foundation for developing, implementing, and sustaining climate friendly solutions in Copenhagen. This guiding principle is further outlined in the Strategy for Involvement of Copenhageners 2023-2028 prepared by the City of Copenhagen's Technical and Environmental Administration.

The new Climate Action Plan 2035 will include new themes such as the Copenhageners' consumption of clothes and products, food, and modes of transport in Copenhagen. These themes are close to the citizens, and it is therefore obvious to involve the experts in the field, i.e., the Copenhageners themselves. The City of Copenhagen acknowledge the great potential in citizens, other stakeholders, and the municipality working together to create more climate-friendly solutions.

Copenhageners are in general aware of the importance of climate change, the need for behavioural changes, and they are ready to engage and participate in climate actions. Copenhageners willingness to engage was confirmed by a survey conducted in 2023. The four overarching results are:

- Copenhageners are worried about climate change and say that climate change is a serious problem. However, fewer fear that climate change will negatively impact their quality of life,
- Copenhageners are aware that their way of living impacts the climate and are willing to change behaviour to support the green transition. Even if Copenhageners think that behavioural change among consumers is necessary about one third is only willing to change direction to some extent,
- Copenhageners experience barriers against making climate friendly choices – especially because climate friendly choices seem to be more expensive, and because the effect of a given choice is difficult to assess,
- Copenhageners think that the City of Copenhagen has a responsibility to manage climate challenges. Many thinks that the City of Copenhagen should do more, others lack knowledge about what the City of Copenhagen is already doing.

The Copenhageners were also asked to indicate their willingness to change behaviour vis-à-vis fifteen concrete areas of action. The survey demonstrated that Copenhageners are in general willing to change behaviour regarding e.g., waste management, use of public transportation, meat consumption, resource savings; whereas climate friendly travelling and change of housing conditions (less space) received a less positive response. During the preparation of the Climate Action 2035 plan the survey results as well as accumulated experience gained via previous and on-going actions guide the design of new social innovation interventions.

4.2.1 Engaging residents and owners

The City of Copenhagen works to become even better at involving Copenhageners to ensure that the municipality is constantly improving the dialogue and the basis for informed decision making to strengthen democracy, foster cooperation, information exchange, and create targeted solutions of high quality for Copenhagen and Copenhageners.

The City of Copenhagen is promoting the establishment of renewable energy communities. Empowering citizens to drive the energy transition locally and directly will lead to better energy efficiency, cost savings, reduced energy poverty, and more local green job opportunities. Renewable energy

communities allow local communities to join forces and invest in clean energy to increase public awareness and acceptance of clean energy transition initiatives, and to produce and share renewable energy, generating and managing cost-effective green energy autonomously, and reducing CO_2 emissions and energy waste. Installation of photovoltaic solar panels and local energy storage solutions are typical elements of renewable energy communities.

As regards photovoltaic solar panels, the City of Copenhagen has included a specific target as part of the CPH 2025 Climate Action plan, i.e., energy produced from photovoltaic solar panels in 2025 shall be equal to at least 3% of 2010-electricity consumption. This target is supported by Copenhagen's Photovoltaic Solar Panel action plan[6] and information provided via the City of Copenhagen's website that inspires and informs citizens and housing associations about solar cells, how to verify if solar cells are relevant in terms of return of investment and type of roof and provides an opportunity to seek financial support to consultancy. The interest among public and private building owners in establishing rooftop solar cells is increasing, but decision-making and construction processes are often lengthy, and lack of adequate legislation still limits sufficient progress.

The *Energy Leap partnership* focuses on energy savings in buildings and represents 56 real estate companies and organizations and almost 40% [2023] of the building stock in Copenhagen.

Through the Energy Leap partnership, partners can address energy challenges in buildings collectively, share valuable insights and experiences, and develop innovative solutions. Together, the partners can make a significant impact by reducing energy consumption, lowering carbon emissions, and creating a more sustainable future for Copenhagen.

Together, the 56 Energy Leap partners have achieved a 9 % reduction in heat consumption from 2021 to 2022, amounting to savings of approx. 2 M€. This demonstrates that collaborative efforts to share knowledge, data, and to promote best practices in green building investments are yielding positive results.

The Energy Leap partnership sets collective goals. Together, partners have established a 3-6-9 percent target for reducing heat consumption. This means that buildings within the benchmarking framework are expected to achieve annual savings of 3 %, 6 %, and 9 % respectively during their first three years. Subsequently, all buildings are encouraged to maintain low levels of energy consumption. Partners are confident that these targets will be reached because:

- Lower energy bills lead to cost savings,
- The demand for green buildings provides the Energy Leap partnership with a competitive advantage,
- The Energy Leap partnership takes responsibility for driving the green transition in the building sector,
- By setting an example and promoting energy-efficient buildings, the Energy Leap partnership inspires others to prioritise sustainable practices in their operations and renovations. This benefits not only our partners' businesses but also the users, residents, and the overall well-being of Copenhagen.

The City of Copenhagen has set ambitious climate goals with its CPH 2025 Climate Plan, and one crucial area of focus is energy consumption in buildings. Buildings play a significant role in achieving these goals, as they account for approximately 70 % of total energy consumption.

As the municipality owns and operates about 5 % of the building stock, it cannot meet the targets alone. That's why partnerships like Energy Leap are crucial, bringing together key stakeholders in the real estate sector to lead the way in the green transition.

The Energy Leap partnership regularly organize events for partners and other stakeholders in the real estate sector, such as: thematic meetings, workshops, and debates. Meetings are focused on topics

[6] Solcellehandlingsplan (kk.dk)

related to energy consumption; between meetings a web-platform allows partners to share knowledge and experiences. Debates are open to all interested participants who wish to expand their understanding of various subjects within the real estate sector and vis-à-vis energy efficiency in buildings. Additionally, partners actively participate in and drive various development projects. At workshops, partners meet to ensure that the solutions developed are effectively implemented and make an impact.

The City of Copenhagen leads the *NetZeroCity Pilot City project Flexumers4Future*. From May 2024 to April 2026 Flexumers4Forture will focus on contributing significantly to sustainable future urban solutions while building on and supporting the goals of the Energy Leap partnership. The assumption is that 1,000 flexible buildings can make it possible to avoid firing up an oil-based peak plant. The Flexumers4Future project aims to verify this assumption and to develop a business concept that permits activating this flexibility. Flexumers4future includes detailed barrier analysis, strategy development, and the execution of pilot activities that support Copenhagen's carbon-neutral ambition and will inform the content of subsequent climate action roadmaps within areas such as:

Social innovation. Flexumers4future offers innovative solutions to working methodically together with building owners to address wider societal issues around climate change through a meso-governance model. This marks a departure from standard top-down methods of enacting change in a city and seeks to systematically support the potentials in local and grass roots action. There could be considerable resistance from citizens who worry about issues ranging from indoor comfort through the inviolability of property rights to the economy and financing of the required technical installations. Furthermore, for the 'technical' solution to become a publicly accepted element of sustainable transition there is a need to mobilize and allow citizens to be part of the social innovation process that influences and transforms the meaning of heating flexibility and flexumers: How is it sustainable to live with heating flexibility: How should I heat individual rooms of an apartment, when do I shower sustainably etc?

Democracy/participation. Providing horizontal alignment and integration across municipal departments will support an unambiguous, clear, and uniform message across all channels, and a coordinated effort among all stakeholders is needed for a holistic and timely change. Local dialogue workshops will empower local citizens through learning and make it possible for more citizens to be able to participate in local conversations on energy topics. The introduction of a local climate coordinator is a prerequisite for a successful and efficiency dialogue.

Learning and capabilities. Every action count, which in this instance means that citizens' climate and specifically energy awareness is a crucial condition for change. If citizens and local professionals such as janitors shall be able to participate in co-create actions and action plans on energy, they need to be able to understand and speak energy. This calls for better knowledge and deeper understanding of the energy system, the technologies, and the possibility to affect local systems and their everyday life. The Flexumers4Future will work directly to increase learning and build capabilities which will enable local climate action.

4.2.2 Engaging local communities

It is crucial for the transition of Copenhagen to a greener and more climate-friendly city that Copenhageners gain knowledge and experience that enables and motivates their active participation in the green transition. The City of Copenhagen works purposefully to ensure that.

The City of Copenhagen focuses on promoting climate formation and education and will work with a broader concept of education through culture, leisure, and public education. Thus, the City of Copenhagen has initiated a dialogue with all actors in the field educational institutions, associations, leisure facilities, public workplaces, cultural institutions, etc. with a view to jointly define how best to move forward.

To significantly reduce Copenhagen's CO_2 emissions, it is crucial that citizens move away from fossil-fuel based transportation. Fortunately, more and more people use electric vehicles. But it is important to create the urban infrastructure, framework, and motivation for an even faster phase-out of fossil-fuelled traffic and opt-in of green alternatives such as public transportation, walking, and biking. To that

end, the City of Copenhagen is looking into what barriers citizens, companies, employees, and customers see as hampering the transition towards green and active modes of transportation.

District Climate Summits. Copenhagen's districts and neighbourhoods want to take responsibility and bring together local actors to jointly plan and carry out climate action. District climate summits aim at creating local action, reduce CO_2 emissions in Copenhagen, and create even better communities. Climate summits are organised by the local actors, the City of Copenhagen, and District Committees. The citizens in the district focus on answering the question: How can our district contribute to the solution of the climate crisis? The first Summit was held in Nørrebro, and during 2024 the next two will be held in Amager and Vesterbro. In Nørrebro they agreed to the following charter: “Nørrebro changes the climate through action and builds new networks and relationships, where we jointly act, initiate initiatives that can contribute to achieving our goal of reducing our CO_2 emissions”, and formulated this set of visions: “We share knowledge and experience to create more sustainable construction for Nørrebro's residents”, “We create new green meeting places where we can meet and be inspired and learn more about better and greener food consumption habits”, and “Nørrebro as a test area for reuse and repair”.

The municipality's role is to create the framework for the local climate summits, while it is the local actors who alone define the content. In this way, ownership is delegated, and the districts are mobilised to act on the parts of everyday life that they can take responsibility for. The initiative should therefore not stand alone but be seen in the context of other work done to improve the structural framework for climate-friendly behaviour.

Prior to the summit itself, an established group of actors has written down a vision for the district, as well as laid out the framework for the summit itself (a so-called charter). The group of stakeholders meets approx. 3 times prior to the summit itself.

The charter contains the district's visions and objectives and forms the framework for the district's local climate actions. The local actions, activities, campaigns, and communication initiatives that will contribute to reducing consumer-oriented emissions in the district will be finally adopted at the local climate summit. The district's citizens and local actors sign a binding agreement, including several climate actions that they must carry out within an agreed timetable.

The goal is that as many people as possible will participate in local climate actions and sign the Charters as they are formulated. When a group in a district reaches a certain size, it can have a positive impact on the culture, habits, and actions of the entire district. In this way, small actions can grow into large ones and contribute to the district's climate transition[7].

After the summit, the message about the local climate actions and the district charter is spread to as many people in the district as possible. This is done to achieve social tipping points, where a "small group" can influence the culture of a larger group.

The City of Copenhagen offers financial support for renovation and energy efficiency activities and advice if a public or private residential property has a high energy consumption, is worn, or poorly insulated. Funding is available for a portfolio of activities such as technical advice vis-à-vis an apartment building or commercial property is suitable for installation of solar PV; support to non-profit housing organisations re optimisation of consumption of heat, electricity, and water through either data-based energy monitoring or heat management; support for major renovation projects (e.g., façade renovation, new roof, or energy optimization) in cooperative or owner's association or private rental property.

Climate Task Force and Urban Area Renewal. Energy saving is also about behavioural change. In 2022, the municipality has therefore launched the project 'Climate Task Force', which aims to help four vulnerable urban areas get started with the green transition through dialogue and networking, with everything from new financing models for solar cells to how residents adjust their radiators. The Climate Task Force is focused on implementing the CPH 2025 Climate Action plan at local level and helps spreading successful local urban renewal initiatives to other parts of Copenhagen such as the Energy

[7] DeltagerDanmark&CONCITO_Hvidbog_endelig_0.pdf

Forum Sydhavn that has shown the potential for working focused on climate challenges in a specific urban area. Over five years, the Climate Task Force coordinates and develops initiatives with a special focus on vulnerable urban area renewal efforts. The project will complement existing work and focus on the implementation of e.g. solar cells, energy savings and car sharing at the local level. This climate action is decentralised and facilitates a citizen-centric approach with the involvement of owners, residents, and investors. A description (in Danish) of the activities for the seven areas in focus can be found here.

Circular Copenhagen. Proper resource and waste management is important and need the active participation of Copenhageners. 'Circular Copenhagen' – Copenhagen's resource and waste plan 2024 focuses on circular economy and contains ambitious goals to reduce the amount of waste sent for incineration. The plan has two overall goals for increasing the amount of recycling and reuse.

- 70 percent of household and light commercial waste must be collected for recycling. For the resources in the waste to be utilized in the best possible way, it is important that sorting options are available. In Circular Copenhagen, the focus is on sorting in Copenhagen's own citizen-oriented institutions and on public areas, where around 550 sorting points will be set up throughout the city. In addition, new technical solutions must be developed for the collection and treatment of the waste so that it is sorted into clean waste types and the resources in the waste can thus be recycled in the best possible way,
- Copenhageners must recycle 3 times as much – equivalent to 6,000 tonnes. As part of shifting away from a throwaway culture, the plan includes several initiatives to help Copenhageners recycle more. These include several sharing and exchange schemes, three new local recycling stations in the city and a resource laboratory.

These two goals are crucial for Copenhagen to reach its goal of becoming CO_2 neutral.

No later than the end of 2024, the City Council must approve the Resource Plan 2030[8], which will replace the Resource and Waste Plan 2024 (Circular Copenhagen). The new plan's main scenario builds on the previous plan consists of three main themes regarding waste and waste management. The extended scenario consists of three additional themes (e.g., reuse and circular economy), which primarily aim to support the upcoming climate action plan.

Sharing Copenhagen. In 2014, Copenhagen was named European Green Capital, and *Sharing Copenhagen* was formed to develop and share the City of Copenhagen's experience in creating a green and CO_2-neutral city with a high quality of life. Sharing Copenhagen supports 20-25 partnerships annually. Sharing Copenhagen is about creating a capital city in line with the vision "Our Copenhagen", i.e., climate-friendly daily life goes hand in hand with innovative urban development towards a green and inclusive city. A city with room for everyone and where citizens and visitors meet across the board. Sharing Copenhagen focuses on facilitating the process from idea to completion. Sharing Copenhagen supports social, cultural, and sustainable projects created by the city's enthusiasts, associations, and creative entrepreneurs, and is particularly fond of projects that focus on creating a climate-friendly, green, and inclusive city with cohesion, commitment, and collaboration.

4.2.3 Engaging school children

Climate Ambassadors[9]. The Climate Ambassador programme is an offer to Copenhagen secondary school students and is organised as a tailored citizen involvement programme allowing students to acquire competences and academic skills in line with the goals of the primary and lower secondary school. The ambassadors gain scientific and social knowledge about climate challenges and sustainable solutions. In addition, the education gives the students concrete tools to take up the ambassador role and communicate their knowledge to other students, friends, family, and decision-makers. Through a real-life assignment, students gain experience and greater awareness of their democratic options as

[8] Resource Plan 2030 scenarios discussion | Copenhagen Municipality's website (kk.dk)
[9] Afdelingen for Bæredygtig Udvikling (kk.dk)

citizens of a local community. They contribute to the development of society with new perspectives on the challenges, creative ideas, solutions for children and a willingness to make a difference. All this equips students with a motivation to be active co-creators and communicators of a sustainable future.

In February 2024, the climate ambassadors presented their 18 recommendations to the Mayor of Technology and Environment, Line Barfod, and the Mayor of Children and Youth, Jakob Næsager, the Citizens' Climate Assembly, and the Technical and Environmental Administration. With the recommendations, the climate ambassadors presented their picture of Copenhagen in 2035 with a focus on less CO_2 emissions from Copenhageners' food, housing, and transport.

ENERGY & WATER[10] - Greater Copenhagen Living Lab is an innovative and experimental environmental school, which offers teaching for all grades within the themes of energy and water supply, climate and climate adaptation in the past, present and future, always with a sustainability perspective. Energy and Water is established via a collaboration between the City of Copenhagen and HOFOR.

4.2.4 Working with institutions and the private sector

As an integrated part of the preparations for the Climate Action 2035 plan various companies, knowledge institutions, associations, including members of Danish Intelligent Energy Alliance and Green Power Denmark (see also Figure 10) were invited to a series of workshops during 2023 and 2024 to better understand the different challenges and identify potential short- and long-term solutions. The workshops also identified efficient and meaningful ways of involving the private sector and create relevant partnerships during the implementation phase of the climate action plan. The workshops, dealt with various themes and challenges such as:

- The main components of the Energy Strategy that will be part of the Climate Action 2035 plan, e.g., renewable energy, decentral district heating, the buildings' role in the energy system, electrification of the transport sector, carbon capture & storage, and energy supply security,
- Mobility and the goal towards a fossil-free transport sector,
- Every day, lunch is served in many Copenhagen companies and educational institutions – and the City of Copenhagen wants to support the canteens that want to take the lead in serving more sustainable and healthy lunch dishes. How is that possible? What potentials does the industry see, and what barriers can the City of Copenhagen help remove?
- Travel and leisure activities are associated with a significant impact on the climate, and it is important to discuss how best to promote forms of travel with less climate impact and make them the preferred choice for Copenhageners,
- The consumption of items like furniture, electronics and clothes has substantial negative impact on the climate. It is important to discuss how to extend the lifetime of consumer goods to reduce CO_2 emissions,
- Planning and designing the physical space in our city are important tools to support a sustainable urban life. Together with others, the municipality has a key role to play in urban planning and development,
- The labour market will need to adapt to and underpin the development and maintenance of a future sustainable society and business arena. Therefore, demands for training and new skills should be addressed in the upcoming climate action plan,
- A large part of Copenhageners' consumption of meat and other foods with a high climate footprint takes place when they shop in the supermarket. The retail trade is therefore an important partner for the City of Copenhagen in the realization of the upcoming climate action plan.

This approach is chosen this model because from a consumption perspective, it is important to understand the impact on the entire value chain. The dialogues take place in three stages: 1) Major workshops with actors who (as far as possible) represent the entire value chain, where the focus is on

[10] https://energiogvand.dk/en/frontpage/

barrier mapping and uncovering maturity in the actors/market for changed practices, 2) mini-workshops with selected actors who can provide valuable knowledge and input for specific initiatives that are under development for the Climate Plan 2035, and can be possible partners, 3) actual meetings with selected actors about the establishment of collaborations/partnerships that will deliver reductions.

The City of Copenhagen works to ensure the energy system's sustainability, security of supply, and sound economy while aiming at being climate positive by 2035. The *Energy Strategic Forum* has been created with the purpose of guiding and validating Copenhagen's future energy strategy that will constitute an important part of the Climate Action 2035 plan. The Energy Strategic Forum includes managers and technical experts from ARC, Cerius-Radius, CTR, Energinet, HOFOR, Ørsted and the City of Copenhagen's Technical and Environmental Administration and Financial Administration. Working groups, with support from the members of the Forum, are providing technical analyses and other input to the Energy Strategic Forum on topics such as renewable energy, decentral district heating, the buildings' role in the energy system, electrification of the transport sector, carbon capture & storage, and energy supply security. The Energy Strategic Forum is playing a key advisor role during the development of the Climate Action 2035 plan and may consequently, in some form, play a similar role during the implementation phase to maintain information and knowledge sharing between key energy system actors.

The climate impact from the construction of new buildings and facilities in Copenhagen is large. The impact comes first and foremost from the production of building materials. The city is growing, and it is important to ensure that future homes and facilities are created with a much lower CO_2 footprint. Fortunately, there are many opportunities to create this transition and the City of Copenhagen explores the potential together with the construction industry, e.g., the existing building stock should be transformed instead of being demolishing, alternative building materials with a low CO_2 footprint should be applied, and a more circular building practice should be adopted by the construction industry.

Spatial planning includes both municipal and local planning and is a key tool for creating a framework for a more sustainable urban life. There is a need to investigate how targeted planning of urban areas can promote CO_2-light buildings or create urban spaces that support the green transition. The question is how green, non-commercial urban spaces can influence behaviour and consumption in a climate-friendly direction or how to implement a "15-minute city", where Copenhageners should be able to go to school, get to leisure activities, work and shop within walking or cycling distance from home?

The green transition of Copenhagen will lead to a different labour market, where the availability of competencies that can develop and operate a sustainable society and business community will be paramount. Across sectors, day-to-day operations must be converted to new and greener solutions, and companies must find new business models that support sustainable consumption. It is important that the development of the labour market takes place in close interaction with citizens and Copenhagen's business community. In support of the city's climate ambitions the business community can develop concrete solutions for the benefit of Copenhageners, and with the possibility of exporting these to the rest of the world. It is essential to explore opportunities to contribute to and support the development of competencies that can foster the green transition and find ways to motivate citizens to improve their competence in the areas where green skills are in demand.

Things like furniture, electronics, and clothes constitute a large part the Copenhageners' climate footprint. The same is true for the municipality's procurement of, for example, furniture, and workwear. The goal is to extend the life of consumer goods by creating a city where it is easy to share, recycle and repair consumer goods. The City of Copenhagen is in dialogue with shops, manufacturers, educational institutions, interest groups, and others who want to contribute to this transition and support and establish a circular business model in Copenhagen. It is important to clarify how to create a good framework for business in Copenhagen while focusing on less consumption; how to promote eco-design and get Copenhageners to prioritise durable products that can be repaired; and to learn Copenhageners to borrow, share, exchange, and recycle more.

Private consumption of food makes up a significant part of Copenhageners' climate footprint. There are therefore great perspectives in looking at how domestic food consumption and meals in canteens and restaurants become less climate-impacting. The goal is to reduce the climate impact of the Copenhageners' consumption by facilitating a transition towards food shopping, cooking, and food consumption habits in a much more plant-rich direction; and to work hard to reduce food waste. Consequently, the City of Copenhagen is in dialogue with the food industry including manufacturers, workplace canteens, retailers, and restaurateurs to identify ways to shape a more climate-friendly food scene in Copenhagen.

The potential for CO_2 reductions from construction machinery is huge. Emissions stemming from construction machinery on building and construction projects within the Copenhagen are estimated to be in the region of 75,000 tons of CO_2 per year. The transition to emission-free construction machinery also reduces noise and air pollution, improves the working environment and the environment for nearby residents and passers-by. The City of Copenhagen and the Centre for Public-Private Innovation (CO-PI) have therefore initiated a process to develop the demand for emission-free construction machinery and ensure the sustainable solutions of the future. This City of Copenhagen is advancing this activity by leveraging the Big Buyers initiative and via C40.

4.2.5 Working with the consultancy and research community

The Technical and Environmental Administration and Climate Secretariat cooperates with universities and consultancies on an ad hoc basis, e.g., in connection with development projects and analyses. However, during the preparation phase for the Climate Action 2035 plan the Climate Secretariat has reached out to universities and R&D institutions with the purpose of initiating a dialogue on how they can contribute to meeting Copenhagen's climate goals and support the implementation of the Climate Action 2035 plan through knowledge sharing and research.

5 Outlook and next steps

The City of Copenhagen is currently managing two parallel processes i.e., the completion of the CPH 2025 Climate Action plan and the preparations for the next plan with a view to ensuring a gap-free continuation of climate actions leading to climate neutrality by 2030 and a climate positive Copenhagen by 2035.

The portfolio of initiatives being executed under the CPH Climate Action plan will conclude by the end of 2025, and a final report and thorough evaluation will be completed thereafter.

The draft Climate Action 2035 plan will be presented to the City Council by December 2024 and will subsequently go through a public consultation process. The final version of the plan is expected to be approved by the City Council towards the end of the second quarter of 2025. In parallel, a first roadmap will be prepared to detail specific goals, initiatives, and schedules for the first implementation phase of the CPH Climate Action 2035 plan.

The content of the present Climate City Contract illustrates the fact that the City of Copenhagen is in a transition phase and in the process of moving from one ambitious climate action plan to another. The specific goals and actions that will steer the City of Copenhagen's trajectory towards climate neutrality by 2030 will consequently mature until the City Council's approval of the final version of the Climate Action 2035 plan towards the end of 2025.

Further, the City Council's approval of the Technical and Environmental Administration's new vision (Our Copenhagen, January 2024), has started a review process that will evaluate the Administration's existing portfolio of policies, strategies, and action plans. The result of the review process will lead to a new targeted set of policies and strategies that will not only be aligned with the new vision, but also constitute the foundation for an efficient and timely implementation of the Climate Action 2035 plan.

6 Additional Sources of information

General information about the City of Copenhagen: International.kk.dk

Climate action plans: Carbon neutral capital

Climate adaptation: Climate Adaptation

Visions and goals for urban life: Creating the liveable city

CO_2 inventories (in Danish): CO_2-udledning fra København

International strategy: An Internationally-Connected Region

The City of Copenhagen's 2024 new vision (in Danish): Vores København

Resource and waste plan 2024 (in Danish): Cirkulær København – Ressource- og Affaldsplan 2024

Citizen's Climate Assembly (in Danish): Klimaborgerting

Recommendations from the citizens' Climate Assembly: Københavnernes Klimaborgertings anbefalinger | Københavnernes Klimaborgerting (kk.dk)

District climate summits (in Danish): Lokale Klimatopmøder

Technical and Environmental Administration's strategy for involving Copenhageners (in Danish: Strategi for TMFøs Københavnerinddragelse 2023-2028 2023 (itera.dk)

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

City of Copenhagen

The content of this document reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

NetZeroCities has received funding from the H2020 Research and Innovation Programme under the grant agreement n°101036519.

Table of contents

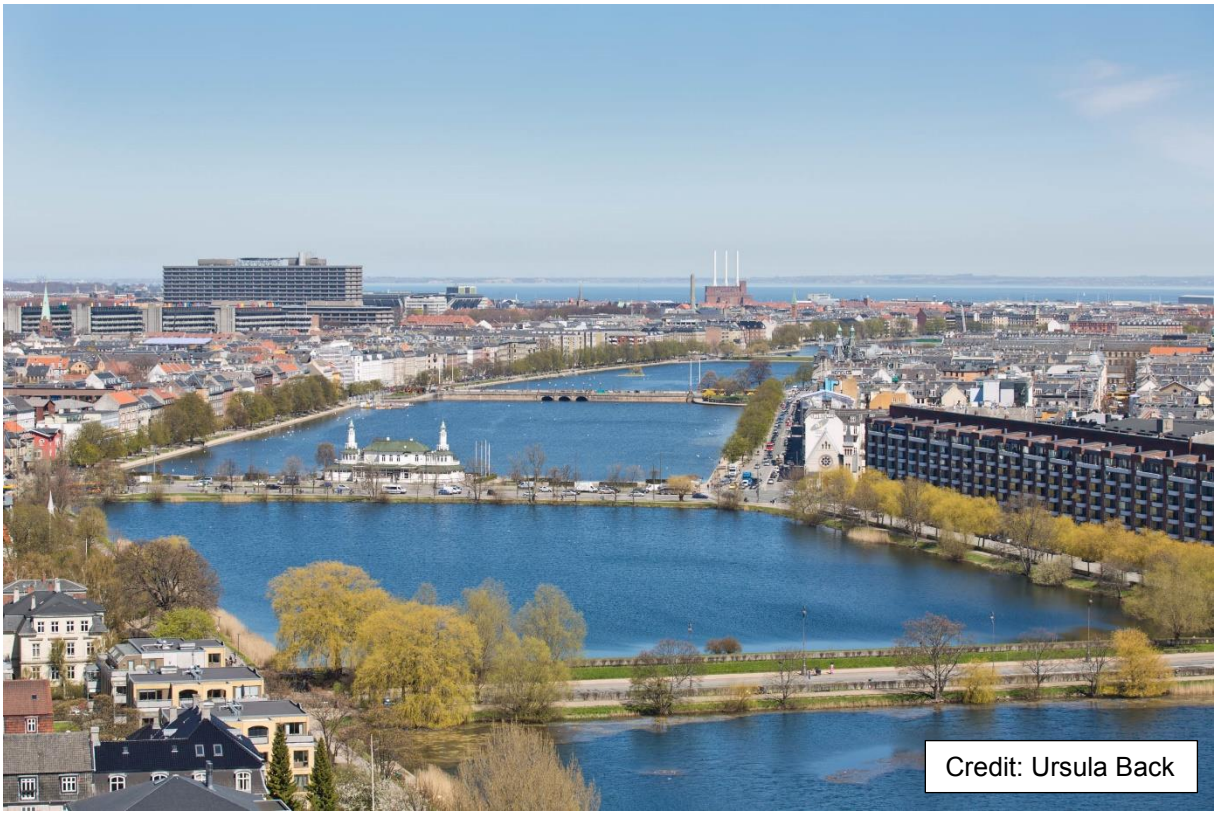
1 Introduction

Copenhagen aims to be among the first carbon neutral capitals in 2030. This is an ambitious goal requiring long-term and sustained action, but it is realistic, and Copenhagen is already well underway.

The CPH 2025 Climate Action plan was adopted by the City Council in 2012 and has been certified by C40 as being compatible with the Paris Agreement. The overarching goal was to achieve carbon neutrality by 2025, and the plan is divided into four different pillars: Energy consumption, Energy production, Mobility, and initiatives directly affecting the City of Copenhagen.

Three detailed and consecutive roadmaps facilitate efficient stocktaking and uptake of new knowledge and technologies and guarantee an efficient and targeted implementation of the CPH 2025 Climate Action plan.

The third and final roadmap covering 2021-2025 was adopted by the City Council in 2020. This final roadmap includes more than sixty initiatives that inter alia focus on green mobility, efficient use of district heating, energy efficiency initiatives, and installation of solar photovoltaic systems.



The implementation of the CPH 2025 Climate Action plan has led to a significant decrease of Copenhagen's emissions, e.g., CO_2 emissions per capita went from 4,7 tCO_2e in 2010 to 1,3 tCO_2e in 2022 and is expected to get below 1,0 tCO_2e by 2025. In addition, the CPH 2025 Climate Action plan considers the contribution from the city's renewable energy production taking place on facilities situated within or outside the city limits. Thus, Copenhagen's CO_2 emission can be reduced even further. In 2022, this reduction amounted to approximately 250.000 tons CO_2 leading to a CO_2 emission per capita of 0,8 tCO_2e. Thus, Copenhagen is clearly on a good trajectory towards climate neutrality.

However, although the goal was to achieve climate neutrality by 2025, it became obvious in 2022 that this objective will not be met mainly because mobility related initiatives resulted in less reductions than expected and due to the postponed installation of a planned Carbon Capture and Storage facility.

Nonetheless, the City of Copenhagen maintains a dedicated and long-term climate ambition and in 2021 the City Council endorsed a set of high-level targets for the city's next climate action plan. The plan will cover the period from 2026 till 2035 and is currently being prepared in line with the City Council's guidance.

The forthcoming Climate Action 2035 plan is being prepared by the Technical and Environmental Administration and the Climate Secretariat in cooperation with several internal and external stakeholders. The plan will be approved by the City Council summer 2025 after a public consultation phase.

Copenhagen participates in the Cities Mission '100 Climate-Neutral and Smart Cities in 2030' to reach the targets of the European Green Deal, to foster a green and climate neutral Europe, to contribute significantly to the Mission with knowledge and experience, and to learn from fellow cities. The Mission's aim to bring together cities well on their way to carbon neutrality, like Copenhagen, and cities just starting on the journey, aligns well with Copenhagen's vision for international cooperation.

As stated in Copenhagen's letter of interest, considering the current CPH 2025 Climate Action plan, and looking to the future, the City of Copenhagen hopes to address and further develop two key challenges with support from the Cities Mission:

1. Involvement of the citizens in Copenhagen's next climate plan, both regarding the development of the plan, and its implementation,
2. Addressing and reducing Scope 3 emissions requires changing both the city administration's procurement practices and the citizens' consumption.

The City of Copenhagen is actively working together and exchanging information and ideas with other Danish mission cities, the Øresund Region, and other Nordic Mission cities. During the development of the Climate City Contract, Copenhagen greatly benefited from expertise made available through the NetZeroCities project. This is also expected to be the case during the implementation phase towards 2030. Furthermore, in May 2024 the City of Copenhagen, together with HOFOR (Greater Copenhagen Utility) started the Flexumers4Future Pilot City project that focuses on how flexible use of district heating will decrease CO_2 emissions and provides essential knowledge and systemic tools that can be replicated across other energy sectors and electricity systems.

Copenhagen wishes to leverage the Cities Mission to further strengthen its work towards even more ambitious goals after 2030. The city is already on a strong trajectory to become climate neutral in 2030 regarding scope 1 and 2 emissions due to the ongoing implementation of the current CPH 2025 Climate Action Plan and current plans for future work. Cross-sectoral work and integration of new technologies such as large-scale heat pumps, Carbon Capture & Storage, and new smart technologies will be central elements in Copenhagen's next climate action plan to further reduce residual scope 1 and 2 emissions.

Copenhagen is in a transition phase, implementing the last part of the current CPH 2025 Climate Action plan while in parallel preparing for a new and ambitious ten-year climate action plan with an extended scope including consumer-based emissions. It is therefore important to underline that, due to the outstanding formal decision-making process of the Climate Action 2035 plan, the final state of the plan and the first implementing roadmap is not yet settled. The exact nature of the governance framework and future climate actions is consequently not known and information regarding the Climate Action 2035 plan should consequently be regarded as provisional. This holds also true as regards the purpose and type of new stakeholder initiatives and to which extent current initiatives will be continued.

1.1 Status

Copenhagen's Technical and Environmental Administration regularly monitors and evaluates the status of all the initiatives included in the CPH 2025 Climate Action plan, produces a CPH 2025 Climate Action progress report every six months, and issues an annual CO_2 inventory including a status report based on 18 indicators.

The progress report issued December 2023, details the status of the more than sixty ongoing initiatives and concludes that CO_2 emissions have been reduced by 74,4% compared to the 2010 baseline where emissions in total amounted to approximately 2.2 M tons CO_2e.

However, even though the target was climate neutrality, the initiatives included in 2021–2025 roadmap are currently expected to result in residual carbon emissions in 2025 amounting to approximately 600.000 tons CO_2e, close to 25% of the 2010 baseline, of which nearly 320.000 tons CO_2e stem from the transport sector and approximately 215.000 tons CO_2e can be related to energy production. When including the contribution from Copenhagen's renewable energy production, CO_2 emissions in 2025 are expected to reach approximately 20% of the 2010 baseline. The progress report dated December 2023 is available here (in Danish). A detailed presentation of Copenhagen's CO_2 inventory is given in module A-1 in the CCC Action Plan.

The primary reasons for not reaching climate neutrality are the slow transition to fossil-free mobility and lack of sufficient funding for the planned Carbon Capture and Storage facility. To the extent possible and necessary, the implementation of these key initiatives will be transferred to the upcoming Climate Action 2035 plan.

However, the implementation of the CPH 2025 Climate Action plan has led to a significant decrease of Copenhagen's emissions, e.g., CO_2 emissions per capita went from 4,7 tCO_2e in 2010 to 1,3 tCO_2e in 2022 and is expected to get below 1,0 tCO_2e by 2025 (or 0,8 tCO_2e when including the contribution from renewable energy production). Furthermore, according to a rather conservative projection, the emissions per capita will be approximately 0,6 tons CO_2e by 2030. It is assumed that this residual can be fully compensated by the planned CCS facility. Thus, Copenhagen is on a good trajectory towards climate neutrality in 2030.

Please note that the results (e.g., Figure 2) presented below do not include the contribution from renewable energy production in alignment with the method of calculation adopted for Copenhagen's next climate plan.

A detailed status for the 18 indicators / targets used vis-à-vis the CPH 2025 Climate Action plan and listed below in chapter 3 is included in the CCC Action Plan module B-3. More information about the 2030 projection can be found in Part A of the CCC Action Plan.

2 Climate neutrality by 2030

The City of Copenhagen confirms its intention to reach climate neutrality by 2030 within its administrative boundary and to address all greenhouse gases and sectors of emissions defined by the Cities Mission. This goal is supported by the implementation of the current CPH 2025 Climate Action plan, the forthcoming Climate Action 2035 plan, and is fully aligned with Copenhagen's overall vision for a smart, green, and climate-neutral city.

Copenhagen is one of the world's most ecological and climate-friendly cities and wants to be sustainable and adapt the city to efficiently cope with climate change. Copenhagen will continue to work hard to ensure that the increasing number of people who live in the city can use it with a clear conscience knowing that future generations will also be able to enjoy a liveable, green, and climate friendly city.

In 2030, Copenhagen will be among the world's first carbon neutral capital cities. As well as being an important milestone in the fight against climate change, this ambition will have other positive effects, e.g., cost savings re power and heating, and in the form of less noise, cleaner air, less waste, healthier citizens, and more green jobs. In 2030, Copenhagen will strive to be a leader as regards circular economy and make less impact on the Earth's resources, via sharing schemes, reuse, and even better frameworks for involving inhabitants in the green transition.

To succeed, the Copenhageners' support to the climate action initiatives is essential. Without the engagement and understanding of the citizens, it is not possible to reach the ambitious targets that will affect the citizen's daily life in many respects.

The Climate City Contract is first and foremost based on those elements of the current CPH 2025 Climate Action plan that are expected to be continued towards 2030, lessons learnt during the implementation of the current plan, and main new initiatives assumed to be included in the Climate Action 2035 plan. The present version of Copenhagen's Climate City Contract will focus on the mandatory scope 1,2, and 3 emissions. Thus, leaving the life cycle assessment approach and related consumption-based emissions, that will be part of Copenhagen's Climate Action 2035 plan, for inclusion in a potential next version of the Climate City Contract.

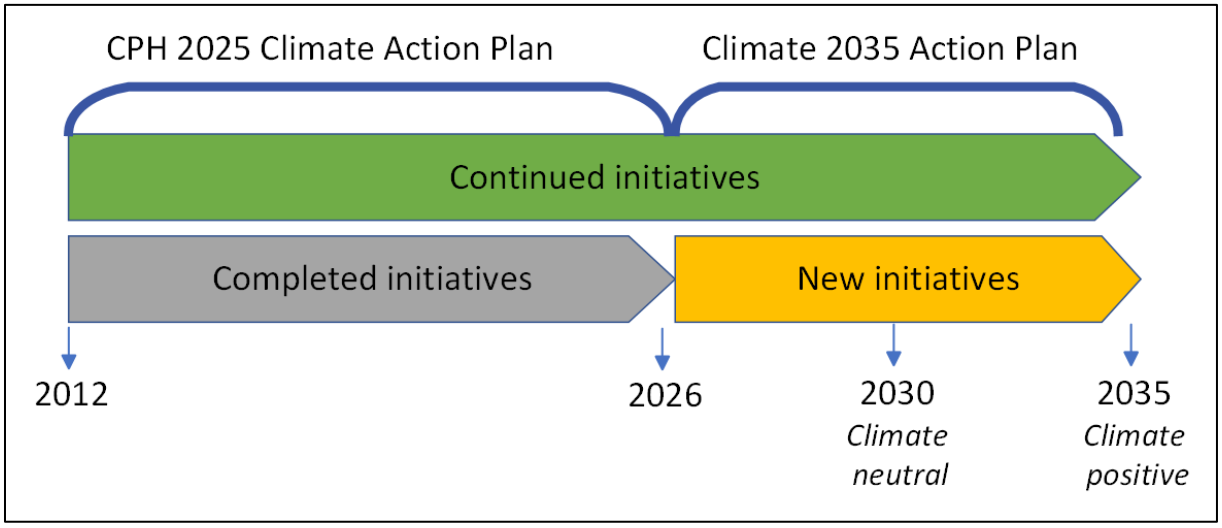


Figure 1. A sketch of Copenhagen's climate action plans, duration, and key targets. The CPH 2025 Climate Action plan will be followed by a new plan currently being developed.

The CPH 2025 Climate Action plan and the upcoming plan operate within the legislative framework composed of the European Climate Law, the EU Green Deal, the fit for 55-package, the Danish Climate Law, and associated implementing legislation adopted by the Danish Parliament.

Similarly, the climate action plans cannot be implemented in isolation and depends strongly on supporting plans and activities. Consequently, the City of Copenhagen has put several other plans and strategies in place in support of the CPH 2025 Climate Action plan such as (a more complete list can be found in module A-2 in the CCC Action Plan):

A new vision for '*Our Copenhagen*' was endorsed by the City Council January 2024. It serves as a strong foundation for the Technical and Environmental Administration's future work and formulates high-level objectives that will guide Copenhagen's climate actions during the next ten years. It put emphasis on co-creation, cooperation, and engagement; and includes a bold vision for a green and climate friendly city and emphasises inter alia that urban development in Copenhagen shall always take the impact on climate and biodiversity into account – regarding new buildings and when rethinking existing buildings and urban spaces"; and that in 2035, "Copenhageners' high quality of life and minimal CO_2 emissions will be an inspiration for the world". The adoption of this new vision by the

City Council was also the starting point for a thorough review and analysis of the City of Copenhagen's existing climate related policies, strategies, and action plans with a view to adapting them to the vision's objectives.

Copenhagen's tree planting policy 2018-2025. The policy's overall goals for 2025: 75% of Copenhageners experience Copenhagen as a green city; the total number of trees in Copenhagen shall increase; good growth conditions for both existing and new trees in the city shall be ensured; and 20% of Copenhagen's total area is covered by tree crowns. In addition, the CHP 2025 Climate Action plan stipulates that 100.000 new trees should be planted before the end of 2025.

Circular Copenhagen. 'Circular Copenhagen' is the City's 'Resource and Waste Management Plan 2019-2024'. The plan was adopted in 2019 and contains three specific targets: 70% of household waste and light commercial waste is recycled in 2024; carbon emission from waste is reduced by 59,000 tonnes; and recycling is tripled. The plan contributes to the climate target by separating waste and by making better use of plastic and biological waste. This plan is currently under revision, for information about specific current activities, see Circular Copenhagen. The new plan will take effect from January 2025 and underpins the implementation of new Climate Action 2035 plan.

Copenhagen's Planning Strategy. This strategy contains an overall vision for Copenhagen's development, "The climate-friendly capital of the future". The vision is translated into concrete proposals for the City of Copenhagen's urban planning over the coming years. Copenhagen must continue to be a green and climate-friendly capital that takes the lead in the green transition and sets ambitious goals for the future that can inspire other cities. This must be accompanied by investments that promote sustainable mobility and more new green spaces and parks that contribute to the health and leisure of Copenhageners. Copenhagen must be a green city and work to increase biodiversity in the city for the benefit of Copenhageners.

Underlying planning basis for Mobility actions. In addition to the above, the underlying planning basis for the mobility sector comprises a wide variety of plans and programmes. Copenhagen's Cycling Strategy 2011-2025, the Cycling Track Prioritisation Plan 2017–2025 and the Prioritisation Plan for Bicycle Parking 2018–2025 stipulate targets and a planning basis for cycling-related actions, while the Green Mobility Action Plan stipulates actions to promote green mobility in general. Going forward, this planning basis is supplemented by new action plans for an electric vehicle charging infrastructure, traffic safety and car-sharing and a new parking strategy.

Copenhagen is a metropolis large enough for its climate solutions to be interesting in an international context, but also small and manageable enough to test out new and smart solutions. The city is growing and consequently there are new urban development areas where trials and demonstrations of innovative solutions and new thinking can take place on a large scale. New solutions being developed and tested in Copenhagen present a unique export potential to cities all over the world which also require solutions to reduce energy consumption and CO_2 emissions and improving the environment.

Copenhagen's green and blue areas endow the city with an air of calm and balance. In a growing city, it is increasingly difficult to find space for big new green areas. Thus, green spaces must be considered when designing new or changed urban spaces. Nature will have to thrive in unexpected places, resulting in a multitude of smaller patches of green and blue.

3 Strategic priorities

Strategic priorities described in section 3.1 to 3.4 refer to the CPH 2025 Climate Action plan, whereas section 3.5 outlines initiatives in preparation for the Climate Action 2035 plan including the subset of current initiatives that are expected to be continued.

3.1 Reducing energy consumption

Targets for the energy consumption sector in Copenhagen by 2025 compared to the 2010 baseline:

- 20% reduction in heat consumption,
- 20% reduction of electricity consumption in commercial and service companies,
- 10% reduction of electricity consumption in households,
- Installation of solar panels corresponding to 3% of electricity consumption in 2025,
- Reduce energy consumption in municipal buildings by 40%,
- Municipal new build up to 2015 meets the requirements of the 2015 classification and up to 2020 meets the requirements of 2020 classification,
- The energy consumption for street lighting in Copenhagen is halved,
- An installed total of 60,000 m^2 of solar panels on existing and new buildings owned by the municipality.

Energy savings constitute an important part of the CPH 2025 Climate Plan. Energy consumption accounts for a minor part of the total reduction of CO_2 emissions but, from an overall economic perspective, energy savings are the cheapest way to cut emissions.

The City of Copenhagen aims at realising the potential for energy savings and develop new, innovative mechanisms to reduce energy consumption in buildings, particularly changing buildings' role in the energy system from passive consumers to active partners which can add flexibility to the energy system and facilitate generation of energy locally. Going forward, buildings and technical facilities must increasingly interact with the overall energy system to adapt energy consumption to renewable energy production. This can for example be achieved by staggering consumption and storing heat in the building stock, particularly buildings made of dense and heavy materials.

The ongoing refurbishment of the city's buildings will gradually save energy. Once a building has undergone a major refurbishment, many years will usually pass before it needs to be refurbished again. Consequently, it is crucial to ensure sufficient focus on energy efficiency as part of the general refurbishment of existing buildings and whenever new buildings are constructed. An added advantage is that energy efficiency measures can contribute to better housing quality and indoor climate.

The day-to-day operation of thousands of district heating substations installed in Copenhagen's buildings significantly impacts energy efficiency. HOFOR (Greater Copenhagen Utility) estimates that it is technically possible, through optimisations, to reduce the city's heat consumption by close to 10% without major investments provided building owners are engaged and act.

Energy Leap is a partnership between housing associations and organizations in Copenhagen that collaborate to reduce energy consumption in buildings. The Energy Leap partnership is a major initiative currently representing 39% of the building stock in Copenhagen, distributed across 56 partners, including HOFOR (Greater Copenhagen Utility), private-sector and public-sector building owners (such as the city's Copenhagen Properties Administration) as well as property sector interest groups. The Energy Leap partnership has collectively achieved a 9 % reduction in heat consumption from 2021 to 2023, amounting to savings of approximately 2 M€, and demonstrating that cross-cutting knowledge and data sharing and promotion of best practices yield positive results.

3.2 Fostering green mobility.

Targets for the Mobility sector in Copenhagen by 2025 compared to the 2010 baseline:

- 75% of all trips in Copenhagen are on foot, by bike or public transport,
- 50% of all trips to work or school in Copenhagen are by bike,
- 20% more passengers use public transport compared to 2009,

- Public transport is carbon neutral,
- 20-30% of all light vehicles run on new fuels,
- 30-40% of all heavy vehicles run on new fuels,
- The City of Copenhagen's vehicles run on electricity, hydrogen, or biofuels.

The City of Copenhagen aims at developing future mobility and transport solutions that are more efficient and space-saving and have a much lower negative impact on the climate, the environment, and human health. This is done in close cooperation with neighbouring municipalities and national authorities.

Credit: Ursula Bach

The transport sector accounted for roughly 340,000 tons of carbon emissions in 2022 and it is expected to be the biggest source of carbon emissions in Copenhagen onwards. Road traffic accounts for approximately 90% of these emissions.

Several initiatives are being pursued to reduce carbon emissions from road traffic including:

- Conversion of parking lots to spaces for electric vehicles (EVs) and shared EVs, are expected to cut carbon emissions by up to 28,000 tons CO_2e by converting half of the current spaces allotted for fossil-fuelled vehicles to EVs,
- Initiatives fostering a shift away from fossil-fuelled vehicles, e.g. generally reducing the speed limit throughout the road network and introduction of superblocks, is estimated to reduce carbon emissions by 46,000 tons CO_2e, or by 2,000 tons CO_2e for just a single speed zone in an urban district,
- Initiatives improving conditions for green and space saving modes of transport, e.g. cycling, bus, walking, shared cars, and car-pooling. As mentioned, these initiatives have a lesser impact in isolation, but substantially impact overall mobility.

The way in which the initiatives are combined will impact the overall effect on traffic and, thus, on carbon emissions. This is because several initiatives affect the same users and trips. At the same time, some initiatives lay the foundation for other initiatives. Similarly, some initiatives in isolation have only a small impact on carbon emissions, but support changes throughout the transport system and are essential for ensuring a satisfactory level of general mobility.

It is an overarching goal for the City of Copenhagen that cycling, public transport and walking should each make up at least 25% of all trips. For the past fifteen years, the bicycle share has been between 25% and 31%; and cycling should amount to 50% of all trips to work and educational institutions by the end of 2025 - in 2023, the share was 45%, compared to 42% in 2020.

Biking is an essential mode of transportation and good for the citizens' health and the environment. Copenhagen, therefore, still aims at being the world's best city for cyclists – also in the future. With more cyclists in the streets, it is required to work hard to make room for everybody, including less experienced cyclists, and provide more bicycle parking and charging options. Biking and should be a source of pleasure and well-being. Copenhagen invests every year in bicycle paths and bridges. Over the past ten years, the City of Copenhagen has invested a total of 113 M€ thereby improving cycling conditions. Today, 75% of Copenhageners experience that the culture of cycling contributes positively to urban life in Copenhagen.

The City of Copenhagen strives to ensure efficient, green, and CO_2-neutral public transportation by creating new green transport solutions that can help reduce air pollution and CO_2 emissions in Copenhagen. From 2008 to 2021, air pollution from Copenhagen's busses has been reduced by more than 85%. At the same time, CO_2 emissions have been reduced by 60%.

The City of Copenhagen is continuously working to improve public transportation ensuring passengers a fast and efficient journey by busses, S-train, and the metro. Copenhagen is growing, by 2050, around 100,000 more Copenhageners are expected compared to 2019. This increases the risk of traffic congestion and puts pressure on public transport capacity. Consequently, it is important to improve public transportation and make it attractive to more people. This may be done by expanding the capacity and raising the level of service, reducing travel time, introducing attractive price models, and ensuring better accessibility and good connections between the different modes of transportation both to, from, and in Copenhagen.

The challenge of imposing restrictions on fossil-fuelled vehicles using the main road network in Copenhagen is that the segment of traffic that does not convert to electric vehicles and does not switch to other modes of transport will presumably take different routes and thereby shift carbon emissions to neighbouring districts or municipalities. Further, national legislation or lack thereof may inhibit or delay relevant initiatives such as the introduction of road pricing nationwide or in Greater Copenhagen that would underpin efforts to reduce carbon emissions from road traffic and significantly reduce the danger of migrating emissions to neighbouring municipalities.

3.3 Building a flexible energy system.

Targets for the Energy Production sector by 2025 compared to the 2010 baseline:

- District heating in Copenhagen is carbon neutral,
- Electricity production is based on wind and biomass and exceeds total electricity consumption in Copenhagen,
- Plastic waste from households and businesses is separated,
- Bio gasification of organic waste.

Copenhagen strives to develop a future energy production system based solely on renewable energy including the possible partial phasing out of biomass, phasing in of new green technologies, developing integrated circular resource systems, and rising the share locally produced energy from

sources such as photovoltaic systems, heat pumps, and geothermal plants. In 2022, around 85% of the heat produced in Copenhagen was CO_2 neutral.

Efforts to ensure a sustainable, carbon-neutral district heating are focused on reducing, and ultimately phasing out, the use of fossil fuels. New initiatives will focus on developing and deploying system components such as heat pumps, electric boilers, geothermal solutions, low-temperature district heating, heat storage and flexible consumption.

Denmark has adopted a national Climate Agreement for energy and industry which changes several framework conditions for these efforts and enables, among other things, a wider deployment of heat pumps and conversion of peak-load production of district heating.

Considering the terms and conditions of this new national framework, existing efforts have been re-evaluated and supplemented by new projects aimed at accelerating the sustainable transition of the district heating system. In relation to the implementation of these efforts, it is crucial that physical urban planning designates appropriate areas for decentralised technical facilities in the city.

3.4 Carbon capture activities.

The City of Copenhagen is cooperating with HOFOR (Greater Copenhagen Utility) and ARC (Amager Resource Centre) to establish a Carbon Capture and Storage (CCS) facility in Copenhagen. The overall effect of this project could make the incineration plant carbon negative and contribute a net absorption of atmospheric carbon. In the short term, the most realistic solution is to store the carbon underground. In the long term, once technologies have matured further, it may be possible to use CO_2 in the production of for instance synthetic fuels.

There remain several uncertainties relating to plant design and waste composition but particularly the plant's financing, as well as how it integrates into the energy system.

The City Council has consequently asked HOFOR and ARC to analyse and possibly put in a bid for the government's CCS (Carbon Capture and Storage) tender in 2025 with the aim to be operational by 2029. This will help to achieve the 2030 climate neutrality target and the 2035 target vis-a-vis climate positivity.

HOFOR is currently investigating the possibilities of capturing and using or storing CO_2 emitted from Amager Power Station which is Denmark's largest and newest point source for biogenic CO_2. The plant may be able to remove up to 900,000 tons of CO_2 per year.

ARC will also work in the coming years to remove CO_2 from the waste-to- energy plant and funds have been allocated for analyses, feasibility studies, and operation of demonstration plants. ARC is working towards making the waste-to-energy plant Amager Bakke CO_2 neutral. With a full-scale plant for carbon capture, Amager Bakke will be capable of capturing 500,000 tons of CO_2 annually, helping Copenhagen take a big step towards becoming CO_2-neutral.

3.5 Climate actions after 2025

The climate battle in front of us will predominantly be won in cities. By 2050, 2/3 of the world's population is expected to be living in cities. Most of the growth will be in the developing countries, especially South-east Asia, Africa, and South America. The global middle class is also expected to grow from 1.8 billion people in 2010 to 4.9 billion in 2030.This will put greater pressure on resources, so it is imperative that the expected growth and development of infrastructure is based on sustainable principles. Otherwise, the Paris Agreement targets will be unrealistic.

Realising this, Copenhagen wants to continue being an international pioneer in terms of climate action and urban development.

The City of Copenhagen will follow up on its actions with ambitious new climate targets both for the emission sources covered by the existing CPH 2025 Climate Action plan, and for consumption-based emissions beyond the current scope of the Climate City Contract.

The City Council has endorsed a set of high-level guiding principles for the city's next climate action plan. The plan will cover the period from 2026 till 2035 and is currently being developed in line with the City Council's guidelines, i.e., Copenhagen aims at being net-positive by 2035, emissions from Copenhagen's procurement activities should be reduced by 50 % by 2035, and emissions stemming from citizens' consumption should be reduced from approximately 10 tons CO_2e to 5 tons CO_2e per citizen by 2035. These goals are ambitious, require sustained, innovative, and targeted actions, and demonstrate Copenhagen's genuine wish to become even greener and more sustainable in the years to come for the benefit of its citizens and the climate.

The concrete initiatives, detailed goals, and indicators are being developed and will be presented to the City Council before the end of 2024 and will, after a public consultation phase, be approved by the City Council towards the end of the second quarter of 2025. Hence, the new Climate Action 2035 plan will be ready to take over from the current plan by January 2026.

Historical and projected emissions per capita in Copenhagen shown in Figure 2 clearly demonstrates that Copenhagen is on a solid trajectory towards climate neutrality in 2030.

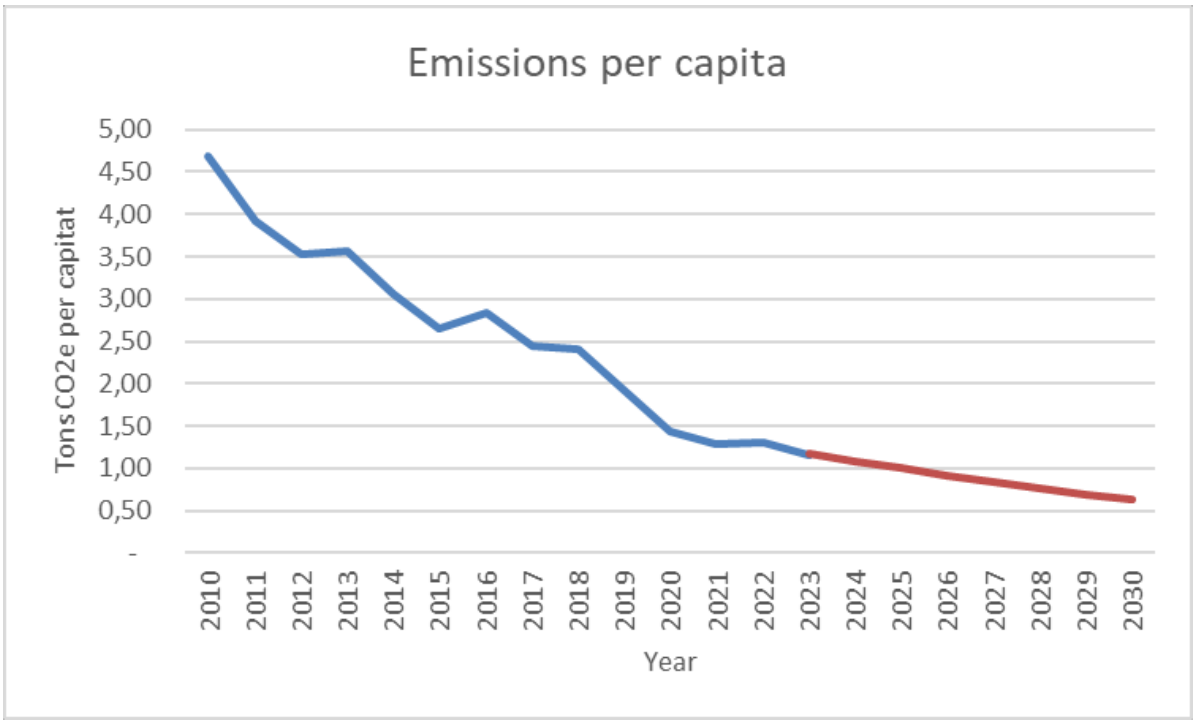


Figure 2. Emissions per capita and projected emissions until 2030 (in red) based on the 'Frozen Policy' scenario presented in module A-2 in the AP.

The new or expanded high-level initiatives that will underpin Copenhagen's 2030 climate-neutrality ambition are briefly presented below and further detailed in Part B of the CCC Action Plan. These activities will build on experiences and results obtained during the implementation of the CHP 2025 Climate Action plan.

Reducing energy consumption. Focus will be put on reducing energy consumption in both buildings owned by the City of Copenhagen (5% of the building stock), buildings owned and managed by the private sector, and on new or retrofitted buildings. The targets will be achieved by involving multiple stakeholders such as residents, building owners, utility companies, building contractors, and private industry.

Innovative initiatives such as Copenhagen's NZC pilot city project, Flexumers4Future, that focuses on how flexible district heating can decrease CO_2 emissions may foster city wide mobilisation of citizens in support of low carbon transitions pathways and provide essential knowledge and systemic tools. Specific activities will be allocated to energy renovation; introduction and optimal use of intelligent building energy management systems; targeted educational and awareness raising activities; and activities facilitating buildings' ability to flexibly interact with the energy system by locally generating, storing, and releasing energy when it is needed.

The introduction of low-temperature district heating will provide significant savings re heat production costs. Converting the existing district heating network to a lower heating temperature will not only increase efficiency and reduce resource consumption but will also enable the creation of a future decentralised multi-source energy system.

Fostering green mobility. The fossil-free electrification of the transport sector will gradually lead to reduced CO_2 emissions. The successful implementation of this initiative is a prerequisite for reaching climate neutrality by 2030. In parallel, the City of Copenhagen will work to reduce the number of passenger car trips inside the Copenhagen area by fostering alternative transportation options such as

walking and biking, e.g., by prioritising biking in urban planning, promote car sharing, building additional biking lanes, and improving public transportation.

Spatial planning includes both municipal and local planning and is a key tool for creating a framework for a more sustainable urban life. There is a need to investigate how targeted planning of urban areas can promote CO_2-light buildings or create urban spaces that support the green transition. The question is how green, non-commercial urban spaces can influence behaviour and consumption in a climate-friendly direction or how to implement a "15-minute city", where Copenhageners should be able to go to school, get to leisure activities, work and shop within walking or cycling distance from home?

Building a green energy system. The energy system will gradually be transformed from consisting of few large installations to an eco-system of several components, i.e., a move from a centralised to a decentralised multi-source approach. Primarily, the electrification of the transport sector and district heating will guide the design and capacity of the future energy system. Hence, the installation of large-scale heat pumps, electric boilers, energy storage facilities, addition of more renewable energy production capacity (wind and solar), and expansion of the electrical grid capacity will be main components of the Climate Action 2035 plan. These new installations will require significant investments as documented in the CCC Investment Plan.

As an integrated part of the Climate Action 2035 plan the Technical and Environmental Administration is developing an Energy Strategy together with the Finance Administration and several municipally utility companies and the private sector. This process is steered and guided by the Energy Strategic Forum chaired by the Technical and Environmental Administration. The rationale for developing an Energy Strategy is the expected increase in demand and the complexity and changing nature of the future energy system. The aim is to develop a visionary and shared strategy supporting biomass reduction, a climate-friendly transition, and ensuring security of supply. The strategy will serve as a common guideline for the short- and long-term co-development of the energy system; and will allow the City of Copenhagen to influence energy planning in a proactive and agile way; and to take responsibility for the overall development of the energy system.

Carbon capture activities. Compensating residual emissions by establishing a Carbon Capture and Storage (CCS) facility in Copenhagen is a prerequisite for reaching climate neutrality by 2030 and the climate positive target by 2035. A test installation is already up and running, but the aim is to have a large-scale operational facility ready by 2029. However, a CCS facility will require substantial investments which is documented in the CCC Investment Plan.

Cross-cutting activities. Several initiatives aimed at engaging citizens and other stakeholders in the formulation of the upcoming Climate Action 2035 plan have been initiated and will form the basis for stakeholder involvement activities to be put in place during the implementation of the Climate Action 2035 plan to facilitate continued guidance and sustained local action. These activities are presented in more detail in module C of the Climate City Contract Action Plan.

3.6 Involvement and engagement of stakeholders

Involvement of Copenhageners is a core task for the City of Copenhagen and essential to make Copenhagen climate neutral by 2030. An engaging and transparent dialogue across different areas of interests, city districts, and citizens with different demographic, social, and cultural background creates a firm foundation for developing, implementing, and sustaining climate friendly solutions in Copenhagen.

The CPH 2025 Climate Action plan is being co-created and implemented in cooperation with key partners and stakeholders. The Climate Action 2035 plan will further engage and involve partners and stakeholders with a view to achieve Copenhagen’s ambition to be climate-neutral by 2030. Both during the development and implementation of Copenhagen’s climate action plans, co-creation and multi-

level stakeholder involvement have been key factors to success ensuring climate justice and a just transition, sustained local action, and facilitate timely uptake of innovative ideas and new technology.

The City of Copenhagen is therefore reaching out to citizens, associations, public entities, and the private sector among others through well-established mechanisms and partnerships[1] such as the Citizens' Climate Assembly, District Committees, the Climate Task Force, District Climate Summits, the Energy Strategic Forum, and the Energy Leap partnership.

This active co-creation environment constitutes a driving force that will underpin Copenhagen's ability to achieve climate neutrality by 2030. Many of these enablers have been created and applied in connection with the implementation of the CPH 2025 Climate Action plan and the development of the Climate Action 2035 plan. These will be further improved and adapted to the Climate Action 2035 plan and additional new tools will be developed.

The new Climate Action Plan 2035 will expand the scope of the current plan to include new areas such as emissions related to construction work and the Copenhageners' consumption of clothes and products, food, and modes of transport in and outside Copenhagen. These are areas that are close to the citizens, and it is therefore obvious to involve the experts in the field, i.e., the Copenhageners themselves.

Lively exchange of ideas between Copenhageners and the City of Copenhagen is an essential part of Climate Summits.

The City of Copenhagen strives to become even better at involving Copenhageners to ensure that the municipality is constantly improving the dialogue and the basis for informed decision making to

[11] Detailed information on these initiatives is available in the Action Plan module C.

strengthen democracy, foster cooperation, information exchange, and create targeted solutions of high quality for Copenhagen and Copenhageners. This is taking place through several lines of action such as:

- *District Climate Summits*. Copenhagen's districts and neighbourhoods want to take responsibility and bring together local actors to jointly plan climate action. District climate summits aim at creating local action, reduce CO_2 emissions in Copenhagen, and create even better communities.
- The *Citizens' Climate Assembly* consists of 36 representatively selected Copenhageners who, based on expert guidance and debates, make recommendations to the City Council re a future Copenhagen with far less CO_2 emissions from the consumption of food, housing, and transport. The Citizen's Climate Assembly's recommendations will serve as input to the Climate Action 2035 plan.
- *Climate Task Force and Urban Area Renewal*. Energy saving is also about behavioural change. In 2022, the municipality has therefore launched the project 'Climate Task Force', which aims to help four vulnerable urban areas get started with the green transition through dialogue and networking, with everything from new financing models for solar cells to how residents adjust their radiators. The City of Copenhagen offers financial support for renovation and energy efficiency activities and advice if a public or private residential property has a high energy consumption, is worn, or poorly insulated.
- *Renewable Energy Communities*. The City of Copenhagen promotes the establishment of renewable energy communities. Empowering citizens to drive the energy transition locally and directly can lead to better energy efficiency, cost savings, reduced energy poverty, and more local green job opportunities. The installation of solar panels on buildings, energy retrofitting, urban renewal and new means of transport are just some areas which involve Copenhageners. The City of Copenhagen actively motivate Copenhageners to opt for green solutions in development of urban properties and spaces, transport, consumption, and education.
- *District Committees* representing multiple communities including those that are at greatest risk of disproportionately poor social outcomes are involved both during the development and implementation of new climate actions.
- *Circular Copenhagen*. Proper resource and waste management is important and need the active participation of Copenhageners. '*Circular Copenhagen*' – Copenhagen's resource and waste plan 2024 focuses on circular economy and contains ambitious goals to reduce the amount of incinerated waste. The plan has two overall goals for increasing the amount of recycling and reuse.
- *Sharing Copenhagen*. In 2014, Copenhagen was named European Green Capital, and *Sharing Copenhagen* was formed to develop and share the City of Copenhagen's experience in creating a green and CO_2-neutral city with a high quality of life. Sharing Copenhagen supports 20-25 partnerships annually. Sharing Copenhagen is about creating a capital city in line with the vision "Our Copenhagen", i.e., climate-friendly daily life goes hand in hand with innovative urban development towards a green and inclusive city.
- *Climate Ambassadors*[2]. The Climate Ambassador programme is an offer to Copenhagen public school students and is organised as a tailored citizen involvement programme allowing students to acquire competences and academic skills in line with the goals of the primary and lower secondary school. The ambassadors gain scientific and social knowledge about climate challenges and sustainable solutions.
- The *Energy Leap partnership* is a major initiative currently representing 39% of the building stock in Copenhagen, distributed across 56 partners, including HOFOR (Greater Copenhagen Utility), private-sector and public-sector building owners (such as the city's Copenhagen Properties Administration) as well as property sector interest groups. The partnership that has

[2] Afdelingen for Bæredygtig Udvikling (kk.dk)

existed since 2016 is being expanded by inviting public housing associations and additional property administrators, both of whom represent the numerous cooperative housing associations and homeowner associations in the city. The expansion of the Energy Leap partnership is aimed at supporting current efforts to optimise almost half of the city's heated floor space by increasing the proliferation of intelligent energy control systems to reduce heat consumption and improving conditions for large-scale heat pumps in Copenhagen going forward.

As an integrated part of the preparations for the Climate Action 2035 plan various companies, knowledge institutions, associations, including members of Danish Intelligent Energy Alliance and Green Power Denmark were invited to a series of workshops during 2023 and 2024 to better understand the different challenges and identify potential short- and long-term solutions. The workshops also identified efficient and meaningful ways of involving the private sector and create relevant partnerships during the implementation phase of the climate action plan.

Things like furniture, electronics, clothes, and shoes constitute a large part the Copenhageners' climate footprint. The same is true for the municipality's procurement of, for example, furniture, and workwear. The goal is to extend the life of consumer goods by creating a city where it is easy to share, recycle and repair consumer goods.

The City of Copenhagen is in dialogue with shops, manufacturers, educational institutions, interest groups, and others who want to contribute to this transition and support and establish a circular business model in Copenhagen. It is important to clarify how to create a good framework for business in Copenhagen while focusing on less consumption; how to promote eco-design and get Copenhageners to prioritise durable products that can be repaired; and to learn Copenhageners to borrow, share, exchange, and recycle more.

Copenhageners discussing climate actions during a Climate Assembly open session.

As full or part-owner of several municipally companies, the City of Copenhagen safeguards that their ambitious objectives are aligned with Copenhagen's climate targets. HOFOR (Greater Copenhagen Utility), ARC (Waste management), CTR (Metropolitan Copenhagen Heating Transmission company), BIOFOS (wastewater utility), Metroselskabet (public transportation - metro), and Movia (public transportation - busses) are all actively involved in the operation and development of the public transportation system and the energy and waste systems that Copenhagen depends on.

These companies and Energinet (Independent public enterprise that owns, operates, and develops the transmission systems for electricity and gas in Denmark), and private companies such as Radius (Electrical grid operator) and Ørsted (Sustainable energy company) are members of the Energy Strategic Forum, headed by the City of Copenhagen's Technical and Environmental Administration, and mandated to provide guidance vis-à-vis Copenhagen's energy strategy, the future energy system in Copenhagen, and the Climate Action 2035 plan.

Private consumption of food makes up a significant part of Copenhageners' climate footprint. There are therefore great perspectives in looking at how domestic food consumption and meals in canteens and restaurants become less climate-impacting. The goal is to reduce the climate impact of the Copenhageners' consumption by facilitating a transition towards food shopping, cooking, and eating habits in a much more plant-rich direction; and to work hard to reduce food waste. Consequently, the City of Copenhagen is in dialogue with the food industry including manufacturers, workplace canteens, retailers, and restaurateurs to identify ways to shape a more climate-friendly food scene in Copenhagen.

The climate impact from the construction of new buildings and facilities in Copenhagen is large. The impact comes first and foremost from the production of building materials. The city is growing, and it is important to ensure that future homes and facilities are created with a much lower CO_2 footprint. Fortunately, there are many opportunities to create this transition and the City of Copenhagen needs to explore the potentials together with the construction industry, e.g., the existing building stock should be transformed instead of being demolishing, alternative building materials with a low CO_2 footprint should be applied, and a more circular building practice should be adopted by the construction industry.

The green transition of Copenhagen will lead to a different labour market, where the availability of competencies that can develop and operate a sustainable society and business community will be paramount. Across sectors, day-to-day operations must be converted to new and greener solutions, and companies must find new business models that support sustainable consumption. It is important that the development of the labour market takes place in close interaction with citizens and Copenhagen's business community. In support of the city's climate ambitions the business community can develop concrete solutions for the benefit of Copenhageners, and with the possibility of exporting these to the rest of the world. It is essential to explore opportunities to contribute to and support the development of competencies that can foster the green transition and find ways to motivate citizens to improve their competence in the areas where green skills are in demand.

4 Process and principles

To reach the climate neutrality goal by 2030, it is essential for the City of Copenhagen to develop and nurse a strong eco-system of political support, internal expertise and resources, and an engaged and dedicated network of citizens, partners, and stakeholders.

The current CPH 2025 Climate Action plan is approved and owned by the City Council and is implemented through a series of multi-annual roadmaps by the Climate Secretariat and the Technical and Environmental Administration in cooperation with the Financial Administration. During the implementation phase the political level, the Technical and Environmental Committee, is informed every six months about status and progress concerning initiatives and indicators. Detailed CO_2 inventories are produced annually and reported internationally in accordance with the CDP and C40

provisions. The Mayor's Forum including the Mayor of Technical and Environmental Affairs, ensures high-level cross-cutting coordination and exchange of ideas and knowledge regarding current and planned climate actions.

The Climate Secretariat embedded within the Technical and Environmental Administration plays a key role concerning the overall coordination of initiatives and schedules, preparation of progress reports, development of multi-annual roadmaps and initiatives, and preparation of additional analyses in support of initiatives as required. Importantly in this context, the Climate Secretariat also follows, supports, and evaluate the impact of the many initiatives that are put in place to engage and involve stakeholders. This ensures that the initiatives are linked to the climate action plans and underpin Copenhagen's overarching and specific goals.

The City of Copenhagen seeks to make sure that the implementation of Copenhagen's climate action plans is carried out in a just and equitable manner. Climate justice plays an important role. Thus, the City of Copenhagen is working in accordance with C40 recommendations on just climate transition, when developing and implementing new climate action initiatives.

Copenhagen cannot act and implement climate solutions in isolation from the surrounding municipalities and developments taking place in Europe and internationally. Copenhagen is therefore actively involved in several national and international cooperation and coordination initiatives, e.g.,

- Copenhagen is actively engaged in the *Climate Alliance* to foster synergy effects, allow that common (cross-border) solutions are identified and efficiently implemented, and to ensure that prober coordination and knowledge exchange with other municipalities in Denmark.
- Since April 2022 Copenhagen has been part of the EU Mission "*100 Climate-Neutral and Smart Cities in 2030*".
- Copenhagen[3] is a member of the *C40 city network*, which works to ensure that the world's big cities meet the climate requirements of the Paris Agreement.
- Copenhagen[4] is member of the *Carbon Neutral Cities Alliance* (CNCA).

In pace with the development and approval of the Climate Action 2035 plan, the Climate City Contract will be amended and updated, i.e., an updated and elaborated version of the Climate City Contract is expected to be available during the second half of 2026.

[3] Lord Mayor of Copenhagen elected to C40 Cities Steering Committee - C40 Cities

[4] Copenhagen – CNCA (carbonneutralcities.org)

5 Signatories

The table below enlists the signatories who are committing to this CCC, and thereby to help the city achieve its goal to reach climate neutrality by 2030. Specific agreements that articulate the details of the climate action(s) between the municipality and signatories are added to the individual contracts in Appendix 1.

Name of the signatory (organisation)	Domain	Legal form	Name of the responsible person	Position of the responsible person
City of Copenhagen	Local	Municipality	Line Barfod	Mayor of Technical and Environmental Affairs
City of Copenhagen	Local	Municipality	Karsten Biering Nielsen	Deputy Director, Technical and Environmental Administration
City of Copenhagen	Local	Municipality	Charlotte Korsgaard	Head of Division, Technical and Environmental Administration
HOFOR – Greater Copenhagen Utility	Regional	Municipally owned utility company	Henrik Plougmann Olsen	CEO
BIOFOS – Wastewater Utility	Regional	Municipally owned utility company	John Buur Christiansen	CEO
CTR – Metropolitan Copenhagen Heating Transmission Company	Regional	Municipally owned utility company	Randi Skogstad	CEO
ARC – Amager Resource Centre	Regional	Municipally owned utility company	Jacob H. Simonsen Andreas Keil	CEO Chairman of the Board, City of Copenhagen

Energy Leap partnership	Local	Partnership	Mette Skovbjerg	Steering Committee Chair. Head of Division, Technical and Environmental Administration