NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan of the City of Helsingborg

HELSINGBORG

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Summary

Textual element
The City of Helsingborg has a long track record of working to decrease its climate impact and improve the local environment with benefits to public health and economic development. It is a city at the forefront of innovative approaches to urban development and improved services for local people and business. The city has a policy focus on Quality of Life which drives an integrated development agenda with a strong focus on environmental issues for a more sustainable city. Helsingborg has committed to be climate neutral by 2030 and is an active partner in both the Swedish Viable Cities initiative and Net Zero Cities. This document sets out the overarching policy framework, governance and innovation capacity of the city as well as its prioritised actions to reach the net zero target. It aims to reduce emissions by 85% from 1990 levels with a focus on five key areas: 1. Energy 2. Mobility and transport 3. Waste and circular economy 4. Green industry 5. Green infrastructure and nature-based solutions This document shows the challenges in each of these areas and lays out a project portfolio to address these challenges. The actions include a number of major investments in new infrastructure, ranging from an electric high-capacity bus rapid transport system to a major hydrolysis plant to replace natural gas in industry. It also includes a plan to build a second larger scale biochar plant and carbon capture and storage facility at the waste-powered CHP plant to address residual emissions. These major single point capital projects are complemented with other initiatives ranging from charging infrastructure for freight and cars to mobility management and partnership approaches with communities and other stakeholders to support behavioural changes or new agricultural practices. A collaborative approach is a prerequisite for the delivery of this ambitious programme. Helsingborg has a strong joint approach within the municipality and with the municipal companies that include the energy and waste utility companies who are major investors in the climate transition. The city also has a strong working relationship with other major businesses and industries and has mobilised key business partners through the Helsingborg Declaration and the Helsingborg Climate Pledge to tackle climate emissions together. Helsingborg has a history of partnerships and innovation with the local community and civil society across issues ranging from culture and the arts to the environment. Engaging actively with communities to understand their challenges in climate transition and co-designing solutions will be key to enabling a high level of adoption of low-carbon behaviours. A strong co-design process will also help to ensure that the process of change can maximise co-benefits, support improved quality of life for all citizens, not least that of under-represented or marginalised groups, and ensure a just transition. Helsingborg's Climate Action Plan is the first iteration of a highly ambitious yet achievable programme of works to drive the city's work to become climate neutral by 2030. Significant challenges lie ahead, as do countless opportunities to mobilise communities and businesses to build a long-term commitment that can drive economic development, improve quality of life and keep driving down the climate footprint beyond net zero.

List of figures

The list of figures **identifies the titles and locations** (page numbers) of **all visual elements:** figures, drawings, photos, maps, etc. used in the CCC Action Plan.

List of tables

The list of tables **identifies the titles and locations** (page numbers) of **all tables** used in the CCC Action Plan.

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Abbreviations and acronyms

The list of abbreviations and acronyms **identifies the abbreviations** (a shortened form of a word used in place of the full word) **and acronyms** (a word formed from the first letters of each of the words in a phrase of name) used in the CCC Action Plan.

Abbreviations and acronyms	Definition
BECCS	Bio-Energy Carbon Capture and Storage
DACCS	Direct Air Carbon Caption and Storage
CAP	Climate Action Plan
CCC	Climate City Contract
CCS	Carbon Capture and Storage
CCP	Carbon Capture Project
CDP	Carbon Disclosure Project
CIP	Climate Investment Plan
GHG	Greenhouse Gas
SECAP	Sustainable Energy and Climate Action Plan
SUMP	Sustainable Urban Mobility Plan
TBD	To Be Decided

1 Introduction

The introduction outlines the local geographic and policy context in which the city´s 2030 Climate Neutrality Action Plan is being developed and describes the gap it addresses in broad terms. It includes:

- The administrative territories included in the city´s 2030 climate neutrality target. Where applicable, any districts or emission sources within these administrative boundaries that are excluded from the target of climate neutrality by 2030[1]. Table I-1.1 summarizes this narrative in a snapshot.
- Key data on the administrative and political organisation of the city, its demographic and socio-economic characteristics, and climate-relevant sectors.
- A clear description of the relationship of this CCC Action Plan with existing climate policies and strategies (further detailed in Module A-2), and how it builds on them to address the gap (if any) to climate neutrality.
- Background information on the work process of developing the city's CCC Action Plan, highlighting its connection with the other Climate City Contract components (2030 Climate Neutrality Commitments and 2030 Climate Neutrality Investment Plan).

[1] By default, the participating city would commit the whole city or entity to become climate-neutral. However, where duly justified, the city may propose to exclude one or more district(s) or sources of emissions from the 2030 deadline, but in this case should commit to a strategy of climate neutrality for these districts as soon as possible, and of course no later than 2050. In this context, districts will be considered as neighbourhoods or zones of special interest of a city administered or governed by some type of "district council".

- A description of future steps, planned timeline and milestones for future iterations for the continuous development of the CCC Action Plan.

Introduction

Helsingborg's Climate Neutrality Ambition

The goal is clear: Helsingborg aims for complete climate neutrality by 2030. In pursuit of a sustainable and responsible future, we come together as a city, mobilising our resources to make climate neutrality not just an ambition but a reality.

Helsingborg's climate neutrality goal is based on the municipality fulfilling its obligations under the Paris Agreement. This entails reducing direct greenhouse gas emissions within the city and those from energy use by at least 85 % compared to 1990. Increased carbon sinks will compensate for the remaining emissions.

The climate neutrality target covers the entire administrative territory of Helsingborg, with no exclusions for sectors, scopes, sources, or gases. The target addresses both direct emissions occurring within Helsingborg's geographic boundaries (such as emissions from vehicles and industries, categorised as scope 1) and indirect emissions from electricity and district heating use (scope 2). The definition of the target is to reduce total greenhouse gas emissions under scope 1 and scope 2 by at least 85 % by 2030, compared to 1990. Carbon sinks will then offset any remaining emissions. Although Helsingborg also has targets covering scope 3 emissions, these are not included within this Climate City Contract (CCC).

Achieving Helsingborg's vision requires both innovative thinking and responsible action, with equal attention to the social, ecological, and economic dimensions of sustainability. The city aims to ensure a high quality of life for all residents while maintaining a low environmental impact. This approach not only benefits the current generation but also safeguards future generations, enabling both individuals and businesses to thrive within a framework of long-term sustainable growth.

Reducing emissions and reaching net-zero will bring significant positive side effects. These include improved air quality, better public health, and enhanced urban environments, all contributing to increased well-being for citizens. By lowering emissions, Helsingborg will also foster economic opportunities, driving innovation and green job creation, which will support the city's goal of sustainable growth.

Key to this transition are the transition team and the transition arena, as outlined in Module C-1 Governance Innovation Interventions. These initiatives are crucial for driving the actions needed to achieve net-zero emissions. They also focus on highlighting and leveraging positive synergies between sustainability efforts, ensuring that the benefits of reducing emissions extend across all sectors of society.

An essential part of Helsingborg's approach to achieving climate neutrality is reflexive learning**.** After each phase of monitoring and evaluation, it is critical to engage in continuous learning to improve and adapt the city's climate strategies. This process ensures that Helsingborg remains agile, identifying what works, where adjustments are needed, and how new knowledge can shape future efforts. Reflexive learning helps drive progress by incorporating lessons learned and ensuring that climate actions remain effective and relevant in a rapidly evolving context.

This learning will take place both within Helsingborg's internal governance structures and through collaboration with regional partners. The city is part of a regional Learning Hub, a joint initiative with Lund University**,** Lund Municipality**,** and the City of Malmö, as outlined in Module C-1.1 of the participatory governance model for climate neutrality. By leveraging the resources of the Learning Hub, Helsingborg ensures that it is not working in isolation but as part of a regional effort to achieve climate neutrality, benefiting from the collective insights and experiences of its partners.

Helsingborg's profound commitment to environmental issues is reflected in our strong focus on innovation, testing, and action, ensuring that we are prepared for the future. This commitment is one of our greatest assets in achieving our goals. The transition to a climate-neutral Helsingborg by 2030 presents a significant challenge, but it also provides an opportunity to learn, innovate, and make a tangible difference swiftly.

Helsingborg's Geographic and Social-Economic Context

Helsingborg is the eighth-largest city in Sweden. Located in the Scania region, Helsingborg's administrative territory spans 344 km², of which 63.7 % is used for agriculture, and 8.4 % is forest. The city has a population of 151 306 as of 2023, with 76 % residing in the central urban area. Population density is high, with 96.6 % of residents living in urban zones. More than 93 % live within 500 metres of public transport, highlighting accessibility as one of Helsingborg's strengths. The average age of residents is 41, slightly younger than the national average, and 28 % of the population is foreign-born, reflecting a diverse community. Out of the 70 340 households, half are single-person households.

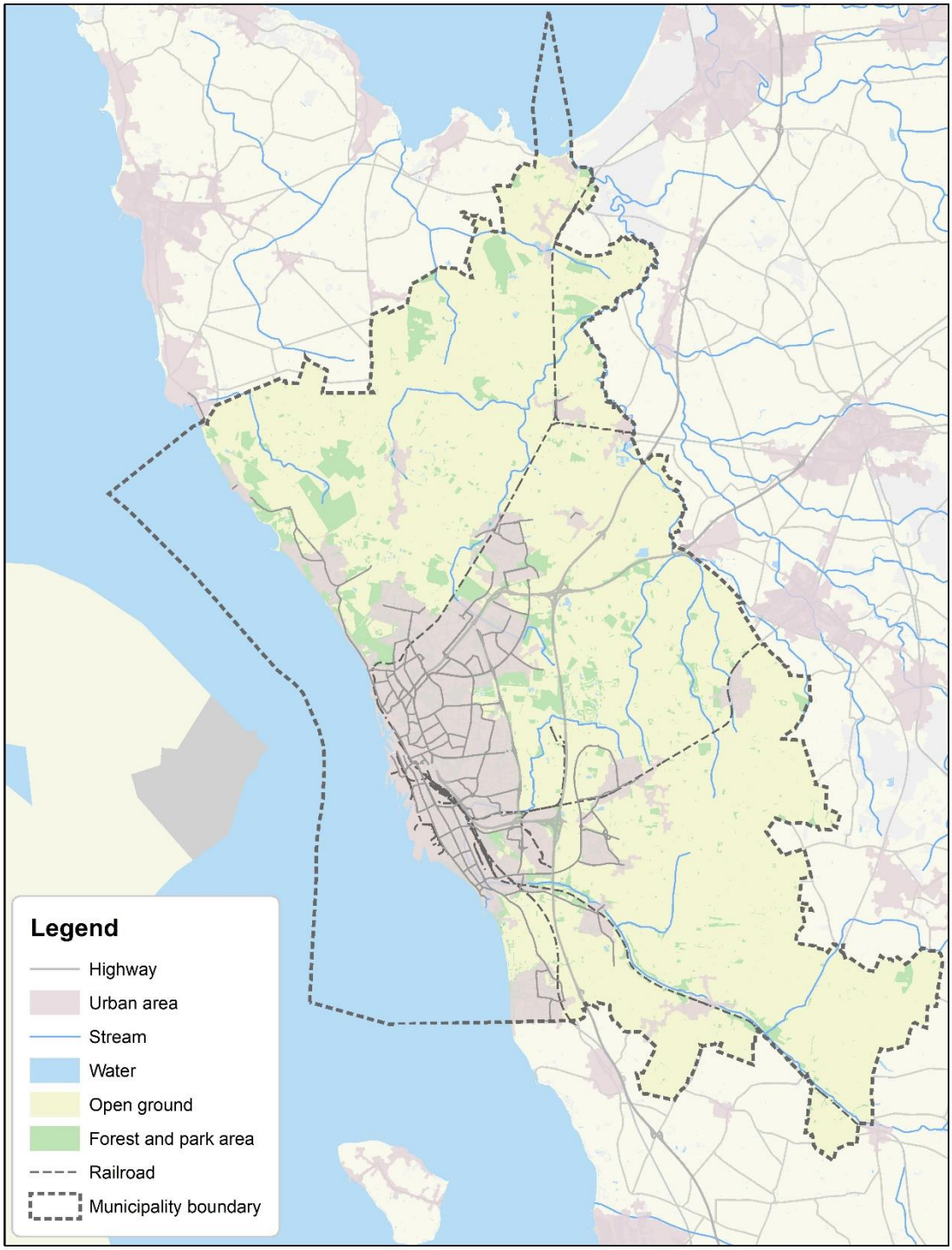

Figure 1: *Layout of urban areas, geographical and other features across the city*

Strategically positioned along the narrowest part of the Öresund Strait, Helsingborg is a key logistics hub for Scandinavia, with critical infrastructure that includes three motorways, a railroad, and Sweden's second-largest container port. Approximately 77 000 people work in the city, with a positive net commute from the surrounding Scania area. Employment rates are high, with 75.9 % of women and 77.7 % of the total population in the workforce.

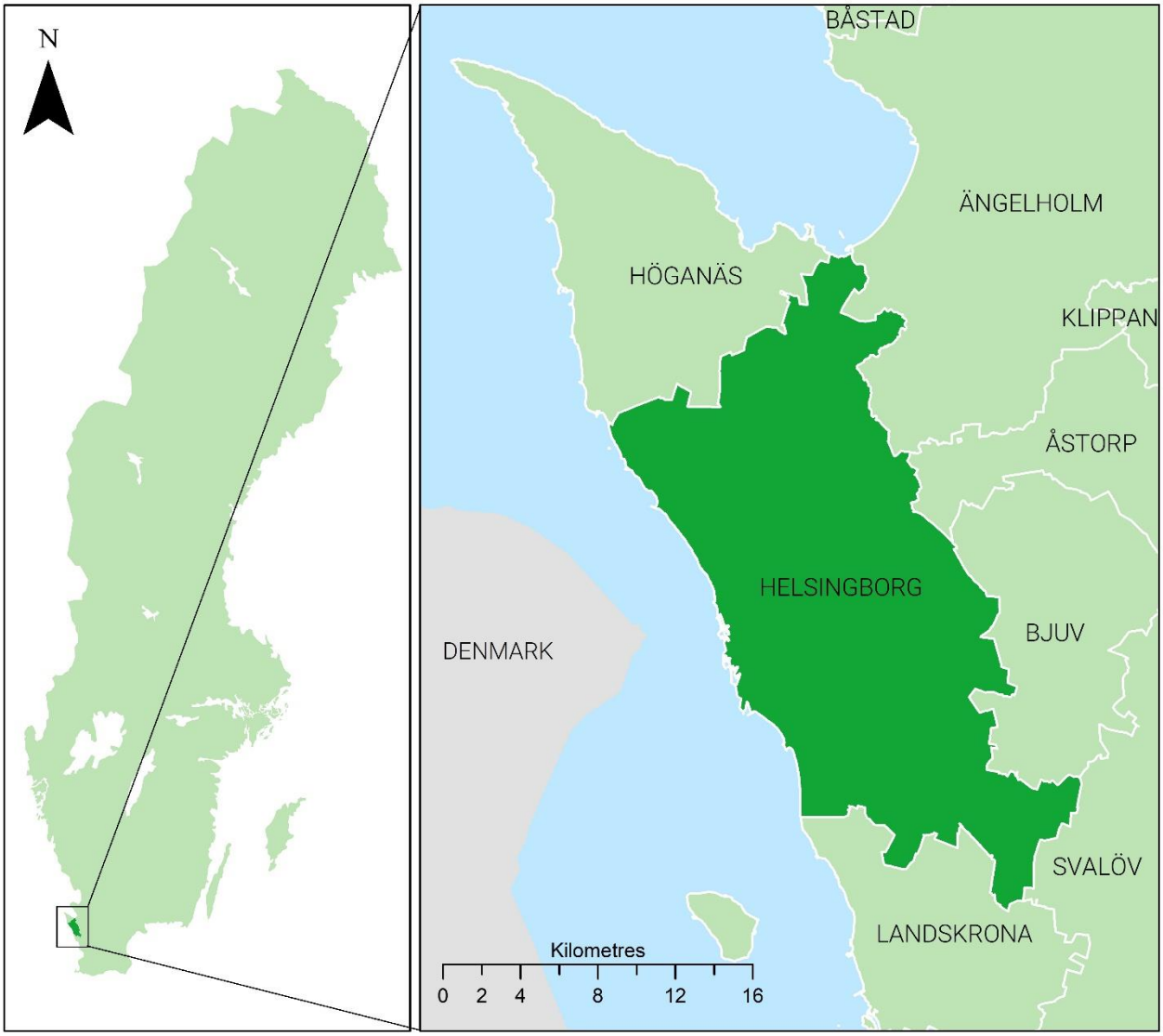

Figure 2: *Helsingborg is the second largest city in Scania (Skåne), the most southern region of Sweden.*

Local Governance Structure

The City of Helsingborg group consists of 11 local government committees (including nine municipal offices) and six larger municipally owned companies. All committees, their offices and companies are committed to work towards the vision of Helsingborg 2035.

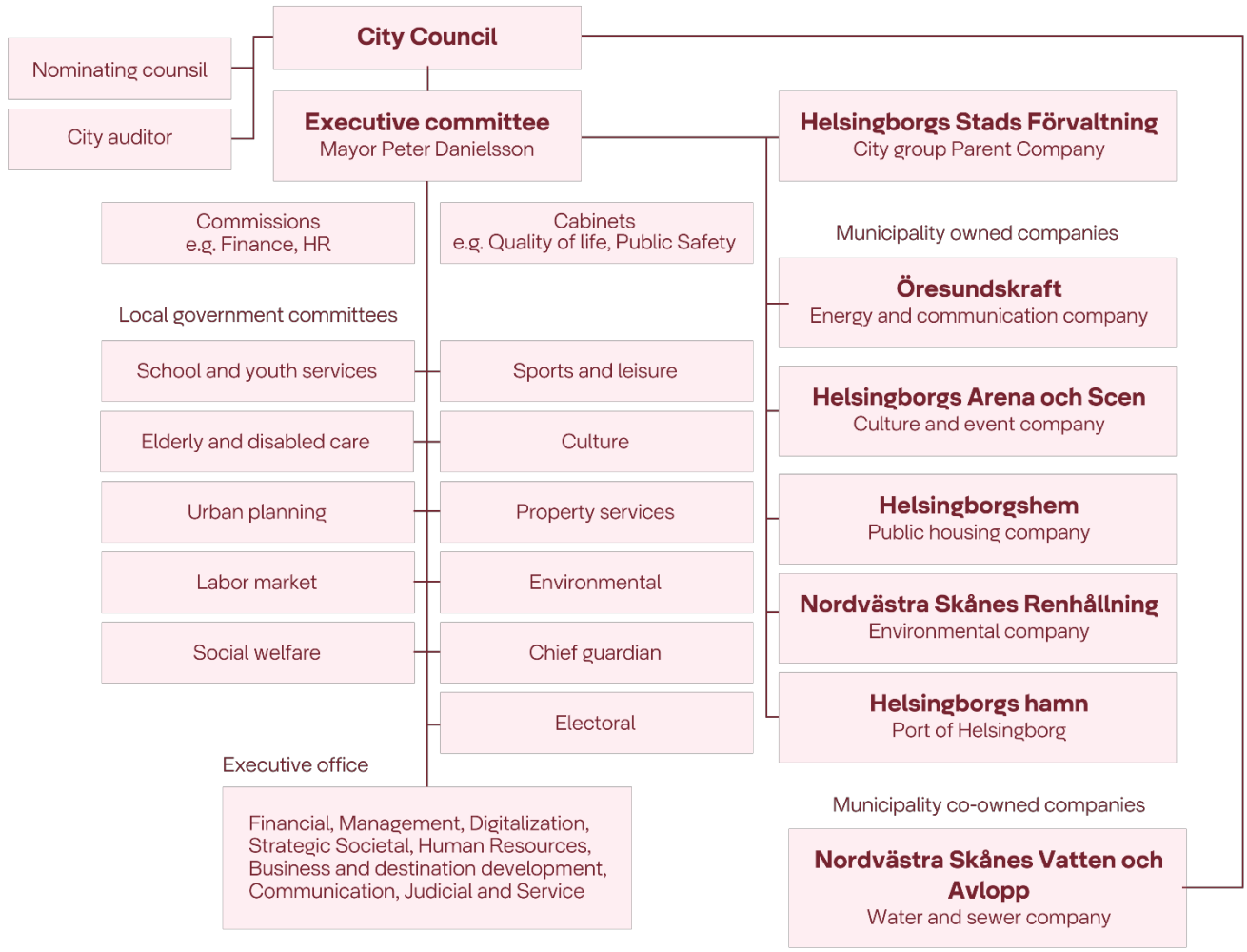

***Figure 3**: Organogram of Helsingborg city group*

Governance, culture and working methods focus on organisational practices and in creating needs-based, quality welfare solutions through trust-based governance. The City Council clarifies and prioritises through the governing documents included in the environmental masterplan. Committees and companies work together to achieve political priorities with support from a team or an office responsible for implementing the priorities in the organisation, following up, evaluating, and reporting progress to the City Council. The governing documents are reported to the City Council through dialogues, special reports, and the city's annual report on business and economy. Indicators are available to the politicians in the city's Business intelligence and on the city's website.

The city's trend and global analysis describes mega and local trends that affect the conditions for sustainable development in Helsingborg. The analysis spreads knowledge and supports committees, companies and businesses when planning in the short term and towards the vision.

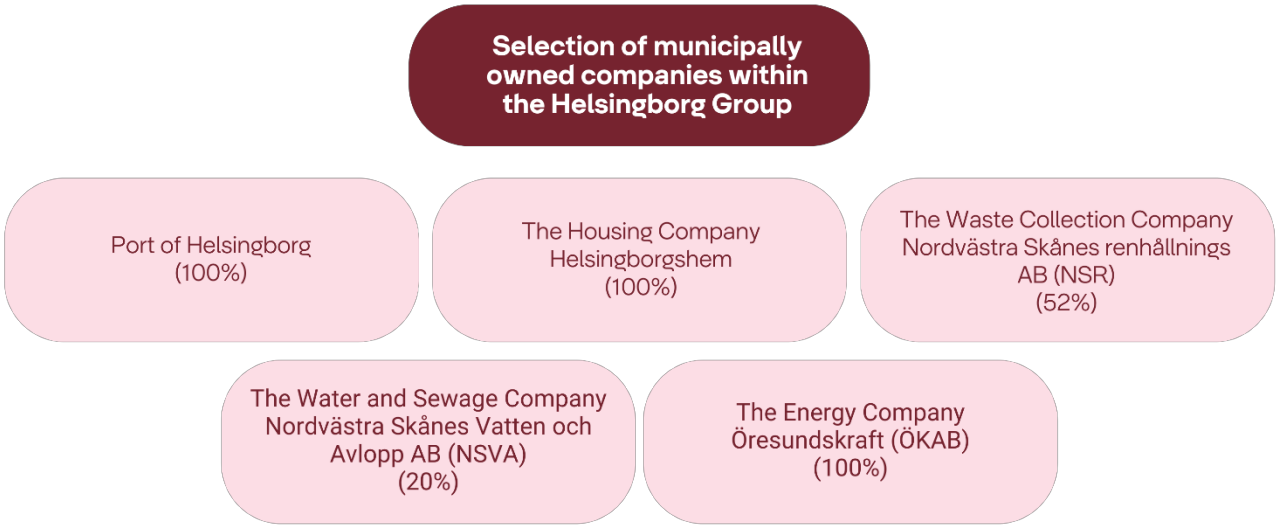

***Figure 4**: Political governance in the City of Helsingborg*

The City of Helsingborg employs around 12 000 people, all of whom play a crucial role in supporting Helsingborg's climate neutrality goals. To meet these goals, the city must reduce emissions at four times the rate previously achieved, with a focus on its highest-emitting sectors: transport, incineration of fossil plastics, and the use of natural gas in industry.

Emissions and Challenges Ahead

In 2022, the total greenhouse gas emissions within scope 1 and scope 2 were approximately 470 000 tons of carbon dioxide equivalents. Transport remains the largest source of emissions in Helsingborg. Significant emissions also stem from industrial energy use, particularly natural gas, and from the incineration of fossil plastics for district heating production. From 1990 to 2022, greenhouse gas emissions in Helsingborg decreased by 56 per cent. This reduction is primarily attributed to the transition to renewable energy for electricity, heating, and industry. Improvements in energy efficiency, more energy-efficient vehicles, and the use of biofuels for road transport have also contributed significantly to this decline.

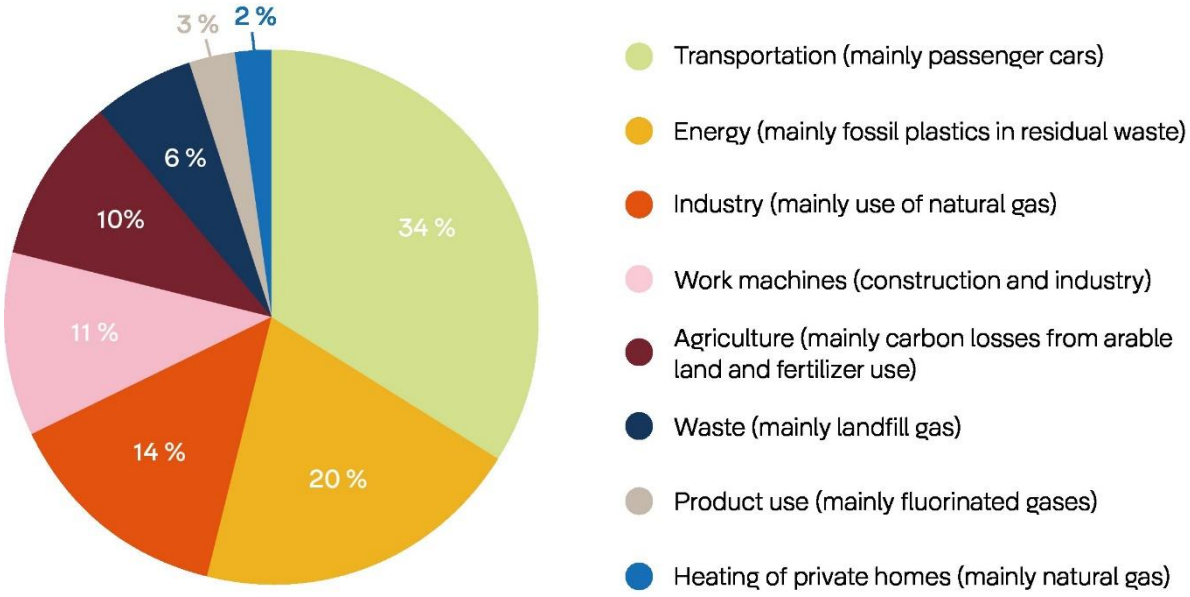

Figure 5: *Distribution of emissions in Helsingborg 2022*

The Helsingborg group (comprising municipal departments and companies) has direct and indirect control over many of the emissions within Helsingborg's borders. It can facilitate and create the conditions for others to reduce their emissions, for example by encouraging reduced car dependence or increasing opportunities for charging electric vehicles. Achieving climate neutrality will require close cooperation between the group and other stakeholders, including authorities, academia, businesses, civil society, and residents.

Collaboration with local businesses, community groups, and regional and national actors is key to reaching our goals. In particular, it is vital to work with stakeholders responsible for transportation, such as Region Skåne, which provides public transport, influences travel behaviour, and is affected by national legislation. Moreover, the group must support industries in transitioning from natural gas to more sustainable energy sources. Other key partners in emission reduction include Nordvästra Skånes Renhållning AB (NSR) for waste management and Öresundskraft for energy provision.

Key Frameworks for Climate Neutrality

Helsingborg's Climate Action Plan (CAP) aligns with existing frameworks and serves as an umbrella that integrates the city's Sustainable Energy and Climate Action Plan (SECAP) with other local strategies. The SECAP, which sets specific targets for each emission sector, is the cornerstone of Helsingborg's climate neutrality efforts. It outlines how the city, in collaboration with stakeholders from academia, businesses, and the community, will work towards achieving these goals. This comprehensive approach is supported by the Climate Action Plan (CAP) and Climate Investment Plan (CIP), which detail the specific actions and investments required to meet these ambitious targets.

Local policies, such as the Sustainable Urban Mobility Plan (SUMP), are essential in addressing emissions in key sectors, further aligning with the overarching sustainable development strategies in Helsingborg. Together with the Comprehensive Development Plan 2021, which focuses on land use and development through 2050, and

the Quality-of-Life Programme, which addresses broader issues like public health and employment, these initiatives place climate mitigation and sustainability at the heart of the city's decision-making process. This integrated approach not only ensures progress towards climate neutrality but also maximises co-benefits such as social inclusion and economic development.

The Climate City Contract (CCC), developed alongside the SECAP, complements it by providing detailed pathways for sector-specific transitions towards climate neutrality. While the SECAP is legally mandated under Swedish law and carries more weight, especially given its accessibility to local actors by being in Swedish, the CCC offers additional value by outlining potential steps within the SECAP framework. Together, the SECAP and CCC ensure that Helsingborg's efforts are both grounded in current realities and flexible enough to adapt to future challenges.

In conclusion, Helsingborg's integrated approach—anchored by the SECAP, supported by the CCC, and aligned with other local strategies—ensures a comprehensive path towards achieving climate neutrality by 2030. The SECAP remains the most significant guiding document for local stakeholders, while the CCC adds dynamic support and international alignment to the city's climate ambitions.

Looking Forward: Adapting and Refining Climate Strategy

As Helsingborg looks to the future, the city remains committed to continuously assessing and refining its climate strategies. The next version of the SECAP, expected in December 2024, will guide climate actions from 2025 to 2030, with a mid-term review in 2027 and a final assessment in 2030. The CCC will be updated biennially to incorporate new developments, ensuring that Helsingborg stays on track to meet its 2030 goals.

Innovation and collaboration are key drivers of Helsingborg's climate ambitions. A dedicated transition team will oversee the implementation of the city's plans, while a transition arena will bring together government, industry, academia, and civil society to co-create solutions. This inclusive approach ensures that the city's climate transition is fair, equitable, and responsive to the needs of all its residents.

In conclusion, Helsingborg's Climate Neutrality Action Plan reflects a comprehensive and integrated approach to sustainability. By aligning climate action with social and economic goals, the city is creating a roadmap not only for reducing emissions but also for improving quality of life, fostering innovation, and ensuring long-term sustainable growth. Through collaboration, innovation, and a commitment to inclusivity, Helsingborg is paving the way for a climate-neutral future by 2030.

Table I-1.1: Climate Neutrality Target by 2030

Sectors	Scope 1	Scope 2	Scope 3
Stationary energy	Included	Included	Not included
	Stationary energy for industry is included in IPPU.		
Transport	Included	Included	Not included

		Electricity for charging electric cars in the home is included in stationary energy (Scope 2).	
Waste/wastewater	Included	Not applicable	Not applicable
			Helsingborg does not export any waste.
IPPU	Included	Not included	Not included
		Electricity and district heating for industrial buildings are included in stationary energy, scope 2.	
AFOLU	Included	Not applicable	
	Missing emission data on forestry, but those emissions are expected to be relatively small. Forests cover 5% of Helsingborg's area, agriculture land about 70%.	Not applicable	Not included
Other	No other sectors included.	No other sectors included.	No other sectors included.
Geographical boundary	**Same as city administrative boundary**	**Smaller than city administrative boundary**	**Larger than city administrative boundary**
(Tick correct option)	X		
Specify excluded/additional areas	No excluded areas	No excluded areas	No excluded areas

2 Part A – Current State of Climate Action

Part A "Current State of Climate Action" describes the point of departure of the city towards climate neutrality, including commitments and strategies of key local businesses, and informs the subsequent modules and the outlined pathways to accelerated climate action.

2.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

Module A-1 "Greenhouse Gas Emissions Baseline Inventory" details and describes the latest GHG inventory, where available from 2018 or more recent, referring to a clearly stated geographic boundary. The aim of this section is to establish the emission baseline and to establish the emissions gap to 2030 climate neutrality according to the inventory specifications defined in the Cities Mission's *Info Kit for Cities*[2] and the process outlined in the CCC Action Plan Guidance and Explanations. It includes:

- Definition of geographic boundary of the GHG inventory and, if applicable, excluded areas, sectors, scopes, sources, gases.
- An explanation of any (current) mismatch between the boundary of the GHG inventory and the climate-neutrality target, including actions planned to address the mismatch.
- Key data and visualisation of the latest GHG inventory (ideally not older than 2018), according to the coverage (source sectors, scopes, and gases) specified in the Mission's "Info Kit for Cities" to establish the emission baseline. If additional inventories are used in the CNAP, the same information should be provided for all inventories.
- Descriptive assessment of current GHG inventory, including a description of the current state of each emitting sector.
- Where a BAU scenario is used as baseline, a description of methodology and assumptions (for instance, which sectors/sources/gases are actually modelled; locally specific input variables vs. national or default data, etc.).

GhG Emissions Baseline inventory
An accurate and comprehensive emissions inventory is a cornerstone of Helsingborg's strategy towards achieving climate neutrality. Aligned with the city's climate neutrality target, the emissions inventory has been uploaded as part of the CCC and meets the criteria set out in the Cities Mission's Info Kit for Cities. Helsingborg's key systemic priorities are closely tied to the findings of the emissions inventory, which highlights transportation, energy, and industry as the largest sources of emissions. Of these, transportation contributes the most significantly to the city's carbon footprint, and as such, the city's impact pathways and proposed actions are heavily focused on this sector. However, achieving climate neutrality requires emissions reductions across all sectors, making a comprehensive approach essential. The city's SECAP, and to a large extent, the CCC, are structured around the data from the emissions inventory. For each sector, Helsingborg has established specific emissions reduction targets and

[2] European Commission, 2021, *Info Kit for Cities*, European Commission. Further guidance is available also in: NZC, 2023, *Guidance on target setting and emissions inventories for the Climate-neutral and Smart Cities Mission*, NetZeroCities https://netzerocities.app/resource-3814

identified the key shifts required to achieve these goals. Furthermore, the plan highlights critical stakeholders whose engagement is vital to ensure the success of the climate neutrality strategy.

Given Helsingborg's long-standing tradition of climate action, the year 1990 has been selected as the base year for the climate neutrality target, mirroring the base year used in Sweden's national climate goals. For tracking progress, 2022 serves as the benchmark, being the latest year with available data on greenhouse gas emissions. In Part A of the action plan, data on both energy use and emissions of greenhouse gases for 1990 and 2022 are provided, allowing for a clear comparison of progress over time.

By basing our strategic actions on this thorough emissions inventory, Helsingborg ensures that our climate goals are grounded in robust data, guiding the city on its path to climate neutrality by 2030.

Energy use			
Base year	1990		
Unit	MWh		
	Scope 1	Scope 2	Scope 3
Households	191 246	929 447	
Fuel type	150 000 oil + 4 000 diesel + 36 700 solid renewable	635 500 district heating + 293 944 electricity	
Public services	74 800	226 000	
Fuel type	51 000 diesel + 24 000 oil	113 900 district heating + 112 179 electricity	
Other services	19 936	353 000	
(Fuel type/ energy used)	1 300 diesel + 16 500 oil	127 200 district heating + 226 100 electricity	
Transport	870 626	5 488	
(Fuel type/ energy used)	638 000 diesel +232 000 petrol	electricity	
Waste	Not applicable	Not applicable	
Industrial and construction activities	816 705	526 935	
(Fuel type/ energy used)	590 000 fossil gas + 112 000 oil + 80 000 liquid gas + 33000 others	80 730 district heating + 446 205 electricity	
Agricultural, Forestry, fishing.	74 400	18 322	
(Fuel type/ energy used)	33 700 diesel + 40 100 oil	Electricity	
IPPU	Not available	Not available	
AFOLU	Not available	Not available	

A-1.2: Emission factors applied 1990

The method used to calculate emissions are GPC-CRF. Scope 2, stationary energy, is calculated with energy data according to Table A-1.1 and local emission factors for electricity and district heating. Emission data for scope 1 stationary energy, transport, waste, AFOLU and IPPU are retrieved from the Swedish national emission database which is established through a collaboration through IVL Swedish Environmental Institute, SCB Statistics Sweden, the Swedish University of Agricultural Sciences (SLU) and the Swedish Meteorological and Hydrological Institute (SMHI). Emission data and emission factors from the national emission database includes CO2, CH4, N2O, SF6, HFC and PFC. Methodologies are in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Some of the most relevant emission factors are listed below. The rest can be found in the following database: ef-bilaga-klimat2.xlsx (live.com)

Primary energy/ energy source	CO_2e	CH_4	CO_2 (fossil)	N_2O	
Electricity	90 g/kWh				
District heating	200 g/kWh				
Oil (Households, CRF 1A4b)		0.0072 kg/MWh	267 kg/MWh	0.00216kg/MWh	
Diesel (CRF 1a1b)		0.0324 kg/MWh	267 kg/MWh	0.00216kg/MWh	
Diesel (transport, passenger cars)		0.0022 kg/GJ	74.26 kg/GJ	5.87 E-05 kg/GJ	
Petrol (transport, passenger cars)		0.03 kg /GJ	71.9 kg/GJ	0.0026 kg/GJ	
Diesel (transport, heavy truck)		0.0022 kg/GJ	74.26 kg/GJ	0.00088kg/GJ	
Petrol transport (heavy truck)		0.0198 kg/GJ	71.9 kg/GJ	0.00092kg/GJ	
Natural gas (industry CRF 1A2)		0.0036 kg/MWh	203 kg/MWh	0.00036kg/MWh	
Oil (industry CRF 1A1b)		0.00324 kg/MWh	267 kg/MWh	0.00216 kg/MWh	

Energy use			
Latest available statistics	2022		
Unit	MWh		
		Scope 2	Scope 3
Households	56 000	880 000	

Fuel type	15 000 solid renewable, 3 000 liquid non-renewable, 15 000 non-renewable gas, 23 000 renewable gas	285 119 electricity + 595 983 district heating	
Public services	2 600	170 735	
Fuel type	Liquid, non-renewable	75 000 district heating + 95 600 electricity	
Other services	160 000	570 925	
Fuel type	Liquid non-renewable	110 000 district heating + 460 840 electricity	
Transport	2 000 000	3 000	
(Fuel type/ energy used)	156 000 liquid non-renewable + 480 000 liquid renewable	electricity	
Waste	Not applicable	Not applicable	
(Fuel type/ energy used)			
Industrial and construction activities	253 029	363 041	
(Fuel type/ energy used)	2 287 liquid non-renewable + 189 057 fossil gas + 263 liquid renewable + 61 400 biogas	51 000 district heating + 311 700 electricity	
Agricultural, forestry, fishing	27 244	32 238	
(Fuel type/ energy used)	19 730 liquid non-renewable + 7 514 liquid renewable	electricity	
IPPU	Not available	Not available	
AFOLU	Not available	Not available	

A-1.2: Emission factors applied 2022

The method used to calculate emissions are GPC-CRF. Scope 2, stationary energy, is calculated with energy data according to Table A 1.1 and local emission factors for electricity and district heating. Emission data for scope 1 stationary energy, transport, waste, AFOLU and IPPU are retrieved from the Swedish national emission database which is established through a collaboration through IVL Swedish Environmental Institute, SCB Statistics Sweden, the Swedish University of Agricultural Sciences (SLU) and the Swedish Meteorological and Hydrological institute (SMHI). Emission data and emission factors from the national emission database includes CO2, CH4, N2O, SF6, HFC and PFC. Some of the most relevant emission factors are listed below. The rest can be found in the following database: ef-bilaga-klimat2.xlsx (live.com) Methodologies are in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. For 2022 emissions from leakage from landfills, composts and biogas production are measured by the municipality owned waste company NSR. Emissions from work machines in the port of Helsingborg are calculated by the Port of Helsingborg.

Primary energy/ energy source	CO_2e	CO_2	CH_4	N_2O	Comment
Electricity	53 g/kWh				Helsingborg's electricity supply is highly dependent on overhead supply from the regional grid, where the local electricity production accounts for a small proportion of the total electricity

					demand in the municipality (self-sufficiency rate approximately 20 % on an annual basis). The climate emissions resulting from the municipality's electricity use are calculated based on an emission factor corresponding to a consumption network mix for electricity area 4 to which Helsingborg belongs, taking into account imports and exports from and to surrounding electricity areas.
District heating	53 g/kWh				Within Helsingborg's heating sector, district heating is the most common form of heating. Climate emissions resulting from district heating use are calculated similarly for electricity based on an emission factor corresponding to the fuel mix found in the district heating network. Today, these emissions mainly come from the system's co-generation production, which releases both biogenic and fossil carbon dioxide as a result of energy recovery from waste destruction.
Natural gas (households, CRF 1A4b)		202.968 kg/MWh	0.0036 kg/MWh	0.00036 kg/MWh	
Diesel (transport, passenger cars)		46.84 kg/GJ	0.003 kg/GJ	0.003 kg/GJ	
Petrol (transport, passenger cars)		65.55 kg/GJ	0.0046 kg/GJ	0.0003 kg/GJ	
Diesel (transport, heavy truck)		46.84 kg/GJ	7.73E-5 kg/GJ	0.004 kg/GJ	
Petrol transport (heavy truck)		65.55 kg/GJ	0.019 kg/GJ	0.0009 kg/GJ	
Natural gas (industry CRF 1A2)		202.7 kg/MWh	0.0036 kg/MWh	0.00036 kg/MWh	

A-1.3: GHG emissions by source sectors 1990				
Base year	1990			
Unit	ton of CO2 equivalent			
	Scope 1	Scope 2	Scope 3	Total
Buildings, including agricultural facilities	55 572	233 881		
Buildings, industry, construction	Included in IPPU	56 306		
Transport, on road, Scope 2 only public charging.	256 668	493		

Transport, machines		154 458	Not available		
Transport, other		8 417	Not available		
Waste (solid waste disposal, biological treatment, wastewater)		73 649	Not applicable		
IPPU, Industrial Process		227 664			
IPPU, Product use		5 791	Not applicable		
Agricultural, Forestry and Land Use (AFOLU), Sources Includes: Livestock, Landuse, Other	Sources (positive emissions)	56 359	Not applicable		
	Sinks (negative emissions)	Not available	Not applicable		
Grid supplied energy		286 551	Not applicable		
Total (not including emissions from grid supplied energy)		838 578	290 680		**1 129 258**

A-1.3: GHG emissions by source sectors 2022					
Latest available statistics		2022			
Unit		tons of CO2 equivalent			
		Scope 1	Scope 2	Scope 3	Total
Buildings, including agriculture facilities.		8 505	91 025	-	
Buildings, industry, construction		Included in IPPU, industry	19 967		
Transport, on road. Scope 2 only public charging.		163 086	173		
Transport, machines		20000	Not available		
Transport, other		6 510	Not available		
Waste (solid waste disposal, biological treatment, waste water)		30 344	Not applicable		
IPPU, Industrial Process		68 810			
IPPU product use		16 259	Not applicable		
Agricultural, Forestry and Land Use (AFOLU) Sources Includes:	Sources (positive emissions)	47 597	Not applicable		
	Sinks (negative emissions)	Not available	Not available		

Livestock, Landuse, Other					
Grid supplied energy		99 675	Not applicable		
Total (not including emissions from grid supplied energy)		361 193	111 165		**472 358**

A-1.4: Activity by source sectors.			
Latest available statistics: 2022			
	Scope 1	Scope 2	Scope 3
Sector: Buildings			
(Activity)	Households: 15 000 MWh solid renewable, 3 000 MWh oil, 15 000 MWh natural gas, 23 000 biogas.	All buildings: 1 185 497 MWh electricity, 831 983 district heating.	
Sector: Transport			
(Activity)	845 584 080 km with passenger cars. (On average 0.076L petrol per km, 0.072L diesel per km and 0.230 kWh electricity per km.) 7 996 registered light trucks (7 287 diesel-powered). National average distance for light trucks 13 750 km. (On average 0.076L diesel per km.) 1 737 registered heavy trucks (1 603 diesel-powered). National average distance for light trucks 42 370 km. (On average 0.423L diesel per km with trailer, 0.275L per km without trailer.)		
Sector: Waste			
(Activity)	No activity data available.		
Sector: Industrial Process and Product Use (IPPU)			
(Activity)	No activity data available.		
Sector: Agricultural, Forestry and Land Use (AFOLU)			

(Activity)	No activity data available.		

2.2 Module A-2 Current Policies and Strategies Assessment

Module A-2 “Current Policies and Strategies” lists and assesses existing policies, strategies, initiatives, or regulation from local, regional, and national level, relevant to the city’s climate neutrality transition. This assessment contributes to identifying the gap (if any) between the emissions reduction due to existing initiatives and the city´s 2030 climate neutrality target. Filling this gap by identifying additional actions and levers to achieve the city´s emission reduction target is the focus of this Action Plan. The assessment of current policies and strategies offers hence a starting point for exploring the impact pathways (See Part C). The module includes:

- Comprehensive list of local relevant policies, strategies, concepts, as well as of regional and national legislation that impact local climate action.
- Descriptive assessment of the current climate-relevant policy context, summarising the objectives and implementation concepts, addressing e.g., spatial planning, energy, local economy, circular/bioeconomy, waste, transport, housing, urban greening/nature-based solutions).
- Quantification of the emissions gap (i.e., emissions reduction target minus reductions already addressed through existing climate action plans).

A-2.1: Description & assessment of policies
In evaluating Helsingborg's transition to climate neutrality by 2030, we have reviewed existing policies, strategies, programmes, and regulations at the local, regional, and national levels. This assessment highlights the complexity of predicting their impact on greenhouse gas (GHG) emissions, particularly as many national and international policies depend on shifting political and economic conditions, making them difficult to assess at the municipal level. We have begun the process of mapping existing and relevant policies in Table A.2.2.1, identifying key initiatives detailed in Table A 2.2.2 that are expected to drive significant reductions in GHG emissions. These policies are critical to the city's climate goals. If implemented as planned, they will contribute substantially to our overall emission reduction targets. However, we recognise that there are likely many additional policies important for local climate action that have yet to be fully mapped. This work needs to continue to ensure we have a comprehensive understanding of all relevant policies that can support our transition. For most sectors, it is possible to separate the impact of these policies from the actions in the Action Plan (Part B). However, it is more challenging in the road transport sector, but we have been careful to avoid double-counting emissions reductions. Based on current data, after accounting for the effects of existing policies, the remaining gap to the 2030 target is approximately 396 000 tons of CO2e. Helsingborg's SECAP suggests that increased carbon sinks could offset up to 15% of 1990 emissions, equivalent to 171 000 tons of CO2e, leaving 225 000 tons to be reduced through the actions outlined in Part B of the Action Plan.

In addition to mapping existing policies, it will be essential to distil international and national policies into local strategies. By doing so, we can better understand how to align these broader frameworks with our local climate goals, maximising their benefits to achieve meaningful progress. Moreover, the possibility of mapping upcoming national and EU strategies will allow us to better prepare for future frameworks that could impact local climate work, ensuring that Helsingborg stays ahead of new developments.

It is also encouraging that multiple policies across sectors reinforce each other, increasing the likelihood of achieving significant GHG reductions. The combined effect of these policies should be assessed collectively, rather than in isolation, to fully understand their total impact. However, the estimates provided are based on current knowledge and may require ongoing refinement as more data becomes available. Further details can be found in Section B 2.3 which explains residual emissions and the strategy for moving forward.

The CCC will be used primarily by the Transition Team as a horizontal policy integration tool. This will provide a holistic overview of actions, costs, synergies, and co-benefits, facilitating a more coordinated and effective approach to the city's climate transition.

A-2.2.1: Existing policies relevant for the climate transition
The potential for emission reduction has been estimated for green marked policies/strategies in Table A 2.2.2.

	Local policies/ strategies	**Regional policies/strategies**	**National policies/strategies**	**International policies/strategies**
District heating		Regional waste plan: Plan for a resource-smart society, 2025-2032	Regulation (2022:1274) on producer responsibility for packaging	
Electricity	Sustainable Energy and Climate Action Plan	Regional climate and energy strategy for Skåne	The national energy target for the composition of electricity production in 2040	Global climate agreement, COP 28, Dubai
	Land and Housing Program, 2024 - 2027	Roadmap for Scania's electricity supply		Energy Efficiency Directive (EU) 2023/1791
	Comprehensive Plan			Renewable Energy Directive (RED)
	Electric Car Strategy			Regulation on the internal market for electricity (EU) 2019/943

				Common Rules for the Internal Market for Electricity and Amending Directive (EU) 2019/944
				Energy Performance of Buildings Directive (EU) 2024/1275
Transport on road	Sustainable Urban Mobility Plan (to be decided 2025)	Regional Development Plan for Scania, 2022 - 2040	National climate target for the transport sector	Alternative Fuel Infrastructure Regulation (EU) 2023/1804
	Comprehensive Plan	Strategy for a Sustainable Transport System in Scania 2050	The government's regulation letters	
	Electric Car Strategy	Traffic Supply Program for Scania 2020 - 2030	Agreement, Fossil fuel-free Sweden, the transport challenge	
Transport - machines	Sustainable Urban Mobility Plan (to be decided 2025)		National target for the non-trading sector	
	Guidelines for purchasing and procurement			
Transport - air, water, rail	Sustainable Urban Mobility Plan (to be decided 2025)	Regional Development Plan for Scania, 2022 - 2040		EU regulation: FuelEU Maritime
	Comprehensive Plan	Strategy for Sustainable Goods and Logistics in Scania		
		Strategy for Development of the Regional Train Traffic in Scania 2020 - 2040		
		Traffic Supply Program for Scania 2020 - 2030		
Waste (solid waste disposal, biological treatment, wastewater)	Waste Plan	Regional Waste Plan	National regulation for landfills, 31–33 §§	Waste Framework Directive
	Policy for purchasing and procurement	Environmental Program for Scania 2030	The National Waste Plan and the Waste Prevention Program	Circular Economy Action Plan

			National Procurement Strategy	
	Guidelines for purchasing and procurement		National Strategy for Circular Economy	
IPPU, Industrial Process			National energy efficiency target	Directive on common rules for the internal markets for renewable gas, natural gas and hydrogen (EU) 2023/1791
			National legislation: Act (2014:266) on energy mapping in large companies	Industrial and Livestock Rearing Emissions Directive (EU) 2024/1785
IPPU, Product Use				EU regulation on fluorinated greenhouse gases, (EU) No. 2024/573
Agricultural, Forestry and Land Use (AFOLU)	Green Strucutre Program	Regional Development Plan for Scania, 2022 - 2040	National legislation: The Swedish Agency for Agriculture's regulations and rules in the Environmental Code	Green City Accord
	Action Plan for Green Structure, 2021 - 2026	Environmental Program for Scania 2030	Sweden's Strategic Plan for the Common Agricultural Policy 2023 - 2027	Farm to Fork Strategy (EU)
	Comprehensive Plan			Land use, land-use change and forestry Regulation (EU)
	Detailed Comprehensive Plan			Nature Restoration Law (EU)
	Action Plan for Trees in Urban Environments, 2025 - 2031			Soil Strategy for 2030 (EU) 2021/699
				Industrial and Livestock Rearing Emissions Directive (EU) 2024/1785
Other relevant governing	Quality of Life Programme		Sweden's Environmental Objectives	Agenda 2030

documents and policies			Sweden's Climate Act and Climate Policy Framework	The Fit for 55 Package
				The European Climate Law

A-2.2.2: Description & assessments of policies
Most relevant existing policies, strategies, programmes, and regulations that impact (directly or indirectly) the 2030 climate neutrality ambition. The table clarifies the numbers given in column 4 of table A 2.2.1.

Sector	Name	Description	Direct impact (ton CO_2e)
District heating (scope 2)	Regulation (2022:1274) on producer responsibility for packaging	The regulation aims to reduce the amount of packaging and packaging waste by: a) reducing volume and weight of packaging b) packaging being used only when necessary, and c) packaging being reused.	**3700** According to calculations for Stockholm exergy (Erselius 2021), emissions from waste incineration of household waste can be reduced by 17 % through full producer responsibility.
Electricity (scope 2)	Global climate agreement, COP 28, Dubai	The agreement stipulates that (among other things) global renewable capacity should triple by 2030.	**28 000** Agreements and targets on global, national, and regional level are expected to lead to strengthening of the electricity grid and expansion of renewable electricity production nationally and regionally. As a result, the emission factor for electricity will decrease in Helsingborg from 55 g CO2e per kWh in electricity district 4 where Helsingborg belongs towards the national average of 26 g CO2e per kWh.
Electricity (scope 2)	The national energy target for the composition of electricity production in 2040	100% renewable electricity system by 2040.	
Electricity (scope 2)	Regional climate and energy strategy for Skåne	Target: Energy use in Scania must consist of 80% renewable energy in 2030.	
Electricity (scope 2)	Roadmap for Scania's electricity supply	Target: Scania's degree of self-sufficiency in electricity power must increase from today's 15% to at least 50% in 2030 during all hours of the year. The roadmap shows that the potential for new onshore and offshore wind power is good. There is, for example, an ongoing permit process for a 1 500 MW offshore wind farm in Scania.	
Transport on road (scope 1 &2)	National climate target for the transport sector	According to Sweden's milestone goals for domestic transport, emissions must be reduced by at least 70% by 2030 compared to 2010.	**28 500** Targets, regulations, agreements that lead to activities by various actors that primarily contribute to a

Transport on road (scope 1 and 2)	The government's regulation letters	The government sees electrification as the main path for Sweden to reach its transport goals. In the regulation letters for 2024, the government has decided on several tasks to various authorities to speed up the electrification of the transport sector.	rapid electrification of passenger transport and freight transport. We believe that there are good chances of reaching the electrification targets for the transport sector for Helsingborg, because the government and private actors are pushing for electrification in parallel with the city group implementing its actions (B-part of CCC). In order to reach the national emissions target as well as the transport target, a shift from car journeys to active transport and public transport will also be necessary. Emission reductions from that type of actions are primarily included in Helsingborg's action plan in part B of CCC. Here we have modelled the total potential for the transition we want to see, using a model developed by Stockholm environmental institute. We have investigated the impact of our CCC actions (part B of CCC action plan) and put the remaining possible emission reduction in column 4.
Transport on road (scope 1 and 2)	Agreement, Fossil fuel-free Sweden, the transport challenge	Gathers actors (authorities, municipalities, businesses) who sign to only carry out and purchase fossil-free transport in 2030.	
Transport Machines	National target for the non-trading sector	In Sweden, work machines are covered by the national milestones for the non-trading sector, which means that emissions must be reduced by 63% by 2030 and by 75% by 2040 compared to 1990.	**2 000** The national target will, among other things, result in economical driving and planning of the work. According to the Swedish Environmental Protection Agency, economical driving and planning of the work can reduce fuel consumption and thus emissions by around 10% compared to previous driving patterns. Actions that lead to a shift to renewable fuel is included in part B of CCC action plan.

Transport, air, water, rail (scope 1)	EU regulation: FuelEU Maritime	According to EU regulation: The amount of greenhouse gases from ships must be reduced by two % from 2025, 14.5% from 2035 and 80% from 2050, compared to 2020 levels.	**600** Assume that a small emission reduction will take place until 2030.
Waste (solid waste disposal, biological treatment, wastewater) (scope 1)	National regulation for landfills, 31–33 §§	Requirements for final coverage and treatment of landfills	Emission reduction that deals with reducing leakage from landfills and composts, and final cover of landfills are included in part B of CCC Action Plan.
IPPU, Industrial Process (scope 1)	National energy efficiency target	Sector-wide target to reduce energy intensity by 50% between 2005 and 2030.	**3 000** Emissions in IPPU industry sector has decreased by 3400 ton CO2e per year since 2005. The emission reduction rate has also been the same in the later years 2015-2022. Production volumes, fuel type and energy efficiency are factors that influence the emissions. Assume that approx. 15% of the emission reduction is due to energy efficiency. Assumes that industries have financial incentives to continue energy efficiency.
IPPU, Industrial Process (scope 1)	National legislation: Act (2014:266) on energy mapping in large companies	This law aims to promote improved energy efficiency in large companies.	
IPPU, product use (scope 1) c	EU regulation on fluorinated greenhouse gases, (EU) No. 2024/573	Availability of fluorocarbons is limited through a quota system. Prohibition for certain products. Certification will be needed to be allowed to buy fluorinated greenhouse gases and usually to install and repair equipment that contains these gases.	**8 000** The purpose of the regulation from 2015 (which now is updated) was to reduce the emissions of f-gases by two-thirds, from 2015 to the year 2030. We used this assumption for our calculations.
Agricultural, Forestry and Land Use (AFOLU), Sources Includes: Livestock, Landuse, Other	National legislation: The Swedish Agency for Agriculture's regulations and rules in the Environmental Code	The Swedish Agency for Agriculture's regulations and rules in the Environmental Code.	**4 000** Emission reduction through legislation in combination with other important policy instruments in the agricultural sector such as advice for sustainable agriculture for example through Greppa Näringen, support and compensation that farmers can apply for within the common agricultural policy (CAP), investment support within

			Klimatklivet. The Swedish Environmental Protection Agency's forecast is that emissions in the agricultural sector will decrease by 12% from 2020 to 2030. Additional actions are included in part B of CCC.

Table A-2.1

The emission reduction scenario presented below reduces emissions in Helsingborg by 83% from 1990 until 2030.

The current climate and energy plan for Helsingborg is valid 2018-2024, so most of the activities related to that plan have already been implemented. The climate and energy plan for 2025-2030 is currently under review. Actions related to that plan are listed in column 6 (same as described later in section B of the Action Plan). In column 4 are activities that we can clearly distinguish from what we include in column 6, mainly emission reductions related to existing national legislation and targets. The emission reduction due to existing policies and CCC actions are best estimate based on the knowledge we currently have within the organization and should not be taken for absolute values. Calculations need to be refined and adjusted on an ongoing basis.

We report emissions and emission reduction from grid supplied energy separately to avoid double counting. Emissions from grid supplied energy is indirectly included in stationary energy (scope 2) because it affects the emission factor for electricity and district heating.

	(1) Baseline emissions	**(2) Emissions Reduction Target 2030**	**(3) 2022 emission**	**(4) Emission reduction through other Action Plans**	**(5) Emissions Gap**	**(6) Emissions reduction through the CCC Action Plan to address the Gap**	**(7) Residual emissions**
	Baseline emissions (ideally not older than 2018) - referring to the inventory used for target setting	The emissions reduction target for 2030 ideally achieves a minimum 80% reduction from the baseline, as reported in Section 2 of the Commitments document of the CCC. The overall target should be absolute or net-zero (i.e. including		These are the emissions reductions that would be achieved through existing policies, and plans, outlined in Section A-2.1. Those actions are by definition not part of the action portfolio in section B. If they are fully or partially incorporated in module B-2, their associated reduction potential should be referenced in column (5) and not be included here. WARNING if the baseline is a BAU scenario: If the BAU	(3-4)-2 Emission reduction gap to reach the target for the sector.	This column is used to present the already quantified emission reduction associated with the action portfolios outlined in module B-2. Ideally, this equals the gap. If the there is a difference between the reduction potential of the actions specified in module B-2 (for instance because their reduction potential has not been fully estimated or because additional measures will be identified in future iterations), the CCC AP should be explicit about this	3-4-6 Total residual emissions 2030

		the compensation of any residual emissions).			modelling includes any of these existing measures, please also do not include the associated emissions reduction in this column as otherwise it would be double counted.				difference and explain how the difference will be closed. In principle, as long as the difference has not been addressed, it would be considered as part of the residual emissions.			
	(absolute) (tons CO2e)	(absolute) (tons CO2e)	(%)		(absolute) (tons CO2e)	(%)	(absolute) (tons CO2e)	(%)	(absolute) (tons CO2e)	(%)	(absolute) (tons CO2e)	(%)
Buildings, including agricultural facilities District heating (scope 2)	191 475	9 574	95	45 784	3700		32 510		32 510		9574	
Buildings, including agricultural facilities, Electricity (Scope 2)	98 710	35 549	65	65 208	28 000		2 660		5 785		31 423	
Buildings, Individual heating of homes and premises (Scope 1)	55 572	881	98	8 505	0		7 624		7 000		1 505	
Transport, on road (scope 1&2)	257 161	38 574	85	163 086	28 500		96 012		75 000		59 586	

Transport, machines (scope 1)	154 458	15 446	90	24 083	2 000		6 637		9 000		13 083	
Transport, air, water, rail (scope 1)	8 417	1 263	85	6 509	600		4 646		0		5 909	
Waste (solid waste disposal, biological treatment, wastewater) (scope 1)	87 649	11 047	85	30 344	0		17 190		17 000		13 344	
IPPU, Industrial Process (scope 1)	227 664	34 150	85	68 810	3 000		31 660		55 000		10 810	
IPPU, product use (scope 1)	5 791	8 223	+42	16 259	8 036		0		0		8 223	
Agricultural, Forestry and Land Use (AFOLU), Sources Includes: Livestock, Landuse, Other	56 359	39 451	30	47 597	4 000		6 146		6 000		37 597	
Total	1 143 256	195 257		476 185	77 836		200 792		204 995		191 054	
Grid supplied energy	286 551	9 859	90	99 675	0		89 816		100 000		0	

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

This module aims to document the conclusions of a systems and stakeholder mapping aimed at identifying systemic barriers and opportunities. In conjunction with the GHG inventory and the policy baseline analysis in the previous two modules of Part A, the analysis reported here serves as a basis for designing actions that address these barriers or exploit the underutilised opportunities in Part C. The results of this analysis as provided here include:

- A description of the main systems related to the city´s GHG emission domains, e.g., technological/infrastructural, institutional/ regulatory, organisational, financial, political, social and behavioural systems.
- A description of barriers and opportunities for each of the systems above. This includes gaps (infrastructural/ technological, institutional/ regulatory, organisational, political, financial, behavioural or social) as well as an evaluation of unexploited resources (e.g., renewable energy sources, digital technologies, etc) or circumstances.
- A map of stakeholders involved for each of the systems above. This includes relevant actors per systemic element at different levels of governance throughout the whole policy cycle, such as local, regional, national, and EU/supranational administrative bodies and agencies, civil society, non-governmental organisations (NGOs), academia, community-based organisations, social movements, steering groups, private sector actors etc.

A-3.1: Description of urban systems, systemic barriers, and opportunities

The basis of Helsingborg's climate transition work is a strong infrastructure of well-developed and -managed systems for energy, transport, and waste management. These have been developed over a longer period to decrease climate impact and improve service in the city. The existing infrastructure has potential to contribute further to the climate transition through the development of climate neutral solutions and the integration of new technologies and infrastructure into the systems.

However, the challenges are more complex than merely a transition and additions to the existing technical systems. A long-term programme of works to decrease emissions from centralised technical infrastructure has contributed to significant historical reductions. This has involved a small number of stakeholders with significant emissions, mandate, and ability to reduce those emissions. However, it is increasingly the case that reductions in remaining emissions become increasingly dependent on the active choices and actions of many stakeholders with smaller emissions at an individual level but with a significant cumulative effect. This may be through a larger number of small businesses, or through the general public of citizens, commuters and employees. This is particularly the case in areas such as mobility where low-carbon solutions need to be attractive, efficient, flexible, accessible, and affordable for them to be seen as a viable option.

The next steps in the transition process will therefore need to combine major infrastructure investment and adaptation, and softer measures to ensure an uptake of new alternatives available. Major infrastructure investment may have challenges related to technology, finance, or

business model. Softer measures may also need new business models and other approaches to behavioural change to drive the transition process.

Mapping of stakeholders and their link to system barriers and opportunities
Achieving net zero requires close co-operation between stakeholders at local, regional, and national levels as all the works are deeply interdependent. Local policies in Helsingborg depend on regional authorities for infrastructure co-ordination, and national governments for legislative frameworks and funding. Without this alignment, progress toward our climate goals will be significantly hindered.

Transport remains the largest source of greenhouse gas emissions in Helsingborg, making it a critical area for targeted actions. Reducing these emissions requires collective efforts of businesses, government, civil society, and citizens. To address this challenge, we have launched the Helsingborg Declaration, an initiative designed to enhance collaboration and strengthen linkages across the entire logistics chain. The declaration aims to accelerate climate change adaptation through concrete, collaborative projects, driving sustainable solutions in transport and logistics. By bringing together key stakeholders, we are creating a united front to tackle the urgent issue of transport-related emissions.

However, the journey to net zero requires continued efforts to deepen co-operation. There is a clear need to establish additional networks and platforms that can foster stronger partnerships between key actors in the climate transition. Building these connections is essential for ensuring that all stakeholders can contribute meaningfully to Helsingborg's climate goals. Through collective action, Helsingborg can lead by example, demonstrating how cross-sector collaboration can pave the way for a sustainable, low-emission future.

Beyond the key stakeholders listed in table A-3.2: Systems & stakeholder mapping, other important actors - though harder to categorise - also play a vital role. International organisations provide funding and expertise, financial institutions enable green investments, and the media shapes public attitudes toward climate action. While these groups may not fit neatly into specific categories, their contributions are essential to Helsingborg’s transition to net zero. Together with the efforts of more traditional stakeholders, they underscore the collective nature of this challenge and the need for widespread engagement.

Results of the analysis
Within most of the fields of action there are multiple barriers and opportunities. Some of these are already reflected in individual actions in the Action Plan. Others may become actions in coming iterations of the Action Plan or part of overarching governance and support work by the transition team.

The following table provides a comprehensive overview of the systems and barriers and opportunities for the transition process in Helsingborg based on the different fields of action.

Field of action: Energy Systems	
Type of system	**Description of system**
General description	Helsingborg has an energy system consisting of district heating, electricity, district cooling and gas (figure 7). In Helsingborg, the energy sector's emissions mainly come from the use of electricity, district heating and district cooling, as well as individual solutions for heating in homes.

	The district heating network in Helsingborg is part of a regional network with several production sources. Helsingborg's part of the production consists of two local cogeneration plants (simultaneous production of heat and electricity) as well as waste heat from industry and water treatment plants. Thus, the local district heating in Helsingborg was produced with 100% recycled or renewable energy. **The electricity grid** supplies Helsingborg with electricity both from local production (cogeneration, wind power and solar power) and electricity that is distributed via the overlying regional grid which is part of a larger northern European system. The municipality's **district cooling** is produced by free cooling from the sea together with a district heating-driven absorption chiller supplemented by liquid cooling units. **The gas network** in Helsingborg is part of a regional gas network that stretches along the west coast with a connection down to Denmark, and is supplied, like the electricity network, by a certain amount of locally produced biogas which is supplemented with biogas and natural gas supplied through the surrounding gas network.
Type of Barrier	**Description of Barrier**
Behavioural	Fossil emissions from district heating production is one of the main emission sources in Helsingborg and originates mainly from plastic produced from fossil raw materials, which are thrown in the residual waste and then burned in the cogeneration plant. According to Swedish law, it is forbidden to landfill residual waste. The waste is instead recovered for energy in cogeneration plants to produce local district heating and electricity. Heat recovery from residual waste will continue to be an important function until 2030 and plastic will most likely continue to occur in residual waste.
Financial	The municipal energy company plans for carbon capture and storage at the district heating plant. This requires a lot of electricity and is expensive to operate. Business models to cover the costs of operating the CCS facility need to be put in place.
Technological/ Infrastructural	In order to solve the climate challenge, a large part of the fossil fuels that today are mainly used in transport and industry will be phased out and replaced by electrified solutions. This leads to a greatly increased need for electricity. At the same time, production of electricity is changing to increasingly consist of renewable weather-dependent sources such as solar and wind power. Expansion of this new production of electricity takes place above all in the northern parts of Sweden, which means that large amounts of electricity need to be distributed south to also supply southern Sweden with electricity. This places high demands on the main, regional, and local grids, which then need to have sufficient capacity to be able to deliver electricity at the right time. Reinforcements and expansion to cope with this transfer are underway, but it will take time. The consequence will be a limited supply of electricity in the southern parts of Sweden. Helsingborg, its residents, and businesses thus need to economise on the electricity effect in order to continue to enable Helsingborg's development in the future.
Lack of control	Lack of control over the electricity grid and lack of local electricity production. This prevents direct interventions in the share of renewables in the electricity mix and reducing the CO2 per KWh.

Regulatory/ Conflict with biodiversity and agriculture land	In Scania's power commission's roadmap, wind power is singled out as a key component to reach the goal of 50 % self-sufficiency in electric power. There are challenges to expand wind power in and around Helsingborg, among other things due to protected bird species that are killed in the wind turbines. For large-scale solar production, there is a conflict with agricultural land.
Organisational/ Social and behavioural	The challenge with production of solar electricity lies in making use of all the electricity produced by solar cells so that there is no need to send out too much surplus quantities to the electricity grid and risk overloading it. Solutions are needed to enable increased self-use of solar electricity. By 2026, solar electricity production is estimated to correspond to 15 % of Helsingborg's annual electricity use, and this needs to be able to be integrated into the electricity system in a sustainable way.
Technological	The need for electricity storage is large due to increased electrification and a greater share of renewable weather-dependent electricity production. To make wind and solar power more accessible, supplementation with some type of energy storage is needed, so that production can add electrical power regardless of whether the sun is shining, or the wind is blowing. Storage solutions can also contribute with balancing and flexibility services and in a way contribute to a more stable electricity supply.
Type of Opportunity	**Description of Opportunity**
Financial	The municipal energy company Öresundskraft plans to implement carbon capture and storage at the cogeneration plant. The design of international and national instruments and legislation is underway which will enable financing.
Organisational/ technological/infrastructural	Helsingborg has unique opportunities to benefit from the establishment of logistics and warehouse premises in the city. These roof surfaces are excellent locations for the installation of solar cell systems. The group plays a central role in accelerating the transition and promoting the expansion of local electricity production by actively promoting investments in solar cells. Through effective cooperation between the city, energy companies and business, the implementation of solar cell installations in these strategic locations can benefit and solar electricity can be integrated into the energy system in a sustainable way. This way, Helsingborg can become a forerunner as a logistics hub and contribute to meeting the common climate goals.
Field of action: Energy system (built environment)	
Type of system	**Description of system**
General description	Within this category, we focus on the use of electricity and heat in homes and properties. In Helsingborg, most houses are heated with district heating. The district heating network is well-developed in the central parts of Helsingborg. But there are areas on the outskirts that do not have access to the district heating network. Emissions from the homes/properties come from the use of natural gas for heating and from the use of electricity. Approximately 1 300 households in Helsingborg heat their houses with natural gas. An efficient use of electricity plays a decisive role in climate change, where above all transport and industry are completely dependent on available fossil-free electricity. An important part of the transition is to reduce and streamline the use of electricity as much as possible only goes, so that electricity is freed up and can meet the increased demand.
Type of Barrier	**Description of barrier**
Technological/Infrastructural	Natural gas used for heating houses mainly occur in areas that do not have access to the city's district heating network.

Type of opportunity	**Description of opportunity**
Technical, Behavioural	The national organisation Fossil-free Sweden's national efficiency strategy shows that nationally there is a potential to save around 11 % of the electricity in homes, premises, and industries.
Infrastructural, Organisational	In Helsingborg, there has been local production of biogas for many years, and thus there is knowledge and infrastructure that facilitate an increased production of biogas, which could be used to phase out natural gas for heating or from the use in industries.
Organisational	Administrations and municipal companies in Helsingborg today have a good dialogue and good co-operation regarding planning conditions for future electricity use in Helsingborg.
Technological/Infrastructural	Expansion of the district heating network is an opportunity to phase out natural gas. District heating reduces the need for electricity for heating and enables local electricity production in Helsingborg's cogeneration plant. The production of district heating also supplies electricity and electrical power when it is needed most. When it is cold outside and the heating demand increases, local electricity is produced at the same time. This contrasts with electrically powered heating alternatives, such as heat pumps, which instead contribute to an increased use of electricity during these cold periods. If you change from electric heating to district heating, electricity and electric power are freed up for other purposes.
Financial	There are government subsidies for private individuals living in detached houses powered by direct-acting electricity or gas. This support drives the conversion from heating with direct electricity or gas to district heating or heat pump, but also other energy-saving measures.
Field of action: Mobility and Transport (on road)	
Type of system	**Description of system**
General description	Helsingborg is a logistics hub and home to Sweden's second largest port. Many logistics companies are established in the area. It is possible to move quickly in the region by rail. There are ferries across the strait to Denmark. The central station in Helsingborg is called “Knutpunkten” and all buses, trains and ferries depart from there. There are also commuter train stations in several locations in the municipality. Helsingborg is growing, which means that more people and more goods need to stay and move on the same surface. Helsingborg must have a sustainable, safe and accessible transport system that meets the needs of 160 000 inhabitants by the year 2030. The City of Helsingborg, in collaboration with business and academia, aims to be Europe's most sustainable and fast-moving logistics hub, and the port of Helsingborg must be the country's most sustainable. Transport is the largest source of fossil emissions in Helsingborg and accounted for 36 % of the total emissions from scope 1 and scope 2 in 2022. Of the transport sector's emissions, the largest part comes from passenger cars. When private individuals travel within Helsingborg, they choose car in the first place. Just over half of the number of trips is made by car.
Type of barrier	**Description of barrier**
Social/Behavioural	Significant behavioural changes are needed for several transitions in personal mobility. Among other things, we need to build a stronger cycling culture.
Social/Behavioural	Fleet replacement takes time; a certain number of fossil-fuelled vehicles will remain in operation in 2030.

Infrastructural	Charging infrastructure for different types of rechargeable vehicles needs to be expanded in a sufficiently fast and effective manner, both regarding the electrical system and for the vehicles to be charged.
Regulatory	Helsingborg as an individual actor does not have full discretion to reduce transport emissions sufficiently on its own to achieve the goal. Co-operation between different key actors is necessary. The reduction obligation, mandatory mixing of a certain amount of biofuel with petrol and diesel, has been the most important steering tool to promote bio-based fuels. However, the current government has decided to lower the reduction obligation to a minimum and proposes to lower fuel taxes on petrol and diesel.
Financial, Social & Behavioural	Limited acceptance of changes among citizens can impact support and impact financial resources available.
Type of opportunity	**Description of opportunity**
Organisational	Business is an important and often driving force in the transformation of the transport sector. The business world's willingness to phase out fossil fuel-powered vehicles and make their transport more efficient is crucial. The Helsingborg Declaration and Climate Agreement in Helsingborg are networks that contribute to the transformation of the transport sector at the local level.
Organisational	Helsingborg has a dedicated sustainability team in the Procurement Department that has extensive experience in setting requirements for fossil-free transport services.
Infrastructural	We have 10 locations in Helsingborg with their own railway station, which facilitates commuting by train.
Technological	Public transport within Helsingborg is already 100% fossil-free today.
Social/Behavioural	A large proportion of those who commute to work by car live close enough to their workplace to cycle instead.
Field of action: Mobility and transport (off road)	
General description	Work machines fulfil many important social functions. Within Helsingborg, work machines are used, among other things, for digging and moving materials in the construction sector, for moving goods in the port, for ploughing arable land and for the maintenance of green areas in the city. Work machines include energy-driven work tools and work vehicles that are not intended for transport by road, such as tractors, excavators, forklifts and ride-on lawnmowers. Handheld work tools such as chainsaws are also counted here. Work machines account for 11 % of the emissions within scope 1 and scope 2 in Helsingborg. To reduce emissions from work machines, a switch to fossil-free fuels is primarily required. This can mainly be done by shifting from fossil diesel to biofuels such as HVO100 (100 % hydrogenated vegetable or animal oil), and by a transition to emission-free machines, i.e. machines that are operated with electricity or hydrogen.
Type of barrier	**Description of barrier**
Technological/Infrastructural (Safety)	If Helsingborg switches to electric machines, there could be problems in crisis situations. The Helsingborg group must be able to maintain functions even during long-term power outages. This may mean having back-up power or alternative plans to continue running important operations even if there are problems with the power grid.
Technological	The range of electric work machines is still limited

Financial	The investment cost for an electric machine is significantly higher than for a traditional machine. The City of Helsingborg and municipal companies need to find business models that do not exclude small and medium-sized entrepreneurs due to the increased investment costs.
Type of opportunity	**Description of opportunity**
Social (CO-benefits)	A transition to emission-free machines is desired by many because they reduce the local emissions of particulates and nitrogen oxides that pollute the air while reducing noise in and around workplaces.
Organisational	The City of Helsingborg is expected to have a great opportunity to influence the actors who work with construction and operation, as we are a major customer of their services.
Field of action: Waste and circular economy	
General description	Helsingborg strives to convert waste into resources. Food waste is digested into biogas and biofertiliser, plant nutrients and heat are recovered through source-sorting sewage systems, and garden waste is turned into biochar. In connection with the treatment of waste and purification of wastewater in Helsingborg, however, greenhouse gases are also emitted. The largest emissions from treatment of waste come from incineration of residual waste for the purpose of energy recovery, which is also described in the energy system section. There are also emissions from the decomposition of organic waste in the landfill. At the waste facility, nitrous oxide and methane are also released during composting of garden waste. During biogas production from food waste there is a minor leakage of methane gas. At the wastewater treatment plant, there are emission of methane and nitrous oxide when treating wastewater and sludge. Municipal companies NSR and NSVA are responsible for waste and wastewater in the municipality.
Type of barrier	**Description of barrier**
Social/behavioural	Reducing the plastic in residual waste is a way to reduce emissions from waste incineration. However, each resident in north-western Scania throws an average of around 25 kilos of plastic into the residual waste per year. There is a long way to go to change behaviour to eliminate plastic in residual waste.
Type of opportunity	**Description of opportunity**
Organisational	NSR (Nordvästra Skånes Renhållningsaktiebolag) has the authority to implement measures required to reduce emissions from waste management. Technology solutions for implementation are already available today.
Infrastructural	on-site/ near house collection of plastic packaging has been offered for 20 years.
Technological/Behavioural	The municipal waste company has started a competence and development centre with the aim of making use of different types of waste more efficiently and creating new circular energy and material flows. The centre offers a testbed for developing tomorrow's technology solutions.
Organisational (important for scope 3)	Public procurement has the potential to become a powerful tool in a transition to a circular economy. Most of the purchases made in a municipality are common to all municipalities. Collaboration around requirements facilitates a more thorough market analysis and creates the opportunity to set more appropriate requirements.
Behavioural (important for scope 3)	About a third of the waste in Sweden comes from construction. Much of the waste can continue to be used. Saving and recirculating the materials in our built environment can reduce both society's environmental impact

	and costs. There is an increasing interest from construction companies in contributing to reduced construction waste.
Field of action: Green industry	
General description	In Helsingborg, it is mainly the chemical, pharmaceutical and metal industries that generate emissions within industry. It is mainly the use of natural gas that gives rise to emissions within the sector. Natural gas is used both as a fuel for energy processes and as an input when it is used and consumed in production. A stable and safe supply of natural gas has been an important factor behind the establishment of existing industry in Helsingborg.
Type of Barrier	**Description of barrier**
Financial	The biggest obstacle to climate change is that it is still not profitable for most industries to change production. The costs of production without fossil fuels are often high and investments involve high risk because the technologies are new and immature. In some industries, continued research into alternatives is also needed technician.
Financial/ lack of control	Fossil-free manufacturing depends on the construction of an 80MW hydrolysis facility to produce hydrogen, but there has been no decision on this facility yet.
Technological/Infrastructural	Electricity is an enabler for industry in the energy system of the future. In the transition to processes that do not require fossil fuels, a sharp increase in electricity use is expected. As described in the energy chapter, the availability of electricity and power in northwestern Scania is estimated to be limited until 2030.
Type of opportunity	**Description of opportunity**
Technological/Infrastructural	Biogas has the potential to replace fossil gas in various industrial processes, where it can be used both as fuel and input. In Helsingborg, there has been local production of biogas for many years, and thus there is knowledge and infrastructure that facilitate an increased production of biogas, which could be used to phase out natural gas for heating or from the use in industries.
Infrastructural/Organisational	The Helsingborg region has been identified as a possible cluster for hydrogen production, which could contribute to a phasing out of fossil gas in industry.
Field of action: Nature based solutions	
General description	Helsingborg municipality consists of more than two-thirds of agricultural land (22 426 hectares). Helsingborg is also a coastal municipality. Located at the Öresund. There are 22 nature reserves in the municipality, of which 2 are marine reserves.
Type of Barrier	**Description of Barrier**
Conflict over land	Carbon storage is generally higher in natural soil than in arable land and lowest in hard-made surfaces. Restoration of forests, natural and pasture lands and rewetting of drained peatland are cost-effective measures to increase the natural carbon sinks. It also contributes to creating stable ecosystems and leads to more land within the municipality gaining natural values and becoming natural environments, which is important for reaching the environmental and public health goals in the Quality-of-Life program. The challenge is that the measures conflict with using the fertile land in Helsingborg for growing food.
Lack of control	The challenge when it comes to agricultural land is that it is mainly owned and managed by private landowners. The city of Helsingborg owns 1 250 hectares of agricultural land which is currently leased out to farmers.
Type of opportunity	**Description of opportunity**

Scaling up	There is particularly good potential to increase the carbon sink in Helsingborg's arable land as the areas are large and the carbon content is low.
Technological/ spread knowledge	With a newly inaugurated facility for the local production of biochar in operation and an established competence centre for biochar, Helsingborg has a unique opportunity to demonstrate how biochar can play a significant role in climate change.
	General barriers
Citizen acceptance	Limited acceptance of changes among citizens can impact support and impact financial resources available.
Policy	Changes in policy and regulatory frameworks related to climate action have unpredictable consequences, constraining investment capacity in both short and long term. Stable and supportive policy environments are advocated to mitigate these risks.
Financial and funding	There are several financial barriers, including assisting stakeholders in accessing financing and seeking external funds. However, please refer to Table 5 of the CIP for more details on financial barriers.

	A-3.2: Systems & stakeholder mapping			
Field of action	System	Stakeholders	Influence on the city´s climate neutrality ambition	Interest in the city´s climate neutrality ambition
Energy systems	Technological, Infrastructural	Öresundskraft, municipal energy company	High	High
	Financial, Organisational, Infrastructural, Technological, Regulatory	The Swedish Energy Agency	High	High
	Technological	Kemira (chemical engineering company that contributes residual heat to the heating system)	High	High
	Technological, Resident engagement	Solar Park (member-owned solar association)	High	Medium/High
Energy systems, built environment	Regulatory	The Swedish National Board of Housing	High	Medium
	Building and planning, infrastructural	Building and Planning departments Helsingborg	High	High

	Building and construction	National and local building, and construction industry through a range of networks/platforms (the entire chain from materials to construction and operation	High	Medium/High
	Behavioural, Social (Choice of heating system, energy savings)	Residents of Helsingborg	High	Low/ Medium
	Behavioural, Social (Choice of heating system, energy savings)	Property owners of Helsingborg	High	Medium/ High
Mobility and transport (on road)	Behavioural, Social	Residents of Helsingborg	High	Low, Medium
	Infrastructural, Environmental	Trafikverket (Swedish Transport Administration), Region Skåne (responsible for, public transport, infrastructure, as well as environmental and climate issues in Skåne.)	High	High
	Infrastructural, Operational, Environmental	Skånetrafiken works for sustainable travel for everyone who lives, works, and travels in Scania)	High	High
	Organisational, Social, Behavioural	The Helsingborg Declaration Network	High	High
	Organisational, learning oriented	Drive Sweden (the development of digitalised, connected, and shared mobility solutions)	Medium	Medium

	Technological/infrastructural	Öresundskraft, municipal energy company	High	High
	Infrastructural	Port of Helsingborg	High	High
	Social/Behavioural	Helsingborgshem, municipal housing company	High	High
	Organisational, social, environmental	EIT Urban Mobility (A European initiative to create liveable urban spaces)	Medium	Medium
Mobility and transport (off road)	Technological	Machine rental company that provides machines in Helsingborg	Medium, High	Medium
	Technological	Manufacturer and retailer of emission-free work machines	High	Medium
	Behavioural	Building and construction contractors and their subcontractor(engine driver) who operates in Helsingborg	High	Medium/High
Waste and circular economy	Circularity	The National Agency for Public Procurement	Medium	Medium
	Technological/ Behavioural/infrastructural	NSR (municipal recycling company)	High	High
	Technological/ Behavioural/infrastructural	NSVA (municipal water treatment company)	High	High
	Organisational, Social, Behavioural	The Helsingborg Agreement Network	High	High
Green industry	Technological/ Behavioural	Local industries, especially users of natural gas.	High	Medium/High

	Technological/infrastructural	Öresundskraft, municipal energy company	High	High
	Technological	NSR (biogas producer)	High	High
Nature based solutions	Technological, Behavioural	Farmers in Helsingborg	High	Low to High
	Technological	NSR (producer of biochar)	High	High
	Organisational, technological, Behavioural	LRF (federation of Swedish farmers)	Medium, High	High

3 Part B – Pathways towards Climate Neutrality by 2030

Part B represents the core of the CCC Action Plan, shaped by local authorities, local businesses, and stakeholders, comprising of the most essential elements: scenarios, strategic objectives, impacts, action portfolios and indicators for monitoring, evaluation, and learning.

3.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

Module B-1 "Climate Neutrality Scenarios and Impact Pathways" lists and describes impact pathways, early and late outcomes and direct and indirect impacts (co-benefits) according to and adapted from the NetZeroCities Theory of Change and the CCC Action Plan Guidance – clustered by fields of action.

- List of impact pathways, selected from or inspired by the NetZeroCities Theory of Change, including early and late outcomes (strategic objectives) and levers of change structured along the fields of action.
- Descriptions of the impact pathways, summarising their relationship with key priorities and strategic interventions and with the analysis developed in Part A

B-1.1: Impact Pathways
Impact pathways are attached in a separate document.

B-1.2: Description of impact pathways
The impact pathways presented in Table B 1.1 are based on the key shifts required to achieve climate neutrality, as outlined in Helsingborg's proposal for a new SECAP. These shifts were developed through sector-by-sector analysis, involving working groups with representatives from municipal administrations, municipal companies, local businesses, and academia. Together, these stakeholders have assessed the opportunities and challenges of reaching climate neutrality by 2030. The impact pathways have made these shifts concrete by breaking them down into specific levers and identifying the necessary early changes. These pathways align with the systemic strategic priorities outlined in Helsingborg's 2030 Climate Neutrality Commitments, focusing on reducing emissions from the city's largest sources: transport, energy production and distribution, building heating and electricity use, and industry. Transport remains Helsingborg's biggest source of emissions and is therefore the primary focus of the impact pathways, with the most proposed actions targeting this sector. However, to achieve climate neutrality, all sectors must reduce their emissions, and the impact pathways account for this need. The level of detail within each pathway varies, depending on the city's discretion over emissions reductions in a given sector. For example, the energy sector, where the city has more control, has seen more advanced planning for its transition. In all cases, the pathways are built by starting with desired outcomes for 2030 and then backtracking to identify the early changes required to reach those goals. The prioritisation of pathways is supported by detailed descriptions of individual

actions, helping decision-makers focus on the early changes that will enable the most impactful measures.

The early steps of the impact pathway broken down into the different levers also helps to counteract many of the barriers highlighted in section A3.

The structures established to support climate neutrality, such as the Transition Team mentioned in Part C of the Action Plan, are designed to facilitate the implementation of these actions and initiatives. They also ensure that the actions follow the identified impact pathways, addressing different barriers to achieving climate neutrality while enabling existing strategies.

Helsingborg's journey towards net zero is outlined through a comprehensive list of proposed actions that align with the objectives of the SECAP. While these actions provide clear direction, timelines, budgets, and the specific scope of certain measures are still under development. As a result, they may be subject to change following further assessment and decision-making.

The emission reduction potential of the actions has in most cases been estimated in collaboration with the company ClimateView and the external consultant company Afry. The estimates have been made based on an impact assessment methodology developed by ClimateView. The methodology is based on the fact that climate transition can be divided into a number of shifts from a high-carbon activity to a low carbon activity that fulfill the same need. An example of a shift is a trip made by an electric car instead of a fossil driven car. The first step of the impact assessment is to identify what shift it related to the action that will be assessed. Actions are then divided into three different categories. They can be direct, indirect, or enabling actions. Direct measures lead to a shift without affecting the attributes of the city. For example, if the city group changes its fossil-powered cars to electric-powered cars the attributes of the city will not change. But many actions are indirect, and therefore affect the attributes of a city to encourage people to change behaviour so that a shift occurs. For example, by shortening the distances to public transportation both behaviour and attributes of the city will be affected. Enabling interventions serve as catalysts for other direct or indirect interventions. When the shift and action types are identified, an assessment is made of how large an impact a certain action has on a shift. For indirect measures and enabling measures, this is done qualitatively. The method also handles the need to evaluate the combined effect that several different actions can have on one and the same shift, as well as the cases where certain actions have an impact on several different shifts.

The emission reductions and cost estimates presented in Section B2.2 are based on the City of Helsingborg's current knowledge but should not be taken as absolute values. These calculations will need to be refined and adjusted as more information becomes available. The list of proposed actions should be viewed as a flexible framework that prioritises emission reduction strategies, which, based on current analysis, offer the most reliable path to success. By contrast, estimations of carbon sequestration, including natural sinks, are often less reliable due to environmental variables and uncertainties in long-term impact.

Additionally, the City of Helsingborg has applied for funding through the EU Innovation Fund for its Carbon Capture and Storage (CCS) initiatives. The final decision on municipal investment in CCS will be made by the City Council in early 2025, which could significantly shape future planning.

In summary, while the proposed actions offer a solid foundation for achieving climate neutrality, flexibility will be crucial as the city continues to refine and adjust its approach. The impact pathways will guide this process, helping overcome barriers and ensuring alignment with Helsingborg's climate neutrality strategies.

3.2 Module B-2 Climate Neutrality Portfolio Design

Module B-2 "Climate Neutrality Portfolio Design" contains a project description for **each action planned** in the CCC Action Plan. This includes interventions targeted at creating/enhancing carbon sinks to address residual emissions.

- A table of planned interventions grouped per field of action, including interventions by local businesses and industry (B-2.1).
- An outline of each action. The table contains all information for implementation (e.g., topic, kind of intervention, emission sector, scope, allocation, responsible actors, GHG reduction by gases and estimated costs), including interventions aimed at addressing residual emissions (incl. carbon sinks) (B-2.2).
- A summary of the actions and impact planned to address residual emissions (B-2.3).

B-2.1: Description of action portfolios - textual or visual		
Portfolio description		
Fields of action	Descriptions	Actions
Energy systems	Capture and store fossil emissions from district heating production from residual waste. Capture and store biogenic emissions from district heating production from residual waste.	1. Implementation of CCS. 2. Planning and design of CCS. *(Storage of biogenic emissions are counted towards residual emissions)*
	Secure a robust energy system by increasing the availability of electric power and strengthening local electricity production, making it more plannable.	3. Increase the share of flexible energy use within the city group. 4. Increase the self-sufficiency of electricity. 5. Solar power production by the City of Helsingborg. 6. Solar power production by the City of Helsingborg.
Energy system, built environment	Fossil-free fuels heating in homes and premises	7. Phase out fossil gas from the heating system.

	Reduce the use of electricity in homes, premises and industries	8. Change all public light sources in the city to LED. 9. Energy and climate consultancy for engaging homeowners, companies, and industry building owners to install renewables on private buildings and increase their energy efficiency 10. Energy efficiency in public buildings. 11. Energy efficiency in homes (external actor). 12. Construction of climate-positive housing in healthcare.
Mobility and transport (on road)	Shift to a more transport-efficient society. The number of vehicle kilometers with cars decreases without reducing people's accessibility.	13. Actions to promote cycling and walking (e.g. constructions and improvements of roads for cyclists and pedestrians. Also includes the introduction of superbike lanes). 14. Actions to promote public transportation (e.g. Introduction of Helsingborgsexpressen (electric BRT bus)). 15. Explore the benefits of environmental zones, to limit transport with fossil fuel. 16. Development of two station areas to facilitate commuters. 17. Actions to reduce residents' need for a car (e.g. travels to and from work).
	Shift to a more transport-efficient society. The number of vehicle kilometers for transport of gods with energy-demanding means of transport such as trucks, decreases without reducing accessibility.	18. Expansion and upgrading of industrial tracks. 19. Expansion and upgrading of harbour tracks. 20. Explore the benefits of environmental zones, to limit transport with fossil fuel. 21. Systems for parcel boxes and/or delivery points in residential areas. 22. Development of standardised requirements for sharing of data.

		23. Development of local climate network, The Helsingborg Declaration
	Shift to fossil-free fuels for passenger transport and goods transport.	24. The City of Helsingborg plans for, develops and invests in infrastructure for electric charging of heavy trucks 25. The City of Helsingborg plans for, develops and invests in infrastructure for electric charging of passenger cars. 26. Engage residents and business owners in switching to electric vehicles. 27. Public procurement, requirements for fossil fuel-free and emission-free transport. 28. Development of local climate networks for business and organisations "The Helsingborg Declaration "and "Climate Agreement in Helsingborg". 29. Explore the benefits of environmental zones, to limit transport with fossil fuel. 30. Increased availability of fossil-free fuel car sharing.
Mobility and transport (off road, machines)	Shift to a more efficient use of machines.	31. Economical driving and planning of the work within the city group
	Shift to fossil-free fuels for machines.	32. The Helsingborg group contribute charging infrastructure required to support a transition to electrified machinery. 33. Purchase of electric machines by the Helsingborg group. 34. Increased requirements for electric work machines during procurement. 35. Electrically powered work machines in the port of Helsingborg.
Waste and circular economy	Reduce the amount of greenhouse gases leaking from landfills and from compost for garden and park waste.	36. Installation of landfill gas wells and final cover of the landfill with bio-windows.

		37. Reduce emissions from composts at the recycling centre.
	Reduce the amount of plastic in the residual waste to decrease the emissions from waste incineration for energy recovery.	*Handled in local and regional waste plan.*
Green Industry	Fossil-free manufacturing	38. 50 % increase in local biogas production 39. Establishment of an 80 MW electrolysis plant in Helsingborg.
Green infrastructure & nature-based solutions	Shift agricultural land from a source of greenhouse gases to a sink of greenhouse gases. The agricultural land in Helsingborg is currently a source of greenhouse gases.	40. The City of Helsingborg works to enable farmers to switch to agricultural methods that reduce emissions of greenhouse gases from agricultural land.
	Increased production and use of biochar	41. Establishment of a new biochar plant *(counted towards residual emissions*)
	Increase the natural carbon sinks in soil and vegetation	42. Creation, restoration, and protection of forests, natural land, pasture lands, seaweed, and eelgrass. Rewetting of drained peatland. *(counted towards residual emissions)*

B-2.2: Individual action outlines		
Action outline	Action name:	Implementation of CCS
	Action type:	New technology
	Action description	Within Helsingborg, district heating is the most common form of heating. District heat and electricity production generates fossil emissions from plastic produced from fossil raw materials, which are thrown into the residual waste and then burned in the cogeneration plant. The potential for a CCS plant is to reduce fossil emissions from burning of waste by 90%. The CCS also has capacity to capture CO2 from biogenic origin and create a carbon sink, by storage of the CO2.
Reference to impact pathway	Field of action	Energy systems

	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Full scale Carbon Capture and Storage at the district heating plant in 2028. The CCS will capture fossil CO2 from burning of fossil waste as well as CO2 from biogenic origin. The capacity of the carbon sink of biogenic carbon will increase when, for example, plastic in the residual waste decreases.
Implementation	Responsible bodies/person for implementation	Öresundskraft
	Action scale & addressed entities	Heating system for the entire municipality.
	Involved stakeholders	Öresundskraft, the City of Helsingborg. Companies willing to pay to be able to offset their own emissions. Legislators
	Comments on implementation – consider mentioning resources, timelines, milestones	The company is on track to have the carbon capture facility up and running by 2027/2028. Currently Öresundskraft is actively seeking a partner to build the plant, aiming for completion by summer 2024. The next pivotal step is securing a storage operator who can efficiently receive and sequester CO2 in line with Öresundskraft's schedule. Procurement process for the storage operator is expected to be completed in the second half of 2024.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	100 000 ton CO2e
	GHG emissions compensated (natural or technological sinks)	100 000 ton CO2e
	Total costs and costs by CO2e unit	2 000 MSEK and 10–20 SEK per captured ton CO2e in operating costs

B-2.2: Individual action outlines

Action outline	Action name	Planning and design of CCS
	Action type	Enabler
	Action description	Permits, financing, forms of procurement and business model. The size of the facility and which technology we will use must also be finally decided.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Full scale Carbon Capture and Storage at the district heating plant in 2028. The CCS will capture fossil CO2 from burning of fossil waste as well as CO2 from biogenic origin.
Implementation	Responsible bodies/person for implementation	The municipal company Öresundskraft.
	Action scale & addressed entities	Heating system for the entire municipality.
	Involved stakeholders	Öresundskraft, the city of Helsingborg. Companies willing to pay to be able to offset their own emissions. Legislators
	Comments on implementation – consider mentioning resources, timelines, milestones	Öresundskraft has started discussions with customers about future cooperation where they offer customers negative emission certificates from bio-CCS. Customers who buy the rights for negative emissions in advance contribute to the possibility of getting financial fundings for the CCS-plant. The project is currently looking for investment fundings. Currently Öresundskraft is preparing decision basis for investment.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Enabler for CCS. When in operation, the CCS will capture 100 000 tons of CO2e from fossil origin.
	GHG emissions compensated (natural or technological sinks)	When in operation, the CCS will capture 100000 tons of CO2e from biogenic origin.

	Total costs and costs by CO2e unit	70 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Increase the share of flexible energy use within the city
	Action type	Robust energy system
	Action description	The south of Sweden has a low degree of self-sufficiency in electrical power. This is a limitation for the electrification in the region. Therefore, a regional goal is set to increase the self-sufficiency to 50% by 2030. By predicting the hours when the need for electrical power is greatest and then proactively working to keep power peaks down, there will be a more even power output and a lower load on the power grid. One way to do this is to apply flexible electricity use, for example by using electricity during times of the day when demand is low. The Helsingborg group can contribute a large system benefit because the group accounts for a large part of the total electricity use in the municipality. This is done by inventorying, streamlining and thus controlling the need for electricity.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Action will contribute to the output: increased self-sufficiency in electric power within the entire municipality.
Implementation	Responsible bodies/person for implementation	All municipal departments and companies
	Action scale & addressed entities	All electricity used by the city group.
	Involved stakeholders	All municipal departments and companies

	Comments on implementation – consider mentioning resources, timelines, milestones	Mapping of Helsingborg group's electricity use and possibilities for flexible use has begun. We will be able to see results within a couple of years.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	The general assessment is that the potential for flexible electricity use amounts to approximately 10% of the estimated need for peak power.
	GHG emissions reduction estimate (total) per emission source sector	0–1 ton CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	5 MSEK (only administration included, does not include any technical solution that might be necessary)

B-2.2: Individual action outlines		
Action outline	Action name	Increase self-sufficiency in electricity
	Action type	Robust energy system
	Action description	Develop a local action plan to describe how to increase the self-sufficiency in electricity. The south of Sweden has a low degree of self-sufficiency in electrical power. This is a limitation for the electrification in the region. Therefore, a regional goal is set to increase the self-sufficiency to 50 % by 2030.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/ infrastructure
	Outcome (according to module B-1.1)	Action will contribute to the output: increased self-sufficiency in electric power within the entire municipality.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg, The municipal energy company Öresundskraft.
	Action scale & addressed entities	Not decided

	Involved stakeholders	The City of Helsingborg, The municipal energy company Öresundskraft.
	Comments on implementation – consider mentioning resources, timelines, milestones	Summarise already preformed reports and analyse needs and possibilities to increase self-sufficiency. To be finalised in 2025
Impact & cost	Generated renewable energy (if applicable)	yes
	Removed/substituted energy, volume, or fuel type	no
	GHG emissions reduction estimate (total) per emission source sector	no
	GHG emissions compensated (natural or technological sinks)	no
	Total costs and costs by CO2e unit	N/a

B-2.2: Individual action outlines		
Action outline	Action name	Solar power production by the City of Helsingborg
	Action type	Renewable energy production
	Action description	Increased production of solar electricity on Helsingborg's city properties. Solar panels will be installed on 8000 m2.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Action will contribute to the outcome: Solar electricity makes up 15% of the electricity used.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg Property Departement.
	Action scale & addressed entities	Properties owned by the city of Helsingborg.
	Involved stakeholders	The City of Helsingborg, Property Departement.
	Comments on implementation – consider mentioning resources, timelines, milestones	Installation of solar panels will be ready by 2025.
Impact & cost	Generated renewable energy (if applicable)	1 600 MWh/year
	Removed/substituted energy, volume, or fuel type	Not applicable

	GHG emissions reduction estimate (total) per emission source sector	1 200 tons of CO2e. Climate benefit can be calculated as 0.8 kg CO2 per charged kWh with an electric car.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	30 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Solar power production by the municipal housing company.
	Action type	Renewable energy production
	Action description	The municipal housing company Helsingborgshem will install 10 000 m2 solar power until 2026 distributed among approx. 50-70 facilities. Another 20 000 m2 suitable for solar production has been identified.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/infrastructure
	Outcome (according to module B-1.1)	Action will contribute to the outcome: By 2026, solar electricity production will correspond to 15 % of Helsingborg's annual electricity use.
Implementation	Responsible bodies/person for implementation	The municipal housing company Helsingborgshem.
	Action scale & addressed entities	Properties owned by Helsingborgshem.
	Involved stakeholders	The municipal housing company Helsingborgshem.
	Comments on implementation – consider mentioning resources, timelines, milestones	TBD
Impact & cost	Generated renewable energy (if applicable)	1 850 MWh/year
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	1 400 tons CO2e. Climate benefit can be calculated as 0.8 kg CO2 per charged kWh with an electric car.
	GHG emissions compensated (natural or technological sinks)	Not applicable

	Total costs and costs by CO2e unit	30 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Phase out fossil gas from the heating system
	Action type	Heating, renewable energy
	Action description	Households in Helsingborg who currently heat their homes with natural/fossil gas shift to district heating. Helsingborg considers it important to promote district heating. District heating reduces the need for electricity for heating and enables local electricity production in Helsingborg's cogeneration plant. The production of district heating also supplies electricity and electrical power when it is needed most. When it is cold outside and the need for heating increases, local electricity is produced at the same time. This is in contrast to electrically powered heating alternatives, such as heat pumps, which instead contribute to an increased use of electricity during these cold periods. If you change from electric heating to district heating, electricity and electric power are freed up for other purposes.
Reference to impact pathway	Field of action	Energy systems/built environment.
	Systemic lever	Technology/ infrastructure
	Outcome (according to module B-1.1)	The fossil emissions for homes and premises with heating from natural gas have decreased by 90 % compared to the year 2020 due to a shift to renewable energy for heating.
Implementation	Responsible bodies/person for implementation	The municipal company Öresundskraft enables a shift through extension of the district heating net. When not possible shift to heat pumps.

	Action scale & addressed entities	1 300 households
	Involved stakeholders	The municipal company Öresundskraft, Households in Helsingborg, municipal energy advisors.
	Comments on implementation – consider mentioning resources, timelines, milestones	This is dependent of the households' ability to change heating system and the possibility to extend the district heating system.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Natural gas
	GHG emissions reduction estimate (total) per emission source sector	7 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	>75 M SEK (TBD)

B-2.2: Individual action outlines		
Action outline	Action name	Change all public light sources in the city to LED.
	Action type	Energy efficiency
	Action description	All public light sources will be changed to LED. Luminaires in approx. 30 000 lampposts need to be replaced. In addition to lighting, the lampposts will be able to communicate with nearby sensors that can collect everything from traffic and air quality to congestion and noise. They can tell when lawns need watering or when trash cans need emptying, detect traffic jams and track vacant parking spaces.
Reference to impact pathway	Field of action	Energy system/ built environment.
	Systemic lever	technology
	Outcome (according to module B-1.1)	Electricity use in housing, services, premises, and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020.

Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	Entire municipality
	Involved stakeholders	The City of Helsingborg
	Comments on implementation – consider mentioning resources, timelines, milestones	The work started in 2023 and is ongoing in six districts of Helsingborg.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	7 000 MWh per year
	GHG emissions reduction estimate (total) per emission source sector	385 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	14 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Energy and climate consultancy.
	Action type	Information
	Action description	Energy and climate consultants reach out to residents in Helsingborg with advice on energy efficiency and renewable energy production. Every year the energy advisors carries out approx. 250 consultations with private individuals and 35 consultations with companies. Approximately half of all those who seek advice from the municipality's energy and climate advisor make an effort afterwards to save energy.
Reference to impact pathway	Field of action	Energy system / built environment
	Systemic lever	Learning and capabilities
	Outcome (according to module B-1.1)	Electricity use in housing, services, premises, and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020.
Implementation	Responsible bodies/person for implementation	The city of Helsingborg.

	Action scale & addressed entities	Available for all residents in Helsingborg.
	Involved stakeholders	Energy advisors, residents
	Comments on implementation – consider mentioning resources, timelines, milestones	The city of Helsingborg has a team of 3 energy advisors.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	TBD
	GHG emissions reduction estimate (total) per emission source sector	Not available
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	4 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Energy efficiency in public buildings.
	Action type	Energy efficiency in buildings
	Action description	Ongoing work to reduce energy use in the properties through, among other things, climate shell improvements and replacement of ventilation units and heating sources.
Reference to impact pathway	Field of action	Energy systems, built environment
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Electricity use in housing, services, premises and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	Public buildings in Helsingborg
	Involved stakeholders	The City of Helsingborg, the municipal housing company Helsingborgshem
	Comments on implementation – consider mentioning resources, timelines, milestones	A work that is ongoing and of which there is a lot of experience within the city group.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available

	GHG emissions reduction estimate (total) per emission source sector	0- 1 000 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	110 M SEK

B-2.2: Individual action outlines		
Action outline	Action name	Energy efficiency in homes
	Action type	Energy efficiency in buildings
	Action description	For example, insulation and energy-efficient technology
Reference to impact pathway	Field of action	Energy systems, built environment
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Electricity use in housing, services, premises and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020
Implementation	Responsible bodies/person for implementation	Residents of Helsingborg
	Action scale & addressed entities	Private buildings in Helsingborg
	Involved stakeholders	Residents of Helsingborg, Companies that work to reduce energy use in buildings.
	Comments on implementation – consider mentioning resources, timelines, milestones	Governmental funding for energy efficiency in single-family homes is an incentive.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	85 GWh electricity, 128 GWh district heating.
	GHG emissions reduction estimate (total) per emission source sector	1 800 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	198 M SEK

B-2.2: Individual action outlines		
Action outline	Action name	Climate-positive housing in healthcare.
	Action type	Energy efficiency, small scale renewable energy production
	Action description	The Property Department projects a future climate

		positive LSS accommodation, 6 apartments in Påarp. The accommodation will function as a pilot project that tests new techniques to reduce the climate impact during the construction and management of properties.
Reference to impact pathway	Field of action	Energy system, built environment.
	Systemic lever	Technology, social innovation, learning
	Outcome (according to module B-1.1)	Electricity use in housing, services, premises, and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	Few buildings
	Involved stakeholders	The city of Helsingborg
	Comments on implementation – consider mentioning resources, timelines, milestones	TBD
Impact & cost	Generated renewable energy (if applicable)	16 MWh per year
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	0.3 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	15 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Actions to promote cycling and walking
	Action type	Sustainable travel
	Action description	Construction of 7 new roads for cyclists and pedestrians. New cycle paths and improvements of links in the existing cycle path network. Promote cycling and walking by elevator, bike parking, safety and upgrades of cycle paths.

		Actions for increased cycling and reduced speed for motorists at the city's station areas. Introduction of superbike lanes. This actions also include the following activities, but which are not included in total cost: • Development of mobility hub concept suitable for Helsingborg. • Shared bikes Possibly subsidised bikes to city employees. • Campaign focusing on Helsingborg City employees (Pendlapepp). • Up-scaling and digitalisation of recruitment of bikers.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology, infrastructure, participation, regulation.
	Outcome (according to module B-1.1)	Easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	City wide
	Involved stakeholders	Private stakeholders, for example HubPark, Travelshop, Nudgd. Residents of Helsingborg.
	Comments on implementation – consider mentioning resources, timelines, milestones	Bike and walking paths – in the seven-year investment plan. Campaigns financed and decided upon on a regular basis.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable

	GHG emissions reduction estimate (total) per emission source sector	0-1 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	390 MSEK, see action description for what is included in total cost.

B-2.2: Individual action outlines		
Action outline	Action name	Actions to promote public transportation.
	Action type	Sustainable travel
	Action description	Introduction of electric BRT bus lines (Helsingborgsexpressen) section 2 and 3. **This actions also include the following activities, which are not included in the total cost:** Redesign of the bus line network in accordance to the new BRT lines. Strengthening of Maria train station as a hub with regional buses from December 2024. Upgrading traffic from one to two trains an hour on Västkustbanan from 2026.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services.
Implementation	Responsible bodies/person for implementation	Skånetrafiken (the Public Transportation regional company) in close partnership with the city of Helsingborg.
	Action scale & addressed entities	City wide

	Involved stakeholders	Skånetrafiken, the City of Helsingborg, financing from Trafikverket, the Swedish Transport Administration
	Comments on implementation – consider mentioning resources, timelines, milestones	Regional buses at Maria station – December 2024. Helsingborgsexpressen 2 ready June 2025. New city busline network – June 2025. Upgrading train traffic - 2026 Helsingborgsexpressen 3 ready December 2027
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	1 000 – 3 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	383 MSEK , see action description for what is included in cost.

B-2.2: Individual action outlines		
Action outline	Action name	Explore the benefits of environmental zones
	Action type	Sustainable travel
	Action description	Follow and evaluate the system demonstrators CoAction in Lund and STOLT in Stockholm as well as Gothenburg's Green City Zone.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Governance, policy and regulation
	Outcome (according to module B-1.1)	Proximity to important everyday functions in combination with environmental zone, makes it easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services. Children and young people primarily walk and

		cycle to school and to activities.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	City center
	Involved stakeholders	Viable Cities, Lund University, companies of the Helsingborg Declaration
	Comments on implementation – consider mentioning resources, timelines, milestones	Evaluation 2025 Plan 2026 Implementation 2027
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	7 000 – 20 000 CO2e per year, if environmental zone is implemented.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	100-200 MSEK, if implemented. Does not include car owners' private financial costs, which arise because an environmental zone may force a change of vehicle.

B-2.2: Individual action outlines		
Action outline	Action name	Development of two station areas to facilitate for commuters.
	Action type	Built environment and traffic offer.
	Action description	Up-grading of existing stations areas to hubs for change between train, regional bus, city bus, bike and walking.
Reference to impact pathway	Field of action	Mobility and transport
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Proximity to important everyday functions in combination with environmental zone, makes it easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services. Children and young

		people primarily walk and cycle to school and to activities.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg, Trafikverket, Skånetrafiken
	Action scale & addressed entities	Two station areas
	Involved stakeholders	The City of Helsingborg, Trafikverket, Skånetrafiken
	Comments on implementation – consider mentioning resources, timelines, milestones	Maria station ready December 2024.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	0-200 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	49 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Actions to reduce residents' need for a car.
	Action type	Sustainable travel
	Action description	Reduce the need to travel to and from work by introducing satellite offices. Develop concept. Offering shared mobility in new as well as old neighbourhoods.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology and infrastructure, participation
	Outcome (according to module B-1.1)	Proximity to important everyday functions in combination with environmental zone makes it easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services. Children and young

		people primarily walk and cycle to school and to activities. Broadband expansion and satellite offices creates prerequisites for remote work which reduce the number of trips to and from work for residents.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg Helsingborgshem (Helsingborg's Public Housing Company)
	Action scale & addressed entities	TBD
	Involved stakeholders	The City of Helsingborg Helsingborgshem (Helsingborg's Public Housing Company)
	Comments on implementation – consider mentioning resources, timelines, milestones	Satellite Office for Helsingborg City employees in Malmö (implemented). Development of concepts 2025.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	2 000 – 4 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	10 MSEK, if implemented.

B-2.2: Individual action outlines		
Action outline	Action name	Expansion and upgrading of industrial tracks
	Action type	Sustainable transport of goods
	Action description	Change of switch at the Olympiaden property
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Coordinated and efficient freight transport. Optimized filling levels in trucks and optimized routes. Good collaboration and co-creation between different actors linked to the logistics chain.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	Industrial trucks in Helsingborg

	Involved stakeholders	City of Helsingborg, Noce AB
	Comments on implementation – consider mentioning resources, timelines, milestones	Switch change in 2025
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	0-1 000 ton CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	10 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Expansion and upgrading of harbour tracks.
	Action type	Sustainable goods transport
	Action description	Possible electrification, double tracks and level separation.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Co-ordinated and efficient freight transport. Optimised filling levels in trucks and optimized routes. Good collaboration and co-creation between different actors linked to the logistics chain.
Implementation	Responsible bodies/person for implementation	City of Helsingborg, Helsingborg Port
	Action scale & addressed entities	Harbour tracks in Helsingborg
	Involved stakeholders	City of Helsingborg, Helsingborg Port
	Comments on implementation – consider mentioning resources, timelines, milestones	An investigation is underway in 2024. It will respond to the future function and needs of the harbour track, for example double track in a southern section and level separation for other traffic. The results will have an impact of the investments costs.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable

	GHG emissions reduction estimate (total) per emission source sector	500 –1 000 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	100-400 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Systems for parcel boxes and/or delivery points in residential areas.
	Action type	Sustainable goods transport
	Action description	Development of parcel box system well suited for Helsingborg. Exploration of delivery robots.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Infrastructure, participation
	Outcome (according to module B-1.1)	Co-ordinated and efficient freight transport. Optimised filling levels in trucks and optimised routes. Good collaboration and co-creation between different actors linked to the logistics chain.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	City-wide
	Involved stakeholders	VTI, Hugo Tech AB, Apotea AB, Best Transport AB
	Comments on implementation – consider mentioning resources, timelines, milestones	Project financed til 2026.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	500 –1 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	5 MSEK

B-2.2: Individual action outlines

Action outline	Action name	Development of standardized requirements for sharing of data.
	Action type	Sustainable goods transport
	Action description	Various initiatives leading up to a standardized way of sharing data.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Learning and capabilites
	Outcome (according to module B-1.1)	Co-ordinated and efficient freight transport. Optimised filling levels in trucks and optimised routes. Good collaboration and co-creation between different actors linked to the logistics chain.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	Transportation of goods within Helsingborg.
	Involved stakeholders	VTI, Univrses AB, Hugo Delivery AB, Open Mobility Foundation
	Comments on implementation – consider mentioning resources, timelines, milestones	TBD
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	500-1 000 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	0,5 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Developement of local climate network, The Helsingborg Declaration
	Action type	Sustainable goods transport
	Action description	Gathering key stakeholders in Helsingborg in order to make the logistics chain sustainable and climate neutral.
Reference to impact pathway	Field of action	Transport and mobility (on road)
	Systemic lever	Democracy / participation

	Outcome (according to module B-1.1)	Co-ordinated and efficient freight transport. Optimised filling levels in trucks and optimised routes. Good collaboration and co-creation between different actors linked to the logistics chain.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	All of the logistics chain in Helsingborg.
	Involved stakeholders	Some 50 stakeholders take part of the network – private stakeholders, research organizations
	Comments on implementation – consider mentioning resources, timelines, milestones	Projects under development 2024. Implementation 2025-2026
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	5 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	6 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	The City of Helsingborg plans for, develops and invests in infrastructure for electric charging of passenger cars.
	Action type	Fossil free fuel for transportation.
	Action description	Systematic team-work on developing public infrastructure meeting demand and pushing away from fossil driven vehicles. Includes developing a map for suitable areas for infrastructure.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Around 50% of light vehicles and around 30% of heavy vehicles can be electrified in Helsingborg. The public installed charging power for light vehicles amounts to at least 41 MW and for heavy

		vehicles to at least 19 MW in 2030. Transport services and deliveries to the Helsingborg group are fossil-free.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	City-wide
	Involved stakeholders	Öresundskraft (publicly owned energy company), private developers
	Comments on implementation – consider mentioning resources, timelines, milestones	The goal is 41 MW installed electrical power (public) by 2030 for light vehicle.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	21 000-41 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	140 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	The City of Helsingborg plans for, develops and invests in infrastructure for electric charging of heavy trucks
	Action type	Fossil fuel free transportation
	Action description	Systematic teamwork on developing public infrastructure meeting demand and pushing away from fossil driven vehicles. Includes developing a map for suitable areas for infrastructure.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Around 50% of light vehicles and around 30% of heavy vehicles can be electrified in Helsingborg. The public installed charging power for light vehicles amounts to at least 41 MW and for heavy vehicles to at least 19 MW in 2030. Transport services and deliveries to the city group are fossil-free.

Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	City-wide
	Involved stakeholders	Öresundskraft (publicly owned energy company), private developers such as for example Volvo Trucks.
	Comments on implementation – consider mentioning resources, timelines, milestones	The goal is 19 MW installed electrical power (public) by 2030 for light vehicle.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	1 000 – 3 000 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	250 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Engage residents and business owners in switching to electric vehicles.
	Action type	Fossil fuel free transportation
	Action description	Contribute to influencing and enabling private individuals and companies to switch to electric vehicles.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Participation, financing, learning
	Outcome (according to module B-1.1)	Around 50% of light vehicles and around 30% of heavy vehicles can be electrified in Helsingborg. The public installed charging power for light vehicles amounts to at least 41 MW and for heavy vehicles to at least 19 MW in 2030. Transport services and deliveries to the city group are fossil-free.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	City-wide

	Involved stakeholders	City of Helsingborg, residents, businesses
	Comments on implementation – consider mentioning resources, timelines, milestones	The first step is to gain knowledge about barriers through climate dialogues with residents and dialogues within the Helsingborg Declaration and climate agreement for Helsingborg.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Included in measures related to charging infrastructure
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	

B-2.2: Individual action outlines		
Action outline	Action name	The City of Helsingborg engage residents and business owners in switching to electric vehicles
	Action type	Fossil fuel free transportation
	Action description	The City of Helsingborg engage residents and business owners in switching to electric vehicles. To be developed.
Reference to impact pathway	Field of action	Mobility and transport (on road).
	Systemic lever	Participation
	Outcome (according to module B-1.1)	Around 50% of light vehicles and around 30% of heavy vehicles can be electrified in Helsingborg. The public installed charging power for light vehicles amounts to at least 41 MW and for heavy vehicles to at least 19 MW in 2030. Transport services and deliveries to the city group are fossil-free.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	City-wide
	Involved stakeholders	City of Helsingborg, residents and businesses in Helsingborg

	Comments on implementation – consider mentioning resources, timelines, milestones	TBD
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	Included in action about charging infrastructure
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	8 000 MSEK (cost for residents and businesses to shift to electric vehicles)

B-2.2: Individual action outlines		
Action outline	Action name	Public procurement, requirements for fossil fuel free and emission free transport
	Action type	Fossil fuel-free transportation
	Action description	Implementing new and higher requirements, sector by sector.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Governance, policy, and regulation
	Outcome (according to module B-1.1)	Transport services and deliveries to the city group are fossil-free.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	Contractors hired by City of Helsingborg
	Involved stakeholders	Stakeholders delivering transport to City of Helsingborg – directly and indirectly.
	Comments on implementation – consider mentioning resources, timelines, milestones	We see that we should work sector wise. In some sectors the fossil free solutions are closer than in others.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	5 000-13 000 tons of CO2e CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	23-45 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Increased availability of fossil fuel free car sharing
	Action type	Fossil fuel-free transport
	Action description	Finding incentives for car sharing to turn to fossil free fuel.
Reference to impact pathway	Field of action	Mobility and transport (on road)
	Systemic lever	Democracy, Participation
	Outcome (according to module B-1.1)	Proximity to important everyday functions in combination with environmental zone, makes it easier for residents to choose walking, cycling and public transportation. An integrated and coordinated transport infrastructure enables easy transition between different modes of transport and the possibility for different types of shared vehicles and shared services. Children and young people primarily walk and cycle to school and to activities. Broadband expansion and satellite offices creates prerequisites for remote work which reduce the number of trips to and from work for residents.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	TBD
	Involved stakeholders	Car-sharing companies
	Comments on implementation – consider mentioning resources, timelines, milestones	Use development of mobility hub concept as a lever. Sync with development of public charging infrastructure.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	6 000-10 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	TBD

B-2.2: Individual action outlines		
Action outline	Action name	Economical driving and planning of the work within the city group.
	Action type	Efficient use of machinery
	Action description	By using work machines more efficiently, the emissions from them are reduced. This can happen through improved planning of projects, improved logistics, and reduced removal of masses. For the Helsingborg group, it can be about optimising the elevation of projects, stabilising soil pollution on site to avoid moving the masses, using surplus soil from projects for topsoil instead of sending it to landfill, and saving areas from mowing the lawn.
Reference to impact pathway	Field of action	Mobility and transport (off road)
	Systemic lever	Learning, participation, infrastructure.
	Outcome (according to module B-1.1)	Economical driving and planning of the work have reduced fuel consumption of machines in Helsingborg by on average 10 % compared to previous driving patterns.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	City-wide
	Involved stakeholders	City of Helsingborg, contractors
	Comments on implementation – consider mentioning resources, timelines, milestones	Start by analysing where the biggest changes can be made to reduce the machines' fuel consumption.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	500 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	TBD, (reducing the amount of fuel will rather lead to savings).

B-2.2: Individual action outlines

Action outline	Action name	The city Group contribute charging infrastructure required to support a transition to electrified machinery.
	Action type	Charging infrastructure machines
	Action description	In order to create incentives for companies, such as machinery rental companies, to invest in emission-free work machinery, the Group can help put in place the charging infrastructure required to support a transition to electrified machinery. If the necessary charging infrastructure is missing, it can discourage companies from investing in electrified work machines.
Reference to impact pathway	Field of action	Mobility and transport off road
	Systemic lever	Technology, infrastructure
	Outcome (according to module B-1.1)	Diesel operation is almost phased out from machines.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	Urban development areas, construction sites
	Involved stakeholders	City of Helsingborg, Construction companies
	Comments on implementation – consider mentioning resources, timelines, milestones	Early planning stage
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	Not available
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	Not available

B-2.2: Individual action outlines		
Action outline	Action name	Purchase of electric machines by the city group.
	Action type	Renewable machines
	Action description	Most of the work machines used in work for the group are

		owned by contractors and machine hirers. However, the group also has its own work machines, most of which belong to the port, where, among other things, container trucks are used to move goods. Within the City of Helsingborg, riding lawnmowers are used, among other things, to maintain sports facilities and parks. By choosing emission-free work machines for new purchases, the group can inspire other actors to change.
Reference to impact pathway	Field of action	Mobility and transportation off road
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Diesel operation is almost phased out from machines.
Implementation	Responsible bodies/person for implementation	The city group
	Action scale & addressed entities	Machine fleet of the city group
	Involved stakeholders	The Helsingborg group
	Comments on implementation – consider mentioning resources, timelines, milestones	A first step is to map which machines need to be replaced and if there are electric alternatives on the market. Machines that are currently powered by diesel may need to be powered by HVO during a transition period.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	2 000 – 6 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	80 - 240 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Increased requirements for electric work machines during procurement.
	Action type	Renewable machines

	Action description	The range of electrically powered work machines, while still limited, is increasing due to increased demand from cities and companies. On the market today there are, among other things, smaller excavators, smaller wheel loaders and hand-held work tools. When it comes to heavier machinery, it is still primarily HVO that can replace fossil diesel, although a few emission-free heavy-duty machines have been introduced to the market. By placing increasingly high demands on emission-free work machines when procuring contracts, the group creates incentives for manufacturers to further invest in and develop emission-free work machines.
Reference to impact pathway	Field of action	Mobility and transport off road
	Systemic lever	Governance, policy, and regulation
	Outcome (according to module B-1.1)	Diesel operations are almost phased out from machines.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg, The Helsingborg group
	Action scale & addressed entities	All machines used by the Helsingborg group's contractors.
	Involved stakeholders	The Helsingborg group and contractors who work with construction of buildings and public spaces.
	Comments on implementation – consider mentioning resources, timelines, milestones	Planning stage. At first, the Helsingborg group need to assess when it is appropriate to set requirements for emission-free machines, additional knowledge is needed about its benefits and challenges. Through pilot projects with electric-powered machines, the group can gather data and experience that can form the basis of more informed decisions about procuring and using emission-free machines on a wider basis.
Impact & cost	Generated renewable energy (if applicable)	Not applicable

	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	2 000 – 7 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	12–32 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Electrically powered work machines in the port of Helsingborg.
	Action type	Renewable machine fleet
	Action description	Purchase of electric rubber tyred gantry cranes for fossil-free container handling in the port. Replace diesel trucks with electric trucks in the port
Reference to impact pathway	Field of action	Mobility and transport off road
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Diesel operations are almost phased out from machines.
Implementation	Responsible bodies/person for implementation	The municipal harbour company, Port of Helsingborg.
	Action scale & addressed entities	All machines working in the harbour area of Helsingborg.
	Involved stakeholders	Port of Helsingborg
	Comments on implementation – consider mentioning resources, timelines, milestones	The goal is for 75 % of the port's work machines to be electric by 2026. In 2024, an electric reachstacker arrived. There are also four electric vehicles/machines for towing/pulling.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	(2 000 ton CO2e) Since the machines already run on biodiesel, there will be no reduction in CO2 due to shift to electric machines.
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	360 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Increased reuse of construction and building materials
	Action type	Reuse of materials
	Action description	Reuse of materials for construction of buildings and public spaces, such as bricks, paving stones, concrete, benches, playground equipment. It is important to reduce waste and reuse building materials where it is effective, as well as design for increased circularity and flexibility in the future use of materials and building components. When choosing new materials and products, we should prioritise those that can be reused.
Reference to impact pathway	Field of action	Waste and circular economy
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Established routines so that as much material as possible is reused.
Implementation	Responsible bodies/person for implementation	City of Helsingborg
	Action scale & addressed entities	Existing and future buildings
	Involved stakeholders	The municipal housing company Helsingborgshem.
	Comments on implementation – consider mentioning resources, timelines, milestones	There are already several construction projects with recycled materials, but it needs to be implemented on a larger scale.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	6 000–19 000 ton CO2e per year. (scope 3 emissions, not included in climate neutrality 2030 target).
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	3 MSEK

B-2.2: Individual action outlines

Action outline	Action name	Installation of landfill gas wells and final cover of the landfill with bio-windows.
	Action type	Reduced leakage of landfill gas.
	Action description	Additional landfill gas wells will be installed at the landfill. Final covering takes place by placing gas-tight plastic sheeting on top of the landfill and prevents gas from leaking out. Bio-window is a gap in the waterproofing layer with a soil mixture where methane-oxidizing bacteria thrive. The bacteria break down the methane into carbon dioxide, which reduces the climate impact.
Reference to impact pathway	Field of action	Waste and circular economy
	Systemic lever	Technology
	Outcome (according to module B-1.1)	Final cover of the landfill with bio-windows.
Implementation	Responsible bodies/person for implementation	The municipality owned waste company NSR.
	Action scale & addressed entities	The landfill in Helsingborg.
	Involved stakeholders	Waste company NSR
	Comments on implementation – consider mentioning resources, timelines, milestones	Since 1985, there is a landfill gas landfill system consisting of horizontal and vertical wells. The gas from the landfill is led with the help of a compressor to two combustion engines to produce electricity and heat which will contribute to running a biochar plant. Additional gas wells will be installed in the landfill gas system. Final coverage of the landfill was already started in 2002 and large parts of the landfill will be finally covered in 2028.
Impact & cost	Generated renewable energy (if applicable)	Not available
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	15 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable

	Total costs and costs by CO2e unit	5–10 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Reduce emissions from composts at the recycling centre.
	Action type	Reduced leakage
	Action description	The size of the emissions of methane and nitrous oxide varies with, among other things, water content, temperature, and oxygen content. It is possible to regulate these parameters to some extent by changing the handling of the composting. Other measures that may be relevant are currently difficult to predict as further investigations and measurements are required as a basis for this the continued work.
Reference to impact pathway	Field of action	Waste and circular economy
	Systemic lever	Learning and capabilities, technology
	Outcome (according to module B-1.1)	Adjusted compost handling for reduced leakage
Implementation	Responsible bodies/person for implementation	The municipal waste company NSR.
	Action scale & addressed entities	Municipal compost at recycling centre.
	Involved stakeholders	Waste company NSR
	Comments on implementation – consider mentioning resources, timelines, milestones	As a first step leakage of greenhouse gas emissions from composts will be measured, to learn be able to apply the correct action.
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	1 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	0,5 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	50 % increase in local biogas production.
	Action type	Fossil fuel free industry
	Action description	There is already a biogas plant in Helsingborg that produces approx. 80 GWh each year. By 2030, it is hoped that biogas production can be increased by 50% by unused biomass.
Reference to impact pathway	Field of action	Green industry
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Hydrogen and biogas can replace fossil gas for manufacturing through establishment of an 80 MW electrolysis plant in Helsingborg and a 50 % increase in local biogas production.
Implementation	Responsible bodies/person for implementation	The City of Helsingborg; the municipal waste company NSR.
	Action scale & addressed entities	Large scale biogas plant
	Involved stakeholders	The City of Helsingborg; the municipal waste company NSR.
	Comments on implementation – consider mentioning resources, timelines, milestones	Early planning stage. The target of 50 % increased biogas production to 2030 will come up for decision in the municipal council in December 2024.
Impact & cost	Generated renewable energy (if applicable)	40 GWh
	Removed/substituted energy, volume, or fuel type	Not available
	GHG emissions reduction estimate (total) per emission source sector	20 000 tons of CO2e
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	300 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Establishment of an 80 MW electrolysis plant in Helsingborg.

	Action type	Fossil fuel free industry
	Action description	One way to replace the industrial usage of natural gas is by using green hydrogen. Implementation of production, distribution and storage of hydrogen in Helsingborg is needed.
Reference to impact pathway	Field of action	Green industry
	Systemic lever	Technology and infrastructure
	Outcome (according to module B-1.1)	Hydrogen and biogas can replace fossil gas for manufacturing through establishment of an 80 MW electrolysis plant in Helsingborg and a 50 % increase in local biogas production.
Implementation	Responsible bodies/person for implementation	So far, the municipal energy company Öresundskraft is only responsible for the feasibility study.
	Action scale & addressed entities	Will highly contribute to phase out fossil fuels from industries in Helsingborg.
	Involved stakeholders	Industries using fossil gas, Öresundskraft
	Comments on implementation – consider mentioning resources, timelines, milestones	This project is in an early stage of development. Basic conditions such as location, economics and technical aspects are now investigated. The possibility to use excess energy from hydrogen production is an important factor to consider and investigate. A critical aspect is the access to renewable electricity.
Impact & cost	Generated renewable energy (if applicable)	No
	Removed/substituted energy, volume, or fuel type	Replacement of natural gas
	GHG emissions reduction estimate (total) per emission source sector	45 000 tons of CO2e per year
	GHG emissions compensated (natural or technological sinks)	Not applicable
	Total costs and costs by CO2e unit	1 500 MSEK

B-2.2: Individual action outlines

Action outline	Action name	The City of Helsingborg works to enable farmers to switch to agricultural methods that reduce emissions of greenhouse gases from agricultural land.
	Action type	Changed agricultural practices
	Action description	The City of Helsingborg needs to involve farmers in the climate transition and make it easier for more farmers to invest in carbon storage. It can do this by, for example, educating, informing, and making visible support, grants and advice, as well as supporting landowners in applying for agricultural support. The City of Helsingborg also needs to explore how procurement as a tool can drive and control the demand for food that promotes increased carbon storage in soil and the development of a resilient agricultural landscape. In the case of new leases on the municipality's arable land, the municipality should steer towards an increase in methods that increase carbon storage in the soil. At the same time, previous decisions on organic farming should be considered for new agricultural leases.
Reference to impact pathway	Field of action	Nature-based solutions
	Systemic lever	Democracy /participation
	Outcome (according to module B-1.1)	Changed agricultural practices on 5 % of the agricultural land
Implementation	Responsible bodies/person for implementation	The City of Helsingborg
	Action scale & addressed entities	5 % of agricultural land in Helsingborg.
	Involved stakeholders	The city of Helsingborg, farmers in Helsingborg.
	Comments on implementation – consider mentioning resources, timelines, milestones	Dialogues with LRF, the local branch of the federation of Swedish farmers has been initiated. Agriculture is one of

		the work packages in the latest application for Viable Cities (climate neutral cities). Awaiting notification if the application has been granted
Impact & cost	Generated renewable energy (if applicable)	Not applicable
	Removed/substituted energy, volume, or fuel type	Not applicable
	GHG emissions reduction estimate (total) per emission source sector	12 000 tons of CO2e per year.
	GHG emissions compensated (natural or technological sinks)	Not available
	Total costs and costs by CO2e unit	3MSEK (coordination of the city's work)

B-2.2: Individual action outlines		
Action outline	Action name	Establishment of a new biochar plant.
	Action type	Carbon storage
	Action description	Helsingborg has recently inaugurated Sweden's largest facility to produce biochar from garden waste, with the capacity to sequester 3 500 tons of CO2e per year. Expanded production requires additional access to organic material as raw material. In Helsingborg, wood chips, among other things, could be used for production.
Reference to impact pathway	Field of action	Nature-based solutions
	Systemic lever	Technological
	Outcome (according to module B-1.1)	Operation of new biochar plant.
Implementation	Responsible bodies/person for implementation	NSR (municipality owned waste company), City of Helsingborg.
	Action scale & addressed entities	Scale based on amount of wood chips from used wood within the municipality.
	Involved stakeholders	NSR (municipality owned waste company), City of Helsingborg. Companies that can contribute with used wood.
	Comments on implementation – consider mentioning	Early investigation / feasibility stage. If implemented, it will be close to 2030.

	resources, timelines, milestones	
Impact & cost	Generated renewable energy (if applicable)	Possibilities to retrieve heat from the production process that can feed into the district heating system.
	Removed/substituted energy, volume, or fuel type	Not relevant
	GHG emissions reduction estimate (total) per emission source sector	Not relevant
	GHG emissions compensated (natural or technological sinks)	20 000 tons of CO2e per year
	Total costs and costs by CO2e unit	70 MSEK

B-2.2: Individual action outlines		
Action outline	Action name	Creation, restoration, and protection of forests, natural land, pasture lands, seaweed and eelgrass.
	Action type	Carbon storage
	Action description	Restoration of forests, natural and pasture lands, and re-wetting of drained peatlands are cost-effective measures to increase natural carbon sinks. This also helps create stable ecosystems and leads to more land within the municipality gaining natural values and becoming natural environments, which is important for achieving the city's environmental and public health targets. The challenge is that these measures conflict with using the fertile land in Helsingborg for food production. However, converting arable land to natural land in strategic locations can benefit food production by creating shelter, improving the water balance, increasing pollination, and reducing the risk of pest attacks.
Reference to impact pathway	Field of action	Nature-based solutions
	Systemic lever	Green infrastructure

	Outcome (according to module B-1.1)	0.3 km2 restored natural land. 0.2 km2 new parks and green areas. 2.5 km2 protected nature. Marine areas have a good biological status.
Implementation	Responsible bodies/person for implementation	The Urban Planning Department at the City of Helsingborg.
	Action scale & addressed entities	City-wide
	Involved stakeholders	The Urban Planning department at the City of Helsingborg. The Environmental Department at the City of Helsingborg.
	Comments on implementation – consider mentioning resources, timelines, milestones	A work that takes place continuously until 2030. These actions are also included in Helsingborg's participation in the Green city accord.
Impact & cost	Generated renewable energy (if applicable)	Not relevant
	Removed/substituted energy, volume, or fuel type	Not relevant
	GHG emissions reduction estimate (total) per emission source sector	Not relevant.
	GHG emissions compensated (natural or technological sinks)	2 500 tons of CO2e per year.
	Total costs and costs by CO2e unit	90 MSEK

B-2.3: Summary strategy for residual emissions

(Detail where residual emissions stem from, provide a more detailed rationale for ruling out emissions reduction options, and how residual emission will be compensated, if applicable. Include the expected breakdown of natural sinks, permanent sequestration, and offsets.). Only options that durably store carbon captured from the atmosphere should be part of the residual emissions strategy. If non-durable options are included, the strategy should discuss how the city intends dealing with reversals.

Buildings, district heating (scope 2)

Within Helsingborg's heating sector, district heating is the most common form of heating, and the emissions correspond to approximately 35 % of the emissions from energy use within the municipality. Climate emissions resulting from district heating use are calculated similarly for electricity based on an emission factor corresponding to the fuel mix found in the district heating network. Today, these emissions mainly come from the system's cogeneration production, which releases both biogenic and fossil carbon dioxide because of energy recovery from waste destruction. The fossil emissions are mainly derived from plastics produced from fossil raw materials, which are thrown in the residual waste and then burned in the cogeneration plant. As we are planning a CCS facility at this cogeneration plant, the emissions in this sector will be greatly reduced.

Buildings electricity (scope 2)
Electricity use in Helsingborg accounts for approximately 60 % of the emissions from energy use. Helsingborg's electricity supply is highly dependent on supply from the regional grid, where the local electricity production accounts for a small proportion of the total electricity demand in the municipality (self-sufficiency rate approximately 20 % on an annual basis). The climate emissions resulting from the municipality's electricity use are calculated based on an emission factor corresponding to a consumption network mix for the Swedish electricity area 4, taking into account imports and exports from and to surrounding electricity areas. The municipality therefore cannot fully control emissions in this sector. We lack a forecast of how the emission factor for electricity will develop. In Helsingborg, we are currently counting on an emission factor of 55 g CO2e per kWh of electricity used. According to the Swedish Energy Authority, the average emission factor for electricity in Sweden is 26 g CO2e per kWh. We therefore assume that we will approach 26 g CO2e per kWh in Helsingborg by 2030. The expansion of renewable energy is expected to increase significantly in Sweden (mainly wind power) and Europe, which will have a positive impact on the emission factor. The emission factor could decrease more by 2030 than what we have calculated here.

Buildings individual heating of homes and premises
The emissions come mainly from the use of natural gas in about 1 300 households. There are good opportunities to greatly reduce emissions in this sector by switching to district heating and heat pumps. However, we estimate that there will be a smaller percentage of households left in 2030 that have not yet converted to a renewable heating system. The municipality can enable a shift, but cannot require households to convert.

Transport, on road (scope 1&2)
To reach the ambition of net zero emissions in Helsingborg it is necessary that the fossil emissions from transport continue to decrease, and at a rapid pace. The pace of change needs to increase drastically. When national policy instruments such as reduction obligations of fossil fuels and climate bonuses for car purchases disappear, greater efforts are required at the local and regional level, by both public and private actors. The city can create conditions for emission reductions in the transport sector. This happens, among other things, in urban planning, in prioritising land use and by setting climate requirements in procurement. However, the city as an individual actor does not have full discretion to reduce transport emissions sufficiently on its own to achieve the goal. Co-operation between different key actors is necessary. The number of actors who need to act in a short time, and the fact that the transition is to some extent based on how the residents choose to travel, means that we do not believe that we can reduce emissions within the sector by more than 85%. Currently, there is also uncertainty as to exactly how the emission reduction will take place. We calculate the emission reductions based on a possible scenario.

Transport, air, water, rail (scope 1)
Helsingborg also has certain emissions from domestic flights, shipping and railways. The industry organisation for domestic aviation aims to be fossil-free by 2030. Local emissions from shipping and railways are already relatively small in relation to how much is transported with these means of transport. Currently, we do not see that these will decrease to a greater extent until 2030. Emissions from shipping will decrease to a larger extent towards 2050 due to EU regulation: According to EU

regulation, the amount of greenhouse gases from ships must be reduced by two % from 2025, 14.5 % from 2035 and 80 % from 2050, compared to 2020 levels.

Transport, scope 1, machines
Emissions from machinery mostly come from the construction and industrial sector and from road works. Emissions also come to some extent from work machines that cut grass on public and private lawns. Through requirements on contractors and through declarations of intent regarding fossil-free and emission-free work machines together with other municipalities, most emissions will be able to be cut by 2030. However, there will be actors within the municipality who have not been able to shift to fossil-free fuels by 2030, mainly due to financial reasons.

Waste (solid waste disposal, biological treatment, wastewater) (scope 1)
The municipal waste company has full authority to implement the measures required to reduce emissions from waste management by 85%. Technology solutions for implementation are already available today. The remaining 15% is difficult to reduce before the entire landfill is finally covered, which it is not expected to be in 2030. Emissions from composting and biogas production are also not expected to be completely solved by 2030.

IPPU, Industrial Process (scope 1)
Emissions in the industry sector come primarily from the use of fossil gas in industry. Emissions in the sector can be almost completely reduced by 2030, but this requires local hydrogen production which can replace natural gas. This brings with it challenges in terms of costs. It is also a tight timetable to get all parts of the facility and infrastructure in place by 2030. Currently, there is no definitive decision on whether a facility will be in place by 2030.

IPPU, product use (scope 1)
Emissions of greenhouse gases from this emission sector mainly consist of leakage of fluorinated gases. The use of fluorinated gases is regulated by the EU in the form of regulations, directives, and other legal acts. The municipality has little discretion to reduce these emissions. But new legislation in Sweden in combination with technological development is expected to reduce emissions further.

Agricultural, Forestry and Land Use (AFOLU), sources include livestock, land use, other (scope 1)
Greenhouse gases are emitted in the form of methane and nitrous oxide from animal digestion and fertilizers (mainly artificial), as well as carbon dioxide and other climate gases from arable land. Emissions are greatest from carbon losses from agricultural soil and from the use of artificial fertilizers. There is a great potential to reduce carbon losses from arable land and store more carbon in arable land. Reducing the emissions caused by animal digestion and the use of artificial fertilisers does not have much potential in Helsingborg because the number of farms with animals is few, and the use of artificial fertilizers already complies with the legislation. We expect that most emissions from fertiliser use will remain in 2030.

Grid supplied energy
The emissions from grid supplied energy will almost be gone by 2030 through implementation of a CCS plant at the cogeneration plant.

Carbon sinks for compensation of residual emissions

Technologies for directly capturing and storing large amounts of carbon dioxide from the air are a very important part of the solution. Technology that separates carbon dioxide from the air is already being tested today at the Filbornaverket in Helsingborg.

With a newly inaugurated facility to produce biochar in operation and an established competence centre for biochar, Helsingborg also has a unique opportunity to take the lead in demonstrating how biochar can play a significant role in the climate transition.

The capacity of natural carbon sinks in Helsingborg, such as forests, seas, and soil, is also crucial for achieving climate neutrality. Developing these natural carbon sinks not only provides climate benefits but also promotes biodiversity and soil fertility, creates opportunities for tourism and business, and strengthens ecosystems' resilience to climate change. There is particularly good potential to increase the carbon sink in Helsingborg's agricultural land since the areas are large and the carbon content is low.

Targets in line with the Paris Agreement

Helsingborg's target of climate neutrality is set based on what is required for Helsingborg to fulfil our part of the Paris Agreement. The target means that direct greenhouse gas emissions within Helsingborg and emissions from energy use must decrease by at least 85 % compared to 1990 levels. Increased carbon sinks will compensate for the remaining emissions. Fifteen % of the 1990 emissions corresponds to 170 000 tons of carbon dioxide equivalents.

How to reach the target

To create carbon sinks equivalent to 170 000 tons of carbon dioxide equivalents, a balance between investing in innovative carbon storage technologies and increasing natural carbon sinks is required. Capturing and storing biogenic carbon dioxide emissions, which occur during biomass combustion at the Filbornaverket, has the potential to create a carbon sink equivalent to 100 000 tons of CO2e per year. To achieve climate neutrality by 2030, natural carbon sinks (including biochar) need to increase by 70 000 tons of CO2e by then.

Increase Carbon Sequestration with Carbon Capture Technologies

The municipal energy company Öresundskraft is planning to reduce the emissions from Filborna's combined heat and power plant by investing in a carbon capture and storage (CCS) facility. The facility will separate carbon dioxide from the flue gases produced by the combustion of residual waste. The carbon dioxide will then be permanently stored underground. In addition to capturing 100 000 tons of carbon dioxide from the combustion of fossil plastics, the facility will have the capacity to capture 100 000 tons of carbon dioxide from the combustion of biomass in the residual waste, such as cardboard, thus functioning as a carbon sink. The more plastic that is sorted out from the residual waste, the greater the amount of carbon dioxide from biomass combustion that can be captured.

Increase Biochar Production

Biochar acts as a long-term carbon sink because it is a very stable carbon compound that can be preserved in soil for up to 1 000 years. It can be mixed into soil where it helps to bind nutrients and water, and its porous structure gives soil a light and airy texture. During the biochar process, energy is released which can be utilized in the district heating system. Helsingborg has recently inaugurated Sweden's largest facility to produce biochar from garden waste, with the capacity to sequester 3 500 tons of CO2e per year. Expanded production requires additional access to organic material as raw material. In Helsingborg, wood chips, among other things, could be used for production.

However, it is important to consider whether biomass by-products might generate more climate benefits by replacing fossil fuels. Biochar actions are also described in the pathways and action portfolio but not counted toward the 85% reduction in emissions because it is counted here toward residual emissions.

Increase Carbon Sequestration in Agricultural Land

More than two-thirds of the municipality consists of agricultural land. A small change in carbon sequestration per hectare of agricultural land in Helsingborg municipality would have a significant climate impact. The challenge for the Helsingborg group lies partly in the fact that the arable land is owned and managed primarily by private landowners. Encouragement, information, and good cooperation between the company and farmers are therefore important. The municipality can also help create financial incentives for farmers to manage the land in ways that store more carbon. The City of Helsingborg owns 1 250 hectares of agricultural land that is currently leased to farmers. Here, the City of Helsingborg has more control and sees an opportunity to, through new leases, ensure that the land is managed with methods that lead to increased carbon content in the soil.

Increase natural carbon sinks in soil and vegetation

How land is used and managed affects whether it functions as a source or sink of carbon dioxide. Carbon sequestration is generally higher in natural land than in arable land and is lowest in hardened surfaces. Restoration of forests, natural and pasture lands, and re-wetting of drained peatlands are cost-effective measures to increase natural carbon sinks. This also helps create stable ecosystems and leads to more land within the municipality gaining natural values and becoming natural environments, which is important for achieving the city's environmental and public health targets.

The challenge is that these measures conflict with using the fertile land in Helsingborg for food production. However, converting arable land to natural land in strategic locations can benefit food production by creating shelter, improving the water balance, increasing pollination, and reducing the risk of pest attacks.

Nationally, there is significant potential to reduce greenhouse gas emissions by re-wetting drained soils with high organic material, so-called organogenic soils, which reduces the emission of carbon dioxide. In Helsingborg, however, the area of organogenic soils is relatively small. At the same time, wetlands help to strengthen biodiversity, purify water, and reduce nutrient leakage. The combined benefits can therefore motivate the re-wetting of this type of land.

Preserve and develop existing carbon sinks in sea, soil, and vegetation

In addition to creating new areas of forest and natural land, it is important to preserve the land we already have; otherwise, the carbon sink and biodiversity decrease. A mature forest can also continue to sequester carbon for many years. Agreements can be made with private landowners who own valuable natural land. It is important that the City of Helsingborg facilitates this work so that landowners see the benefits of protecting land. We also need to ensure that our marine areas have good biological status and that areas with seaweed and eelgrass are preserved and have favourable development. In addition to contributing to high biodiversity, they have the capacity to store carbon to the same extent as a forest on land.

Carbon sink potential

Below table lists the potential for the different carbon sinks in Helsingborg by 2030. The total potential for carbon sinks depends, among other things, on how large areas are utilized for measures that increase natural carbon sinks.

Carbon Sink Potential				
Activity	Potential (tons of CO2e per hectar per year)	Extent (Number of hectares)	Carbon sink (tons CO2e/year)	Duration
Bio-CCS	Not applicable	Not applicable	100 000	Mineralisation of CO2
Recently inaugurated biochar plant	Not applicable	Not applicable	3 500	More than 1 000 year.
Increased Biochar production	Not applicable	Not applicable	20 000	More than 1000 year.
Restoration, creation of forest land and shelterbelt plantations.	12	100	1200	TBD
Protection of natural land	5	250	1 250**	TBD
Changed agricultural practices on 5% of agricultural land.	5.5	1 200	6 000*	TBD
Rewetting of organogenic soils	13.5	100	1 350	TBD
Increased area of eelgrass meadows	1	Not available	Not available	TBD
Total carbon sink			**124 050**	

*Not included in total sink. At the moment the agricultural soil is a source of carbon. Changed farming methods will therefore primarily reduce emissions from agricultural land. Carbon losses from agricultural land are included in Helsingborg's total greenhouse gas emissions. They are estimated at around 12 000 tons of carbon dioxide equivalents per year. Therefore, we count changed agricultural practices as a measure for reduced emissions, until the land shifts from a net source to a net sink.

** Not included in total carbon sink since it is not an additional activity.

How to close the gap

According to Gap table A 2.1, emissions in Helsingborg are assumed to decrease by 83% compared to 1990. To reach climate neutrality, we need to compensate for 191 000 tons of CO2e.

On the scale that carbon sinks are currently being considered in Helsingborg, we reach a total carbon sink of approx. 124 000 CO2 equivalents. Thus, we need to increase the carbon sink by

another 66 000 tons of CO2e. To get there, there are a few different possible paths to take. There are ongoing discussions about which route we should take, and there are yet no decision.

Summary of alternatives

Reduction of plastic in the residual waste

If plastic in the residual waste is reduced so that the fossil emissions are reduced, the capacity of the CCS plant to capture biogenic carbon dioxide increases. This can, for example, be done on a larger scale through a facility that automatically sorts out plastics. According to calculations for Stockholm Exergy, emissions from waste incineration of household waste can be reduced by 17 % through full producer responsibility. After that, a plastic sorting facility can reduce emissions by a further 67 %. It is based on the fact that business waste is also sorted. Helsingborg's district heating plant also burns imported waste. So the effect of a sorting facility depends, among other things, on which waste fractions are sorted and how much plastic is in the different waste fractions. The incoming waste to Filbornaverket, consists of around 22 % of household waste. If we make use of the potential that Stockholm has calculated and with the assumption that the plastic content in the various plastic fractions would be the same, the emissions from Helsingborg's waste incineration could be reduced by up to **60 000** tons. The calculation is a rough estimate and needs to be adjusted to Helsingborg conditions.

Increased carbon sequestration in agricultural land

Helsingborg consists of around two-third of agricultural land and the carbon content of the agricultural land is low. Therefore, it is a great potential to increase the carbon content through changed agricultural practices. A conversion of agriculture on 25% of the agricultural land in Helsingborg would result in an increased carbon sink of around **30 000** tons of CO2e.

Increased forest plantation

In the City of Helsingborg's Green Structure Programme from 2014, there is an ambition to convert 600 hectares of arable land into forest, primarily to benefit biodiversity and recreation. This would also increase carbon storage in soils and vegetation. As there are conflicting targets around land use, forests have not been planted at a rate that corresponds to the ambition. A conversion of 600 hectares of arable land into forest and parkland would result in a carbon sink of around **7,200** tons of CO2e.

Compensation by carbon credits

According to the regulations for mission cities, there is also the possibility for cities to offset emissions by certified Carbon credits from outside the city's boundary. However, this is a path that we would like to avoid as far as possible. We need to investigate which forms of carbon credits we can support that will ensure a long-term carbon sink.

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

Module B-3 "Indicators for Monitoring, Evaluation and Learning" contains a selection of indicators to monitor and evaluate progress along the selected impacts pathways and fields of action described in Module B-1. as well as a monitoring and evaluation plan, i.e., metadata on each indicator selected, in addition to milestones and timeline. More specifically:

- An overview table listing the indicators selected per outcome and impact including targets and evaluation points (B-3.1);
- A metadata table for each indicator selected (B-3.2).

Module B-3

For the CCC, Helsingborg has selected a set of required indicators from the NZC indicator framework, which predominantly reflect actual changes in emissions across various sectors. We have also selected a set of recommended indicators from the indicator framework to describe the development of co-benefits, with an initial focus on environment and health. Additionally, we have chosen to include certain indicators that will help assess whether Helsingborg is on the right track in areas where we have identified high risks related to the transition such as for hydrogen production and the conversion of agricultural land (e.g. risks related to mandate and financing).

Within a year, the City of Helsingborg will identify further qualitative indicators needed to monitor the transition process. Experts from each emission sector within the organization will participate in this effort, and social strategists will be consulted regarding indicators within the area of Social Inclusion, Innovation, Democracy and Cultural Impact. For some indicators, targets and milestones are yet to be established. Supplementary indicators, targets and milestones will be included in the next iteration of the CCC.

The Environment Committee is responsible for the monitoring and evaluation of targets and actions outlined in Helsingborg's SECAP and CCC. Monitoring and evaluation of the SECAP will be conducted annually, with reports presented to the politicians on the Quality-of-Life Committee, which includes representatives from the municipal council. Additionally, Helsingborg's emissions statistics and climate actions will be reported yearly to the Covenant of Mayors 2030 and the WWF One Planet City Challenge through the Carbon Disclosure Project (CDP). The entire CCC will be revised and reported on every two years. Reporting to organizations connected to CDP is an important part of Helsingborg's learning process, as they provide feedback to help the city advance in its climate work.

Helsingborg primarily relies on emissions data from the national emissions database for reporting Scope 1 emissions and energy statistics from Statistics Sweden (SCB) for Scope 2 emissions. A dilemma with the national emissions and energy statistics in Sweden is that there is a delay of 1.5 years before the statistics for a certain year becomes available. Currently, 2022 is the latest year for which statistics are available. Further details regarding data sources can be found in Part A of the CCC.

To support the evaluation and learning process, Helsingborg uses the Climate OS tool, developed by ClimateView. The tool is based on the theory that the climate transition can be broken down into numerous shifts from high-carbon to low-carbon activities that still meet the same needs. For example, shifting from commuting by gasoline-powered car to commuting by electric bus. These shifts form the backbone of the transition. The tool helps conduct a tempo analysis, determining the pace of change required to meet a target within a specified timeframe. The tempo is derived through back casting and helps identify the annual rate of progress needed to achieve long-term goals. For instance, the tempo analysis found that to reduce emissions from the transport sector by 17 000 tons of CO2 per year, an additional 3 800 people would need to switch from personal vehicles to electric buses annually. For a further reduction of 7 000 tons of CO2 per year, an additional 2 900 people would need to start commuting by bike or foot. Results and learnings from tempo analysis will contribute to the work of supplementing the list of CCC indicators and setting targets for the

interim target years. The tempo analysis also enables Helsingborg to design tailored, citizen-centric, and outcome-focused actions.

B-3.1: Impact Pathways							
Outcomes/ impacts addressed	Actions (numbers from table B-2.1)	**Indicator No.** (unique identified)	Indicator name		Target values		
					2025	2027	2030
(List early changes/ late outcomes and impacts to be evaluated by indicator)	(List action/ pilot project if applicable)		(Insert indicator name)		(List one value per indicator)	(List one value per indicator)	(List one value per indicator)
Domain: Greenhouse gas emissions							
• Carbon Capture and Storage at the district heating plant. • Electricity use in housing, services, premises, and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020.	1-12	1	GHG emission from stationary energy (t CO2 equivalent)		106 495	97 830	45 000
• Electricity use in housing, services, premises, and industry has decreased and/or made more efficient by at least 11 % compared to the year 2020.	9-11	2	Electricity use in housing, services, premises and industry (MWh)		572 200	555 788	531 169
• The fossil emissions for homes and premises with heating from natural gas have decreased by 90 % compared to the year 2020.	10-11	3	GHG emissions from individual heating of homes and premises.		7 000	6 000	881
• It is easy for residents to choose walking, cycling and	13-30	4	GHG emission from on road		116 394	85 266	38 574

public transportation. • Easy transition between different modes of transport. • Good access to shared transport. • Children and young people primarily walk and cycle to school and to their activities. • Good conditions for working remotely. • Co-ordinated and efficient freight transport. • Optimised filling levels in trucks. • Optimised routes for trucks. • Good collaboration and co-creation between different actors linked to the logistics chain. • 50% of light vehicles are electric. • 30% of heavy transport is electric. • A well-developed charging infrastructure.			transport (t CO2 equivalent)				
• 50% of light vehicles are electric. • A well-developed charging infrastructure.	25-27,29-30	5	Share of light vehicles in Helsingborg that are electric (%)		18	31	50
• 30% of heavy transport is electric. • A well-developed charging infrastructure	24,26-30	6	Share of heavy vehicles in Helsingborg that are electric (%)		9	17	30
• It is easy for residents to choose walking, cycling and public transportation. • Easy transition between different modes of transport.	13-17	7	Modal share of green transport modes (walking, cycling, public		61	64	70

• Children and young people primarily walk and cycle to school and to their activities.			transportation) (%)				
• Efficient use of work machines. • Emissions from machines has decreased with 90 % from 1990 to 2030. • A strong development of the market for electrically powered machines.	31-35	8	GHG emissions from machines (t CO2 equivalent)		40	30	15
• Final cover of the landfill with bio-windows. • Reduced leakage from landfills.	36-37	9	GHG emission from waste (t CO2 equivalent)		23 100	18 283	11 000
• Hydrogen and biogas can replace fossil gas for manufacturing. • Reduced emissions from fluorinated gases.	38-39	10	GHG emission from IPPU (t CO2 equivalent)		TBD	TBD	TBD
• Hydrogen and biogas can replace fossil gas for manufacturing.	38-39	11	GHG emissions from industrial processes within the city boundary (t CO2 equivalent).		55 812	47 148	34 150
• Reduced emissions from fluorinated gases	-	12	GHG emissions from non-energy product use (t CO2 equivalent).		13 246	11 237	8 223
• Changed agricultural practices on 5 % of the agricultural land.	40	13	GHG emission from AFOLU (t CO2 equivalent)		44 542	42 506	39 451

• Self-sufficiency in electric power.	5-6, 38-39	14	Local RES energy production.		TBD	TBD	TBD
• Phasing out of fossil fuels in industry.	38-39	15	Local hydrogen production (MWh)		TBD	TBD	TBD
• Carbon Capture and Storage at the district heating plant.	1-2	16	GHG emission from grid supplied energy (t CO2 equivalent)		99 675	99 675	9 859
• Carbon Capture and Storage at the district heating plant.	1-2	17	Amount of permanent sequestration of GHG within city boundary (t CO2 equivalent)		TBD	TBD	TBD
• Changed agricultural practices has increased storage of carbon in agricultural land. • Operation of new biochar plant. • New parks and green areas.	41-42	18	Negative emissions through natural sinks (t CO2 equivalent)		10 000	100 000	171 000
• Changed agricultural practices has increased storage of carbon in agricultural land.	40	19	Hectares of land with changed agricultural practices (hectares)		TBD	TBD	1 250
Domain: Public health and Environment							
• Reduced air pollution		20	Yearly mean PM2.5, placed in traffic environment (µg/m3)		7.8	7.5	7
• Reduced air pollution		21	PM 10 concentration level. Number of		3	3	2-3

			days per year that exceed the daily average value of 45 micrograms per cubic meter (µg/m3).				
• Reduced air pollution	13-30, 38-39	22	NO2 concentration level (µg/m3)		15.6	14.6	13
• Reduced noise	13-30,	23	Population exposed to nighttime noise (%).		20.6	20.4	20
• Reduced noise	13-35	24	Population exposed to avg. LDEN ≥ 55dB (%)		41.3	40.8	40
• Restored natural land.	42	25	Restored natural land since 2022 (km2)		0.23	0.31	0.42
• New parks and green areas.	42	26	New parks and green areas since 2022 (km2)		0.23	0.28	0.35
• Protected nature.	42	27	Protected nature (km2)		12.8	13.4	14.35
• Reduced resource use		28	Municipal waste generated per capita (tons), including garden waste		0.389	0.377	0.360

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from stationary energy
Indicator Unit	CO2 equivalent
Definition	Greenhouse gas emissions (mainly CO2 emissions) from the operations of buildings.
Calculation	Base emission information can be derived through "Amount of fuel consumption per fuel type x GHG emission per fuel type". Calculation

	methodology has been described in detail in GHG Protocol for Cities (GPC) pages 60 – 73
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Stationary energy
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: Energy systems, built environment, action 1-12
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database.
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	Electricity use in housing, services, premises, and industry.
Indicator Unit	MWh
Definition	All electricity used in buildings.
Calculation	Amount of fuel consumption per fuel type.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: Energy systems, built environment, Action 9-11
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	

Expected data source	Statistics Sweden
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emissions from individual heating of homes and premises
Indicator Unit	t CO2 equivalent
Definition	GHG emissions from heating of homes and premises that are not heated by district heating.
Calculation	Amount of fuel consumption per fuel type x GHG emission per fuel type
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Stationary energy, scope 1
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: energy systems, built environment. Actions 10-11
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database.
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from on road transport
Indicator Unit	t CO2 equivalent

Definition	Greenhouse gas emissions from the operations of vehicles.
Calculation	Calculation formulae for Transport indicators can be found in the GHG Protocol for Cities (2020).
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Transport
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: Mobility and transport on road, action 13-30
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database.
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	

B-3.2: Indicator Metadata	
Indicator Name	Share of light vehicles in Helsingborg that are electric
Indicator Unit	Percent (%)
Definition	Share of light (<3.5 tons) vehicles in Helsingborg that are electric
Calculation	Number of electric light (< 3.5 tons) vehicles in Helsingborg divided by total number of light vehicles in Helsingborg
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes

If yes, which action and impact pathway is it relevant for?	Impact pathway: Mobility and transport, on road, actions 25-27,29-30
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Transport Analysis
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	Not that we know of

B-3.2: Indicator Metadata	
Indicator Name	Share of heavy vehicles in Helsingborg that are electric
Indicator Unit	procent
Definition	Share of heavy (> 3.5 tons) vehicles in Helsingborg that are electric
Calculation	Number of electric heavy vehicles in Helsingborg divided by total number of light vehicles in Helsingborg
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Mobility and transport, off road, action 24,26-30
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Transport Analysis
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	Not that we know of

B-3.2: Indicator Metadata	
Indicator Name	Modal share of green transport modes (walking, cycling, public transportation)
Indicator Unit	%
Definition	An increase in the shares of walking, biking and public transport indicates that the mobility behaviour of the local population has changed and that the preference for climate friendly mobility options has risen. The transport modes walking, biking and public transport are summarized as green transport modes because they cause no (walking and biking) greenhouse gas emissions, or at least significantly less (public transport) greenhouse gas emissions than the transport modes private motor cars or motorbikes. The indicator can be defined as the average number of trips per day that an inhabitant of the city does walking, biking or going by public transport, expressed as a %age of the average total number of trips per inhabitant and day.
Calculation	$MSgreen$ = ((Tw + Tb + $Ttrain$ + $Tbus$ + $Ttram$)/ $Ttotal$) x 100 $Where$: Tw = $Walking\ trips\ per\ capita\ and\ day$ Tb = $Bike\ trips\ per\ capita\ and\ day$
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Mobility and transport, on road. Actions: 13-17
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Region Skåne
Is the data source local or regional/national?	Regional
Expected availability	Open and free to all
Suggested collection interval	Updated every 5 years
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emissions from machines
Indicator Unit	ton CO2 equivalents
Definition	Greenhouse gas emissions from the operations of machines.
Calculation	Amount of fuel consumption per fuel type x GHG emission per fuel type.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Transport, off-road, machines
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Mobility and transport, off road, machines, Actions: 31-35
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Open and free to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from waste
Indicator Unit	t CO2 equivalent
Definition	Greenhouse gas emissions from waste treatment, waste incineration and landfills
Calculation	Quantity of waste per End-of-life (EoL) treatment type x emission factors per EoL treatment. Detailed methods for different waste types are defined under GPC, pages 89 - 107
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Waste

Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Waste and circular economy, Actions: 36-37
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from IPPU
Indicator Unit	t CO2 equivalent
Definition	Greenhouse gas emissions from industrial processes and product use within city boundary
Calculation	GHG emission calculation methodology for the IPPU sector is described in detail in the 2014 IPCC Mitigation of Climate Change, chapter 10, page 746. City-level calculation and scoping methodology described in GPC, pages 109 onward.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	IPPU
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Green Industry, Action: 38-39
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National

Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP.
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emissions from industrial processes within the city boundary
Indicator Unit	t CO2 equivalent
Definition	GHG emissions from industrial processes within the city boundary
Calculation	Amount of fuel consumption per fuel type x GHG emission per fuel type.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	IPPU, industry
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Green industry, Actions: 38-39
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emissions from non-energy product use
Indicator Unit	t CO2 equivalent
Definition	GHG emissions from non-energy product use

Calculation	Amount of fuel consumption per fuel type x GHG emission per fuel type.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	IPPU, product use
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Green Industry.
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from AFOLU
Indicator Unit	t CO2 equivalent
Definition	IPCC guidelines divides AFOLU emission activities into three categories: Livestock, Land, Aggregate sources and non-CO2 emissions sources on land. The cumulative of these emissions forms the sectoral emissions. It requires identifying which categories of the AFOLU sector are relevant for reporting purposes.
Calculation	Detailed calculation and scoping methodology described in GPC pages 121- 137.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	AFOLU
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes

If yes, which action and impact pathway is it relevant for?	Impact Pathways: Nature based solutions, Action: 40
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	Local RES energy production.
Indicator Unit	MWh
Definition	Annual local renewable energy production. It can be inferred that this indicator will prove useful for tracking the impact of the installation and operation of renewable energy projects over time. It will allow for the analysis of the before and after situation, as following the installation and operation of renewable energy projects (or as the difference between the annual renewable energy generation related to the project compared to the BAU case). It is possible to divide the annual total energy consumption compared to a previous baseline or inventory, and then multiply it by 100 to express the difference/result as a %age.
Calculation	Annual local renewable energy production is calculated by acquiring the total renewable energy generation within the city in a given year. Relevant unit conversions are 1 J = 1 Ws; 1 kWh= 3 600 000 J; and 1 TOE = 41.868 GJ, 11 630 kWh, or 11.63 MWh (ITU-T L.1430: 2013)
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Energy systems, Actions: 5-6, 38-39

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Local energy company Öresundskraft (solar, bioenergy), owners of wind farms,
Is the data source local or regional/national?	Local
Expected availability	Available through dialogue
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Included in one planet city challenge report
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	Local hydrogen production
Indicator Unit	MWh
Definition	Renewable production of hydrogen within the geographical area of Helsingborg.
Calculation	MWh hydrogen produced per year
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: green industry, actions 38-39
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	Municipally owned energy company (Öresundskraft)
Is the data source local or regional/national?	Local
Expected availability	Available through dialogue
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	GHG emission from grid supplied energy
Indicator Unit	t CO2 equivalent

Definition	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary
Calculation	Detailed calculation and scoping methodology described in GPC pages 56 – 75.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes
If yes, which emission source sectors does it measure?	Grid supplied energy
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Energy systems, Actions: 1-2
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	Yes
Data requirements	
Expected data source	Swedish national emission database
Is the data source local or regional/national?	National
Expected availability	Free and open to all
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	CDP

B-3.2: Indicator Metadata	
Indicator Name	Amount of permanent sequestration of GHG that originates from Helsingborg.
Indicator Unit	t CO2 equivalent
Definition	This indicator supports the reporting of carbon sequestration through “Technological sinks”, such as Biomass for Energy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS) technologies. This indicator can only be reported for Carbon Capture Project (CCP) applications which result in permanent sequestration of the CO2 (i.e., injected into geological structures)
Calculation	Direct reporting from Carbon Credit Projects (CCP) based on C40 guidance: C40 and NYC Mayor’s Office of Sustainability, Defining Carbon Neutrality for Cities and Managing Residual Emissions. Cities’ perspective, C40, 2019.
Indicator Context	

Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways according to Energy systems, Actions 1-2
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	Local energy company Öresundskraft
Is the data source local or regional/national?	Local
Expected availability	TBD
Suggested collection interval	TBD
References	
Deliverables describing the indicator	Not that we know of
Other indicator systems using this indicator	Not that we know of

B-3.2: Indicator Metadata	
Indicator Name	Negative emissions through natural sinks
Indicator Unit	t CO2 equivalent
Definition	“Natural sinks” refer to the planting of trees or other conversion of land use. Cities are allowed to account for negative emissions through the enlargement or enhancement of natural sinks within the territory to address residual emissions (accounting for all changes in the carbon stock). Carbon sinks should be accounted for as part of the ‘AFOLU’ sector of the GHG inventory and can be independently monitored as a progress indicator to show negative emissions.
Calculation	TBD
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathways: Nature based solutions, Actions 41-42

Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	TBD
Is the data source local or regional/national?	Local
Expected availability	TBD
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Not that we know of
Other indicator systems using this indicator	Not that we know of

B-3.2: Indicator Metadata	
Indicator Name	Hectares of land with changed agricultural practices.
Indicator Unit	hectares
Definition	hectares of land with changed agricultural practices with potential to reduce the emissions of greenhouse gases from agricultural land.
Calculation	Hectares of land with changed agricultural practices.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	No
If yes, which co-benefit does it measure?	Not applicable
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact pathway: nature-based solutions, action 40
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	No
Data requirements	
Expected data source	Farmers in Helsingborg
Is the data source local or regional/national?	Local
Expected availability	Available through dialogue with farmers
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Will be included in follow up of Helsingborg SECAP
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	Yearly mean PM2,5, placed in traffic environment

Indicator Unit	µg/m3
Definition	This indicator corresponds to the highest annual mean of PM2.5 concentration recorded in traffic location.
Calculation	Based on measurements made in urban and suburban background locations established for this purpose.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Nno
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Air pollution
Is the indicator useful for monitoring the output/impact of action(s)?	No
If yes, which action and impact pathway is it relevant for?	Not applicable
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	Measurements by Environmental Department, City of Helsingborg
Is the data source local or regional/national?	Local
Expected availability	Available from yearly report
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	annual report, air measurements in Helsingborg. Baseline report green city accord
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	PM 10 concentration level. Number of days per year that exceed the daily average value of 45 micrograms per cubic meter
Indicator Unit	µg/m3
Definition	This indicator corresponds to the highest number of days in a year where the PM10 concentration level recorded at stations in urban and suburban background locations has exceeded the WHO recommendation of 45 µg/ m3. It refers to the number of days on the monitoring station that measured the most days in excess of the WHO recommendation of 45 µg/m³.
Calculation	This air quality management indicator corresponds to the highest number of days in a year where the PM10 concentration level recorded at stations in urban and suburban

	background locations has exceeded the WHO recommendation of 45 µg/ m3. It refers to the number of days on the monitoring station that measured the most days in exceedance of the WHO recommendation of 45 µg/m³.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Air pollution
Is the indicator useful for monitoring the output/impact of action(s)?	No
If yes, which action and impact pathway is it relevant for?	Not applicable
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	Based on measurements by Environmental Department, City of Helsingborg.
Is the data source local or regional/national?	Local
Expected availability	Available through yearly report
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Annual report, air measurements in Helsingborg. Baseline report green city accord
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	NO2 concentration level
Indicator Unit	µg/m3
Definition	This indicator corresponds to the highest value of the annual mean of nitrogen dioxide (NO2) concentrations recorded in a particular year at stations with the highest traffic location levels.
Calculation	This indicator corresponds to the highest value of the annual mean of nitrogen dioxide (NO2) concentrations recorded in a particular year at stations with the highest traffic locations. Data can be obtained: - From air quality monitoring reports in different stations on a municipal and regional level; and - Based on measurements made in urban and suburban background locations established for this purpose.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No

If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Air pollution
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Actions: 13-35, 38-39
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	Based on measurements by environmental department, city of Helsingborg.
Is the data source local or regional/national?	Local
Expected availability	Available through yearly report
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Annual report, air measurements in Helsingborg. Baseline report green city accord
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	Population exposed to night-time noise
Indicator Unit	%
Definition	The indicator 'Population exposed to night-time noise (Lnight) ≥ 55 dB refers to an annual average period of exposure to noise at night.
Calculation	(no. inhabitants exposed to noise > 50 db (A) / Total number of inhabitants) x 100 = % population affected by noise.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	NNo
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Noise
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Actions: 13-30
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	City of Helsingborg
Is the data source local or regional/national?	Local
Expected availability	TBD

Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Action program for road traffic noise and sound environment in the city of Helsingborg 2024–2028. Baseline report Green City Accord.
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	Population exposed to avg. LDEN ≥ 55dB (%)
Indicator Unit	%
Definition	The indicator 'Population exposed to average day-evening-night noise levels (Lden) ≥ 55 dB' represents the average noise level to which a citizen is exposed throughout the day, evening, and night over the period of one year.
Calculation	Lden= 10log10 1/24 (12 × 10Lday/10 + 4 × 10Levening+5/10 + 8 × 10 Lnight+10/10)
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Noise
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Actions:13-35
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	City of Helsingborg
Is the data source local or regional/national?	Local
Expected availability	Available through yearly report
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Action program for road traffic noise and sound environment in the city of Helsingborg 2024–2028. Baseline report Green City Accord.
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	Restored natural land since 2022
Indicator Unit	km2

Definition	The total area of protected natural areas and restored and naturalised areas in the city.
Calculation	Total area of natural, restored, and naturalised land.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Restored natural land
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathway: Nature based solution, action 42
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	City of Helsingborg
Is the data source local or regional/national?	Local
Expected availability	Available through yearly report
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Baseline report Green City Accord
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	New parks and green areas since 2022
Indicator Unit	km2
Definition	Area of new parks and green areas since 2022.
Calculation	Total area of new parks and green areas
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	New parks and green areas
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathway: Nature based solution, Actions 42
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data	City of Helsingborg

source	
Is the data source local or regional/national?	Local
Expected availability	TBD
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Baseline report Green City Accord
Other indicator systems using this indicator	TBD

B-3.2: Indicator Metadata	
Indicator Name	Protected nature
Indicator Unit	km2
Definition	Total area of protected nature
Calculation	Total area of protected nature
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	No
If yes, which emission source sectors does it measure?	Not applicable
Does the indicator measure indirect impacts (i.e., co- benefits)?	Yes
If yes, which co-benefit does it measure?	Protected nature
Is the indicator useful for monitoring the output/impact of action(s)?	Yes
If yes, which action and impact pathway is it relevant for?	Impact Pathway: Nature based solution, Action 42.
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	TBD
Data requirements	
Expected data source	City of Helsingborg
Is the data source local or regional/national?	Local
Expected availability	TBD
Suggested collection interval	Yearly
References	
Deliverables describing the indicator	Baseline report Green City Accord
Other indicator systems using this indicator	TBD

4 Part C – Enabling Climate Neutrality by 2030

Part C "Enabling Climate Neutrality by 2030" aims to outline any enabling interventions, i.e., regarding organizational setting or collaborative governance models or related to social innovations – designed to support the climate action portfolios (Module B-2) as well as aiming to achieve co-benefits outlined in the impact pathway (Module B-1). These interventions also address the identified opportunities, gaps and barriers identified Module A-2 and A-3.

4.1 Module C-1 Governance Innovation Interventions

This module details the city´s governance innovations for achieving city climate neutrality by 2030, describing innovations in institutional design, in leadership, and in collaborative and outreach processes, whether they are inter-organisational or internal to the key organisations responsible for the city´s climate neutrality target. It also describes expected outcomes, for example how these governance innovations enable climate actions and their co-benefits (outlined in Modules B-1 and B-2), and how they address the opportunities, gaps and barriers identified in Modules A-2 and A-3. This content aims to include:

- Descriptions or/and visualisations of a participatory / collaborative governance model to facilitate the city´s climate neutrality target, including institutional design (horizontal links among city institutions, vertical links to other levels of government, roles, responsibilities, ground rules, processes). Building on the systems and stakeholder mapping in module A-3, it highlights the relations and processes established or planned to facilitate joint climate action among stakeholders and systems at relevant levels (e.g., showcasing new organisations, partnerships, alliances, networks, or processes), as well as mechanisms of citizen involvement.
- Descriptions of how the governance innovations introduced or planned to reach climate neutrality address some (or all) systemic barriers and opportunities (Module A-3) and contribute to NZC impact pathways (Module B-1), e.g., through improving organisational settings and interorganisational models – horizontally within municipal administration and across local stakeholders in the city ecosystem, as well as vertically at regional and national levels.

C-1.1: Description or visualisation of the participatory governance model for climate neutrality

New approach to governance

Helsingborg is mobilising its resources to drive the climate transition across the municipal organisation, its publicly owned companies and in wider partnerships. The city is establishing a central Transition Team to lead and co-ordinate the transition work, which is organised into thematic areas, each with its own multi-stakeholder working group. The municipality has recently launched an Innovation and Transformation department with an innovation fund and testbed system to support innovation towards climate neutrality. The climate transition is also a focus area for some of the community engagement and environmental education work being carried out by the city. These internal resources are complimented by the Open Academy regional learning arena which is an important resource for shared knowledge development and co-operation with the other Net Zero Cities in the region.

The policy framework for the governance programme is already in place and the Climate City Contract provides a strategic framework for the delivery stage and is helping to structure the action planning, financial strategy, and investment planning for implementation.

Cross-sectoral transition arena

The cross-sectoral transition arena forms the basis for Helsingborg's participatory governance for climate neutrality. At the core of this approach is the establishment of a streamlined and coordinated process that will mobilise climate actions across sectors in Helsingborg with the city group (city and city-owned companies) as the key force. A critical aspect of this model is the emphasis on engagement and collaboration. Recognising that climate actions require collective effort, the city is dedicated to building strong and enduring partnerships with a wide array of stakeholders, including public and private sector actors, civil society, and academia. These collaborations are about fostering deep, collective understanding, and broad participation in Helsingborg's transition towards a sustainable future, where every sector of society plays its role.

The transition arena is designed to provide Helsingborg's climate work with a clear and coherent framework. It combines effective coordination, strong partnerships, and a commitment to innovation and education, while ensuring that efforts are continuously monitored and adjusted to achieve the city's ambitious climate goals. This comprehensive approach will help generate the momentum needed to drive the city's climate agenda forward, ensuring a sustainable and resilient future for all its residents.

Figure 6: *Helsingborg's transition arena*

Transition Team and Working Groups

The climate transition is a joint commitment and responsibility based on decisions by the municipal council, and actions are implemented by the city group with the support of regulations and ownership directives. In line with Helsingborg's new SECAP and several other policy documents that indicate city-wide directions and objectives, a new organisational structure has been introduced in 2024. It consists of two main components: a central Transition Team and different working groups focused on specific emission sectors.

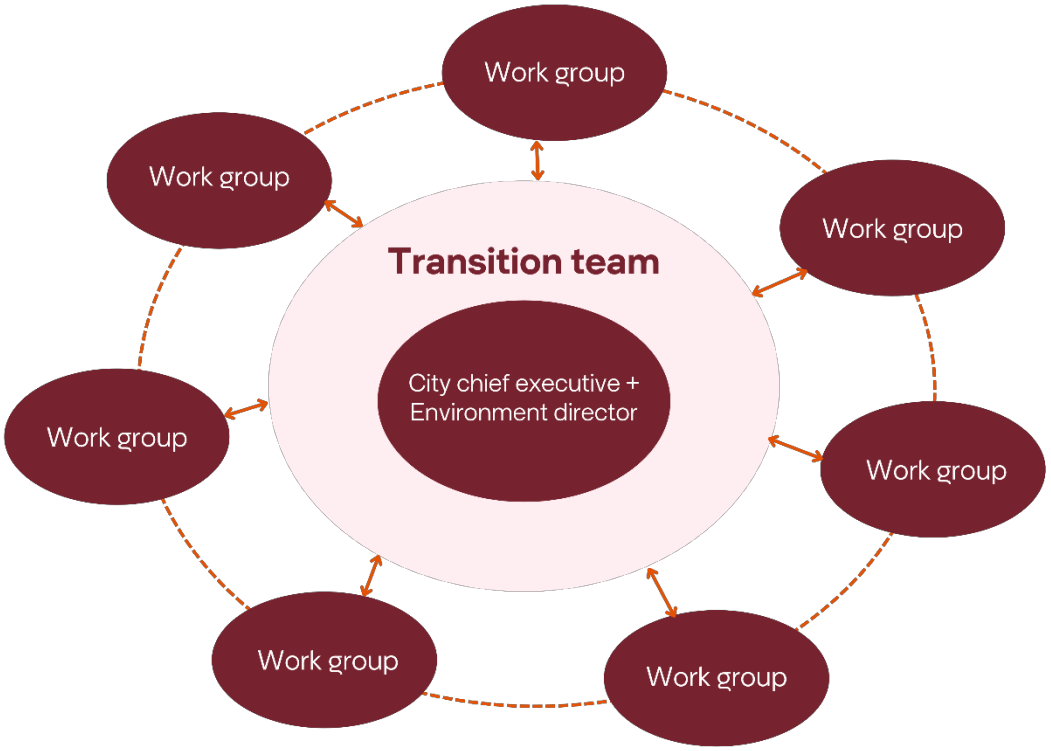

Figure 7: *Transition team and working groups*

The Transition Team

The central Transition Team will be established in the autumn of 2024 to ensure progress and coordination of climate action with the comprehensive responsibility for driving and monitoring climate actions city-wide through;

- **Co-ordination and Planning:** The team will coordinate efforts and plan actions across the city, focusing on optimising and aligning with parallel processes to address impact pathways and systemic barriers.

- **Monitoring and Problem-solving:** By identifying areas where progress is stalled or where goal conflicts arise, the team will support coordinators and project leaders in overcoming these obstacles.

- **Compilation of Plans:** The team is responsible for compiling city-wide documents, such as roadmaps and climate investment plans, as well as for updating Helsingborg's Climate Contract 2030 (a national contract with Viable Cities and Swedish authorities), and the Climate City Contract.

- **Financing the transition:** The team will support the allocation of financial resources for the climate transition and liaise with the finance team regarding the wider investment portfolio. The city plans to stimulate green investments by developing economic incentives that encourage businesses and individuals to adopt more sustainable practices.

- **Reporting to Management Board**: The transition team reports on progress in the transition process to the management board, led by the Environment Director. Regular reports are also made to

political committees by the various technical departments, company boards and the overall political leadership of the council.

Working Groups for Emission Sectors

The work to reduce emissions will be driven by dedicated working groups, each focusing on a specific emission sector. These working groups are made up of civil servants from the city's administrations and municipal companies, such as the housing company Helsingborgshem, the waste collection company Nordvästra Skånes Renhållning AB, and the energy company Öresundskraft. These working groups are tasked to develop roadmaps that clearly define the actions and initiatives required to reduce emissions within each sector.

Division for Innovation and Transformation

Over the past three years, the City of Helsingborg has placed particular emphasis on reinforcing the culture, structure, and capacity for innovation. The city aims its innovation work at 15 shared challenges, with a view to creating a smarter, more sustainable, and more inclusive Helsingborg. The four challenges most directly linked to the city's climate actions are:

- Reducing the city's carbon footprint and promoting transition to a circular society.
- Capitalising on business interests in the green transition.
- Engaging and involving citizens in the creation of a more sustainable city.
- Utilising data to improve services and quality of life.

The newly established Division for Innovation and Transformation has climate neutrality by 2030 as one of its key focuses and is tasked to support all city administrations and municipal companies.

Examples of department's functions are:

- Methodology, process management and evaluation
- Portfolio management support for administrations
- Support for priority initiatives and scaling up
- Coordination of strategic networks and innovation programmes (regional/national/European)
- Funding
- Collaboration with research
- Testbed co-ordination

The department is located in the Helsingborg Innovation District (HEIDI), an innovation hub launched in November 2023 jointly by Campus Helsingborg/Lund University, Region Skåne and the City of Helsingborg. This strategic location means easy contacts between the city and a large community of students and companies that work on smart solutions and collaborations on a daily basis. The ambition is to create long-term capacity for innovation and transformation so that the Helsingborg group can lead, support, and drive the transition process.

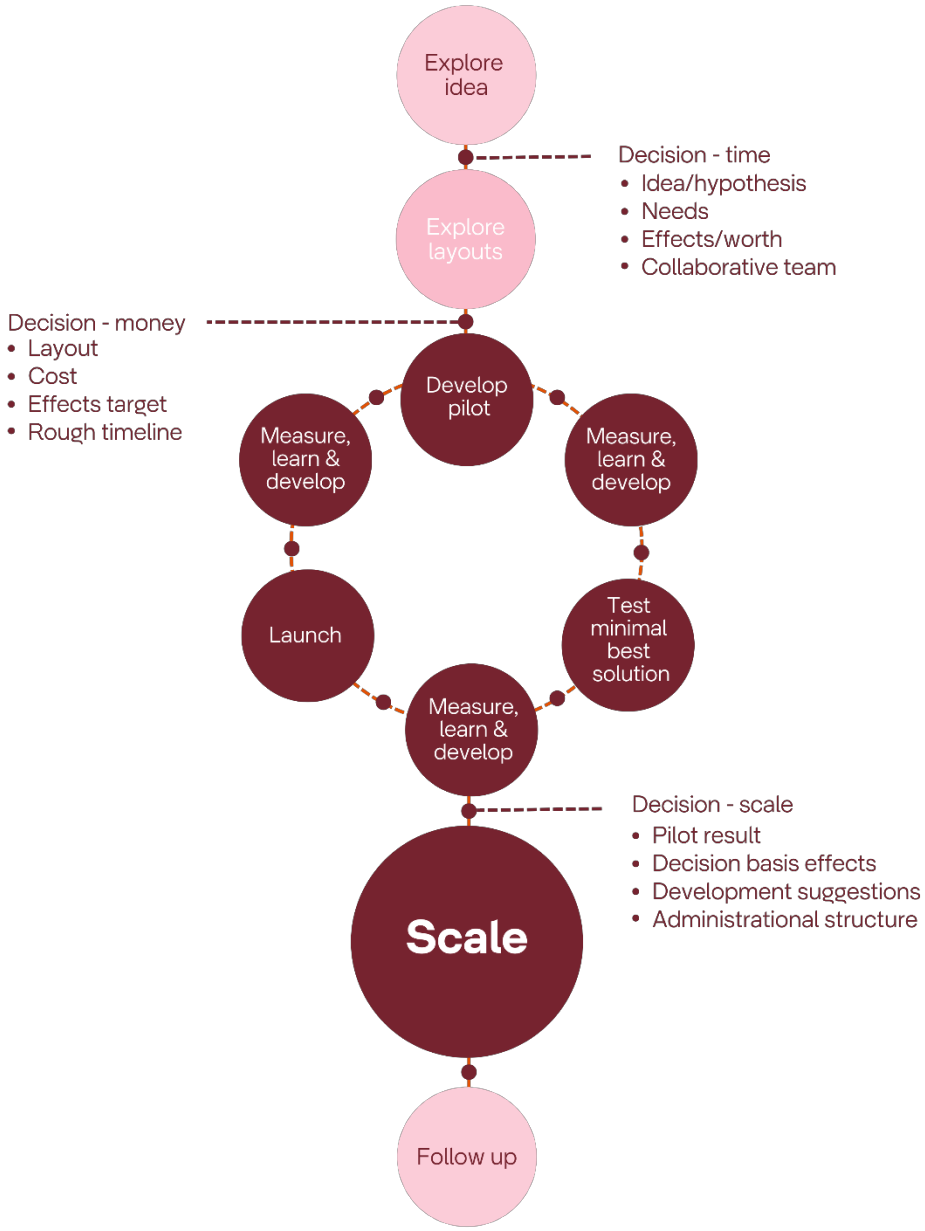

Figure 8: *Innovation model*

Innovation Fund

In 2023 the City of Helsingborg implemented a central innovation fund to address larger projects that include at least two city agencies with weight placed on projects that include quadruple helix stakeholders.

Testbed ecosystem

Under the testbed ecosystem umbrella, the city offers both physical and virtual innovation environments where companies, academia and other organisations can collaborate in developing, testing, and introducing new products, services, processes, or organisational solutions. Helsingborg's testbed ecosystem includes both more technically oriented test beds as well as flexible and user-friendly test environments such as living labs. While each individual environment offers a unique opportunity for collaboration, together they also complement each other.

Here one will find testbeds that offer controlled and often high-tech environments with access to both equipment and basic data. Our RECO concept focuses on innovation and development for the circular transition with resources and expertise in water, waste, and energy. Helsingborg also hosts Sweden's first testbed for municipal data - AI Sweden's National City Lab. Living labs and more open innovation arenas are run within various projects. The city development area Oceanhamnen is a living lab for wastewater recycling within the RECO concept. In addition, work is underway to explore opportunities to establish more permanent living lab operations more notably within health care and culture.

The “city as testbed ambition” is realised by close collaboration with researchers, practitioners, and business actors. In 2024 a network for the city’s testbeds, living labs and urban transition labs was launched to support and facilitate not only knowledge transfer and synergetic effects but also to strengthen the systematic approach by aligning processes and methodological approaches. In this, we focus on context and capability alike – knowing that the city’s testbed capacity is greater than the sum of each individual testbed.

The testbed ecosystem is co-ordinated by a dedicated member of the Department for Innovation and Transformation, ensuring alignment with the city’s broader climate neutrality goals. As the city works towards net zero, many of the required actions will likely be trialled within the testbed ecosystem before being scaled up. This allows for controlled testing and refinement, minimising risks and maximising the effectiveness of the solutions.

Actions and projects identified by workgroups are discussed with the testbed co-ordinator to determine where the testbeds can provide the most value. This collaborative approach helps identify the best testing environments for each initiative, ensuring that innovations are thoroughly evaluated and optimised before broader implementation.

Regional Cooperation and Learning

A regional Learning Hub for "facilitated action learning" is being established jointly by Helsingborg, Malmö, and Lund. Its aim is to support the development of transformative capacity and accelerating the progress of the transition work. Lund University is coordinating the establishment, facilitation, and development of the hub. This regional effort facilitates knowledge-based and practice-oriented exchange of experiences for learning within and between the cities. The work in the hub is grounded in theories of learning pedagogy (Conway, 2023), with iterative efforts aimed at building knowledge, exchanging experiences, and promoting peer learning for reflective learning. The hub is expected to play a central role in achieving progress in key areas of climate transition, and modules will be developed to support the development of, for example, gap analyses, portfolio and design management, reflexive monitoring and learning, directionality and roadmaps, multi-level governance, structures, functions, and processes for closer collaboration with external actors. The choice of themes for the hub’s focus will be made continuously in collaboration between the parties. Members of the Transition Team and co-ordinator of emission groups will participate in the learning hub.

Tailored Stakeholder Engagement

The transition to climate neutrality necessitates a highly coordinated effort across multiple sectors, each with unique stakeholder landscapes and challenges. Effective stakeholder engagement, therefore, cannot adopt a one-size-fits-all approach but must be tailored to the specific needs and dynamics of each sector involved.

In the industrial sector, the focus on transitioning from natural gas to green hydrogen involves a smaller, more specialised group of stakeholders, including large corporations, energy suppliers, and regulatory bodies. Although fewer in number, these stakeholders bring technical complexities that require in-depth

expertise and long-term strategic planning. Engagement here can be more focused and targeted, allowing for detailed discussions, but demands significant technical knowledge and alignment on future visions.

Conversely, the mobility sector presents a much broader and more intricate stakeholder landscape. Achieving climate-neutral transport solutions involves a wide range of actors, from local citizens and businesses to national governments, car manufacturers, and public transport providers. This sector also requires mass behavioural change, significant infrastructure investments, and regulatory coordination at multiple levels of governance. The diversity of stakeholders and the scale of required transformations amplify the complexity of engagement efforts. Here, the city must adopt inclusive, broad-based strategies that foster collaboration across all layers of society and governance.

Acknowledging these distinct dynamics is essential for managing an effective climate transition. The city's approach must be carefully adapted to each sector's specific needs—focusing on precise, technical engagement for specialised industries like energy, while promoting widespread, inclusive participation where public involvement is critical, as seen in transport and mobility. Balancing these different levels of complexity will be crucial to achieving a successful and timely transition to climate neutrality.

To meet the ambitious goal of climate neutrality by 2030, the city will integrate governance innovations that encourage systems thinking and drive impactful change. A key component of this strategy is the formation of a transition team, set to become operational by autumn 2024. This team will play a pivotal role in ensuring horizontal learning across sectors, breaking down silos, and fostering a collaborative, cross-sectoral approach to climate action. By promoting interconnected efforts, the city can maximise synergies, address barriers more holistically, and unlock new opportunities for climate solutions.

At the heart of this strategy is the City of Helsingborg's role as an enabler. The city must provide the frameworks, resources, and platforms that empower all stakeholders—whether public, private, or from civil society—to actively contribute to the climate transition. This enabling role will underpin the entire process, ensuring that governance innovations are translated into tangible, impactful climate actions that drive the city towards its 2030 climate goals.

Citizen involvement to building a shared understanding

Citizen involvement is a crucial factor in innovation and collaboration, as it brings a diversity of perspectives, creates relevant solutions, increases public support and acceptance, considers the local context, contributes to long-term sustainability, and promotes democratic participation. In recent years, the city has brought together methods for citizen dialogue and service design under the broader concept of "involvement." This approach aims to work more deeply with development and innovation projects together with those we serve, both by listening and by developing and testing solutions to challenges.

Helsingborg’s work with community engagement has been developing over recent years. The municipality has worked with leading researchers from the universities of Lund and Linköping and citizens to develop capacity and approaches to meaningful participation. Some of these methods and approaches were tested and developed in conjunction with the H22 sustainable urban development expo in the city. The city also launched its digital dialogue platform in 2021. Together these elements form a strong foundation for a deeper level of community engagement moving into the future in development work in general across the city, but also for the climate transition. As part of the action planning process in the CCC, more detailed community engagement strategies are being developed to drive change in mobility management. This can

range from co-design processes to understand and address barriers to active mobility as well as collaborative communications to design to maximise impact.

Habiteum

The Division of Environmental Education and Behavioural Influence runs Habiteum, Helsingborg's workshop for quality of life, where the city's administrations and companies, citizens, associations, and businesses co-create for better environmental and public health. In 2024, the division has been tasked with conducting 25 dialogues with Helsingborg's citizens to listen and understand how the residents view the measures and proposals in the new SECAP. The project's implementation gives us the opportunity to genuinely include more people in identifying challenges and finding solutions to address them.

By actively promoting participation, citizens' opportunities for shared ownership of Helsingborg's development are increased. The aim is to create processes for citizen involvement that are built-in, repetitive, and in-depth, to build long-term trust and well-grounded results. By actively involving citizens in the city group's climate actions, strong trust is created, thresholds for co-determination are lowered, and feelings of powerlessness are countered by attributing trust and influence to citizens.

With our climate dialogue sessions, we want to explore how we can democratise the climate transition work in Helsingborg. Ultimately, it is about empowering citizens in the face of the significant climate challenge. The project aims to develop skills, working methods, and routines for citizen involvement as a regular feature of climate work. For many years, behavioural influence has been about the city informing, inspiring, supporting, educating, and training target groups to adopt new desired behaviours. These areas will, of course, continue to be important in the future, but how can we broaden to a more inclusive approach where we systematically use citizens as a resource to understand needs, analyse the current situation, generate ideas, and test solutions? After the project concludes, the goal is to have a long-term strategic plan for how we work with citizens in the city's efforts for climate transition, and to explore how citizen assemblies and the NetZeroCities framework ''city as a commons'' can be effective tools for participatory governance in Helsingborg's specific context.

As the City of Helsingborg continues to strengthen citizen involvement, children and youth have been identified as a key demographic group. See more in the following chapter on social innovation interventions.

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways				
Systemic barriers / opportunities addressed	**Intervention name**	**Description**	**Leadership and stakeholders involved**	**Co-benefits**
(Refer to barriers and opportunities identified in Module A-3)	(Indicate name of intervention)	(Describe the substance of the intervention)	(List leaders and all stakeholder involved and affected, referring to the stakeholders mapped in Module A3)	(Indicate how intervention helps achieve the impact listed in Module B-1)

Technological and infrastructure	The Helsingborg Declaration	An initiative where the city works together with stakeholders from the entire logistics chain to develop the Helsingborg region into Europe's most sustainable and fast-moving logistics hub. Initiated 2022, ongoing until further notice.	City Management Department, Enterprise and Destination Development Division, Companies within transport and logistics operating in Helsingborg	Cleaner air, new collaborations and innovations, Increased awareness of climate goals, Reduced energy use, Reduced costs, Reduced resource use
	The Helsingborg Climate Agreement	Climate Agreement for local businesses and associations, supporting the goal of a climate neutral Helsingborg 2030 by actively reducing emissions. Initiated 2021, ongoing until further notice.	Environment department, Local businesses, and associations	
	Energy and climate advisory service	Helsingborg's energy and climate advisors offer residents individual advice for reduced energy use. Made possible by funding from the Swedish Energy Agency, ongoing until further notice	Residents	
	Environmental control	Through environmental control and inspections, the city can detect deviations and thereby implement measures that are important for the	Environment Department, local businesses such as industries with a large proportion of emissions	

		environment and human health. Required by Swedish law.		
Regulatory and Political Systems	The Committee for Quality of Life	The committee is responsible for monitoring issues stated in the Quality of Life programme, such as environment and climate, public health and equal opportunities. Initiated 2018, ongoing until further notice.	Local politicians, City Management Department, Environment Department	New collaborations, Strengthened relationships
	Policy Lab	Together with representatives from 23 Swedish municipalities, Viable Cities and National Agencies Helsingborg is participating in different policy labs, examining how to design policy instruments favouring climate-neutral, inclusive and health promoting mobility, land use, energy sharing, circular resource and material flows. Initiated 2022, ongoing until further notice.	Environment Department, Urban Planning and Technical Services Department, City Management Department, Öresundskraft, Viable Cities, Vinnova, Formas, Energimyndigheten, Trafikverket, Tillväxtverket, Naturvårdsverket	
	Trend analysis and benchmarking	Yearly analysis designed to provide an in-depth picture of global and local trends effecting the city's work. Initiated 2012, ongoing until further notice.	All departments within the City of Helsingborg	

Financial Systems	Policy Lab	Together with representatives from 23 Swedish municipalities, Viable Cities and National Agencies Helsingborg is participating in different policy labs, examining how to design policy instruments favouring climate-neutral, inclusive and health promoting mobility, land use, energy sharing, circular resource and material flows. Initiated 2022, ongoing until further notice.	Environment Department, Urban Planning and Technical Services Department, City Management Department, Öresundskraft, Viable Cities, Vinnova, Formas, Energimyndigheten, Trafikverket, Tillväxtverket, Naturvårdsverket	Lowering barriers for marginalised groups to access funding
	Roadmaps for climate neutrality	Developing methods to identify feasible measures for reduced emissions within each emission sector, accompanied by estimated costs and investments. Initiated 2023, currently planned to run until 2027.	City Management Department, Environment Department, ClimateView	
	Sustainable linked bonds	In 2023, Helsingborg launched another unique sustainable investment framework, with the option to issue both green and social bonds, either separately or together as a	City Management	

		sustainable bond. The framework is based on Green bond and Social bond principles and enables financing of projects within most of the city's emission categories. Initiated 2021, ongoing until further notice.		
	Network for International Cooperation	Monitoring international collaborations, projects and calls that can accelerate the city's work in various ways. Initiated 2014, ongoing until further notice.	All departments and municipal companies within the City of Helsingborg	
	The Climate Fund	Residents of and over 18 years of age and non-profit associations based in Helsingborg can receive up to 100 000 SEK for projects contributing to reduced emissions in Helsingborg or strengthening the involvement of civil society in climate neutrality work. Initiated 2023, ongoing until further notice.	Environment Department	
	The Vision Fund	Residents of and over 18 years of can receive up to 100 000 SEK for projects contributing to the city's vision of Helsingborg 2035. Projects	City Management Department	

		are assessed based on the potential benefit to society. Initiated 2014, ongoing until further notice.		
Social and Behavioural Systems	Habiteum, the Environmental Workshop	At Habiteum, Helsingborg's workshop for quality of life, the city's administrations and companies, residents, associations, and businesses co-create for a healthy environment and a future with low emissions. Initiated 1989, ongoing until further notice.	Environment Department	Increased public health
	Behavioural campaigns and nudging	The division for environmental education and behavioural influence carries out several different projects and campaigns to inform residents about the city's climate work. By using nudging as a tool, we want to encourage climate-smart habits. Initiated 1989, ongoing until further notice.	Environment Department	
	Climate dialogues	Climate dialogues with different groups of residents to get a better understanding of Helsingborg's residents need in order to contribute to climate-	Environment Department, City Management Department	

		neutrality. Initiated 2023, ongoing until 2025.		
	The Climate Fund	Residents of and over18 years of age and non-profit associations based in Helsingborg can receive up to 100 000 SEK for projects contributing to reduced emissions in Helsingborg or strengthening the involvement of civil society in climate neutrality work. Initiated 2023, ongoing until further notice.	Environment Department	
	The Vision Fund	Residents of and over 18 years of can receive up to 100 000 SEK for projects contributing to the city's vision of Helsingborg 2035. Projects are assessed based on the potential benefit to society. Initiated 2014, ongoing until further notice.	City Management Department	

4.2 Module C-2 Social Innovation Interventions

This module lists the actions taken by the city to support and foster social innovation initiatives or non-technological innovation more broadly (e.g., in entrepreneurship, social economy, social awareness & mobilization, social cohesion and solidarity, etc) aimed to address the systemic barriers and leverage the opportunities identified in Module A-3[3]. It also includes:

- A description of the innovations (what do they innovate?).

[3] For more guidance on social innovation, please refer to the NetZeroCities Quick Read on Social Innovation,to the NetZeroCities Report on indicators & assessment methods for social innovation action plans and the Social Innovation Toolkit. Social innovation case studies are also available on the NetZeroCities website.

- Systemic barriers /opportunities addressed by these innovations (from Module A-3).
- Stakeholders involved in the innovation.
- Additional enabling levers (e.g., technical, policy/ regulatory, democracy/ participatory, fiscal/ financial; learning and capabilities, behaviour change).
- Foreseen impact on climate neutrality and co-benefits.

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership and stakeholders involved	Enabling impact	Co-benefits
Visualised climate data in our classrooms	Testing sensors that measure climate influencing factors and then visualise them on a dashboard that can be used in. teaching	Citizen acceptance, Behavioural	School and leisure administration /City management department Students and teachers at Västra Ramlösa and Gläntanskolan	Facilitate teaching about how climate works, and make something concrete out of an otherwise abstract issue.	Build awareness
The environmental workshop	Environmental program for all students in Helsingborg about sustainable mobility, “reduce, reuse, recycle”, and sustainable energy solutions.	Citizen acceptance, Behavioural	The environmental department City-owned corporations Öresundkraft (energy) and NSR (waste).	School children learn how to travel safely to school by bicycle and how to save resources.	Build awareness, build bicycle culture

Circular economy with new outdoor recycling	Outdoor recycling is a place where materials that would otherwise have been thrown away now instead become new resources for schools	Citizen acceptance, Behavioural	School and recreation services department Schools in Helsingborg	50% of the city's schools and preschools have picked up materials the outdoor recycling centre	Save resources
Haffa	Concept and digital platform to share gadgets and resources, reuse furniture and products instead of buying new	Behavioural	Several departments within the city	Reduced climate footprint through increased sharing of internal resources	Save resources
City maps for more families on the move	Produce maps in Geego's app that inspire joint walks in the urban environment. In the walking loops, playful movement tips will appear for the younger members of the family and training exercises for adults.	Citizen acceptance, Behavioural	School and recreation services department, Residents	Leisure activity with a low climate footprint that does not depend on car travel. Increased physical movement for children.	Facilitate for a sustainable lifestyle

Climate Dialogues	Testing different tools and methods for carrying out productive community dialogues so that the city and residents can together reflect on challenges and needs connected to behavioral change necessary for climate neutrality.	Citicen acceptance, Behavioural	Environment department The division for environmental education and behavioral influence, City management department, residents	Increased understanding among residents of the city's climate neutrality goals	Increased understanding of residents' views and thoughts about the city's climate work
The Storm in the Calm Neighbourhoods: Sustainable Mobility in the Future	City residents, public servants and politicians lack a common vision about what sustainable mobility in Helsingborg can look like, and therefore lack alignment on possibilities for common goals to work towards.	Citizen acceptance, Infrastructural, Regulatory	City Management Department, Urban Planning and Technical Services Department, Environment Department, Planethon, Residents	Strategic foresight and future prototyping challenge assumptions, explore solutions and facilitate group dialogues with city residents and target groups	Increased public health

The Climate Fund	City residents and smaller non-profits can pitch ideas and test plans for how to address climate change. Ideas are evaluated against specific criteria and include a diversity of solutions. Residents with winning ideas are awarded up to 9 000 euros to test and implement their ideas.	Financial, Innovation	Environment Department, Residents		New solutions and innovations aligning with the climate goals
A Sustainable Tomorrow – Conference for children and teenagers	The first youth conference where 150 young people from different schools meet. The students listen to selected speakers and get involved in various activities to forge new relationships and joint action for the climate goals.	Citizen acceptance, Behavioural	A Sustainable Tomorrow, City Management Department, School and Recreation Services Department, Environment Department, school students	Relationship building and collaborative work	New solutions and innovations

NEEDS Repowered, Case 6	Case study focusing on the interaction between energy technologies, citizen engagement, business and ownership models, and strategies and plans for sustainable behaviour. Focus on shared local energy solutions in Oceanhamnen, e.g. through shared mobility	Behavioural, Infrastructure	Öresundskraft, HubPark, City Management Department, RISE	Lower energy consumption	Reduced costs for households
Miljövärdar (Environmental wardens)	Environmental wardens help residents in various areas with proper waste sorting. Their presence also contributes to increased well-being and safety.	Behavioural	Helsingborgshem, Labour Market Department	Less waste	Community

C-2.2: Description of social innovation interventions

The City of Helsingborg has identified three transformations that are at the centre of a changing world: the green, the social and the technological. These transformations are a common framework and strategy to reach vision Helsingborg 2035. The aim is to strengthen the organisation's power and ability to make a difference through new collaborations, smarter working methods, and common focus.

Our mission as an organisation is to make society better. Our ability to *do* difference is fundamentally what social transformation is all about. If we are to succeed, we need to address the fundamental causes of society's challenges and create power for real change. Participation, inclusion, individual and joint responsibility are prerequisites for social transformation. A change that also requires us to see ourselves as enabler of the power and knowledge found in others. The transformations are closely connected, enabling each other.

Figure 9: *Vision Helsingborg 2035*

The program is aimed at the entire Helsingborg group but is above all a guide for the city's strategists who work with various sustainability issues. The social transformation, together with the Quality-of-Life program functions as an overall umbrella in the city's work with social innovation. Together they aim to overcome systemic barriers, while lowering barriers for marginalised groups to participate in the city's climate action work.

Social innovation interventions

Behavioural barriers such as putting plastic in residual waste and using the car too much can be partly changed by technical or regulatory solutions, but the city will have much bigger success when the will to change comes from the citizens.

Helsingborg's citizens are worried about threats to life that come with the climate crisis. Because of their concern they are also willing to make necessary changes happen – as a survey showed the citizens are willing to pay more taxes to facilitate measures. Social innovation is an important pathway to nurture strong wills among citizens to contribute to climate neutrality through entrepreneurial endeavours and/or individual actions.

As of now the City of Helsingborg does not have a road map or blueprint specifically for social innovation interventions with a focus on the climate transition, but Vision Helsingborg 2035 and the Quality-of-Life Program provide solid foundation for the next steps. Social transformation is one of the three pillars of Vision Helsingborg 2035. Participation, inclusion, individual and joint responsibility are prerequisites for social transformation, a change that also requires us to see ourselves as enabler of the power and knowledge found in others.

The Quality-of-Life programme establishes that the city's ambition for sustainable development is for all residents to experience a high quality of life, but with a low environmental impact so that people and businesses reach their full potential in long-term sustainable growth, and so that future generations can also experience a good quality of life. The social transformation, together with the Quality-of-Life program functions as an overall umbrella in the city's work with social innovation. Together they aim to overcome systemic barriers, while lowering barriers for marginalised groups to participate in the city's climate action work.

With this policy framework in place and a clear understanding of the transition challenges ahead, not least those requiring behavioural change, the Climate Transition Team will be designing a public engagement and social innovation framework to guide the development of user-friendly solutions. The recently formed Division for Innovation and Transformation will be an important partner in systems design and the development of innovative approaches and solutions. Understanding the challenges of users, citizens and businesses and engaging them in identifying solutions can be key to the success of measures around sustainable consumption, mobility choices or circularity. Strong stakeholder engagement can also support co-benefit development.

As shown in Table C- 2.1 there are many projects and processes with strong social innovation characteristics that have been/are being implemented. Many of them have children and young people as focus. These forward-looking interventions aim to educate, engage, and empower Helsingborg's citizens from a young age. As the city continues to strengthen its portfolio of social innovation interventions it takes inspiration from initiatives such as H22, a major investment in innovation. Earmarked resources used for innovation transformed Helsingborg into a citywide testbed for developing sustainable solutions. By seeking out new and unexpected partnerships – local, national, and global – the city collaborated with residents, businesses, and academia to position Helsingborg as a forerunner in green solutions. As proof of progress, Helsingborg was one of the runners up in iCapital 2020. The Division of Environmental Education and Behavioural Influence runs Habiteum, Helsingborg's workshop for quality of life, where the city's administrations and companies, citizens, associations, and businesses co-create for better environmental and public health. In 2024, the department has been tasked with conducting 25 dialogues with Helsingborg's citizens to listen and understand how the residents view the measures and proposals in the new Sustainable Energy and Climate Action Plan (SECAP).

Social innovation is also supported through the 4.7MSEK Research and Development Fund which is a joint initiative with Lund University. Each year, the City of Helsingborg contributes funding for research and development projects that strengthen higher education, research, and collaboration in and around Helsingborg. The purpose of the fund is to enhance research and development cooperation between the City of Helsingborg and Campus Helsingborg. The aim is to increase research-based collaboration between the City and Campus, contribute to research-driven development in line with the city's goals and priorities, such as climate-neutrality 2030 and increased quality of life.

There is therefore a robust organisation with a strong policy framework, organisational capacity, and experience of iterative innovation in sustainable urban development upon which to build a more comprehensive social innovation programme that is integrated into coming iterations of the action plan. It is expected that this will be in place in the spring of 2025.

5 Outlook and next steps

This section should draw any necessary conclusions on the CCC Action Plan above and highlight next steps and plans for refining the CCC Action Plan as part of the Climate City Contract in future iterations.

Plans for next CCC and CCC Action Plan iteration

As the City of Helsingborg embarks on its ambitious journey to achieve climate neutrality by 2030, continuous assessment, adaptive strategies, and robust stakeholder engagement will be key to success. The successful implementation of the CCC hinges on our ability to integrate and evolve key planning instruments, while ensuring the transition is equitable and inclusive.

The forthcoming SECAP, set to be finalised in December 2024, will serve as the cornerstone of our climate action framework for 2025–2030. This plan will outline the strategic measures necessary to reduce emissions across all sectors, including energy, transportation, and waste management. To ensure accountability and track progress, the SECAP will be evaluated every year. These evaluations will allow us to monitor our progress, offering insights into what is working, what is not, and where additional actions may be required. This continuous learning process will form the foundation for future development and iterations of the CCC, which will be updated biannually.

Parallel to the SECAP, the Quality-of-Life Programme will undergo a significant update in 2025. This programme is essential for integrating climate actions with broader social and economic objectives, ensuring that the pursuit of climate neutrality enhances the well-being of all residents. Aligning the Quality-of-Life Programme with the SECAP will foster synergies between environmental sustainability and social equity, reinforcing the city's holistic approach to climate action.

A new SUMP, expected to be finalised in 2025, will address Helsingborg's transportation emissions. The SUMP will prioritise public transit, cycling, and walking, while reducing reliance on fossil-fuel-powered vehicles. Transforming the city's mobility infrastructure is critical to achieving our climate neutrality goals, and the SUMP will be pivotal in shaping this transition.

To operationalise these plans, detailed roadmaps with specific actions and investment strategies for each emission sector will be developed. These roadmaps will provide clear guidance on the necessary steps to meet emission reduction targets, ensuring that every sector contributes effectively to the overall climate neutrality objective.

Recognising the complexity of this transition, Helsingborg will adopt a portfolio approach to prioritise and sequence initiatives. This approach will enable us to allocate resources to projects with the highest impact potential and make informed decisions about where to focus our efforts. Monitoring emissions and tracking the progress of actions and initiatives will provide valuable insights into the effectiveness of different measures. This reflexive process will help us adapt our strategies as needed, ensuring a dynamic and responsive approach to climate action.

To support this transition, a dedicated Transition Team will be established. This team will orchestrate the various elements of the transition, ensuring that actions are aligned with the overall strategy and that all stakeholders are engaged and informed. The Transition Team will also play a crucial role in ensuring that the move towards climate neutrality is just and equitable, addressing any social or economic disparities that may emerge.

Additionally, a structured process will establish a Transition Arena, a collaborative platform where government, industry, academia, and civil society can come together. This arena will encourage dialogue, innovation, and co-creation, ensuring that the transition benefits from diverse perspectives and that all voices are heard.

The development of these plans, combined with the establishment of a robust governance structure, will lay the foundation for future iterations of the Climate City Contract. As we progress, a reflexive approach—continuously learning from successes and setbacks—will allow us to refine and adjust our strategies in response to emerging challenges and opportunities. This flexibility is essential to keeping Helsingborg on track to meet its climate neutrality goals by 2030.

6 Annexes

The annexes contain any textual or **visual material** to the 2030 Climate Neutrality Action Plan as necessary.

- Emission Inventory
- Impact Pathways

HELSINGBORG

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of Helsingborg

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Table of contents

1. Introduction

Helsingborg has committed to becoming climate neutral by 2030. We have signed a Climate Contract with national authorities in Sweden, as part of the Climate Neutral Cities 2030, run by Viable Cities. Helsingborg is also recognised as one of EU's strategic 100 (+12) Climate-Neutral and Smart Cities by 2030. We are now submitting an updated version of our Climate City Contract (CCC).

Through the Cities Mission, we are fully committed to our ongoing multi-stakeholder engagement and actions. In doing so, we can effectively develop and prioritise actions that will accelerate our transition to a climate-neutral society. Being part of the 100 (+12) Climate-Neutral and Smart Cities is providing us with an impact-driven template to explore new partnerships, new funding opportunities and new collaborations between cities, as well as business, academia, and the civil society.

It therefore explores evidence, ideas, and action well beyond our city boundaries.

The City of Helsingborg is the eighth largest city in Sweden. Geographically, the city is well-placed to service critical freight and logistics requirements of Scandinavia and has a thriving port, freight, and logistics industry. Nationally, Helsingborg plays a leading role in innovation and business and within the tech community and is a vibrant place to live and work, with the innovation district and the new urban renewal area (H+) acting as a draw card to new tech businesses.

Since 1990, emissions in Helsingborg have fallen by 55%, evidencing the city's long-standing work but also need to increase the pace of transition (see page 3 for the track record of completed emission reduction measures). The Sustainable Energy and Climate Action Plan (SECAP) for 2018–2024 addresses crucial points of action for achieving a climate transition by 2035. It is fully endorsed by all municipal committees, and all companies and utilities owned by the city. Its goals on emission targets serve also as steering goals in other municipal processes and documents.

A new and updated SECAP has been drafted during 2023 and has been out for consultation during spring 2024. The new SECAP will reset Helsingborg's goal and raise our ambition of being climate neutral from 2035 to 2030. The development of the new SECAP has been an inclusive process, with a broad group of stakeholders, endorsed by the same group of actors who will be endorsing the final CCC.

The objective of this document is to clarify Helsingborg's commitments to achieve climate neutrality by 2030. The combined action and investment plan in this CCC

should be read as a proposal for intended actions to achieve climate neutrality. The SECAP, that will be adopted at the end of 2024, sets targets broken down at the municipality's emissions sectors. In the work to implement the plan, which will commence in the autumn of 2024, measures to achieve the targets will be specified and prioritised.

In September 2022, Sweden held municipal elections and the political majority in Helsingborg's city council confirmed capacity building for collaborative innovation and Climate Neutrality by 2030 as one of the four top priorities for the ongoing mandate-period. With political unity and a genuine commitment to high targets and ambitions, the City of Helsingborg and its leading stakeholders in the local innovation ecosystem are mobilising to become one of the first cities to reach climate neutrality by 2030.

The city recognises that the challenges ahead are substantial and will meet them with effective mobilisation of citizen engagement, stakeholders, digitalisation efforts, and large-scale investments.

Track record

Emissions of all greenhouse gases have decreased with 55% since 1990 within Helsingborg. Our subsequent accomplishments include:

1964
Expansion of the district heating system. Today, 99,8% of the district heating is from fossil-free energy sources.

1974
Industrial symbiosis between energy company Öresundskraft and Kemira.

1983
The first environmental protection plan was adopted.

1988
Kerbside collection of sorted waste was introduced.

1989
Miljöverkstaden was founded, providing education for every student and teacher on water, energy, and recycling.

2005
100 % fossil-free public bus system.

2010
All single-family households sort household waste.

2017
Halved the number of flights by city officials by a local Polluters' Pay Principle involving a 50% fee.

Halved the food waste from public school's canteens.

2018
World's first high-intensity electric ferry line between Helsingborg-Elsinore.

2019
Electric city bus line was established.

2021
Climate Agreement in Helsingborg, gathering local businesses working together for climate neutrality.

2022
Helsingborg is selected as one of 100 (+12) Mission Cities.

Öresundskraft invests in 300 charging points for electric vehicles over a 5 year period.

2024
Development of new SECAP and CCC.

2. Goal: Climate neutrality by 2030

Helsingborg is a climate-conscious city with the ambition to become climate neutral by 2030, as defined and pursued by the Cities Mission. This includes the entire geographic area of the municipality, without any exceptions. There is a total of two ETS facilities within the geographical boundary of the city, both included in the climate neutrality target.

During 2023 Helsingborg has developed its new Sustainable Energy and Climate Action Plan (SECAP). The existing SECAP is valid until 2024. Since the plan was adopted in 2018, the city of Helsingborg has sharpened its ambition for net zero emissions within the geographical area towards the goal of climate neutrality by 2030.

For Helsingborg to reach its long-term climate goals, it is required that emissions decrease at a significantly faster rate than they have done to date. The new SECAP is proposed to apply from 2025-2030 and will contain stronger targets that correspond to the content in the national Swedish Climate Contract 2030 as well as the Climate City Contract (CCC). The plan will cover emissions within the geographic area of the municipality, as well as the emissions caused by those who live, work, and stay in Helsingborg regardless of where the emissions occur.

We aim to play an active role in mitigating climate change and create a sustainable future. Not only do we endeavour to generate collective responsibility at the local level, but we also want to set an example globally. In accordance with the Paris Agreement, we are working to limit the global temperature increase to 1.5°C above pre-industrial levels, while simultaneously adapting how we use the planet's resources. Since 1990, greenhouse gas emissions in Helsingborg have decreased by 55%, compared to the corresponding national figure of 35%.

To ensure a holistic approach to climate change, Helsingborg is using the Climate OS platform, developed by ClimateView, which breaks down the advanced interconnected systems of the city into manageable transition elements. Climate OS shows the impact of possible solutions on carbon abatement, a great basis for discussion and decisions about which measures the city should adopt. We are currently exploring how to use the platform to connect our stakeholder groups to co-create solutions and actions.

Possible co-benefits and adverse impacts generated by local scale climate mitigation policies have briefly been assessed in the SECAP from 2018 as well as the Quality-of-Life Programme from 2021. In 2018 an overall impact assessment was carried out of what consequences the implementation of Helsingborg's SECAP will have from an economic perspective, an environmental perspective, and a social perspective.

In the development of Helsingborg's new SECAP (to be decided in December 2024, valid 2025 – 2030), an analysis of the social dimension in the plan has been carried out by two researchers. They identified three important conditions in the implementation of the plan:

1. The climate transition must address social disparities to improve quality of life for all.

2. Participation from all social groups and stakeholders is crucial for social sustainability and climate neutrality.

3. Helsingborg holds structural power to influence societal development through its climate policies and collaboration with various stakeholders.

In the Quality-of-Life Programme, the road to climate neutrality is briefly summarised, stating among other things that actions to mitigate climate change, resource management and circular systems and economy create new opportunities for job creation. The programme also mentions the importance of creating a more resilient society, a society that can prevent, resist, manage and recover from disturbances.

Increasing climate action and reducing reliance on fossil fuels can bring numerous co- benefits to Helsingborg. These co-benefits cover economic, social, and environmental aspects of sustainability, and include job creation, reduced energy costs, improved public health, increased competitiveness, a more sustainable and liveable city, enhanced social equity, reduced greenhouse gas emissions, biodiversity conservation, and resource conservation.

Working towards climate neutrality goals can help Helsingborg achieve various co-benefits, including improving the well-being and health of residents, promoting social equity and justice, achieving financial savings through lower energy costs, and preserving the environment by reducing greenhouse gas emissions and protecting biodiversity. Therefore, it is important for Helsingborg to prioritise climate action and transition to a low-carbon economy to achieve these co-benefits and create a just and sustainable future for all.

3. Strategic priorities

Below follows a description of Helsingborg's largest sources of emissions, making it particularly important to devise measures to achieve reductions within these areas, while measures within other areas will also be developed.

- **Sustainable transport and mobility, implementing a diverse set of measures to reduce dependence on fossil fuels.**
- **Electricity and district heating production.**
- **Reduced emissions from industry, mainly natural gas use.**

Priority measures in the near term to reduce emissions from transport include the development of a new Sustainable Urban Mobility Plan. The plan will include new goals, clear prioritisations, and trade-offs between different measures. The plan is expected to be finalised by 2025.

In the climate and energy plan currently under consultation, the City of Helsingborg intends to support the formation of a local hydrogen cluster in and around Helsingborg. The benefit of this would be that hydrogen, produced using renewable electricity, could replace much of the natural gas that the industry in Helsingborg currently relies on. This, in turn, would promote the city's goal of achieving climate neutrality, with the target of reaching net zero emissions by 2030.

Furthermore, the industrial and transport sectors today are calling for sustainable alternatives to the current fossil energy carriers and are actively seeking collaborations and locations that offer the conditions for such a transition. Therefore, an investment in hydrogen, provided it can be made available in a cost-effective manner, would serve as a driver for the city's competitiveness and attractiveness.

While emissions must be reduced to the greatest extent possible, development and implementation of compensatory measures need to take place in parallel, such as biological and technological carbon sequestration. Equipping the district heating plant Filbornaverket with a CCS-system to capture fossil emissions from the burning of waste is a necessary climate action to continue managing society's residual waste and deliver sustainable energy. Investment decisions for the facility are planned to be taken by the municipal assembly in April 2025.

To achieve climate neutrality, the municipality, together with other stakeholders, must accelerate the pace of its transition efforts. We need to reduce emissions by an average of approximately 40,000 tonnes of carbon dioxide equivalents each year—

more than four times the rate at which emissions decreased from 1990 to 2021. This means that both the municipality and other stakeholders in the transition must significantly increase their efforts.

To enable large-scale change, we must also build transformational capacity within the organisation as well as with other stakeholders. Emissions that are not directly caused by the city of Helsingborg can be managed by processes and decisions enabled by city officials, as well as joint actions for regulation together with key stakeholders, such as residents, businesses, regional and national governments as well as international organisations.

To ensure that greenhouse gas emissions are reduced at the required rate, the city must focus on mobilising stakeholders and financial support, as well as co-creating actions and solutions with key stakeholders and residents to build transformational capacity. By clearly connecting measures for the climate with measures for a higher quality of life, the transition towards a climate-neutral society will also mean a better and more sustainable Helsingborg to live and work in. The process of going about this is very important and a crucial aspect of our city-wide approach of mobilising actors and build common capacity and understanding.

4. Process and principles

For several decades, Helsingborg has worked to systematically reduce environmental and climate impact. A framework of Council adopted programmes and plans for climate change and adaptation, waste management and Quality-of-Life are in place, although always in a dynamic process of upgrading. To plan, act and follow up is in the city's DNA. The city possesses extensive environmental expertise across its administrations and municipal companies. Additionally, there is broad political consensus regarding the environmental challenges we face and the need for transition. This consensus has long supported a shared vision and enabled sustained investments towards achieving climate neutrality.

The environmental work is monitored annually as part of the city's financial statements. Key environmental indicators like quality of air, marine fauna, waste, use of fossil fuel and climate impact are annually updated. We annually report to regional and national authorities. This includes the follow up on national environmental objectives. This allows us a process of reviewing performance across a wide range of groups and looking for ways to upgrade, amend and redesign actions to improve.

Now, Helsingborg is building upon these capacities and directing efforts towards achieving climate neutrality by 2030. As part of this, we are reorganising and strengthening our internal teams working with transformation and mission-oriented innovation. This is being done across multiple departments in the city, ensuring that we have resources and capacity across the whole organisation.

In 2023, the city also has launched a new department for innovation and transformation, working to further strengthen and support the innovation capacity of the city and finding models to accelerate scale up and initiate/strengthen the ongoing innovation-partnerships in the whole innovation ecosystem of the city, including focused research-programmes. This overarching function will develop, support, and manage programmes and portfolios for larger and complex innovation projects within the city's climate neutrality work.

Simultaneously, we are developing collaborative arenas and platforms, testbeds, tools, and programmes to engage with citizens, businesses, academia, and other public sector actors. We believe these efforts will foster new collaborations and genuine co-creation, promote mission-oriented innovation and, ultimately, accelerate our transition toward climate neutrality by 2030.

Monitoring and updating the CCC

To ensure that the CCC remains aligned with the latest scientific knowledge and technological advancements, and has the greatest possible impact within the city, the plan will be reviewed every two years. This work also includes identifying potential additional measures and/or information that accelerate climate transition. By clarifying the steps required to create a comprehensive overview of actions and

investments for Helsingborg's climate transition, we also highlight how we need to work to achieve climate neutrality.

Citizen engagement

We must bring people together with the goal of building trust and gaining support from the residents, while also emphasising a sense of responsibility. By inviting Helsingborg's community to examine the municipality's climate goals and climate work, we highlight where citizens themselves can influence their emissions, and in which emission areas the city is responsible.

By establishing processes for community involvement that are integrated, repeated, and thorough, we can build long-term trust and firmly anchored results. By actively involving our residents in the city and broader stakeholder climate work, we create a strong sense of trust, lower the barriers to participation, and counter feelings of powerlessness by entrusting residents with trust and influence.

We continuously work on citizen engagement in various processes in the city, especially related to the construction or redevelopment of residential areas - which has a significant impact on the climate. This type of input is of great benefit in the development of the city's Sustainable Climate and Energy Plan (SECAP), as well as the subsequent Climate City Contract.

In line with the recently developed SECAP it is crucial that messages about the necessary transition are rooted in the local reality where the consequences of the climate crisis and the need for transition are clear. Residents' carbon emissions vary from neighbourhood to neighbourhood. By analysing factors such as age, income, education level, and gender in relation to neighbourhoods, the municipality can prioritise which groups are most important to reach to have the greatest impact on emission reduction but also to cultivate engagement among different segments of the population.

In accordance with a political decision, the residents of Helsingborg will be actively engaged with in climate action. This engagement seeks to involve citizens in shaping and driving the transition towards climate neutrality. By focusing on their opportunities, needs, and willingness to contribute, the aim is to harness collective efforts to accelerate the city's climate transition. Citizens from various neighbourhoods and age groups are involved to ensure broad and inclusive participation, ensuring that the city's climate strategy reflects the diversity of its population.

Stakeholder engagement and mission-oriented innovation

The City of Helsingborg has limited control over emissions that occur within the municipality's geographical boundaries. To successfully achieve climate neutrality, it is of utmost importance that we collaborate with other stakeholders. During 2023, representatives from the business sector, academia, and civil society have been

invited to several workshops to work together with the city to identify how and where we can support each stakeholder's climate efforts, as well as important measures for the city itself as part of developing the new SECAP.

We also have a strong focus to engage and form partnerships with the business community to accelerate transition towards climate neutrality. We collaborate with the business community within the Helsingborg Declaration and the Helsingborg Climate Agreement, two initiatives where companies come together to drive transition efforts. The Helsingborg Declaration is an initiative where the city works together with stakeholders from the entire logistics chain to develop the Helsingborg region into Europe's most sustainable and fast-moving logistics hub. Businesses and associations who have signed the Helsingborg Climate Agreement support the goal of a climate neutral Helsingborg 2030 by actively reducing their emissions as quickly as possible.

In Helsingborg, the city and municipal companies offer various testbeds where innovative solutions and approaches within water and sewage, waste management, biochar, renewable energy, and sustainable construction enable new opportunities and job prospects.

An Innovation District was established in 2023 by existing pivotal businesses, municipal companies, the Helsingborg Campus of Lund university, and the city. Circularity, e-commerce, building and construction industries, urban logistics as well as a growing start-up community of tech are involved and enrolled in the community of the Helsingborg innovation District. Much of the focus offered from the city in the Helsingborg Innovation District is aimed at businesses that can support the making of a smarter and more sustainable Helsingborg.

Helsingborg has a strong tradition of multi-stakeholder approaches to innovation and development towards sustainability. This is a strong foundation on which to build for a successful acceleration of the climate transition process, not least when many of the critical decisions, changes and investments will need to be made by local businesses and local people. The commitment of the city, its political leaders and business, academic and civil society partners are a key strength our transition work, and the climate transition can strengthen these ties further.

5. Endorsement

The Helsingborg Climate Agreement

The Helsingborg Declaration