



Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan for the City of Umeå

V1.0

**UMEÅ
KOMMUN**

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Summary

An abstract **summarizes the content** of the 2030 Climate Neutrality Action Plan (CCC Action Plan) that is developed jointly by local authorities, local businesses, and other stakeholders.

Textual element

This iteration of "Umeå CCC Action plan March 2024 outlines Umeå's ambitious journey towards achieving climate neutrality by 2030, emphasizing strategic priorities and a comprehensive action plan. Developed partly in collaboration with various stakeholders, it aligns Umeå's commitment to the EU Mission for 100 climate-neutral and smart cities by 2030 and are in line with the Climate Neutral Cities 2030 initiative by Viable Cities and the Umeå climate roadmap framework. This document highlights Umeå's strategic interventions across mobility, the built environment, energy systems, and circular economy, aiming to drastically reduce greenhouse gas emissions, foster sustainable growth and social sustainability.

Strategic priorities outlined in Umeå CCC include transitioning to fossil fuel-free transportation, enhancing circular systems and resource flows, and managing residual emissions, with a focus on systemic transitions that aim for significant GHG emission reductions. These priorities also align with the focus areas identified in Umeå's Climate Roadmap, underpinning the critical role of cooperation among stakeholders in achieving climate neutrality.

Umeå's Climate City Contract reflects on the importance of collective resolving of various stakeholders to support the city's climate neutrality ambitions through concrete commitments and collaborations. The inclusion of municipal, private, and civic sectors underscores the holistic approach Umeå is adopting to overcome financial, policy, and behavioral barriers to investments in climate action.

To improve the Climate City Contract (CCC) and its impact, Umeå should focus on bolstering private sector engagement, specifically in transitioning to fossil fuel-free transportation and circular economy initiatives. Enhancing stakeholder collaboration across sectors, including municipal, academic, and civic, is crucial for innovative and scalable climate solutions. Overcoming financial and behavioral barriers to climate investment requires innovative financing models and incentives that encourage community and business participation in sustainability efforts. Additionally, increasing transparency and public involvement in climate actions can drive community support and participation, ensuring the climate work in Umeå are met through collective effort, shared responsibility and conducting a just transition by and for all in a strong partnership.



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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 or name) used in the CCC Action Plan.

Abbreviations and acronyms	Definition
Transition(s)	Transition(s), each describing a specific activity shift needed to full fill a demand in a climate neutral way ¹ . For example: shifting fossil fuel cars to electric vehicle. The intention is to break down the overall transition into more manageable pieces where each transition is quantified in terms of activity data and potential CO2 emissions reduction.
GHG	Green House Gas
UCTM	Umeå Climate Transition Map
The City of Umeå	The system boundary for this CCC is the City of Umeå population. 91960 of 130000 inhabitants are the used scaling factor for the emissions since the data used are on administrative boundary level.
RUS	Regional development & cooperation in the environmental objective system.
UCR	Umeå climate roadmap

¹ See appendix “Material economics report on investments for climate neutrality” for more details on the transitions.



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 2030². 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).
- A description of future steps, planned timeline and milestones for future iterations for the continuous development of the CCC Action Plan.

² 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".



Introduction

Umeå

Umeå is northern Sweden's most populous municipality with a total population of approx. 133 000 inhabitants (Febr. 2024). The average age is 39 years old. The city of Umeå is actively involved in several projects aiming to achieve climate neutrality by 2030. It's part of the European Commission's initiative, joining over 100 Mission Cities, and is also involved in Sweden's Climate Neutral Cities 2030, led by Viable Cities. Umeå's goal is to be a leader in trying out new ideas and innovations that help make Europe greener and healthier by 2050. To reach its climate goals, Umeå has committed to the EU's mission and is working on creating a Umeå Climate City Contract. This plan involves cooperation with important partners at all levels, from local to international, to ensure a successful climate transition for Umeå and the broader world.

Umeå key assets and figures

Umeå has historically invested in solutions to produce renewable energy. In the 1958 Sweden's largest hydro power plant co-owned by the city was constructed in Umeå producing over 2 TWh annually, almost double the power needed in Umeå. This is a key asset for the city and the region in the transition towards climate neutrality concerning electrification. In the City of Umeå a large district heating network has been over the years developed and are providing heat to almost 80 % of the buildings within the city. The CHP plant connected to the DH-network, owned by the city is recovering energy from waste and incinerated biofuels e.g. forest residues for producing heat and electricity to the city.

Umeå were an early pioneer testing electric busses for public transport in the city and today 75 % of the trips with local public transport are conducted by electric bus. However, one of Umeå major challenges are in the transport sector due to high dependency on fossil fuel for transport by car, freight transport by trucks and construction machines. The transport sector stands for more than half of the emissions emitted in Umeå.

Umeå Climate targets

The city of Umeå has set ambitious climate mitigation targets:

- Umeå's urban area/the city will be climate neutral by 2030 and the whole of Umeå municipality will be climate neutral by 2040, i.e. have net zero* greenhouse gas emissions. ³
- The Umeå municipal group will be climate neutral by 2025, i.e. have net zero greenhouse gas emissions.
- The climate impact of transport in Umeå will be reduced. This will be achieved by making fuels fossil-free by 2030 and by increasing sustainable travel.
- Umeå's consumption-based footprint will be reduced to 2 tonnes of CO₂e per person by 2040 and 1 tonne by 2050.

Umeå's climate goals are designed in such a manner so that the city of Umeå will take the lead in the transformation and achieve climate neutrality by 2030. The remaining rural areas of the municipality will be climate neutral by 2040. The target is achieved from a perspective of fairness, as the largest greenhouse gas emissions and the opportunities to address these emanate from the city.

³ * Climate neutral Umeå means that by 2040, Umeå will have no net emissions of greenhouse gases into the atmosphere. The goal means that greenhouse gas emissions from Umeå will be at least 85% lower in 2040 than in 1990 (in 2030 Umeå city according to the action plan for Climate Neutral Umeå 2030). The rate of reduction must be such that Umeå municipality's emission allowance is not exceeded. The emission allowance is based on the Paris Agreement and is calculated based on the best available research.



Figure 1 The climate neutrality goals adopted by the municipal council.

This first version of Umeå CCC will include the fields of action/emission domains: Transport and Mobility, Buildings, and Energy Systems, Waste, IPPU and AFOLU. Emission categorized as Scope 1 and 2 will initially be addressed. Emission categorized as Scope 3 needs to be explored more with knowledge and information gathering how to address these indirect emissions at city level. The city of Umeå have been working for several years with consumption-based emissions (CBE), getting a better understanding which will be mentioned as step to further development and to be addressed in the city. (See the Commitments for more information on CBE)

This action plan and the scope for the CCC are the city of Umeå (See section A1 for more details about the CCC scope and system boundary).

The IPPU and AFOLU sectors are part of the action plan. However, additional information needs to be created or sourced within this fields to get a better understanding and knowledge how to address emissions from these sectors. This is planned to be explored and enhanced in the future iterations of the Umeå CCC.

This action plan and the whole of Umeå CCC is lined with Umeå Climate Roadmap, setting even more focused strategic priorities for reaching climate neutrality and a more formal, closer partnership with the EU, giving local stakeholders opportunities to collaborate locally *and* with/in the EU for succeeding to implement the most crucial actions.

This CCC Action plan should be seen as a complement to existing plans and strategies. It fullfils an important step providing a gap analysis of what the City of Umeå needs address to move towards net zero. The CCC Action plan has provided us with a framework and methodology to address emissions that has previously not been addressed. Next year the adopted action plan "Action plan for the city of Umeå environmental targets 2022- 2025" (See section A2.1 for more detailed information of the plan) will be reviewed. The framework and methodology/process are proposed to be used in the new version to align the two plans.

In this iteration of CCC Umeå has identified several key-transitions each describing a specific activity shift required to full fill a need in a climate neutral way. For example: shifting fossil fuel cars to electric vehicle. The intention is to break down the overall transition towards climate neutrality into more manageable pieces where each transition can be quantified and used to develop scenarios towards climate neutrality.



The systemic work process

Umeå CCC aim to provide a comprehensive insight in the process towards climate neutrality which includes the status, what we need to improve, develop, and explore further. We see the work as an iterative process where the city of Umeå is using the NZC CTM as a guiding model for enabling a transition towards climate neutrality by 2030. Below is the UCTM, Umeå Climate Transition Map, showing how Umeå intends to work in the transition towards climate neutrality.



Figure 2 : UCTM – Umeå Climate Transition Map

Here follows a description of the different parts of the climate transition map and how they will be organised and implemented in Umeå. These paragraphs should be read together with the Umeå CCC Commitment, chapter 1 and 4.

CTM: A just climate transition

UCTM: Sustainable growth and a good life in Umeå.

The climate transition offers many co-benefits or added values which will develop Umeå into a great city to live and work in also in the future. The City of Umeå has conducted a comprehensive socio-economic analysis based on an a very ambitious transition scenario which shows that the transition is socio-economically profitable, thus, the city of Umeå aims to simultaneously improve social, economic, and ecological values in the transition towards climate neutrality, to implement a just transition. Examples of added values the City of Umeå strives to improve are air quality and health, job creation and turning the climate transition into business opportunities for local businesses. Social sustainability is about inclusion and give opportunities for all groups to take part in the transition. One example of



that is designing the transport system with high levels of accessibility like public transport available for elderly and disabled people.

CTM: Activate an inclusive ecosystem for change

UCTM: Lead the transition in accordance with the Umeå Municipality overarching goals.

The municipal council's goals are as follows:

1. Umeå's growth must be managed with social, ecological, cultural and economic sustainability with the vision of 200,000 citizens by 2050.
2. Umeå must grow sustainably without any segregated areas.
3. Umeå municipality must create conditions for women and men to have the same power to shape society as well as their own lives.
4. Umeå must be climate neutral by 2040.

Umeå municipality as a change leader in the climate transition is an important and strategic role that has a significant impact on society's ability to meet and manage the challenges of climate change. The municipality exercises this role by adopting strategies and measures, which involve both direct impact on its own operations as well as indirect impact by inspiring residents, businesses, and other stakeholders and by collaborating and facilitating.

CTM: Build a strong mandate

UCTM: Partnerships, commitments for transition.

An important strategy for how Umeå works with the transition is through partnerships. A partnership means that one or more partners work towards a common goal. One of the key partnerships in Umeå is the Umeå climate roadmap – Umeå's local green deal. It brings together +50 organizations with a common goal, to contribute to reducing Umeå's emissions in line with the Paris Agreement.⁴ Another important partnership is the collaboration with NZC through Umeå being part of the EU Mission: Climate-Neutral and Smart Cities. Furthermore, Collaboration and partnership agreements with Universities and Research institutes are to mention.

To steer and enable transition for the city of Umeå being climate neutral the municipality council has established guidelines for the governance and steering mechanism. For the activation of governance, orientational, overarching goals are used to create directions in a defined issue that is common to several municipal committees/companies, for example the climate mitigation targets. As mentioned above one orientational and overarching goal is Climate neutrality.

To build a strong mandate engaging with citizens are a key. Umeå has developed Umecom, which is a community-based initiative in Umeå, aiming at fostering collaboration among citizens, businesses, associations, researchers, and the public sector to realize ideas that make Umeå a better place for all. The platform encourages cross-sectoral collaboration, allowing to support individuals with ideas and engagement in reducing climate impact and improving Umeå.

Please access more information about Umeå's partnerships, governance, and steering mechanisms in Umeå CCC Commitments March 2024.

Umeå intends to develop these parts further and additional work is needed to:

- Continue to build and develop strong key partnerships for enable transition.

⁴ Umeå climate roadmap:

<https://www.umea.se/byggaboochmiljo/samhallsutvecklingochhallbarhet/klimatmiljoochhallbarhet/umeaklimatfardplan/nyhetsarkiv/arkivklimatfardplan/klimatoppmotlockademangadeltagare.5.30a0b27c18c13d4542524941.html>

CTM: Understand the system

UCTM: Understanding of the systems to change and what the transition means in terms of benefits, opportunities, and challenges.

Umeå has a good understanding of the current situation in terms of energy use and emissions occurring based on different activities in the city across its systems. By systems we refer to energy system, transport system etc. Umeå has monitored emissions and energy use in the city for a long time. To further increase knowledge, Umeå has worked with Material Economics/McKinsey and Climate View to develop scenarios on how Umeå could reach climate neutrality (See appendix: "Material economics report on investments for climate neutrality"). The scenarios point out the gaps to be addressed, give a better understanding of systems in need of change and lay a foundation for the next step to co-create actions. To understand the current systems is necessary to identify the systemic challenges for the transition in different sectors. In this phase an early stakeholder mapping was conducted to identify key actors important for the transitions.

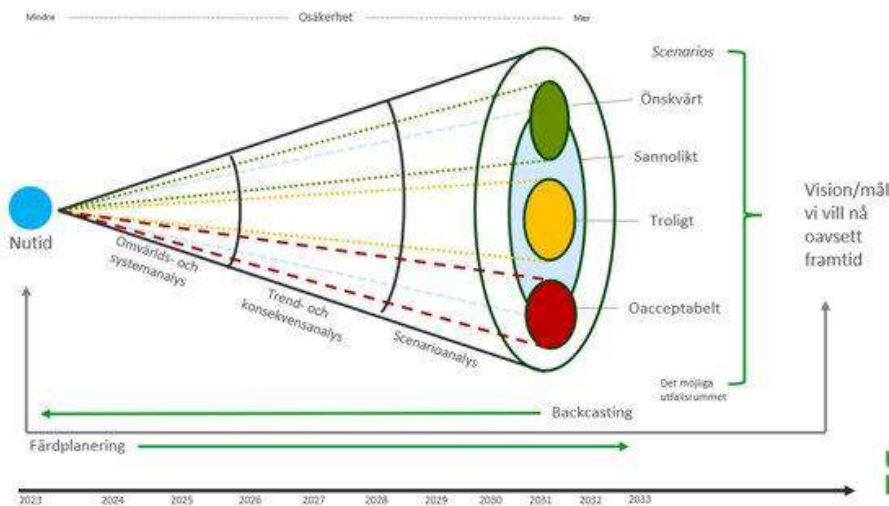


Figure 3 Model for scenario based planning

The city of Umeå is applying scenario planning method with Normative Scenarios. The scenarios are based on a desirable future, focusing on vision and goals. In this case, this means breaking down the city of Umeå goals into a scenario with multiple different transitions e.g. shifts needed to happen to create a sustainable future, see module A. Scenario-based approach increases the opportunity of having a proactive rather than reactive responses to emerging challenges important in a fast-changing world. Anticipation of possible futures cultivate a mindset of flexibility, adaptability and anticipation of challenges before they arise.

As we are facing very large changes and an uncertain future, a scenario-based working method can provide the possibility to identify and address multiple uncertainties. With scenarios the method provides an increased understanding of the systems in need of change and what the transition entails, while also laying the foundation for co-creating portfolios with measures for the transition. It also helps to identify the gaps that need to be addressed. (Gap in e.g. kWh biofuel or km with electric car etc...). Normative scenarios are used because we have goals and a vision of what we want the future to look like, but we don't really know how to reach that vision. By starting with the desired future and then working backwards to identify the steps that need to be taken, a road map can be developed.

Umeå intends to explore this part further and additional work is needed to:

- Develop dynamic scenarios.
- Build scenarios and enhance pathways together within partnerships to enable development of actions within the partnership's sphere of opportunity, for example the Climate Roadmap.



- Further explore and get a better understanding of how existing policies and plans will reduce emissions.

CTM : Co-design a portfolio

UCTM : Co-create a transition portfolio describing what we need to do.

Umeå has in an early stage developed and designed pathways to enable the transition towards climate neutrality. Umeå has during this step discussed with internal and external stakeholders, however more work in close co-creation processes is needed to develop portfolios with the right types of actions to maximize impact.

Umeå has started identifying which levers need to be activated within various transitions to create impactful actions towards managing the defined transitions/late outcomes and build a strategy/roadmap. However, further development is needed as next step.

ClimateOS with its associated framework is expected to be an important supporting tool in the scenario-based planning process and in Co-designing a portfolio. It can help us by creating dynamic scenarios of transitions, which adapt more easily to exogenous factors that have impact on planning and design of the portfolio. Furthermore, the tool is expected to be able to contribute with impact analyses in terms of emissions and socio economy.

Umeå intends to:

- Scale up the work and find models to effectively co-create action portfolios together with actors in the Climate Roadmap but also within the e.g. municipal group.
- Thru digitalization Umeå intend to use dynamic scenario planning for Umeå as the next steps in co-creation and iteration of the climate mitigation planning process.

CTM: Take action

UCTM: Prioritize, funding/finance and realize transitions incl. initiatives, actions.

In Umeå Municipality, we have long worked for sustainable development, both locally and globally. We have a history of implementing major environmental and climate measures. E.g Electric buses, major energy performance contracting project and transition from oil furnaces for heating houses to mostly district heating in the city. Previous projects on strategic development and innovation provide a strong foundation for future transitions but the process of achieving climate neutrality is still a major challenge. The city is approaching the limit of its ability to achieve climate neutrality within the desired timeframe as systemic barriers block faster development. The city now aims to take a comprehensive approach to climate-neutrality. The most difficult parts remain and require large investments and large shifts in behavior changes and strategies to prioritize actions for Umeå.

An important future step for Umeå is to develop methods for upscaling and also increasing the capacity in applying for external funding and financing. Umeå intend to develop a Strategy for financing the transition to a net zero future. Further development of partnerships between stakeholders in Umeå as well as between policy actors regionally, nationally and globally is needed to enable action. Moreover, refinement of digital solutions is necessary to support climate work and to better involve citizens and co-create the vision of a good life in a climate neutral Umeå.

Umeå intend to develop and improve:

- Develop and learn how a city like Umeå can scale up innovative and successful solutions.
- Enhance and prioritize efforts to secure external funding for innovative projects and portfolios aimed at facilitating Umeå's transition.

CTM: Learn & reflect

UCTM: Evaluate transition results & the process of transition work, disseminate to the city and EU



In the local climate roadmap initiative, a survey has been developed to collect baseline emission data from all actors including information about actions conducted and best practices so far. This survey is the first ever for the climate roadmap and will collect information for a baseline (and annually after that).

Umea municipality has over a long time monitored the CO₂-emissions and energy consumption in the municipality. Looking back from 1990 to 2019 with a total population growth of approx. 40 000 inhabitants the absolute emissions generated in the geographical area each year have been on a long-term downward trend, with a total reduction of 19% compared to 1990. The per capita emissions have improved significantly over the period. (Source: Swedish Metrological institute, SMHI).

Umea municipality is annually reporting a summary of the traffic situation in Umea. The municipality is measuring traffic flows at the same time every year to see how the development towards sustainable mobility is progressing. This includes transport of goods by heavy vehicles. The latest reporting from 2021 shows that the number of vehicles in one of the most traffic intensive roads in the city has decline from 23 500 in 2007 to 19 000 in 2021. This is one indicator in the shift from cars to other means of transport. The monitoring will continue, and the data is complemented by other sources to give a more systemic perspective.

The 2030 Climate Neutrality Action Plan will be updated and elaborated. Every second year, an updated version will be sent to NetZeroCities and the EU. There will be an annual follow-up of the City's progress towards a climate neutrality in connection to different programs in the city of Umeå like the Environmental program, and the program for climate neutrality 2040. The intention is to connect the Climate City Contract to the ordinary organizational structures of Umeå municipalities program for climate neutrality 2040 and the climate road map initiative. The regular monitoring will also be reported to CDP.

Benchmarking and learning from other cities with similar challenges is also an important part of the process.

Umeå intends to develop and improve:

- Improve capacity for environmental monitoring of the city emission working more data driven.
- Ambition to connect CCC to Climate roadmap and the governance structure.

CTM: Make it the new normal

UCTM: Translate insights from evaluation and learning into an updated way of working.

In the climate road map, the first circular calendar has been developed inspired by the CTM. As UCTM is developed, the process now needs to be implemented in the different programs and accelerated. In this part more work is needed to embed the UCTM and CCC in the city work processes and the connection to the administration steering documents etc.

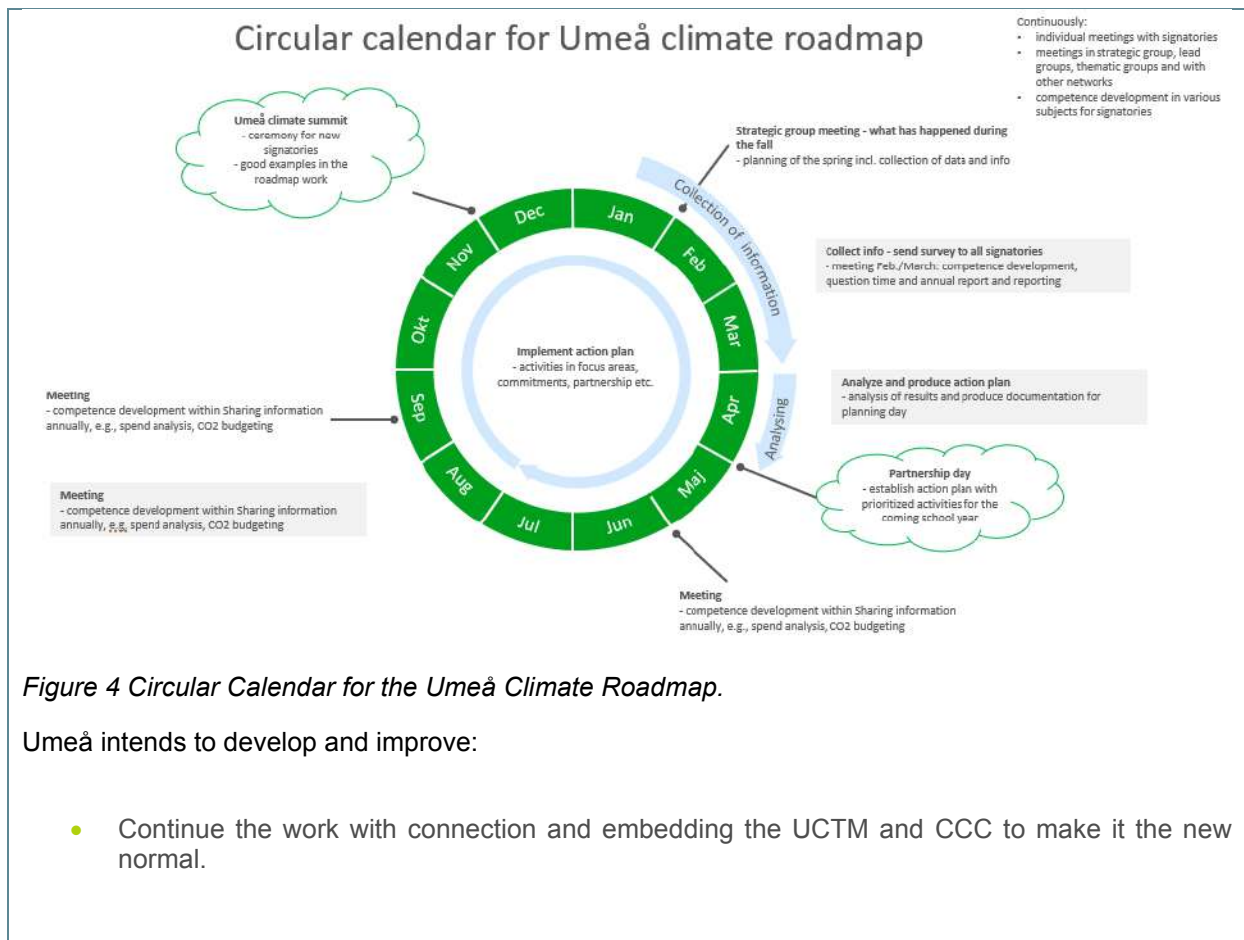


Figure 4 Circular Calendar for the Umeå Climate Roadmap.

Umeå intends to develop and improve:

- Continue the work with connection and embedding the UCTM and CCC to make it the new normal.



Tabell 1 Climate Neutrality Target by 2030

Table I-1.1: Climate Neutrality Target by 2030			
Sectors	Scope 1	Scope 2	Scope 3
Stationary energy	Included	Included	
			Optional information
Transport	Included	Included	Optional information
			Optional information
Waste/wastewater	Included	Not applicable	Excluded
		Not applicable	Not applicable
IPPU	Included	Not applicable	Optional information
		Not applicable	Optional information
AFOLU	Included	Not applicable	Optional information
		Not applicable	Optional information
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		Emssions Scaled based on population in the city of Umeå.	
Map			
<p>See explanation of the system boundary for Umeå climate neutral 2030 target in the section GHG Emissions Baseline inventory</p>			



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](#)⁵ 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.).

⁵ 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>



GhG Emissions Baseline inventory

The system boundary for emissions inventory

The system boundary for this inventory and for the climate neutrality target by 2030 is the population of the urban area of Umeå, from now on referred to as the city of Umeå with the urban area code 2480TC122. The city of Umeå is located in municipality of Umeå in the county of Västerbotten. There are 91,916 people living in the city of Umeå.

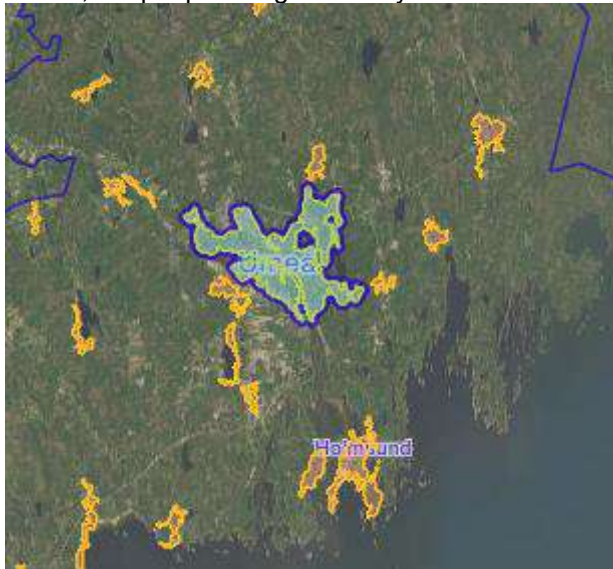


Figure 5 The city of Umeå for which the population are the scaling factor for the scope of the action plan emission inventory.

The city of Umeå for which the population are the scaling factor for the scope of the action plan emission inventory. Meaning that the emissions occurring in the entire administrative/municipality boundary with approx. 130 000 inhabitants are scaled down based on the population size within the city of Umeå. Hence the scaling factor used for calculating the emission for the 2030 target for the city of Umeå is $91\,916/130\,997$ (year 2021) multiplied with the emission for the entire municipality. In below figure the emissions for 2021 are calculated for each of the city targets system boundaries which is shown in *Figure 1 The climate neutrality goals adopted by the municipal council.*

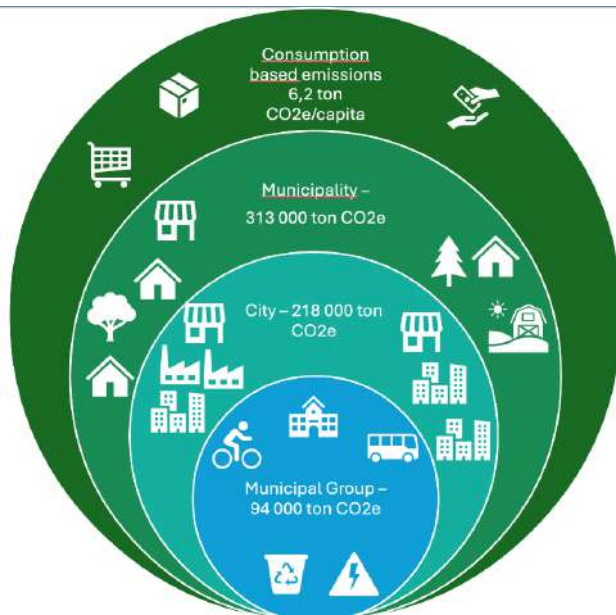


Figure 6 : 2021 baseline emissions for each of the municipality's climate mitigation targets

Tabell 2 A-1.1: Final energy use by source sectors (City boundary 2030)

A-1.1: Final energy use by source sectors (City boundary 2030)				
2021	Energy data are from collected from Statistics Sweden, Central Bureau of Statistics and from the local utility company. Oil used in the transport sector are figures from the study conducted with material economics. See appendix. Waste, IPPU, and AFOLU sectors included in the emission inventory are the data collected in CO2e format from regional development & cooperation in the environmental objective system, RUS.			
Unit	MWh/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings				1 289 610
Electricity	-	1 027 000	-	1 027 000
District heating	619 965	-		619 965
Oil	2 070	-		2 070
Transport				385 434
Electricity	-	16 905		16 905
Fossil Fuels (Petrol/diesel)	272 930	-		272 930
Biofuels	99 498			99 498
Waste				
Included in table 1.4				



Industrial Process and Product Use (IPPU)				
<i>Included in table 1.4</i>				
Agricultural, Forestry and Land Use (AFOLU)				
<i>Included in table 1.4</i>				

Tabell 3 A-1.2: Emission factors applied

A-1.2: Emission factors applied

(please specify for primary energy type and GHG emission factor according to methodology used)

For calculation in t or MWh of primary energy

(Please indicate method used, e.g. GPC, IPCC, CRF, national etc.) **GPC - CRF**

Emission factors and emissions data includes, CO₂, CH₄, and N₂O and when relevant also F-gases, SF₆ and NF₃.

	<i>Carbon Dioxide (CO_{2e})</i>
Electricity [g/kWh] (EEA)	9
District heating [g/kWh]	50,1
Oil [g/kWh]	333,4 <i>(From Material Economics report)</i>
Passanger cars transport avg.	159 g CO _{2e} / vkm <i>(From Material Economics report)</i>



Tabell 4 A-1.4: GHG emissions by source sectors city boundary

A-1.4: GHG emissions by source sectors city boundary				
	Greenhouse gas emissions for 2021 according to Greenhouse Gas Protocol for Cities.			
Kton CO ₂ e	CO ₂ equivalent/year			
	Scope 1	Scope 2	Scope 3	Total
Stationary energy/ Buildings	33,3	9,3		42,6
Transport	122,7	0,2		122,9
Waste	3,3			3,3
Industrial Process and Product Use (IPPU)	34,6			34,6
Agricultural, Forestry and Land Use (AFOLU)	14,6			14,6
Total	208,5	9,4		217,9

Part of emissions under category IPPU and Stationary Energy are registered under the EU Emissions trading scheme (EU ETS). There are two large facilities one CHP producing heat and electricity for the city of Umeå and one plant under category IPPU a large-scale producer of paper and pulp. The CHP plant is owned by the municipal owned utility company meaning that the administration has a full resourcefulness over its emissions. However, that is not that case in the IPPU category, it is included since the plant owner are involved in the Climate Road Map initiative⁶.

GHG emissions from road transport are based on data for vehicle-km⁷ and emission factors for the different types of vehicles and fuels used. GHG emissions for waterborne transport, work machines/construction machines and rail ways emission data (CO₂e) are based on national statistics from RUS (regional development & cooperation in the environmental objective system).⁸

Regarding waste GHG emission from sewage sludge is based on data from RUS and emission from waste incineration for district heat production is included in the emission factor for district heat (buildings) as scope 1.

GHG emissions from IPPU sector are based on data from RUS and from national emission data from large industries published at the Swedish Environmental Protection Agency.

GHG emissions from AFOLU is collected from RUS⁹. Data from RUS CO₂e includes GHG CO₂, N₂O, CH₄, SF₆, HFC and PFC.



Tabell 5 A-1.3: Activity by source sectors

A-1.3: Activity by source sectors			
1990 is the base year to calculating climate neutrality by 2030			
	Scope 1	Scope 2	Scope 3
Sector: Buildings (Activity)			
Sector: Transport (Road passenger transport)	Approx. 303 million Vehicle kilometres with ICE	10 million Vehicle kilometres with BEV	Not included
Sector: Waste (Activity)			
Sector: Industrial Process and Product Use (IPPU) (Activity)			
Sector: Agricultural, Forestry and Land Use (AFOLU) (Activity)			

⁶ See Umeå CCC Commitments March 2024 page 12 for more information of the Umeå Climate Roadmap.

⁷ Source from Google EIE

⁸ <https://nationellaemissionsdatabasen.smhi.se/>

⁹ <https://nationellaemissionsdatabasen.smhi.se/>

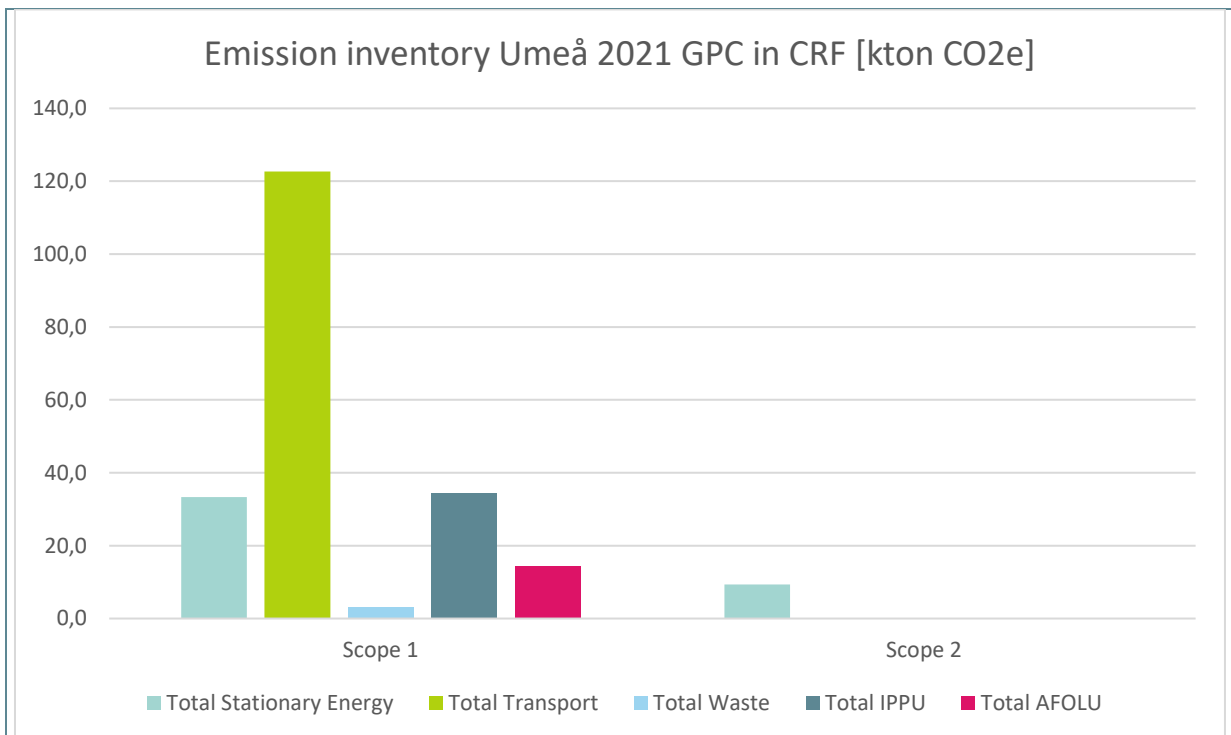


Figure 7 : Displays the total GHG emitted within the city boundary divide in the scope 1 and 2 and the different sectors according to GPC.

Transport is by far the largest CO2e emitting sector in Umeå due to its dependence of fossil fuels. This is one of the most challenging sectors for Umeå to tackle and also set a strategic priority **FOSSIL FUEL FREE TRANSPORTS AND SMART MOBILITY** for Umeå¹⁰. Stationary energy is the second largest sector, and it mainly depends on the city of Umeå geographical location, north of Sweden with its cold climate creates a high heating demand. Scope 1 emissions in the stationary energy sector is high due to a CHP-plant heating approx. 80 % of all the buildings in the city of Umeå. Depending on the perspective those emissions can be accounted as scope 2 emissions also but are here accounted as scope 1. The emission from stationary energy connects very well to Umeå second strategic priority **CIRCULAR SYSTEMS AND RESOURCE FLOWS** since one of the major reasons for that are energy recovery from waste, particularly plastics.¹¹

The baseline inventory has also implications on how the impact pathways are designed. The pathways are partly designed based on what each field of action are emitting in total. Transport being the major emitter a total of 7 pathways have been designed. For road transport 5 pathways are designed to tackling different ways to reduce emission in the sector. E.g. Smart Mobility which is about increase the range of mobility services. The baseline inventory lay the foundation for developing the scenario estimating CO2 reduction potential for each pathway.

¹⁰ Umeå CCC Commitments March 2024 chapter 3.

¹¹ Umeå CCC Commitments March 2024 chapter 3.

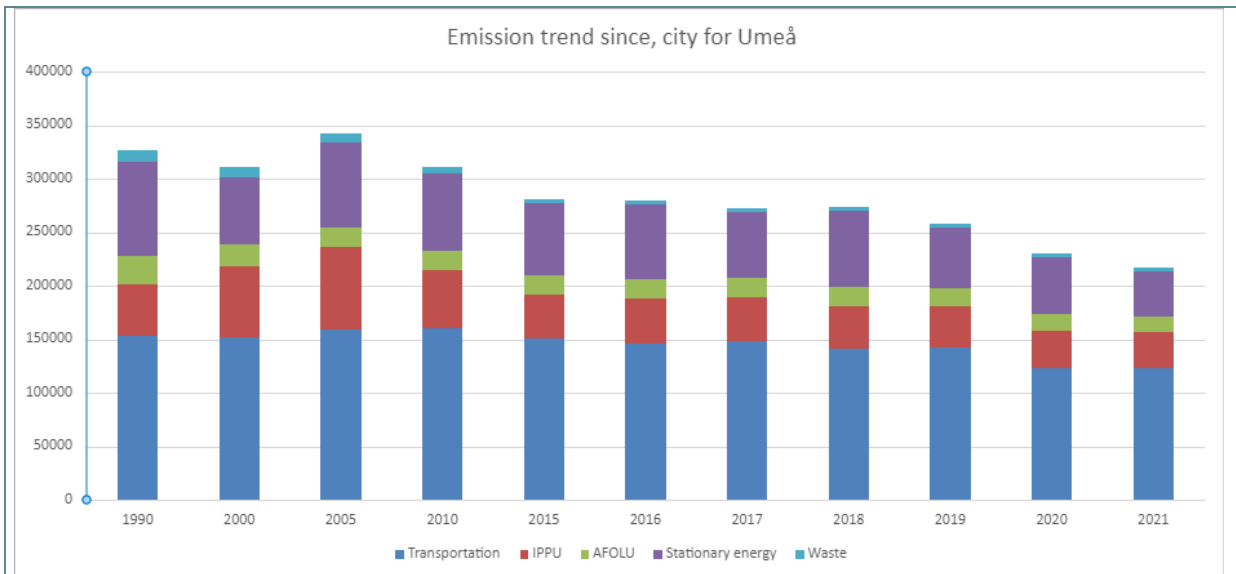


Figure 8 : GHG emission trend since 1990 until 2021.

Emission calculated for 2021 differ partially due it is based on other local data sources. Examples are passenger transport and emissions from energy use where local data is utilised. The reason for that is to make a better estimation of the emissions and to conduct a better monitoring. A bottom-up approach also makes a better understanding what drives the emissions.

Description and assessment of GHG baseline inventory

The emissions for the base year 1990 were approx. 325 000 tonnes CO₂e for Urban areas. City of Umeå has had a steady growth of population with avg. 1300 person/year since 1990. However, the emissions have continuously decreased and in 2021 the emissions are approx. 218 000 tonnes CO₂e for the city of Umeå. The main reduction of GHG emissions are direct impacts of reduced fossil fuels for heating and for transportation. One important measure was to phase out oil burners for heating of buildings which has from own heating of homes and premises reduced emissions by 90 percent. Energy efficiency has contributed to reduction in all sectors with more efficient buildings, heating sources, equipment's, and machinery. The total energy use per capita has been reduced from approx. 53 MWh/capita in 1990 to 38 MWh/capita in 2021.

The emission inventory is conducted by top-down and bottom-up analysis based on data collected from numerous research reports, statistics from Umeå and Sweden, and several global experts. Although the underlying figures and assumptions in this document are based on reputable sources, they should still be considered indicative and are subject to change. The inventory for 2021 has been developed from a bottom-up perspective where possible and top town where local activity data are missing. Activity data such as Vehicle-km, Passenger-km, energy use etc has been collected and relevant emission factors has been applied to estimate the greenhouse gases being emitted in Umeå.

The inventory is reported in the format of GPC-CRF which is the same format the city of Umeå is using in the digital climate mitigation planning tool Climate OS and recommended by EU. The inventory focus on Scope 1 and scope 2 emission emitted within the city boundary. The full emission inventory is attached.¹²

District heating (DH) is accounted as Scope 1 due to the city own the combined heat and power plant, and the grid connected auxiliary Heat plants. Almost all produced heat is used within the city boundary. The emission inventory does not account scope 3 emissions. Emission generated from waste is in this inventory calculated as emissions generated from energy recovery in the city owned CHP-plant producing heat and electricity for the city need. The waste sent to landfill is within city boundary and the wastewater is treated locally.



The emission inventory shows the city of Umeå boundary. This is done due to Umeå climate goals are designed in such a manner so that the city of Umeå will take the lead in the transition and achieve climate neutrality by 2030. The remaining rural areas of the municipality will be climate neutral by 2040. The target is achieved from a perspective of fairness, as the largest greenhouse gas emissions and the opportunity to address these emanate from the city. Data for calculation of GHG emitted in Umeå are for the whole geographical area. When estimating the GHG emitted within the city of Umeå the data in the inventory has been scaled down based on population within the city of Umeå compared to the whole municipal geographical area. The factor is approx. 70% which means that more than 2/3 of the emissions are accounted as emission generated within the city of Umeå. Those emissions are in focus in this AP.

Increasing knowledge and understanding of Scope 3 emissions on city level is a field of development for Umeå and we aim to learn more about this field. Actions has been taken to get more knowledge of Consumption based emissions (CBE) to get a view of the public and population carbon footprint.¹³ (See Commitments part for more information on CBE)

Short description of sources for the emission inventory.

Local emission factor is applied for calculation of emissions from district heating, where 57 % of the fuel incinerated in the local CHP plant are energy recovery from waste and other sources such as flue gas condensation, 42 % are renewables and 1 % are from fossil fuels.

Emission factor for electricity in Umeå/Sweden are from EEA European environment agency statistics.

Emissions from road transport are calculated using emission factors from national statistics and ClimateOS/Material Economics which compile the emission factors for different fossil fuels.

Emissions from other transport in the transport sector are collected from RUS (regional development and Collaboration in the Environmental Objectives system). Emissions from AFOLU, waste and partly IPPU are collected from RUS. Part of the emissions from IPPU are collected from local environmental reports.

Emissions from energy recovery of waste are embedded in the district heating and allocated as scope 1 hence all that energy recovered is used within the city of Umeå.

Consumption based emissions.

The city has adopted a CBE target to 2040 aiming for 2 tonnes GHG/ Capita and total emissions per capita are on avg. 6,2 tonnes from households¹⁴. The City of Umeå has since 2018 been working with Consumption Based Emission (CBE) conducting a local survey among the citizens of Umeå about their spending behaviour to get increase knowledge in this field. This was conducted in collaboration with SEI (Stockholm Environment institute). The collaboration where successful and city of Umeå still collaborate within in this field and are part of developing the Consumption compass¹⁵, a tool where CBE emissions are calculated per zip code in all of Sweden. See figure Figure 9 for Umeå municipality:

¹² Attachment “Emission Inventory City of Umeå 2021”

¹³ Umeå CCC Commitments March 2024 chapter 1

¹⁴ <https://www.sei.org/tools/konsumtionskompassen/>

¹⁵ <https://www.sei.org/tools/konsumtionskompassen/>

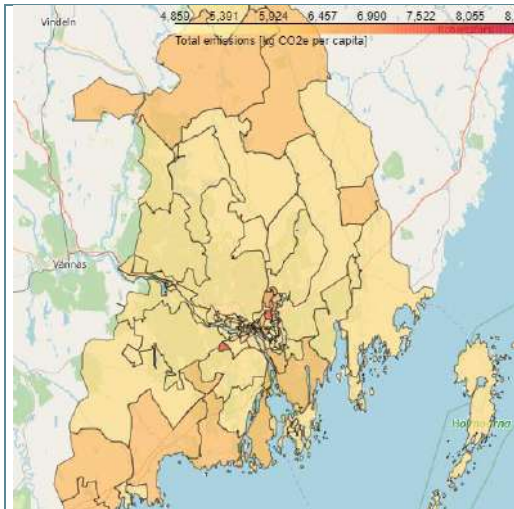


Figure 9 Map displaying CBE in Umeå municipality.

There is a need for the city of Umeå to learn more about CBE and find tools and methods to work for reducing emissions driven by consumption. The city of Umeå have started to address these challenges on a governmental level by setting environmental demands in procurement.

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



Tabell 6 A-2.1: List of relevant policies, strategies & regulations

A-2.1: List of relevant policies, strategies & regulations					
Type (regulation / policy/ strategy/ action plan)	Level (Local, regional, national, EU)	Name & Title (Name of policy/ strategy/ plans)	Description (Description of policy/ strategy/ plans)	Relevance (Describe relevance/ impact on climate neutrality ambition)	Need for action (List any suggested action in relation – to be further picked in Module C-1)
Programme	Local	Climate and environmental goals for Umeå	The programme contains the municipality of Umeå environmental targets. 4 Targets aim for rapid reduction of greenhouse gases incl. Climate neutrality	High relevance since it clearly sets the ambition of climate neutrality in Umeå	Under implementation
Roadmap	Local	Umeå Climate Roadmap	Umeå's climate roadmap is two things at the same time: a compilation of what needs to be done to reduce climate emissions in Umeå, and a platform where the whole city of Umeå can strengthen each other and work together for climate mitigation in accordance with the Paris Agreement.	Impact the whole municipality geographical boundary. Provides an impact on our climate neutrality target where actors work together to reduce the city emissions. The roadmap is a key for mobilising external stakeholders targeting climate neutrality ambition. The Umeå Climate roadmap involves all emission domains from transport to AFOLU sector.	Quantification of its potential and conduct MEL activities. Co-create concrete actions together with stakeholders in the roadmap. Under implementation
Action Plan	Local	Action plan for city of Umeå environmental targets 2022-2025	Partly a climate action plan implemented by Umeå Municipality in Sweden. It	This action plan impact particularly the local government incl. the municipal group emissions who indirectly affect the	The action plan will be monitored annually. It should also be revised, if necessary.



			aims to address and mitigate the effects of climate change through various measures and initiatives.	whole city. Emission domain affected are primary Transport, Energy and Waste.	The plan is in implementation phase
Action plan	Local	Public transport program (Traffic program)	The program aims to show how the share of trips with public transport can increase and how to improve city of Umeå public transport quality.	High relevance – a high capacity and high-quality public transportation system is a key to reduce emissions from transport	Under implementation , monitoring regularly in comprehensive mobility accounts for the city .
Action plan	Local	Bicycle program (Traffic program)	The program's overall goal is promoting cycling and improving cycling infrastructure which contributes to climate mitigation. By encouraging more people to cycle, the program aims to reduce the reliance on motor vehicles.	High relevance – providing a good, safe and quick infrastructure for cycling is an important enabler reducing the need for travel by car.	Under implementation , monitoring regularly in comprehensive mobility accounts for the city .
Action plan	Local	Pedestrian program (Traffic program)	The program is focused on improving pedestrian infrastructure and promoting walking as a sustainable mode of transportation . It aims to create safe, accessible, and attractive	Transportation by walking is relevant for reducing GHG, but most relevant for improving public health and wellbeing.	Under implementation , monitoring regularly in comprehensive mobility accounts for the city .



			walking environments for residents and visitors in Umeå.		
Action plan	Local	Freight traffic program (Traffic program)	The program aims to reduce congestion, improve traffic flow, and minimize environmental impact caused by goods transportation in the city center.	High relevance	TBD
Strategy	Regional	Thriving northern cities – regional strategy	Aims to jointly take the lead for the development of northern Sweden, to create an attractive place for 1 million inhabitants, a place with climate-neutral sustainable urban development and sustainable, beautiful and inclusive living environments in focus.	Focus on sustainable city development, strengthening competens to drive the transition and create conditions sustainable population growth Emission domains in focus are energy system, transport system and built environment in terms of sustainable construction.	Under implementation
Strategy	Local	Integrated Comprehensive plan	It aims to create a sustainable and attractive urban environment by guiding decisions on land use allocation, promoting efficient transportation systems, preserving	It has a high relevance and how the city is planned affect e.g. transportation system. Promoting efficient transportation by develop the city through public transport lines and enable traveling by bicycle. Tackling emission domain like	Under implementation



			natural areas and cultural heritage sites, ensuring adequate housing options for residents, and fostering social inclusion.	transport and energy.	
Strategy	Local	Energy plan/strategy for the municipality of Umeå	Aims to point out how the energy system will be affected by transitioning and how it can be an enabler of the transition of Umeå towards climate neutral city.	relevance in future it aims to point out the energy system enable a transition of society.	Under development
Strategy	Regional	Together for the climate: Climate and energy strategy for Västerbotten County 2020	It outlines the national goal of no net greenhouse gas emissions by 2045 and a county-specific goal of reducing CO2 emissions by 16% annually until 2040. The strategy identifies the transport sector as the area with the most potential for rapid emission reduction.	High relevance of the regional development and local though the challenges are similar, decarbonising transportation is a key that needs to be tackled on many government levels. Tackling multiple emission domains, transport and energy are the biggest.	Under implementation
Policy	Nation	Sweden's climate policy framework	Aims to create order and stability in climate policy. It provides business	High relevance for the overall climate mitigation work in Umeå pointig out the national ambition of being climate neutral.	Under implementation



			and society with the long-term conditions to implement the transition needed to address the challenge of climate change.		
policy	National	Sweden Climate City Contract 2030 (SCCC)	Umeå municipality is one of 23 municipalities that have signed the SCCC 2030 with six authorities. It is a contract between cities and authorities to accelerate the development of climate-neutral cities	High relevance since the SCCC is multilevel governance tool. A long-term commitment that secures cooperation between the cities and the state level for tackling climate challenges. All emission domains.	Under implementation
Strategy	Local	Gendered Landscape - Umeå	The strategy supports local committees to understand how gender equality works. It also shows how it can be incorporated into the city council's own activities and how it can inform its goals and indicators.	High relevance, promoting behaviour change for CO2 reduction and improve the air quality. Emission domains transport is in focus but also consumption.	Adopted

The City of Umeå environment programme is connected to several actions plans:

Action plan for the city of Umeå environmental targets 2022- 2025

The climate mitigation chapter in the " Action plan for city of Umeå environmental targets " outlines measures for the local climate goals. It assigns responsibility for each measure, to the municipal boards/companies and related activity, emphasizing collaboration. The costs, environmental and climate effects, and health impacts of the measures have been graded how well it intends to contribute to its goal. The status of the action plan is adopted and in early implementation phase. The Action plan has potential to reduce the CO2 emissions significantly, However, the actions/action plan has not been quantified in terms of CO2e reduction potential. The actions in the action plan does not have an allocated budget which means there is a risk it may be subject to prioritization. These actions are not included in the CCC action plan. Actions in the climate action plan are followed up annually reported



back to the program steering group for climate neutral Umeå. The city emissions and KPI's for monitoring the progress are reported on an annually basis.

City of Umeå Traffic programs

The city of Umeå Traffic Programs includes the Pedestrian program, Public transport program, Bicycle program and Freight traffic program which all are included in the overarching environmental action plan. These programs aim to improve local transportation to be more sustainable e.g. reduce emissions, improved safety, and infrastructure for the different modes. An analysis of the Traffic programs has been conducted by estimates of the emission reduction potential. The Traffic programs excl. The freight traffic program has the potential to contribute to a reduction of 4 kiloton CO₂ in 2030 with the pre-condition that all actions in the programs will be conducted.

Umeå Climate roadmap

The Umeå Climate Roadmap is the adopted, existing overall framework for Umeå's climate transition towards climate neutrality in 2030. It identifies the most important areas and actions to reduce climate emissions in Umeå. By signing up to Umeå Climate Roadmap, organisations, businesses, academia and the public sector commit to working together to accelerate Umeå's climate transition and strongly reduce climate emissions in accordance with the Paris Agreement. The work within the roadmap also contributes to long-term sustainable Umeå in accordance with Agenda 2030.

The climate transition work lays the foundation for creating opportunities in Umeå to develop cooperation between different actors, create new initiatives, projects and business ideas as well as developing the conditions for well-being among everyone who lives and works in Umeå. Today 55 different actors have joined and accepted the challenge to work for a climate neutral Umeå.¹⁶

Gendered Landscape - Umeå

Through its gendered landscape approach Umeå is also acting to reduce CO₂ emissions and clean the air. The idea is that when the design of urban infrastructures and services takes gender differences into consideration, it can more effectively change behaviours. Key to it is an understanding of how gendered power structures affect the way women and men feel about, use, and access the city. This method is also applied to improve the accessibility and inclusion of the existing projects. Umeå has also calculated that if men used public transport as often as women, there would be a significant reduction in CO₂ emissions. So, the gendered landscape approach is ultimately beneficial for men and women alike. It improves their access to public transport and enables their participation in the green transition.¹⁷

Strengths with existing strategies, policies and plans

There is good engagement of relevant municipal boards and municipal companies for tackling climate mitigation and working towards climate neutrality.

A growing engagement in the Climate roadmap collecting external actors to combat climate change by contributing to the city of Umeå climate mitigation targets.

Established a good ground collaboration within the climate roadmap to enable co-creation of actions. Pointing out MEL actions

The local action plan act as an umbrella for the local environmental goals and gather an overall picture.

The Gendered Landscape strategy promotes behaviour changes a key for Umeå's transition.

Gaps need to be addressed based on existing strategies and plans:

There is a need in existing plans and future plans to conduct better estimation of impact in terms of GHG reduction potential and its Co-benefits.

There is a need to improve monitoring and learning processes.

The overarching action plan is partly resource set.

There is a need to involve more stakeholders from the municipal group and from the city.

¹⁶ See Umeå CCC Commitments March 2024 page 12 for more information of the Umeå Climate Roadmap.

¹⁷ <https://genderedlandscape.umea.se/>



Actions that are none quantifiable may also be as importance as quantifiable e.g. by facilitate and to incentives behaviour changes in the city and to increase leverage. Actions may be quantified in a set of actions with the intent to conduct one or many transitions.

Multilevel Governance

Becoming climate neutral is extremely complex issue which are multifaceted, involving diverse stakeholders, technologies, and policies. Multilevel governance allows for a more comprehensive and coordinated approach to addressing these complexities by involving actors at various levels of government, as well as non-governmental organizations, businesses, and communities. Umeå has since 2020 signed the Swedish Climate City Contract, a multi-level governance tool to tackle climate mitigation on different levels. It is a long-term commitment that secures cooperation between the cities and the state level. Since there is no crystal-clear path forward, the Climate Contract 2030 develops over time. The content is revised every year, both at the local level and at the national level. And that process for joint work changes continuously. For more information on Multilevel Governance regarding e.g. the local climate city contract Umeå climate Roadmap, civic society, citizens, and different partnerships on regional, national, EU and international level, see commitments chapter 4, where it is described in more detail in an Umeå context.¹⁸

Description of emission gap

The emission gap covers the city of Umeå boundary according to city of Umeå climate mitigation target by 2030 and the system boundary description above. Most of the emissions reductions in the existing strategies and action plans are not quantified in terms of CO2 emissions reductions. However, the city of Umeå newly adopted an Action plan for the city Environmental targets which is the overarching plan for how we aim to achieve the environmental targets. The actions have an initial estimation of cost and graded each activity based on how it intends to contribute to the overall goal completion. Many of the actions are none quantifiable and are of category of enabling actions. This means that the actions intend to enable emissions reduction by incentives e.g. sustainable transportation modes by reduce parkings spaces, provide energy advice to citizens, mobility management, travel policy and incentives home working etc.

However, initial estimates based on fuel reports for municipal fleet are actions that can be quantified : E.g “Fossil-free vehicle fleet in own operations and optimized use of these vehicles.” If fully deployed the administration/ municipal organization will have the potential of approx. 1000 - 800 tonne CO2e.

The total emission for this CCC AP scope and inline with the EU mission requirements are estimated to 169 kton CO2e.

To show the city of Umeå 2030 target and how much emission it intends to mitigate it is displayed in the table below in a separate column. It is estimated to 154 kton CO2e that needs to be abated according to city of Umeå target to 2030, where 85 % of emission has to be reduced compared to 1990 levels. There is a slight difference between those two of total 14 kton. However, in this AP the 168 kton CO2e target is used since it is in line with the mission requirements and are referred to as the 2030 emission Gap.

In column 5 in the emission gap table, showing the identified emissions reduction through the CCC Action Plan module B2, the actions who intends to address this Gap are not covering the whole gap. Therefore the level of residual emission are in this iteration of Umeå CCC approx. 85 ktonne CO2e, or 39% of baseline emissions. The main reasons for this is that all transitions/pathways actions reduction potential has not been fully estimated and additional measures will be identified in future iterations. The potential has not been estimated in Waste, IPPU and AFOLU sectors. In total these sectors stands for approx. 25 % of the total 2021 emission baseline. Umeå plan to have discussions with key stakeholders within these emission domains for example with partners in the climate roadmap and The Industry Council.

To handle emissions from waste, deployment of technical solutions on Dåva Dac (The municipal company handling landfill) have been initially identified but this actions are very costly in comparison with the amount of emissions that can be abated . Moreover, discussions are needed with the stakeholders in this field as well for discussion of cost effective solutions.

¹⁸ "Umeå CCC Commitments March 2024"



Estimated potential of existing strategies are not compared to a BAU scenario.

To report the city's emissions gap and residual emissions, you can use table A-2.1 and the associated definitions. You will have to refer to estimates from your iterations of Climate Neutrality Scenarios and Impact Pathways (Part C).



Tabell 7 Emission Gap

	-1	-2	-2	-3	-4	-5	-6
	Baseline emission 2021	Emissions Reduction Target adopted by city of Umeå to 2030	Emissions Reduction Target 2030	Emission reduction through other Action Plans	Emissions Gap	Emissions reduction through the CCC Action Plan to address the Gap	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 the compensation of any residual emissions). Target is Residual	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 the compensation of any residual emissions).	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.	(4) = (2) – (3)	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 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	(6) = (1) – (2)



	(absolute) (Tonne)	emissions / offsetting 15 % of 1990 emissions in ()				WARNING if the baseline is a BAU scenario: If the BAU 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.						identified in future iterations), the CCC AP should be explicit about this 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. (This is the estimated potential of the transtions needed to take place in Umeå)					
		(absolute 1990 baseline target)	(%)	(absolute Mission Target)	(%)	(absolute)	(%)	(absolute 1990 baseline target)	(%)	(absolute 2021 baseline)	(%)	(absolute)	(%)	(absolute 2021 Mission target)	(%)	(absolute 1990 target)	(%)
Buildings	42 600	29 396	69%	34 080	80%	531	1%	28 865	68%	33 549	79%	37 400	88%	8520,00	20%	13 204	31%
Transport	122 900	89 843	73%	98 320	80%	4800	4%	85 043	69%	93 520	76%	95 100	77%	24580,00	20%	33 057	27%
Waste	3 243	1 488	46%	2 594	80%	0		1 488	46%	2 594	80%	NE	NE	648,60	20%	1 755	54%
Industrial Process and Product Use (IPPU)	34 638	27 880	80%	27 710	80%	0		27 880	80%	27 710	80%	NE	NE	6927,60	20%	6 758	20%



Agricultural, Forestry and Land Use (AFOLU)	14 600	10 732	74%	11 680	80%	0		10 732	74%	11 680	80%	NE	NE	2920,00	20%	3 868	26%
Total	217 981	159 339	73%	174 385	80%	5331	2%	154 008	71%	169 054	78%	132 500	61%	43 596	20%	58 642	27%



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

Achieving climate neutrality by 2030 requires addressing a range of systemic challenges due to the task complexity. We need to think differently and we need to do new things.

The city of Umeå has identified several barriers and challenges in the aim for climate neutrality by 2030 especially when it comes to collaboration and working together maximizing impact on the reduction of GHG emissions. The systemic barriers below will be in focus for this action plan.

- **Working in Silos:** The city and its publicly owned companies have a variety of activities aimed at increasing sustainability. However, these activities are often not integrated, which limits their overall impact. This lack of integration is slowing down progress towards climate neutrality.
- **Organizational Lock-in:** The organizations involved have developed specific ways of operating over decades, which are embedded in all aspects of the organization. This results in conflicts between different perspectives and slows down implementation of climate-neutral practices.
- **Behavioural Change:** Achieving climate neutrality requires transformation at every level of the city. This includes changes in citizen behaviour to reduce greenhouse gas emissions, as well as changes in organizational behaviour. The city does not have control over all aspects of this transformation, which presents a challenge.
- **Suboptimization:** The tendency to optimize individual parts of the system without considering the overall impact can lead to counterproductive results from a climate neutrality perspective. It is difficult for organizations to fully understand or predict the consequences of suboptimization for the city as a system.

With the transition towards climate neutrality opens many opportunities e.g. those related to co-benefits. Also, the transition has the opportunity to evolve/develop Umeå to a better and healthier city. The transition may increase for example added value and co-benefits such as:

- Job creation
- Increased health



- Less air pollution/cleaner air
- New businesses and business models for value creation
- Improved socio-economy

The way of working and processes for planning is identified as a barrier. Since we are living and operating in a fast-changing world and new tools and methods of working are needed to fast adapt and enable planning of new technology and shifts in norms and behaviour. Becoming climate neutral is an immense shift that also needs to happen fast which requires new ways of working and planning, enabling faster transition of the city for example by creating “Centers-of-Excellence” around key challenges. Center of Excellence aim to drive organisational capacity for each systemic lever and is something Umeå intend to develop.

Engagement

Citizens and businesses have a long history of active involvement in Umeå’s sustainable development. Confirmed in the 2014 European Smart City benchmarking by Vienna University of Technology ranking the Umeå citizens Europe’s most environmentally aware citizens. They put pressure on the city to be progressive, bold and to put forward new green solutions.

Umeå has an opportunity/good starting position in the transition with a high awareness among actors and also a high engagement for developing a sustainable Umeå, examples of the engagement are in the Umeå Climate Roadmap, the business network Sustainable construction in cold climate and Umecom.

A basis for Umeå’s development is a high level of trust and engagement. Today, over 80% of the citizens are engaged in civil society organisations. The high degree of citizen engagement is a major component in our rapid and progressive development, as is our unique governance model for gender equality. How we can reach an even more elevated level of engagement is an ongoing challenge. The root system consists of social trust and stability. In Sweden, one of the countries with the highest levels of trust in the world, Umeå and the northern part of Sweden stands out. The EU SPI ranks Övre Norrland as #1 out of 272 EU regions (A:1). High levels of mutual trust and gender awareness, combined with a historically rooted “do-it-together” spirit, create unique opportunities for innovation.

Umeå has a high degree of citizen engagement. One way to measure this is voter turnout for the local elections which has increased from 82,2% (2006) to 87,1% (2018). In Umeå the ability to harness ideas from our citizens and communities is built into how we do things, with society built around citizen movements. An important building block in Umeå are NGOs and “popular education”, education on voluntary basis for all ages and without grades. The city allocates 6,5M€ annually to activities to be community driven through the NGO support Föreningsbyrån, supplying around 750 NGOs in the city with funding, to co-create activities for education, culture, sports, environment, diversity etc (A:2). Today, over 80% of the citizens between the age 18-64 are engaged in civil society organisations, and around 90% of children between 9-12, enabling broad uptake of ideas from youngsters and individuals (A:4).

Digitalisation is seen as an important enabler and opportunity for Umeå’s transition and World Economic Forum states that 20 % of emissions can be reduced by digital solutions. This is an opportunity and an area City of Umeå need to build capacity in within all the parts of the system.

Umeå comprehensive plan integrates perspectives and is a foundation for the transition. The strategies enable provides the opportunity for Umeå to grow sustainable.

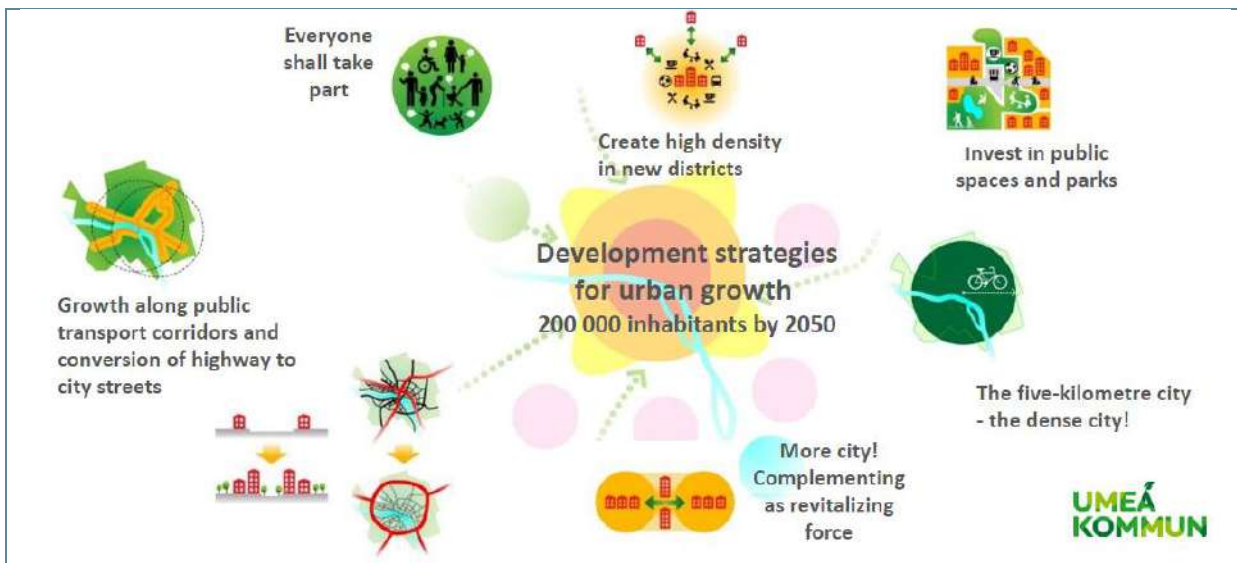


Figure 10 Umeå Comprehensive plan Strategies

Identified barriers below and some of the potential actions have been discussed with experts in many of the fields of action below. Some of them are from Research institutes (RISE) and Umeå University, local utility companies, in-house experts in Nature based solutions and Circular Economy, the municipal group holding company, municipal housing company and the Waste, water and sewage company, planning and infrastructure department and company.

Mobility and Transport

Transportation on road/passenger transportation

Passenger transportation on road is one of the biggest emitting sectors in Umeå, accounting for over 50 % of the total emission. The majority of the registered passenger cars in Umeå are powered by fossil fuels such as petrol and diesel. Shifting from unsustainable transportation driven by fossil fuels is one key challenge to reduce emissions and becoming climate neutral.

A set of transitions listed below is identified to have a significantly impact on emissions from the passenger transport sector:

- *Transition to sustainable modes of local transport.*
- *Smart traveling - reducing transportation need.*
- *Increase the utilization rate of passenger cars.*
- *Accelerate the transition of electric cars.*
- *Shift to biofuels.*

Stakeholders and systems:

To mitigate GHG-emissions from mobility and transport emission domain many systems are needed consideration. Those systems are technological/infrastructural, institutional/ regulatory, organisational, financial, political, social- and behavioural systems. The transport and mobility are a complex sector involving many stakeholders within and outside the city, regional and national. The main stakeholders of these systems are Businesses that develop and supply innovative technologies for transportation, such as electric vehicle (EV) charging infrastructure, advanced materials for lighter vehicles, and software for optimizing traffic flow. The City of Umeå, play a critical role in planning, implementing, and regulating urban transport systems also regional and National Governments who create overarching policies, regulations, and frameworks that guide transportation planning, funding, and environmental standards. Multilevel governance is important in this sector where local, region and national authorities align their work to accelerate the transition towards net zero. Local key stakeholders in the transition of Mobility and Transport emission domain are partners in the Climate Roadmap, having the potential to e.g. promote sustainable commutes, accelerate the transition to EV's and reduce their business CO2 emissions.



Transition to sustainable modes of local transport – Public transport, Bicycle and walking

City of Umeå has a well-developed public bus system with a fossil fuel free local public bus fleet, driven by either electricity or biofuels. The public transport is growing in Umeå and the number of travels has had a steady increase and since 2005 the travel has increased with 100 %. City of Umeå has been pioneer in ultra-fast charging electric buses, and the first fully electric bus was put in operation for over 10 years ago, today over 25 fully electric busses are in operation. Umeå is a growing city with the strategy to grow a long corridor for effective public transport utilization (see Figure 10 Umeå Comprehensive plan Strategies).

Umeå has a well-developed bike road network of over 300 kilometres of dedicated cycling paths that connect various parts of the city. These paths are well-maintained and offer a pleasant cycling experience for both commuters and recreational riders. With the strategy of expanding and developing Umeå within a 5 km radius or 15 min city making biking and walking beneficial modes of travel. In the latest travel survey 91 % of the city residents has access to bicycle and 76% of the residents has access to a car in the household.¹⁹

Umeå has good preconditions for shifting from fossil fuel passenger transportation to smarter traveling and more sustainable modes of transportation. However, there are several identified barriers to enable the transitions identified in the passenger transportation system. The barriers are listed below:

1. Limitations of Public Transportation network. A smaller city like Umeå has limitations in having an extensive public transportation network, absence of efficient and widespread public transportation options forces residents to rely more on personal vehicles. Also, a relatively small city makes the car more attractive due to its flexibility and speed.
2. Geographical and climate challenges – Umeå due its location in the Arctic has long, cold and dark winters with often lots of snow which makes biking and walking more difficult. Climate changes also affects by increasing the extent and intensity of snow dumps.
3. Cultural and behaviour aspects when it comes to driving kids to schools, leisure activities etc.
4. We are building in a system that demands transportation.
5. Information and awareness

Accelerate the transition of electric veichles

The rate of change for EV adoption has been 7,3 % per year since 2015.

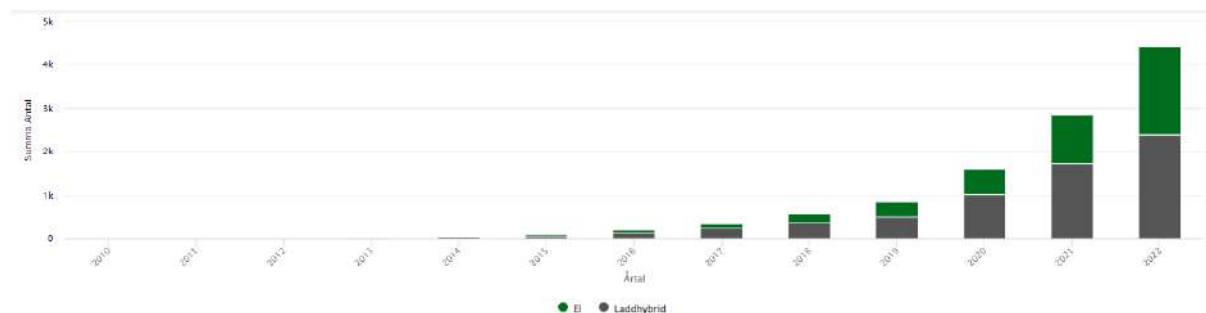


Figure 11 Growth of registred BEV and PHEV cars in Umeå.

The growth of registered BEV and PHEV in Umeå since 2010. The trend is clear and approx. 8 % of the passenger cars have an electric drivetrain in 2022. In the city of Umeå there are approx. 49 public charging stations with various amount of charging points. To be able to accelerate the transition of electric vehicles the capacity of EV charging needs to be increased. Scenario analyses conducted of

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<https://www.umea.se/download/18.7812482218690c08728819a0/1679067909860/Resvanor%20i%20Ume%C3%A5.%20s%C3%A5%20reste%20vi%20i%20kommunen%20h%C3%B6sten%202022.pdf>



the local electric grid shows a good robustness and capacity to handle future increase of EV charging with only minor upgrades²⁰.

The main identified barriers for adopting EV in Umeå are:

- Access to EV charging for residential and housing associations.
- Economic investment, price gap between cars with otto engines and electric
- Long distance combined with a cold climate, EVs has a significantly reduced range in cold weather.

Biofuels

A significant barrier is the shift in national policy for biofuel use in fossil fuels, the so-called reduction quota. The City has limited ability to influence the percentage of renewable fuels used in fuel consumption, which is established by national policy. Sweden's policies include a requirement to increase the blend of renewable fuels in gasoline and diesel until 2030, but this requirement has been paused in 2023 by the Government.

Increase the utilization rate of passenger cars.

The main identified barriers to increase the utilization rate of passenger cars are:

- Behaviour changes and convenience with limited access
- Shifting Norms of owning an own car

Smart accessibility - Avoid unnecessary transportation,

There is an opportunity to reduce emissions from traveling but also barriers to overcome. The global pandemic has thought us to work from distance and from home and with a good fast broadband within the city has there is a good pre-condition for reducing transportation need. However, there are barriers due to a society constructed for cars with services centralised in the outer parts of the city. Also, how the city is planned, for example new districts where there may be a lack of local municipal services which in turn drives transportation needs.

Freight transportation

The knowledge of the freight transportation system in Umeå are sparse and there is a need for a better understanding of its barriers and opportunities. Freight to and from the city centre has previous been explored in the project Freight Tails²¹ where focus was on safe and environmentally friendly freight transportations. Within in this category couple of key transitions have been identified to have a significantly impact on emissions from freight transport:

- Smart freight – reduce transport work.
- Improved utilization – increased load
- Electrification – shifting to electric trucks.
- Shift to Biofuels

Smart freight – reduce transport work and Improved utilization – increased load

The two transitions “Smart Freight” and “Improved utilization” are somewhat interconnected with the intention to reduce emission by reducing the traffic work from freight transportation. Umeå has a well-developed infrastructure network that creates the conditions for efficient and competitive logistics for all types of transport and that suits the various needs that business in the region requires, both in terms of passenger and goods transport.

²⁰ [Microsoft Word - PM nÅ†tanalys elbilslast \(umea.se\)](#)

²¹ https://archive.urbact.eu/sites/default/files/umea_iap_english_summary.pdf



The municipality has for many years deliberately developed the railway to create efficiency and redundancy in the railway facilities with intermodal transport in focus. Intermodal transport is a key to cost-effective and environmentally friendly transport, which is a must for the region's business community, which often transports its goods over long distances.

Even though investments in different modes of transport Umeå rely on single-mode transportation, like trucks, which can be less efficient than a combination of modes. Encouraging and promoting intermodal transport, where goods switch between road, rail, and sea is of importance.

Lack of data and real-time information about transportation routes and environmental impacts can hinder decision-making. Implementing advanced tracking and analytics systems can help provide the necessary insights.

Electrification – shifting to electric trucks.

To increase the electrification of trucks, Umeå needs to facilitate the establishment of fast-charging stations in strategic locations. The barriers for adopting electric trucks are similar for electrification of passenger cars, however challenges related to planning, logistics and business models that are adapted to the conditions of electric operation are also identified depending on the type of transports.

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Shift to Biofuels

See previous description on biofuels. However, there is an opportunity for procuring organisations to develop policy and increase demand of biofuels or fossil free fuels in freight transportations.

Maritime transport - Port of Umeå

Port and terminal operation comprises many diverse activities including cargo handling, energy management, fuel bunkering, ship operation and processing of hinterland transportation. In addition to maritime infrastructure, ports also provide facilities for non-maritime activities, i.e. power generation or industrial production.

Furthering greening in one field usually also requires adaptations in other areas: Terminal- or transport operators, for instance, can only use fossil-free equipment, if responsible port authorities invest in the corresponding infrastructure. Emissions are also linked to hinterland transport starting or ending in ports and the utilized modes have to make use of what is currently available.

The Port of Umeå is the northernmost Swedish port with regular container handling at practically ice-free conditions. Due to the long distances between ports in northern Sweden, and the unique conditions in the port of Umeå, the port has a significant importance as a transport link for the private industry in the region, and the catchment area is very large.

Aviation

The transition listed below is identified to have a significantly impact on emissions from aviation

- Increase share of biofuels in aviation

Aviation is a difficult and complex sector to decarbonize. Umeå depend on flight transportation, living in the northern periphery with long distances. The sector is highly dependent on fossil fuels. An opportunity is that Umeå has a relatively small airport that may/have the potential acting as a test bed for new green aviation fuels. The recent approved project FlyH2UME²² develops knowledge and prepares for a scalable facility at Umeå Airport for flights powered by hydrogen and later liquid hydrogen. The project contributes to accelerating the transition to a fossil-free flight where the development of aircraft, the airport's supply and the capacity of the electricity grid go hand in hand.

The Key stakeholders in this emission domain can be found in the Umeå Climate Roadmap, where Swedavia the national airport company are a local partner due to Umeå airport and also the local utility company.

²² [Sökresultat \(energimyndigheten.se\)](https://www.energimyndigheten.se)



Buildings and construction machines

Buildings

The transitions listed below is identified to have a significantly impact on emissions from buildings or more specific from energy used in buildings.

- Renovation/improve energy efficiency.
- (Reduce emissions from construction)

The Energy use in the construction and property sector stands approx. for 35 % of the total energy use²³. Renovations improving thermal efficiency and retrofitting of heat source from inefficient direct electric heating are identified as key transitions to reduce emissions from the building sector. Umeå has a cold climate with an avg. Outdoor temperature of 4 C²⁴ heating stands for approx. 60% of buildings energy use. Renovation of buildings are mostly conducted for the purpose of refurbish and maintenance/reinvestments. Retrofitting of heat sources has been done for many years in Umeå using more and more efficient technologies such as heat pumps which has created a local market with high competence. Renovation of buildings also generates emissions from manufacturing building materials (embodied energy/scope 3) which has an indirect effect on climate. It needs to be addressed and combined with actions to reuse materials and utilize e.g. materials binding coal and materials produced with less pollution. Umeå is growing with increased demand of energy, energy efficiency is an important measure to avoid investments in new energy infrastructure such as heating plants. In Umeå there is a network for sustainable construction in cold climate capture the whole building chain, a great opportunity and enabler to work with reducing emissions from the building sectors in all scopes. The city administration provides free and impartial energy and climate advice for the citizens, organisations and companies for over 20 years. They focus primarily on energy efficiency in building, renewable energy but also transport.

Main identified barriers for reducing GHG emissions are:

- Relative low energy price in norther Sweden which makes ROI difficult to achieve in short time.
- High initial costs and access to capital are obstacles to implementing energy efficient renovation.
- Split incentives depending on rental agreements e.g. share the economic benefits and investment for energy efficiency improvements in commercial buildings.
- Complicated processes, time consumption, uncertainty about cost savings and inconveniences in the accommodation during the renovation also appears as an obstacle for renovation of especially private own buildings.

Stakeholders and systems:

As mentioned in the emission domain mobility and transport many systems are needed consideration to mitigate CO2 emissions in the building sector. Those systems are technological/infrastructural, institutional/ regulatory, organisational, financial, political, social- and behavioural systems. The Network for Sustainable construction in cold climate are key-stakeholders, who has been working with sustainable construction since 2009. Some of the partners in Umeå climate roadmap are also involved in the network. The stakeholders are actors in the whole construction chain from planning, construction, management, regulations, education and market. ²⁵

Construction machines

The transitions listed below is identified to have a significantly impact on emissions from operation of construction machines:

- Electrification
- Increase share of biofuels



Construction machines are machinery used for various types of services and work. Examples are hand-held motorised tools, street sweepers, lawn mowers, wheel loaders and excavators. It is a diverse group of small and large machines, the impact on GHG emissions caused by machines used in the construction of buildings, road work.

The use of electrically powered hand-held machines is becoming more common, but there is still a limited range of electrically powered heavy machinery available. There is also a shortage of these machines on the market.

Using electrically powered machinery can be a significant investment, particularly for smaller suppliers, and the City's increased requirements for such machinery may lead to cost increases for contractors and hence the City.

Energy system

The transitions listed below is identified to have a significantly impact on emissions from the energy system.

- Reduce fossil content in waste.
- Energy production

Umeå's current energy system is fundamentally built from a centralized perspective, with centralized energy production for Heat and Electricity that is distributed in robust distribution networks to energy consumers in society.

Stornorrfor's Hydro powerplant is Sweden's largest in terms of output and is the primary electricity producer in the current system. The electricity grid has extremely high availability, where reliability is equally prioritized in urban areas as in sparsely populated areas. For a long time, we have systematically invested in reinforcement and capacity. Therefore, today we have a very high delivery reliability in comparison with the national average. In addition, the network fee in 2022 was Sweden's third lowest according to the annual mapping in the Nils Holgersson report.

The two combined heat and power plants at Dåva are primary heat producers and supply the District Heating Network with energy for heating 80% of Umeå, owned by the municipal company Umeå Energi. Other heating consists of individual solutions, e.g. heat pumps, biofuel, direct-acting electricity, etc. In 2022, district heating was supplied from 57% recycled, 42% renewable and 1% fossil fuel. The largest source of waste heat in the current energy system is the waste heat that is recovered from SCA Obbola (Paper factory) and transferred to the district heating network with heat pumps. See appendix 3 for current state of the energy system in Umeå and future scenario towards climate neutrality²⁶.

Stakeholders and systems:

The energy system is complex and to decarbonize the energy system the emissions occurring through energy recovery from waste need to be reduced significantly by reduce plastics in society. The systems needed considerations are among others local business within Waste Management and Recycling and Material Recovery Facilities, Policy and Regulatory Frameworks, Research and Development and behavioural system. Key stakeholders are partners in Umeå Climate Roadmap.

Reduce fossil content in waste.

In the DH-system in Umeå 57% are recycled energy and approx. 27% of total production comes from energy recovery of waste. The residual waste contains fossil plastics which is the biggest source of fossil emission from the system. It stands for approx. In addition to producing district heat, energy recovery of waste plays a vital role in managing the waste generated by the society, reducing the need for landfilling. Also, the CHP plant connected to the district heating provide local electricity. The district heating system is as a very important asset for the city with future opportunities to increase the uptake

²³ [Bygg- och fastighetssektorns energianvändning uppdelat på förnybar energi, fossil energi och kärnkraft - Boverket](#)

²⁴ [Klimat Umeå: Temperatur, Klimat graf, Klimat bord \(climate-data.org\)](#)

²⁵ <https://hallbarahus.se/om-oss/>

²⁶ See attachment "Current state of Umeå energy system"



of waste heat. The identified barriers to overcome reducing fossil content in waste for energy recovery are:

- Consumer awareness and behaviour.
- Infrastructure and recycling
- Corporate responsibility – transition to more sustainable packaging or practices.

Energy production

The demand of renewable energy is increasing in Umeå due to the transition locally but also globally. One RES drive are the electrification of society and the intention to utilize other green energy carriers. The energy system is an important enabler for conducting the transitions towards climate neutrality even though Umeå has well developed energy system there are some key barriers to overcome:

- There is an increased need to handle larger energy transfers where extension and reinforcement of grid slows down due to long permit processes.
- Increasing share of more intermittent energy production
- Lack of competence supply in the field

Waste and Circular Economy

Key transitions:

- Reduction of plastic waste
- Increase energy recovery
- Reduce residual waste

Umeå have been working with circular economy for many years. Umeå is the only Swedish municipality included in the OECD program for circular economy, which aims to minimize waste and maximize recycling and reuse of resources. Umeå has high ambitions developing Umeå Eco Industrial Park, it will become a living environmental center that attracts activities, education, and research in the areas of environmental technology, recycling, energy and local production. Industrial symbiosis will naturally develop between companies, academia, and the public sector. Umeå Eco Industrial Park is an important upcoming investment hence it could have major potentials off setting carbon emission from the CHP plant by e.g. CCU solutions. Umeå has experience and knowledge regarding sharing economy such as car-pooling and e-bike pools e.g. tested in projects like Sharing cities. However, there are some identified key systemic barriers for reducing waste and increase circular business models.

- The Tax-system meaning that the cost to repair stuff vs buying new things is too high.
- Design of products in early stage promoting long life span and repairability.
- Behaviours and attitudes are considering a major barrier in waste and circular economy to overcome.
- Conflict between parts of the business community when promoting sharing economy.

Stakeholders and systems

To effectively increasing circular economy practices and reducing waste in Umeå, a multifaceted approach involving various systems and stakeholders is essential. This approach should be comprehensive, integrating policy, technology, infrastructure, and community engagement to create a sustainable, circular system. Key stakeholders are partners in Umeå Climate Roadmap.



Tabell 8 A-3.2: Systems & stakeholder mapping

A-3.2: Systems & stakeholder mapping				
(Fill out according to Action Plan Guidance and Explanations)				
System description	Stakeholders involved	Network	Influence	Interest
Local climate action/City actors collaboration 54 partners ²⁷	University and research instituts	Local climate action roadmap mobilizing companies and academia to reduce the city of Umeå green house gas emissions in several sectors: Mobility and transport, Energy, built environment, Consumption and circular economy, Food and farming and carbon sequestration	Comitted to contribute to reduce the GHG in Umeå in line with Paris agreement	Business opportunities; Saving money; improving image; reduce emissions
	Stakeholders from variety of branches: <ul style="list-style-type: none"> • Construction companies • Industry • Consult firms • Bank • Hotel and restaurant • Transport • Municipal companies (Utility company, Waste and water, housing) • Forrest industry • Housing companies 			
	Organisations			

²⁷



Governance and policy	National, local level; 23 Swedish cities, 6 government agencies and Viable Cities	<p>The Viable Cities programme. Climate City Contract 2030 – a concentrated effort from Swedish cities and the national level to speed up the work on reaching climate neutral cities.</p> <p>This includes transition labs, workshops and an annual signing event with City mayors.</p>	<p>A long-term commitment that ensures cooperation between cities and the state-level, further assuming multilevel governance through quadruple helix collaboration, not least with civil society. Revised annually.</p>	<p>Learning; enable/speed up transition to a good life in Umeå</p>
	<p>Regional Governments, Administrative Board och County Västerbotten, Region of Västerbotten</p> <p>Local government</p>	City Staff	<p>Influence on regional policy level, coordination</p> <p>City planning</p>	<p>Leads the regional work on the energy transition and reduced climate impact. We coordinate the work and provide support to businesses, municipalities and authorities on these issues.</p> <p>Develop a city in line with the Umeå goals</p>
Research and innovation	City administration; University of Umeå	Strategic partnership with Umeå University	<p>Focus on: Sustainable city development (Focus on Climate Neutrality etc.), Providing and developong Competens, Digitalization/AI</p>	New research areas, applied research, learning and evaluation, knowledge, develop a better Umeå
	SLU, City of Umeå	Collaboration agreement with SLU	<p>Development of Umeå as a sustainable city, BioEconomy, Providing competens</p>	New research areas, applied research, learning and evaluation, knowledge, develop a better Umeå



	<p>Research institutes, Region of Västerbotten, County administrative board, City administration</p>	<p>Innovation Partnership Umeå</p>	<p>Sustainable cities and societies, Bioeconomy, Smart circular industry, Digitalization and AI, Health and wellbeing, Competens</p>	<p>...</p>
	<p>The 4 Northern regions of Sweden, N6 the six biggest cities (Umeå one), universities and R/I institutes</p>	<p>Regional Innovation Partnership for Northern Sweden</p>	<p>Six Innovation platforms, Bio economy, Sustainable cities and societies, Life Science, Cleantech, Digitalization</p>	<p>...</p>
	<p>Umeå, Vasa</p>	<p>Joint development strategy with Vasa</p>	<p>Business cooperation, Common labor market region and strong university towns, Strong attractive urban and living environments, Shared experiences, more cooperation in culture and leisure</p>	<p>...</p>



<p>Business collaboration</p>	<p>Companies/Organisations/R&I organisations involved in: Administration, Planning, construction, Market, regulations, Development/training,</p>	<p>The Network for Sustainable construction in cold climate</p> <p>Nätverket för hållbara restauranger</p> <p>North Sweden Clean Tech</p> <p>Industry Council</p>	<p>Increase knowledge about sustainable construction and management in the cold climate. This must be done through cross-border pilot projects, trainings, research and evaluation projects, seminars and information initiatives. Influence in the whole building chain.</p>	<p>Create a market for sustainable construction and management. Create action in all parts of the construction and management chain. Contribute to a faster transition to new technology in the construction and management chain</p>
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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

Tabell 9 Impact Pathways as attachment Impact_Pathways_B1.1

The Impact Pathways can be seen in attachment: [Impact_Pathways_B1.1](#)

B-1.2: Description of impact pathways

The Impact Pathways are identified on where viable on the systemic barriers on an overall level:

- Working in Silos
- Organizational Lock-in
- Behavioural Change
- Suboptimization

Also, the pathways are based on the identified barriers and opportunities in each field of action and its sub-categories. However, more work is still needed to develop the pathways along with the identified barriers and opportunities to further improvements as part of the work process.

Barriers identified under each transition have been used to build up the pathways towards climate neutrality. The three strategic systemic priorities (See commitments section under module 3.²⁸) have been guiding the development of the pathways for the city of Umeå. These three strategic priorities are:

- FOSSIL FUEL FREE TRANSPORTS AND SMART MOBILITY
- CIRCULAR SYSTEMS AND RESOURCE FLOWS
- MANAGE RESIDUAL EMISSIONS

Transport and mobility is an emission domain that emits most direct GHG emissions in Umeå and much focus has been put on developing pathways in this field with a total of 7 defined pathways. Those pathways are intended to deal with actions such as mobility management, charging infrastructure and promote healthier modes of transport, to name a few examples. The major emission-reducing potentials

²⁸ Umeå CCC Commitments March 2024



in the scenario are found in phasing out fossil fuels in transportation and for construction machines as well as adopting smart climate neutral mobility. This means less trips with fossil fuel cars, increased usage of alternative modes of transport such as walking and cycling and furthermore electrification of construction machines and road vehicles. These necessary changes are part of the strategic prioritization due to their GHG reduction potential.

The priority Circular systems and resource flows include emission domain Waste and energy systems where approx. 20 % of Umeå emissions occur. One pathway connected to this systemic priority is about reducing energy recovery from plastics.

Managing residual emissions has been identified as strategic priority based on the need to handle emissions that are hard to abate. Two pathways were designed to on the one hand initially build further capacity and on the other hand plan the development of robust strategies and roadmaps for handling residual emissions in Umeå with technology and Nature based solutions.

The Impact pathways should be seen as a dynamic scenario and will evolve and be iterated over time, according to the work process adopted.

The pathways with their late outcomes are developed based on the scenario developed with Material Economics²⁹. The pathways and portfolio descriptions are a mix of decided measures and new ones. The next steps are to conduct an engagement process anchoring the pathways in the local stakeholder ecosystem (e.g. Stakeholders of the Umeå Climate Roadmap (UCR)) and start co-designing more detailed aspects of the pathway with identified stakeholders. The municipal group has decided to carry out this plan 2024 within the framework of the UCR. The Pathways in this CCC are a starting point for us getting a detailed understanding of what changes we need to achieve to reduce the emissions according to the targets. The impact pathways have an important role to play regarding communication, telling the story of how a systemic transformation in Umeå is possible to achieve.

The municipality's ability to drive change is a critical success factor. Working with the systemic levers is an important part of that and enables a more holistic transition. The City of Umeå needs to practice working with the levers and apply them to address the systemic barriers. This will strengthen the capacity for a holistic approach on transition. The way Umeå intends to do that is to develop a Center of excellence (CoE) for learning and capacity building for each lever. This will help the development and implementation of our pathways. Furthermore, it is crucial to strengthen learnings across projects and initiatives as well as condensing knowledge from similar processes. Better structures for organisational learning will help to make better use of results, which helps implementation and scaling up, which is another purpose of developing CoE.

The Impact Pathways contains 6 Fields of Actions:

- Energy Systems
- Mobility and Transport
- Waste and circular economy
- Built Environment
- Industry
- Green infrastructure and Nature Based Solutions

As the Umeå CCC evolves and iterates over time, the details of the pathways in each “Field of Action” will grow. We have divided every Field of Action into different pathways containing a set of key transition(s), each describing a specific activity shift needed to full fill a need in a climate neutral way³⁰. For example: shifting fossil fuel cars to electric vehicle. The intention is to break down the overall transition into more manageable pieces where each transition is quantified. This is built upon and lined with the Umeå climate roadmap framework. The transitions lay the foundation for a scenario based planning approach towards climate neutrality and will be used to enable dynamic scenario planning using e.g. Climate OS as the next steps.

The Impact Pathways column” Early Outcome” = Early change and “Late Outcome” = Transition.

²⁹ Attachment "Material economics report on investments for climate neutrality" -2023

³⁰ Attachment "Material economics report on investments for climate neutrality" -2023



The majority of the direct impacts and Co-benefits have been estimated together with McKinsey - Material Economics and their simulation tool called “Decarbonization engine”. See attached report “Material economics report on investments for climate neutrality”. This is a top down and bottom-up analysis based on data collected from many research reports, statistics from Umeå and Sweden as well as several global experts. Although the underlying figures and assumptions in this document are based on reputable sources, they should still be considered indicative and are subject to change. The report estimates investments in electric vehicles, change of heating technology, insulation of houses, etc. as well as cost savings as a result of lower consumption of fuel, etc. However, the model does not take into account, for example, investments in infrastructure to favour a certain transition, such as new cycle paths, charging infrastructure or educational campaign. The cost for these enabling actions are included in the Investment plan.

The energy system decarbonisation potential is relatively low due to low emissions from electricity production and from the production of district heating. However, Umeå has a high energy demand for heating which makes this sector important, also adding many co- benefits such as improved wellbeing and productivity e.g when improving housing energy performance. The district heating system is connected to 80 % of the buildings in the city of Umeå and energy recovery from waste is used as a major source of energy in the City’s CHP plants. This means that the impact pathways tackling energy systems, waste and circular economy and built environment are highly intertwined. To further reduce the emissions connected to heating of buildings, the complex issue of fossil-based plastics ending up in the CHP needs to be addressed.

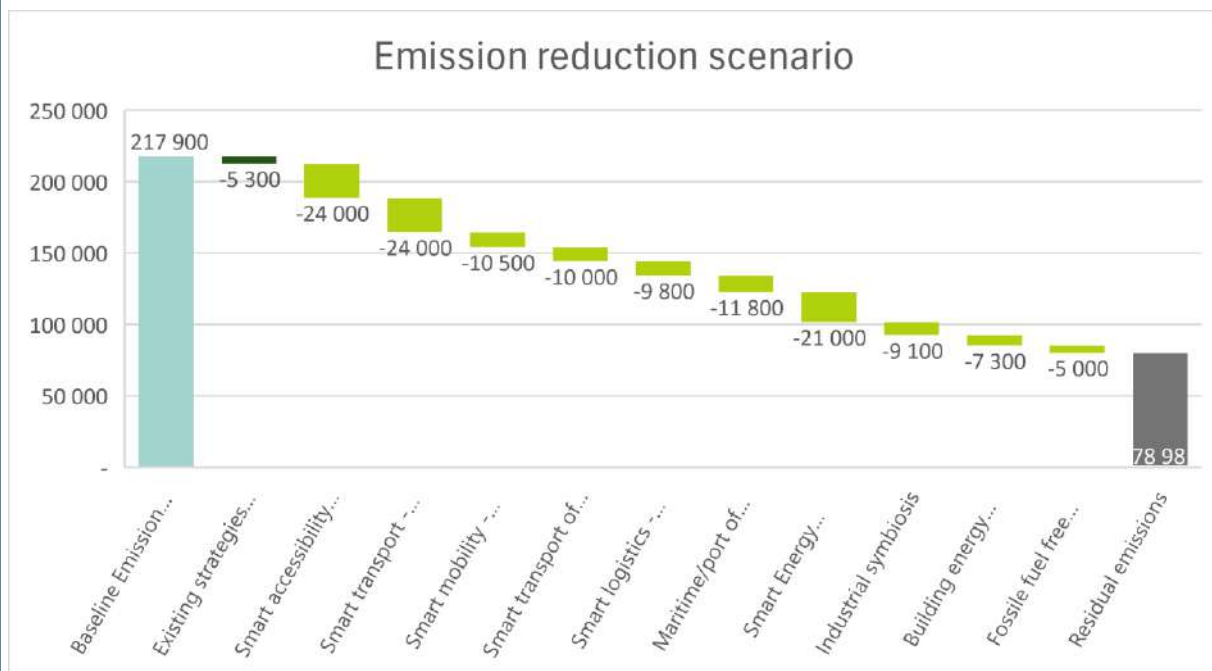


Figure 12 Emission reduction scenario for developed pathways potential direct GHG impact included the impact from existing strategies.

Socio economic analyses – Co-benefits

A transition to a climate-neutral society produces many positive effects in the form of, for example, improved health, improved air quality etc when a larger part of the population walks, bicycle, using public transport services and drives electric cars. Work that must take place in the transition, for example in the form of energy-efficient buildings, also creates many new jobs. Co-benefits such as improved health and air quality has been estimated for the city of Umeå to provide socio economic benefit of 130 M€ until 2050.



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).

Tabell 10B-2.1: Description of action portfolios - textual or visual

B-2.1: Description of action portfolios - textual or visual			
Fields of action	Portfolio description: The transition portfolio in Umeå intent to show what types of actions in each field of actions and under each transition(s) and pathway that needs to be conducted with the aim to close the emission gap. The actions shall be seen as partly suggestive actions based on analyses conducted together with McKinsey. The actions/projects and the early outcomes are developed based on the scenario, what we see needs to be done. It is a mix of partly decided measures and new ones. The next step is to conduct an anchoring process and engagement process. This is decided in the municipal group and planned for in the climate roadmap to be carried out under 2024. The actions are on an overarching level based on the scenario from McKinsey and can be seen as opportunities for the transitions.		
	<i>Pathway and sector</i>	<i>List of actions</i>	<i>Descriptions of potential actions in the roadmap</i>
Mobility and transport	Smart accessibility - Avoid unnecessary transportation <i>(Smart accessibility - Avoid unnecessary transportation for reducing the need of travel/commute in Umeå)</i> Passengertransport	Increase access to reliable high speed fiber network	Maintain and invest in fiber and /or mobile internet connections to enable good connectivity.
		Early implementation IT-technology for enable samrt accessability	ICT and AI solutions for enable and scaling smart travel technology and for reduce the need of travel.
		Improved accessability local public services	Actions in city planning by planning and develop Umeå towards a "15 min city" having the needed services close to peoples homes with the intent to reduce the need for travel.



		Scaling Mobility magement	Mobility management by promote solutions for avoiding unnecessary transportation and Development of goverment and company policies for working from hom e.g. Telecommuting and Flexible Work Policies
<p>Smart transport - Increase the share of fossil-free transport <i>(Transitions from a fossil fuel car fleet to a electric car fleet)</i></p> <p><i>Passengertransport</i></p>	Increasekd electricfication fo public transport		Investment in new electric busses for public transport within the city.
	Increased deployment of EV-charging		Promote, Enable and invest in deployment of public charging the intent is to make the transition to electric cars easier
	New bussiness models for EV charging in place		Developed bussiness models for EV charging
	Increased procurement of EV's		Promote Public and private organizations buying/leasing BEV instead of fossil fuel powerd cars and/or procure electric transportation for their transportation needs.
	Develop a fuel Strategy inkl EV charging		The administration of Umeå togethter with relevant stakholders intend to develop a fuel and EV-cahrging strategy for the city
	Develop of traffic regulations to favour more sustainable transport		Activities to favour public transport within Umeå
	<p>Smart mobility - Increase the range of mobility services <i>(Transitions from</i></p>	Increased development of Mobility magement	



<p><i>fossil fuel means of transport to public and health beneficial means of transportation.)</i></p> <p>Passenger transport</p>	<p>Increased availability of public transport</p>	<p>Enhance and extend railway connections and build train stations/travel centers along the railway to enable sustainable travel. Construction of Norrbotniabanen</p>
		<p>Increase the availability of public transport - Invest and expand in new routes for public transport ex. BRT, incl CO-finance of travel centers</p>
	<p>Modernised public transport</p>	<p>Modernisation of public transport - Invest in electric busses for public transport where possible</p>
	<p>Increased Promotion and improvements of public transport and cycling</p>	<p>Changed use of public spaces e.g. less parking, pedestrian streets - Apply green parking norm and reconstruction of city streets with intent to promote healthier modes of transportation.</p>
	<p>Increased development of Mobility management</p>	<p>Develop testbeds for improved local transportation - Includes actions such as applying for external funding, eg innovation and development projects testing new ways to improve local transportation</p>
	<p>Increased development of Mobility management</p>	<p>Health-promoting transport - Includes investments in bike lanes, campaigns with the intent to shift from local transport by cars to walking and biking.</p>
<p>Smart transport of goods - Increase the proportion of fossil-free transport <i>(The pathway intends to accelerate the shift to electric light- and heavy trucks and improve logistics.)</i></p> <p>Freight transport</p>	<p>Increased charging infrastructure for trucks</p>	<p>Includes actions to enable charging of heavy trucks in the city</p>
	<p>Increased number of procurements of electric goods delivery</p>	<p>This action may include development of procurement policies to reduce emissions from freight operations.</p>



	Fossil fuel free Construction Machines <i>(Transitions towards fossil fuel free construction machines)</i>	Increase promotion of fossil fuel free construction machines	Promote fossil fuel free construction machines	
		Pilot project with fossil fuel free construction machines'	Piloting fossil fuel free construction site	
	Smart logistics - More efficient logistics Freight transport	Increased uptake solutions for logistics optimization	Capacity building - Build digital capabilities and promote digital solutions for optimization of logistics	
		Multi modal transport	Multi modal transport - Includes activities to enable logistics by combining modes of transport (Multi modal transport) - enabling actions to promote transport by rail e.g Norrbotniabanan	
	Maritime/port of Umeå	Ongoing demonstration projects	Engagement in demonstration projects and initiatives TBD	
		Ongoing reconstruction and modernisation	Included activities to electric power supply for ships and enable more goods transport by sea	
	Aviation	Ongoing demonstration projects	Engagement in demonstration projects and initiatives TBD	
	Energy systems	Enabling Electrification	Enhance and reinforce electric grid	Through the investment program for electricity networks, it is expected to enable increased electrification that corresponds to 2–3 times the current electricity consumption in the municipality.
		Smart Energy recovery - Reduce fossil content for energy recovery from waste <i>(Transitions to Renewable energy sources.)</i>	Post sorting plant	Reduce fossil content in waste used for energy recovery - Includes investments in post sorting of plastic waste, promoting of waste sorting for recycling and waste content requirements of waste used for energy recovery



		Increased uptake of waste heat	Energy recovery - it includes activities to increase the uptake of waste heat from the city.
		Increased energy flexibility	Flexible energy usage - Includes activities such as development and promoting new business models for flexible energy use.
		Increased recycling	Enable recycling - Includes activities such as enhance Waste Sorting and Collection Systems and Promote Recycling Facilities
Built environment	Improve building energy efficiency <i>(Transitions to improve energy efficiency)</i>	Increased renovation projects	Improve thermal comfort - This activity includes energy advice service to citizens and organizations and investments in public buildings promoting thermal efficiency and efficient heat sources
		Increased energy efficiency projects	Energy efficiency measures - Retrofitting of building systems with energy efficient technology to reduce electricity use and heat. This involves actions to increase capacity in digital solutions for energy optimization and energy advice to companies.
		Piloting Energy communities	Energy communities - Activities to promote and enable energy communities, sharing of surplus energy a vital part of developing positive energy districts
Industry	Negative Emissions <i>(Tackle Residual emissions)</i>	Develop a roadmap to drive the transition towards "Negative emissions" that covers actions for each lever.	Develop a roadmap for residual emissions
Waste & circular economy	Industrial symbiosis <i>(Transitions including actions about smart use of resources)</i>	Marketplace for re-use of construction material in operation	Re-use of construction materials - This activity includes development of a marketplace for second hand construction materials and potential other activities.



		Clear steps taken to develop Dåva Eco Industrial park	Develop Dåva Eco industrial Park - Includes activities to promote smart use of resources such as utilizing waste heat or other waste streams such as CCU
		Building start of sewage waste treatment plant	Energy recovery from waste streams - This activity may include investments in energy recovery from sewage waste and biogas uptake from sewage treatment
Green infrastructure & nature-based solutions	Increased Nature Based Solutions (NBS) <i>(Transitions to increase the use of NBS)</i>	Roadmap for NBS solutions	Develop a roadmap for residual emissions

The above table presents a selection of portfolio actions that are clustered into the most important fields of action for Umeå and needs further development as mentioned above. Those actions as mentioned above will be further developed and new ones will be added together with stakeholders in the Umeå climate roadmap. The table below is an example of an action outline for the pathway/portfolio Smart transport. The intent is to further develop individual actions outlines for the different portfolios. We see this as a start of developing a comprehensive transition portfolio for the city of Umeå.

Tabell 11 B-2.2: Individual action outlines

B-2.2: Individual action outlines		
Smart transport - Increase the share of fossil-free transport		
Actions	Type	Technical Interventions Physical and Spatial Procurement actions Business models Planning



	Description	<p>Investment in electric busses and fossil fuel free options.</p> <p>Massive increase in purchase of electric vehicles for use in fleets or by individuals.</p> <p>Promote, Enable, and invest in deployment of public charging for EV cars and busses.</p> <p>Develop and deploy new business models for EV charging</p> <p>Develop a fuel Strategy incl EV charging.</p> <p>Develop of traffic regulations to favour more sustainable transport</p> <p>Procurement of fossil fuel free transportation services.</p> <p>Develop a center of excellence for learning and building capabilities</p>
Reference to impact pathway	Field of action:	Mobility and transport
	Systemic lever:	<p>Governance and policy</p> <p>Social innovation</p> <p>Learning and capabilities</p> <p>Technology and infrastructure</p>
	Late Outcome:	100 % Electric busses and 78 % of car fleet are EV's
Implementation	Responsible bodies/person for implementation:	The City of Umeå Administration
	Action scale & addressed entities	Scaling electrification of passenger transport is key to reduce carbon emissions from the sector
	Involved stakeholders:	Partners in Climate Road Map
	Comments on implementation – consider mentioning resources, timelines, milestones	This is a combination of interventions and investments with many stakeholders involved and affected. Cooperation and collaboration are a key for the actions outlined.
Impact & cost	Generated renewable energy (if applicable):	Na
	Removed/substituted energy, volume, or fuel type:	from fossil fuels to electric
	GHG emissions reduction estimate (total) per emission source sector:	Potential for the actions outlined is to reduce the GHG with 24 000 tonnes
	GHG emissions compensated (natural or technological sinks):	Na
	Total costs and costs by CO2e unit:	159,9 M€ or [6662 €/tonne CO2]



B-2.3: Summary strategy for residual emissions

The residual emissions stem from all emission domains but as mentioned above most of them come from Waste, IPPU and AFOLU sector due to more work is needed to develop the pathways and actions to get a better understanding of the true residual emissions.

In the transportation domain, we encounter the highest levels of residual and hard-to-abate emissions, primarily due to the sector's significant reliance on fossil fuels. In 2030 there will still be transportation using fossil fuels since cars driven by fossil fuels sold today will still be in operation in 2030 if existing regulations and policies are not changed.

The residual emission offsetting is explored by future development/installation of CCS and/or CCU. Within the city of Umeå there are two larger industries with point emissions where there is potential to capture carbon. A first initial analyses of the potential of CCS have been conducted for those two industries. It indicates a total capturing potential of 620 ktCO₂ where 550 kt are biogenic CO₂ (See figure Figure 13 Displays the approx. potential for CCS and negative emissions from two of Umeå's largest point emitters.). The CCS scenario needs to be further assessed and developed into a more detailed strategy in collaboration with relevant stakeholders.

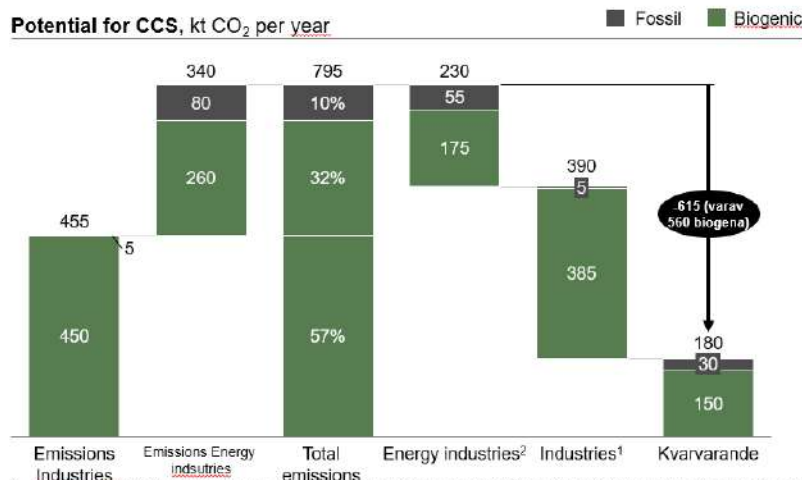
The potential of biological carbon sinks within the city of Umeå needs to be assessed and further investigated to see how the city may maximize the potential of biological sequestration and how this can help offset residual emissions. This field of action also called Nature based solutions (NBS) needs to be further utilized in developing Umeå towards a climate neutral city. There are plans to investigate the carbon storage potential by NBS/natural carbon sinks in existing action plans.

There are many potential solutions, both technology and NBS for Carbon sequestration where the city of Umeå needs to analyse how these different solutions can be utilized in the local context. One of Umeå's three strategic priorities is "Manage residual emissions" and there are actions planned to learn and build capacity in this field within the city of Umeå, the administration, and develop a roadmap for managing the residual emissions.

Potential for CCS ~620kt of emissions from Industries of which ~550 kt biogenic CO₂

ILLUSTRATIVE EXAMPLE

Potential for CCS, kt CO₂ per year



Over 550 kt of biogenic CO₂, i.e. more than 2x Umeå's total emissions can potentially be captured every year through CCS at both Dåva and Öbböla

Thanks to these being biogenic, they are seen as negative emissions and could be used to compensate for Umeå's remaining emissions

Figure 13 Displays the approx. potential for CCS and negative emissions from two of Umeå's largest point emitters.



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)

Umeå has started the work with indicators, and it is part of the plan for 2024 to continue develop these. The indicators below are a list of adopted and suggested indicators. TBD = To be defined.

Tabell 12 B-3.1: Impact Pathways Indicators

B-3.1: Impact Pathways Indicators						
Pathways	Indicator No. (unique identified)	Indicator name		Target values		
				2025	2027	2030



(List early changes/ late outcomes and impacts to be evaluated by indicator)	(Indicate unique identifier)	(Insert indicator name)	Present value(2021/2022)	(List one value per indicator)	(List one value per indicator)	(List one value per indicator)
Climate neutral city compared to 1990	1	Change in total emissions compared to 1990 (target baseline year)	(2021) -34%	TBD	TBD	-85%
Climate neutral city 2030	2	CO ₂ e per capita (Scope 1 and 2 emissions)	(2021) 2,35 ton CO ₂ e/capita	TBD	TBD	TBD
Climate neutral municipal organisation	3	GHG emission for the municipal group [kton]	(2022); 94	14	TBD	TBD
City transportation indicator	4	Share of sustainable modes of travel (Buss, Bike, Walk)	(2022); 44 %	65%	TBD	TBD
Smart transport	5	Energy use of liquid non-renewable fuels, MWh per inhabitant (Fossil fuels)	(2021); 7,92 MWh/capita	TBD	TBD	TBD
	6	Share of vehicle fleet that are EV	(2022) ~8%	TBD	TBD	TBD
Smart mobility	7	Energy use / person km [kWh/pkm]	(2022): 0,11	TBD	TBD	TBD
Smart accessibility	8	Reduced Vkm with cars	(2022) 343 Million V-KM	TBD	TBD	30%
Smart transport of goods	9	Share of fossil free fuel	Nd	TBD	TBD	TBD
Smart logistics	10	[kWh/ton-km]	Nd	TBD	TBD	TBD
Maritime/port of Umeå	11	TBD	Nd	TBD	TBD	TBD
Aviation	12	TBD	Nd	TBD	TBD	TBD



Smart Energy recovery - Reduce fossil content for energy recovery from waste	13	Emissionfactor for Distrcit heating	(2021) 50,1 g/kWh	TBD	TBD	50%
Industrial symbiosis	14	Waste to energy recovery [Tonne] / total waste [Tonne]	53%	TBD	TBD	TBD
	15	re-use of materials [tonne]//total waste [tonne]	0,01%	TBD	TBD	TBD
	16	recycling of materials from waste [tonne] /total waste [Tonne]	8%	TBD	TBD	TBD
building energy efficiency	17	kWh/sqm, year	(2021) 128,9	TBD	TBD	TBD
Fossile fuel free Construction Machines	18	Share of fossil fuel free working machines	Nd	TBD	TBD	TBD
Negative emissions and Increased NBS	19	TBD	Nd	TBD	TBD	TBD
Co-benefit: Air quality indicator	20	nitrogen dioxide(NOx) number of days over 60 µg/m3	(2022) 8 Days	Environmental quality standard (MKN) for nitrogen dioxide (SFS 2010:477)		

Tabell 13 includes all tables with Metadata for Indicators

B-3.2: Indicator Metadata (1)



(For each indicator selected)	
Indicator Name	Climate neutral city compared to 1990
Indicator Unit	Relative [%]
Definition	Change in total emissions compared to 1990 (target baseline year)
Calculation	Total Emissions current year / Total Emission 1990
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[Yes]
If yes, which emission source sectors does it measure?	All sectors
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[No]
If yes, which action and impact pathway is it relevant for?	
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Local data, data from RUS
Is the data source local or regional/national?	Local and national
Expected availability	Annually, lagging min 1,5 years.
Suggested collection interval	Annually
References	
Deliverables describing the indicator	

B-3.2: Indicator Metadata (2)



(For each indicator selected)	
Indicator Name	CO2e per capita (Scope 1 and 2 emissions)
Indicator Unit	CO2e/capita
Definition	CO2e S1+S2 for city of Umeå divided by the population
Calculation	CO2e/population
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[Yes]
If yes, which emission source sectors does it measure?	Cross sector indicator measuring direct and indirect emissions from all sectors. Scope 3 excluded.
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[No]
If yes, which action and impact pathway is it relevant for?	Actions in the transport sector with the intent to reduce fossil fuels.
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Local data, data from RUS
Is the data source local or regional/national?	Local and National
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	



B-3.2: Indicator Metadata (3)	
(For each indicator selected)	
Indicator Name	Climate neutral municipal organisation
Indicator Unit	[kton]
Definition	GHG emission for the municipal group [kton]
Calculation	GHG inventory for the municipal group, GHG-protocol.
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[Yes]
If yes, which emission source sectors does it measure?	All sectors
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
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 target directly to the municipal group
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	From the organizations
Is the data source local or regional/national?	Local data
Expected availability	Annually
Suggested collection interval	Annually



References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (4)	
(For each indicator selected)	
Indicator Name	Share of sustainable modes of travel (Buss, Bike, Walk)
Indicator Unit	[%]
Definition	Share of sustainable modes of travel (Buss, Bike, Walk) in the city
Calculation	From Travel Survey conducted by the city
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	% of sustainable modes of transport in the city
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 with purpose to increase the sustainable modes of travel
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	From travel survey every 8th year and travel data from google EIE annualy
Is the data source local or regional/national?	Local data
Expected availability	From travel survey every 8th year and travel data from google EIE annualy
Suggested collection interval	Annually and every 8th year
References	



Deliverables describing the indicator	
Other indicator systems using this indicator	The city monitoring this indicator

B-3.2: Indicator Metadata (5)	
(For each indicator selected)	
Indicator Name	Fossil fuel free transport
Indicator Unit	MWh/year and capita
Definition	Energy use of liquid non-renewable fuels, MWh per inhabitant (Fossil fuels)
Calculation	MWh fossil fuels / Inhabitants
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[no]
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?	
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 in the transport sector with the intent to reduce fossil fuels. Pathways within transports.
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Sweden Statistics - Municipal and regional energy use
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	



Other indicator systems using this indicator	

B-3.2: Indicator Metadata (6)	
(For each indicator selected)	
Indicator Name	Electrification of passenger transport
Indicator Unit	Share of cars with electric drive train
Definition	Share of car fleet electrified (BEV + PHEV)
Calculation	Nr of registered passenger cars with electric drive train / total registered cars in Umeå
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co- benefits)?	[Yes]
If yes, which co-benefit does it measure?	Nr on EV's
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 in the transport sector with the intent to increase uptake of EV's. Pathway "Smart Transport"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Transport analyses (trafa,se)
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (7)	
(For each indicator selected)	
Indicator Name	Energy use per person Km



Indicator Unit	kWh/Pkm
Definition	Total energy used for transportation divided by calculated total Pkm in Umeå
Calculation	Total energy used for transportation divided by calculated total Pkm in Umeå
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[no]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[Yes]
If yes, which co-benefit does it measure?	Pkm
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]
If yes, which action and impact pathway is it relevant for?	Pathway: "Smart Mobility"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	SCB, Trafa and RUS, google EIE
Is the data source local or regional/national?	Local and national
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (8)	
(For each indicator selected)	
Indicator Name	Smart accessibility - Avoid unnecessary transport
Indicator Unit	[vkm] Vehicle kilometers
Definition	Reduced vkm with fossil fuel cars
Calculation	Nr of registered fossil fuel driven cars * annual avg. distance per car
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[no]



If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[Yes]
If yes, which co-benefit does it measure?	Vkm
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 in the transport sector with the intent to avoid unnecessary transport
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	Transport analyses (trafa,se) and RUS
Is the data source local or regional/national?	National and local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (13)	
(For each indicator selected)	
Indicator Name	Emission factor for District Heating
Indicator Unit	g CO2e /kWh
Definition	Emission factor for District Heating
Calculation	CO2e / sold kWh district heating
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[Yes]
If yes, which emission source sectors does it measure?	Energy systems, District heating



Does the indicator measure indirect impacts (i.e., co- benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[No]
If yes, which action and impact pathway is it relevant for?	Pathway "Smart energy recovery...."
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Local data from local Utility company
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (14)	
(For each indicator selected)	
Indicator Name	Waste to energy recovery [Tonne] / total waste [Tonne]
Indicator Unit	[%]
Definition	Tonne municipal waste for energy recovery divided by total municipal waste
Calculation	Waste to energy recovery [Tonne] / total waste [Tonne]
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co- benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]



If yes, which action and impact pathway is it relevant for?	Pathway "Industrial symbiosis"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Local data from local waste company
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (15)	
(For each indicator selected)	
Indicator Name	re-use of materials [tonne]/total waste [tonne]
Indicator Unit	[%]
Definition	Tonne municipal waste for re-use of material divided by total municipal waste
Calculation	re-use of materials[Tonne] / total waste [Tonne]
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]
If yes, which action and impact pathway is it relevant for?	Pathway "Industrial symbiosis"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	



Expected data source	Local data from local waste company
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (16)	
(For each indicator selected)	
Indicator Name	recycling of materials from waste [tonne] /total waste [Tonne]
Indicator Unit	[%]
Definition	recycling of materials from waste [tonne] /total waste [Tonne]
Calculation	recycling of materials from waste [tonne] /total waste [Tonne]
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]
If yes, which action and impact pathway is it relevant for?	Pathway "Industrial symbiosis"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Local data from local waste company
Is the data source local or regional/national?	Local
Expected availability	Annually
Suggested collection interval	Annually



References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

B-3.2: Indicator Metadata (17)	
(For each indicator selected)	
Indicator Name	Energy performance
Indicator Unit	[kWh/sqm, year]
Definition	Total kWh excluded household electricity / heated area > 10 C
Calculation	kWh / Sqm heated area
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[No]
If yes, which co-benefit does it measure?	
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]
If yes, which action and impact pathway is it relevant for?	Pathway "Building energy efficiency"
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Data from national authority Boverket, Energy declaration register.
Is the data source local or regional/national?	Local
Expected availability	Every second year
Suggested collection interval	Every second year
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	



B-3.2: Indicator Metadata (20)	
(For each indicator selected)	
Indicator Name	Air quality Nox
Indicator Unit	µg/m3
Definition	µg Nox /m3
Calculation	Na
Indicator Context	
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	[No]
If yes, which emission source sectors does it measure?	
Does the indicator measure indirect impacts (i.e., co-benefits)?	[Yes]
If yes, which co-benefit does it measure?	Air quality NOx in the city center, Västra Esplanaden
Is the indicator useful for monitoring the output/impact of action(s)?	[Yes]
If yes, which action and impact pathway is it relevant for?	Pathways within transport
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[no]
Data requirements	
Expected data source	Local data from local measurements
Is the data source local or regional/national?	Local
Expected availability	Every year
Suggested collection interval	Every year
References	
Deliverables describing the indicator	https://www.umea.se/download/18.70382e361870212d49c1276e/1679586215758/%C3%85rsrapport%20luftm%C3%A4tningar%202022.pdf
Other indicator systems using this indicator	



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

In Umeå CCC Commitments, chapter 4 Process and principles there are detailed description and visualization of Umeå’s multi-level and multi-stakeholder governance, partnership, and mobilisation for a climate neutral Umeå 2030 and lowering of CBE with local actors in Umeå: private, public, academic, civic organisations and citizens, as well as with regional, national and international partners, cities and authorities. The municipal and multi-level governance structures incl. responsible departments and actors, processes, and mechanisms to move together towards climate neutrality and lowering of CBE’s are there thoroughly elaborated and therefore it’s crucial to read that part together with reading the rest of this Umeå CCC Action plan part C (all modules).

In addition to these descriptions, the Umeå CCC Investment Plan also identifies different actors’ investment needs to implement necessary actions. The majority of climate investments that is needed to reach the goals has to be done by private companies while the city takes on a smaller share. This requires developed forms of collaboration and dialogue for coordinated planning and implementation of measures, see more detail of this process also in chapter 4, Umeå CCC Commitments.

In Umeå, the approach to the climate agenda and the journey toward climate neutrality is characterized by a comprehensive governance strategy that involves various structures within the city’s administration and extends to a broader framework.

The Municipal Group Steering Mechanism takes a lead role in coordinating efforts within the municipal group. This initiative aims to minimize sub-optimization and silo thinking by fostering collaboration



among different departments. Simultaneously, the Umeå Climate Roadmap (UCR) functions as a local green deal, creating partnerships that include the City of Umeå, the strategic development office, numerous companies, organizations, and citizens through Umecom. This collaborative approach seeks to break down barriers and promote a shared commitment to climate goals.

The Swedish Climate City Contract 2030 (SCCC) further extends the collaborative efforts nationally, involving Umeå and 22 other cities in policy adjustments for climate-neutral development. Viable Cities, a national innovation program, plays a crucial role in building capacity for climate transition and facilitating collaboration among cities, universities, research institutions, and state agencies.

Internally, Team Climate within Umeå's administration prevents silo thinking and ensures coordination on climate-related matters. The Pilot City Project: The North Star focuses on addressing systemic barriers through workshops and system innovation prototypes, engaging Umeå municipality, RISE, the municipal group, and participants from organizations in the climate roadmap.

Involvement of stakeholders is a key aspect of the governance approach. UCR integrates Umecom, engaging 54 companies, organizations, and citizens, fostering quadruple helix collaboration. The SCCC engages Viable Cities, creating a network for cross-city learning and collaboration. The Pilot City Project actively involves various entities, including Umeå municipality, RISE, the municipal group, and participants from organizations in the climate roadmap.

Moreover, citizen involvement is prioritized through UCR's inclusive approach, integrating Umecom and engaging citizens in the climate agenda. The governance structures collectively address barriers by fostering collaboration, breaking down silos, and providing national and local contexts for effective climate action. In this integrated approach, Umeå's governance structures aim to empower stakeholders, engage citizens, and overcome barriers, ensuring a collective commitment to climate neutrality.

Tabell 14 C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways

C.1.2: Sample Table: Relations between governance innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership // stakeholders involved	Enabling impact	Co-benefits
(Indicate name of	(Describe the substance of the intervention)	(Refer to barriers and opportunities	(List leaders and all stakeholder	(Describe how intervention enables	(Indicate how intervention helps



intervention)		identified in Module A-3)	involved and affected, referring to the stakeholders mapped in Module A3)	climate neutrality)	achieve the impact listed in Module B-1)
Municipal group steering mechanism	Program for the administration and municipal group to jointly tackle the long-term focus target of climate neutrality.	Increased coordination and reduced sub-optimisation and Silo thinking. This is helping to overcome organisational lock-ins internally. Participants of the program must work closer together than before.	The municipal board // City's administration, Local utility company Umeå energi, Waste and water company VAKIN, local housing company Bostaden; all these companies are subsidiaries of the municipal group.	Enables more joint and coordinated efforts for transition into climate neutrality by e.g increasing transition capacity, analytics of investments from the climate targets.	No direct co-benefits but it enables measures that lead to co-benefits
Umeå climate roadmap (UCR)	UCR is Umeå's Local green deal. A partnership between Umeå and various stakeholders to take on the joint mission of a Climate neutral Umeå. The citizens engagement platform Umecom is connected to UCR and we are working on a stronger integration into the activities of the UCR. With this strong inclusive approach, we bring together stakeholders from all strains of the quadruple helix.	UCR with the integration of Umecom is a tool to tackle suboptimization by finding better solutions in cooperative models. With peer-to-peer learning UCR strengthens the capability to identify organisational lock-ins. Always recircling to the system Umeå in our discussions breaks down silo thinking. With the integration of Umecom and citizens we address	City of Umeå, strategic development office // 54 companies and organizations ³¹ + Citizens via Umecom.	Enabling transition by building mandate and identification as well as responsibility for the mission that is climate neutral Umeå. Functions as umbrella initiative channel will to act. Acts as communications platform and vehicle. Enables activation of private capital for the transition.	No direct co-benefits but it enables measures that lead to co-benefits



		another primal barrier that is behavioural change.			
Swedish climate city contract 2030 (SCCC) ³²	Umeå municipality is one of 23 municipalities that have signed the SCCC 2030 with six national agencies. It aims to accelerate the development of climate-neutral cities in Sweden through for instance policy adjustment.	Barriers that are tackled often have policy nature. Policy lock-ins that lead to suboptimal decision making on city level due to preset or narrow paths of action. Additional learning between cities leads to a better understanding of organisational lock-ins within the own administration.	Viable Cities // The municipal board is responsible for Umeå's engagement. Other signatories are 22 Swedish cities and 6 national agencies	See description about tackled barriers. Additionally, the SCCC enables the transition by providing a national context and network of Swedish cities that want to excel in climate transition.	No direct co-benefits but it enables measures that lead to co-benefits
Team Climate	City Internal crosscutting team for collaboration and breaking barriers and increasing the transition capacity.	This initiative is aiming to overcome the barrier of Silo-working in different departments. It provides an arena for coordination in climate related questions and thereby prevents sub-optimised parallel actions.	Director for development, Strategic development office, Umeå municipality // clerks of different City administration departments. (Strategic dev., technical dep., Environment and health dep. etc)	Enables the transition by building the internal capacity for an integrated strategic approach on planning and executing Umeå's plan for climate neutrality	No direct co-benefits but it enables measures that lead to co-benefits
Viable Cities	A national strategic innovation programme to speed up the transformation towards climate neutral cities.	Building capacity for the transition and learn from other cities. Engage in	Swedish Energy Agency is the responsible authority. // Network includes cities,	Builds capacity and designs new working methods for cities and agencies to	Networking with Swedish cities and experts in the field.

³² <https://viablecities.se/en/klimatneutrala-stader-2030/klimatkontrakt/>



		policy impacting collaboration.	universities, Research institutions and state agencies	work more closely together for green and liveable cities.	
Pilot City Project: The north star	Pilot city project organizes capacity building workshops and system innovation prototype development for members/stakeholders of the Umeå climate roadmap.	Like described in the project application we aim to address the identified systemic barriers for transition, especially organisational lock-in, sub-optimization and behavioural change	Umeå municipality // RISE, Municipal group (project partner), Participants: organisations in climate road map	Increasing transition capacity and enabling identification and overcoming of transition barriers in participating organisations	The systemic prototypes that will be developed during the project have the target to lead to reduction and there will be co-benefits (in small scale) to observe, which will depend on the nature of the prototypes.
Team Green	Internal crosscutting team with a focus on increasing the pace in transitioning to climate-neutrality.	Reusing and leveraging solutions from individual companies within the group and applying them across the entire group.	The groups business strategist. Participants: Sustainability strategists from the companies within the group	Increasing transition speed within the municipality group of companies.	No direct co-benefits but it enables measures that lead to co-benefits
Self-leadership transition	Leadership-model transition into self-leadership in many administrations of the municipality.	Opportunity to build a more agile approach to leadership and organisation	Director for development // Strategic development office, Umeå municipality	to enable more dynamic approaches to fast evolving challenges within the climate spectrum but even outside	No direct co-benefits but it enables measures that lead to co-benefits
Municipal consulting services for citizens and small businesses.	Umeå has about 25 year experience in offering free consulting services to citizens and SMEs. Consulting areas are Energy & Climate, Consumption, and debt (for private households) Thereby their services have a steering function for	These services are aiming to promote and enable behavioural changes as well as guiding private investments in a sustainable direction.	City administration Department for environment and health // Citizens and SMEs	Enables transition by providing information and consulting on how to decrease energy consumption, climate impact or consumption costs (even	Empowerment. Building trust and engagement



	private investments av well.			environmental)	
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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-3³³. It also includes:

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

Tabell 15 C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways

C.2.1 Sample Table: Relations between social innovations, systems, and impact pathways					
Intervention name	Description	Systemic barriers / opportunities addressed	Leadership stakeholders involved //	Enabling impact	Co-benefits
(Indicate name of intervention)	(Describe the substance of the intervention)	(Refer to barriers and opportunities identified in Module A-3)	(List leaders and all stakeholder involved and affected, referring to the stakeholders mapped in Module A3)	(Describe how intervention enables climate neutrality)	(Indicate how intervention helps achieve the impact listed in Module B-1)
Umecom (Also mentioned in C.1.2 as connected part of the UCR)	Umecom is a community-building initiative in Umeå, aiming at fostering collaboration among citizens, businesses,	This social innovation addresses different barriers but most of all behavioural change. Umeå's highly climate continuous part of the	City of Umea, Strategic development office is responsible, but community members are encouraged to occasionally take over leading rolls // Citizens, business, associations, research,	The platform encourages cross-sectoral collaboration, allowing to support individuals with ideas and engagement in reducing climate impact and improving	Enhance social cohesion, Building trust and engagement

³³ 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.



	associations , researchers, and the public sector to realize ideas that make Umeå a better place for all.	population is a asset that we need to use and enable in order to push the envelope when it comes to citicens engagement and co-creating on the issue of behavioural change and sustainable lifestyle.		Umeå. A movement that could build momentum within the population.	
Umeå together	social innovation initiative. Croud funding platform for initiatives to create a more sustainable city where people thrive and feel good.	Organisation al lock-ins lead to good ideas not being granted the funds they need since the dominant perception doesn't allow to see upsides or potential. With Umeå together private capital can be raised, circumventing this issue.	Umeå municipality, Coompanion, Umecom, Open collective europe, innovation x, parti design, fantastic studios	Build engagement and harness local ideas and (croud-) fund ideas via the platform open collective. Fund micro initiatives for sustainability.	Enhance social cohesion, local job creation Building trust and engagement
SPIS (Social Progress Innovation Sweden)	One of seven Innovation platforms for sustainable cities in Sweden. The platform strengthens the city's innovation capacity and Umeå Municipality' s ability to solve complex social and	The innovation platform has been a multifaceted project with many different barriers to deal and take action with. Above all and most clearly, the innovation platform has tackled the barriers of organizationa	Umeå municipality, Strategic development office // RISE (Research institute of Sweden),	Overall impact is that innovation is organized at the city management office in Umeå municipality and has a broad mandate to drive and support innovation work, which is a key for tackling the city's challenge to reach climate	Enhance social cohesion, Building trust and engagement



	<p>sustainability challenges by building and establishing an internal organization that drives and supports culture, structure and capacity for innovation and future-oriented development.</p>	<p>Lock-ins and working in silos. The platform has built organizational conditions for systematic innovation work, together with the organization's management. The platform had carried out work to increase the organization's innovation culture and ability by testing new ways of working.</p> <p>In all of this, Umeå municipality has practiced a lot in cooperation with the surrounding community and the customers we are there for.</p>		<p>neutrality, in all administrations.</p> <p>The platform has given the municipality leaders and employees increased knowledge about working methods for innovation, courage to test and develop ideas and prototypes and increased ability to adjust based on the city's complex challenges together and in collaboration with other organizations.</p>	
Project; Association for climate neutrality	<p>Initiative to work together with civic associations of all kinds to discuss climate issues and find ways to reduce emissions.</p>	<p>This initiative addresses the barrier of behavioural change, and contributes to advance and spreading of climate awareness into different social groups.</p>	<p>Umeå kommun, dep. for Sports and leisure //, associations, inhabitants, sports clubs, all age groups</p>	<p>Building awareness and engagement, Bringing up climate as important topic in former "climate-free-settings". Reaching new target groups.</p>	<p>Normalisation of discussing climate emissions in your operations and activities.</p>
Initiatives on physical literacy	<p>An association that works and lobbies</p>	<p>Behavioural change: We need to drastically</p>	<p>The association for physical literacy // Municipality of</p>	<p>By spreading knowledge about the importance of</p>	<p>Improved health and wellbeing,</p>



	for a concept called physical literacy and active live, with which the municipality has cooperated several times.	change our behaviour regarding mobility and one beneficial way to do that is more active travel. The association focuses not on the climate aspect, but the co-benefits instead. We still see it as a good way to get more ppl to take the bike or walk.	Umeå, Businesses as sponsors, schools and kindergartens, other associations, children	an active lifestyle and especially focusing on early age, the concept of physical literacy is changing norms and improving healthy and climate friendly mobility.	Avoided accidents by less motorized transport, improved air quality, noise reduction, Cost savings, Behaviour change
transport services for disabled people	The transport service is an adapted on-demand form of public transport for people with special needs who are unable to travel on regular buses and trains.	Just transition that includes everyone is a prerequisite since it is important for public approval. It is also an opportunity to form cities and society more inclusive during the far reaching transformation necessary.	Municipality of Umeå, streets and parks department // people with special needs,	Just transition: All should be able to partake in the transition and e.g. be able to travel with public transport (or equivalent). This increases the acceptance and possibility for an increasingly "car-free" city.	Enhance social cohesion, Increased comfort and attractivity,
Fritidsbanken Umeå	Fritidsbank is like a library, but with sports and outdoor equipment (even para-sports). Here one can borrow equipment for active leisure, such as skis, skates, inline	Barriers addressed: Behavioural change	Behind the investment is Västerbotten's Sports Confederation, with support from, among others, Umeå Municipality, Bostaden AB and several private companies. In addition, a wide range of associations and	Equipments circulates and is used much more often than if privately owned. This reduces the need to own and buy and thereby the use of new resource and emissions.	Enhance social cohesion, Cost savings, Behaviour change, Increase incentive for sharing. Allows better participation



	skates, life jackets, tents etc.		private individuals donate their leisure items to the bank.	The social aspects are the driving motivation for this initiative.	for children especially from low-income families. Challenges the norm of ownership and shows a working alternative.
Open data climate challenge ³⁴	The Open data climate challenge is an invitation and motivation to explore Umeå's expanding open data platform with the goal to foster innovations worth implementing of developing further.	Organisational log-ins : Organisations are not (always) capable to see solutions from the inside since they are locked into a certain way of thinking, while innovative ideas come often from outside.	Organised by Opendata Umeå and Umeå municipality together with Umecom initiative, Länsförsäkringar Västerbotten and SLU. Cooperationpartners: INAB, Baltigruppen, Tyrens, Umeå university, HYBES-project. Target group: open to everyone and targeted specifically at students	The initiative promotes the use of umeå's open data platform and enables and facilitates innovations that use this data in tackling different aspects of the climate challenge	Pot. Job creation. Promoting innovative culture Promoting digital innovations and solutions

C-2.2: Description of social innovation interventions

In the context of Umeå's standing in the Social Progress Index, ranking among the highest-scoring regions, the city upholds a 30-year tradition of actively pursuing gender and inclusion policies. However, the journey toward climate neutrality faces identified barriers, particularly concerning behavior change. Social innovations play a crucial role in addressing this challenge, recognizing that forcing behavior change is ineffective. Instead, initiatives like Umecom, Umeå Together, and Associations for Climate Neutrality actively contribute to raising understanding, awareness, and engaging citizens in collaborative efforts to develop sustainable behaviors, ensuring improvements in lives.

Umecom, inspired by an IURC-exchange between Umeå and Kamakura, Japan, stands out with ideation workshops, known as "Live Sessions," and an annual local world improvement festival. Emphasizing a sense of community, Umecom believes in the power of collective action. The initiative's community rules highlight dialogue, acceptance, and the freedom to express creative and ambitious ideas. Umecom's positive, constructive, and inclusive culture not only fosters engagement but also facilitates the municipality's connection with citizens through an alternative channel.

Umeå Together contributes by providing a crowdfunding platform that empowers citizens to circumvent organizational barriers, enabling direct engagement in sustainable initiatives. Simultaneously, the initiative Association for Climate Neutrality collaborates with civic associations to empower citizens in discussing and reducing emissions, normalizing climate conversations, and fostering inclusivity in climate discussions. These initiatives collectively explore and shape a vision of

³⁴ https://opendata.umea.se/pages/climate_challenge/



a good life in a climate-neutral city, demonstrating that the journey toward climate neutrality requires a combination of innovative approaches that actively involve and empower citizens.

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

The 2030 Climate Neutrality Action Plan will be updated with more details and elaborated on an ongoing basis, e.g. when new formal governing documents have been adopted. Every second year, an updated version will be sent to NetZeroCities and the EU. There will be an annual follow-up of the City's progress towards climate neutrality. The monitoring will be done in the City's regular system and reported to CDP. See more on principles for monitoring and updating in Umeå CCC Commitments March 2024, chapter 4.

Next steps for Umeå Climate transition

The 2030 Climate Neutrality Action Plan in this iteration is trying to provide a comprehensive overview of the climate transition ongoing work, the gaps and initial suggestions to handle identified gaps.

Stakeholder engagement and co-creation of portfolios and actions. This is decided in the municipal group and planned for in the climate roadmap to be carried out under 2024. The scenarios, pathways and transitions intend to be presented for relevant stakeholders and discussed on an early and late outcome level to set targets and plan actions. This is planned for 2024 working together with the stakeholders in the climate roadmap and within the municipal group.

Continue develop the work process during iterations with the intent to accelerate the transition towards climate neutrality in Umeå.

Develop e.g. "Center of Excellences" to tackle key-challenges to enable the transition to climate neutrality. One example could be a Mobility Center of excellence or CoE around the systemic lever Finance and funding testing new innovative and smart solutions for a fossil fuel free transport system and finance and funding models etc..

The IPPU and AFOLU sectors are part of the action plan. However, additional information needs to be created or sourced within this fields to get a better understanding and knowledge how to address emissions from these sectors. This will be in the scope in the future iterations of the CCC.

MANAGE RESIDUAL EMISSIONS is a strategic priority for Umeå building capacity and knowledge in this field to develop robust strategies and actions that suitable for Umeå in handling those emissions who are hard abate. The plan is to develop a roadmap for manage residual emissions in the city of Umeå.

Improve knowledge and capacity handling scope 3 emission and consumption-based emissions.

Monitoring and Learning process, Umeå CCC

The proposed monitoring and learning process for the Umeå CCC focus on continuous learning and adaptation through a series of structured steps. Initially, clear, measurable objectives and indicators are established to guide monitoring efforts which can be find in module B-3 Indicators, the work with indicators will continue development under 2024. Targets for the city is already adopted e.g. a climate neutral city by 2030 which the indicators aim to monitor on different levels. Data collection and analysis are undertaken, leveraging both quantitative and qualitative methods to assess progress. A



first ever survey will be sent out to all stakeholders in the Umeå climate roadmap for data collection and being able to analyse the current state, the plan is to make this an annual survey. Also, annually data collections are carried out for the whole city and administrative boundary to track the overall trends and emissions.

Stakeholder engagement plays a critical role, ensuring different perspectives are considered and feedback loops are integrated into the process. Regularly Meetings are already planned with the climate roadmap partners in Umeå to present insights, gather feedback and planning of actions. See description of the work process “Make it the new normal”. Meetings with the steering group for climate neutral Umeå part of the governance and steering mechanism process in Umeå are already planned to follow the progress and provide input to the program climate neutral Umeå. The steering group are responsible for the monitoring of city of Umeå climate mitigation targets and the progress (See the Commitments part for more info on the governance and steering mechanism). Periodic review and reflection sessions intend to enable the assessment of initiatives against objectives, facilitating the identification of successful strategies and areas for improvement. Based on these insights, Umeå CCC intent to iteratively be updated and refined, with adjustments made transparently and communicated to all stakeholders. Finally, documentation and knowledge sharing are essential to not only ensure transparency and accountability but also contribute to EU and global knowledge base on climate action.

6 Annexes

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

- Impact Pathways B-1.1
- Emission Inventory City of Umeå 2021
- Current state of Umeå energy system
- Material economics report on investments for climate neutrality

Fields of action	Sub sector	Pathway 2030	KPI	Systemic Levers	Strategies for actions	Early outcome/changes (1-3 years)	Late outcome/Transitions (4-6 years) (2030 assumptions)	Direct potential impact (Mton)	Indirect impact/Co-Benefits
Mobility and transport	Passenger transport	Smart accessibility - Avoid unnecessary transportation	V/km	Technology and infrastructure Governance and policy Finance and funding Social innovation	Updated and revised roadmap to drive the transition towards "Smart accessibility" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.	Increase access to reliable high speed fiber network Early implementation IT-technology for enable smart accessibility Improved accessibility local public services Strategy for financing the transition to a net zero future. TBD Scaling Mobility management	30% less vkm	-24	Time savings for citizens Improved air quality
Mobility and transport	Passenger transport	Smart transport - Increase the share of fossil-free transport	Share of EV's Energy use of liquid non-renewable fuels per capita	Technology and infrastructure Governance and policy Finance and funding Social innovation	Updated and revised roadmap to drive the transition towards "Smart transport" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.	Increased electrification of public transport Increased deployment of EV-charging Increased procurement of EV's Develop of traffic regulations to favour more sustainable transport Develop a fuel Strategy incl EV charging New business models for EV charging in place Strategy for financing the transition to a net zero future. TBD TBD	100 % electric buses 78 % of car fleet are EV	-24	Increased comfort and attractiveness Improved air quality
Mobility and transport	Passenger transport	Smart mobility - Increase the range of mobility services	[kWh/pkm]	Technology and infrastructure Governance and policy Finance and funding Social innovation	Updated and revised roadmap to drive the transition towards "Smart mobility" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Modernised public transport Increased availability of public transport Increased Promotion and improvements of public transport and cycling Strategy for financing the transition to a net zero future. TBD Increased development of Mobility management	Shift 16 % of local vkm by fossil fuelled car to bus; increase non motorized transport with 10 %	-10,5	Improved air quality; Increased comfort and attractiveness; Improved health and wellbeing; Avoided accidents by less motorized transport
Mobility and transport	Passenger transport	Smart transport of goods - Increase the proportion of fossil-free transport	Share of fossil free fuel	Technology and infrastructure Governance and policy Finance and funding Social innovation	Updated and revised roadmap to drive the transition towards "Smart transport of goods" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Increased charging infrastructure for trucks Increased number of procurements of electric goods delivery Strategy for financing the transition to a net zero future. TBD TBD	46 % heavy lorries and 68 % light lorries are EV, 8 % Hydrogen	-10	Improved air quality; Noise reduction
Mobility and transport	Freight transport	Smart logistics - More efficient logistics	[kWh/ton km]	Technology and infrastructure Governance and policy Finance and funding Social innovation	Updated and revised roadmap to drive the transition towards "Smart logistics" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Increased uptake solutions for logistics optimization Multi-modal transport of goods TBD Strategy for financing the transition to a net zero future. TBD TBD	30 % less vkm with trucks	-9,8	Improved air quality; Noise reduction
Mobility and transport	Maritimeport of Umeå	Share of fossil free fuel	Share of fossil free fuel	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition towards "Maritimeport" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Ongoing reconstruction, modernisation increasing capacity Ongoing demonstration projects Strategy for financing the transition to a net zero future. TBD TBD TBD	Increased capacity of the port and terminal	-11,8	Improved air quality
Mobility and transport	Air transportation	Aviation	Share of fossil free fuel	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition of "Aviation" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Ongoing demonstration projects Strategy for financing the transition to a net zero future. TBD TBD TBD	TBD	NE	Job creation
Energy systems	Electricity transmission	Enabling Electrification	TBD	Technology and infrastructure	Updated and revised roadmap to drive the transition towards "electrification" that covers actions for each lever.	Enhance and reinforce electric grid		Ne	Job creation
Energy systems	Energy production	Smart Energy recovery - Reduce fossil content for energy recovery from waste	(tCO2e/kWh) Emissionfactor for District heating	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition towards "Smart Energy recovery" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Port sorting plant Increased uptake of waste heat Increased production of biogas Increased energy flexibility Strategy for financing the transition to a net zero future. TBD TBD Increased recycling	50% reduction of plastic in waste for incineration	-21	Local job creation
Waste and circular economy	NA	Industrial symbiosis	waste to Energy recovery + total waste [Tonne] re-use of materials (tonne)/total recycling of materials from waste/total	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition towards "Smart Energy recovery" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition.	Clear steps taken to develop Diva Eco Industrial park Port sorting plant Building start of energy-waste treatment plant Strategy for financing the transition to a net zero future. TBD TBD Marketplace for re-use of construction material in operation	Increased energy recovery from waste Increased re-use of materials from waste Increased recycling of materials from waste	-9,1	Local jobs Return of macro nutrients Local jobs enhanced Local economy Improved resilience
Built environment	NA	building energy efficiency	kWh/mq, year	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition towards "Building energy efficiency" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.	Increased renovations Increased energy efficiency projects Strategy for financing the transition to a net zero future. Pooling Energy communities TBD TBD	Improve building energy class	-7,3	Local job creation Enhanced local economy Improved health and wellbeing Increased property value
Transport and mobility	Construction machines	Fossil fuel free Construction Machines	Share of fossil fuel free working machines	Technology and infrastructure Finance and funding Social innovation Governance and policy	Updated and revised roadmap to drive the transition towards "Fossil fuel free Construction Machines" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.	Plant project with fossil fuel free construction machines Strategy for financing the transition to a net zero future. TBD TBD Increase promotion of fossil fuel free construction machines	100 % fossil fuel free working machines	-5	Improved air quality; Noise reduction
Industry	NA	Negative emissions	TBD	Technology and infrastructure Finance and funding Social innovation Governance and policy	Develop a roadmap to drive the transition towards "Negative emissions" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.	Roadmap for residual emissions	Business case	"Potential - 350 Biogenic CO2"	TBD
Green infrastructure and nature based solutions	NA	Nature Based solutions	TBD	Technology and infrastructure Finance and funding Social innovation Governance and policy	Develop a roadmap to drive the transition towards "NBS" that covers actions for each lever. Develop organisational capacity and learning covering each lever to enable the transition focusing on participatory approaches.		Business case		

Umeå city population
Year Accounting
Reporting Framework

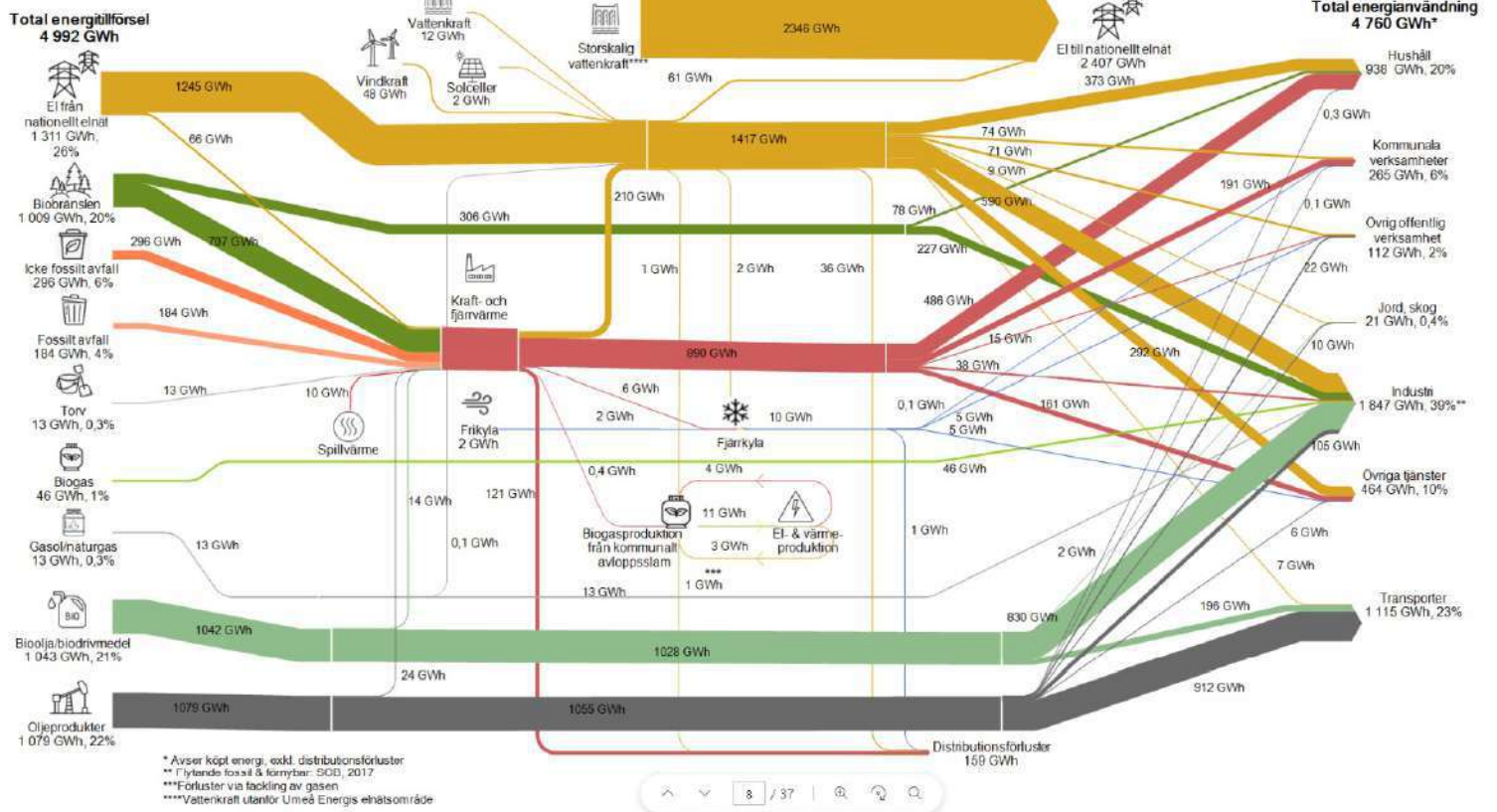
91916
2021

(Global Protocol for Community-scale Greenhouse gas emissions inventories (GPC) reported in the format of Global Covenant of Mayors Common Reporting Framework (CRF)).

[kton CO2e]	Emissions occurring outside the jurisdiction boundary as a result of in-jurisdiction activities		Comment	Source
	Direct emissions Scope 1	Indirect emissions from grid supplied energy Scope 2		
Stationary energy > Residential buildings^	18,7	2,9		ME(Material Economics) is based on bottom up method for sectors: buildings, transport and energy
Stationary energy > Commercial buildings & facilities^	5,8	2,5		ME(Material Economics)
Stationary energy > Institutional buildings & facilities^	6,2	0,5		ME(Material Economics)
Stationary energy > Industrial buildings & facilities^	1,8	3,2		Umeå energi(SCB KRE)
Stationary energy > Agriculture^	0,0	0,1		RUS
Stationary energy > Fugitive emissions^	0,0	0,0		
Total Stationary Energy	33,3	9,3	0,0	
Transportation > On-road^	89,6	0,0		ME(Material Economics)
Transportation > Rail^	0,0	0,2		ME(Material Economics)
Transportation > Waterborne navigation^	6,0	0,0		RUS
Transportation > Aviation^	4,7	0,0	Domestic flight within Umeå	RUS
Transportation > Off-road^	23,8	0,0	Geographical area	ME(Material Economics)
			Machinery/Construction machines	
Total Transport	122,7	0,2	0,0	
Waste > Solid waste disposal^	1,5	0,0		RUS
Waste > Biological treatment^	0,5	0,0		RUS
Waste > Incineration and open burning^	0,0	0,0		RUS
Waste > Wastewater^	1,3	0,0		RUS
Total Waste	3,3	0,0	0,0	
IPPU > Industrial process	25,7	0,0		the Swedish Environmental Protection Agency
IPPU > Product use	9,5	0,0		RUS
Total IPPU	34,6	0,0	0,0	
AFOLU > Livestock	10,9	0,0		RUS
AFOLU > Land use	2,3	0,0		RUS
AFOLU > Other AFOLU	1,4	0,0		RUS
Total AFOLU	14,6	0,0	0,0	
Total Sum	208,5	9,5	0,0	
Generation of grid-supplied energy > Electricity-only generation^				
Generation of grid-supplied energy > CHP generation^				
Generation of grid-supplied energy > Heat/cold generation^				
Generation of grid-supplied energy > Local renewable generation				
Total generation of grid-supplied energy	54,579			RUS
Please ensure that this value is the sum of the generation of grid-supplied energy sub-sectors values reported above.				
Total Emissions (excluding generation of grid-supplied energy)	208,5	9,5	0	

(SCB KRE) Statistics Sweden, Central Bureau of Statistics, municipal and regional energy statistics
ME(Material Economics) is based on bottom up method for buildings, transport and energy
RUS(regional development & cooperation in the environmental objective system)

Umeå kommun 2019



MATERIAL ECONOMICS

INVESTING FOR GROWTH AND WELLBEING

2023

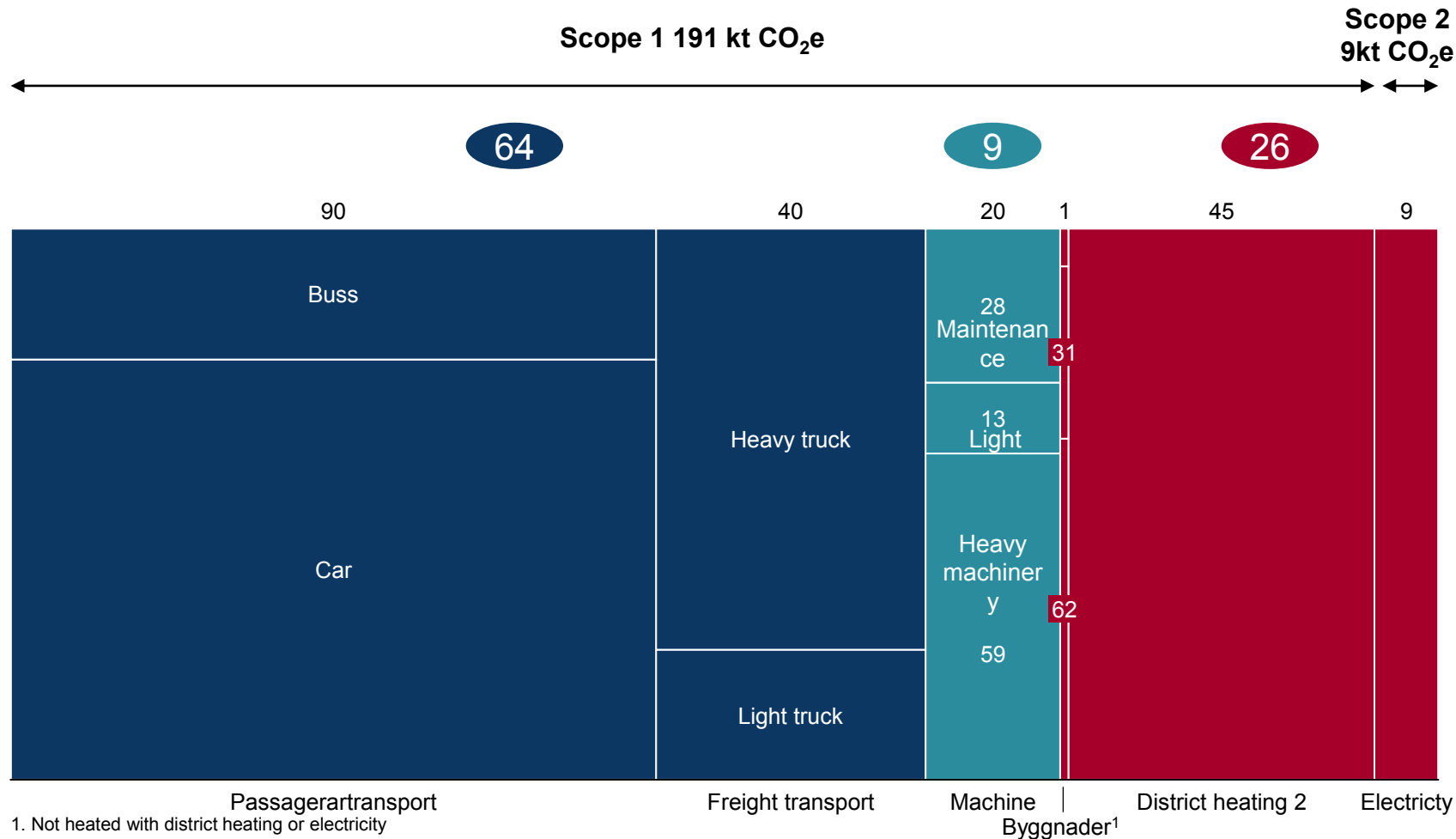
Background

- We have a political assignment ” *The Umeå municipal corporation's investments need to be analyzed based on the climate goals in order to make both the climate benefit and the gap between goals and investment visible. The group needs to both develop and implement a unified method for climate investment plans.*”
- Conducted a analyse with Material Economics in colaboration with Climate View
- Important input for our work with the CCC process as a climate neutral mission city

Umeå's emissions amount ~200 kt CO₂e, with passenger transport as the largest source

Emissions 2021, in kt CO₂e

■ Transport
 ■ Machinery
 ■ Buildings, electricity and heating
 ● Total andel, i %



1. Not heated with district heating or electricity
 2. District heating fuel consists of biofuels (forest waste) and household waste

Although the majority of energy is used in the building sector, the largest greenhouse gas emissions occur in the transport sector, as a result of a low CO₂ content in Swedish electricity and a relatively low fossil CO₂ content also in heat production. Fossil emissions from district heating come mainly from energy recovery of plastics contained in household waste, emissions from energy recovery of, for example, forest waste are biogenic and thus excluded here

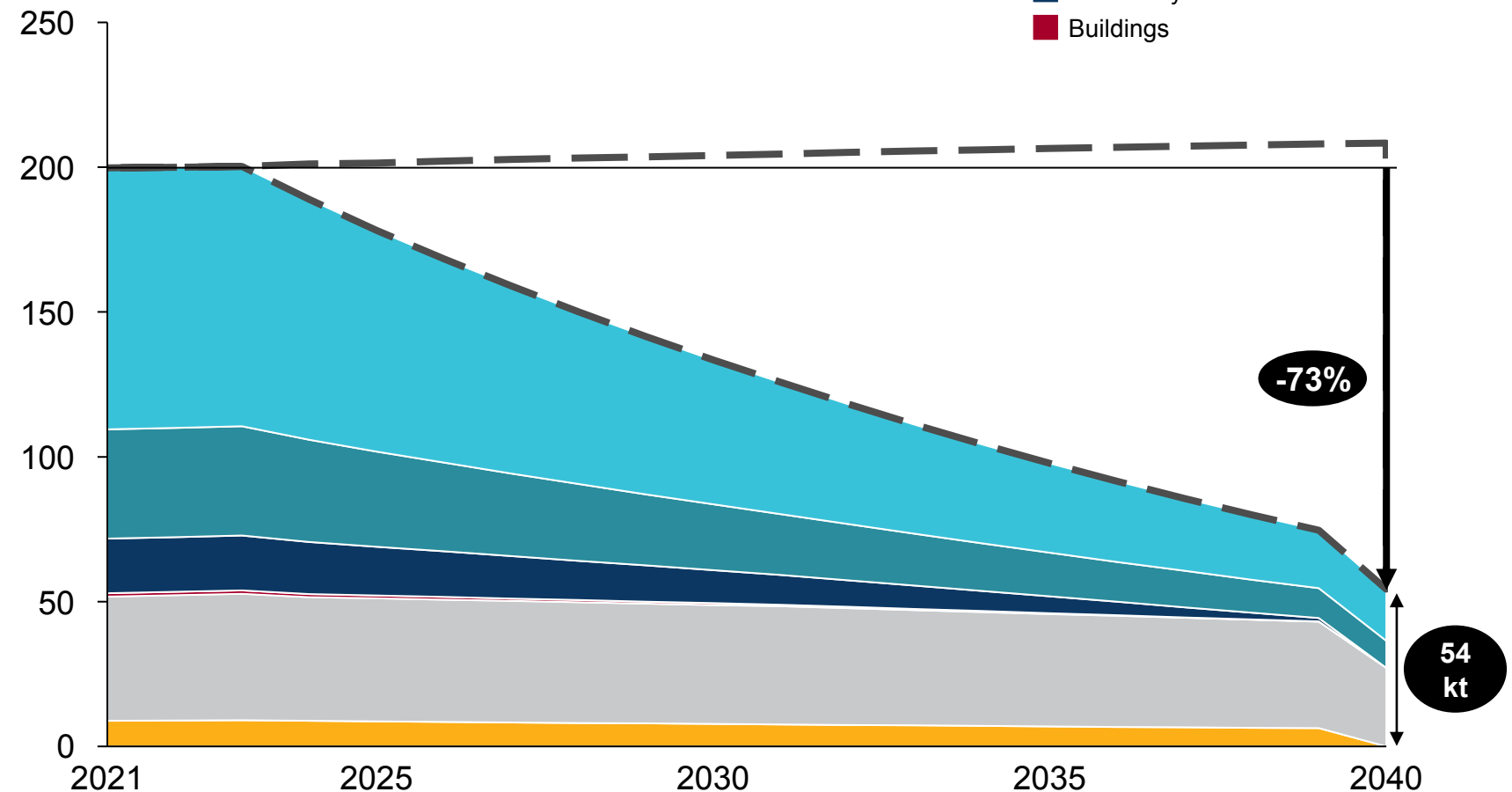
Emissions in the transport sector are dominated by passenger transport, mainly passenger cars. On the goods transport side, heavy trucks dominate emissions. Heavy machinery has a relatively higher share of emissions in Umeå than other Swedish cities due to the situation in cold climates with a high proportion of snow clearing.

In an ambitious scenario, Umeå reduces its emissions by 73% by 2040

2040 scenario

Utsläpp 2021–2040

kt CO₂e



In an ambitious scenario, Umeå implements the simulated transitions by 2040 and thus achieves an emission reduction of 73% during the period. In a very ambitious scenario, the same transitions will already be implemented by 2030. This scenario is presented in Annex

In BAU (business as usual), emissions from the grid are assumed to remain constant during the period, population growth (1300 people/year) increases emissions, while the effects of reduction obligations in the transport sector reduce emissions. All in all, this results in an emissions increase of ~4% over the period

A larger population increase, such as that which would correspond to a population of 200'000 by 2050 (i.e. ~4000 pers/year), gives significantly higher emission increases that in that case also need to be compensated for

Since Umeå in the simulated scenario has 27% of its emissions, or 54 ktonnes CO₂e / year, the municipality needs to compensate for this in another way or further raise the ambition in the transitions. The sectors that still contribute to emissions are district heating production and the use of fossil fuels in the transport sector.

Opportunities to reduce these can be found, for example, in sorting plastic from waste, more extensive conversion to electric vehicles or switching to biofuels

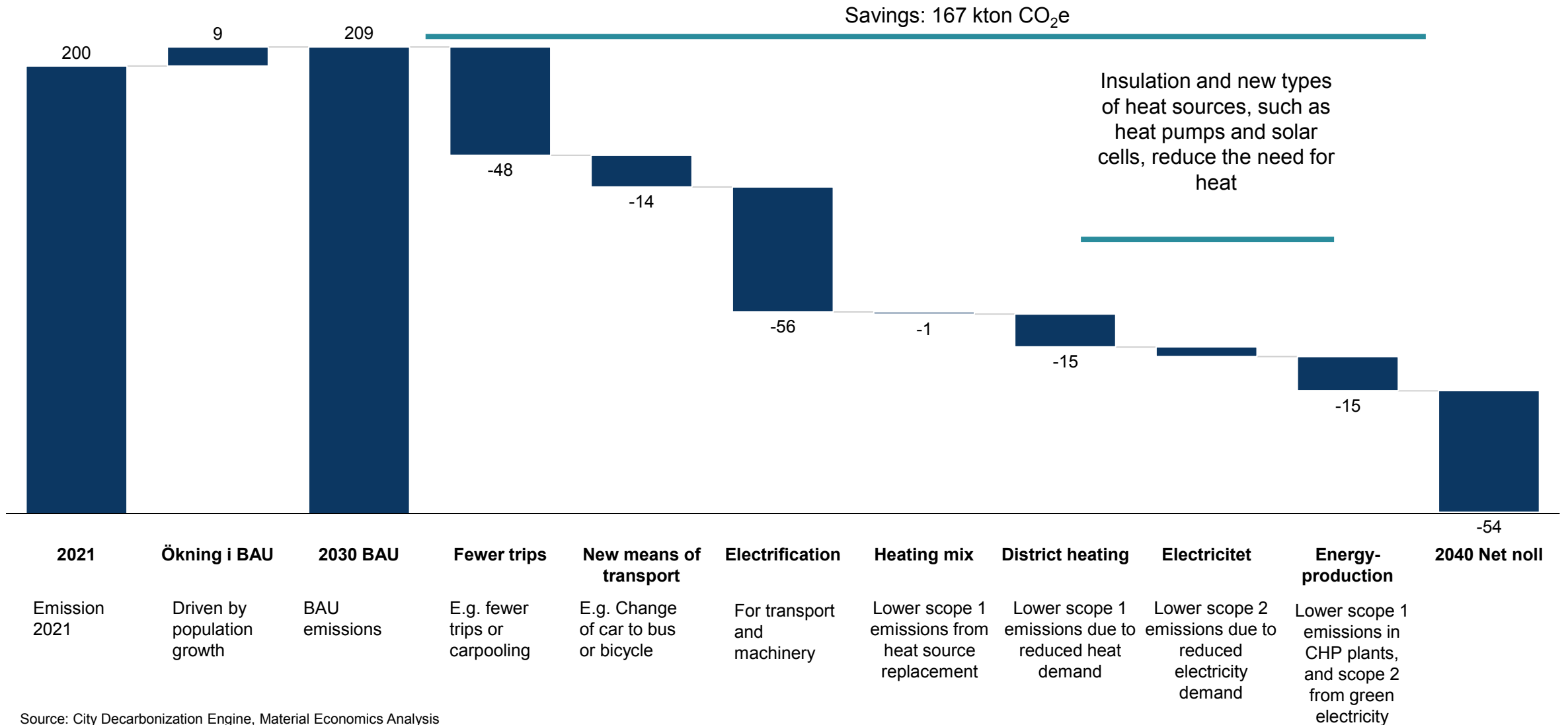
Note: Total remaining CO₂ budget after 2021: 1,018 ktonnes. Cumulative emissions after 2021 in baseline scenario=848 ktonnes and in BAU scenario=1673 ktonnes

Källa: City Decarbonization Engine, Material Economics analys

Fewer trips and electrification of transport and machinery are the biggest reduction measures in Umeå until 2040

Emission reduction per transition, kt CO₂e

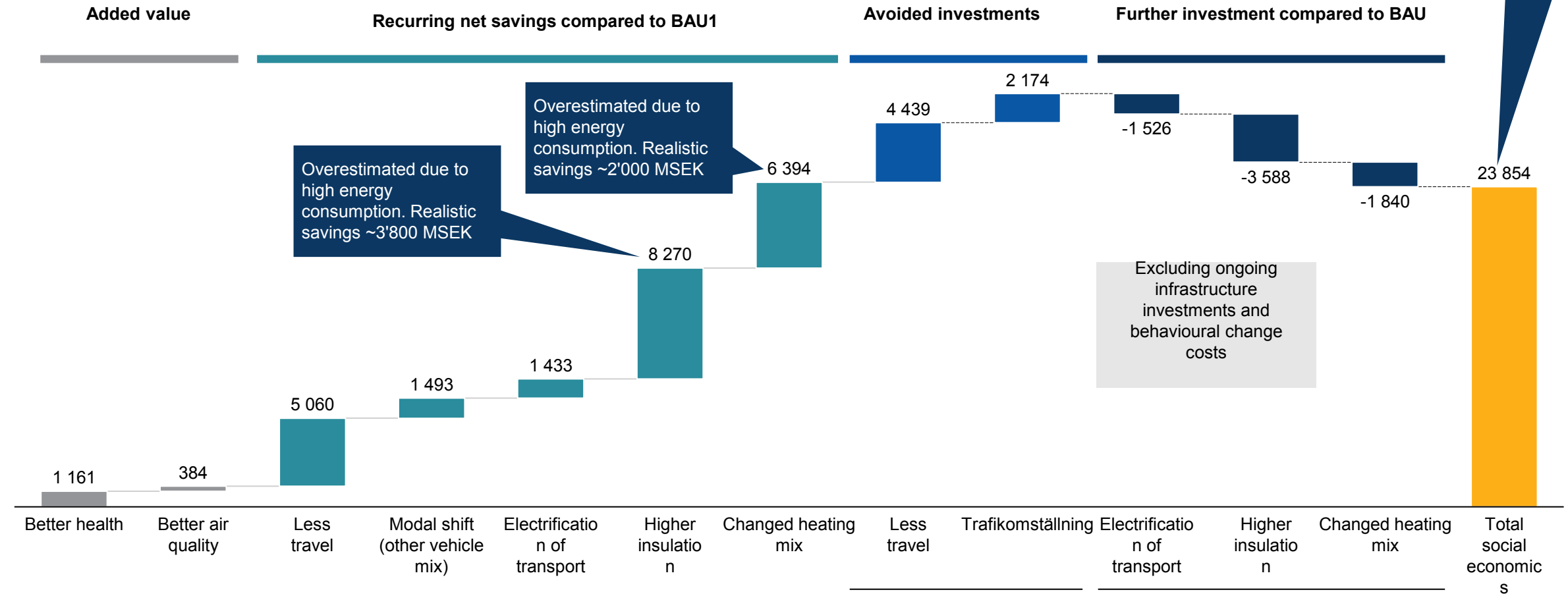
Total savings: 167 ktonnes CO₂e



The socio-economic outcome of Umeå's transition gives a surplus of SEK 23.9 billion by 2050

Economic effects of climate transition to 2040

MSEK , NPV investments (2022–2040) and savings (2022–2050)

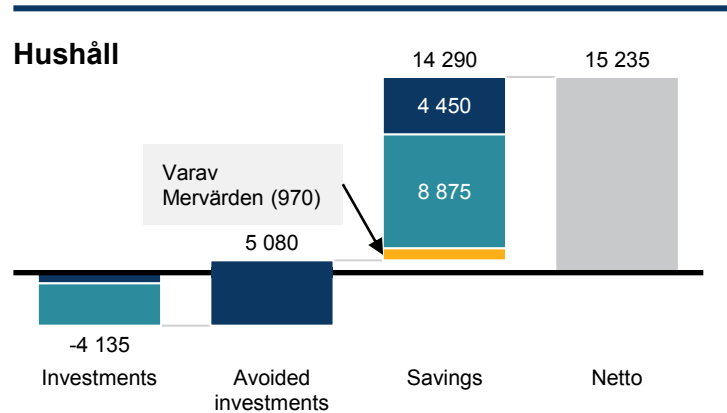


1. No price effects on imported energy have been taken into account
 Note: Capex = Capital expenditures
 Opex = Operational expenditures
 NPV=NPV (the sum of all future value created in today's monetary value)

~10 MSEK/
kton CO2

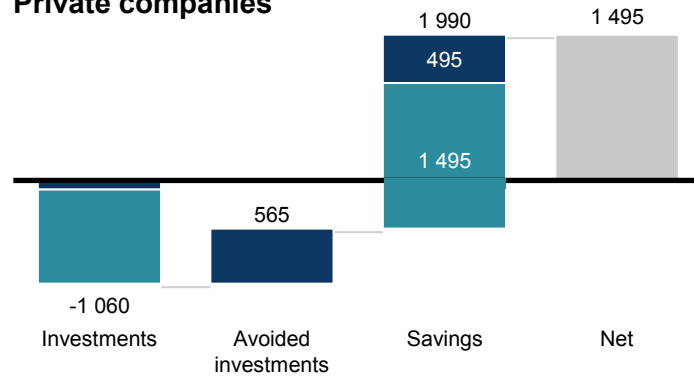
Municipal residents are the big winners in the transition

MSEK PRIVATE STAKEHOLDERS



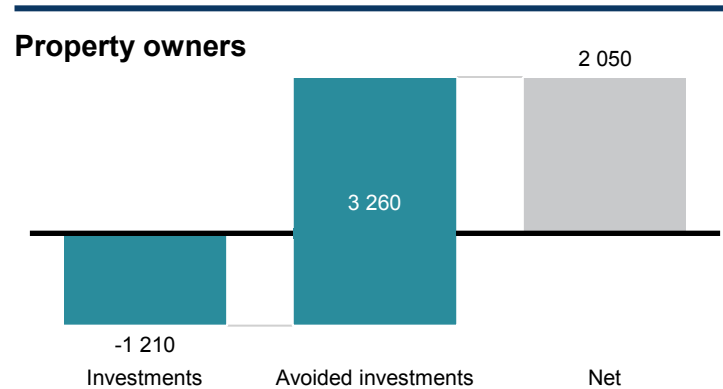
Households benefit from the investments made by themselves, as well as the municipality and private property owners. They also benefit from better air quality and increased physical activity in the form of walking and/or cycling.

Private companies



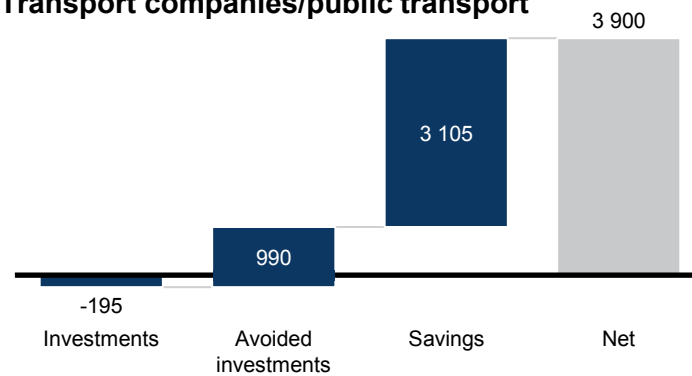
Private companies play a smaller role than households. Operating savings in both transport and buildings compensate well for the initial investment required.

PRIVATE/PUBLIC STAKEHOLDERS



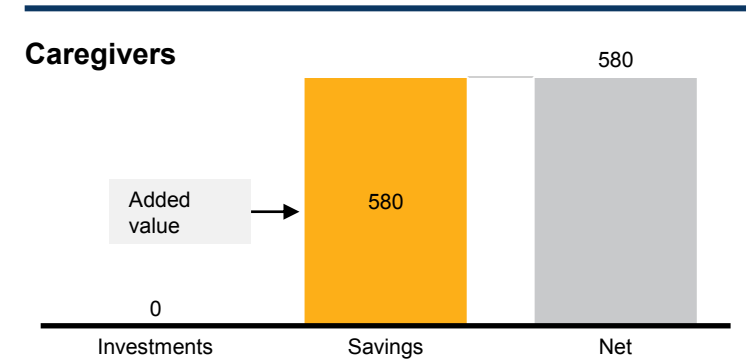
Property owners need to invest, but in return benefit from reduced operating costs for energy and heating.

Transport companies/public transport



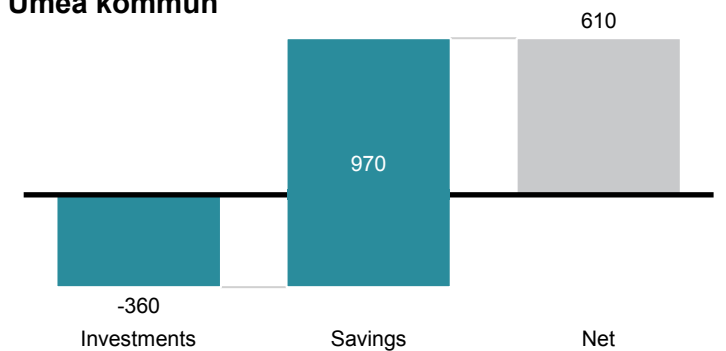
Transport and public transport companies need to invest in an expanded network and new vehicles (and their maintenance), but benefit from optimised logistics, higher utilisation, economies of scale and lower operating costs.

PUBLIC STAKEHOLDERS

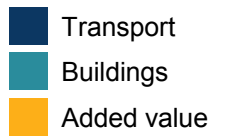


Healthcare providers (the region) benefit from the added value of a healthier population without making any specific investments other than in renovations of their own properties.

Umeå kommun



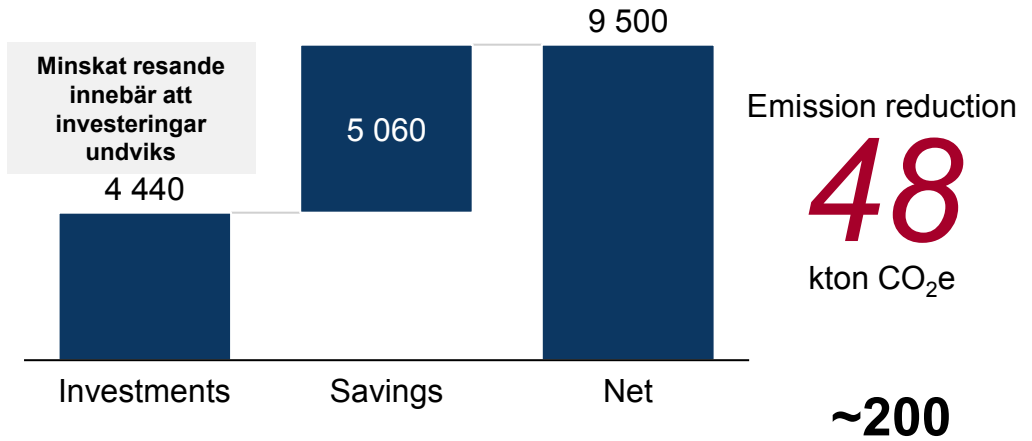
Cities typically cover costs for public charging and walking/cycling infrastructure as well as lower land costs for developers who build energy efficiently



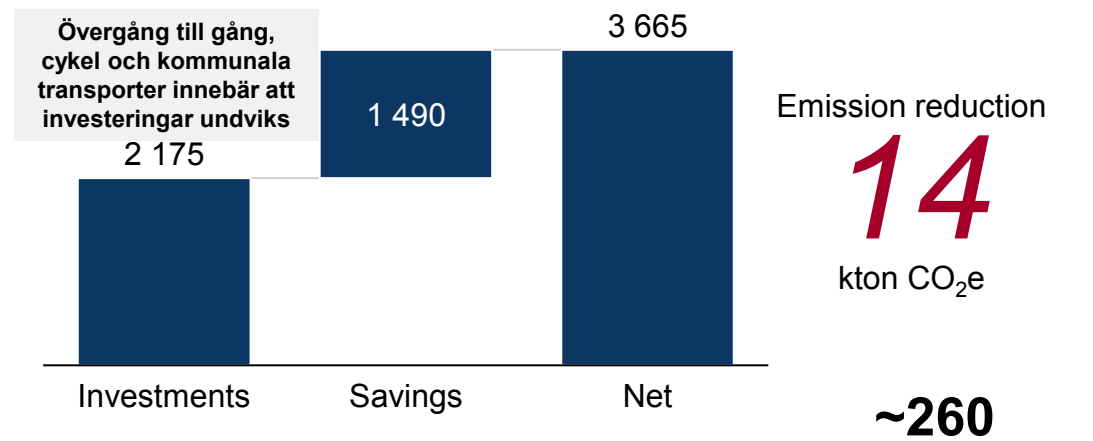
Reduced and changed travel, results in the greatest reduction in emissions per krona

MSEK

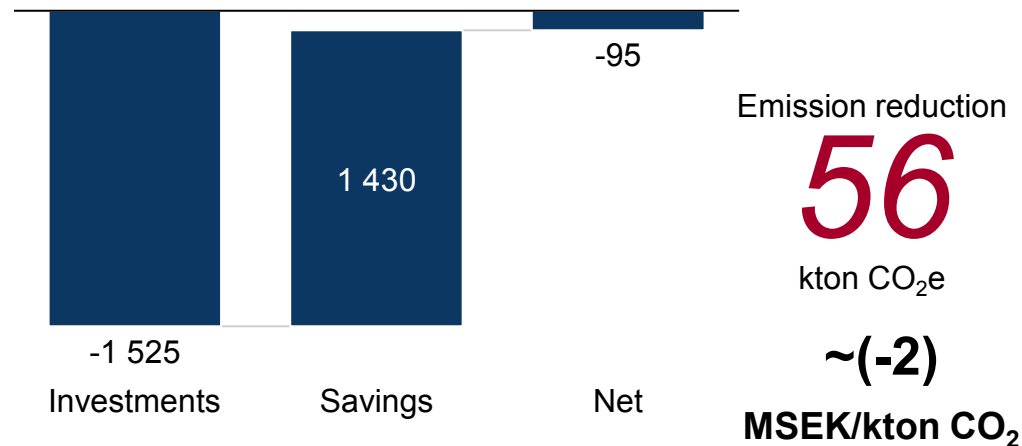
Reduced travel



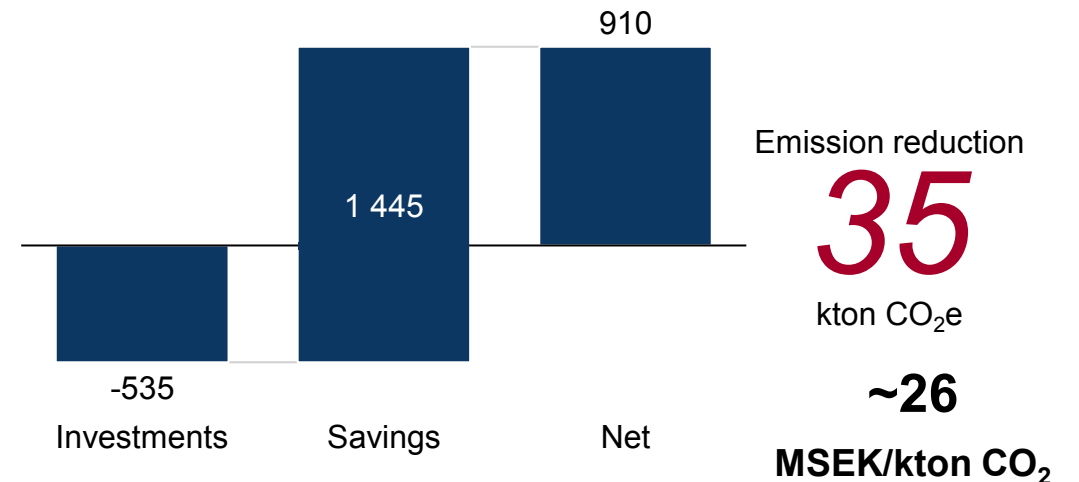
New means of transport



Electrification



Real estate (insulation and heating)¹



1. Includes emission reductions from electricity and district heating networks

Overview of modeled transitions*

Bold = Expected higher opportunity for Umeå to influence

Sektor	Omställning	Beskrivning	Scope of change	Ambitious scenario Target date	Very ambitious scenario Target date	
TRANSPORT	Passenger travel	1. Smart travel	Working remotely, local community gaining importance	30% fewer trips	2040	2030
		2. utilization rate	Higher utilization of cars, e.g. via car pools	15% increase in average passenger rate per car	2040	2030
		3. Traffic transition	Transition from car to public transport, bicycle or walking	Shift from car from 41 to 25% and non-motorized up to 25% for local traffic (see details on next page)	2040	2030
		4. Electrification	(Acceleration of) transition to electric cars	50% and 5% for local and through bus traffic and 78% ¹ (cars)	2040	2030
		5. Biofuel	Increased biofuel content in diesel and petrol	No increase beyond regulated interference ²	2040	2030
TRANSPORT	Freight-transport	6. Less trspt	Shorter distances due to e.g. central point delivery	30% fewer trips	2040	2030
		7. Nyttjandegrad	Higher utilization, e.g. smart vehicle planning and collaboration	+10% of average load for heavy, +100% for light	2040	2030
		8. Electrification	(Acceleration of) electrification of the truck fleet	46% (heavy trucks) and 68% (light trucks) and 8% hydrogen-powered trucks	2040	2030
BUILDINGS	Machinery	9. Biofuel	Increased biofuel content in diesel and petrol	No increase beyond regulated interference ²	2040	2030
		10. Electrification	Transition to electrical machines	100% electric machines	2040	2030
	Buildings	11. Biofuel	Increase the biofuel content of diesel	No increase beyond regulated interference ²	2040	2030
12. Renovation		Upgrading buildings for better insulation/efficiency	5% renoveringstakt per år ⁴	2040	2030	
ENERGY	Energy	13. Heat source	Transition to biofuel, geothermal heat pumps etc	Increase in district heating and transition to heat pumps ³	2040	2030
		14. Content of waste	Lower fossil content in waste for energy recovery	25% reduction in plastic content	2040	2030
ENERGY	Energy	15. Electric mix	Renewable electricity	100% renewable electricity through purchased certificates	2040	2030

1. Including electric vehicles, fuel cell vehicles and plug-in hybrids

2. From 2023 to 2027: 6% for both diesel and gasoline acc. Revised reduction obligation; 2030 and onwards 14% for diesel and petrol according to EU requirements. Interpolated values 2028-29

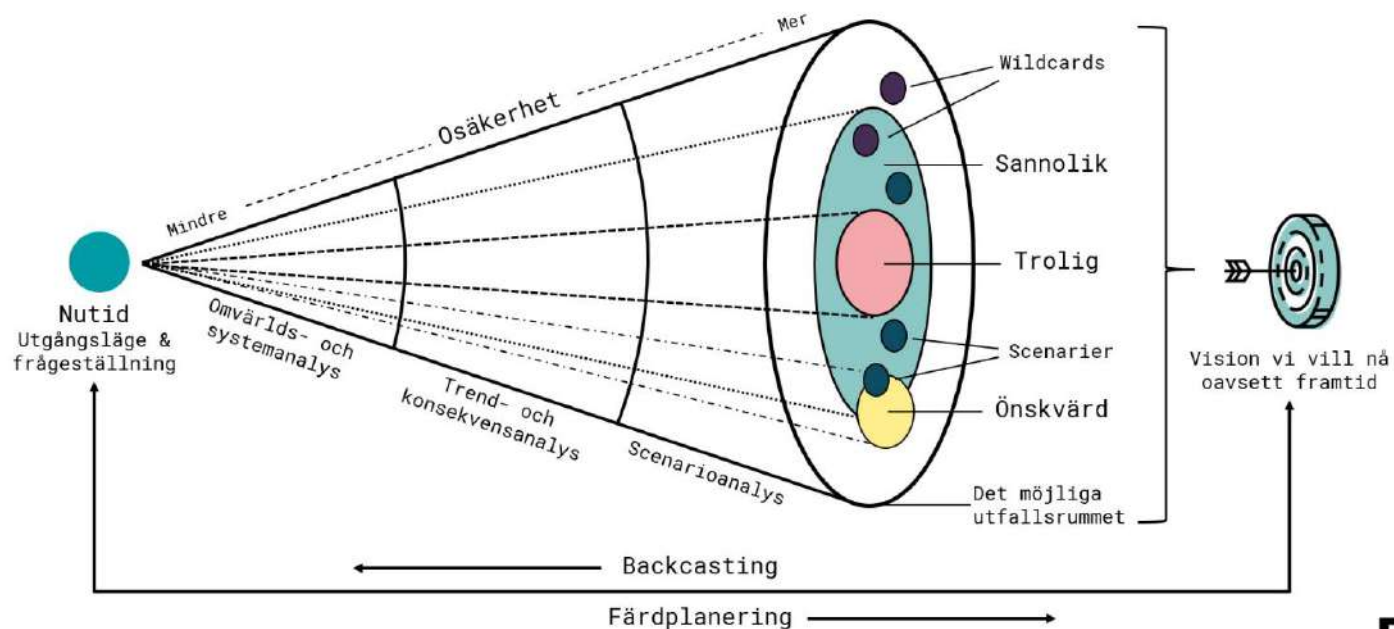
3. Ex: 87%, 85% and 55% district heating in commercial and public buildings and homes. 8% and 26% heat pump in public buildings and homes respectively

4. Very high renovation rate compared to standard drives high costs. May need to be adapted to only apply to certain insulation classes or houses of a certain age

5. *Transitions refer to changes necessary in the various sectors to achieve emission reduction targets. These can be achieved through various initiatives and actions

Note: All new vehicles fully electric, adopting XX municipality may require only electric vehicles, 80% electric cars would require the retirement of fossil cars. Average renovation cycle 20 years

Towards a scenario-based approach to meet greater uncertainty, new risks and opportunities



Kommunens mål

Vision

Umeå kommun har som vision att Umeå ska ha 200 000 invånare senast år 2050. Visionen uttrycker att alla ska uppleva att de vinner på att bo och verka i Umeå. Det gäller alla Umeås medborgare och alla som överväger att flytta hit och etablera sig, studenter, företag med flera. Kommunfullmäktige fastställer budget, övergripande mål och inriktning för kommunens samlade verksamhet i juni varje år.

Kommunfullmäktiges mål 2021–2024

Långsiktiga mål

200 000-målet:

- **Mål 1:** Umeås tillväxt ska klaras med social, ekologisk, kulturell och ekonomisk hållbarhet med visionen om 200 000 medborgare år 2050.




Social hållbarhet:

- **Mål 2:** Umeå ska växa hållbart utan några utsatta områden.
- **Mål 3:** Umeå kommun ska skapa förutsättningar för kvinnor och män att ha samma makt att forma samhället såväl som sina egna liv.

Klimatneutrala Umeå:

- **Mål 4:** Umeå ska vara klimat neutralt till 2040.

Overview of measures to bring about the necessary transitions

NON-EXHAUSTIVE	Measure	Duration 1	Emission reduction 2	City resourcefulness 3	Savings and benefits 4	Investments 5	
Pro-active technical measures 	15. Certified renewable electricity	●	●	●	◐	●	<p>Proactive technical measures have a high duration and can deliver high to medium emission reductions. The city has a high level of discretion over measures that are within the city's responsibility (e.g. buses), while other solutions can be influenced indirectly through various initiatives.</p> <p>Technology solutions have medium savings, mainly from reduced energy consumption and fuel costs (e.g. energy-efficient buildings and electrification). Investments are relatively high as new technology needs to be purchased or built and old technology may need to be replaced before technical life</p>
	4. Electrification of buses	●	●	●	◐	●	
	4. Electrification of passenger cars	●	●	◐	◐	◐	
	14. Increased mechanical sorting of plastics ⁶	◐	◐	●	◐	●	
	10. Electrification of machinery	●	◐	◐	●	◐	
	13. Switching to district heating/heat pumps ⁶	●	◐	◐	◐	●	
	12. Energy efficiency renovations	●	◐	◐	◐	●	
	12. Energy efficient new buildings	●	◐	◐	◐	●	
Proactive behavior change. 	8. Electrification of trucks	●	◐	◐	◐	●	<p>Proactive behavior changes. characterized by high benefits/savings and low investments, which makes the financial calculation strong. On the other hand, the measures have a low duration, but the impact on emissions can be large. The city can influence behavioral changes through, for example, information, incentives and facilitation, but does not have a high level of control over these measures.</p>
	7. Optimized logistics	◐	○	◐	◐	○	
	1. Reduced transport need	○	◐	◐	●	○	
	14. Increased recycling of plastics ⁶	○	◐	◐	◐	○	
	1. Car pooling	○	○	◐	●	○	
Reactive technical effort 	3. Shift to public transport/cycling/walking	○	○	◐	●	◐	<p>A city has a high level of control over CCS as a measure if the power plant is operated under the auspices of the city. The solution is characterized by high investments, which in turn provide large emission reductions with a long duration. A capture that exceeds remaining emissions can be used to pay back an overdraft of the CO2 budget</p>
	CCS on combined heat and power plants and Paper mill	●	●	●	○	●	

○ Low ◐ Avg. ● High ● High categorization better ● Low categorization better

Not: Klassificeringar är grova uppskattningar. (1) Klassificeras som låg om lösningen har flyktig karaktär (mindre än 1 års varaktighet), medel om lösningen antas ha cirka 1-3 års varaktighet när den väl implementerats och hög om lösningen är mer permanent (mer än 3 års varaktighet). (2) Hög är definierat som potentiella utsläppsminskningar som är mer än 50 tusen ton CO₂ per år 2030, medel som 15-100 och låg som mindre än 15. Elektrifiering av bussar definieras högre här då potentialen är större om jämförelsen exkluderar Sveriges reduktionsplikt. (3) Definieras som hög om Malmö stad har direkt rådighet över åtgärden, som medel och staden har indirekt påverkan och som låg om staden har ingen påverkan. (4) Klassificeras som låg om besparingar är nära 0 SEK per år, som medel om både totala besparingar är under 60 MSEK per år och om åtgärden har en besparingsintensitet på under 3 tusen SEK per ton minskad CO₂, och som hög om besparingen är över detta. (5) Klassificeras som låg om ytterligare investeringar nära 0 SEK per år, som medel om antingen ytterligare investeringar är under 80 MSEK per år eller om investeringsintensitet är under 2 tusen SEK per ton minskad CO₂, och som hög om investeringar är över detta. (6) Åtgärd "Fossilfri uppvärmning" är uppdelad i tre mindre åtgärder i den här analysen. Data saknas för vissa klassificeringar och har uppskattats av Material Economics.

Thank you for you attention

Friskrivning

This is a top-down analysis based on data collected from many research reports, statistics from Umeå and Sweden as well as several global experts. Although the underlying figures and assumptions in this document are based on reputable sources, they should still be considered indicative and subject to change

Sammanfattning

Umeå, as a pilot city in the EU's 'Net Zero City' program, has set an ambitious goal for 'Umeå City' to be climate neutral by 2030 for scope 1 and 2 emissions¹. For the entire municipality, the goal is to be climate neutral by 2040. This means that all fossil emissions by the target year have either been eliminated or compensated by capturing non-fossil carbon dioxide corresponding to the remaining annual emissions.

Umeå municipality's emissions in 2021 amounted to ~200 ktonnes CO₂e. Energy use is dominated by the construction sector, while emissions are dominated by the transport sector due to Sweden's low CO₂ content in electricity and heat production.

To reach net zero emissions by 2040, extensive societal transformations are needed in both the transport and construction sectors. In order to achieve the same goal already in 2030, very extensive changes are required. The changes include significantly reduced travel, the transition from motor vehicles to trains, bicycles and walking, and electrification of vehicles and machines. In addition, a sharp reduction in energy consumption in buildings is required, which today is significantly above the Swedish average consumption. With these changes, Umeå reduces its carbon dioxide emissions by 74%. In order to reach net zero emissions, either even stronger changes are needed or that remaining emissions are compensated in another way.

Investments will be needed to achieve the necessary transitions, including better insulated buildings, electrification of vehicle fleets, efficiency of energy consumption and changes in behavior. At the same time, changes in behaviour and adaptation to a carbon-free society lead to major benefits in terms of improved health, job creation, cost savings and avoidable investments. At the same time, the socio-economic calculation for Umeå's climate transition ends at over SEK 23 billion plus until 2050. In the simulated scenario, the largest net worth creation will accrue to Umeå's municipal residents (SEK 15.2 billion), but residents, property owners and private companies will also need to make investments in the transition of SEK 7 billion.

Umeå currently (2023) has about 500 ktonnes left of the amount of CO₂ that can be emitted in order not to exceed the Paris Agreement. In the ambitious scenario (target year 2040), Umeå will exceed the budget, i.e. the total emissions will be greater than the space allows by 1730 ktonnes even if a net zero situation is reached by the target year. To compensate for this, Umeå has the opportunity to capture non-fossil carbon dioxide from the combined heat and power plant in Dåva and the paper mill in Obbola. As the total amount of available carbon dioxide for capture exceeds Umeå's gap, you can over a couple of years compensate for the 'overdraft' of the carbon budget that has taken place and in the longer term create room for carbon offsetting even outside Umeå (eg sell certificates or in the form of CCU).

To bring about the necessary changes, a variety of measures can be taken, from technological investments, such as insulating houses to personal decisions such as taking the bike instead of the car. Ultimately, who is chosen will have different effects on duration, the level of investment needed and the stakeholders involved.

In a next step, Umeå municipality needs to anchor with stakeholders which combination of measures has the best conditions to lead to the necessary changes; It is about understanding the detailed links between action and transition, ensuring responsibility and ownership among actors for different measures and securing necessary investments for measures and control instruments.

1. Direct, local emissions from the production of energy, heat, transport, etc.

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Scope of the study

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Actions and priorities

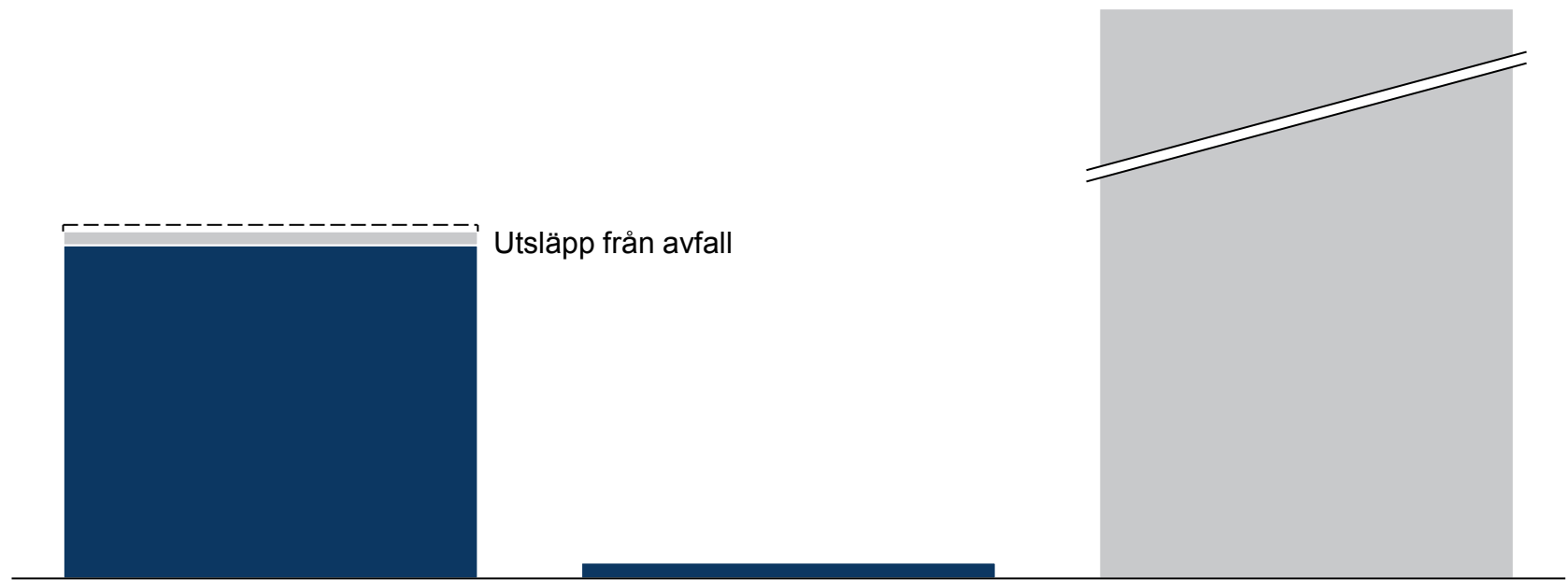
Challenges and next steps

Attachments

Omfattning av den samhällsekonomiska klimatanalysen för Umeå

kt CO₂e

 Fossil emissions from industries¹
 Not covered
 Covered



Scope 1



Direct local emissions, e.g. from transport, buildings, construction, etc.

Scope 2



Electricity used in the municipality²

Scope 3



Upstream and downstream emissions from consumption, materials and services consumed, agriculture and forestry

The study covers scope 1 and 2 emissions from the entire Umeå municipality, i.e. direct local emissions from, for example, transport, buildings, as well as locally produced heat such as district heating and 'imported' electricity in the form of electricity purchased from the electricity grid. Fossil industrial emissions from SCA in Obbola have been added separately. Emissions from direct local emissions, e.g. from transport, buildings, construction, etc.

emissions from the incineration of waste are included in emissions from district heating, but emissions from other waste management, such as landfill, are excluded, but only constitute 1% of the municipality's waste

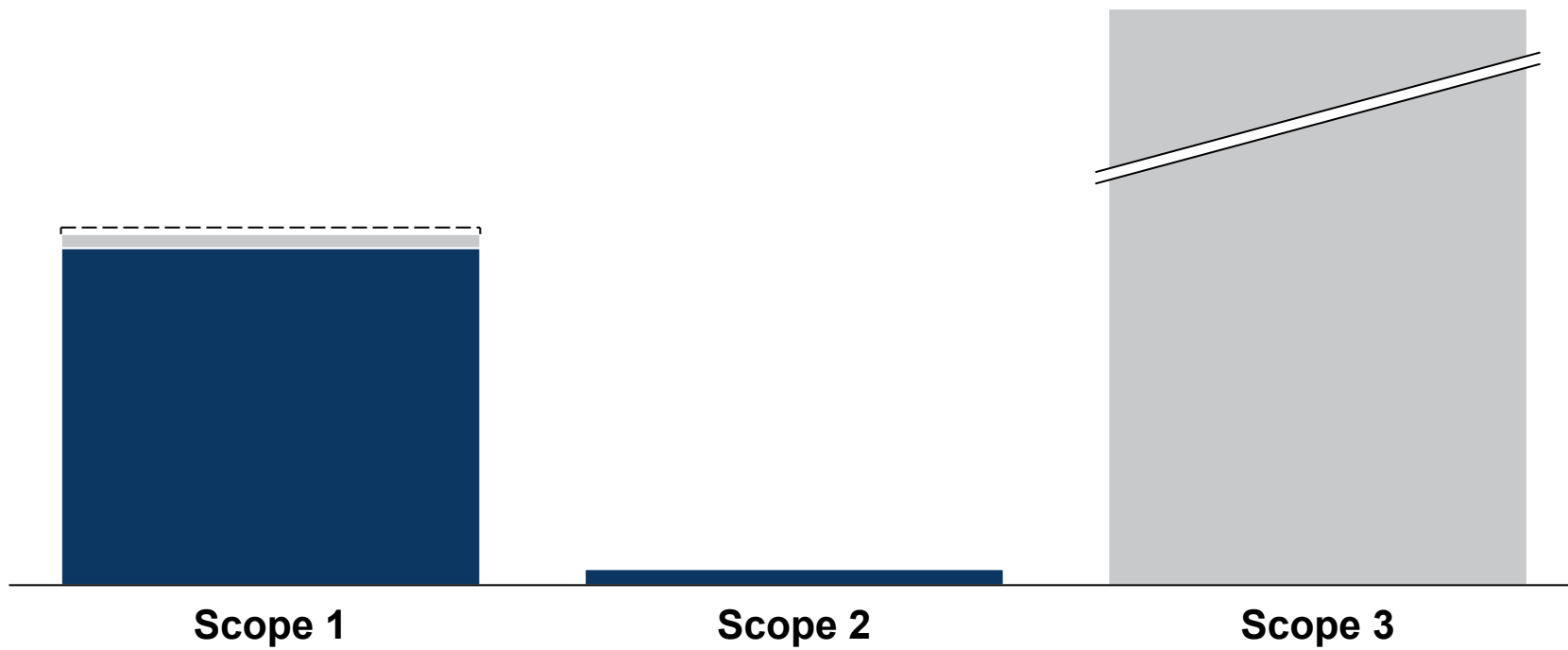
Scope 3 emissions from, for example, consumption, purchased materials and services, as well as agriculture and forestry

1. SCAs pappersbruk i Obbola 2. modellen antar att all el importeras i utgångsläget 3. Effekter på utsläpp och ekonomi från samhällsekonomisk analys för Umeå 2040

☐ Fossila utsläpp från industrier¹

■ Omfattas ej

■ Omfattas



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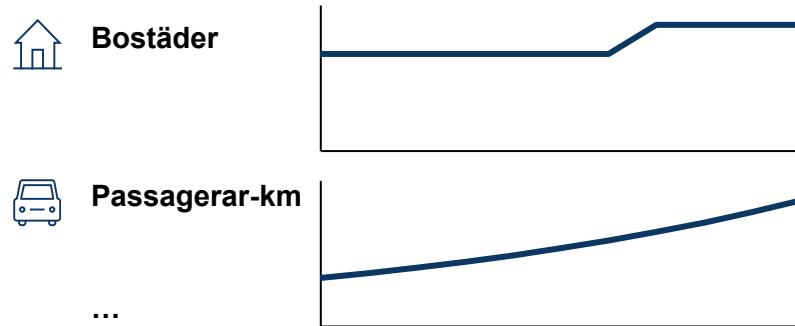
Utmaningar och nästa steg

Bilagor

Simulation model to calculate emissions, energy use, investments and savings

CITY DECARBONISATION ENGINE – FÖRENKLAD METODIK

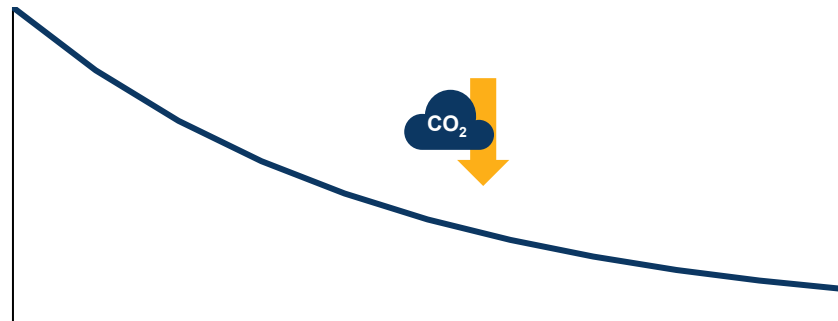
Based on the underlying demand for value-creating services each year



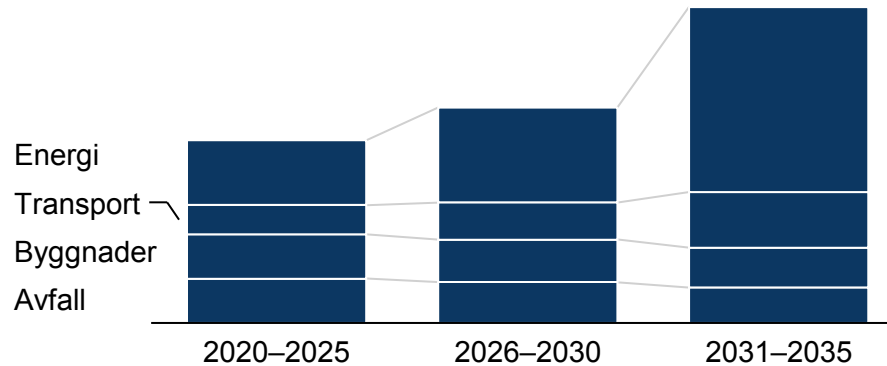
... and development of modal choice and use of technology mix...



... calculates the total greenhouse gas emissions and added value of the choices made...
Emissions, MtCO₂e



... and forecast investments, costs and savings, including added value for health and jobs, for emission reductions
Investments, USD



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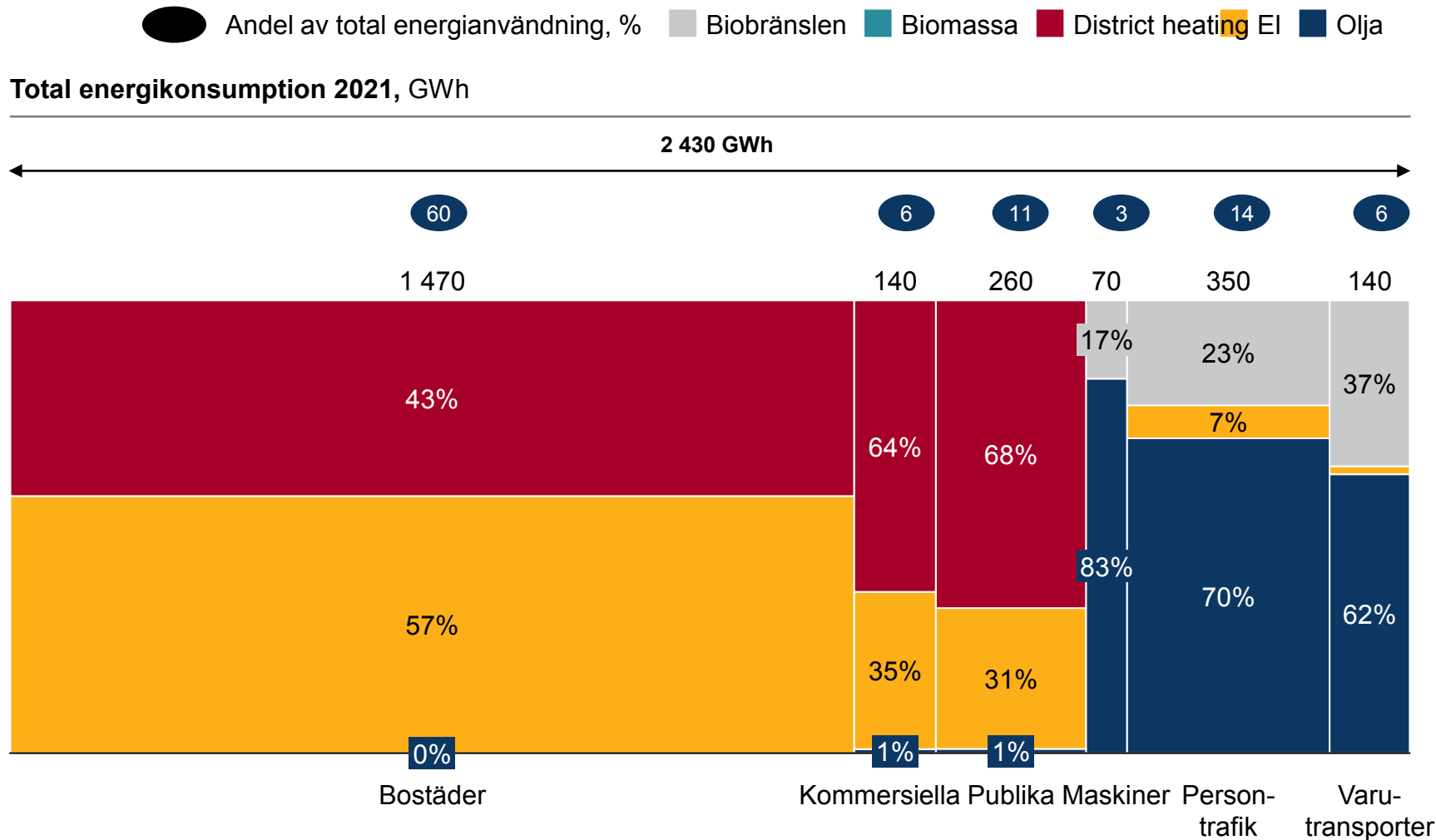
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Umeå's energy consumption in 2021 was ~2,430 GWh²

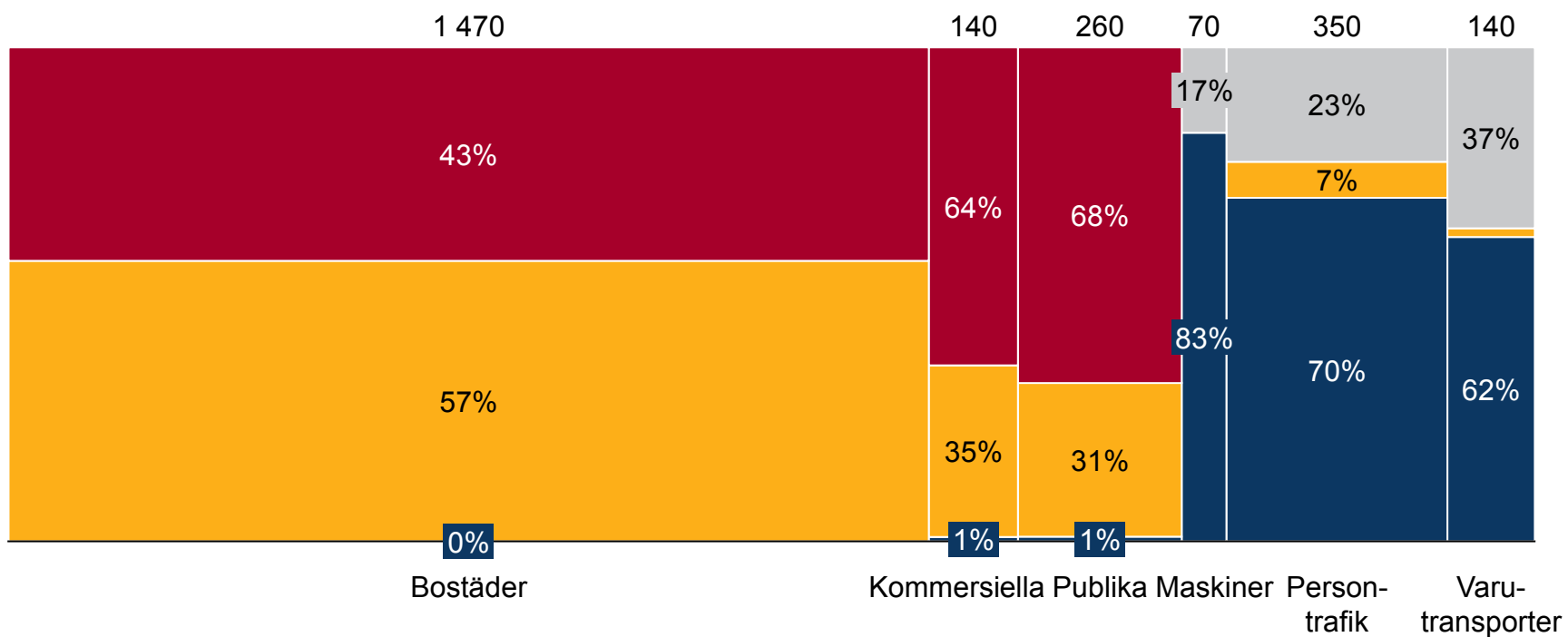


77% of Umeå's energy consumption takes place in the construction sector, where housing accounts for the majority. The consumption of energy per m² in Umeå, which consists of heating and household electricity, is about twice as high as the Swedish average (according to Statistics Sweden)¹. This can have several causes; For example, system leaks (applies to heat specified as production), that buildings have a poorer degree of insulation, that Umeå is located in cold and dark climates, that a larger part is heated with inefficient direct-acting electricity, a high proportion of inefficient electrical equipment and a historically very low electricity price that has not been an incentive to save on electricity.

23% of energy consumption in the municipality takes place in the transport and machinery sector, which today is dominated by fossil fuels, with some elements of biofuels as a result of, among other things, the reduction obligation (a proportion that will

1. See next page
2. Equivalent to SEK 1,530 million with the 2021 average price of 63 öre at Nordpool

Biobränslen
 Biomassa
 Fjärrvärme
 El
 Olja



Energikonsumtion – modellantaganden och effekter på simulering



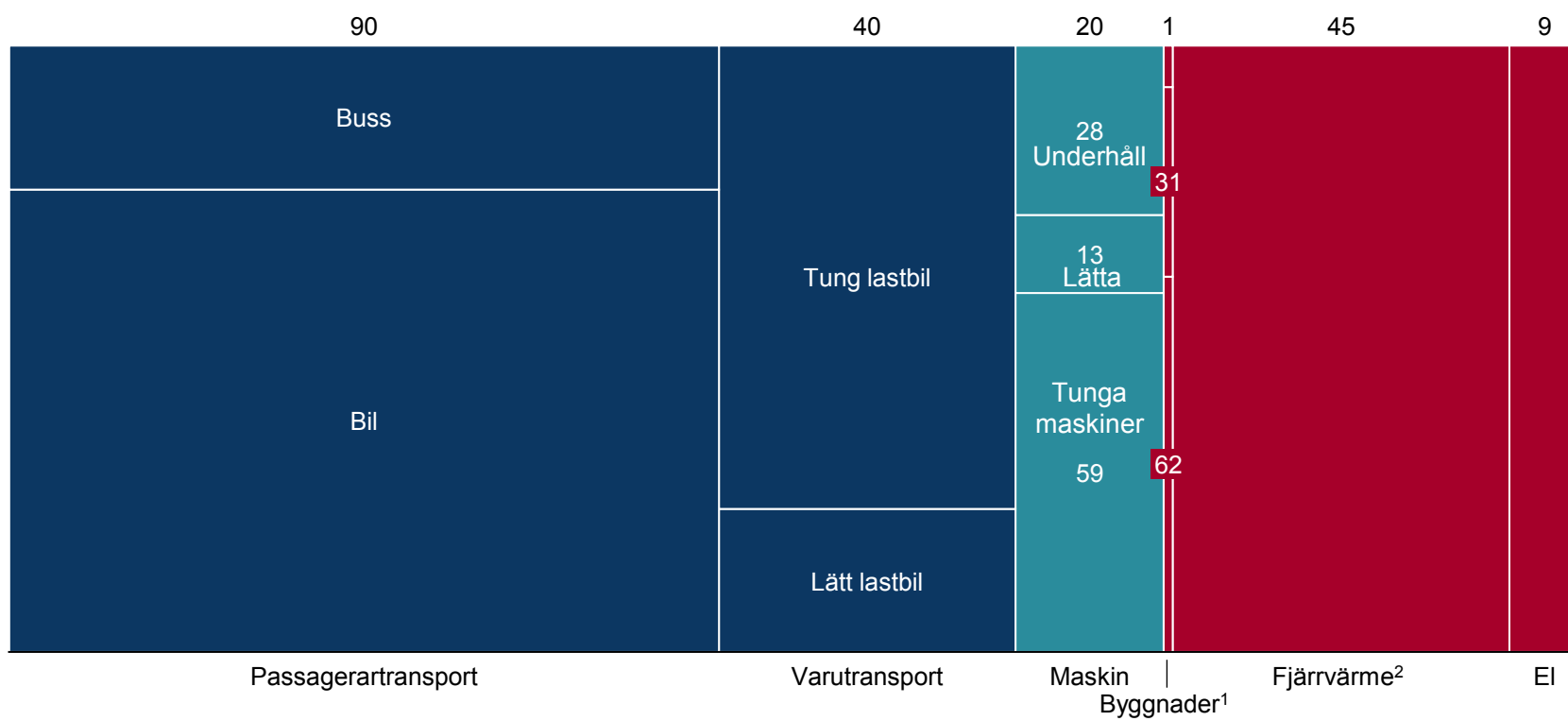
Fördjupande diskussion

The model generates, based on input of m2, degree of insulation and heating type distributed by different building categories for Umeå, an energy consumption per m2 that corresponds to a Swedish average (according to Statistics Sweden). The measured energy consumption in Umeå is about twice as high (both for heat and electricity). Since we have not had evidence that neither the number of m2 nor the measured energy consumption are incorrect, the model has instead been calibrated with the parameters insulation degree (a higher proportion of poorly insulated houses has been assumed) and heating type (a higher proportion of inefficient direct-acting electricity has been assumed) to correspond to the measured energy consumption. In reality, the higher consumption is probably due to a mix of these and a high proportion of inefficient electrical machines (e.g. lighting, refrigerators, freezers, washing machines, etc.) as well as a behavior that results in high energy consumption (e.g. high housing temperatures, equipment that 'stands and walks', etc.).

By attributing the entire higher consumption to inefficient electricity and poorer insulation, a maximum high cost is generated to reduce energy consumption (the price of insulating houses and changing heating). If the entire high energy consumption were instead solved by behavioral changes (eg lower indoor temperatures or 'turn off and off', the cost would be maximally low. The truth lies somewhere between these 'outliers', i.e. the entire improvement will not be solved by technical measures such as insulation, but the cost will thus also be lower than the maximum.

In order to better plan for the best prioritization of measures for conversions, Umeå should investigate what drives the high energy consumption (various measures to address leaks in the grid, changed behaviors or incentives for changing the heating type, for example). With efforts to reach 100% renewable electricity, main other efforts to reduce the municipality's climate footprint should not primarily focus on reduced electricity use, but reduced fossil content in heating (excluding electricity) and transport/machinery. However, reducing electricity use is a good idea for many other reasons like cost, availability, etc.

■ Transport
 ■ Maskiner
 ■ Byggnader, el och värme
 Total andel, i %



Utsläpp av växthusgaser – modellantaganden och effekter på simulering



Fördjupande diskussion

Initially, a share of biofuel of 26% for diesel and 6% for gasoline has been adopted in the transport sector (according to the current reduction obligation in 2021). This proportion will decrease in the coming years and contribute to emission increases in a BAU scenario.

District heating is produced by the combined heat and power plant in Dåva, which runs on waste and biofuel. In the modelling, the proportion of fossil content flue gases from Dåva has been used. At present, waste fuel contains a significant proportion of plastic. In the simulated scenario, it is assumed that 25% of the plastic can be sorted out.

All electricity has initially been assumed to be electricity purchased from the grid, despite the fact that Umeå has a hydropower plant within the municipality in which it is a shareholder. This is because it is not possible to verify whether residents and businesses buy renewable electricity. In a future scenario, we have assumed that 100% of the electricity comes from renewable sources. This requires that Umeå can guarantee renewable electricity with certificates (eg from hydropower, wind power or solar power)

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Overview of modeled transitions*

Fet stil = Förväntad högre möjlighet för Umeå att påverka

	Sektor	Omställning	Beskrivning	Scope of change	Ambitious scenario Target date	Very ambitious scenario Target date
TRANSPORT	Passenger travel	1. Smart resande	Working remotely, local community gaining importance	30% fewer trips	2040	2030
		2. Nyttjandegrad	Higher utilization of cars, e.g. via car pools	15% increase in average passenger rate per car	2040	2030
		3. Trafikomställning	Transition from car to public transport, bicycle or walking	Shift from car from 41 to 25% and non-motorized up to 25% for local traffic (see details on next page)	2040	2030
		4. Elektrifiering	(Acceleration of) transition to electric cars	50% and 5% for local and through bus traffic and 78% ¹ (cars)	2040	2030
		5. Biobränsle	Increased biofuel content in diesel and petrol	No increase beyond regulated interference ²	2040	2030
	Gods-transporter	6. Mindre trspt	Shorter distances due to e.g. central point delivery	30% fewer trips	2040	2030
		7. Nyttjandegrad	Higher utilization, e.g. smart vehicle planning and collaboration	+10% of average load for heavy, +100% for light	2040	2030
		8. Elektrifiering	(Acceleration of) electrification of the truck fleet	46% (heavy trucks) and 68% (light trucks) and 8% hydrogen-powered trucks	2040	2030
		9. Biobränsle	Increased biofuel content in diesel and petrol	No increase beyond regulated interference ²	2040	2030
BYGGNADER	Machinery	10. Elektrifiering	Transition to electrical machines	100% electric machines	2040	2030
		11. Biobränsle	Increase the biofuel content of diesel	No increase beyond regulated interference ²	2040	2030
	Buildings	12. Renovering	Upgrading buildings for better insulation/efficiency	5% renoveringstakt per år ⁴	2040	2030
13. Värmekälla		Transition to biofuel, geothermal heat pumps etc	Increase in district heating and transition to heat pumps ³	2040	2030	
ENERGI	Energy	14. Innehåll i avfall	Lower fossil content in waste for energy recovery	25% reduction in plastic content	2040	2030
		15. Elmix	Renewable electricity	100% renewable electricity through purchased certificates	2040	2030

1. Including electric vehicles, fuel cell vehicles and plug-in hybrids

2. From 2023 to 2027: 6% for both diesel and gasoline acc. Revised reduction obligation; 2030 and onwards 14% for diesel and petrol according to EU requirements. Interpolated values 2028-29

3. Ex: 87%, 85% and 55% district heating in commercial and public buildings and homes. 8% and 26% heat pump in public buildings and homes respectively

4. Very high renovation rate compared to standard drives high costs. May need to be adapted to only apply to certain insulation classes or houses of a certain age

5. *Transitions refer to changes necessary in the various sectors to achieve emission reduction targets. These can be achieved through various initiatives and actions

Note: All new vehicles fully electric, adopting XX municipality may require only electric vehicles, 80% electric cars would require the retirement of fossil cars. Average renovation cycle 20 years

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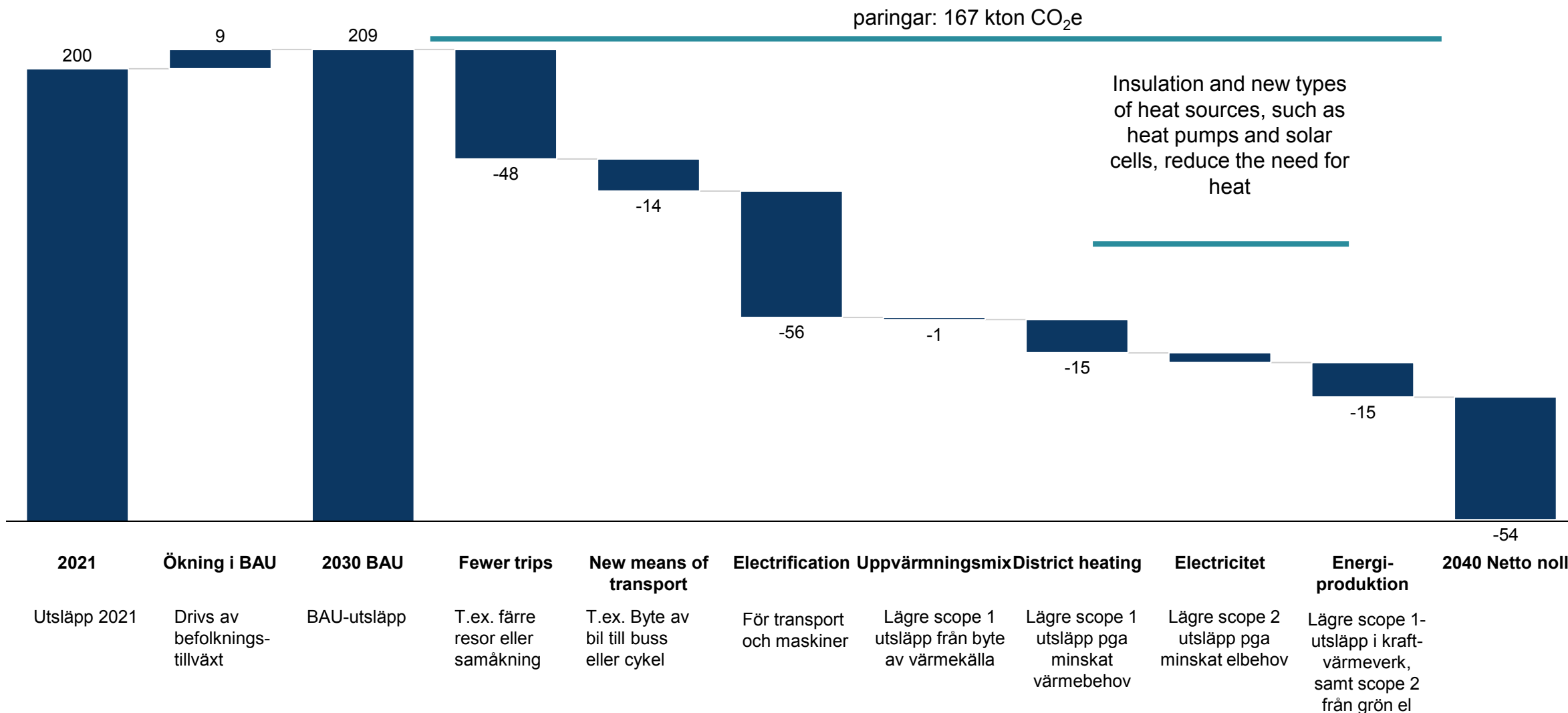
Utmaningar och nästa steg

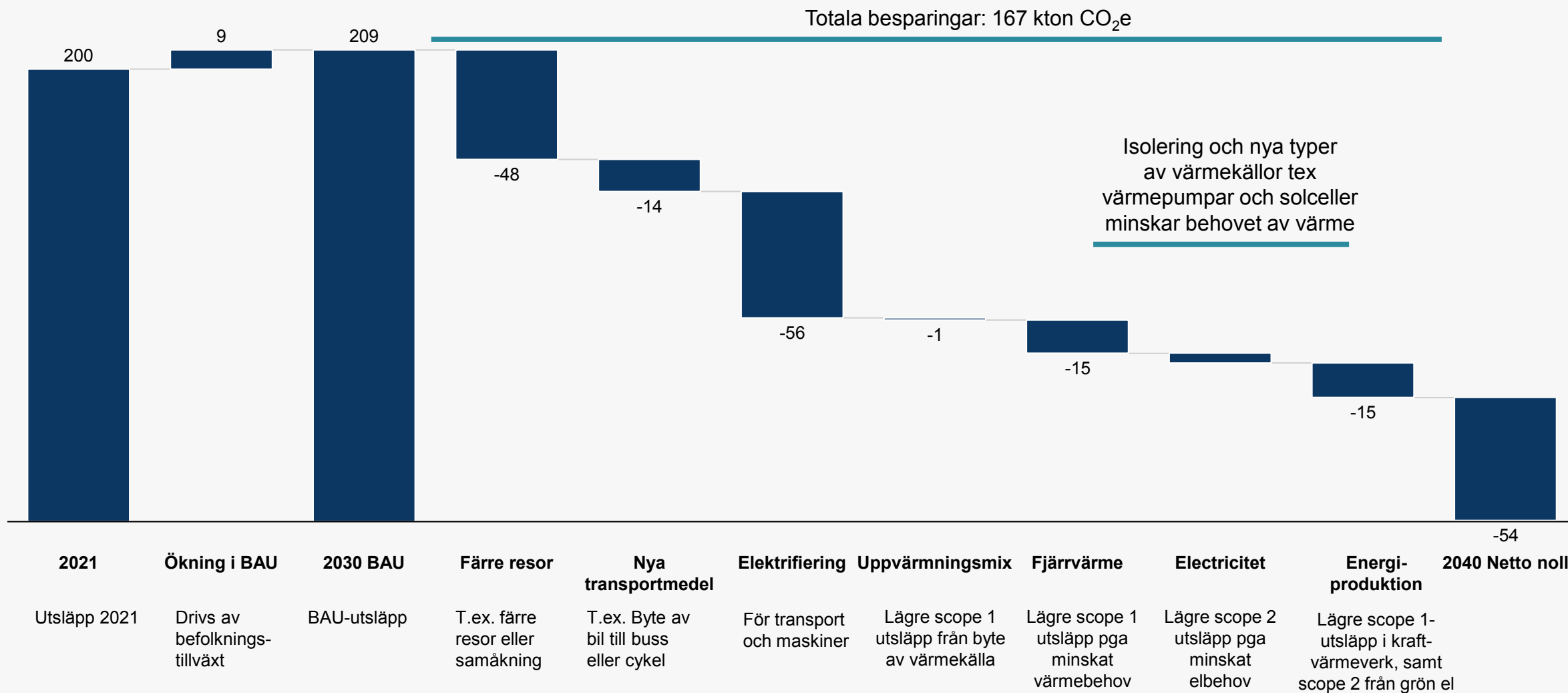
Bilagor

Fewer trips and electrification of transport and machinery are the biggest reduction measures in Umeå until 2040

Utsläppsminskning per åtgärd, kt CO₂e

Totala besparingar: 167 ktonnes CO₂e





Utsläppsminskande åtgärder



Fördjupande
diskussion

The major emission-reducing transitions in the scenario are found in fewer trips, a different vehicle mix, electrification of vehicles, reduced need for heat and electricity, and conversion to renewable electricity. These transitions are thus a priority to succeed with.

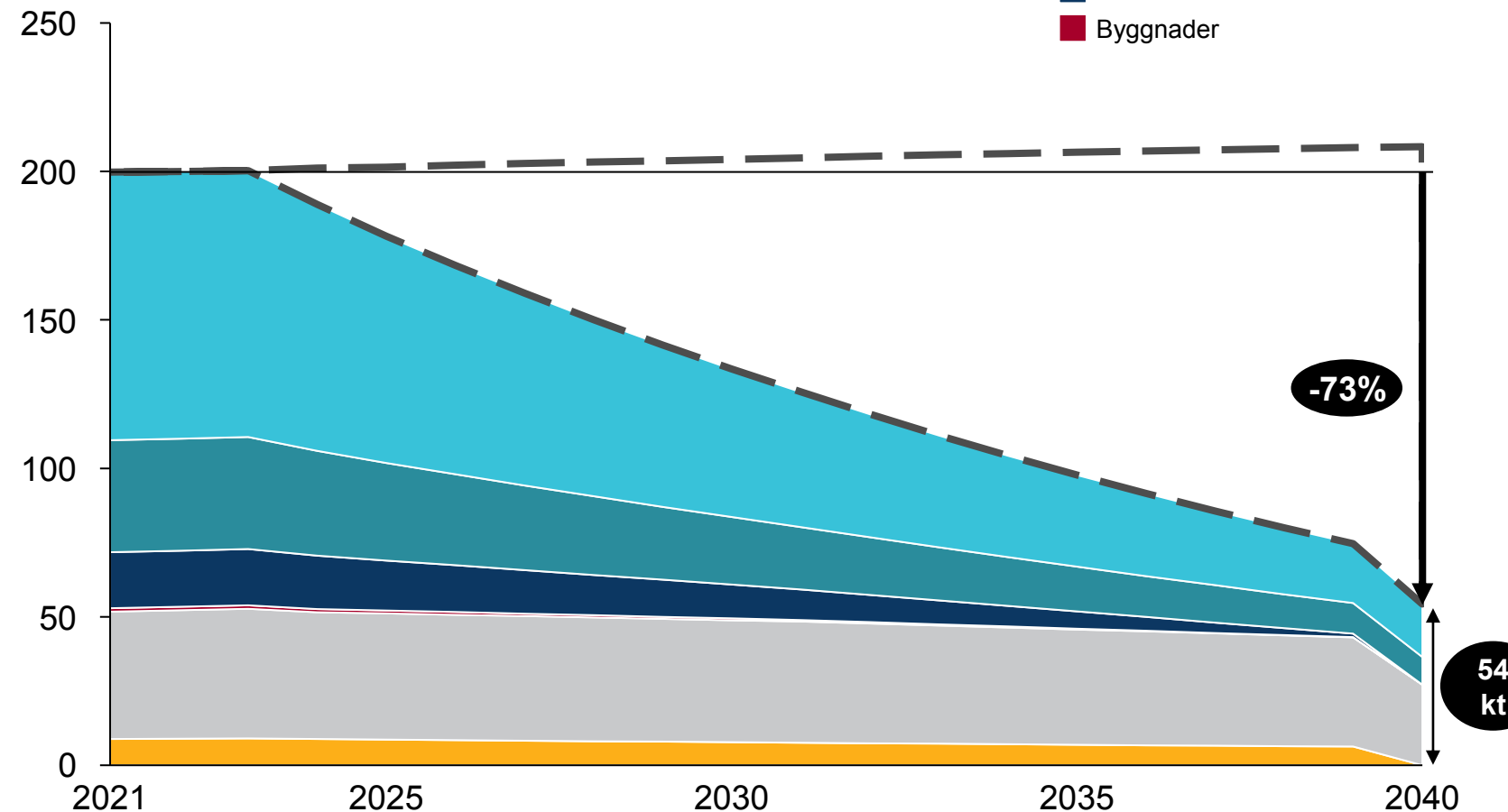
Since a relatively large proportion of emissions (27%) remains in 2040 in the simulated scenario, a reduction in this item should also be prioritized, for example through eliminating of fossil content in heat and higher conversion to electric vehicles or transition to biofuels

In an ambitious scenario, Umeå reduces its emissions by 73% by 2040

2040 scenario

Utsläpp 2021–2040

kt CO₂e



In an ambitious scenario, Umeå implements the simulated transitions by 2040 and thus achieves an emission reduction of 73% during the period. In a very ambitious scenario, the same transitions will already be implemented by 2030. This scenario is presented in Annex

In BAU (business as usual), emissions from the grid are assumed to remain constant during the period, population growth (1300 people/year) increases emissions, while the effects of reduction obligations in the transport sector reduce emissions. All in all, this results in an emissions increase of ~4% over the period

A larger population increase, such as that which would correspond to a population of 200'000 by 2050 (i.e. ~4000 pers/year), gives significantly higher emission increases that in that case also need to be compensated for

Since Umeå in the simulated scenario has 27% of its emissions, or 54 ktonnes CO₂e / year, the municipality needs to compensate for this in another way or further raise the ambition in the transitions. The sectors that still contribute to emissions are district heating production and the use of fossil fuels in the transport sector.

Opportunities to reduce these can be found, for example, in sorting plastic from waste, more extensive conversion to electric vehicles or switching to biofuels

Not: Total återstående CO₂-budget efter 2021: 1 018 kton. Ackumulerade utsläpp efter 2021 i huvudscenario=848 kton och i BAU-scenario=1673 kton

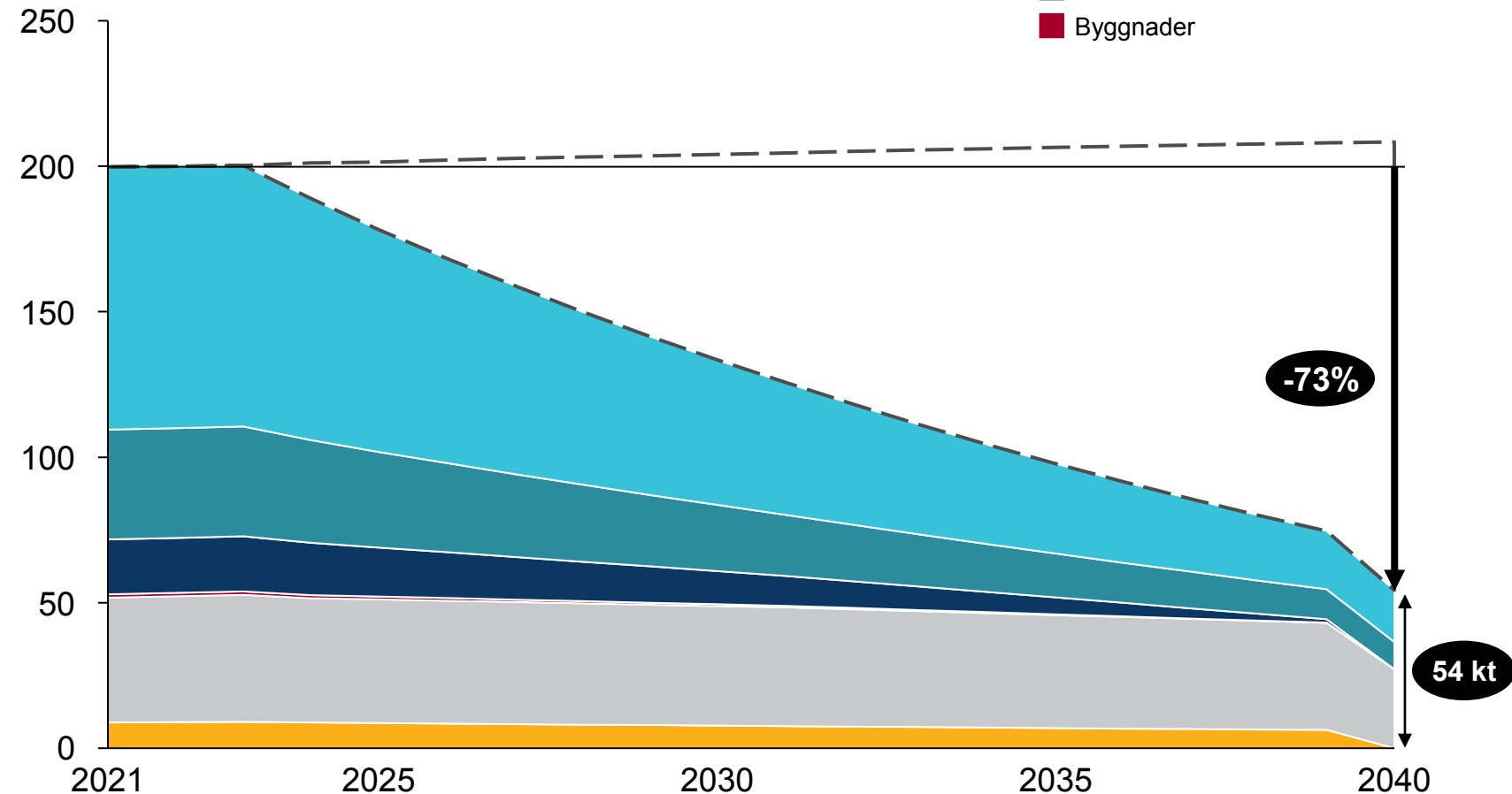
Källa: City Decarbonization Engine, Material Economics analys

I ett ambitiöst scenario minskar Umeå sina utsläpp med 73% till 2040

2040 scenario

Utsläpp 2021–2040

kt CO₂e



Not: Total återstående CO₂-budget efter 2021: 1 018 kton. Ackumulerade utsläpp efter 2021 i huvudscenario=848 kton och i BAU-scenario=1673 kton

Källa: City Decarbonization Engine, Material Economics analys

I ett ambitiöst scenario genomför Umeå de simulerade omställningarna till år 2040 och åstadkommer därmed en utsläppsminskning på 73% under perioden. I ett mycket ambitiöst scenario genomförs samma omställningar redan till 2030. Detta scenario redovisas i bilaga

I BAU (business as usual) antas utsläpp ifrån nätet ligga konstant under perioden, befolkningsökningen (1300 pers/år) ökar utsläppen, medan effekter av reduktionsplikt i transportsektorn minskar utsläppen. Sammantaget resulterar det i en utsläppsökning på ~4% under perioden

En större befolkningsökning tex den som skulle motsvara en befolkning på 200'000 till 2050 (dvs ~4000 pers/år) ger väsentligt högre utsläppsökningar som i så fall också behöver kompenseras för

Då Umeå i det simulerade scenariot har 27% av sina utsläpp, eller 54 kton CO₂e/år behöver kommunen kompensera för detta på annat sätt eller ytterligare höja ambitionen i omställningarna. De sektorer som fortfarande bidrar till utsläpp är fjärrvärmeproduktionen och användning av fossilt bränsle i transportsektorn.

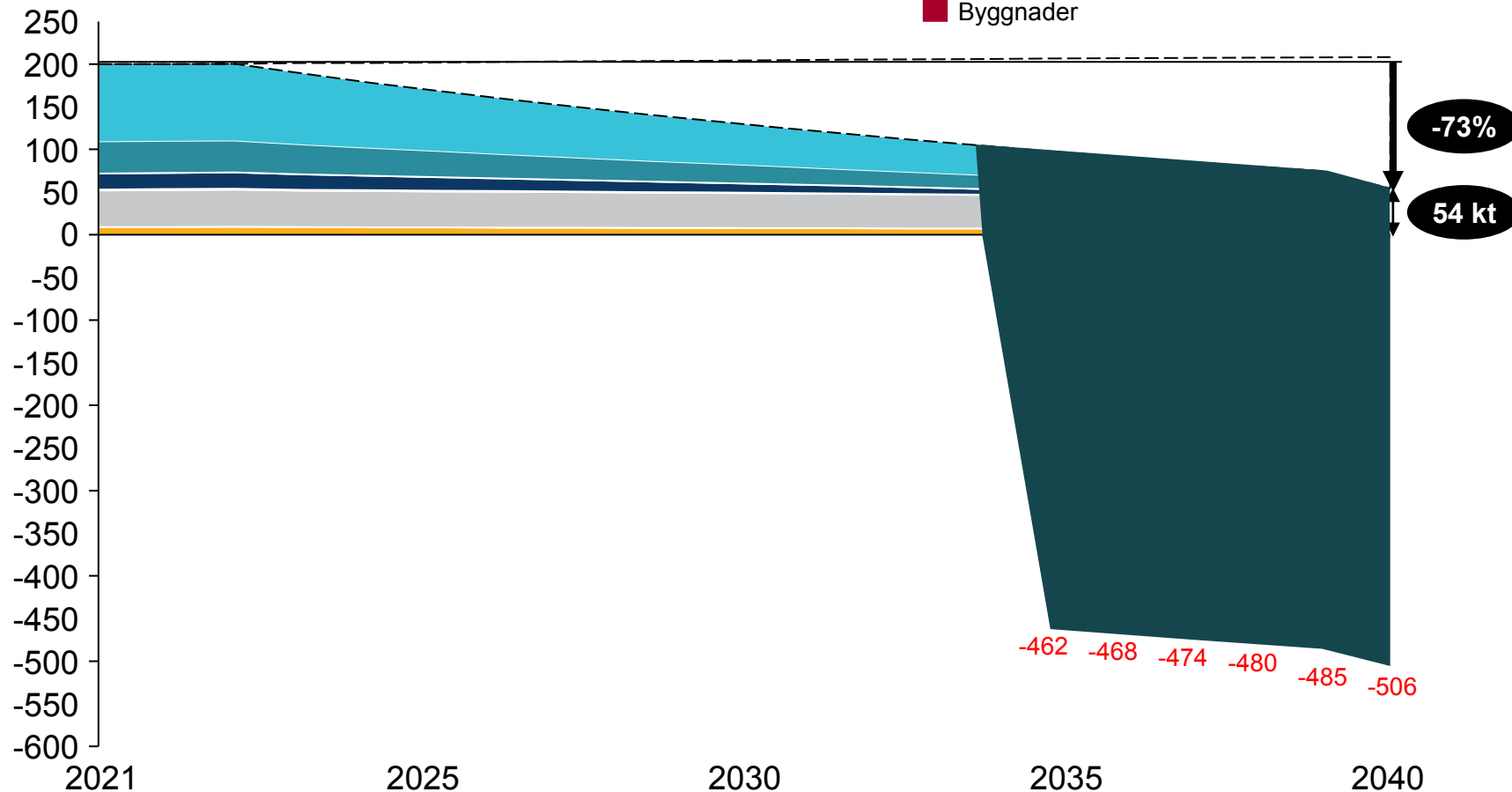
Möjligheter att minska dessa finns tex i utsortering av plast ur avfall, mer omfattande omställning till elfordon eller övergång till biobränslen

With CCS, Umeå can offset its remaining emissions

2040 scenario

Utsläpp 2021–2040

kt CO₂e



In an ambitious scenario, Umeå implements the simulated transitions by 2040 and thus achieves an emission reduction of 73% during the period. In a very ambitious scenario, the same transitions will already be implemented by 2030. This scenario is presented in Annex

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Since Umeå in the simulated scenario has 27% of its emissions, or 54 ktonnes CO₂e / year, the municipality needs to compensate for this in another way or further raise the ambition in the transitions. The sectors that still contribute to emissions are district heating production and the use of fossil fuels in the transport sector.

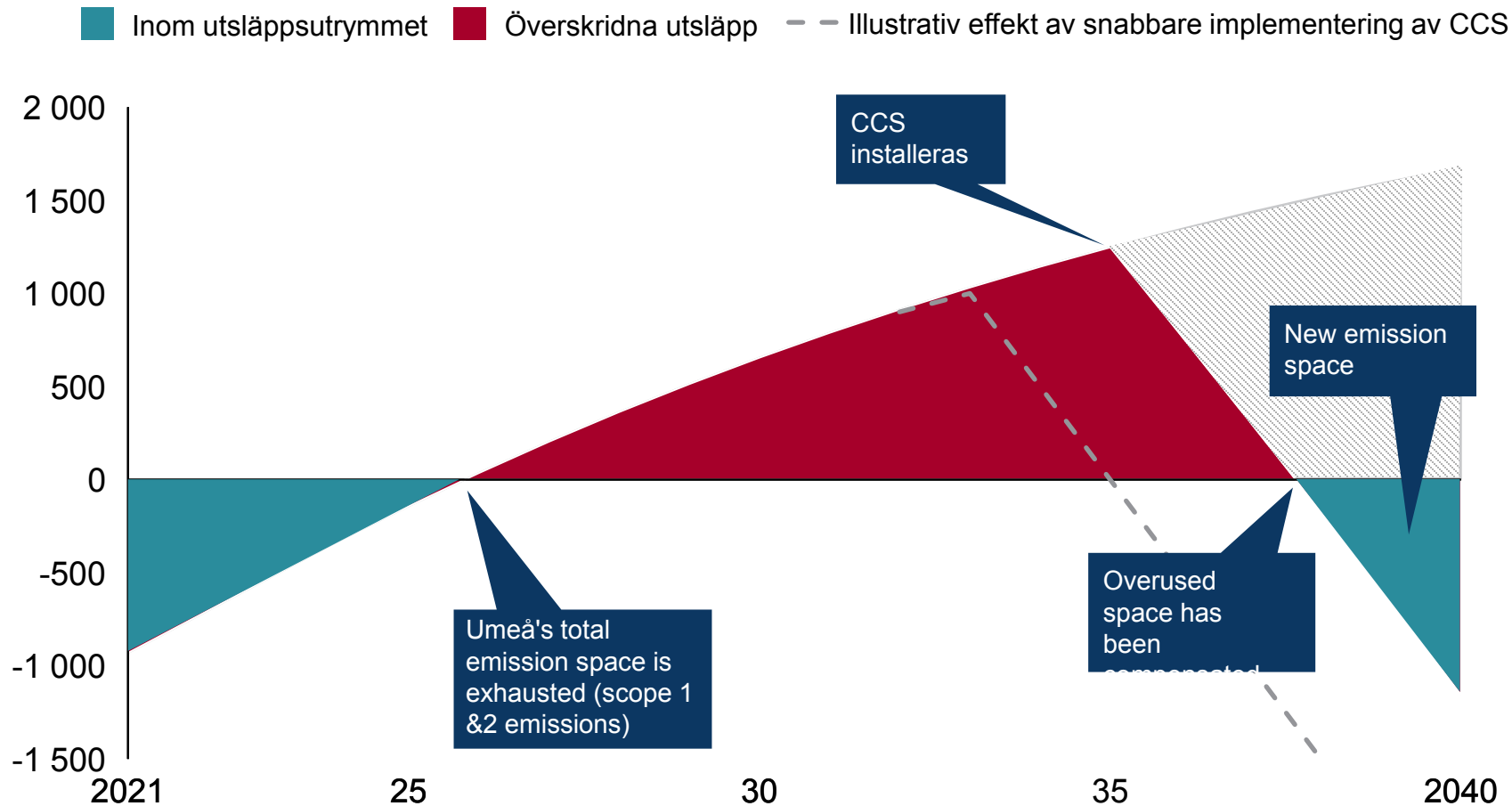
Opportunities to reduce these can be found, for example, in sorting plastic from waste, more extensive conversion to electric vehicles or switching to biofuels

Not: Total återstående CO₂-budget efter 2021: 1 018 kton. Ackumulerade utsläpp efter 2021 i huvudscenariot=848 kton och i BAU-scenariot=1673 kton

Källa: City Decarbonization Engine, Material Economics analys

With CCS, Umeå can compensate for its remaining emissions and become net negative

2040 scenario utveckling till 2040, kt CO₂, Kumulativa utsläpp

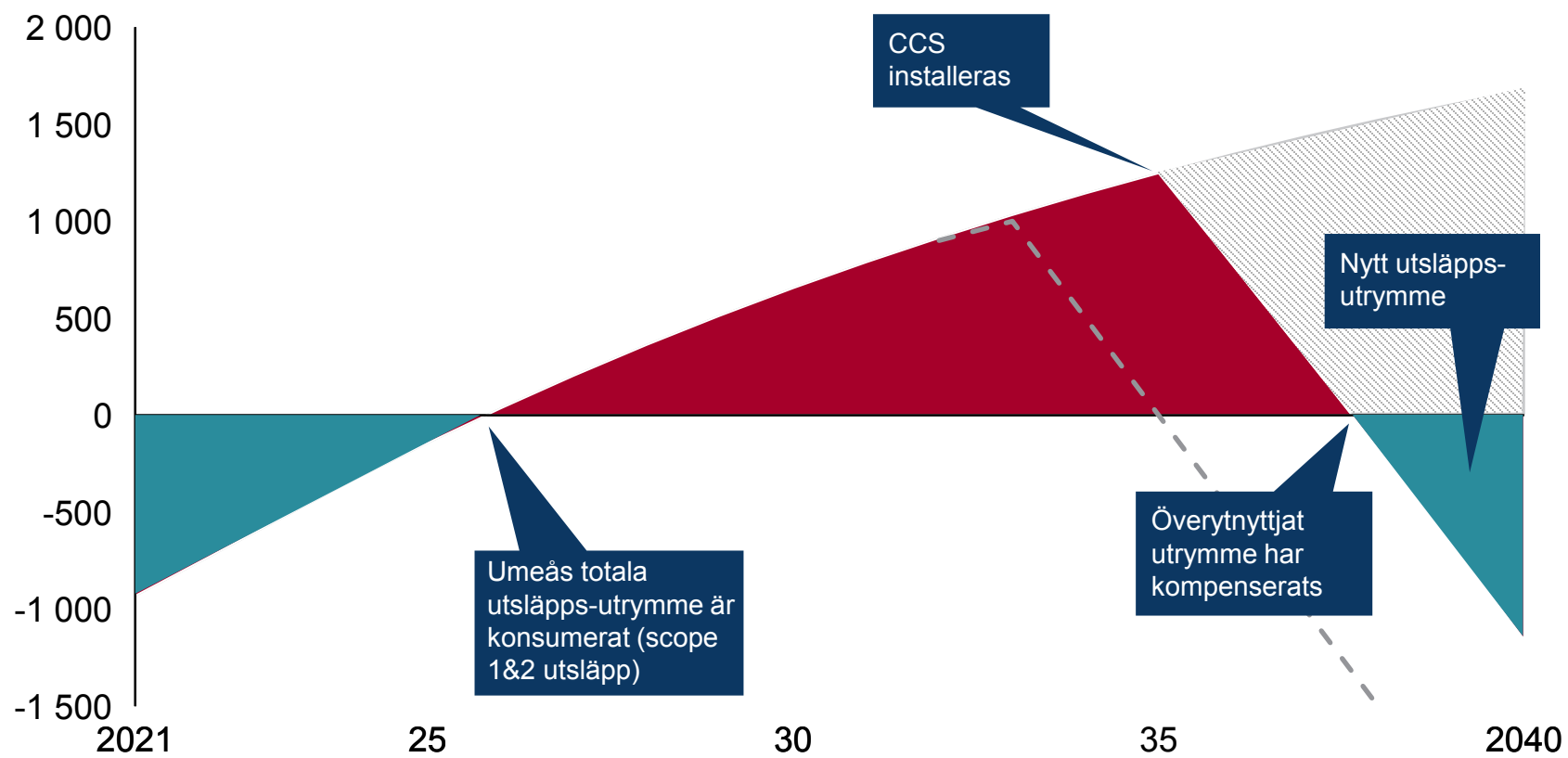


In the simulated scenario, Umeå significantly reduces its emissions until 2040, but continues to emit 54 ktonnes of CO₂e per year even after 2040

Already in 2025, Umeå has consumed the emission space allowed by the Paris Agreement and then continues to build up a 'CO₂ debt'

With the help of CCS that exceeds emissions, the remaining emissions can be compensated and the debt paid off. In the event of an installation with full effect in 2035, the debt has been repaid until 2038 and then a scope is created to sell emission rights to, for example, finance the investments in CCS. By bringing forward the installation of CCS, the debt that needs to be handled is reduced and the value creation opportunity increases and is brought forward

■ Inom utsläppsutrymmet ■ Överskridna utsläpp - - Illustrativ effekt av snabbare implementering av CCS



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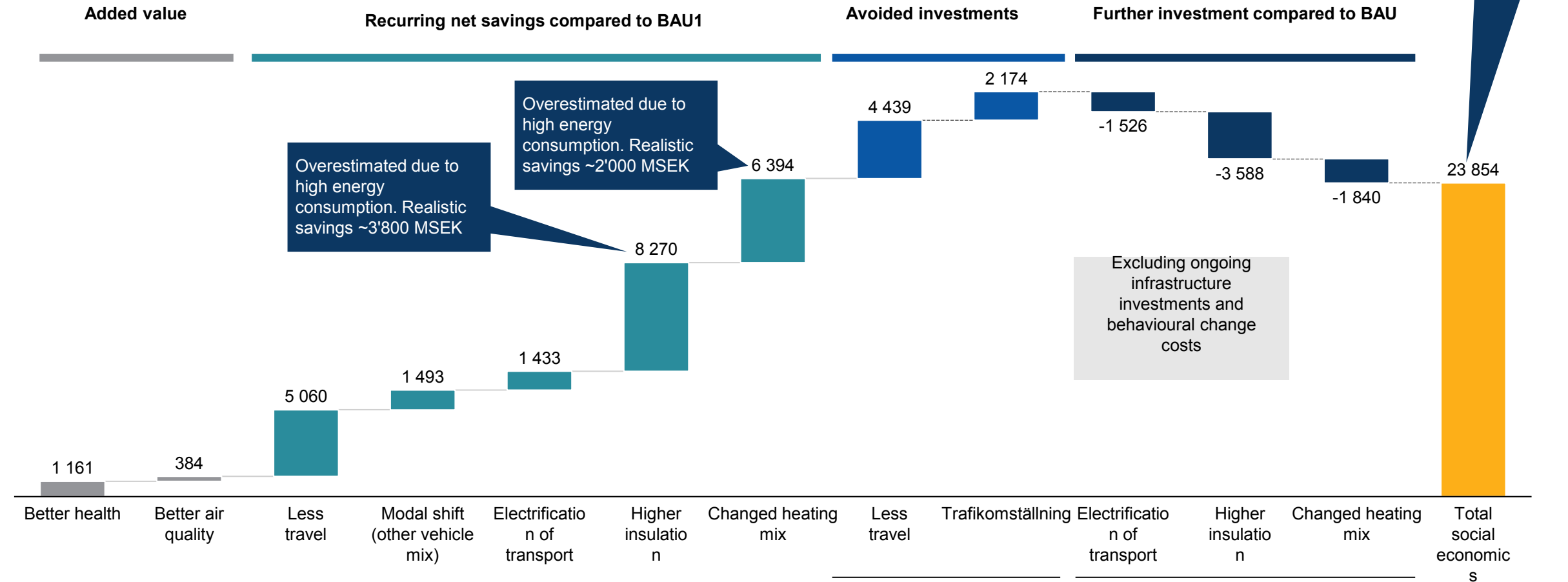
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Bilagor

The socio-economic outcome of Umeå's transition gives a surplus of SEK 23.9 billion by 2050

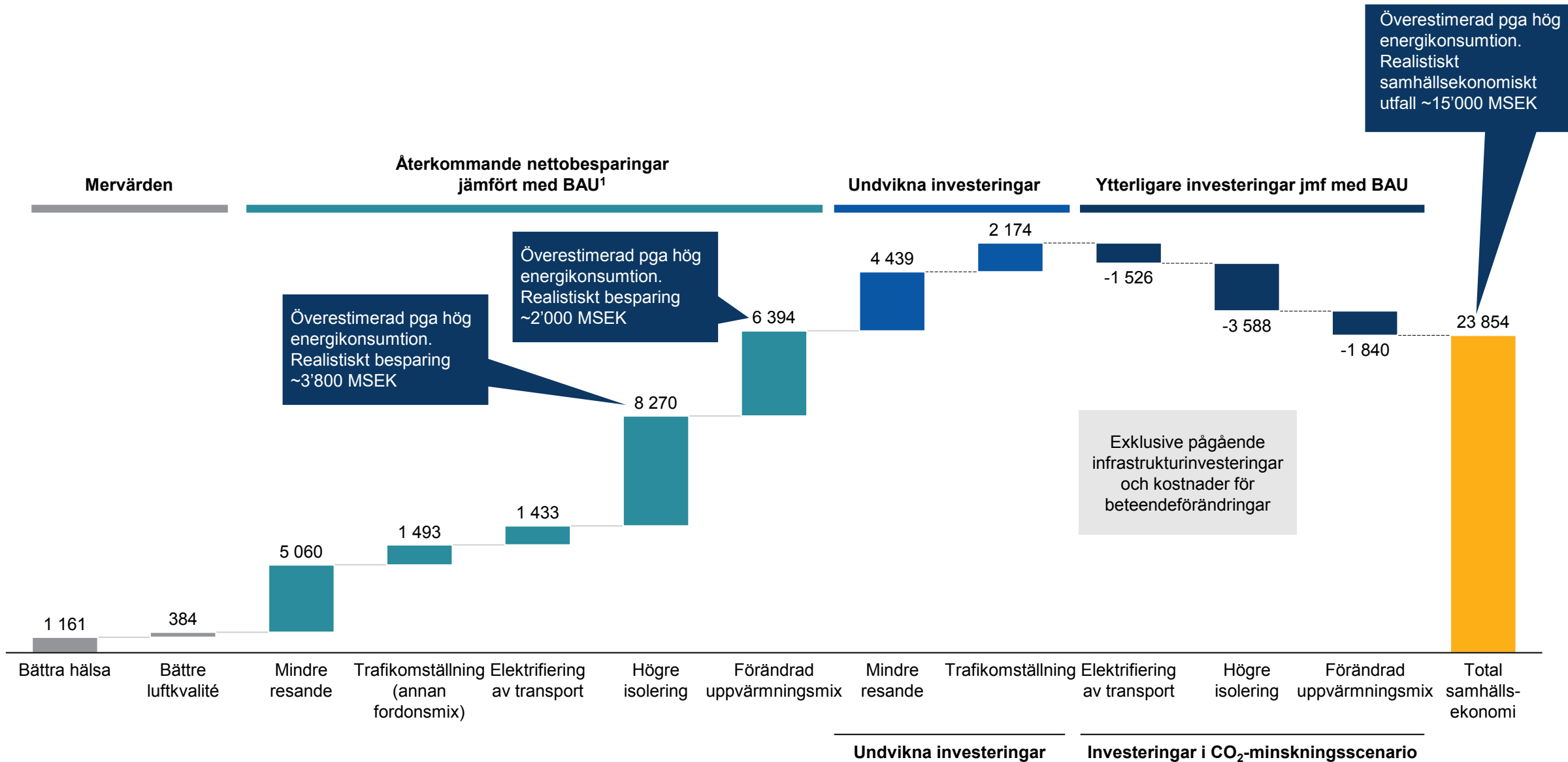
Economic effects of climate transition to 2040

MSEK , NPV investments (2022–2040) and savings (2022–2050)



1. No price effects on imported energy have been taken into account
 Note: Capex = Capital expenditures
 Opex = Operational expenditures
 NPV=NPV (the sum of all future value created in today's monetary value)

~10 MSEK/
kton CO2



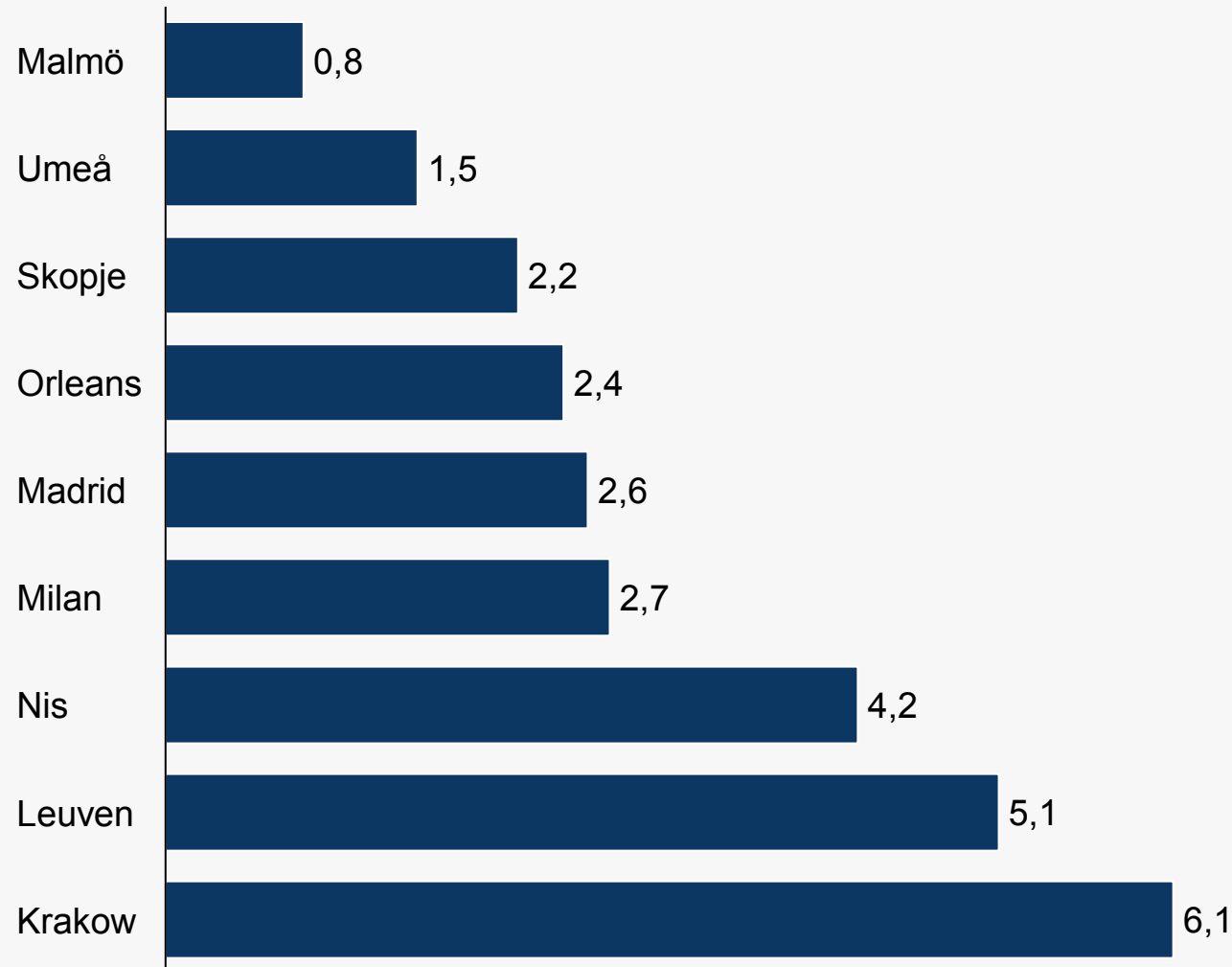
Undvikna investeringar

Investeringar i CO₂-minskningsscenario

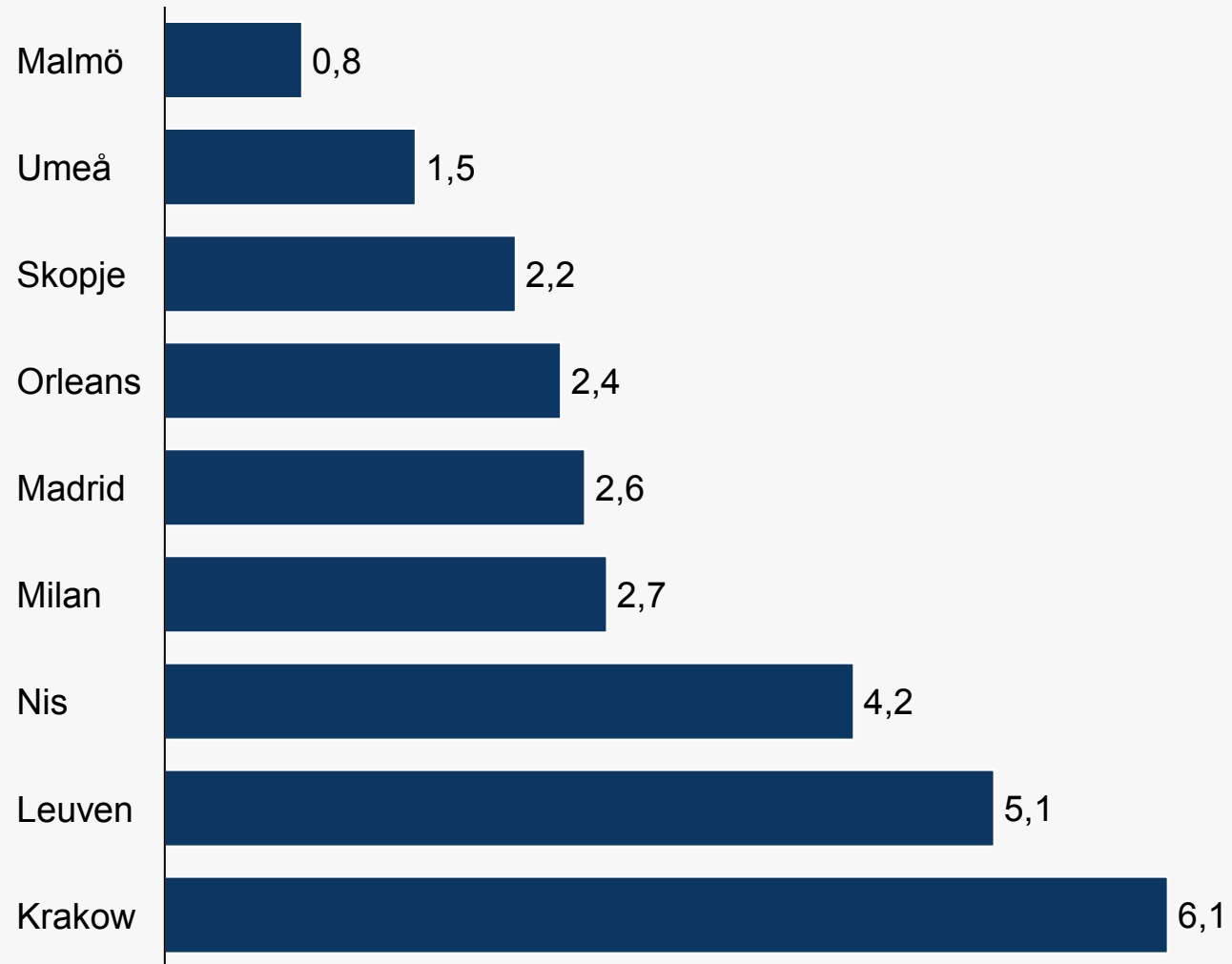
~10 MSEK/
kton CO₂

Umeåbornas utsläppsprofil 2020 (för scope 1 och 2) är lägre än andra städer i Europa, men nästan dubbelt så hög som Malmö

CO2 per capita 2020



Umeås målsättning 2040
0,35 CO2/capita



Samhällsekonomisk analys



Fördjupande
diskussion

A transition to a climate-neutral society has many positive effects in the form of, for example, improved health when a larger part of the population walks or travels by car and reduced amount of air pollution with less combustion of fossil fuels. Work that must take place in the transition, for example in the form of energy-efficient buildings, also creates many new jobs

The model takes into account investments in electric vehicles, replacement of heating technology, insulation of houses and cost savings due to lower need for fuel, change of type of fuel, etc.

However, the model does not take into account, for example, investments in infrastructure to promote a certain transition, such as new bike lanes, charging infrastructure or educational campaigns.

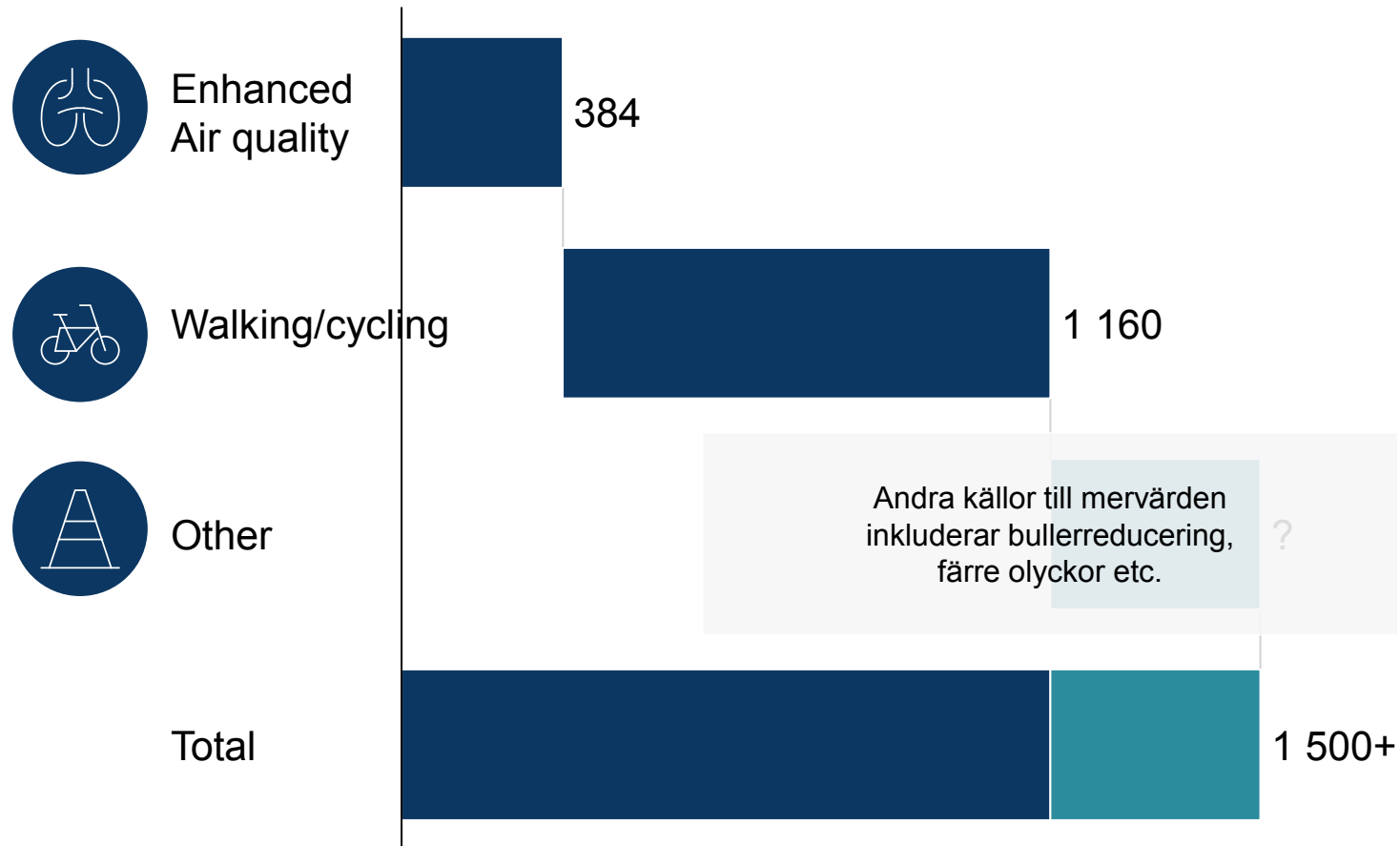
In the model, a discount rate of 3.5% has been used. This corresponds to the Swedish Transport Administration's recommendations for infrastructure investments.

The transition has positive effects on public health

Ackumulerat 2021–2050

EJ UTTÖMMANDE

Health benefits, MSEK



EA transition to a climate-neutral society will have positive effects of over SEK 1.5 billion by 2050. Health effects occur when a larger part of the population walks or cycles instead of cars. Less combustion of fossil fuels also results in lower levels of air pollution with positive effects on public health.

In addition to the quantified effects, there are positive effects on the noise environment, accident statistics, etc. (see page 31)



Förbättrad
luftkvalitet

384



Gång/cykel

1 160



Övrigt

Andra källor till mervärden
inkluderar bullerreducering,
färre olyckor etc.

?

Total

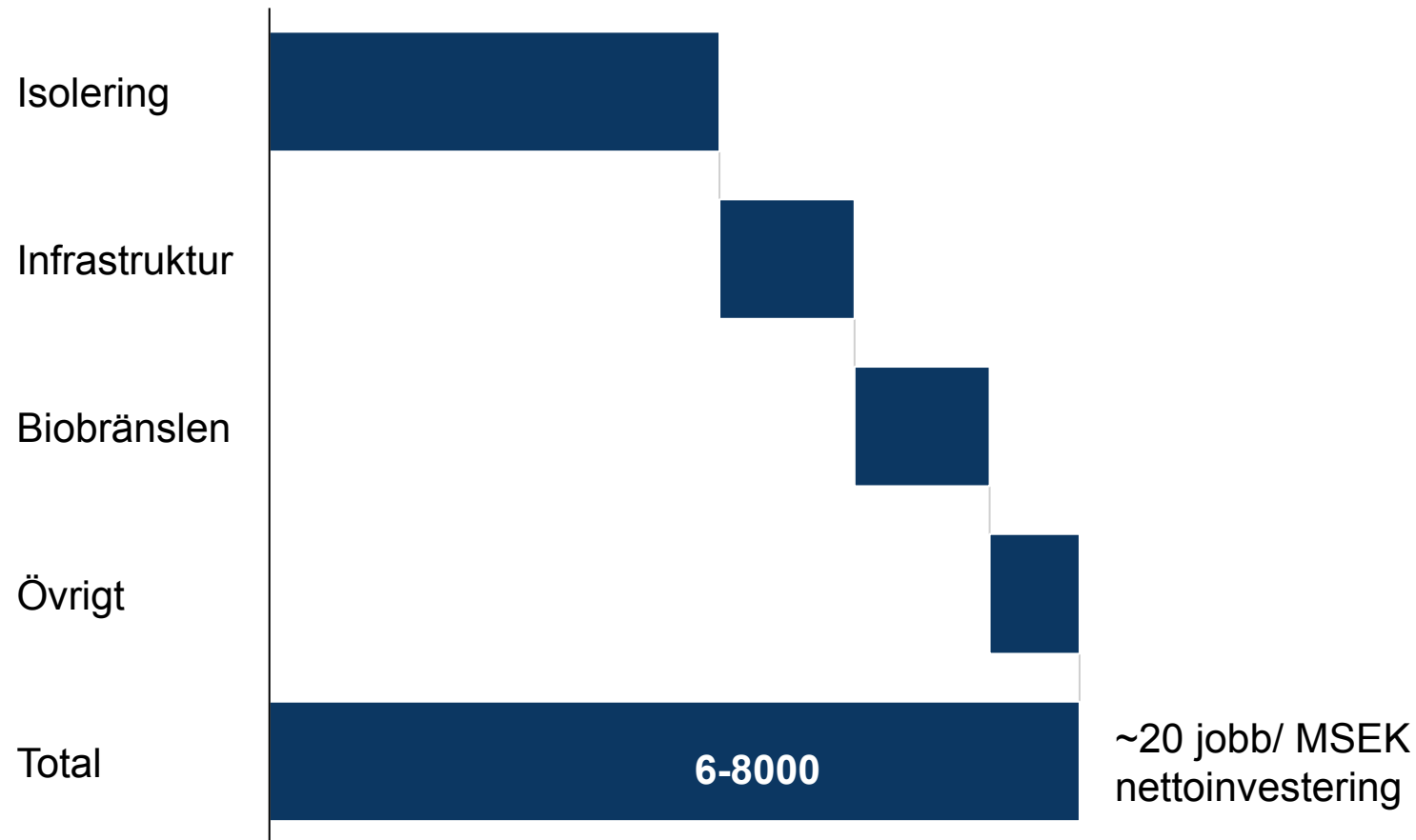
1 500+

The transition creates new jobs

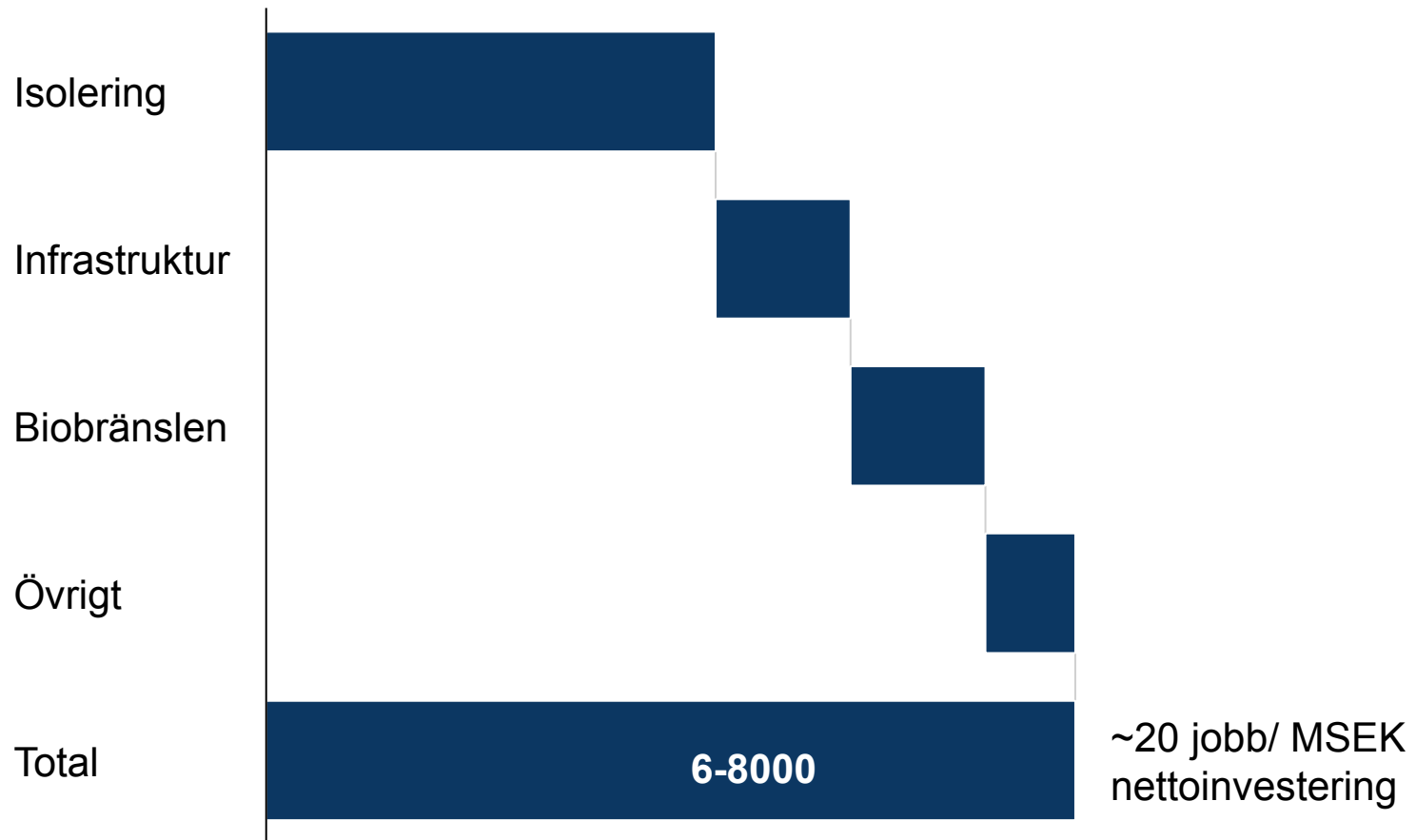
Akkumulerat 2021–2050

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Skapade arbetstillfällen, antal jobb



Work that must take place in the transition, for example in the form of energy-efficient buildings and new infrastructure, also creates many new jobs



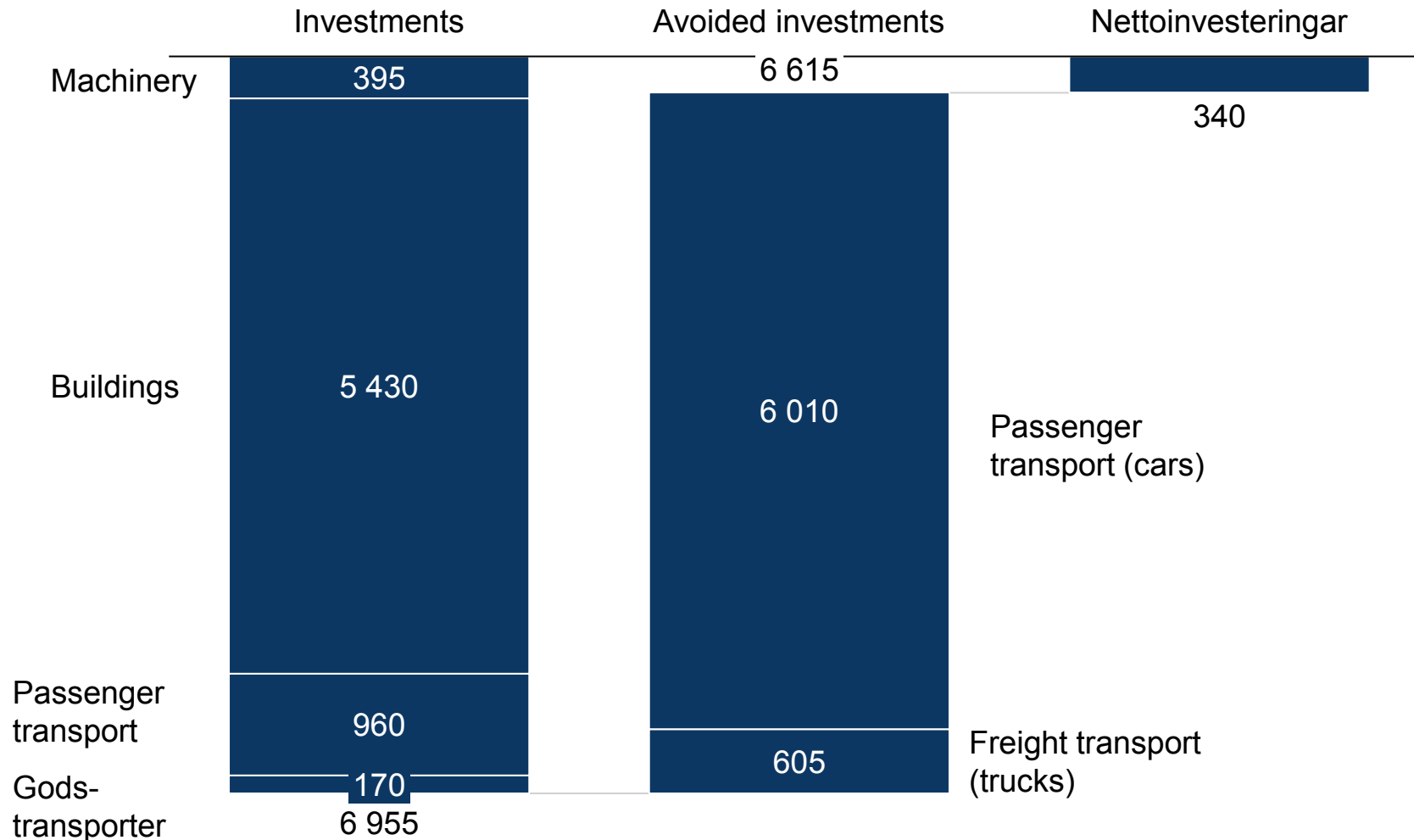
Added value can be found in health, economy and an inclusive society

INTE UTTÖMMANDE

Kategori	Mervärde	Beskrivning	Mätning
Hälsa	Luftkvalitet	Hälsoförbättringar för medborgarna från renare luft från t.ex. minskade motoriserade transporter och elektrifiering av energi	kg föroreningar (NOx, PM 2,5 och PM10)
	Buller	Hälsoförbättringar för medborgarna från lägre bullerföroreningar från t.ex. minskade motoriserade transporter och övergång till elfordon	km transport från ICE-fordon
	Trafiksäkerhet	Olyckor undviks genom t.ex. minskade motoriserade transporter	# Antal olyckor
	Fysisk hälsa	Hälsoförbättringar för medborgarna från t.ex. ökad gång och cykling	km transport från gång och cykling
	Välbefinnande	Hälsoförbättringar av medborgarna från t.ex. renoverade byggnader (bättre livsmiljö)	m ² isolerade hus
	Ekosystemets hälsa	Ekosystemförbättringar i staden från t.ex. återbeskogning	<i>Ej kvantifierad</i>
	Vattenkvalitet	Förbättrad vattenkvalitet från t.ex. återbeskogning	# Antal planterade träd
Ekonomisk tillväxt	Anställning	Ytterligare arbetstillfällen skapas i staden från t.ex. övergång till kollektivtrafik och ökning av byggandet	# av skapade arbetstillfällen i staden
	Tidsbesparingar	Tid som medborgarna sparar genom t.ex. minskade transporter och trängsel	Sparad tid (dagar)
	Fastighetens värde	Ökning av fastighetsvärde från t.ex. utbyggd kollektivtrafik och byggnadsförbättringar	Värdet av fastighetsmarknaden (EUR)
Inkludering	Jämlikhet	Lika tillgång till produkter och tjänster från t.ex. förbättrad tillgång till transporter	<i>Ej kvantifierad</i>
	Gemenskapens tillgångar	Offentligt ägda och fritt använda områden/tillgångar genom att t.ex. återanvända parkeringsplatser	<i>Ej kvantifierad</i>

Avoidable investments almost outweigh necessary conversion investments

MSEK

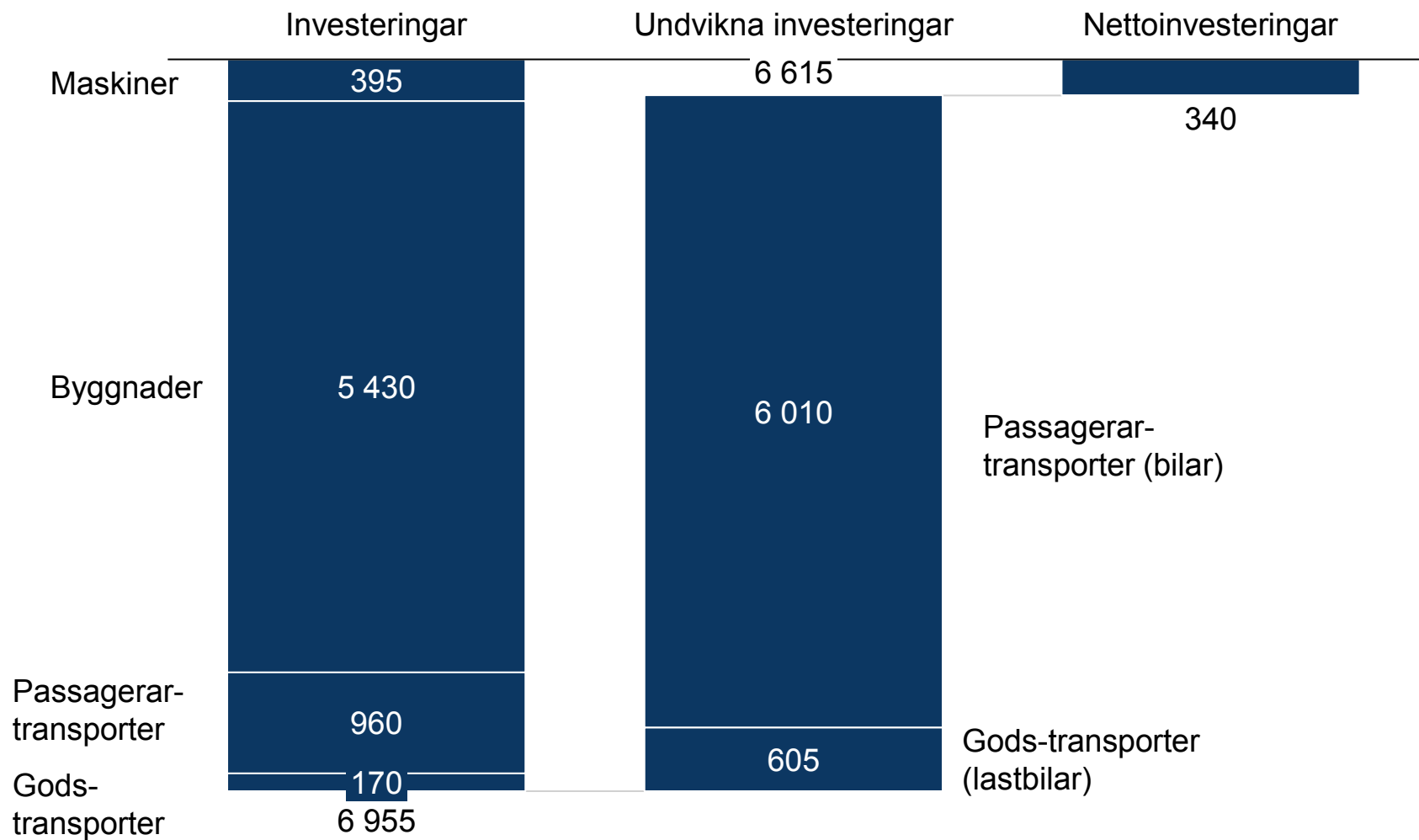


Investments of up to €7 billion will be needed to implement the transitions in the scenario.

In the simulated scenario, the high energy consumption in buildings has been entirely attributed to low insulation and a high proportion of inefficient heating technologies. A change in this generates an overestimated high investment. If the higher energy consumption is instead a consequence of and can be addressed with changed behaviors, it will result in a lower investment

The main investments needed are linked to reducing energy consumption in buildings and electrifying vehicle fleets and machinery.

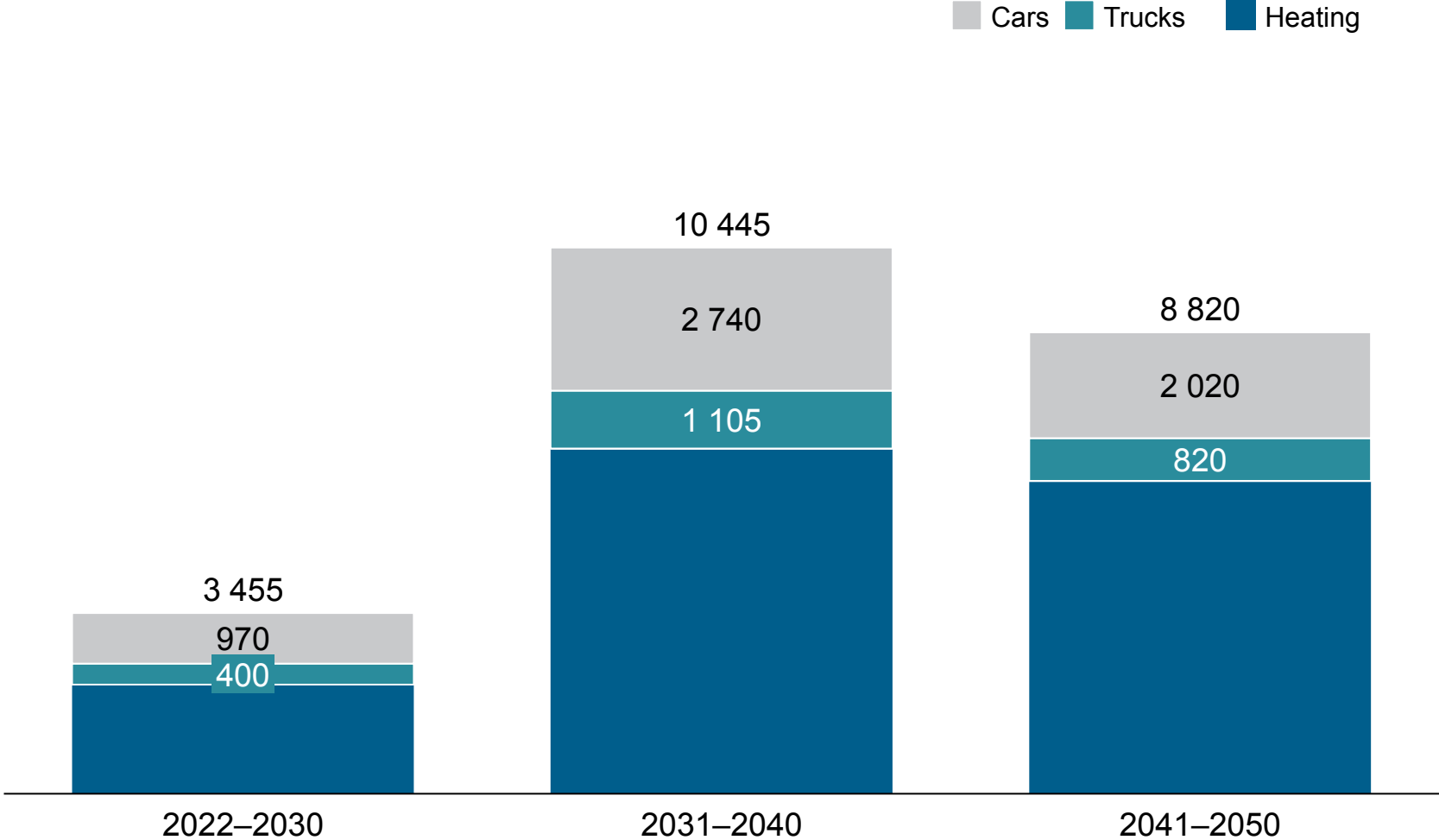
The reduced and more efficient travel (e.g. shared cars) and higher proportion of public transport means that far fewer vehicles need to be purchased in the scenario. This is represented by 'avoided costs' which, overall, are almost as large as the investments required. However, they land neither on the same stakeholders nor at the same time in time



The transition means cost savings in all segments for many years

MSEK

■ Cars ■ Trucks ■ Heating



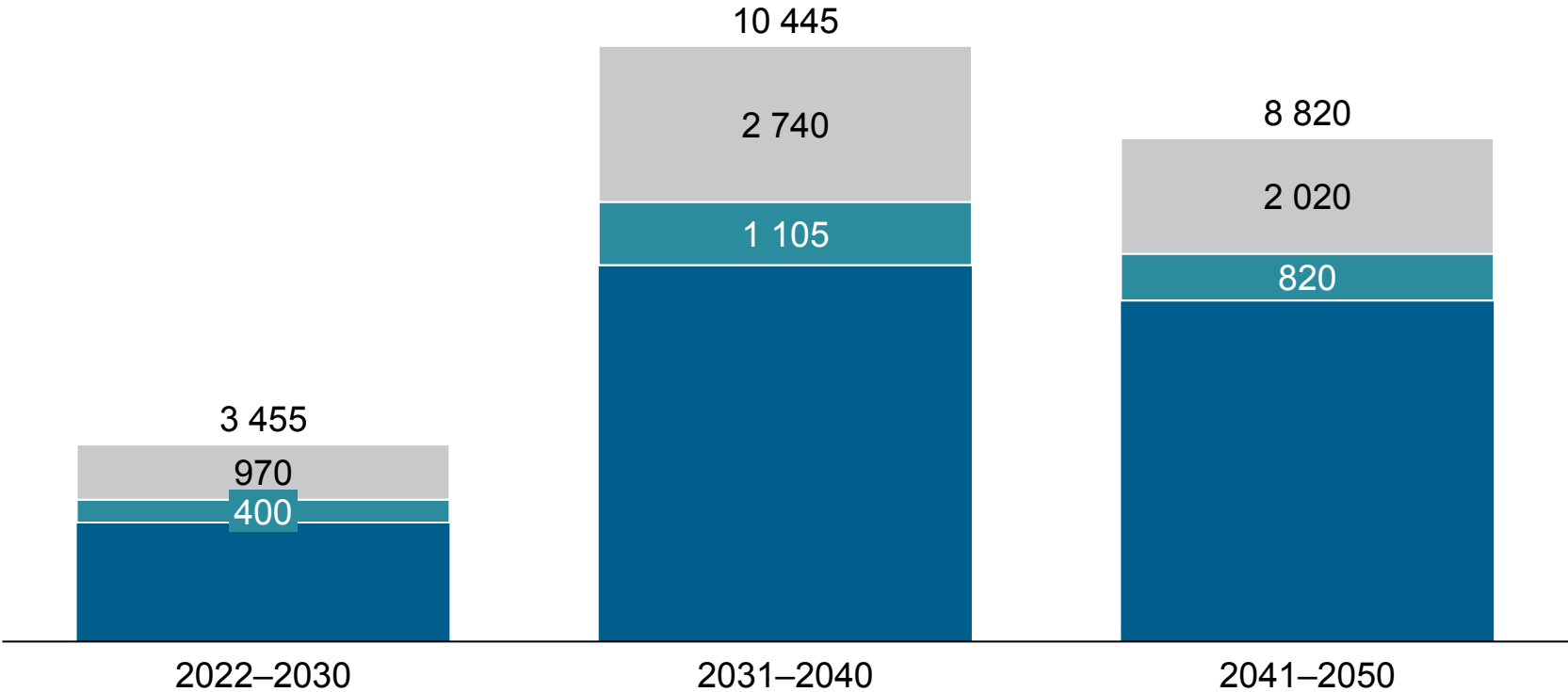
The simulated scenario is made investments in transitions up to the target year 2040

Value creation as a result of the transition will then continue to generate value for many years (e.g. savings in the form of lower fuel costs and heating costs)

In the scenario, savings up to 2050 have been simulated

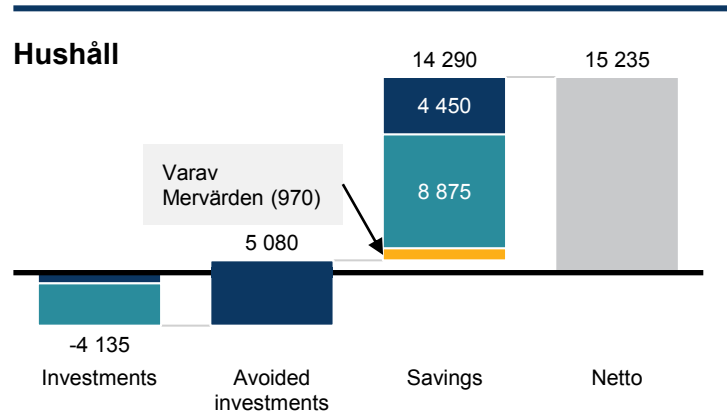
1. Non discounted, cumulative opex (running costs/savings) value

■ Bilar ■ Lastbilar ■ Uppvärmning



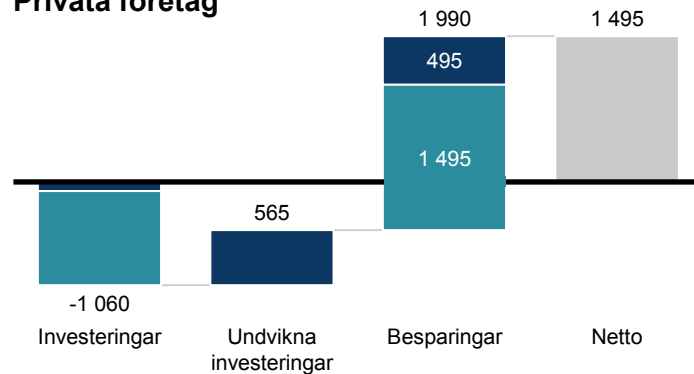
Municipal residents are the big winners in the transition

MSEK PRIVATE STAKEHOLDERS



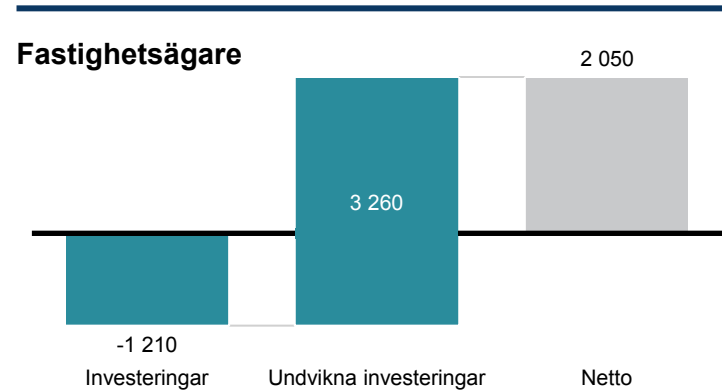
Households benefit from the investments made by themselves, as well as the municipality and private property owners. They also benefit from better air quality and increased physical activity in the form of walking and/or cycling.

Privata företag



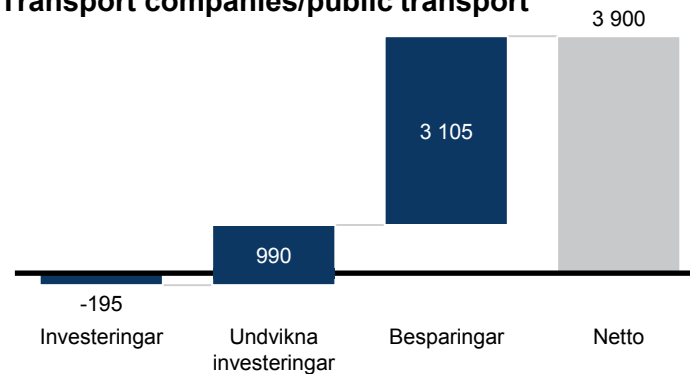
Private companies play a smaller role than households. Operating savings in both transport and buildings compensate well for the initial investment required.

PRIVATE/PUBLIC STAKEHOLDERS



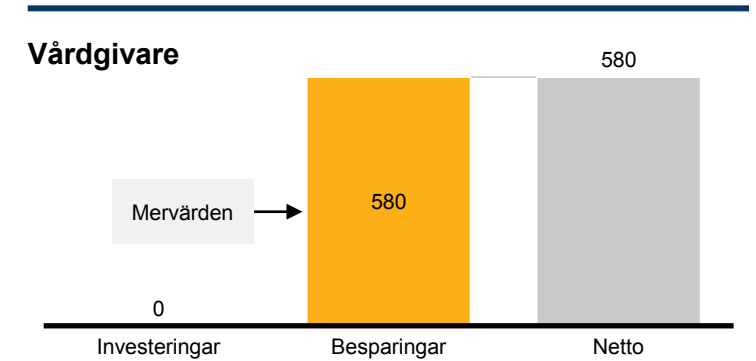
Property owners need to invest, but in return benefit from reduced operating costs for energy and heating.

Transport companies/public transport



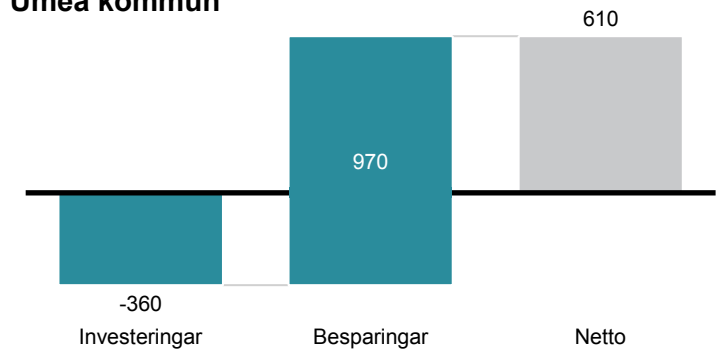
Transport and public transport companies need to invest in an expanded network and new vehicles (and their maintenance), but benefit from optimised logistics, higher utilisation, economies of scale and lower operating costs.

PUBLIC STAKEHOLDERS

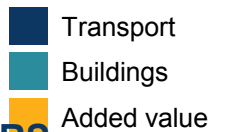


Healthcare providers (the region) benefit from the added value of a healthier population without making any specific investments other than in renovations of their own properties.

Umeå kommun

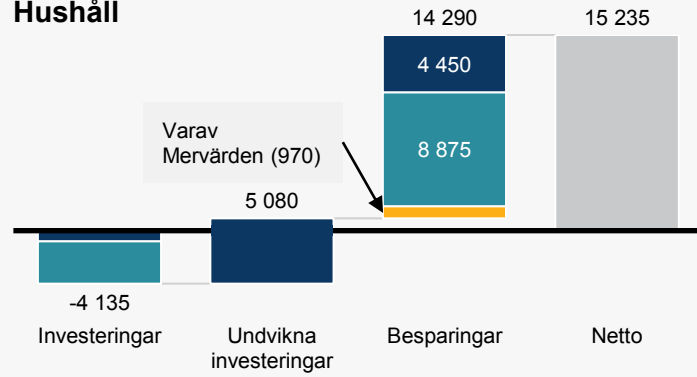


Cities typically cover costs for public charging and walking/cycling infrastructure as well as lower land costs for developers who build energy efficiently

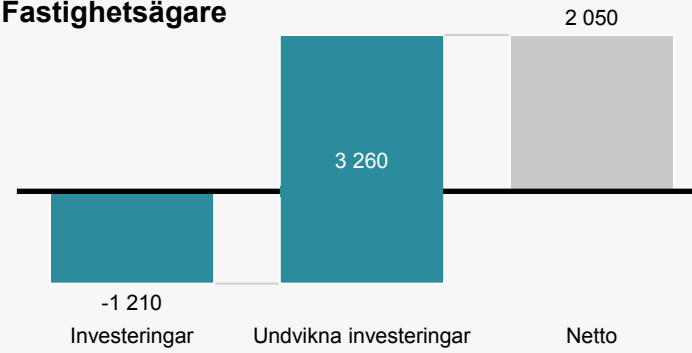


- Transport
- Byggnader
- Mervärden

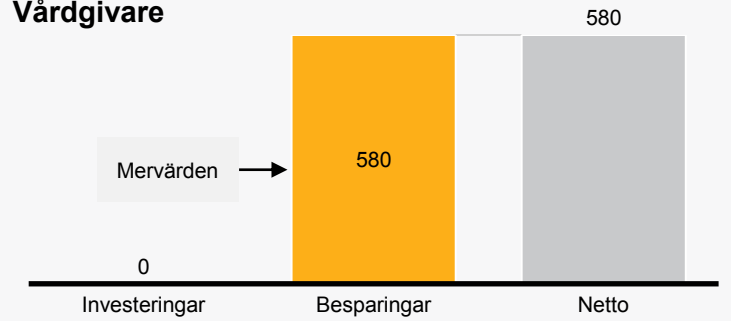
Hushåll



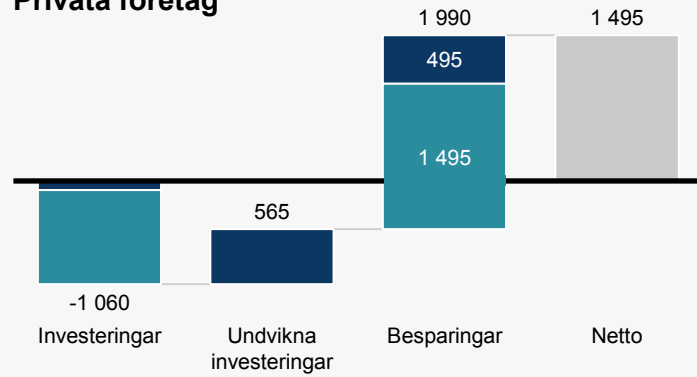
Fastighetsägare



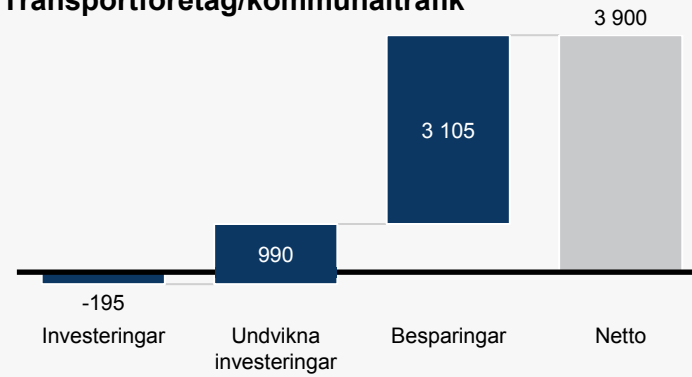
Vårdgivare



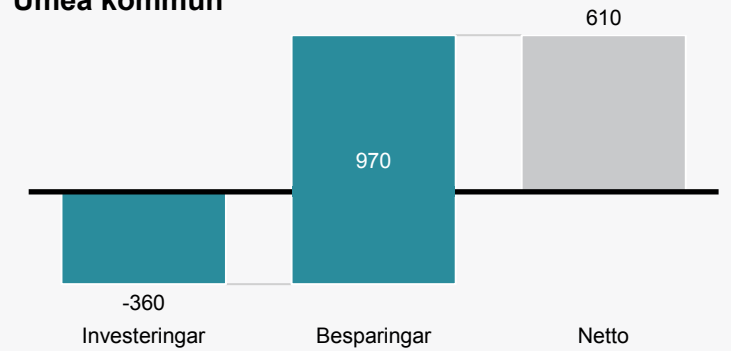
Privata företag



Transportföretag/kommunaltrafik



Umeå kommun



Effects of the transition on different actors



Fördjupande
diskussion

The group that receives by far the greatest benefits from climate change is Umeå's municipal residents, who will receive a net worth creation of just over SEK 15 billion until 2050. However, at the beginning of the period, they need to invest in both energy-efficient buildings and electric cars, but will recoup this in the long run in the form of improved health and lower costs for electricity, transport and heating

Property owners, private companies and Umeå municipality are the actors that need to make the greatest investments in more energy-efficient commercial buildings and public buildings as well as housing

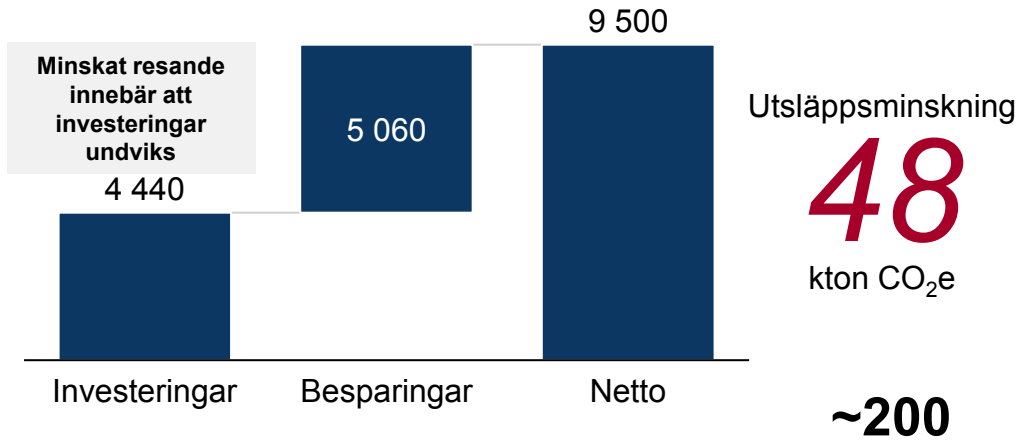
Transport companies, like private individuals, will need to invest in the electrification of their vehicle fleet, but will also benefit in terms of avoided investments and lower fuel costs

Healthcare providers, who can be regional, i.e. outside the municipality's direct influence, are the actor who gets almost the entire value of improved public health (in addition to the municipal residents who get better health)

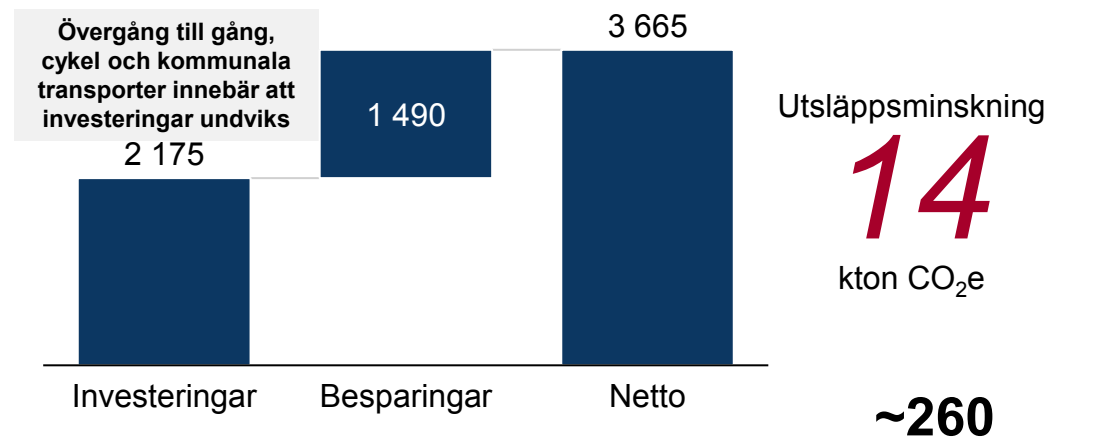
Reduced and changed travel results in the greatest reduction in emissions per krona

MSEK

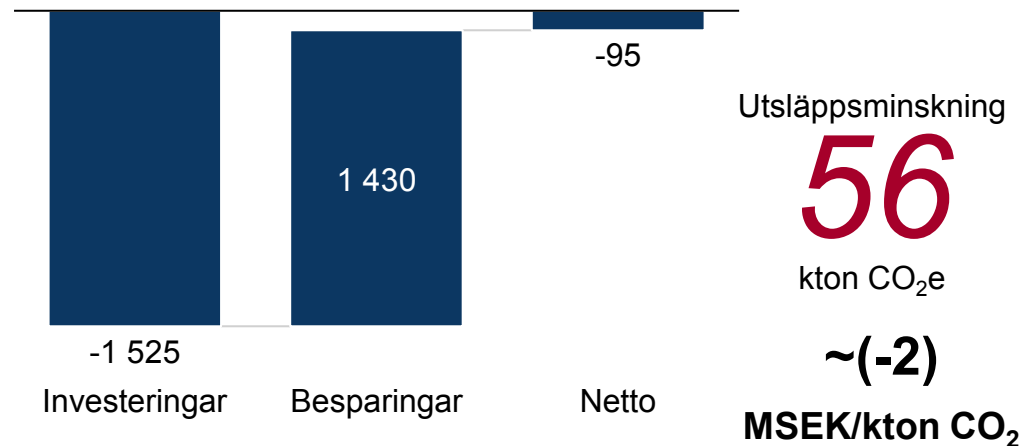
Reduced travel



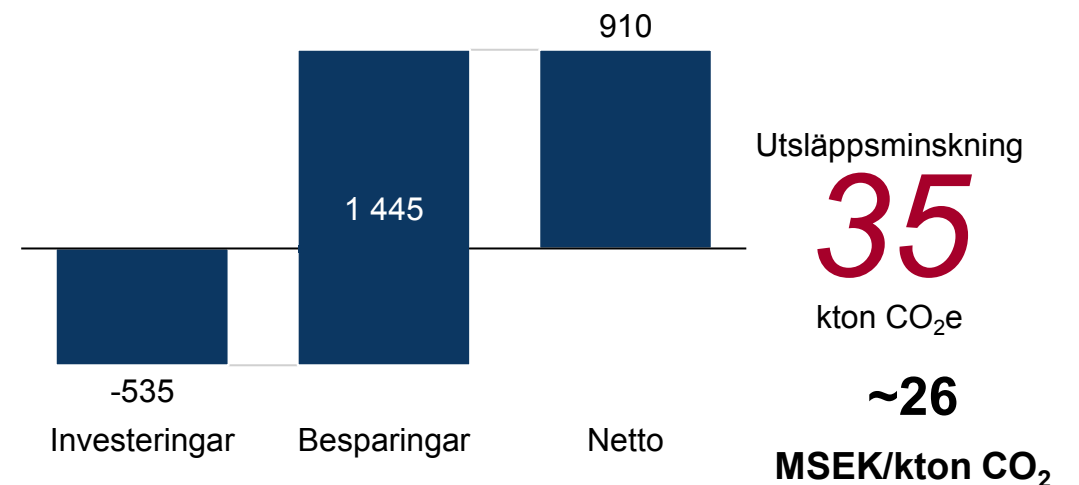
New means of transport



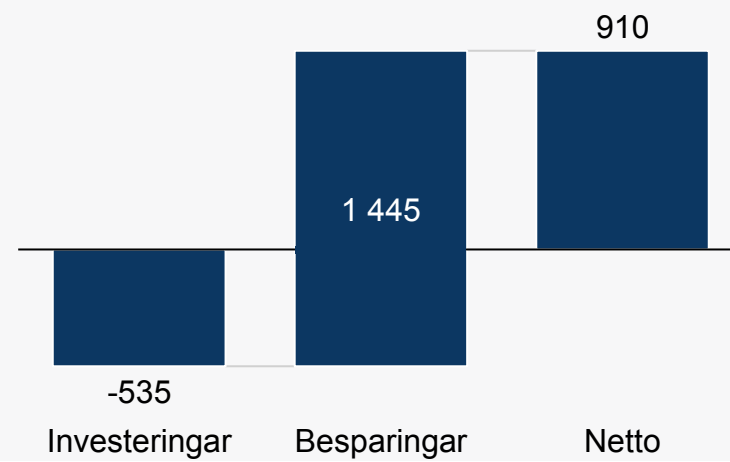
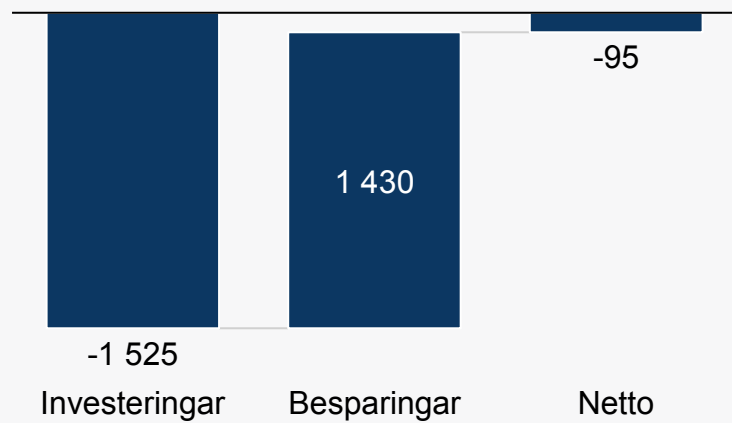
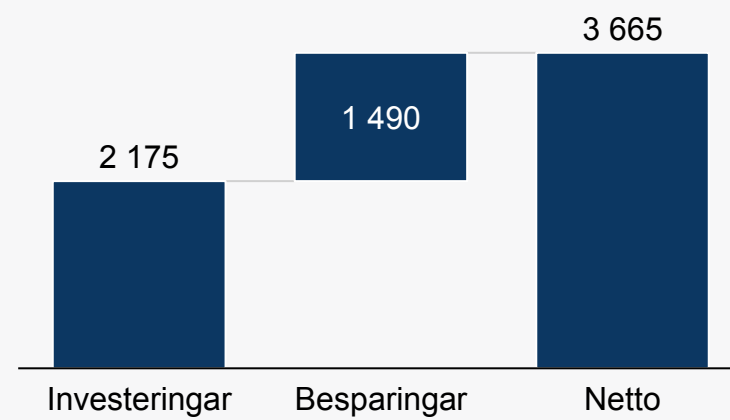
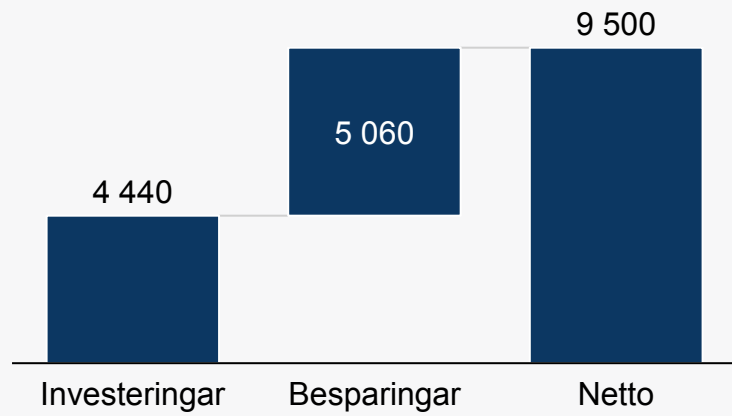
Elektrifiering



Fastigheter (isolering och värme)¹



1. Inkluderar utsläppsminskningar från el- och fjärrvärmenät



Cost-benefitanalys



Fördjupande
diskussion

An analysis of which transitions provide the greatest emission reduction per krona shows that changes in the transport sector, especially reduced and changed travel, have the greatest CO₂ effect in relation to what needs to be 'invested'.

In both of these cases, the total value creation is positive due to avoided investments and large savings resulting from reduced travel and walking/cycling instead of going by car. This basically means that you save ~200-260 MSEK/ktonnes of CO₂ that are eliminated by making these changes. Efficiency improvements in the real estate sector also lead to net savings of SEK 26 million/ktonnes of CO₂. Electrification comes at a cost of SEK 1.7 million/ktonnes of CO₂

The reason for the large return on the changes reduced and changed travel is that they are based on behavioral changes that do not really require any investments (someone stops or starts with something). It is therefore very attractive for Umeå from a financial perspective to take advantage of these opportunities. However, they require that Umeå can persuade enough people to make the change (which in itself may require investments in, for example, information) and that the change persists over time (so that a decrease in travel one year is not followed by increased travel the next)

Innehåll

Studiens omfattning

Metodik

Utgångsläge

Omställningar

Effekter på utsläppsläget

Samhällsekonomiska effekter

Åtgärder och prioriteringar

Utmaningar och nästa steg



Bilagor

Prioritering av omställningar

- Transport
- Byggnader och uppvärmning
- Energi



Översikt över åtgärder för att åstadkomma nödvändiga omställningar

EJ UTTÖMMANDE	Åtgärd	Varaktighet ¹	Utsläpps- minskning ²	Stadens rådighet ³	Besparingar och nyttor ⁴	Investeringar ⁵	
Proaktiva tekniska åtgärder 	15. Certifierad förnyelsebar el	●	●	●	◐	●	Proaktiva tekniska åtgärder har hög varaktighet och kan ge höga till medelstora utsläppsminskningar. Staden har hög rådighet över åtgärder som ligger inom stadens ansvar (t.ex. bussar) medan övriga lösningar kan påverkas indirekt genom olika initiativ. Tekniska lösningar har medelstora besparingar, framförallt från minskad energiförbrukning och bränslekostnad (t.ex. energieffektiva byggnader och elektrifiering). Investeringar är relativt höga då ny teknik behöver köpas in eller byggas och gammal teknik kan behövas bytas innan teknisk livslängd
	4. Elektrifiering av bussar	●	●	●	◐	●	
	4. Elektrifiering av personbilar	●	●	◐	◐	◐	
	14. Ökad maskinell utsortering av plast	●	◐	●	◐	●	
	10. Elektrifiering av arbetsmaskiner	●	◐	◐	●	◐	
	13. Byte till fjärrvärme/värmepumpar ⁶	●	◐	◐	◐	●	
	12. Energieffektiviserande renovering	●	◐	◐	◐	●	
	12. Energieffektiva nya byggnader	●	◐	◐	◐	●	
Proaktiva beteendeförändr. 	8. Elektrifiering av lastbilar	●	◐	◐	◐	●	Proaktiva beteendeförändr. karaktäriseras av höga nyttor/besparingar samt låga investeringar vilket gör den ekonomiska kalkylen stark. Däremot har åtgärderna låg varaktighet men påverkan på utsläpp kan vara stor. Staden kan påverka beteendeförändringar genom tex information, incitament och underlättande men har inte en hög rådighet över dessa åtgärder.
	7. Optimerad logistik	◐	○	◐	◐	○	
	1. Reducerat transportbehov	○	◐	◐	●	○	
	14. Ökad återvinning av plast ⁶	○	◐	◐	◐	○	
	1. Bildelning	○	○	◐	●	○	
Reaktiv teknisk insats	3. Skifte till kollektivtrafik/cykel/gång	○	○	◐	●	◐	En stad har hög rådighet över CCS som åtgärd om kraftverket drivs i stadens regi. Lösningen karaktäriseras av höga investeringar som i sin tur ger stora utsläppsminskningar med lång varaktighet. En infångning som överstiger kvarvarande utsläpp kan användas för att betala tillbaka en övertrassering av CO2 budgeten
	CCS på kraftvärmeverk och pappersbruk	●	●	●	○	●	

○ Låg ◐ Medel ● Hög ● Hög kategorisering bättre ● Låg kategorisering bättre

Not: Klassificeringar är grova uppskattningar. (1) Klassificeras som låg om lösningen har flyktig karaktär (mindre än 1 års varaktighet), medel om lösningen antas ha cirka 1-3 års varaktighet när den väl implementerats och hög om lösningen är mer permanent (mer än 3 års varaktighet). (2) Hög är definierat som potentiella utsläppsminskningar som är mer än 50 tusen ton CO₂ per år 2030, medel som 15-100 och låg som mindre än 15. Elektrifiering av bussar definieras högre här då potentialen är större om jämförelsen exkluderar Sveriges reduktionsplikt. (3) Definieras som hög om Malmö stad har direkt rådighet över åtgärden, som medel och staden har indirekt påverkan och som låg om staden har ingen påverkan. (4) Klassificeras som låg om besparingar är nära 0 SEK per år, som medel om både totala besparingar är under 60 MSEK per år och om åtgärden har en besparingsintensitet på under 3 tusen SEK per ton minskad CO₂, och som hög om besparingar är över detta. (5) Klassificeras som låg om ytterligare investeringar nära 0 SEK per år, som medel om antingen ytterligare investeringar är under 80 MSEK per år eller om investeringsintensitet är under 2 tusen SEK per ton minskad CO₂, och som hög om investeringar är över detta. (6) Åtgärd "Fossilfri uppvärmning" är uppdelad i tre mindre åtgärder i den här analysen. Data saknas för vissa klassificeringar och har uppskattats av Material Economics.

Möjliga åtgärder för att åstadkomma nödvändiga omställningar

Maximera investeringar i accelererad omställning

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Proaktiva tekniska åtgärder

Beskrivning	Fördelar	Nackdelar
<ul style="list-style-type: none">• Upphandling:<ul style="list-style-type: none">– 100% elektrifierad lokaltrafik– energikrav på nya byggnader– innehållskrav på avfall– Certifikat för förnybar el	<ul style="list-style-type: none">• Stor rådighet	<ul style="list-style-type: none">• Inte säkert leverantörer har möjlighet att leverera• Personal för ombyggnationer?• Fördröjningseffekt• Hur styra privata elinköp?
<ul style="list-style-type: none">• Lägre energianvändning i byggnader via smart teknik• Återvinning av spillvärme	<ul style="list-style-type: none">• Begränsade beteendeförändringar• Ta tillvara värden	<ul style="list-style-type: none">• Kräver investeringar
<ul style="list-style-type: none">• Incitament för elektrifiering av fordon	<ul style="list-style-type: none">• Stor effekt på utsläpp• Liten beteendeförändring• Lägre driftskostnad	<ul style="list-style-type: none">• Svårt med lokala lösningar• Kräver privata investeringar• Ev flaskhalsar (ex. Batterier)• Belastning på elnätet
<ul style="list-style-type: none">• Maskinell plastutsortering i värmeverk• Investeringar/incitament för förbättrad energieffektivitet i hushållsapparater	<ul style="list-style-type: none">• Stor effekt på utsläpp (plast)• Stor rådighet (plast)	<ul style="list-style-type: none">• Begränsad effekt (hushållsel)?• Begränsad rådighet (hushållsmk.)
<ul style="list-style-type: none">• Lokal biobränsleproduktion (anläggning) från exempelvis jord- och skogsbruk• Maximera yta för solpaneler<ul style="list-style-type: none">– Årstidsbatterier (tex., sandbatterier)– 'Batteri till nät' för utjämning	<ul style="list-style-type: none">• Lokala partnermöjligheter, t.ex. inom biodrivmedel• Tillåter långsammare utfasning av fossila drivmedel• Tillförlitlig energiförsörjning• Lägre prisfluktuationer• Grön energiförsörjning	<ul style="list-style-type: none">• Kräver stora lokala investeringar• Lokala energisystem kräver mer utjämning (tex solceller)

Åtgärder för att åstadkomma nödvändiga omställningar

Maximera potentialen för beteendeförändringar

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Beteendeförändringar

Beskrivning	Fördelar	Nackdelar
<ul style="list-style-type: none">• Minimera användningen av bilar<ul style="list-style-type: none">– Resa mindre (IT infrastruktur,)– Gå, cykla eller elbil (lokal service, laddinfrastruktur)	<ul style="list-style-type: none">• Lägre investerings- och driftskostnader pga kortare transporter och minskat bränslebehov• Mer motståndskraftigt vid befolkningstillväxt	<ul style="list-style-type: none">• Betydande inverkan på människors dagliga liv
<ul style="list-style-type: none">• Smart energianvändning i hushållen genom medveten konsumtion av värme och el	<ul style="list-style-type: none">• Låg investering• Minskade kostnader för hushållen	<ul style="list-style-type: none">• Stor inverkan på människors liv• Kräver sannolikt omfattande information och incitament (tex höga priser alt subventioner)
<ul style="list-style-type: none">• Manuell (ut)sortering av plast	<ul style="list-style-type: none">• Låg investering• Stor effekt på utsläpp (vid hög grad)	<ul style="list-style-type: none">• Risk för låg varaktighet• Kräver information, incitament (tex 'pant?') och minskade barriärer

Åtgärder för att åstakomma nödvändiga omställningar

Maximera potentialen för infångning av CO₂

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Reaktiva tekniska åtgärder

Beskrivning	Fördelar	Nackdelar
<ul style="list-style-type: none">• Koldioxidinfångning av fossila utsläpp på Dåva (minskar mängden CO₂-utsläpp som behöver kompenseras)• Koldioxidinfångning av biogena utsläpp på Dåva (skapar nytt utsläppsutrymme/möjlighet att betala av 'CO₂-skuld')• Koldioxidinfångning av biogena utsläpp på Obbola	<ul style="list-style-type: none">• Mindre förändring av människors liv möjliggör enklare acceptans• Stor effekt på utsläpp• Komersiell möjlighet inom skapat utrymme	<ul style="list-style-type: none">• Högt investeringsbehov• Relativt ny teknik• Relativt lång ledtid

Åtgärder: fördjupade beskrivningar

Proaktiva tekniska åtgärder



Upphandling av:	Genom stärkta och ambitiösa kravställningar i upphandlingar kan Umeå både tydligt kommunicera sin ansträngning och proaktivt agera i omställningen. Det är även en åtgärd Umeå har stor rådighet över, speciellt då både trafik- och energibolag är kommunägda. Genom att till exempel ställa krav på maximal andel plast i avfall både från egna och andra kommuner kan Dåvas utsläpp minska. Genom att köpa certifikat för t.ex. grön el som produceras i Umeå kommun kan även utsläpp från el minska, här är dock en utmaning att även säkerställa att privatpersoner köper grön el.
<ul style="list-style-type: none">• Elektrifierad lokaltrafik• Energikrav på nya byggnader• Innehållskrav på avfall• Certifikat för förnybar el	
<ul style="list-style-type: none">• Lägre energianvändning i byggnader via smart teknik• Återvinning av spillvärme	Umeå använder mer både el och värme jämfört med nationella referenser. Två tekniska åtgärder för detta är att minska energianvändningen genom smart teknik (t.ex. automatiska termostater) samt återvinning av spillvärme från t.ex. närliggande industrier för att öka fjärrvärmens verkningsgrad ytterligare
<ul style="list-style-type: none">• Incitament för elektrifiering av fordon	Umeå har hög rådighet över flera incitament för att elektrifiera fordon, t.ex. att utöka laddinfrastrukturen, eller att ställa krav på tjänstebilar att vara elektriska
<ul style="list-style-type: none">• Maskinell plastutsortering i Dåva• Förbättrad energieffektivitet i hushållsapparater	Maskinell plastutsortering i Dåva kan minska utsläppen från förbränning av fossil plast och öka möjligheterna till återvinning. Förbättrad energieffektivitet i hushållsapparater kan uppnås bl.a genom att ersätta gamla, ineffektiva apparater.
<ul style="list-style-type: none">• Lokalt biobränsle• Solpaneler och batterier	Avfall från jord- och skogsbruk kan ofta användas för att producera biobränsle. I en kommun med mycket yta som Umeå kan det dessutom finnas möjlighet att etablera förnybar elproduktion och batterier för nätet

Beteendeförändringar



<ul style="list-style-type: none">• Minimera användningen av bilar• Resa mindre• Gå, cykla eller elbil	Umeå har stor rådighet att skapa förutsättningar och motivation för en mer hållbar transportmix. Till exempel genom att prioritera cykelinfrastruktur, planera framtidens bostadsområden med närhet i åtanke, eller starta initiativ för att premiera cykling som t.ex. vintertramparna i Östersund och liknande. Även informationskampanjer och tävlingar samt att skapa bättre dataunderlag genom t.ex. Cykelmätare kan skapa förutsättningar för bättre planering och engagemang
<ul style="list-style-type: none">• Smart energianvändning i hushållen genom medveten konsumtion av värme och el	Även om tekniska åtgärder kan tas för att minska Umeås energianvändning är beteendeförändringar en effektiv åtgärd. Kanske kan temperaturen i hem minska någon grad och bastun bara stå på när den används. Att det blir allt vanligare med timmätning på el gör att det skapas möjligheter för invånare att se hur de påverkar sin förbrukning i "realtid"
<ul style="list-style-type: none">• Manuell (ut)sortering av plast	Utsortering av plasten redan där avfallet uppstår kan minska mängden plast som förbränns i Dåva och därmed utsläppen



Reaktiva tekniska åtgärder

<ul style="list-style-type: none">• Koldioxidinfångning på Dåva och/eller Obbola	Genom CCS på Dåva och/eller Obbola kan Umeå både kompensera för kvarvarande utsläpp och potentiellt sälja netto-negativa utsläpp
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Omställningar att överväga för ytterligare minskning av utsläpp

Illustrativa idéer, inte uttömmande



Återplantering av skog som lokal kolsänka



Biokol lokal biokol som kolsänka



Utsläppsfritt biobränsle från lokalt livsmedels- eller jordbruksavfall?



Restaurering av våtmarker för att fungera som lokal kolsänka



Recirkulering av spillvärme från byggnader, transporter och industrier?



Byggande med material som fungerar som kolsänka



'Batterilösningar för att möjliggöra bättre fluktuationshantering av (lokal) energi (t.ex. sandlager, batteri till nät)



...

Vägar mot klimatneutralitet



Fördjupande diskussion

Med vidtagna åtgärder når Umeå en utsläppsminskning på 73% vilket innebär fortsatta utsläpp på 54 kton även efter 2040. Kommunens utsläppsutrymme enligt Parisavtalet överskrids inom ca 2 år (enbart baserat på utsläpp ifrån scope 1 och 2). Umeå har möjlighet att kompensera för de kvarvarande utsläppen med hjälp av koldioxidinfångning på kraftvärmeverket i Dåva. Det är dock en dyr åtgärd och utsläppsutrymmet skulle istället kunna användas kommersiellt i form av utsläppscertifikat eller som CCU (exempelvis produktion av fossilfritt bränsle).

Umeå kan därför i första hand se över möjligheter att ytterligare eliminera utsläpp. Kvarvarande utsläpp finns i sektorerna fjärrvärmeproduktion (27,3 kton/år samt i de delar av transportsektorn som fortfarande använder fossila drivmedel (26,8 kton/år). Utsläppen i fjärrvärmeproduktionen härstammar huvudsakligen från plast i avfallet. En högre utsorteringsgrad av plast minskar utsläppen från värmeproduktionen. Åtgärder för att åstadkomma detta kan vara antingen beteendebaserade (hushåll och verksamheter sorterar ut mer plast), eller tekniska (installation av sorteringsanläggning i värmeverket). För att minska utsläppet från transportsektorn ytterligare behöver en snabbare elektrifiering av flottan ske, alternativt navändning av biobränsle istället för fossilt bränsle. Umeå skulle kunna överväga lokal produktion av biobränsle tex från jord- eller skogsbruksavfall för att så fort som möjligt eliminera utsläpp från arbetsmaskiner.

När Umeå uttömt alla (finansiellt motiverade¹) möjligheter att ytterligare minimera sina utsläpp, kan sankor för koldioxid (billigare) eller infångning (effektivare) av koldioxid användas för att kompensera kvarvarande utsläpp och återbetala eventuell koldioxidskuld.

1. Lättare eller mer lönsamt att undvika att utsläpp uppstår än att ta hand om dem efteråt

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Bilagor

Utmaningar att hantera i övergången till ett hållbart samhälle



Takt i utfasning och uppgradering

Förändringstakten högre än den naturliga/ nuvarande takten i uppgradering av utrustning och tillgångar



Beteendeförändringar

Att förändra medborgarnas vardagsbeteende kräver 'puffar', incitament och ett förändrat tankesätt



Tidiga investeringar

Höga initiala investeringar håller tillbaka beslutsfattare, trots positivt samhälls-ekonomiskt utfall



Grön strömförsörjning

Snabb elektrifiering kommer att sätta press på tillgången till, och kostnaden för, el i allmänhet och förnybar energi i synnerhet samt till effekt i systemet



Tillgång till alternativa bränslen

Stor efterfrågan på biobränsle i olika sektorer och regioner i kombination med begränsad tillgång

Exempel på utmaningar

- Fossildrivna fordon behöver ställas av innan naturlig livslängd uppnåtts.
- Energieffektiviseringar i högre takt än teknisk livslängd
- Byte av uppvärms tekn tidigare än teknisk krav
- Arbetskraft för att genomföra nödvändiga renoveringar och teknikförändringar.
- Skifte i resvanor från privatbilar till kollektiv- eller icke-motoriserade transporter
- Proaktiv inställning till energibesparingar hemma
- Övergång till centrala leveranspunkter
- Byte från fossil- till elbil kan fortfarande kräva en större initial investering
- Husisolering och värmepumpar kräver investeringar med besparingar under de årtionden som följer
- Elektrifiering av transporter och industri ökar effektbehovet radikalt
- Svårigheter att säkra förnybara elcertifikat
- Förbrukning utöver certifierad förnybar energi kan leda till import av grå el
- Uppskalning av förnybar energi Kan kräva effektbalansering
- Risk för brist på biobränsle givet rikstäckande reduktionsplikt
- Kostnaden för biobränsle kan öka på grund av rikstäckande krav på byte
- Slutna kretslopp för avfall för biobränsleproduktion är logistiskt utmanande

Nästa steg - planering 1(2)

Förbered för snabb förändring



Resurssätt omställningen och fördela ansvar³

Validera, detaljera, planera och leda klimatomställningen. 'Hålla i trådarna', se till att rätt diskussioner förs, att hastigheten hålls uppe. I nära samarbete med verksamhetsägare mfl intressenter, men vars huvuduppgift är att omställningen lyckas

Hantering av finansiering av omställningen (klimatplan, finansieringslösningar och uppföljning)



Förankra scenariot hos olika intressenter och verifiera resultat:

Verifiera viktiga detaljer i dynamik och drivkrafter som underlag för åtgärdsprogram (exv vad driver den höga energikonsumtionen) (ex-jobb?)

Validering av mål med berörda intressenter (medborgare, privat sektor, offentliga aktörer)

Utvärdera alternativa vägar mot minskade koldioxidutsläpp med berörda parter¹

Simulering av alternativ för prioritering (effekt av scenarios).

Utveckling av business case(s) för mest lovande scenario(s) för att säkerställa finansiering



Planera:

Översätt top-down-mål till enkla, relevanta och mätbara mål²

Detaljerad implementeringsplan med prioriteringar och åtgärder kommande ~ 1-2 år

1. Förslag från olika stakeholders på åtgärder och detaljerad analys av koppling mellan åtgärd och omställningseffekt (tex plastreduktion ur avfall-hur mycket kan det minska fossilinnehållet i fjärrvärmeproduktionen, när kan det vara på plats) samt ytterligare investeringar kopplade till detta (vad behöver investeras för att uppnå reduktionsnivån? tex incitament för hushållen, förenkling för hushållen, investering i sorteringsanläggning i väremeverket etc)
2. Tex för att minska resandet med 30% till 2040, hur mycket behöver ske med hjälp av delade bilar, hur mycket behöver hemarbete öka per år, per olika yrkeskategorier eller område, vilka åtgärder ska göra att detta sker tex utbildning, när behöver de vara på plats för effekt i tid osv)
3. De initiala resurserna för att komma igång behöver sannolikt kompletteras till ett omställningsteam, tex med en ansvarig för omställning per sektor eller per aktör samt tex juridisk resurs för avtal och avtalsriktlinjer

Nästa steg – handling 2(2)



Mobilisera lokalsamhället

Möjliggör och driv förändring för olika grupper genom konkreta, lokala åtgärder och kampanjer:

Utbilda och engagera medborgare och företag om behovet av förändring och effekt av (beteende)förändringar

Undersök alternativ för pilotprojekt för grön finansiering med finansinstitut

Undersöka möjligheter att samarbeta med lokala intressenter, t.ex. biobränsleproduktion, smart/effektiv byggnad etc.

Undersök möjligheter att använda olika verktyg för att motivera och accelerera förändring; tex upphandlingskrav, incitament som pant, rabatter, premier osv, förenklingar som laddstolpar, enkel insamling, fördelar för önskvärda beteenden tex parkering för delade fordon osv



Adressera regionala beroenden

Samarbeta med nationella och regionala partners för att möjliggöra omställningen:

Säkra certifikat för 100% förnybar el (formulera kombinationen av fritt elval med nettonollambitionen?)

Fortsätta att arbeta med kollektivtrafik- och övrig transportsektor för att förverkliga en integrerad, koldioxidsnål framtid för transporter (hur integrera och nyttja nationella infrastrukturprojekt tex tåg och väg)

Samarbeta med regionala och nationella myndigheter för att utarbeta politiska åtgärder och samverka med andra Kommuner (exempelvis bidrag/premier, reduktionsplikt och liknande)

Cirkulär ekonomi-lösningar som bygger på regionala eller nationella flöden

HANDLING





Möjliga nästa steg på längre sikt

- **Maximera möjligheter till "grön tillväxt"** som påverkar både medborgare och lokalt näringsliv positivt
- **Förstå Umeå kommuns utsläpp** i scope 3, konsumtionsbaserade utsläpp, och hur de kan minskas, särskilt där kommunen har direkt påverkan
- **Planera för anpassning** till oundvikliga klimatförändringar (t.ex. skydd mot värmeböljor, översvämningsrisk, stormar etc.)
- **Integrera nettonollomställningen i en** holistisk plan för hållbarhet och motståndskraft (inkl. ämnen som biologisk mångfald, cirkularitet etc.)

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Bilagor

- **Terminologi**

- Metodik

- CCS

- 2030 Scenario

- Validering av resultat

- Detaljerade antaganden

Terminologi

BAU – Business As Usual, dvs utveckling utan att särskilda förändringar genomförs

NPV – Net Present Value, nuvärdesanalys, anger den samlade framtida värdeskapningen i dagens penningvärde baserat på en viss ränta på pengarna (diskonteringsränta)

Diskonteringsränta – ränta på framtida intäkter eller kostnader för att kunna relatera framtida värden/kostnader till dagens värde. En lägre diskonteringsränta ger ett större nuvärde av framtida värdeskapning vilket därmed gör fler långsiktiga investeringar lönsamma. I modellen har 3,5% diskonteringsränta använts¹

Nettonollutsläpp – summan av alla utsläpp som görs och utsläpp som kompenseras (permanent avlägsnande av icke fossil CO₂) är lika med noll

Koldioxidbudget – uppskattning av total mängd koldioxid som kan släppas ut av en viss region innan en viss effekt uppstår. Tex mängd koldioxid Umeå kan släppa ut (som andel av global mängd) utan att temperaturen i atmosfären överstiger 1.5 grader Celsius (överenskommet i Parisavtalet)

Omställning – förändring i viss nivå, tex andel per transportslag, eller andel av isoleringsgrad

Åtgärd – aktivitet för att åstadkomma en viss förändring (omställning)

Sektor – 'Samhällsfunktion' tex byggd miljö eller transport av människor och varor

Scenario – En antagen combination av

Simulering – beräkning av effekter av ett scenario baserat på indata-antaganden (tex behov av antal person-km) och modellparametrar (tex bränslekonsumtion per motortyp och fordonskilometer)

CCS – Carbon Capture and Storage, infångning och permanent förvaring av koldioxid

CCU – Carbon capture and Usage, infångning av koldioxid för användning i annan application, tex som bränsle. Om den infångade är av biogent ursprung får man tex fossilfritt bränsle

1. Rekommenderas av trafikverket för infrastrukturinvesteringsberäkningar. Diskonteringsräntan ligger vanligen mellan 3% och 4%

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- **Metodik**
- CCS
- 2030 Scenario
- Validering av resultat
- Detaljerade antaganden

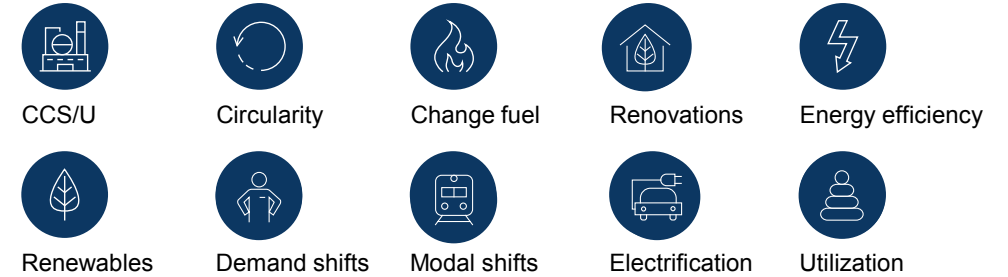
The City Decarbonization Engine allows for rapid scenario development to reduce emissions and shape the socio-economic case for decarbonization



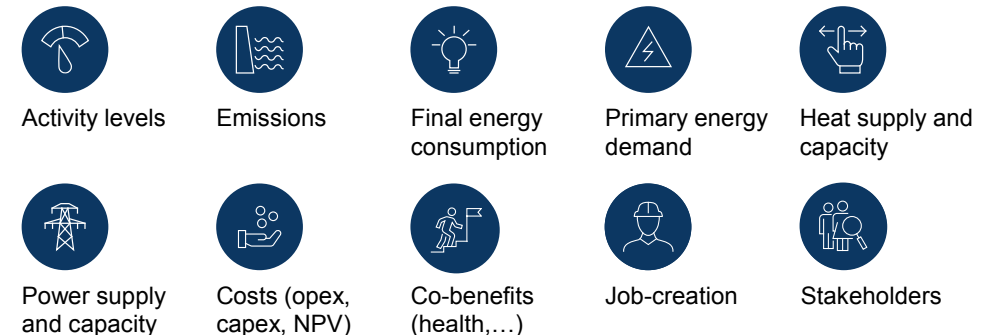
30+ (sub) sectors



200+ abatement levers across technologies, behavioural shifts, and efficiency improvements

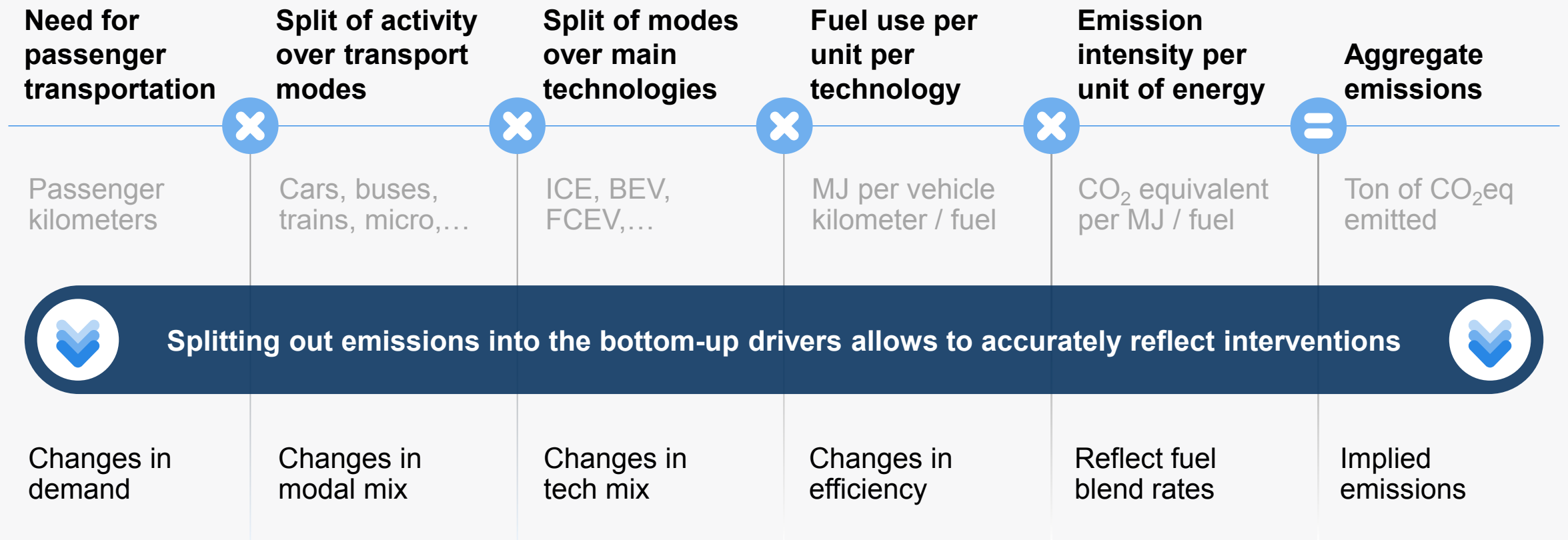


As of 2023 - Immediate scenario development across all key dimensions in an online dashboard is enabled



The bottom-up approach decomposes each activity unit into the different drivers that lead to emissions

EXAMPLE



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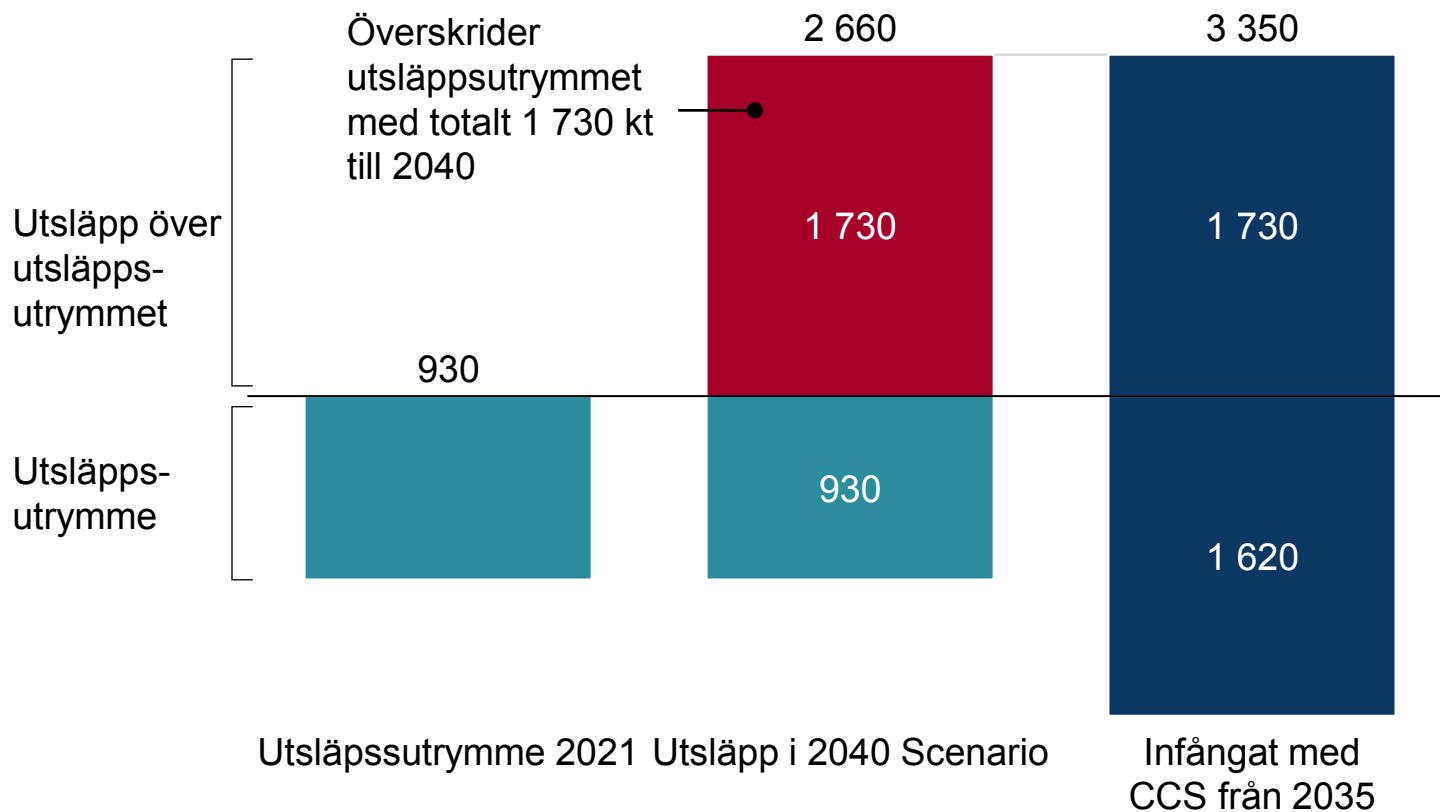
Bilagor

- Terminologi
- Metodik
- **CCS**
- 2030 Scenario
- Validering av resultat
- Detaljerade antaganden

Umeå överskrider sitt utsläppsutrymme även i ett ambitiöst omställningsscenario, men kan kompensera med CCS

Utsläppsutrymme för huvudscenario 2040, kt CO₂

■ Infångat CO₂¹ ■ Överskridande utsläpp ■ Utsläpp inom utrymme



I det simulerade scenariot överskrider Umeå det utsläppsutrymme som Parisavtalet medger redan från 2025 vilket resulterar i en total övertrassering på över 1730 ton till 2040

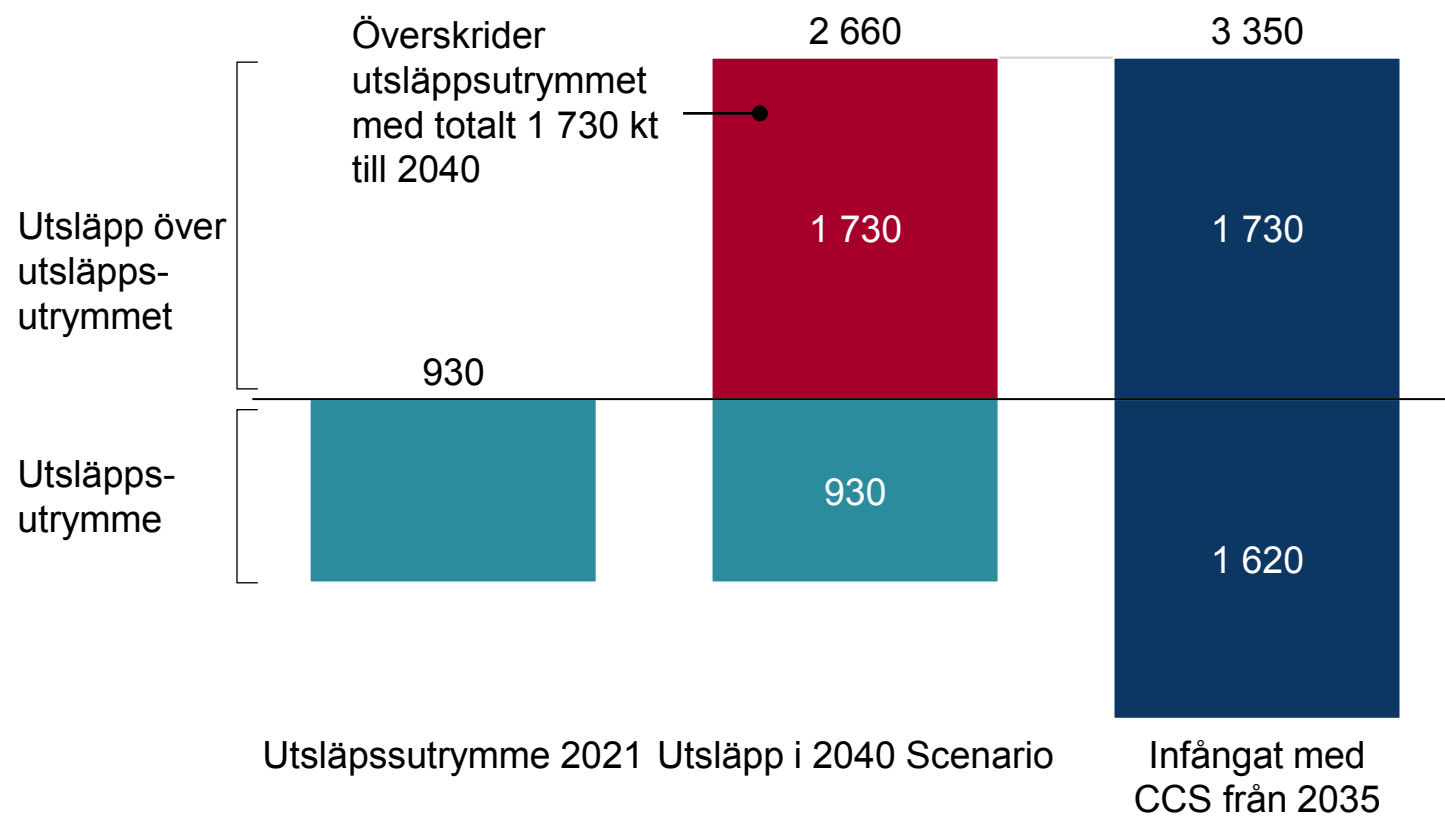
CCS (carbon capture and storage) av icke fossil koldioxid på Dåva och Obbola kan användas för att kompensera för kommunens kvarvarande utsläpp.

Då infångningskapaciteten från dessa enheter är större än Umeås kvarvarande årliga utsläpp kan de användas till att 'betala tillbaka' den koldioxidsskuld som uppstått. Dessutom finns ytterligare kapacitet att sänka eller använda det skapade utrymmet (som inte utnyttjas för kompensation eller avbetalning) för att sälja utsläppsrätter eller CCU (carbon capture and utilization i exempelvis e-metanol)

Detta scenario innefattar bara utsläpp från scope 1 och 2. Då utsläppsbudgeten är absolut måste utsläpp från scope 3 också täckas inom budget

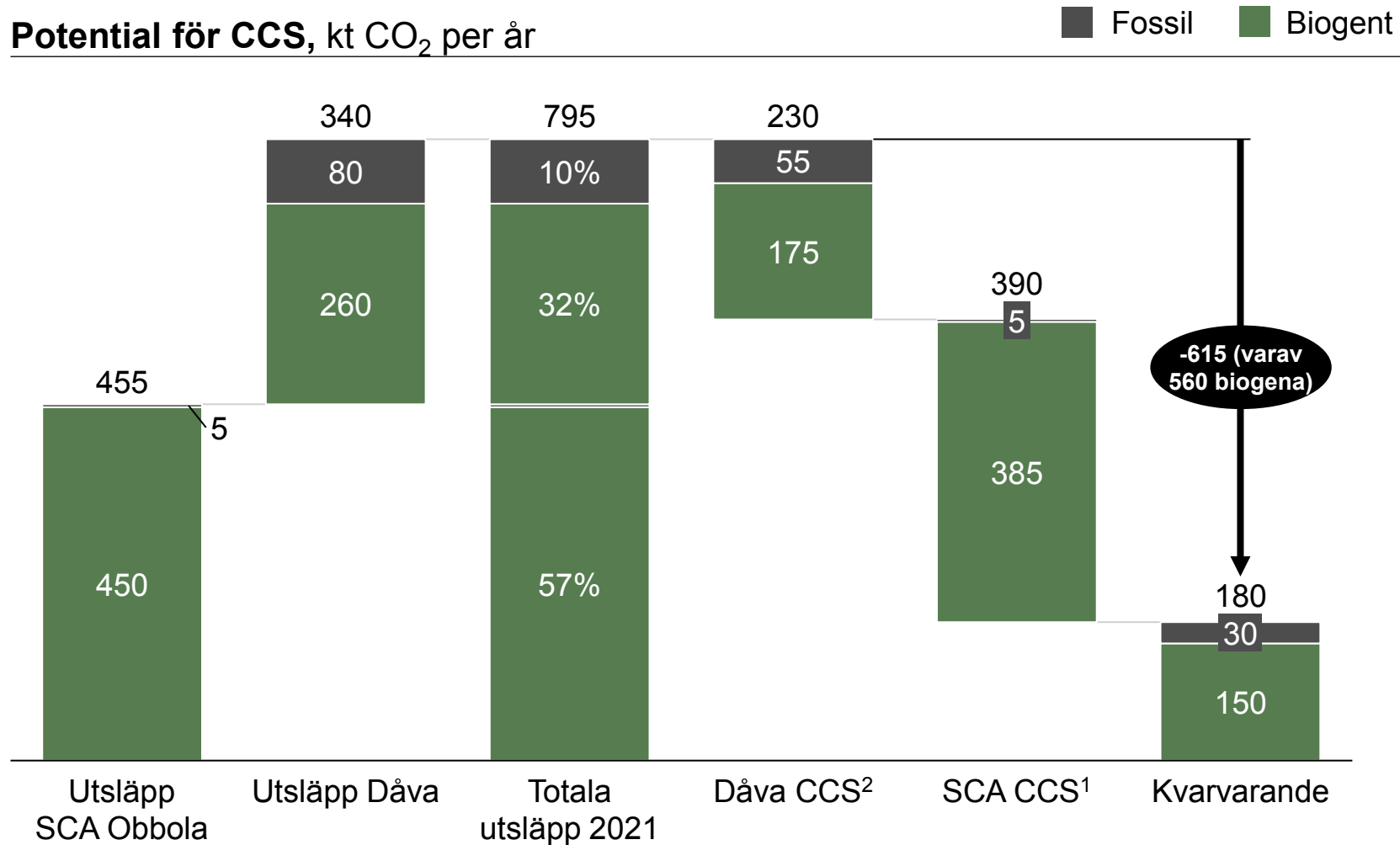
Den del av det skapade utrymmet som åstakoms mha av CCS från Obbola ägs kommersiellt av SCA

■ Infångat CO₂¹ ■ Överskridande utsläpp ■ Utsläpp inom utrymme



CCS kan fånga in ~620kt av utsläppen från Dåva och Obbola, varav ~550 kt biogena

ILLUSTRATIVT EXEMPEL FÖR DISKUSSION

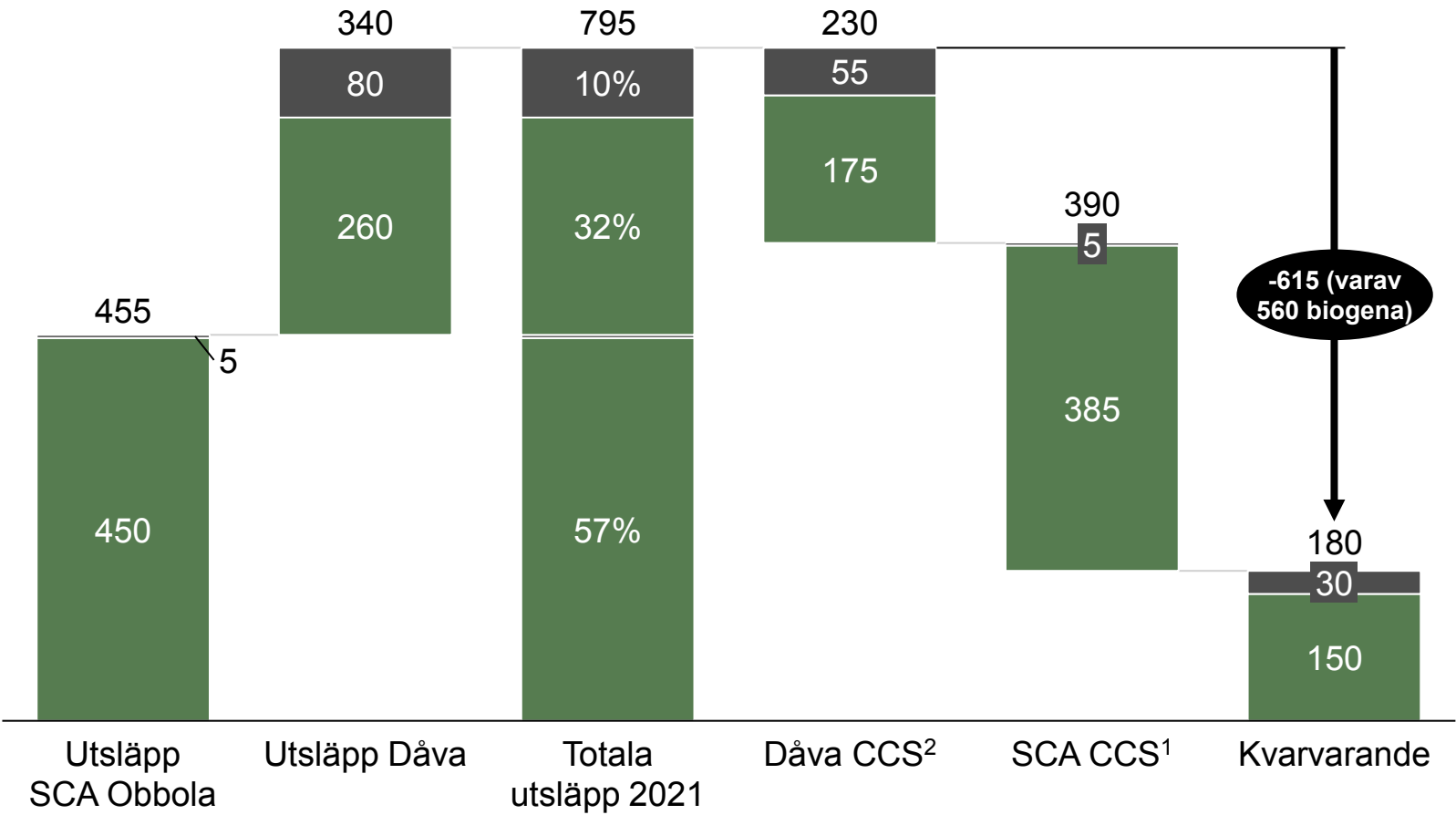


Över 550 kt biogent CO₂, dvs mer än 2x Umeås totala utsläpp kan potentiellt fångas in varje år genom CCS på både Dåva och Obbola

Tack vare att dessa är biogena ses de som **minusutsläpp och skulle kunna användas för att kompensera** för Umeås kvarvarande utsläpp

1. Antagande att 80-90% av utsläppen kan fångas in, utsläppsdata från Naturvårdsverket; 2. Antagande att 68% av utsläppen kan fångas in för Dåva (från <https://www.energinyheter.se/20230123/28335/ny-metanolfabrik-gront-sjofartsbransle-kan-byggas-intill-dava-kraftvarmeverk-i-umea>) och 85% för Obbola

■ Fossil ■ Biogent

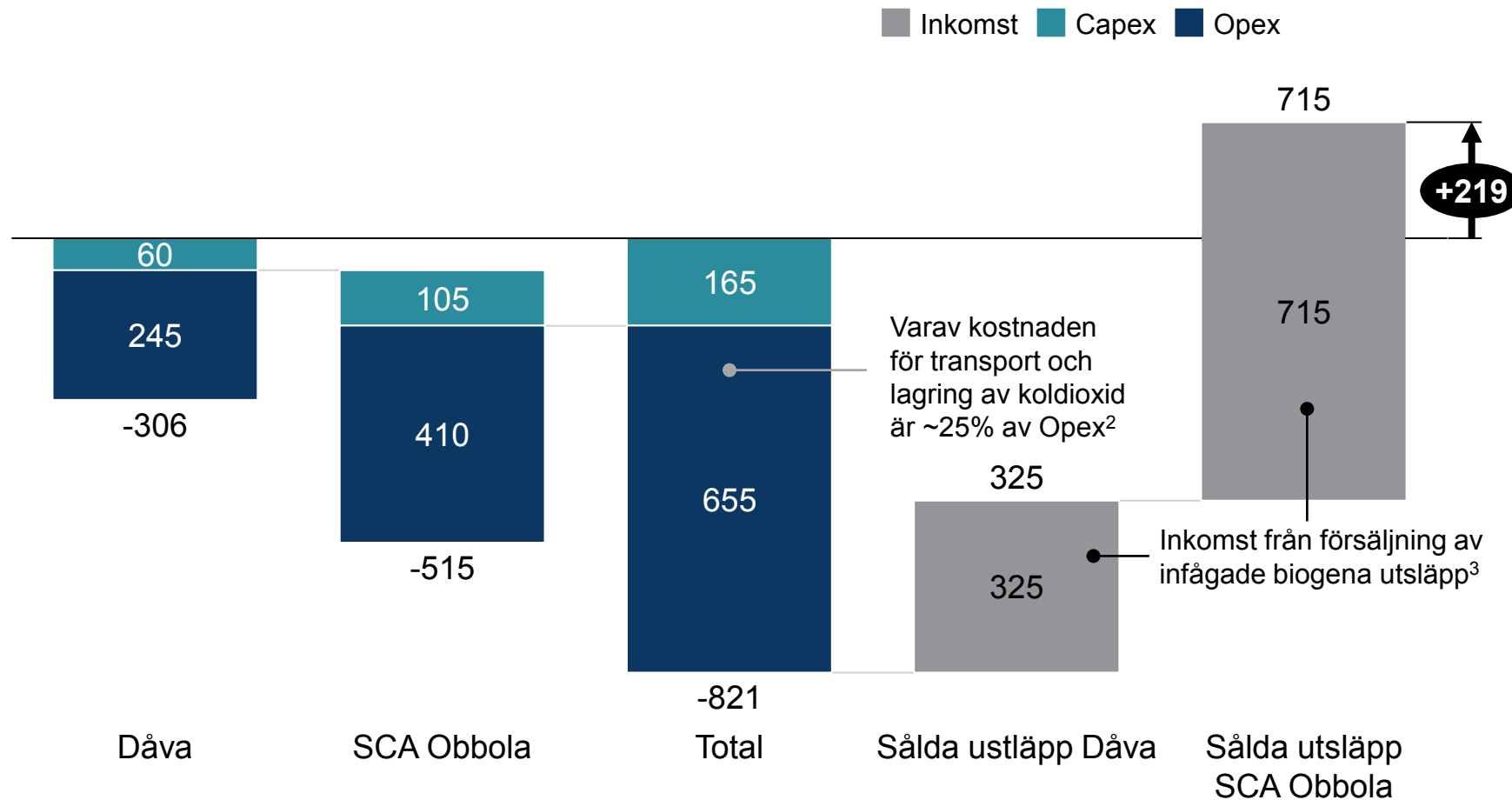


-615 (varav 560 biogena)

CCS på Dåva och Obbola har potential att vara lönsamma investeringar

ILLUSTRATIVT EXEMPEL FÖR DISKUSSION

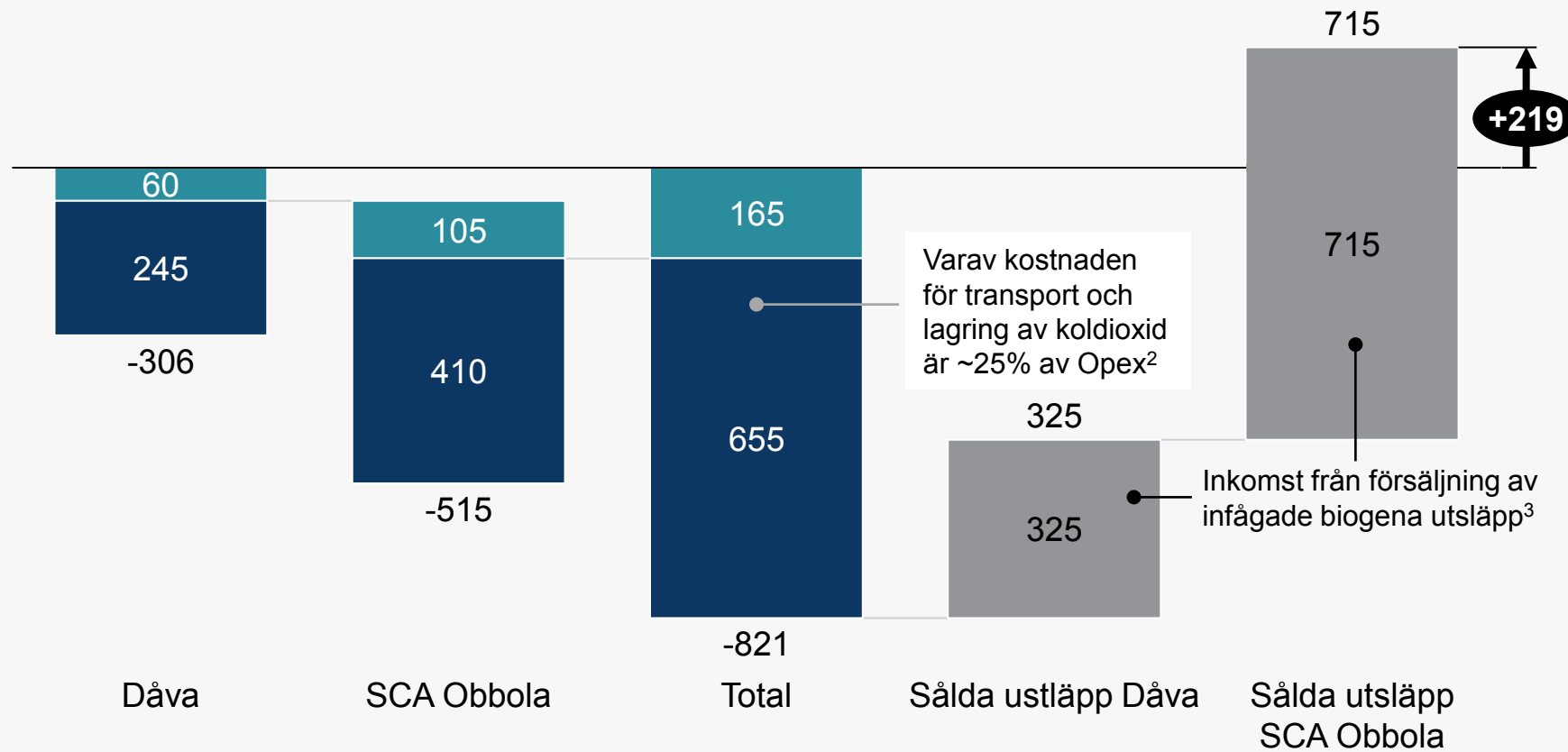
Exempel på ekonomiskt case för CCS på Dåva och Obbola, MSEK per år¹



Om alla infångade biogena utsläpp från Obbola och Dåva såldes skulle CSS på dessa verk potentiellt kunna vara lönsam investering

1. Capex och opex för CCS är schablonsiffror från Material Economics CCS-modell och bygger på ett större Svenskt pappersbruk som har CCS på sin recovery boiler och har hamnläge, samt att koldioxiden lagras till havs. Den faktiska kostnaden kan skilja mellan CCS teknologier, volym utsläpp, typ av industriverksamhet, typ av lagring, transportavstånd osv och bör därför enbart ses som en indikation. Total capex ~200-400 mEUR; 2. Från https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_chapter8-1.pdf; 3. 175 EUR/t CO₂, förutsätter att alla infångade biogena utsläpp lagras och säljs

■ Inkomst ■ Capex ■ Opex



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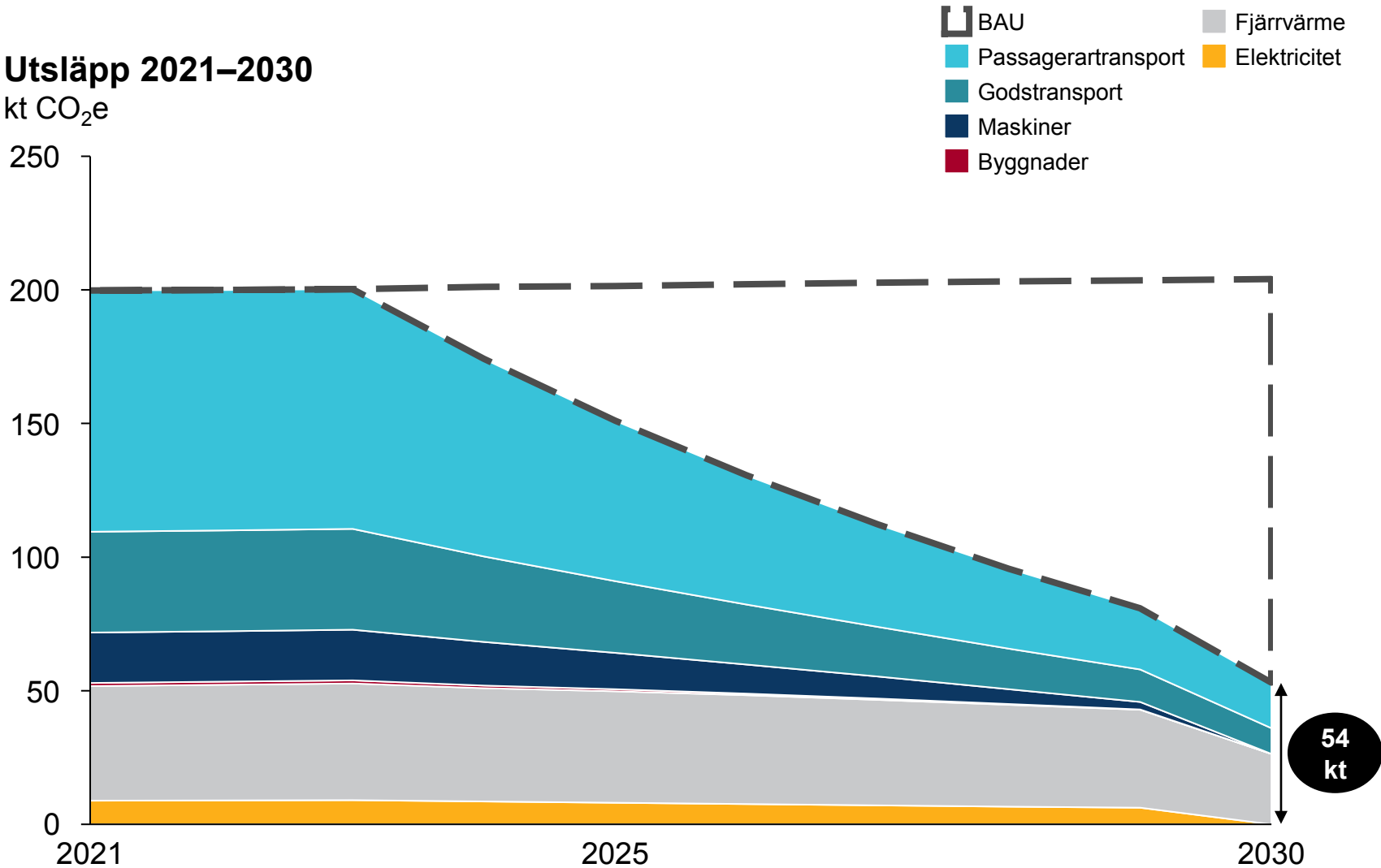
- Terminologi
- Metodik
- CCS
- **2030 Scenario**
- Validering av resultat
- Detaljerade antaganden

Utsläpp av CO₂e 2021-2030

2040 scenario

Utsläpp 2021–2030

kt CO₂e



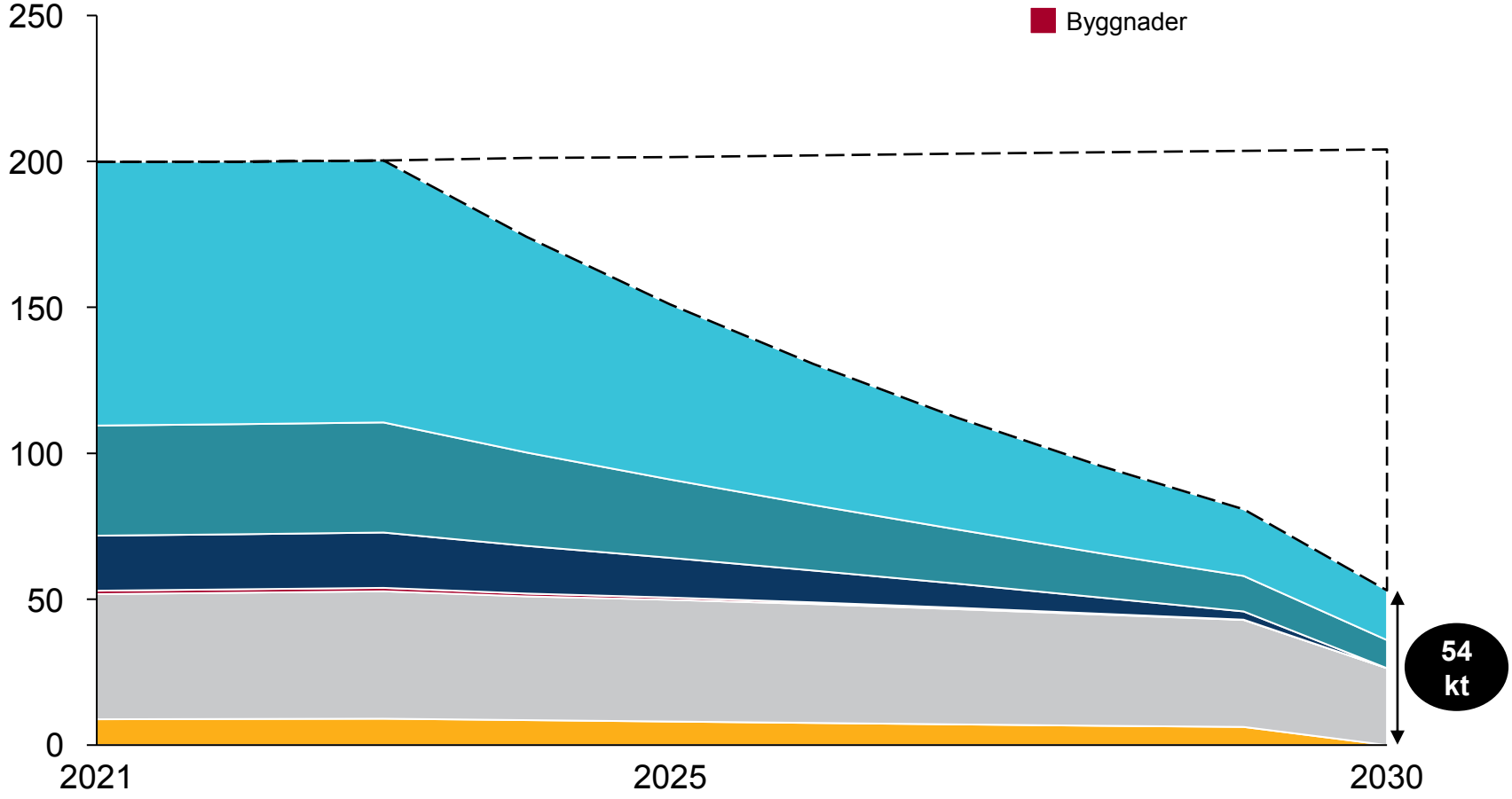
I BAU ingår; grid emissions antas ligga konstant under perioden, befolkningsökning (1300 pers/år) ökar utsläppen, samt effekter av reduktionsplikt i transportsektorn som minskar utsläppen. Sammantaget en begränsad utsläppsökning på knappt ~2% under perioden

En större befolkningsökning tex den som skulle motsvara en befolkning på 200'000 år 2050 (dvs ~4000 pers/år) ger väsentligt högre utsläppsökningar som i så fall också behöver kompenseras

Not: Total återstående CO₂-budget efter 2021: 1 018 kton. Ackumulerade utsläpp efter 2021 i huvudscenario=848 kton och i BAU-scenario=1673 kton

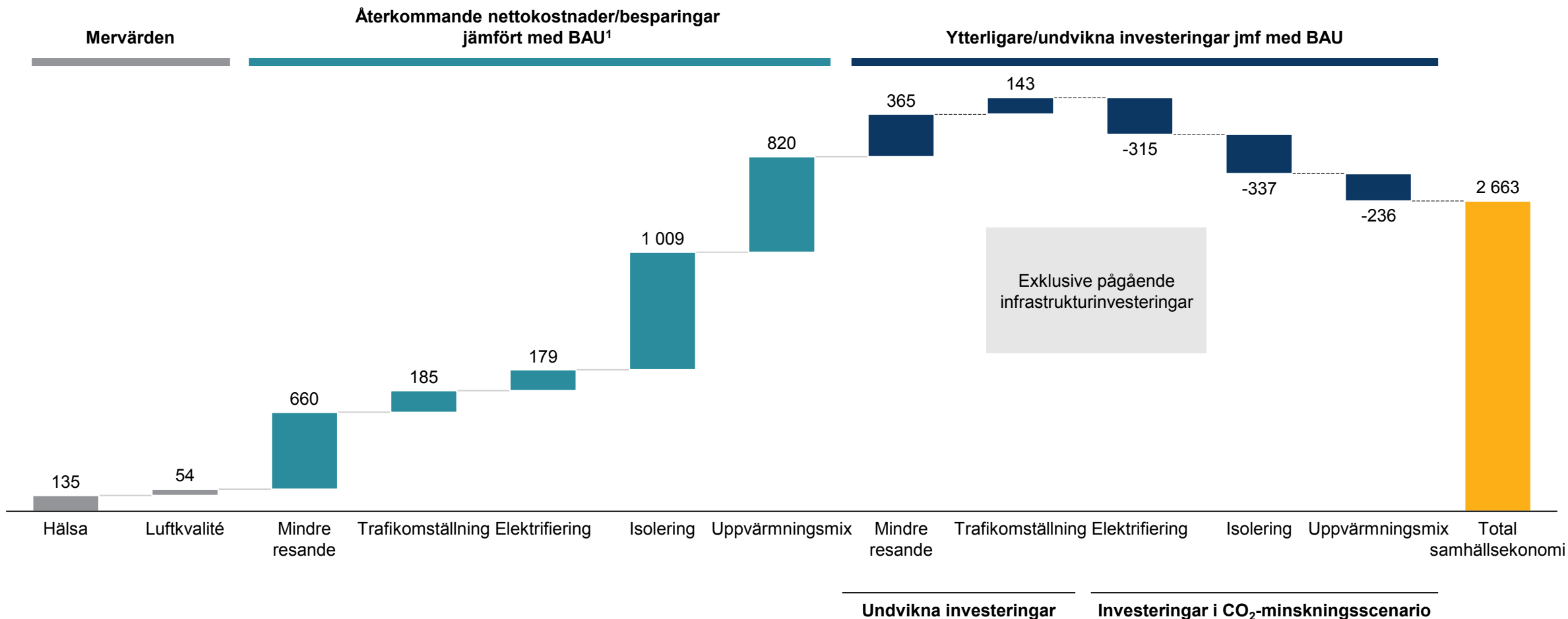
Källa: City Decarbonization Engine, Material Economics analys

- BAU
- Passagerartransport
- Godstransport
- Maskiner
- Byggnader
- Fjärrvärme
- Elektricitet



Ekonomiska effekter av klimatåtgärder 2030 scenario

MEUR, NPV investeringar (2022–2040) och kostnader/besparingar (2022–2050)



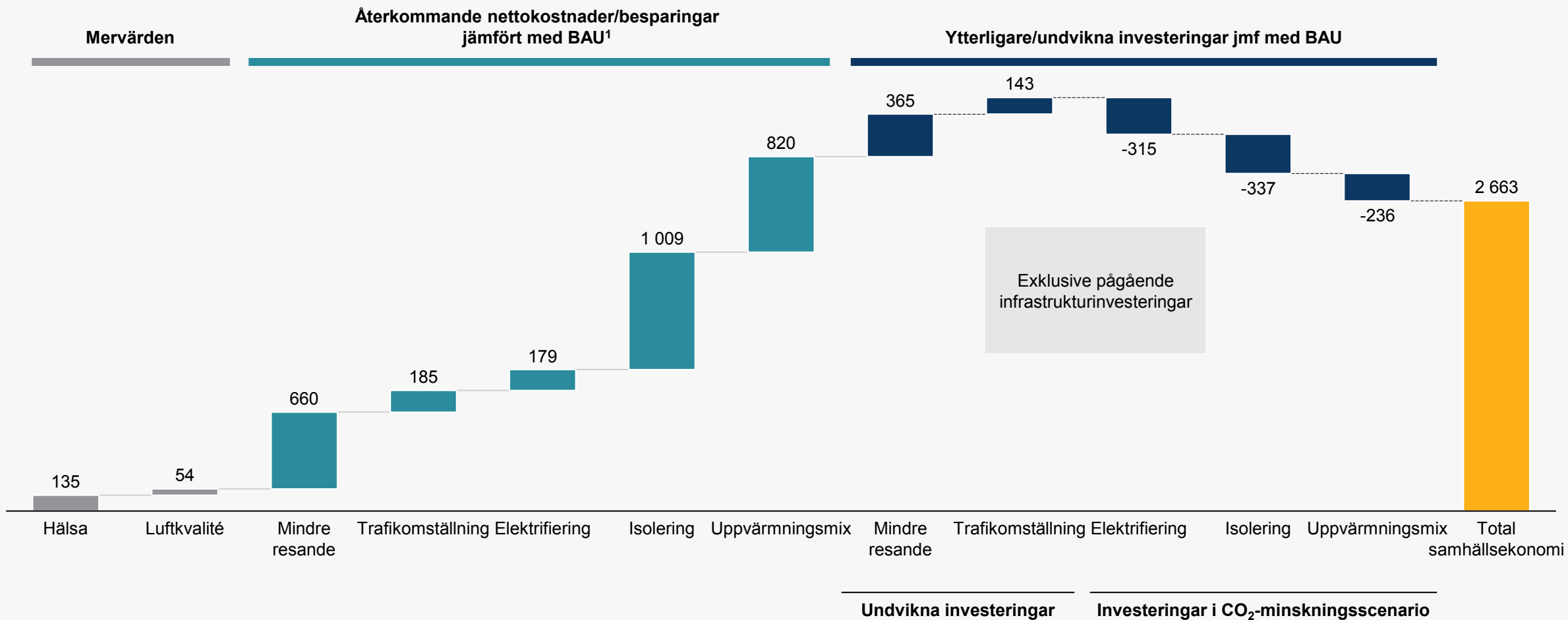
1. Inga priseffekter på importerad energi har beaktats

Obs: Capex = Capital expenditures (Investeringar eller undvikna investeringar)

Opex = Operational expenditures (Löpande kostnader eller kostnadsbesparingar)

NPV=Nettonuvärde (summan av allt framtida värde som skapas i dagens monetära värde)

Källa: City Decarbonization Engine, Material Economics analys



Mervärden för 2030 scenariot

Akkumulerat 2021–2050

EJ UTTÖMMANDE

Hälsovinster, MSEK



Förbättrad
luftkvalitet

550



Gång/cykel

1 375



Övrigt

Andra källor till mervärden
inkluderar bullerreducering,
färre olyckor etc.

?

Total

1 925+



Förbättrad
luftkvalitet

550



Gång/cykel

1 375



Övrigt

Andra källor till mervärden
inkluderar bullerreducering,
färre olyckor etc.

?

Total

1 925+

Omställningen skapar nya arbetstillfällen

Akkumulerat 2021–2050

EJ UTTÖMMANDE

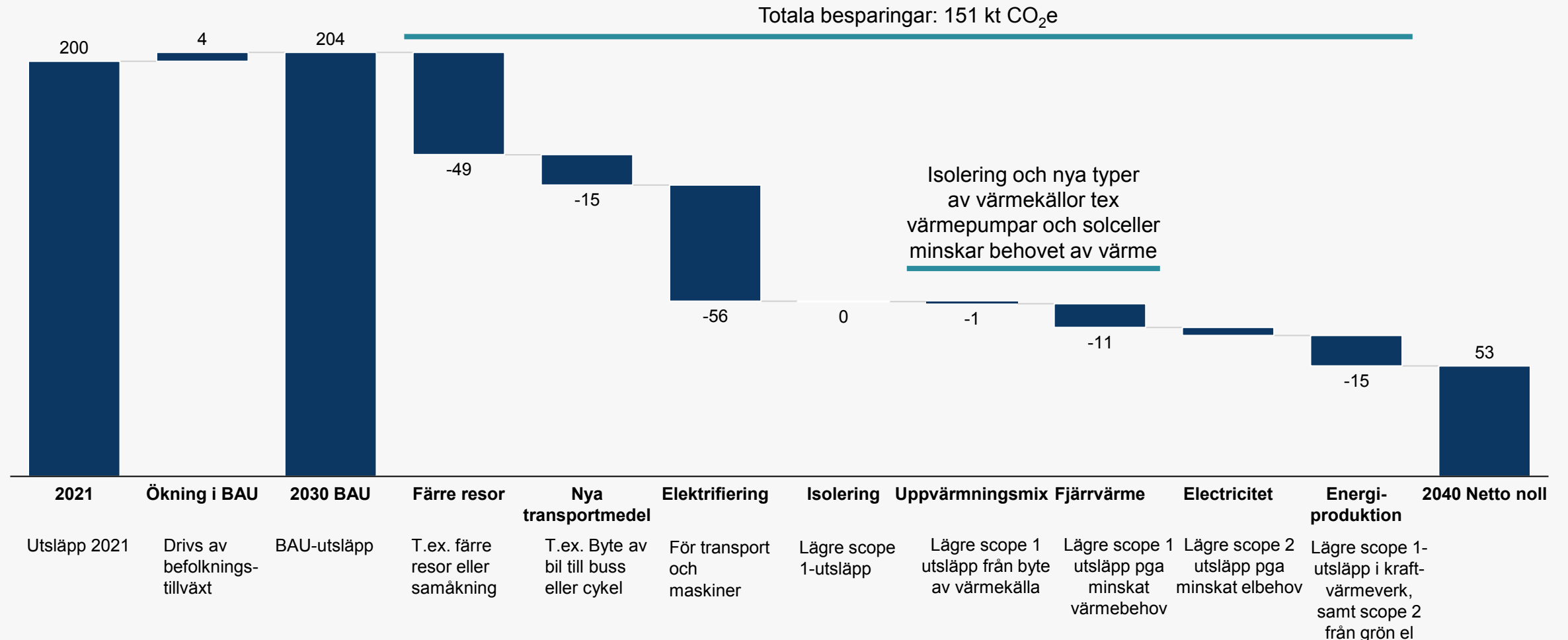
Skapade arbetstillfällen, antal jobb



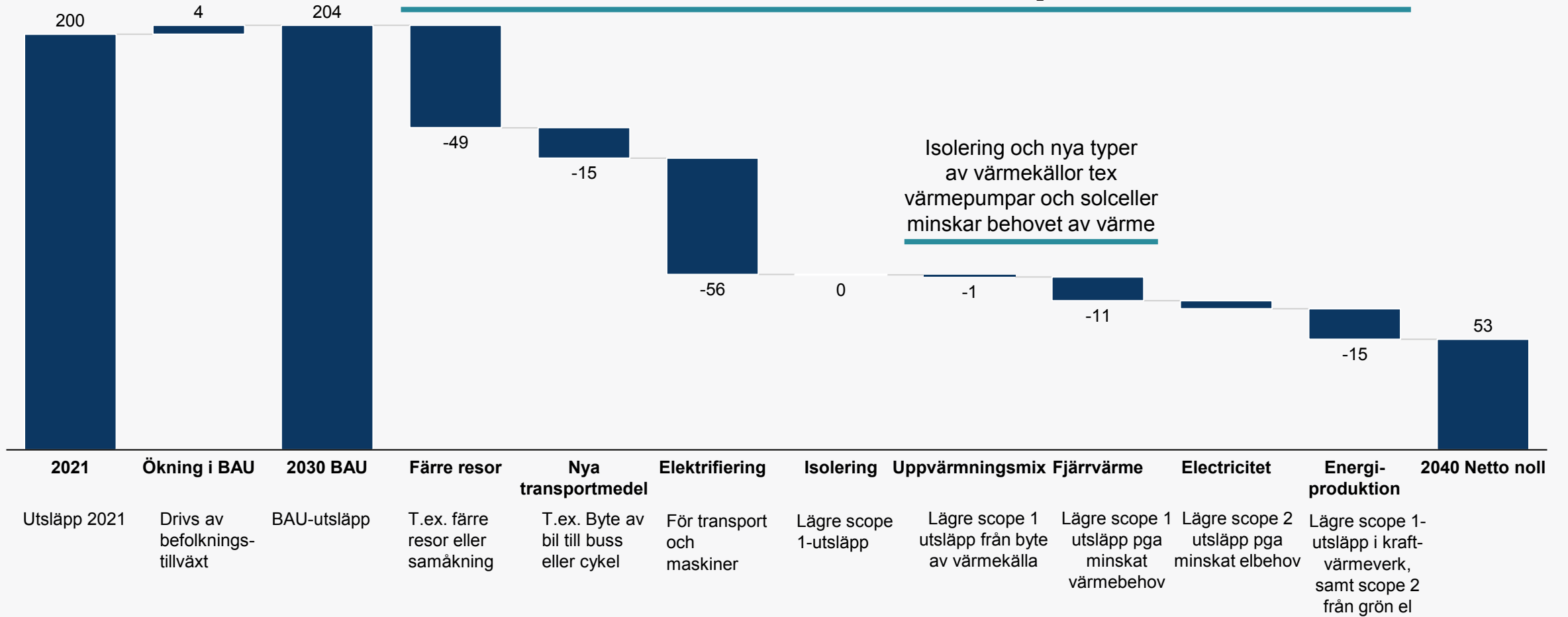


Färre resor och elektrifiering av transport och maskiner är de största minskningsåtgärderna i Umeå fram till 2030

Utsläppsminskning per åtgärd, kt CO₂e

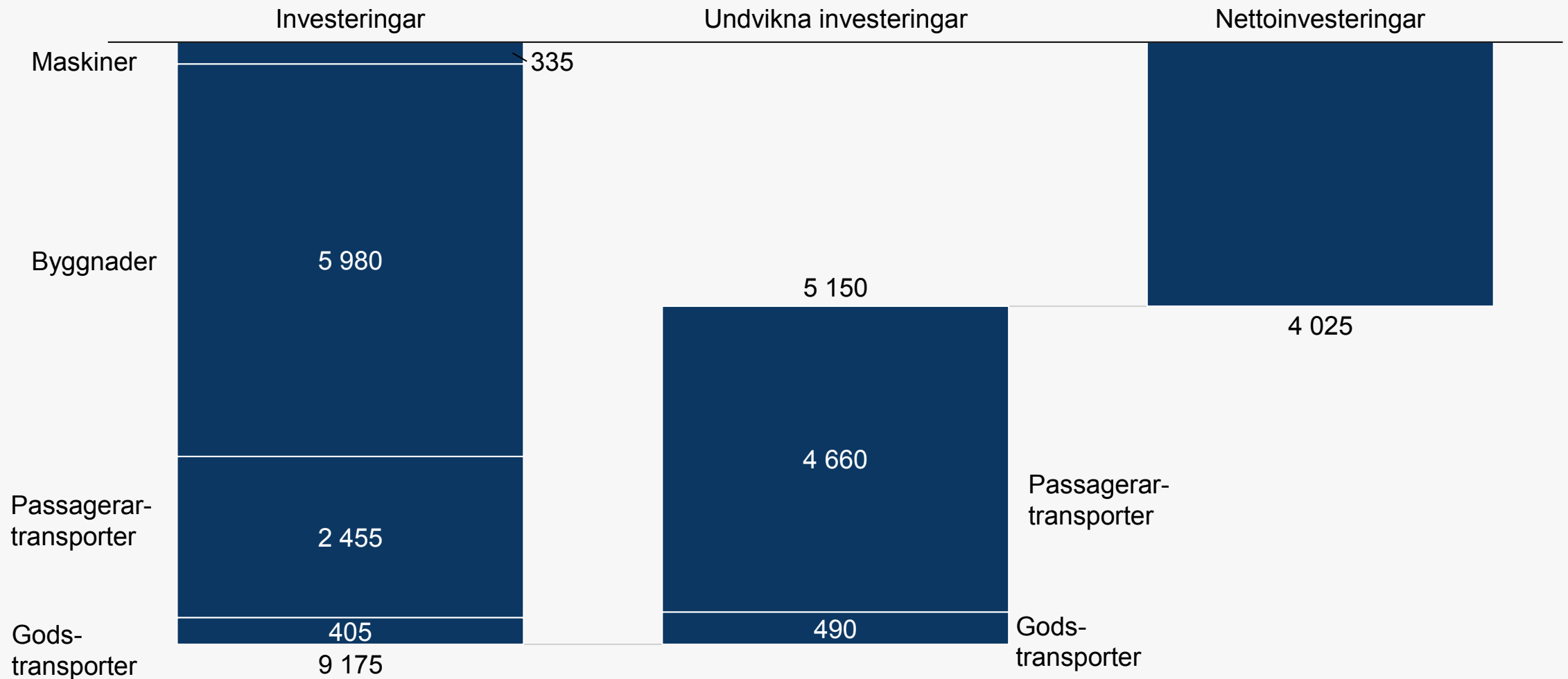


Totala besparingar: 151 kt CO₂e

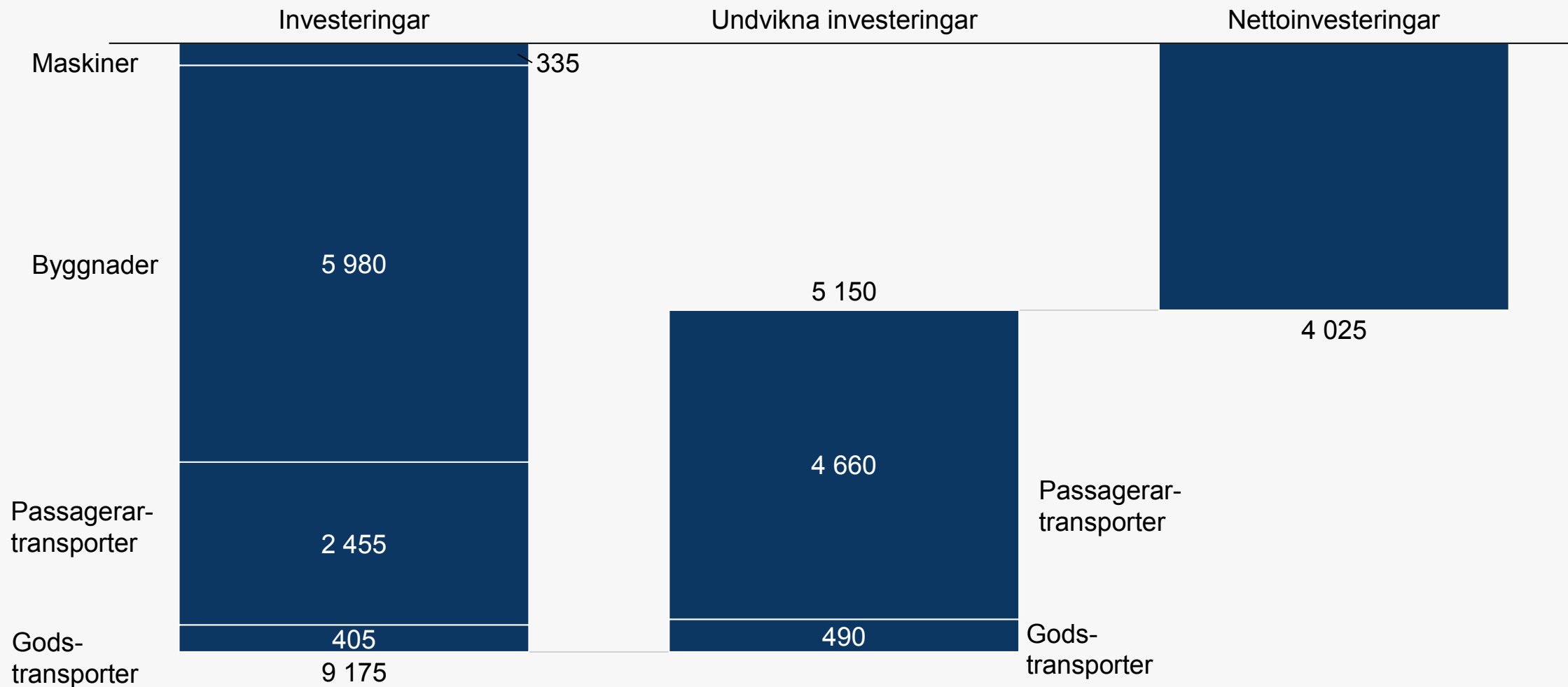


Ekonomiska effekter av klimatåtgärder – investeringar 2022-2030

MSEK



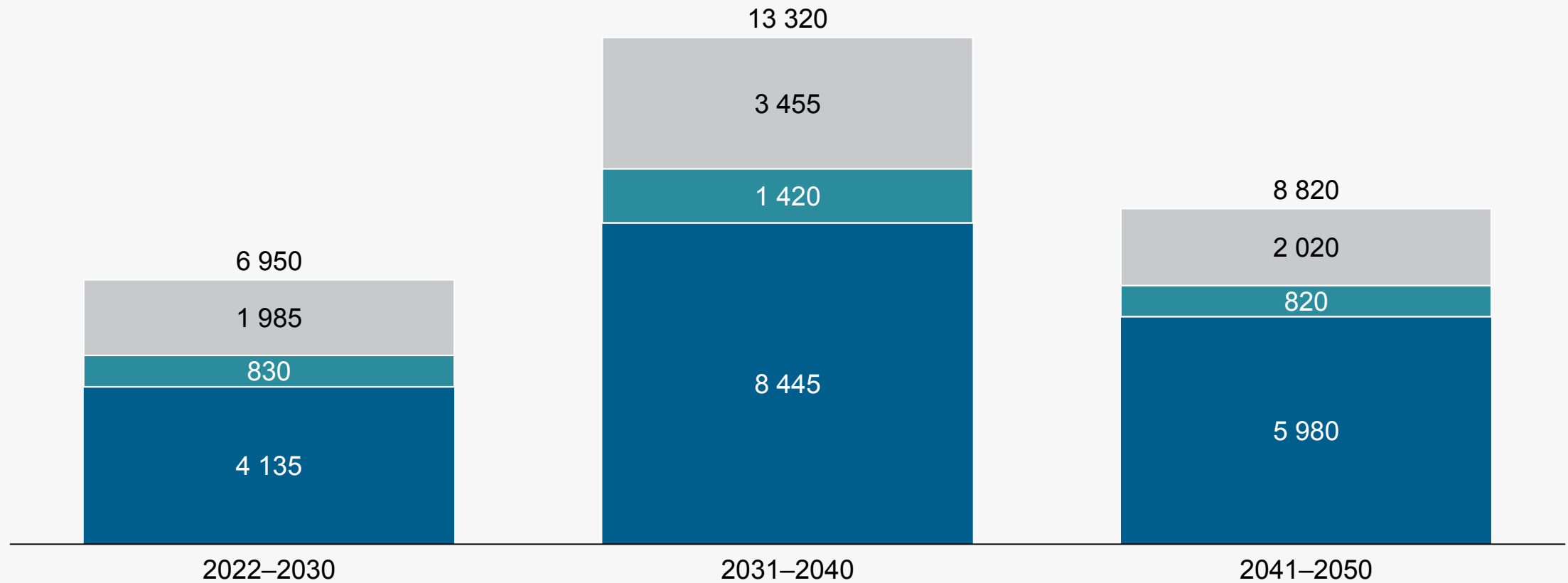
Källa: City Decarbonization Engine, Material Economics analys



Ekonomiska effekter av klimatinvesteringar – kostnadsbesparingar 2030 scenario

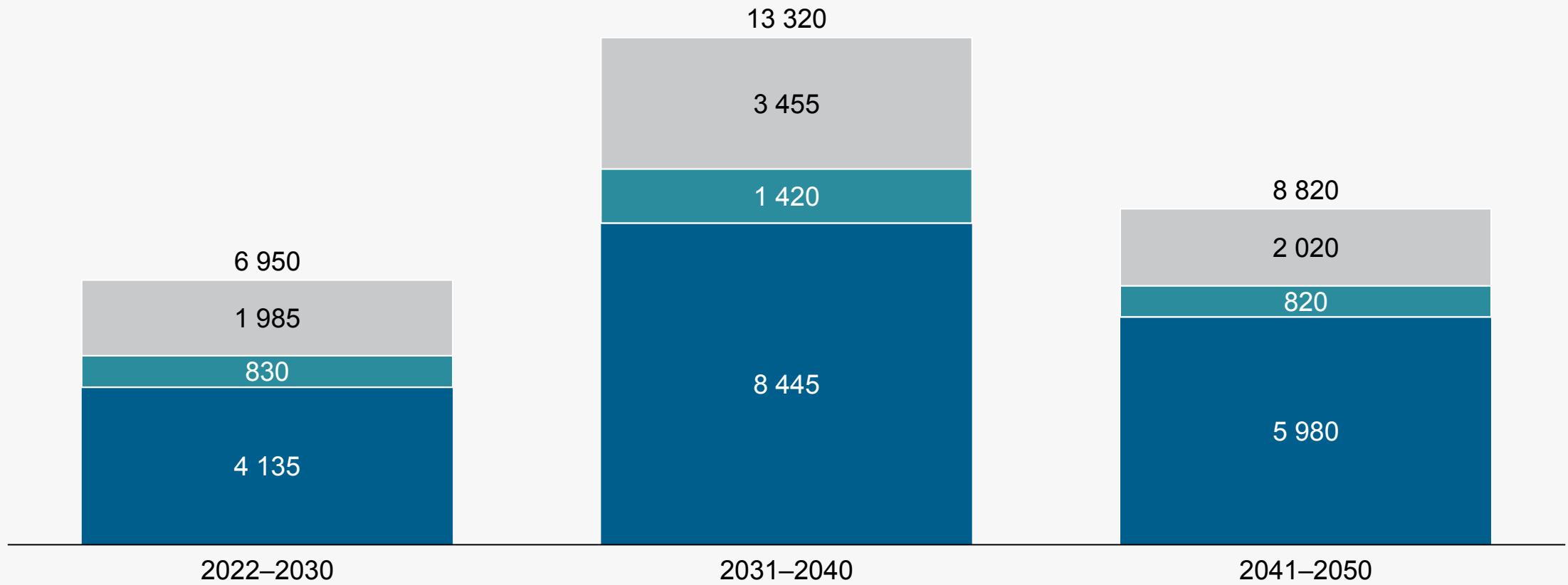
MSEK

Passagerartransporter Godstransporter Uppvärmning



1. Non discounted, cumulative opex (running costs/savings) value
Källa: City Decarbonization Engine, Material Economics analys

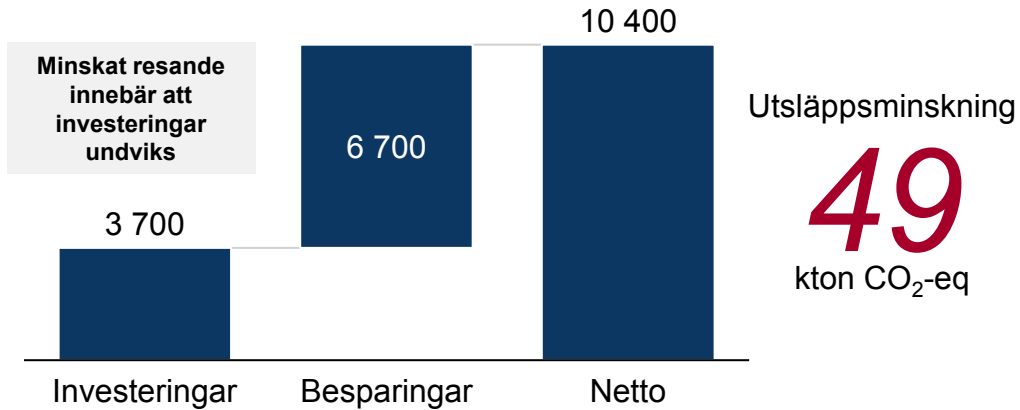
Passagerartransporter Godstransporter Uppvärmning



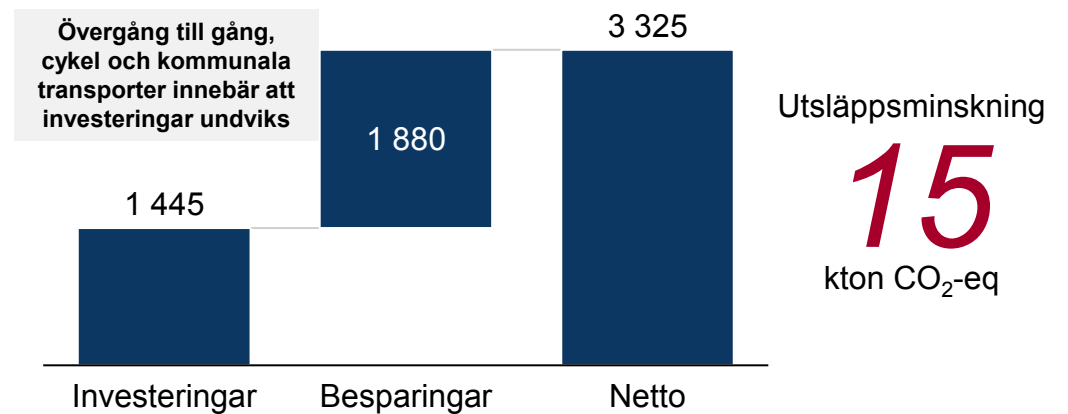
Kostnader för att minska utsläpp per sektor, 2030 scenario

MSEK

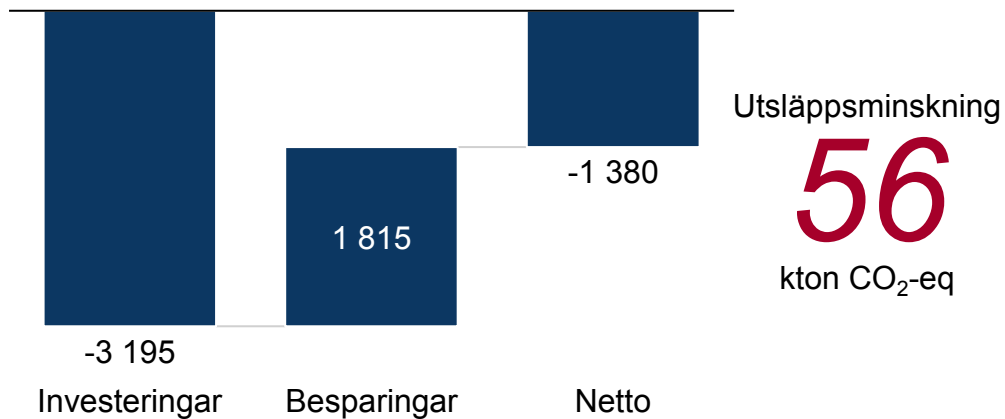
Minskat resande



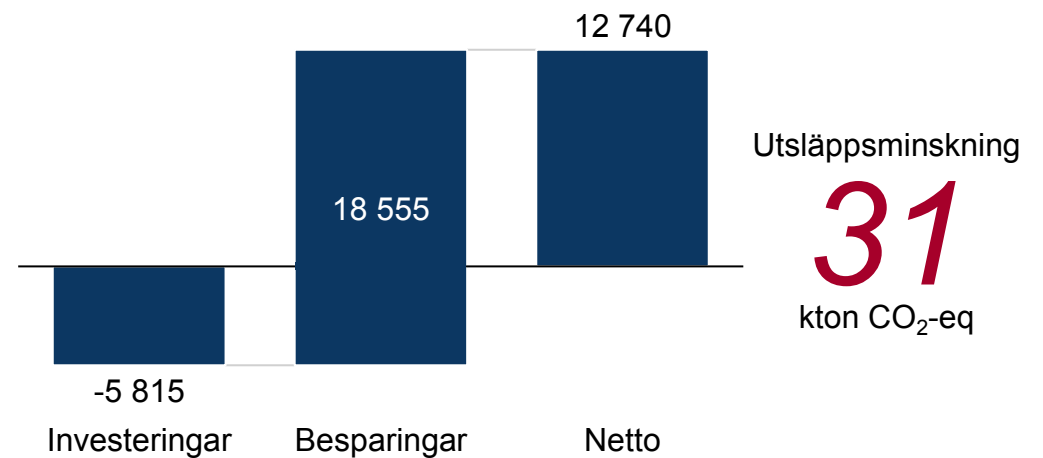
Nya transportmedel



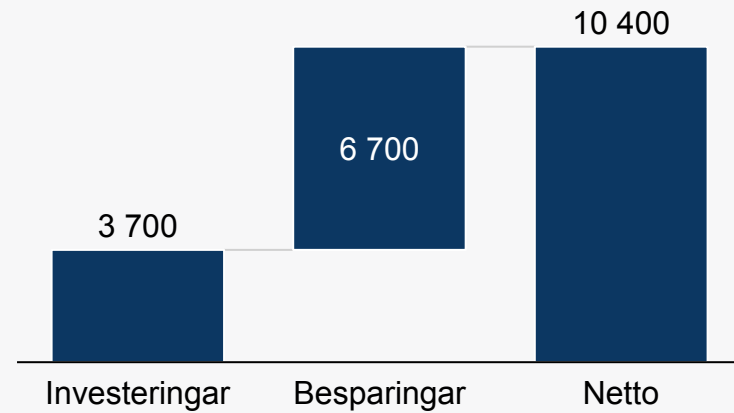
Elektrifiering



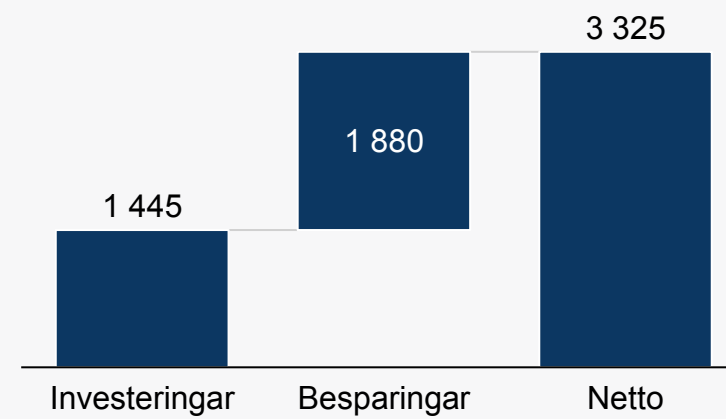
Fastigheter (isolering och värme)



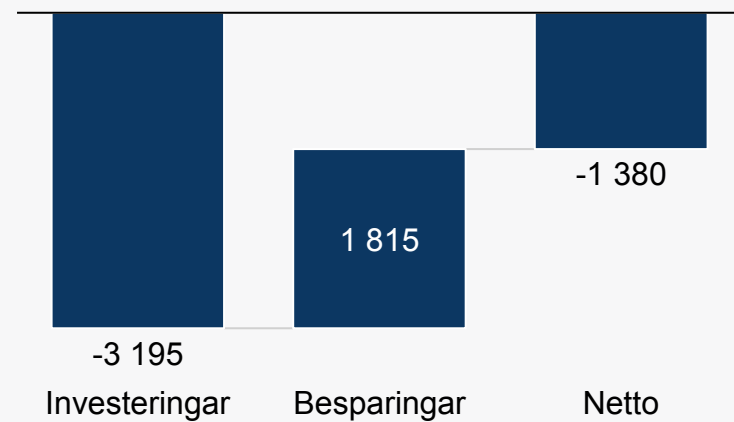
Minskat resande



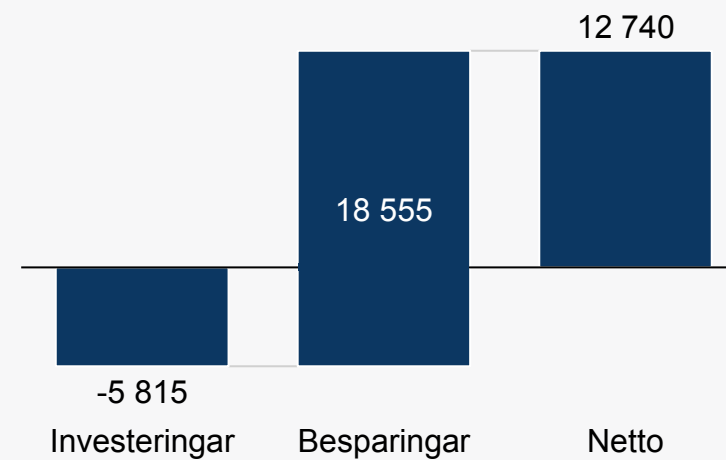
Nya transportmedel



Elektrifiering



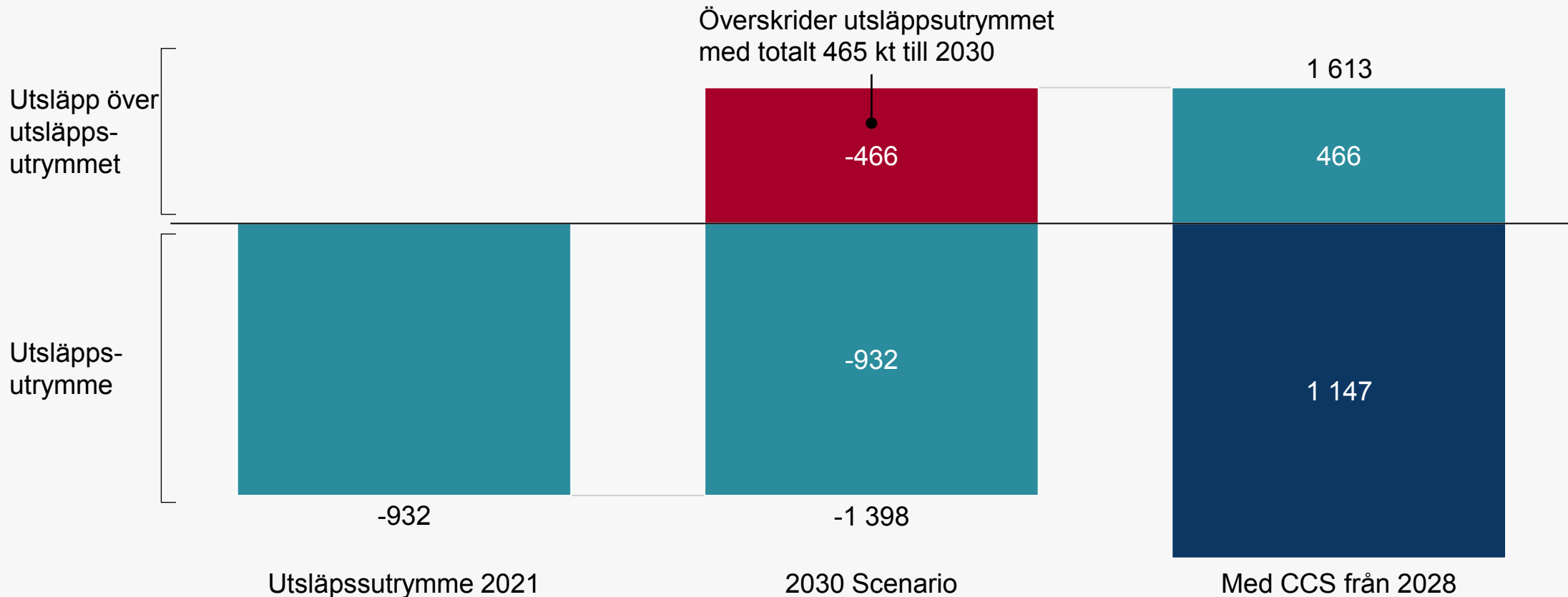
Fastigheter (isolering och värme)



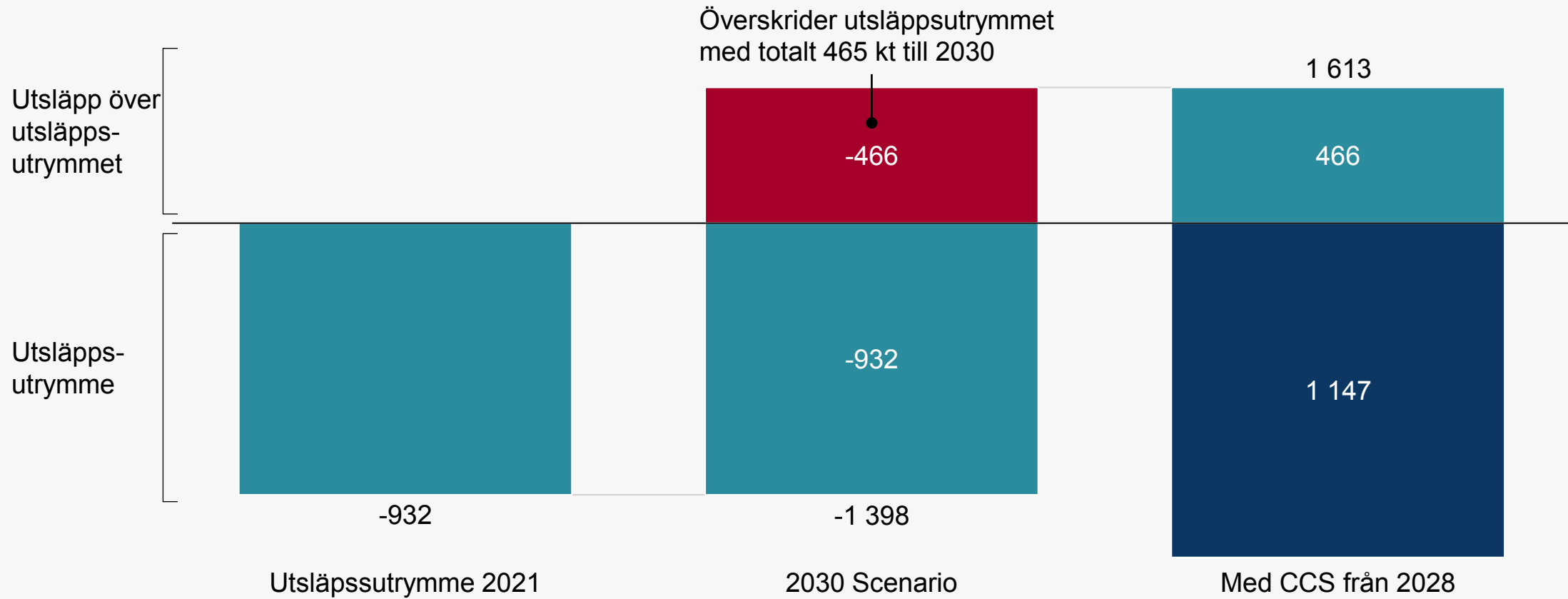
Umeå överskrider sitt utsläppsutrymme även i ett ambitiöst omställningsscenario, men kan kompensera med CCS

Utsläppsutrymme för 2030 scenario år 2030, kt CO₂

■ Infångat CO₂¹ ■ Överskridande utsläpp ■ Utsläpp inom utrymme

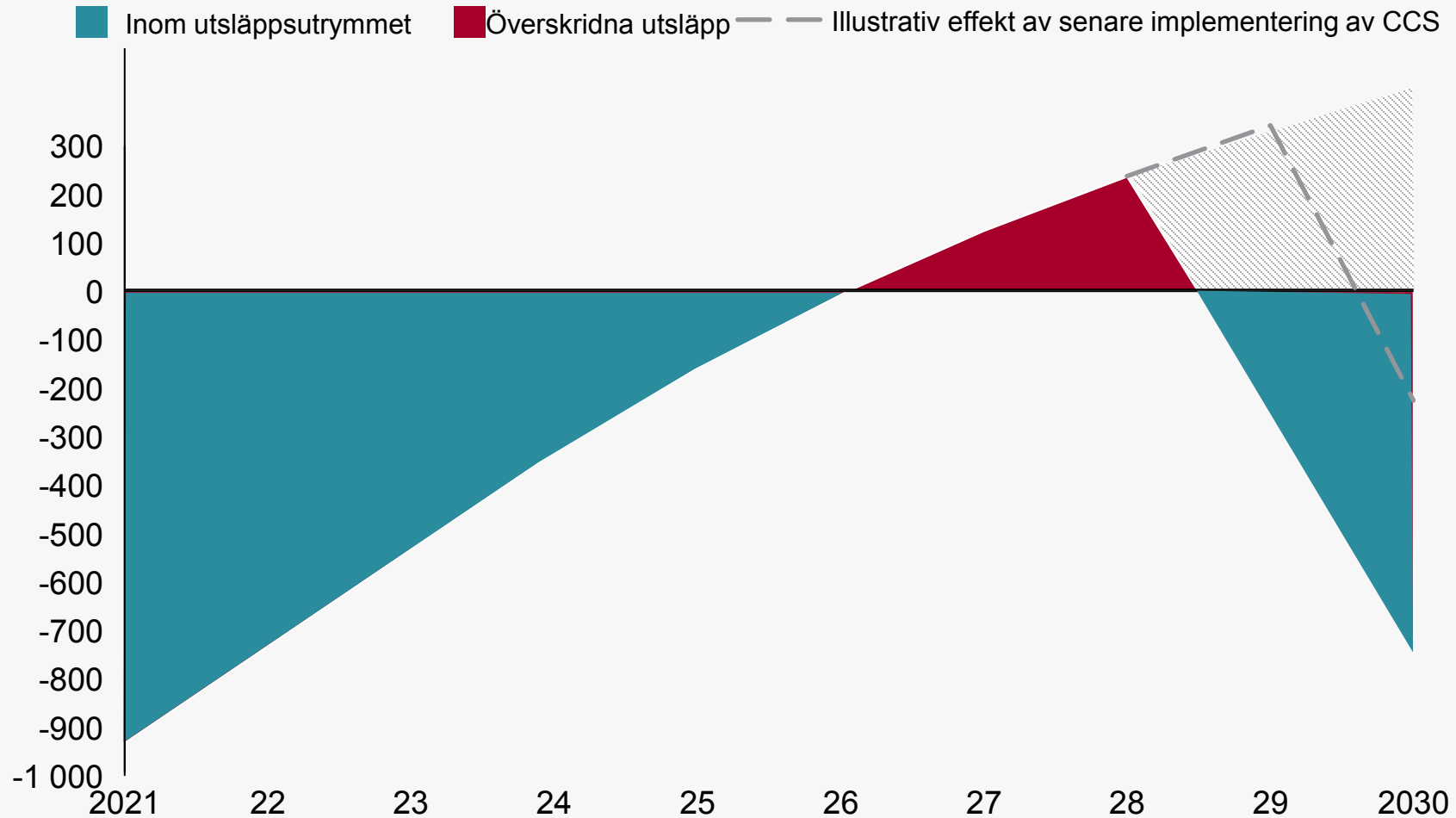


■ Infångat CO₂¹ ■ Överskridande utsläpp ■ Utsläpp inom utrymme



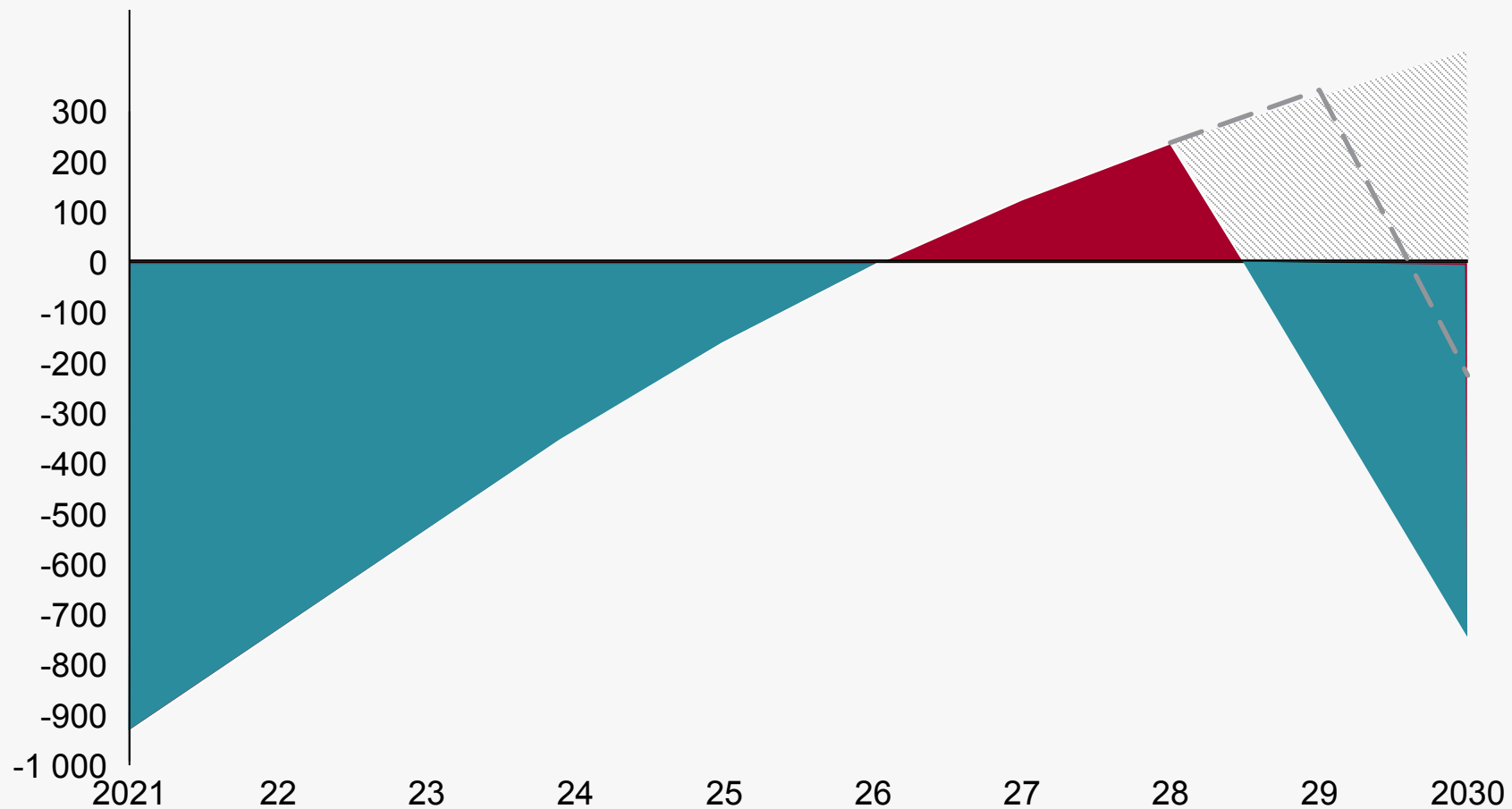
Med CCS kan Umeå i längden hålla sig inom sitt utsläppsutrymme

2030 scenariots utveckling till 2030, kt CO₂



Med CCS kan Umeå i längden hålla sig inom sitt utsläppsutrymme

Inom utsläppsutrymmet Överskridna utsläpp — — Illustrativ effekt av senare implementering av CCS



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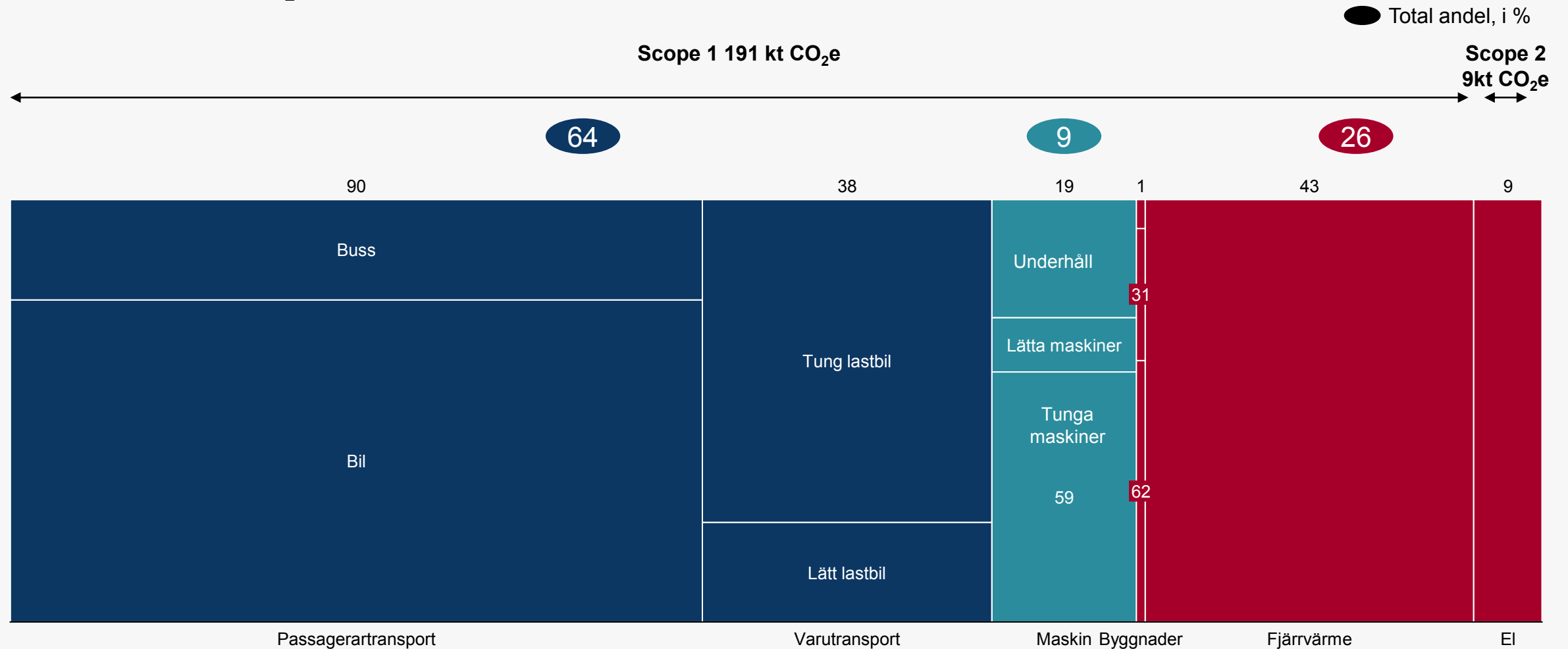
Utmaningar och nästa steg

Bilagor

- Terminologi
- Metodik
- CCS
- 2030 Scenario
- **Validering av resultat**
- Detaljerade antaganden

Umeås utsläpp uppgår till ~200 kt CO₂e, med passagerartransport som den största källan

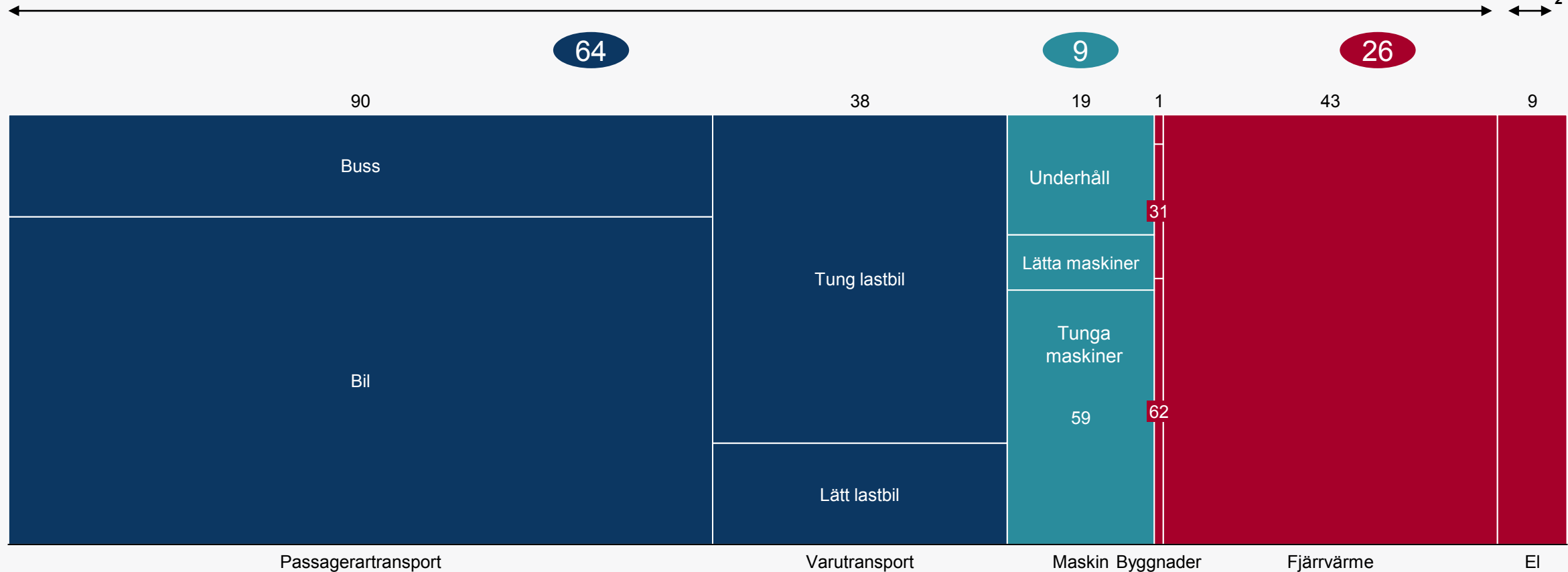
Utsläpp 2021, i kt CO₂e



● Total andel, i %

Scope 1 191 kt CO₂e

Scope 2
9kt CO₂e



Beräkning av utgångsläge - kommentarer



Umeås energikonsumtion beräknades 'bottom-up', baserat på angivna mängder m² byggnadsyta, fordonskilometer och maskinanvändning samt antaganden om andelar i olika energiklasser, energianvändning, motortekniker och bränsle. Simuleringen resulterade i energinivåer för värme och el som låg lägre (ungefär halva) de värden som uppmätts i Umeå,

Detta kan ha orsakats av:

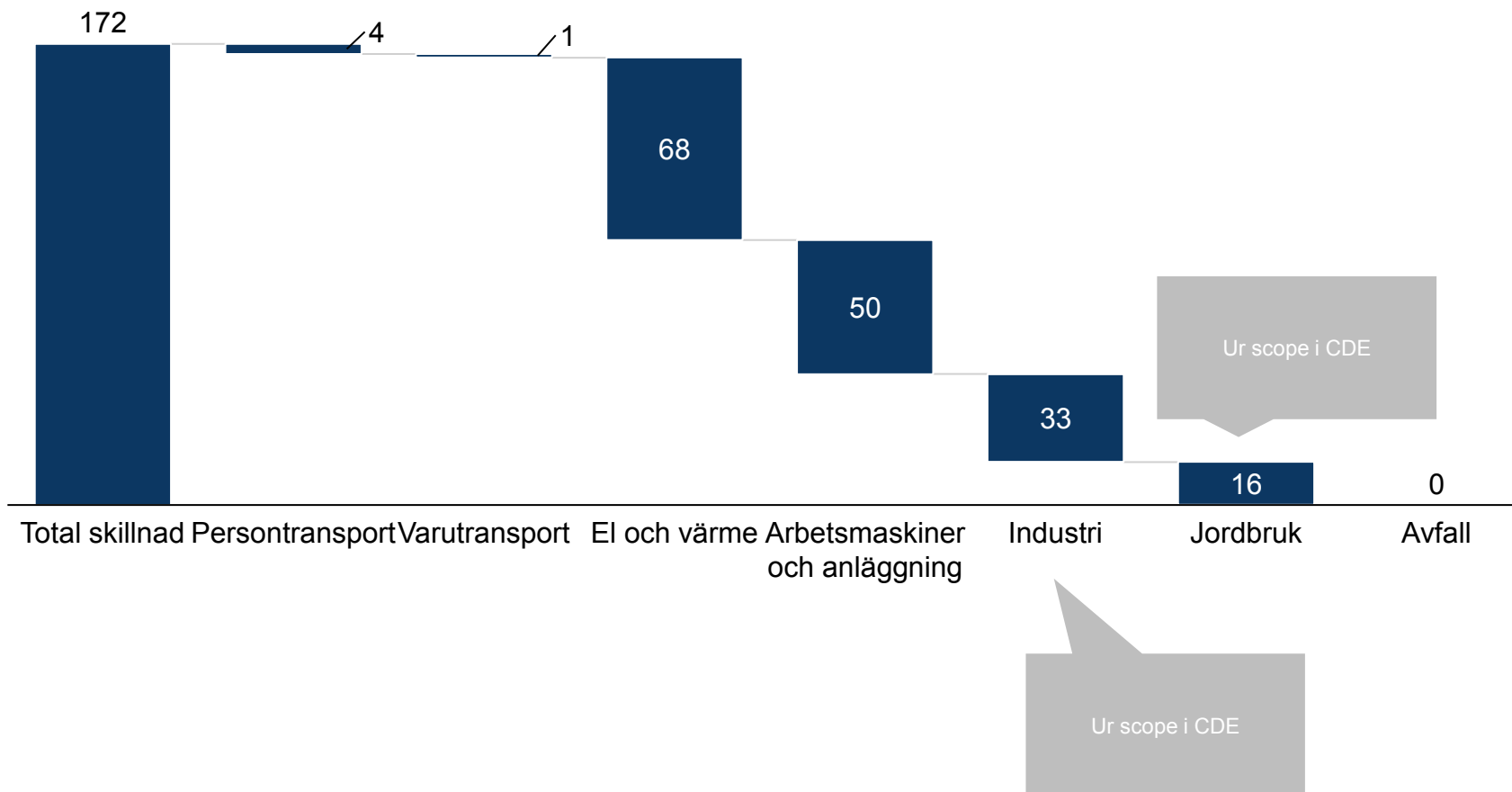
- För värme att isoleringsgraden är lägre än antagit, att antalet kvadratmeter är lägre än antagit, att annan mix av uppvärmningsteknik gäller, eller att värmekonsumtionen per m² är högre än schablonvärdet
- För el pss för el realterat till uppvärmning samt för hushållsel att konsumtionen är högre än schablonvärdet

Följande justeringar har gjorts i modelleringen;

Då värme och el är uppmätta värden har modellen kalibrerats mot dessa. För värme antas att antal m² är korrekt (angivet från Umeå), och att den högre konsumtionen är en blandning av högre konsumtion/m² (drivet av kallt klimat och låga elpriser), samt en högre andel låg isolering än antaget. I modelleringen har hela skillnaden ansatts till lägre isolering då detta kommer att visa 'extremvärdena' för lösningsutrymmet (tekniska investeringar vs beteendeförändringar). För el gäller samma antaganden, samt lägre effektivitet i 'appliances' (tex kylskåp, frysboxar, odyl)

Skillnad mellan CV och ME baseline per sektor

Skillnad i resultat mellan CV och ME modell (kt CO₂)



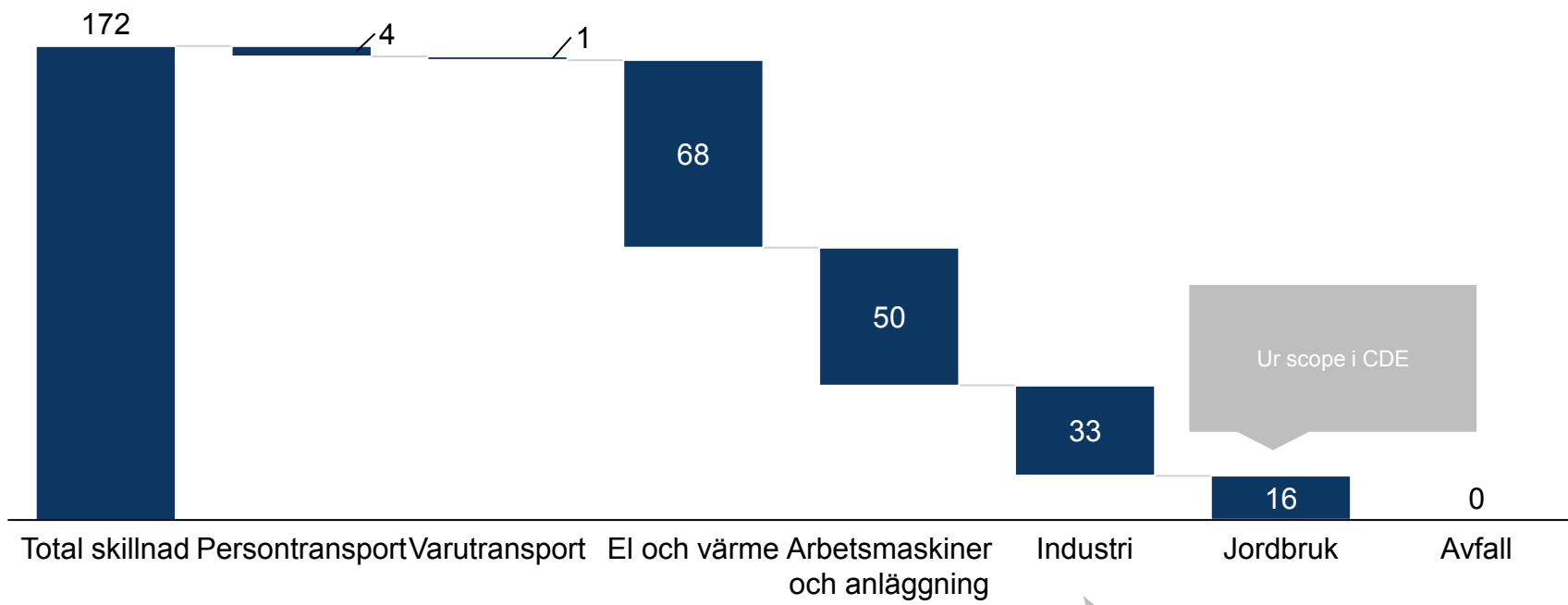
Bottom-up-beräkningar i CDE resulterar i jämförbara siffror för transportsektorn

Industri i och jordbruk är inte inkluderade i CDE-modelleringen

Stora skillnader förekommer i energisektorn (el- och värme) och i 'Machinery'

För energisektorn syns även stora skillnader i bottom-up modelleringen jämfört med uppmätta värden i Umeå kommun. Modellen behöver kalibreras för att matcha uppmätta värden

Orsaker till skillnaderna kan ligga i högre värme och elkonsumtion per m² än schablon pga kallt klimat och låga sparincitament, att nätförluster inte beaktats samt olika emissionsfaktorer



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- Terminologi
- Metodik
- CCS
- 2030 Scenario
- Validering av resultat
- **Detaljerade antaganden**

Översikt över modellerade omställningar*

	Sektor	Omställning	Beskrivning	Förändringens omfattning	Ambitiöst scenario Måldatum	Mycket ambitiöst scenario Måldatum
TRANSPORT	Passagerarresor	1. Mindre resande	Arbeta hemifrån, lokalsamhället får större vikt	30% färre resor	2040	2030
		2. Nyttjandegrad	Högre utnyttjande av bilar, tex via bilpooler	15% ökning av genomsnittligt passagerant per bil	2040	2030
		3. Trafikomställning	Övergång från bil till kollektivtrafik, cykel eller gång	Skifte från bil från 41 till 25% och icke-motoriserad upp till 25% för lokal trafik (se detaljer på nästa sida)	2040	2030
		4. Elektrifiering	(Acceleration av) övergång till elbilar	50% och 5% för lokal resp. genomfartstrafik med buss och 78% ¹ (bilar)	2040	2030
		5. Biobränsle	Ökat biobränsleinhåll i diesel och bensin	Ingen ökning utöver reglerad inblandning ²	2040	2030
TRANSPORT	Gods-transporter	6. Mindre trspt	Kortare avstånd till följd av t.ex. centralpunktsleverans	30% färre resor	2040	2030
		7. Nyttjandegrad	Högre utnyttjande, tex smart fordonsplanering och samarbete	+10% av genomsnittlig last för tunga, +100% för lätta	2040	2030
		8. Elektrifiering	(Acceleration av) elektrifiering av lastbilsflottan	46% (tung lastbilar) och 68% (lätta lastbilar) och 8% vätedrivna lastbilar	2040	2030
		9. Biobränsle	Ökat biobränsleinhåll i diesel och bensin	Ingen ökning utöver reglerad inblandning ²	2040	2030
BYGGNADER	Maskiner	10. Elektrifiering	Övergång till elektriska maskiner	100% elektriska maskiner	2040	2030
		11. Biobränsle	Öka biobränsleinhållet i diesel	Ingen ökning utöver reglerad inblandning ²	2040	2030
	Byggnader	12. Renovering	Uppgradering av byggnader för bättre isolering/effektivitet	5% renoveringstakt per år ⁴	2040	2030
13. Värmekälla		Övergång till biobränsle, bergvärme/värmepumpar etc	Ökning av fjärrvärme och övergång till värmepumpar ³	2040	2030	
ENERGI	Energi	14. Innehåll i avfall	Lägre fossilinnehåll i avfall för energiåtervinning	25% minskning av plastinnehållet	2040	2030
		15. Elmix	Förnybar el	100% förnybar el genom köpta certifikat	2040	2030

1. Inklusive elfordon, bränslecellsfordon och plug-in-hybrider

2. Från 2023 till 2027: 6% för både diesel och bensin enl. Reviderad reduktionsplikt; 2030 och framåt 14% för diesel och bensin enligt EU-krav. Interpolerade värden 2028-29

3. Ex: 87%, 85% och 55% fjärrvärme i kommersiella respektive publika byggnader och bostäder. 8% och 26% värmepump i publika byggnader respektive bostäder

4. Mycket hög renoveringstakt jämfört med standard driver höga kostnader. Kan behöva anpassas till att endast gälla vissa isoleringsklasser eller hus av viss ålder

*Omställningar avser nödvändiga förändringar i de olika sektorerna för att nå utsläppsminskningarna. Dessa kan åstadkommas med hjälp av olika initiativ och insatser

Not: Alla nya fordon helt elektriska, antagande XX kommun kan kräva endast elfordon, 80% elbilar skulle kräva pensionering av fossila bilar. Genomsnittlig renoveringscykel 20 år

Antaganden för utgångsläge och BAU

Datagrupp	Antaganden
Electricitet	<ul style="list-style-type: none"> 1,6m MWh, räknar användning (inte produktion) och antar 100% grid mix Antar 100% låg effektivitet för hushållselektronik
Värme	<ul style="list-style-type: none"> Matchar modellen till given produktion av fjärrvärme (0,9 miljoner MWh exl. industri). Se antagnade kring uppvärmning för olika byggnadstyper i s. 77
Befolkningsökning	<ul style="list-style-type: none"> Använder Umeås egna prognos, +1300 personer per år
Byggnader	<ul style="list-style-type: none"> 1,9m kvm flerfamilj, 3m kvm familj, 1m kvm publik, 0,5m kvm kommersiella. Uppdaterat antagande ~20% med ~80% med dålig isolering för alla byggnadstyper för att kalibrera modellen
Avfall	<ul style="list-style-type: none"> 60k ton kommunalt avfall, definierar organic waste som nedbrytbart avfall och plast i en egen kategori
Indata baserad på referens	<p>Använder data från andra städer (främst Malmö) och skalar med befolkning, gäller följande datakategorier:</p> <ul style="list-style-type: none"> Passagerartransport, 1,3 miljarder pkm och 90% lokal trafik baserat på data från google insights. Antagande på 1,2 pkm/vkm för bilar samt 144 för tåg baserat på Malmö. 15 pkm/vkm för bussar top dow estimat Varutransport, antar 20% genomfartstrafik, med 99% tunga och 1% lätta lastbilar (andel av ton-km) Maskiner, skalad data från Malmö med antagande att byggmaskiner drivs till 76% på fossila bränslen och 24% på HVO. Ökade tunga maskiner med 15% för att ta hänsyn till snöröjning

Övrigt

- Använder EEA grid mix data för Sverige (9 g CO₂/kWh 2021) och bortser från att nätet blir grönare över tid, se fördjupning på s. 79
- Använder växlingskurs EUR till SEK på 10.1465 från EUs centralbank (genomsnitt för perioden januari till december 2021)

Input-datablad med mer detaljer

- Detaljerad dokumentation finns i excel-filen *"Input_datasheet_Umea_final_with_comments"*

	Units	2021 Used in model	Comment on change	Comment
Transport - passenger and freight				
Passenger transportation				
Demand for passenger transportation	passenger km	1,310,164,205	1,310,164,205	From google insights data for Umeå, inb
Local traffic	%	90%	90%	
Throughfare traffic	%	10%	10%	
Local traffic	Local traffic	1,179,147,784	1,179,147,784	From google insights data for Umeå
Modal mix				
Passenger cars	%	41%	41%	From google insights data for Umeå
Buses	%	30%	30%	Idem
Train	%	14%	14%	Idem
Non-motorized	%	15%	15%	Idem
Utilization per mode				
Passenger cars	pkm/vkm	1.2	1.2	Based om Malmö
Buses	pkm/vkm	15	15	Top down estimate:
Train	pkm/vkm	144	144	Based om Malmö
Non-motorized	pkm/vkm	1.0	1.0	Idem
Passenger cars				
Fossil	vehicle km	402,875,493	402,875,493	Same data and source as before - just added input
100% Biofuel	%	99%	99%	TRAFA 2021 data of registered vehicles
Petrol	o/w %		67%	Idem
Diesel	o/w %		33%	
100% biofuel	%		5%	
PHEV	%		3%	Idem
BEV	%		2%	Idem
Fossil	vehicle km	382,731,718	362,587,944	
100% Biofuel	vehicle km		20,143,775	
PHEV	vehicle km	12,086,265	12,086,265	
BEV	vehicle km	8,057,510	8,057,510	
Buses				
Fossil	vehicle km	23,582,956	23,582,956	TRAFA
100% Biofuel	%	54%	54%	All local buses are electric or HVO
PHEV	%	25%	25%	All local buses are electric or HVO
BEV	%	20%	20%	All local buses are electric or HVO
Fossil	vehicle km	12,734,796	12,734,796	
100% Biofuel	vehicle km	6,131,568	6,131,568	
BEV	vehicle km	4,716,591	4,716,591	

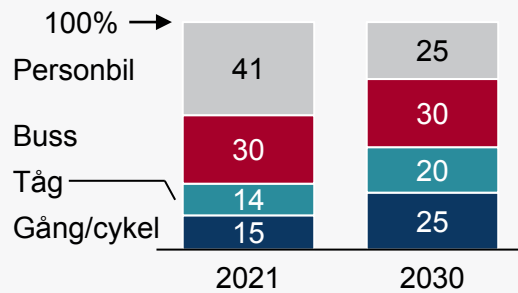
Antaganden för transport och uppvärmningsmix

Personkilometer per transportsätt

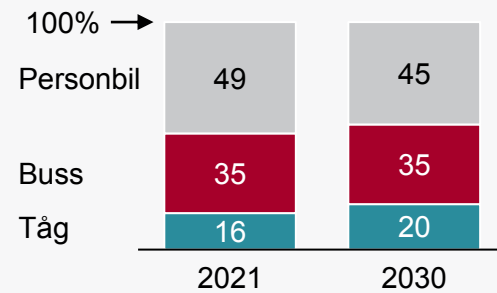
Transportmix för passagerartransporter

Per personkilometer

Lokal trafik



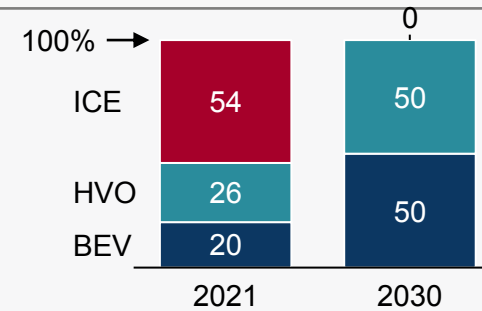
Genomfartstrafik



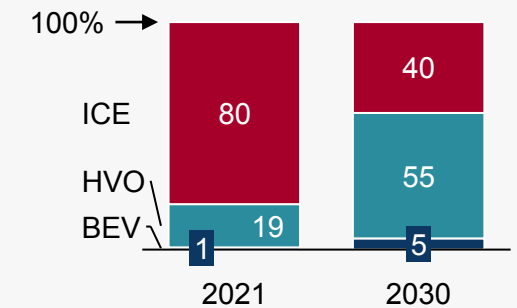
Bränslemix för bussar

Per personkilometer

Lokal trafik

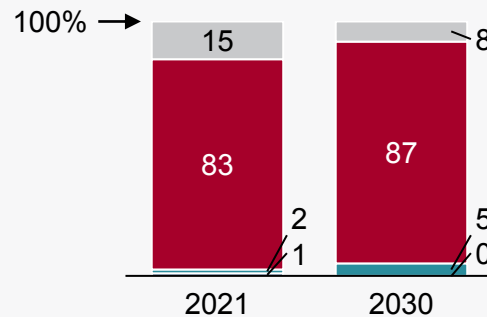


Genomfartstrafik

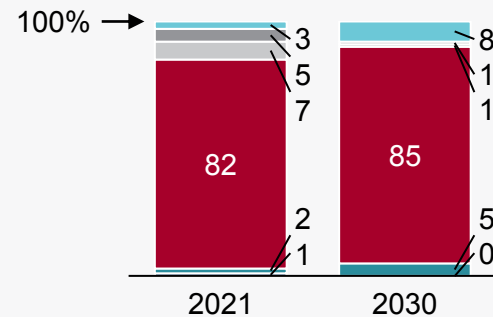


Uppvärmningsmix

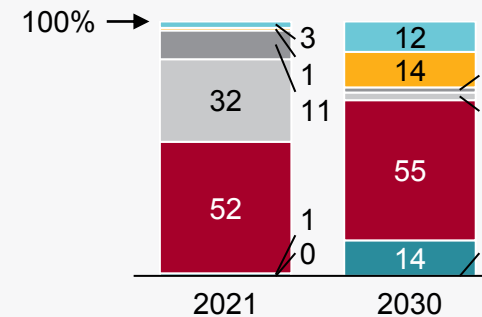
Kommersiella



Offentliga



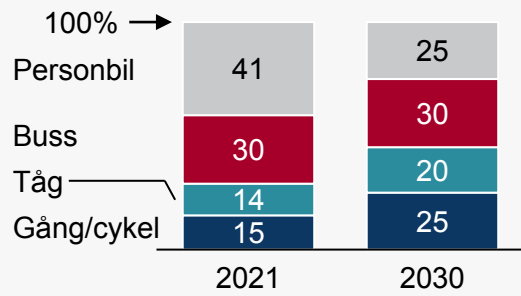
Bostäder



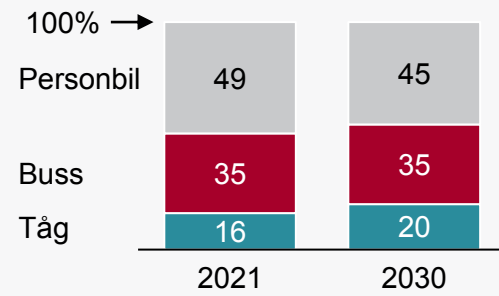
Referens: Amsterdam (2013), 23% bilar, 32% kollektivtrafik, 25% cykling, 20% promenader

Källa: Dutch Cycling Embassy/Cycling Cities

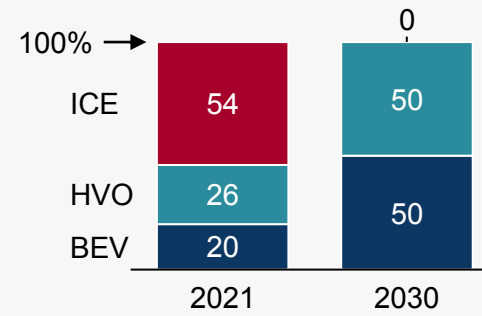
Lokal trafik



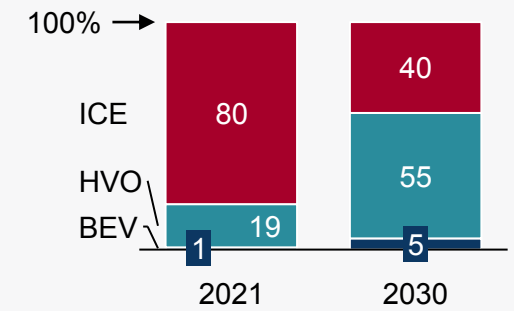
Genomfartstrafik



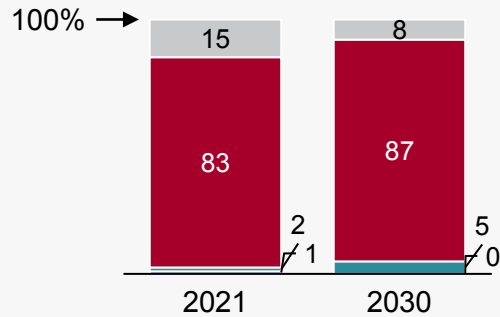
Lokal trafik



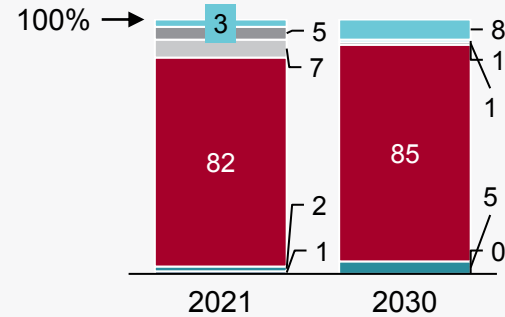
Genomfartstrafik



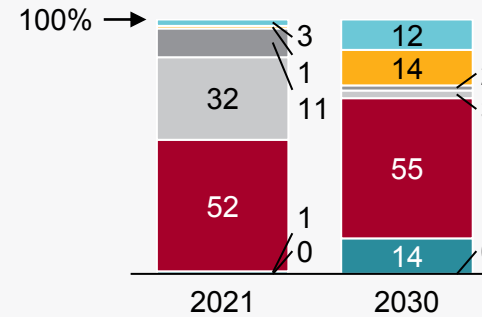
Kommersiella



Offentliga



Bostäder



Resonemang bakom: antaganden för transport och uppvärmningsmix

Transportmix för passagerartransporter

Per personkilometer

Lokal trafik:

- Personbil 41->25 = utmaning, men mindre förändring än referens (51->18)
 - Viss ökning av tåg baserat på Norrbottniabanan
 - Gå/cykla=utmaning (men ref 21-> 54%). Största förändringen behöver ske i Umeå stad
-

Genomfartstrafik:

- Vissa byter från bil till tåg med Norrbottniabanan
-

Bränslemix för bussar

Per personkilometer

Lokal trafik:

- Antar större inflytande över bussupphandling/förmåga att ställa krav på andel BEV och val av bränsle
-

Genomfartstrafik:

- Antar mindre inflytande och allmän trend mot el och HVO
-

Uppvärmningsmix

Antaganden

- Utfasning av olja
- Minskning av direkt eluppvärmning
- Viss ökning av fjärrvärmens pga förtätning av staden
- Preferens mot effektivare värmepumpar och bergvärme

Val av emissionsfaktor för el

Exempel på olika emissionsfaktorer för Sveriges elnät 2021

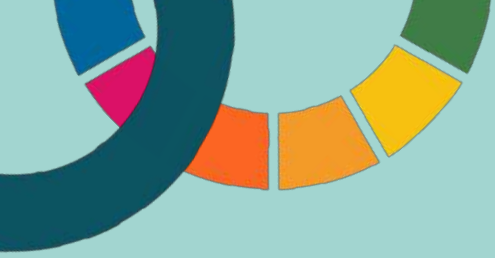
Källa	g/kWh
Climateview	30
European environment agency (EEA)	9
NowTricity databas ²	29
IVL (nordisk elmix)	90
Fortum	89

Det finns flera olika sätt att räkna emissionsfaktorn för el från elnätet. Faktorer som kan påverka är tex:

- El som produceras direkt till företag jämfört med att produceras till nätet
- El som exporteras och importeras
- Elcertifikat på grön el som minskar mängden förnybar el på nätet
- Om biogena utsläpp är inkluderade eller inte

I modellen valdes utsläppsfaktorn från EEA då den:

- 1) Använder en strikt definition och tillhörande beräkningsmetodik¹
- 2) Samma metodik som används för att certifiera el
- 3) Inte inkluderar biogena utsläpp



Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of
the City of Umeå

UMEÅ
KOMMUN



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1 Introduction

Introduction

The City of Umeå has a strong and long-term commitment to climate neutrality by 2030 with net zero GHG emissions. Through leveraging our extensive collaborations with the universities, research institute, private and public sector, civic society, and citizens in the city we are determined to make the transition a reality – by and for all. The main objective of this document is to clarify that Umeå with the City and all other stakeholders are fully committed to achieve the ambitious target of being climate neutral by 2030 as defined by the EU mission and therefore we joined the mission in order to improve and enhance the work needed to reach the goal – in line with that we now submit the first version of Umeå CCC – Climate City Contract.

Umeå – unruly and kind, informed, cultural, and outdoorsy¹,

Umeå is the largest city in northern Sweden, part of Sápmi and the Arctic. With continuous population growth since the 1960's, Umeå now has 133 000 inhabitants characterized by words as unruly and kind, and where almost 40 000 students and 14 000 companies make the city young and vibrant. In the knowledge city Umeå, excellence research and education are conducted at Swedish University of Agricultural Sciences and Umeå university – notably the place for the world's highest ranked education at Umeå Institute of Design².

Due to its closeness to sea, coastlines, forests, and mountains, Umeå is an outdoorsy and sporty city, where the snowy winters and sunny summers give opportunities for all kinds of activities. Umeå is known for being European capital of culture in 2014, for being situated in the region top ranked in the European Social Progress Index³ as well as being the municipality providing highest budget for culture per capita in Sweden.

Umeå Climate City Contract – by and for all in strong partnership

The City of Umeå has joined the EU mission and developed the first Umeå CCC in order to succeed becoming climate neutral in 2030 and lowering consumption-based climate emissions, partnering with all crucial actors at all governance levels, from local to international. In the process leading up to our first Umeå CCC, the most important milestone was our incorporation of the NetZeroCities NZC CTM Climate Transition Map method into existing transition work (read more in Umeå CCC Action plan, chapter 1 Introduction). The Umeå CTM has further systemized, broadened, and much improved our transition work. Notable examples from this process are the deepening of our climate investment plan including extensive work on investment financing, the development of strategic priorities and impact pathways and the more systemic descriptions of implemented and planned initiatives, partnerships, and actions.

The Umeå CTM is also systemizing the iterative process needed in order to continually enhancing and developing the work towards climate neutrality and transition in Umeå, where the continuous improvement and focusing of the Umeå CCC is crucial. This process has strong focus on deepening the work with impact pathways, including the roadmaps for each pathway, investment planning and financing, together with the local stakeholders in Umeå Climate Roadmap partnership and actors in other important partnerships, see more in chapter 4. The process also creates opportunities to further develop partnerships, e.g. with the NZC initiative Capital Hub, inviting more Umeå stakeholders into the process, with Mission cities in Sweden and Europe especially at the yearly gathering Swedish Mission Cities Summit – a City of Umeå initiative launching in May 2024.

Umeå Climate Roadmap⁴ is the adopted, existing overall framework for Umeå's climate transition towards climate neutrality in 2030, which includes the overall climate targets (see chapter 2 Goal), focus areas and prioritized climate challenges on which joint initiatives are based, further developed, and implemented. The Umeå CCC is completely lined with Umeå Climate Roadmap and vice versa, setting even more focused strategic priorities for reaching climate neutrality and a more

¹ [Welcome to Umeå - Umeå kommun \(umea.se\)](https://www.umea.se)

² [Umeå Institute of Design secures top spot on Red Dot Ranking \(umu.se\)](https://www.umu.se)

³ [Inforegio - European Social Progress Index \(europa.eu\)](https://www.europa.eu)

⁴ Umeå Climate Roadmap, [Umeå Climate Roadmap \(wrep.it\)](https://www.umea.se/klimatfardplan), <https://www.umea.se/klimatfardplan>



formal, closer partnership with the EU, giving local partners great opportunities to collaborate locally and with/in the EU within the Umeå CCC for succeeding to implement the most crucial actions, even more so in the following years.

Umeå's multi-level and multi-stakeholder governance, partnership, and mobilisation with private, public, and academic actors in Umeå as well as civic organisations and citizens, regional, national, and international partners, authorities and cities and the role they play in Umeå CCC and vice versa are described in Chapter 4 Process and principles.

Highlights and milestones in Umeå's climate transition

The continuous population growth is one of many key drivers of the emissions and energy use in Umeå. Since 1990 the population has increased with over 40 % and the emissions has fallen by approx. 27 %⁵ (2021). Policy and governance work is the basis for Umeå's successful climate transition, where important milestones are:

- The City Council adopted updated climate goals, February 2020, see chapter 2 Goals.
- The City Council adopted climate and environmental action plan for the municipal group, November 2022⁶: prioritized measures to reduce climate emissions etc., revision of plan in 2025 to further intensify the work needed from the municipality and municipal companies.
- The City Council adopted climate neutrality as a municipal overall goal and connected steering mechanisms to achieve the goal, see chapter 4 Process and principles.
- Umeå climate roadmap: framework developed by the city in 2021, adopted by the municipality and 36 other partners 2022, now a total of 55 signatories in a strong partnership, see chapter 4 Process and principles.
- Yearly signed Swedish Climate City Contract 2030⁷ with national authorities, starting in 2020: the Swedish CCC 2030 is lined with the EU CCC with clear commitments between Umeå and the national level.

Energy use and production

The most energy used in Umeå is in the building sector followed by the transport sector. However, the most CO₂-emissions occur in the transport sector due to highly developed energy production system with very low carbon emissions.

Umeå has invested strategically in infrastructure in DH district heating since the 1960s and today 80% of the buildings in Umeå are connected. In 2010 a new CHP central heating plant was opened using biofuels such as logging residues, wood chips, bark, sawdust, and peat. The facility dramatically reduced the amount of oil in the fuel mix down to 1%. The plant also improves the environmental performance as well as security of supply in the overall DH-heat production.

The unique sustainable energy system of Umeå is a prerequisite for the transition, continuing to be an important generator of progress towards climate neutrality. Umeå is a net exporter of renewable electricity, with an annual production of approx. 2300GWh, far exceeding the 1500GWh electricity used locally. Electricity production in Umeå comes mainly from hydropower (Sweden's largest, 25% city-owned), complemented by a dramatic expansion of CHP, wind power, and photo-voltaics in recent years.

Comprehensive planning and social sustainability

In Sweden, municipalities are solely responsible for spatial planning and in Umeå the overarching strategies for the municipality's planning including buildings, infrastructure, green areas etc. are specified in the comprehensive plan⁸. This in turn constitutes an integrated strategy where climate

⁵ <https://nationellaemissionsdatabasen.smhi.se/>

⁶ Climate and environmental action plan for the municipal group [Åtgärdsprogram för Umeå kommuns miljömål 2022-2025 \(umea.se\)](#)

⁷ Umeå Climate City Contract 2030 [Klimatkontrakt 2030 \(umea.se\)](#), [Climate City Contract 2030 | Viable Cities](#)

⁸ Umeå municipality comprehensive plan, <https://www.umea.se/byggaboochmiljo/oversiktsplanochdetaljplaner/oversiktsplan.4.88db09b1724ee319ca392.html>, [Comprehensive Plan for Umeå Municipality.pdf \(umea.se\)](#)



adaptation, climate mitigation, and social sustainability create and enable a holistic urban planning for all Umeå, concretized in more detailed plans and projects.

Umeå municipality plans for a city that holds together, with a proximity principle that provides conditions for service, sustainable travel, and high comfort. By actively working with mixed housing types and forms of tenure, conditions for social sustainability are created. New city districts are planned to enable a sustainable lifestyle, and existing city districts are supplemented with new functions and services. It is in the city districts that planning, strategies, and objectives are specified in the form of, for example, technical solutions and social innovations, but forming investment plans and business models are conducted for the city as a whole. An example is the Horizon 2020 smart city project Ruggedised⁹, where Umeå as a lighthouse city e.g. developed business models to share energy between stakeholders and use geothermal storage – lessons learned for the whole city.

The system perspective lays the foundation for collaboration, where solutions for resource efficiency, energy supply, sustainable mobility, reuse, digitalization, and social sustainability are to be woven together. Umeå's work with social and (notably also) cultural sustainability is central to achieving sustainable growth and the climate goals, e.g. further explored in the URBACT project Gendered Landscape¹⁰ with 7 cities, led by Umeå. As the city grows, it is important to continuously take advantage of qualities and safeguard the importance of local identity and social capital. Here, Umeå Municipality has carried out a unique survey through extensive district dialogues that have provided a broad knowledge base to continue improving the districts based on residents' needs¹¹.

Transportation and mobility

Major actions and investments are needed to tackle Umeå's largest climate challenge, reducing emission from the transport sector. One notable investment is fully electric busses for local public transport, by which now over 75 % of the trips are done, further developing the possibility for sustainable travels. Another is the joint investment for the new ferry Aurora Botnia between Umeå and Umeå's closest city the Finnish Vasa connecting two cities and countries – a long-term joint work¹² led by the EGTC Kvarken Council¹³ developing the TEN-T Trans-European Transport Network¹⁴. Amongst the many initiatives addressing sustainable mobility are the aviation projects FFFly¹⁵ and FlyH2UME¹⁶, Equal and sustainable work commuting¹⁷, Car-free families¹⁸ and GoGreenRoutes¹⁹.

Thus, Umeå has a good starting point, with low CO₂-emissions, renewable electricity, and a strong commitment for collaboration towards climate neutrality, demonstrated in the adopted Umeå Climate Roadmap, Swedish Climate City Contract 2030 and thematic cooperations as the Clydebank Declaration for green shipping corridors²⁰.

Leader in CBE and circular economy – focus on all actors' behavioural changes

The city of Umeå is a pioneer²¹ in working with reducing CBE consumption-based climate emissions. In 2018 Umeå conducted as the first Swedish municipality together with SEI Stockholm environmental institute a survey for getting insights in the CBE of Umeå households (key CBE

⁹ Ruggedised <https://ruggedised.eu/legacy/>

¹⁰ Gendered landscape: project, methods [Smarta städer, innovation och jämställdhet - Umeå kommun \(umea.se\)](https://www.umea.se/stadsdelsdialog)

¹¹ City districts dialogue <https://www.umea.se/stadsdelsdialog>

¹² The work leading up to the investment Aurora Botnia <https://www.kvarken.org/en/project/aurora-botnia/>

¹³ The EGTC Kvarken Council <https://www.kvarken.org/en/egtc/>

¹⁴ [Trans-European Transport Network \(TEN-T\) - European Commission \(europa.eu\)](https://www.european-council.europa.eu/media/e300042c-1d7d-4781-9907-8161e466763d/asset/document/162526/162526_en.pdf)

¹⁵ FFFly Fossil fuel free flights [Fossilfritt flyg i norra Sverige - Umeå kommun \(umea.se\)](https://www.umea.se/fffly)

¹⁶ FlyH2UME [Sökresultat \(energimyndigheten.se\)](https://www.energimyndigheten.se/sokresultat)

¹⁷ [Innovation for equal and sustainable work commuting | RISE](https://www.ri.se/innovation-for-equal-and-sustainable-work-commuting)

¹⁸ [Bilfritt resande - Umeå kommun \(umea.se\)](https://www.umea.se/bilfritt-resande)

¹⁹ [GGR | Umeå \(gogreenroutes.eu\)](https://www.gogreenroutes.eu)

²⁰ Cooperation based on Clydebank Declaration for green shipping corridors [Umeå–Vasa blir grön sjöfartskorridor - Umeå kommun \(umea.se\)](https://www.umea.se/umea-vasa-blir-gron-sjofartskorridor)

²¹ Consumption and climate [Konsumtionsvanor - Umeå kommun \(umea.se\)](https://www.umea.se/konsumtionsvanor)



areas: travels, food, energy for housing and clothes, electronics, and furniture). This led to further collaboration with SEI supporting development of the tool Consumption compass²².

A strong focus of the Umeå CBE-work is on circular economy. Already in the Strategic Plan 2016-2028²³ for the City of Umeå, the objective was set for Umeå to become a leader in the circular economy. This ambition has been further explored in Umeå's participation in the OECD Programme on the Circular Economy in Cities and Regions, where Umeå as the only Nordic example took part in 2019-2020 and a comprehensive report²⁴ resulted in 18 recommendations for next steps. Aligned with this objective, in 2020 Umeå became member in the world's leading circular economy network Ellen MacArthur Foundation²⁵ and Umeå also signed the European Circular Cities Declaration²⁶ to determine the long-term commitment to creating a resource effective, circular, and socially responsible society.

Multiple concrete actions and projects has been conducted for reducing CBE, some examples:

- The projects Koldioxidnäla platsen (the Low-carbon place) 1 and 2²⁷, focusing on developing knowledge and methods for Umeå's companies and citizens to make sustainable choices and reduce their climate impact.
- Ongoing process of establishment of marketplace for second hand construction materials in operation, together with local stakeholders within the building sector²⁸
- Sharing City Umeå²⁹: establish testbeds for developing, testing, and evaluating sharing services and digital solutions, e.g. Cykelstället and U-bike³⁰, digital sharing solutions as the Smart Map³¹.
- Long-term establishment of Fritidsbanken (Leisure bank) Umeå, a public library for sports-equipment, toys, and leisure items
- Re-Umeå³², Revolt: multi-actor initiative and project, e.g. in shopping mall for more recycling and reuse, testing digital sharing solutions.
- Circular Västerbotten (the county where Umeå is situated)³³: cross-sector, regional collaborative project in circular economy.
- School food for change³⁴, Horizon 2020 project: developing sustainable and innovative food procurement, more sustainable school meals by empowering school cooks etc.

2 Goal: Climate neutrality by 2030

Goal

Climate change is among the most critical challenges of our time, not least in Umeå, with Northern Sweden predicted to see higher than average warming and climate impacts. This requires ambitious action, and at the local level, all who live and work in Umeå have an important role to play in reducing our climate emissions. Transportation and energy use related emissions as well as

²² The SEI consumption compass <https://www.sei.org/features/consumption-compass-impact-households/>

²³ [Strategisk plan, Umeå kommun, 2016–2028 \(formgiven version\).pdf \(umea.se\)](#)

²⁴ The Circular Economy in Umeå, Sweden, report by OECD <https://www.oecd-ilibrary.org/sites/4ec5dbcd-en/index.html?itemId=/content/publication/4ec5dbcd-en>

²⁵ The Ellen MacArthur Foundation <https://www.ellenmacarthurfoundation.org/city-of-umea>

²⁶ The European Circular Cities Declaration <https://circularcitiesdeclaration.eu/cities/umeaa>

²⁷ Koldioxidnäla platsen 1 och 2 [Koldioxidnäla platsen - Umeå kommun \(umea.se\)](#)

²⁸ On-going process of establishing second hand marketplace for construction materials https://www.linkedin.com/posts/liv-%C3%B6berg-74bb91b_aevterbruk-byggaevterbruk-cirkuleramera-activity-7156604885566685185-fPE2?utm_source=share&utm_medium=member_desktop

²⁹ Sharing City Umeå www.umea.se/sharingcity

³⁰ Cykelstället and U-bike www.umea.se/cykelstallet

³¹ [Start - Smarta Kartan | Global](#)

³² Re-Umeå, Revolt [Återbruk och cirkulär ekonomi i fokus för galleria i Umeå - Coompanion, RE Start Umeå / Revolt - Coompanion](#)

³³ Circular Västerbotten [Cirkulära Västerbotten - Coompanion](#)

³⁴ School food for change [SchoolFood4Change - Umeå kommun \(umea.se\)](#), <https://schoolfood4change.eu/>



consumption-based emissions in Umeå have particularly high potential for reduction and as such are important focus areas, see more in Umeå Climate Roadmap³⁵.

Clear and ambitious climate targets

In order to realize Umeå's fair share of the Paris Agreement, enable sustainable growth, and ensure a good life for all within planetary boundaries, the Umeå City Council in February 2020 adopted following targets³⁶:

- A climate neutral city by 2030, and a climate neutral municipality as a whole by 2040, i.e. have net zero emissions of greenhouse gases.
- Climate neutral municipal operations (including publicly owned companies) by 2025, i.e. have net zero emissions of greenhouse gases.
- A reduction of Umeå's consumption-based climate emissions to 2 tonnes of CO2 equivalent per person by 2040 and 1 tonne by 2050.
- Significant reductions of transportation related emissions in Umeå, to be achieved by:
 - Increasing the proportion of trips made by public transport, bicycle or on foot within Umeå's urban area to at least 65 percent to 2025
 - Transitioning Umeå's transport sector to only use fossil free fuels by 2030.

As the city is both responsible for the largest share of greenhouse gas emissions and has a greater range of opportunities for achieving emissions reductions, the climate goals place greater responsibility on the city to lead in the transition to climate neutrality by 2030. The remainder of the municipality then follows, mostly rural areas, achieving climate neutrality by 2040. Though, actions and investments will be implemented in city and rural areas at the same time in order to make the most efficient climate transition. The target covers in practice the entire administrative boundary, however since that the city will take the lead in the transition towards climate neutrality the target is based on the population within the city of Umeå. That is almost 70 % of the total administrative boundary population. This means that approx. 70 % the emissions occurring within the administrative boundary are in the scope for this CCC, see action plan section A for more details on the system boundary.

To achieve the climate neutrality targets, the GHG emissions in practice need to be cut by 85 % (base year set to 1990) and the remaining 15 % to be handled with complementary actions as carbon sinks. Comparing the city of Umeå climate neutrality target of 85 % reduction to the CCC baseline 2021 are almost in line with the mission climate neutrality definition. There is a minor difference of 9 % meaning that 71 % compared to the mission requirements of at least 80 % of the 2021 baseline are going to be reduced by 2030.

In addition to adopted targets, the City Council also decided that the rate of reduction shall take place in such a way that the municipality's emission allowance / climate budget is not exceeded. The emission allowance is based on the Paris Agreement and calculated on the basis of the best available research.

Within the scope of Umeå CCC, there are facilities included in the EU-ETS and those are also included in the city targets. The main reason for this is that one facility producing heat and power is owned by the city (the municipal company Umeå Energi) and one is producing paper and pulp, where the owner SCA is a part of Umeå Climate Roadmap initiative, see action plan section A1.4 for more information.

Climate transition drives a continuous good life in a future Umeå

The climate transition offers many co-benefits or added values which will develop Umeå into a great city to live and work in also in the future. The City of Umeå has conducted a comprehensive socio-economic analysis based on an a very ambitious transition scenario which shows that the transition

³⁵ [Umeå Climate Roadmap \(wrep.it\)](https://wrep.it)

³⁶ Climate and environmental goals for Umeå [Miljömål - Umeå kommun \(umea.se\)](https://www.umea.se/miljomal)



is socio-economically profitable³⁷, thus, the city of Umeå aims to simultaneously improve social, economic, and ecological values in the transition towards climate neutrality, to implement a just transition. Examples of added values the City of Umeå strives to improve are air quality and health, job creation and turning the climate transition into business opportunities for local businesses. More co-benefits of the transitions are described in the impact pathways in Umeå CCC Action Plan and attachment Impact pathways B-1.1.

3 Strategic priorities

Strategic priorities

As a long-term achiever within climate mitigation, the City of Umeå has already undertaken extensive work to reduce GHG-emissions, the main reductions in the heating and energy sector. However, largescale challenges remain to reduce emissions especially in the transport sector, Umeå's top climate challenge and main priority for implementing actions. Complementary transitions needed are continuous decarbonization of the local energy system by reducing the fossil content in the waste used for energy recovery as well as managing residual climate emissions.

The City of Umeå acknowledges the need to act simultaneously on consumption-based climate emissions to realize Umeå's fair share of the Paris Agreement, formally reflected in the City Council adopted goal for lowering consumption-based climate emissions. More technical solutions combined with actions targeting and changing non-sustainable consumption and behaviours are therefore essential within all strategic priorities.

We also acknowledge the need of true partnerships and just transition in order to accelerate and upscale reducing GHG emissions: cooperation with stakeholders at all levels in the local climate contract partnership Umeå Climate Roadmap as well as strategic and concrete initiatives and projects as Umecom together with citizens and civic society. The transition needs to be tackled in a holistic way where social and economic sustainability is a key for transition Umeå into a climate neutral city.

The strategic priorities below are the systemic transitions needed for reaching a climate neutral Umeå in 2030 as well as reducing consumption-based climate emissions. They are the transitions with most potential in reducing GHG-emission and are aligned with focus areas and climate challenges in Umeå Climate Roadmap and the findings in the Material economics report on investments for climate neutrality (attachment). The strategic priorities are realized in different impact pathways (see Umeå CCC Action plan and attachment Impact pathways B-1.1) and elaborated in the CCC action and investment plan with timelines, indicators, and relevant levers of change.

Strategic systemic priority 1. FOSSIL FUEL FREE TRANSPORTS AND SMART MOBILITY

GHG-emissions from transports are Umeå's by far largest climate challenge, which is reflected in the City Council adopted transport related goals: increasing sustainable mobility in the city to at least 65 percent to 2025 and transitioning Umeå's transport sector to only use fossil free fuels by 2030. To reach these goals the City works within the transition areas a) a substantial shift from car to walking, biking and public transport, b) electrification of the vehicle fleet and c) reducing the need for travel – these transitions simultaneously creating a healthier, more inclusive, and accessible, sustainable Umeå.

Making the transitions happen requires combined behavioural and technical actions and solutions, where actions include extensive expansion of bike lanes and public transports, enhancing possibilities and solid infrastructure for electrical vehicles including construction machines and

³⁷ Attachment "Material economics report on investments for climate neutrality"



heavy trucks³⁸ and both development of new and re-development of existing city areas to promote smart, sustainable mobility. A key to success is continuous interconnection of actions for more sustainable mobility with actions for gender equality (women travel more sustainable than men in Umeå) and social sustainability and innovation.

Critical stakeholders and their role within this strategic priority are the national government and authorities (policies towards e.g. increased blending of biofuel and development of train transports), private, academic, and public partners in Umeå – specifically signatories to Umeå Climate Roadmap (more sustainable transports of goods and people = employees and customers) as well as civic organisations and citizens (changing from fossil fuel cars to electrical vehicles, public transport and active mobility).

Strategic systemic priority 2. CIRCULAR SYSTEMS AND RESOURCE FLOWS

Aligned with Umeå's strong commitment to become a leader in the circular economy and creating a resource effective, circular, and socially responsible society (see more in chapter 1 Introduction), creating circular systems and resource flows is a key area in the City of Umeå's sustainability work and essential in reducing climate emissions, both from a terrestrial and a consumption-based perspective on emissions.

One transition needed is even further decarbonization of the local energy system by reducing the fossil plastic content in the waste used for energy recovery. Actions needed for this transition address a range of areas, whereas the already planned municipal installation of a waste sorting facility is an important technical solution in a near future, where plastic waste can be sorted out for further recycling and reuse. Though, to avoid plastics to end up as waste and instead make it a resource, the circular systems and models need to be applied to a range of areas as increased sorting of plastic packaging, making plastic a resource instead of waste, procurement initiatives for changing fossil plastic articles to non-fossil plastic etc. The City of Umeå has already conducted a plastic flow analysis for Umeå and within the Umeå Climate Roadmap plastic and circularity is a key priority amongst signatories.

Another important transition is increased use of materials with low climate impact in the construction sector. In Umeå as a city with continuous growth since the 60's, reducing emissions from construction of housing and infrastructure is an important priority. Work has already been done, for example within the Network for sustainable building in cold climate, started in 2008 and this year the City of Umeå establish of marketplace for second hand construction materials in operation, together with local stakeholders within the building sector.

In order to even further push resource efficiency and become a circular city, there is need for extensive cooperation and systemic work. Here the City of Umeå's initiative Umeå Eco Industrial Park³⁹ is crucial: the establishment of a world-leading centre for green innovation within environmental tech, recycling, and energy with a range of stakeholders.

The City of Umeå will also continue the work started with the project Sharing cities, where the municipal initiatives as Fritidsbanken (sharing outdoor equipment for free) and the Horizon project School Food for Change (e.g. regarding food waste) are some examples. A newly started project Circular Västerbotten based on the work Re-Umeå, Revolt etc. will continue explore and implement actions to promote circular resource flows for SMEs, municipalities, and citizens.

Critical stakeholders and their role within this strategic priority are private, academic, and public partners in Umeå (specifically signatories to Umeå Climate Roadmap) to systemically rethink use of plastics and promote circularity of construction materials and other resources. Civic organisations and citizens are important in succeeding in sharing and circularity initiatives as well as reducing plastics in waste.

³⁸ First public charging station for heavy trucks https://www.mynewsdesk.com/se/umea_energi/pressreleases/nu-aer-umeaas-foersta-publika-laddstation-foer-tunga-fordon-invigd-3292392

³⁹ Umeå Eco Industrial Park, <https://inab.umea.se/vad-vi-gor/projekt/umea-eco-industrial-park>



Strategic systemic priority 3. MANAGE RESIDUAL EMISSIONS

In 2024-2026 a highly prioritized task for the City of Umeå is to work extensively to make the plan for managing residual emissions after 2030. Umeå is presently exploring different options, not least learning from leading actors as Stockholm and Copenhagen and looking into both biological and technological solutions.

The City of Umeå right now explore the potential to capture and utilize biogenic CO2 and produce e.g. biofuels. Here the most notable example is the newly started cooperation between the municipal energy company Umeå Energi and the company Liquid wind⁴⁰. There are two major point emitters in Umeå that have theoretical potential of adopting either CCU or CCS solutions to remove carbon, potentially making Umeå a CO2 negative city.

The City of Umeå will also deepen the cooperation with the local universities to explore the local potential of nature-based solutions as mentioned in the IPCC report 2023⁴¹ (p. 21).

Critical stakeholders and their role within this strategic priority are private, academic, and public partners in Umeå (specifically signatories to Umeå Climate Roadmap and the EU-ETS sites mentioned in chapter 2 Goal).

4 Process and principles

Process and principles

In Umeå we have incorporated NetZeroCities CTM Climate Transition Map into our climate transition work, creating an UCTM Umeå Climate Transition Map, and by doing so, even further systemizing, broadening, and much improving our climate transition work towards climate neutrality 2030 and reducing CBE.

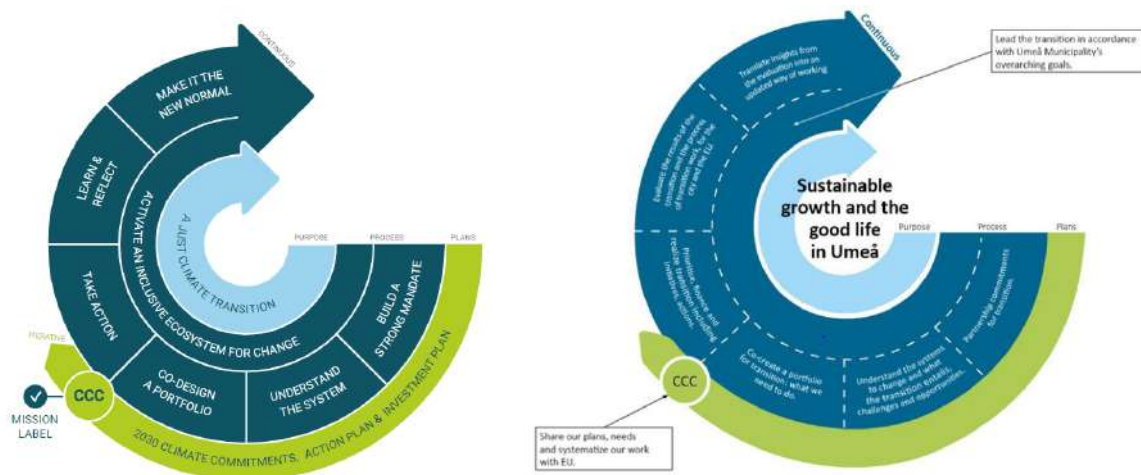


Figure 1 NetZeroCities CTM



UCTM

This systemic work process is described thoroughly in the Action Plan of Umeå CCC. This chapter focuses instead primarily on describing and detailing different important aspects and principles of

⁴⁰ Cooperation between Umeå Energi and Liquid wind [Koldioxid från Dåva kraftvärmeverk kan bli till grönt sjöfartsbränsle i ny metanolfabrik | Umeå Energi \(mynewsdesk.com\)](https://www.liquidwind.se/news/liquidwind-plans-for-third-electrofuel-facility-in-swedish-umea), <https://www.liquidwind.se/news/liquidwind-plans-for-third-electrofuel-facility-in-swedish-umea>

⁴¹ CLIMATE CHANGE 2023 Synthesis Report https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf



the process connected to different CTM parts as governance and steering, monitoring, and updating, joint learning and co-creation.

All reference to stakeholders relate to figure 2 below – a summary of Umeå’s multi-level and multi-stakeholder governance, partnership, and mobilisation for a climate neutral Umeå 2030 and lowering of CBE with local actors in Umeå; private, public, academic, civic organisations and citizens, as well as with regional, national and international partners, cities and authorities.

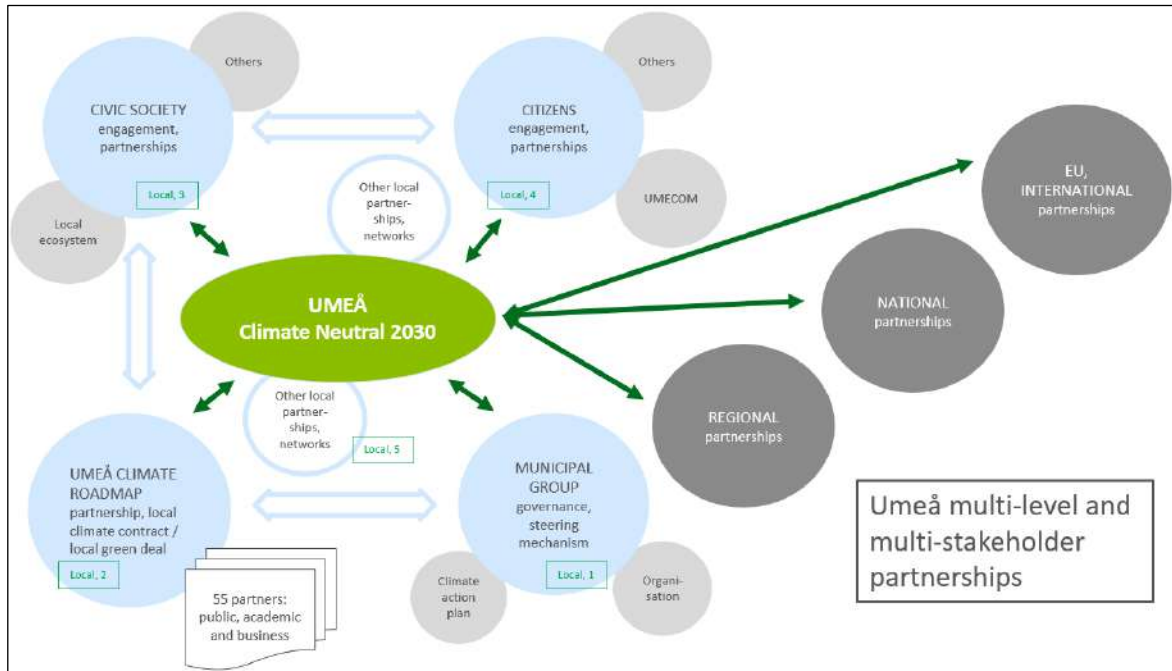


Figure 2 summary of Umeå’s multi-level and multi-stakeholder governance, partnership, and mobilisation

Climate mitigation at the core of city budget and local, city-wide governance

For Umeå to reach the goals of being climate neutral in 2030, large-scale changes need to occur in a short time using all and developing more of Umeå’s transition capacity: within the city administration and with local key stakeholders in all sectors.

City budget, planning and steering (reference in figure 2: Local, 1)

In the City’s financial budget for 2023⁴², formally adopted by the City Council in June 2022, the climate and environmental goal Climate neutral municipality by 2040⁴³ was also adopted as one of the City’s four overarching goals. The other three goals focusing on sustainable growth and social sustainability (two goals). All political committees and municipal companies are directed to actively work towards achieving these overarching goals. For each of these goals the municipal executive board together with specific political committees (with connected departments) and municipal companies are designated to take lead.

To further enhance the efficacy of this governance and steering structure within the municipal group, it is organized into three programs. Each program delineates focus areas, indicators, yearly action plans, and a steering group comprising CEOs and directors from designated departments and municipal companies. The director of development, head of the strategic development department, city management division, Umeå municipality (responsible for all municipal overall

⁴² Municipal financial budget 2023 and plan for 2024–2026 including programmes for overall goals <https://www.umea.se/download/18.40a08041181a2d79c6a2e19/1660209639282/Planeringsdirektiv,%20budget%20och%20investeringar%202023,%202022-06-20.pdf>

⁴³ The city shall be climate neutral by 2030, followed by the whole municipality by 2040, see chapter 2 and <https://www.umea.se/miljomal>



functions), leads the implementation of the climate steering program together with designated officers and Team climate, a municipal internal crosscutting team.

The governance and steering mechanism, specifically the steering program focused on climate, plays a pivotal role in implementing coordinated actions to reduce climate emissions from the municipal group, e.g. concretely stated in the climate action plan for the municipal group⁴⁴. Furthermore, and most importantly, it also aims to enhance the municipal group's efforts in creating optimal conditions for other local entities to minimize *their* climate impact. This involves initiatives such as constructing bike lanes and housing, generating district heating and electricity, and sustainable city planning, but also important actions in processes regarding city-wide governance, monitoring, and mobilisation: driving / co-creating the Umeå Climate Roadmap framework and partnership, further developing / implementing new structures for civic society and citizen engagement and strategically focusing on project financing and creating multi-level partnerships.

The iterative working process of Umeå CCC is fully lined and coordinated with the work in the municipal group, giving even more strength and structure into the local climate mitigation work, both in concrete climate actions and governance.

Consequently, the municipal group has the large capacity to contribute to the reduction of climate emissions both directly and indirectly. However, to fully realize our objectives, it's essential with collective efforts, and partnerships with all stakeholders in Umeå.

Umeå Climate Roadmap – the core of local climate partnerships (reference in picture 2: Local, 2, 5)

One of the most important city-wide governance structures in Umeå is the partnership, local climate contract and local green deal Umeå Climate Roadmap⁴⁵, where 55 organisations have signed up to collaborate to take fast and extensive action to reduce climate emissions. The framework and, thus, the signatories' commitments include supporting the municipal goals on climate neutrality as well as on reduction of consumption-based emissions. Additionally, they shall contribute to a fast climate emission reduction rate of at least -20 % per year. Equally significant, the commitments encompass actively engaging in mutual learning and dialogue as well as annually reporting on progress made in implementing climate work. This involves actively working towards reducing each organization's internal climate emissions in coordination with the specified focus areas and climate challenges outlined in Umeå Climate Roadmap.

Amongst the 55 signatories are the municipality itself, the two universities in Umeå and RISE research institute, the regional authority (responsible for health care etc.), several municipal companies and a large range of businesses within different sectors. These committed businesses are of different sizes and have different needs and potentials to reduce emissions, for instance Volvo trucks industry, large forest industries as SCA and Norra Skog and the locally most important construction and development companies as well as communication, hotel & conference, and business development companies.

In 2021 the municipality led the co-creation and development of Umeå Climate Roadmap (framework and partnership) with strategic local actors and in December 2022 at the yearly Umeå Climate Summit the roadmap was signed by 37 partners including the municipality. During 2023 a large range of partnership activities were implemented, such as meetings and innovative workshops in working groups prioritizing and developing actions, start-up of thematic groups within focus areas, speed dating, get-together, and general information events. Also, important basic work was jointly done regarding how to structure and monitor the partnership on yearly basis incl. in depth stakeholder analysis and development of yearly survey.

At the 2023 Umeå Climate Summit additional partners signed Umeå Climate Roadmap, and 2024 the concrete work focuses on co-creating even more effective climate mitigation work by continue to develop the strategic partnership model with e.g. structure for monitoring and updating (coordinated

⁴⁴ [Atgärdsprogram för Umeå kommuns miljömål 2022-2025 \(umea.se\)](https://www.umea.se/Atgardsprogram-for-Umea-kommuns-miljomal-2022-2025)

⁴⁵ Umeå Climate Roadmap www.umea.se/klimatfardplan



with the Umeå CCC and the municipal group's monitoring structures) and joint learning and co-training about and enhancing transition and innovation capacity amongst roadmap partners⁴⁶. And, most important, then developing and implementing as many concrete climate actions amongst signatories as possible!

As part of the municipality's commitment to Umeå Climate Roadmap, the strategic development department at the city management division (responsible for all municipal overall functions) runs the office for Umeå Climate Roadmap, giving this city-wide governance structure long-term, predictable terms. The roadmap office holds support functions for communication, administration, and process management, which are in turn coordinated with process management for all climate mitigation work in the City of Umeå (the responsibility of this lies within the same department).

The work in Umeå Climate Roadmap is completely lined with the Umeå CTM, where we together with roadmap partners, civic society and citizens co-create, implement, and iteratively develop the Umeå CCC: in 2024 this means deepening the work with impact pathways, including the roadmaps for each pathway, investment planning and financing through e.g. NZC Capital hub, establishing new commitments and ways of working and implementing necessary climate actions.

Since the framework Umeå Climate Roadmap is lined and coordinated with Umeå CCC (see chapter 1), signing and committing to Umeå Climate Roadmap is at the same time signing and committing to Umeå CCC. That is why all 55 signatories in Umeå Climate Roadmap including the municipality also are signatories in Umeå CCC (see chapter 5 Signatories and Appendix 1: Individual / Cluster Signatory Commitments). Important to notice is that the signatories' commitments include support of the municipal goal on climate neutrality by 2040, but as explained in this chapter and chapter 2 Goal, the municipality leads the overall climate mitigation work needed, including the work in Umeå Climate Roadmap, and place greater responsibility on the city and its actors to lead in the transition to climate neutrality by 2030. Thus, Umeå Climate Roadmap and the work conducted with partners also aim towards a climate neutral city in 2030.

As described in figure 2, there are other local partnerships and networks, which are important for reducing climate emissions. The involvement of these additional actors is included in the overall process management the municipality is conducting with Umeå Climate Roadmap: coordinating, developing, and structuring with all networks and actors needed at all levels. Notable local partnerships and networks are e.g. the Network for sustainable building in cold climate: started in 2008, 60+ members within the building sector⁴⁷; Food and Climate in the North: sustainability network for local restaurants, food providers⁴⁸; North Sweden Cleantech⁴⁹; regional innovation and export platform for green technology, clean energy, and sustainable solutions, BioFuel Region⁵⁰: public-private partnership for a fossil-free northern Sweden and Viable business hub⁵¹, a collaboration for a sustainable industry in Umeå and northern Sweden.

Furthermore, the municipal group has launched and participated in several initiatives to enable climate transition together with especially academia and other public partners, e.g. the strategic partnerships between Umeå municipality, Umeå university, the Swedish University of Agricultural Sciences (SLU), RISE Research Institutes of Sweden and the regional authority Region Västerbotten, where innovation, sustainable urban planning and climate neutrality are key elements. An important part of Umeå's transition partnership, which builds capacity for climate transition, is the ability to form innovative initiatives, projects, and collaborations through and with these partners.

⁴⁶ Training programme, learning meetings, hosted by Umeå Pilot City Project the North Star, [Lärandeträffar våren 2024 - Umeå kommun \(umea.se\)](https://netzerocities.eu/umeas-pilot-city-activity-the-north-star/), <https://netzerocities.eu/umeas-pilot-city-activity-the-north-star/>

⁴⁷ [Hållbara Hus – Nätverket för hållbart byggande och förvaltande \(hallbarahus.se\)](https://hallbarahus.se/)

⁴⁸ [Nätverket Mat & Klimat i norr - Umeå kommun \(umea.se\)](https://norklimat.se/)

⁴⁹ [North Sweden Cleantech](https://cleantech.se/)

⁵⁰ [BioFuel Region - för ett ofossiligt norra Sverige](https://biofuelregion.se/)

⁵¹ [Viable Business Hub — ett samarbete för hållbar industri i Umeå och norra Sverige | by Viable Cities | Viable Cities | Medium](https://viablecities.com/)



UMEÅ CLIMATE
TRANSITION
WITH ALL
STAKEHOLDERS

Figure 3 Umeå climate transition with all stakeholders

Civic society and citizens engagement and partnerships (reference in figure 2: Local, 3 and 4)

As true in most of Sweden, the citizens of Umeå are much involved in different civic associations (+80%, 90% for 9–12-year-olds) are engaged in civil society, though the Umeå civic society stands out as very strong and with a long tradition of political engagement⁵². The City of Umeå has simultaneously, running with their citizen's engagement, long-term engagement and achievements in gender equality⁵³, crime prevention⁵⁴, social⁵⁵ and environmental sustainability and the integration of all these aspects in the development and transition of Umeå.

The local community engagement is met by the municipality with solid support and governance structures, formed to further enhance dialogue, democracy, social innovation and a just sustainable transition. The civic association office at the municipal Sports and leisure department is one important part, being responsible for cooperation and development with and municipal funding for local civic society (+600 local civic associations), but also the many local experiences of established municipal – civic partnerships and mechanisms regarding e.g. reception of unaccompanied refugee children⁵⁶, operation of sports and leisure facilities and cooperation in city development projects.

The methods and lessons learned from the work in social sustainability area have been implemented into the numerous initiatives, platforms, and processes where civic society and citizens engage in Umeå's climate transition towards climate neutrality. This work has been ongoing for many years, where examples regarding sustainable mobility, consumption-based emissions and actors' behavioural changes are already described in chapter 1, here governance structures, more examples and the way civic society and citizens are and can be involved in Umeå CCC are further described.

The Strategic development department at the City management division at Umeå municipality is overall responsible for climate engagement and partnership work with civic society and citizens, working together with all other municipal departments and companies. Some examples:



- The civic association office, dept. of Sports and leisure, offers specific municipal funding for implementing activities that promote climate neutrality and the SDG's – Miljöskjutsen⁵⁷ (=the environmental kick), also specific funding for e.g. energy savings in facilities.
- Civic society cooperation for climate neutrality⁵⁸: new forms of cooperation with civic associations to work on climate issues has been tested and developed through a living lab, a joint initiative of the dept. of Sports and leisure and Strategic development, researchers from RISE and Umeå University and representatives from RF-SISU Västerbotten, the regional organization of the National Sports Confederation.
- The Nature School, part of the dept. of Education, is implementing the Schools for sustainability program in all Umeå schools, and has run the annual Council for sustainable urban development, where hundreds of teenagers meet politicians and civil servants to present their innovative ideas for the city.
- In line with the extensive city districts dialogue⁵⁹, the Technical dept. (responsible for e.g. investment in bike lanes, municipal buildings) yearly hosts concrete dialogues in different city and municipality districts to talk to citizens about their district and how to improve it.
- Municipal consulting services for citizens and small businesses regarding energy and climate⁶⁰ as well as consumption at the dept. for Environment and health: 25 years experience in offering free consulting services to citizens and SMEs aiming to promote and enable behavioural changes as well as guiding private investments in a sustainable direction.
- Klimatekot⁶¹, podcasts for all in Umeå regarding different areas within climate transition, run by dept. for Environment and health and Strategic development, highly informative and fun produced together with journalist.

Social innovation for a just transition towards climate neutrality is a core principle for Umeå's work. This is why the City of Umeå applied for and got national funding for the innovation platform SPIS Social progress innovation Sweden. The implemented work in SPIS has strengthened the whole of Umeå's innovation capacity and Umeå municipality's ability to solve complex societal and sustainability challenges by establishing an internal organization that drives and supports culture, structure and capacity for innovation and futureoriented development.

Concrete results from SPIS are the two innovation leaders and a process manager focused on citizen-driven innovation at the Strategic development department at the City management division, who together with the climate mitigation officers run the systemic innovation work needed for the climate transition

A crucial work launched from SPIS is the establishment of Umecom⁶², Umeå's citizen workshop and a community where Umeå's citizens and stakeholders come together to discuss, tackle, and solve societal challenges of different scale, very much focusing on the transition to a climate neutral Umeå. Umecom is now a solid governance structure run by the municipality, where citizen engagement is fostered by different initiatives as idea generation live-sessions, thorough communication through SoMe, films etc.⁶³, out-door and digital festivals, and cooperation projects

⁵² [Celebrating 400 years of fuss - Umeå kommun \(umea400.se\)](https://umea400.se)

⁵³ [A city that roars for gender equality - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁴ [Brottsförebyggande arbete - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁵ [Socialt och kulturellt - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁶ [Mottagande av ensamkommande barn - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁷ [Miljöskjutsen - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁸ [Föreningssamverkan för klimatneutralitet - Umeå kommun \(umea.se\)](https://umea.se)

⁵⁹ City district dialogue [Stadsdelsdialogen - Umeå kommun \(umea.se\)](https://umea.se)

⁶⁰ [Energi- och klimatrådgivning - Umeå kommun \(umea.se\)](https://umea.se)

⁶¹ [Poddar med Klimatekot - Umeå kommun \(umea.se\)](https://umea.se), [Klimatekot - Hosted by Elin Leyonberg \(acast.com\)](https://acast.com)

⁶² <https://umecom.se/>

⁶³ [Umecom Medborgarverkstad | Umeå | Facebook](https://umecom.se/), [Umecom \(@umecom_medborgarverkstad\) • Foton och videor på Instagram](https://umecom.se/), [Umecom - YouTube](https://umecom.se/)



as Umeå together, pop-up dialogues at city development areas as Tomtebo strand⁶⁴ and much more.

Furthermore, as part of Umeå's work in Viable cities (see below about national partnership), the Strategic development dept. at the municipality together with the Umeå university research support and collaboration office and Coompanion Västerbotten⁶⁵ (semi-public organisation for business consultancy and development within cooperation and entrepreneurship) have for many years been working strategically to develop the area citizen driven and social innovation for climate transition:

- Mapping and building local ecosystems for social innovation and climate mitigation, a work which will be further explored and implemented together with regional authority etc. based on the method launched by OECD⁶⁶
- Umeå together⁶⁷, a joint innovation initiative which supports local citizen sustainability initiatives in Umeå to crowdfund their goals with the platform Open Collective, a joint initiative between the municipality, Coompanion Västerbotten, private businesses, civic associations, and citizens
- Forum for social innovation Sweden⁶⁸, Social innovation i Norr⁶⁹: long-term concrete work in different platforms for enhancing the work with social innovation, together with e.g. Malmö university and Luleå university of technology

As the work for climate engagement and partnership work with civic society and citizens as well as the work within the municipality, with Umeå Climate Roadmap and the multi-level partnerships including the work of the Umeå CCC all are the responsibility of and placed at the Strategic development department at the City management division at Umeå municipality, this is all coordinated, developed strategically and carried out in parallel and fitted into the iterative process of the Umeå CCC.

Though, a central part of future work within civic society and citizens engagement and partnerships *and* in future iteration of the Umeå CCC is to, stakeholders together, continue to structure and build the local ecosystems for social innovation and climate mitigation needed (as mentioned above) – this is something not yet completely in place in Umeå, which will much broaden and strengthen the opportunities for civic society and citizens to engage with the overall process (=the Umeå CTM) and plan for reaching climate neutrality in 2030 and implementing the Umeå CCC.

Concrete ideas here are e.g. further exploring the opportunities for civic society in signing the Umeå Climate Roadmap – the roadmap is open to all organisations, but the civic associations are not yet signatories. Also important are to continue developing the initiative Civic society cooperation for climate neutrality into the most effective form of partnership for climate mitigation and, thus, implementing the Umeå Climate Roadmap and Umeå CCC.

Partnering all levels for effective climate mitigation (*reference in figure 2: Regional, National, EU, international*)

In order to reach climate neutrality in 2030 and implement Umeå Climate Roadmap and the Umeå CCC, the City of Umeå and local stakeholders are cooperating and partnering with actors not only at local level, but also at the regional, national, EU and international level. Here is a summary of stakeholders and cooperations on different levels.

Regionally and nationally:

⁶⁴ [Tomtebo strand - en stadsdel som välkomnar framtiden - Tomtebo Strand](#)

⁶⁵ [Coompanion in English - Coompanion](#)

⁶⁶ [Building local ecosystems for social innovation: A methodological framework | en | OECD](#)

⁶⁷ [Umeå Together - Open Collective](#)

⁶⁸ [Forum for Social Innovation Sweden - Mötesplats Social Innovation](#)

⁶⁹ [Social Innovation i Norr – En mötesplats i form av en årlig konferens.](#)



- Thriving northern cities⁷⁰ - five of the largest cities in northern Sweden incl. Umeå have developed a joint strategy for sustainable urban development, linked to the green transition happening in northern Sweden, e.g. green steel, battery production.
- Circular Västerbotten (the county where Umeå is situated)⁷¹: cross-sector, regional collaborative project in circular economy.
- Viable Cities, a national strategic innovation programme⁷²: the City of Umeå is a board member in Viable Cities, was one of the first 9 cities getting national funding for working with the Climate Neutral Cities 2030 mission run by Viable cities and signing the Swedish Climate City Contract 2030⁷³. Umeå is actively participating in activities launched by Viable Cities e.g. system demonstrator, Glove, and twist and storytelling.
- The City of Umeå is actively seeking cooperation with other Swedish cities to exchange experience and knowledge to enhance both the local and mutual work towards climate neutrality 2030, e.g. with Kalmar and SEI regarding the Consumption compass, with Gothenburg and Vinnova regarding development of the Swedish Climate Contract 2030 and with Helsingborg regarding climate investment planning

EU and internationally:

- The City of Umeå has a partnership and adopted development strategy⁷⁴ with the Finnish City of Vasa, where the trans-national forum Kvarken council⁷⁵ is coordinating e.g. strategic transport infrastructure initiatives.
- The City of Umeå is an active member of ICLEI, where Umeå e.g. currently is project partner in project Alliance – local green deals⁷⁶ and of Civitas⁷⁷, e.g. hosting CIVITAS Forum in 2018.
- Umeå is participating in the initiative New European Bauhaus in different ways: RISE, a Umeå Climate Roadmap partner and the first Swedish partners of NEB, now leading the development of a NEB Local Chapter in Northern Sweden; Umeå is one of the sites of the NEB Design Challenge⁷⁸, where another Umeå Climate Roadmap partner Balticgruppen provides the test site.
- Umeå is a multiple finalist of European Green Capital Award and now active part of EGCA network, learning from cities all around Europe. Umeå was also European Capital of Culture 2014 and now an active part of the ECOC-network, where discussions around co-creation and culture a prerequisite for sustainable city development are important.
- The City of Umeå is a member of the Arctic Mayors Forum⁷⁹ and the EU-initiative AURC Arctic Urban Regional Cooperation⁸⁰, where climate mitigation and adaptation are topics high on the agenda for the city-to-city cooperation
- The City of Umeå is since 2011 a signatory of Covenant of Mayors
- The City of Umeå is board member and active part of Biosphere reserve Vindelälven-Juhtátahkka⁸¹, one of the world's largest biosphere reserves. Climate and sustainable transition are core principles for the work within the biosphere reserve.

Specific notes about Umeå's participation in NetZeroCities:

Umeå is a pilot city of the first cohort of the Pilot Cities Programme with the project North Star⁸²,

⁷⁰ Thriving northern cities <https://www.ri.se/en/what-we-do/projects/thriving-northern-cities>

⁷¹ Circular Västerbotten [Cirkulära Västerbotten - Coompanion](https://www.cirkulara.se/)

⁷² [Home | Viable Cities](https://www.viablecities.com/)

⁷³ Umeå Swedish Climate City Contract 2030, version 2023, [Klimatkontrakt 2030 \(umea.se\)](https://www.klimatkontrakt2030.se/)

⁷⁴ [Utvecklingsstrategi för Umeå och Vasa är klar - Umeå kommun \(umea.se\)](https://www.umea.se/utvecklingsstrategi-for-umea-och-vasa-ar-klar)

⁷⁵ [Home - Kvarkenrådet](https://www.kvarken.se/)

⁷⁶ ICLEI, www.iclei.org, Alliance – Local green deals, <https://alliance.localgreendeals.eu/>

⁷⁷ CIVITAS, www.civitas.eu

⁷⁸ [NEB Design Challenge \(ri.se\)](https://www.ri.se/en/what-we-do/projects/new-european-bauhaus), [Kvarteret Hammaren in Umeå, Sweden | RISE](https://www.kvarken.se/)

⁷⁹ Arctic Mayors Forum, www.arcticmayors.com

⁸⁰ AURC Arctic Urban Regional Cooperation https://www.eeas.europa.eu/eeas/15-towns-and-cities-starting-new-cooperation-across-arctic_en

⁸¹ Biosphere reserve Vindelälven-Juhtátahkka www.vindelalvenbiosfar.se

⁸² The North Star <https://netzerocities.eu/umeas-pilot-city-activity-the-north-star/>, [The North Star - Net Zero Cities - Umeå kommun \(umea.se\)](https://www.netzerocities.eu/umeas-pilot-city-activity-the-north-star/)



where Umeå will pilot a new way of working holistically with systemic innovation to reinvent how the city fulfils its basic functions. Umeå will work with learning about and breaking innovation barriers that hinder the transition. As part of this effort Umeå started a training program called “learning meetings”, where all Umeå Climate Roadmap signatories were invited to participate – pinpointing the importance of the partners of Umeå Climate Roadmap in leading the transition towards climate neutrality. The goal is to strengthen the capability of participating stakeholders to lead innovation processes in between organisations as well as their capacity to accelerate and lead the transition in their own organisation.

The concept of these learning meetings is to be seen as a pilot, which if successful could become a model for a training that is offered to Umeå Climate Roadmap signatories on a yearly base and is iterated on continuously. The experiences from learning meetings and other activities made locally within the North star project will be disseminated regionally, nationally as well as internationally, for instance in form of the Twinning Learning programme together with Luleå and Würzburg.

Umeå has been actively taking part in the upcoming NetZeroCities Capital Hub and see this and other initiatives about financing and investment as crucial for learning more and finance the needed climate transition together with local stakeholders.

As true for the work for climate engagement and partnership work with local stakeholders (civic society, citizens, the municipal group, Umeå Climate Roadmap partners etc.) the cooperation with partners at regional, national, EU and international level will be coordinated, developed strategically, and carried out in the iterative work process of the Umeå CCC at the Strategic development department at the City management division at Umeå municipality.

An important step in future iteration of the Umeå CCC in this area is to develop the regional partnerships even further in order to strengthen the climate neutrality work, e.g. within existing partnerships Umeåregionen⁸³ (alliance with municipalities around Umeå), BioFuel Region, Thriving Northern Cities etc. Also important is continuing to participate in European and international projects to learn

Principles for monitoring and updating

For monitoring and updating all parts of the climate mitigation development in Umeå, there are already several processes in place. An important existing process is the politically adopted steering mechanism within the municipal group, which states the production of a yearly progression report of the municipal overarching goals as well as the environmental goals. The yearly report is a part of the compulsory municipal annual report presented to the City council.

In 2024 this monitoring process incl. the report will be further developed and simultaneously the monitoring and updating process of Umeå Climate Roadmap and Umeå CCC will be developed, integrating all three important steering and monitoring mechanisms into one effective process and tool for the whole governance structure of Umeå’s climate mitigation.

The detailed description in Umeå CCC Action plan of the monitoring needs are important parts in this work as well as already suggested development of indicators and ways of monitoring in the municipal steering program focused on climate. The signatories of the Umeå Climate Roadmap have already committed to report their activities and initiatives annually for a combined summary and this will also be important input to (the development of) the monitoring process.

Based on the results from monitoring, Umeå CCC will be updated every second year. In this updating process partners from Umeå Climate Roadmap and the municipal group (as part of the municipal steering mechanism) are important participants as well as actors from the civic sector and citizens. How the participatory process will be implemented will be explored in the development of the monitoring process mentioned above.

⁸³ [In english - Umearegionen](#)



5 Signatories

Name of the signatory (organisation)	Sector / Domain / Level of operation	Legal form	Name of the responsible person	Position of the responsible person
City of Umeå	Public sector, local	Municipality	Hans Lindberg	Mayor
Signatories of Umeå Climate Roadmap (each signatory with both joint and individual commitments), support Umeå CCC by their commitments in this context:				
AB Bostaden	Public sector, local, business sector housing	Municipal company	Jerker Eriksson	CEO
AFRY	Business, local, business sector technical consultant	Business	Jonas Wållberg	Office manager
Atea	Business, local, business sector IT technical consultant	Business	Sebastian Axelsson	Sales manager
Balticgruppen AB	Business, local, business sector building	Business	David Carlsson	CEO
Bilfrakt Bothnia AB	Business, local, business sector transportation	Business	Nicklas Hermansson	CEO
Blå Huset Hotell Umeå AB	Business, local, business sector hotel, conference, restaurant	Business	Sara Johansson	CEO



Bygma AB	Business, local, business sector building	Business	Mikael Häggström	Site manager Umeå
Clarion Hotel Umeå, Hotell drift CL Umeå AB	Business, local, business sector hotel, conference, restaurant	Business	Kim Orre	Inhouse sales manager
Clockwork Umeå AB	Business, local, business sector staffing	Business	Elin Wiklund	Market area manager
Coompanion Västerbotten	Public/business, local, business sector social business development	Cooperative business	Thomas Hartman	Chairman
Cytiva Umeå	Business, local, business sector life science	Business	Staffan Engström	EHS manager
Diös Fastigheter AB	Business, local, business sector building	Business	Göran Fonzén	Business manager
Dåva DAC deponi och avfallscenter i Umeå AB	Business, local, business sector landfill	Business	Jörgen Aronsson	CEO
Esam AB	Business, local, business sector environmental consultant	Business	David Sandén	CEO
Grant Thornton Sweden AB – Umeåkontoret	Business, local, business sector business advisory	Business	Fredrik Wikner	Office manager, partner
Handelsbanken Umeå City	Business, local, business sector bank	Business	Anders Sundström	Office manager
Hållbar Teknik Sverige AB	Business, local, business sector building	Business	Andreas Bodén	CEO



Infrastruktur i Umeå AB (INAB)	Public sector, local, business sector infrastructure construction	Municipal company	Mikael Salomonsson	CEO
iTid, Umeåkontoret	Business, local, business sector business development	Business	Pernilla Lirell	CEO
Link Arkitektur AB	Business, local, business sector architecture	Business	Simon Lidestav	Acting regional manager
Länsförsäkringar Västerbotten	Business, local, business sector bank, insurance	Business	Göran Karmehag	CEO
Martin & Servera Logistik AB	Business, local, business sector food wholesale	Business	Erland Andersson	Site manager
Norra Skog	Business, local, business sector forestry	Business	Pär Lärkeryd	CEO
Ocab Norr AB	Business, local, business sector damage service	Business	Monika Larsson	Regional manager
OF Bygg AB	Business, local, business sector building	Business	Lars Fredriksson	CEO
OK Västerbotten	Business, local, business sector transportation, service	Cooperative business	Erica Lundgren	CEO
Polarbrödsgruppen AB	Business, local, business sector food manufacturer	Business	Karin Bodin	CEO
Peab	Business, local, business sector building	Business	Johannes Pettersson, Susanne Hallberg, Jörgen Eriksson, Christoffer Björn	Regional managers for building, infrastructure, project development, industry



Ragn-Sells Recycling AB	Business, local, business sector waste, recycling	Business	Elias Engström	Regional manager
Ramboll	Business, local, business sector technical consultant	Business	Åsa Lindgren	Sustainability manager
Region Västerbotten	Public sector, local, business sector health care, regional development	Regional authority	Tommy Svensson	Regional director
RISE	Academia, local	National research institute	Marco Lucisano	Senior vice president built environment
Rototilt Group AB	Business, local, business sector machinery	Business	Fredrik Westin	Quality manager
SCA	Business, local, business sector forestry	Business	Hans Djurberg	Sustainability manager
SEB Umeå	Business, local, business sector bank	Business	Jane Axelsson	Office manager
Signify AB	Business, local, business sector lighting	Business	Kenneth Grönholm	CEO Nordics
Skanska	Business, local, business sector building	Business	Örjan Kallin	District manager
StjärnaFyrkant (LTS Telekommunikation AB)	Business, local, business sector IT, communication	Business	Lin Haspel	Vice CEO
Sveriges lantbruksuniversitet, Umeå	Academia, local	National authority	Maria Knutson Wedel	Vice-Chancellor



Sweco Sverige AB	Business, local, business sector technical consultant	Business	Ulla Bergström	Division manager Sweco Architects
Swedavia Umeå Airport	Public sector, local	National authority	Bengt-Ove Lindgren	Airport manager
Tengbom Arkitektkontor	Business, local, business sector architecture	Business	Malin Almgren	Office manager
Tyréns Sverige AB	Business, local, business sector technical consultant	Business	Ulf Wiklund	Business manager
Umeå Energi AB	Public sector, local and regional, business sector energy production, distribution, IT infrastructure	Municipal company	Jan Ridfeldt	CEO
Umeå Folkets Hus	Public sector, local, business sector conference, event	Municipal company (partly owned by municipality)	Håkan Bäckström	CEO
Umeå Hamn AB	Public sector, local, business sector harbor, transportation	Municipal company	Mikael Isaksson	CEO
Umeå Kommunföretag	Public sector, local, business sector development municipal companies, public transport	Municipal company, overall company for all municipal companies	Fredrik Lundberg	CEO
Umeå Parkerings AB (UPAB)	Public sector, local, business sector parking	Municipal company	Elin Pietroni	CEO
Umeå universitet	Academia, local	National authority	Hans Adolfsson	Vice-chancellor
Vakin	Public sector, local and regional, business sector waste, water, waste water	Municipal company	Robert Hansson	CEO



Visit Umeå AB	Public sector, local, business sector tourism	Municipal company (partly owned by municipality)	Gabriella Hed Vall	CEO
VNB Byggproduktion	Business, local, business sector building	Business	Elin Rydh	Project engineer
Volvo GTO Umeå	Business, local, business sector trucks manufacturer	Business	Patrik Gavelin	Quality, environment and VPS manager
White arkitekter AB	Business, local, business sector architecture	Business	Jenny Pettersson	Deputy office manager
Signatories of the Swedish Climate City Contract 2030 ⁸⁴ with Umeå, support Umeå CCC by their commitments in this context:				
Swedish Energy Agency	National	Government agency, national authority	Robert Andrén	Director General
Vinnova	National	Government agency, national authority	Darja Isaksson	Director General
Formas	National	Government agency, national authority	Johan Kuylenstierna	Director General
Swedish Agency for Economic and Regional Growth	National	Government agency, national authority	Elisabeth Backteman	Director General

⁸⁴ [Climate City Contract 2030 | Viable Cities, Klimatkontrakt 2030 \(umea.se\)](https://www.umea.se/Climate-City-Contract-2030)



Swedish Transport Administration	National	Government agency, national authority	Roberto Maiorana	Director General
Swedish Environmental Protection Agency	National	Government agency, national authority	Björn Risinger	Director General
Viable Cities	National	National strategic innovation programme	Olga Kordas	Programme Manager