



NET ZERO CITIES

NetZeroPlanner

Creating, implementing, and
iterating your Climate Action
Plan

Learning Programme Summary

October 16, 2024



Learning Modules

Module 1 - Kickoff

Module 2 - Model Overview

Module 3 - Using NetZeroPlanner

Module 4 - Economic Case and Plan Iteration



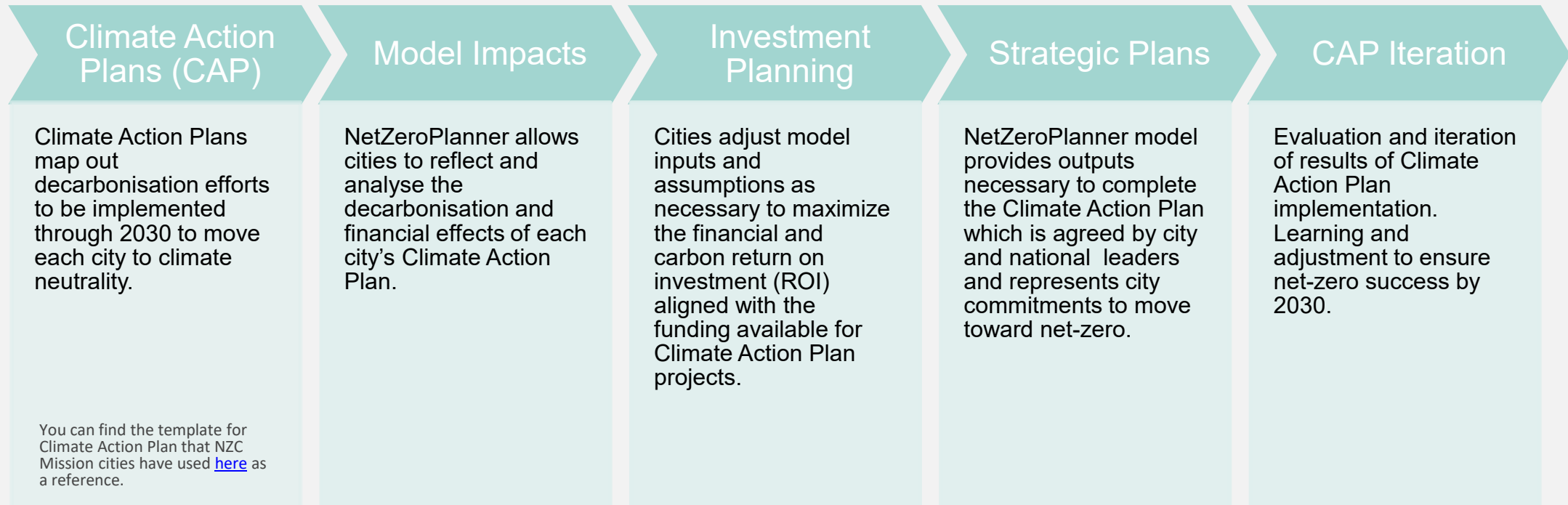


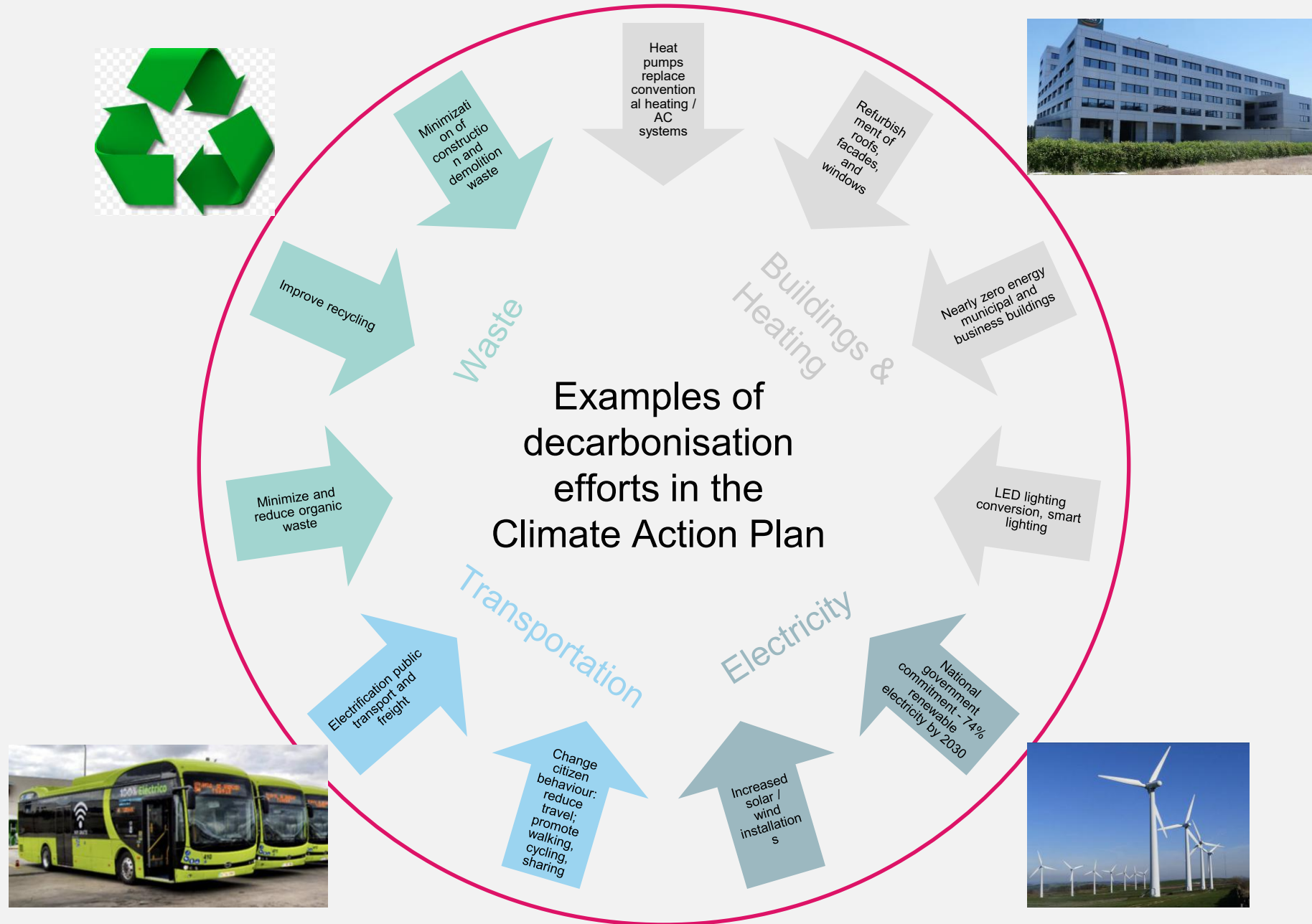
Introduction

NetZeroCities was established to help cities create and implement climate action plans to reach net-zero.

The EU-wide goal is a 55% carbon reduction by 2030 and carbon neutrality by 2050. NetZeroPlanner is a tool to help cities create the roadmap to net-zero success.

The steps cities take to reach net-zero:





- **NetZeroPlanner** has been developed to assist cities in creating an economic case that backs up their Climate Action Plan

An economic case is the foundation of a city's Climate Action Plan



An economic case:

- Allows cities to analyse the costs and benefits of projects in the Climate Action Plan to maximize decarbonisation benefits per Euro invested.
- Breaks down the decarbonisation impacts along with the costs and benefits of the Climate Action Plan by sector and sub-sector to allow for assessment and prioritization of projects so that limited city budgets can be directed to projects with the highest monetary and carbon Return on Investment (ROI).
- Monetizes co-benefits to get a full picture of the advantages of decarbonisation and a more accurate calculation of ROI.
- Decarbonisation impacts and costs / benefits are also separated by stakeholder group to assess investments that are the responsibility and are controlled by the city versus those that will need to be made by citizens and businesses.
- **NetZeroPlanner is a tool that supports a process for creation of an economic case. Through this process, cities validate and improve upon their Climate Action Plans.**

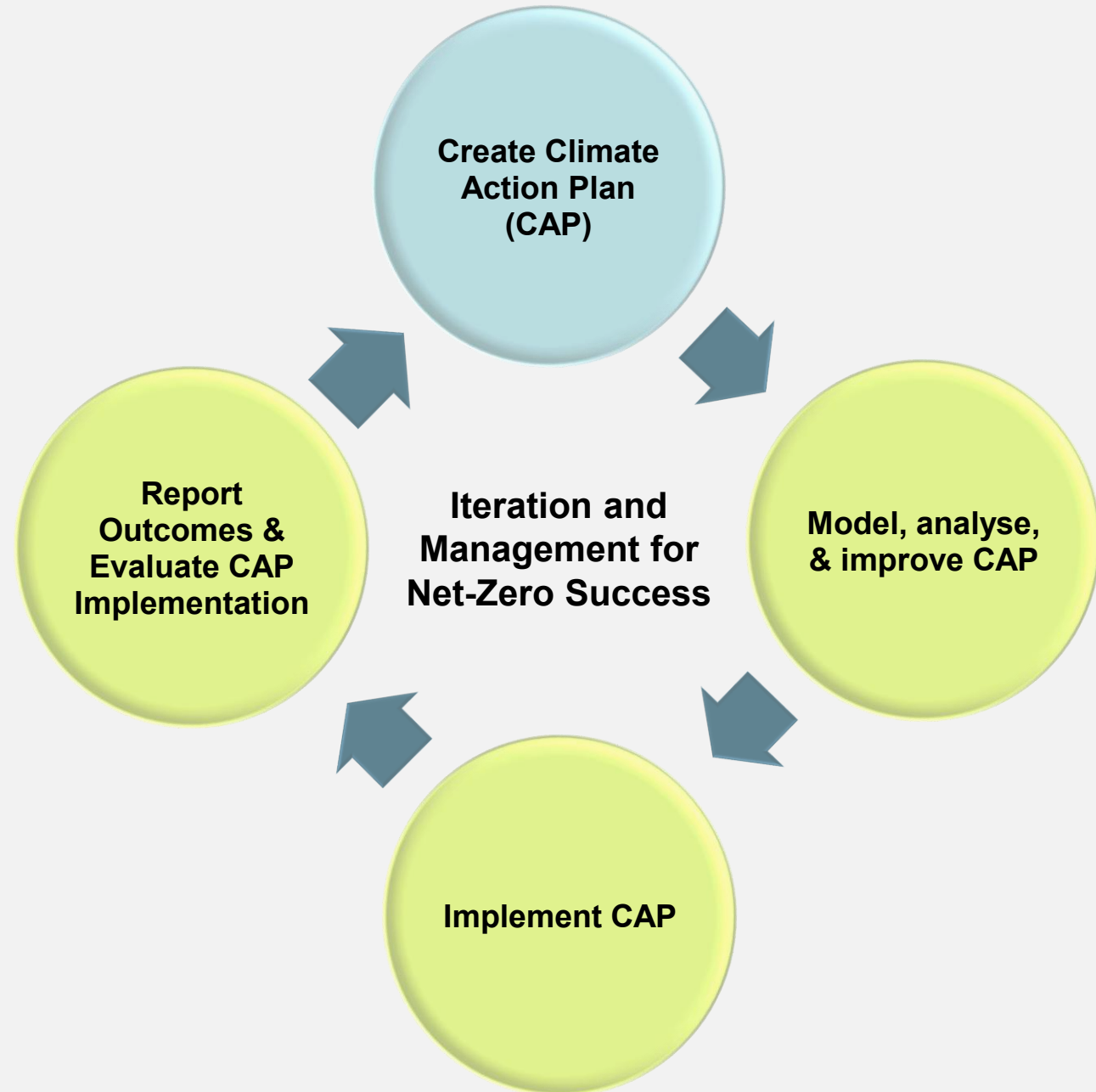
NetZeroPlanner supports Climate Action Planning



- **NetZeroPlanner produces an economic case which serves as the analytical foundation and roadmap for the Climate Action Plan**
 - It provides a validation point to ensure that the Climate Action Plan does in fact achieve net-zero over time.
 - Previous cases show that over 90% of decarbonisation investments will not be made by the city but will instead be made by citizens and businesses. An economic case provides the analysis for cities to strategize on the policies, incentives, and supports that will be needed to motivate citizens and businesses to decarbonise.
 - In concert with the city finance team, investments that are the responsibility of the city are compared to the budget to determine any shortfalls. An economic case is the first step in investment planning as the city works to find funding to fill those gaps or adjusts the Climate Action Plan to reduce cost.
 - Economic case analysis should be used iteratively to represent the Climate Action Plan and inform any changes required to achieve net-zero goals and fit within funding limitations. It should also be adjusted ongoing if the results of the Climate Action Plan are falling short of forecasted decarbonisation goals.



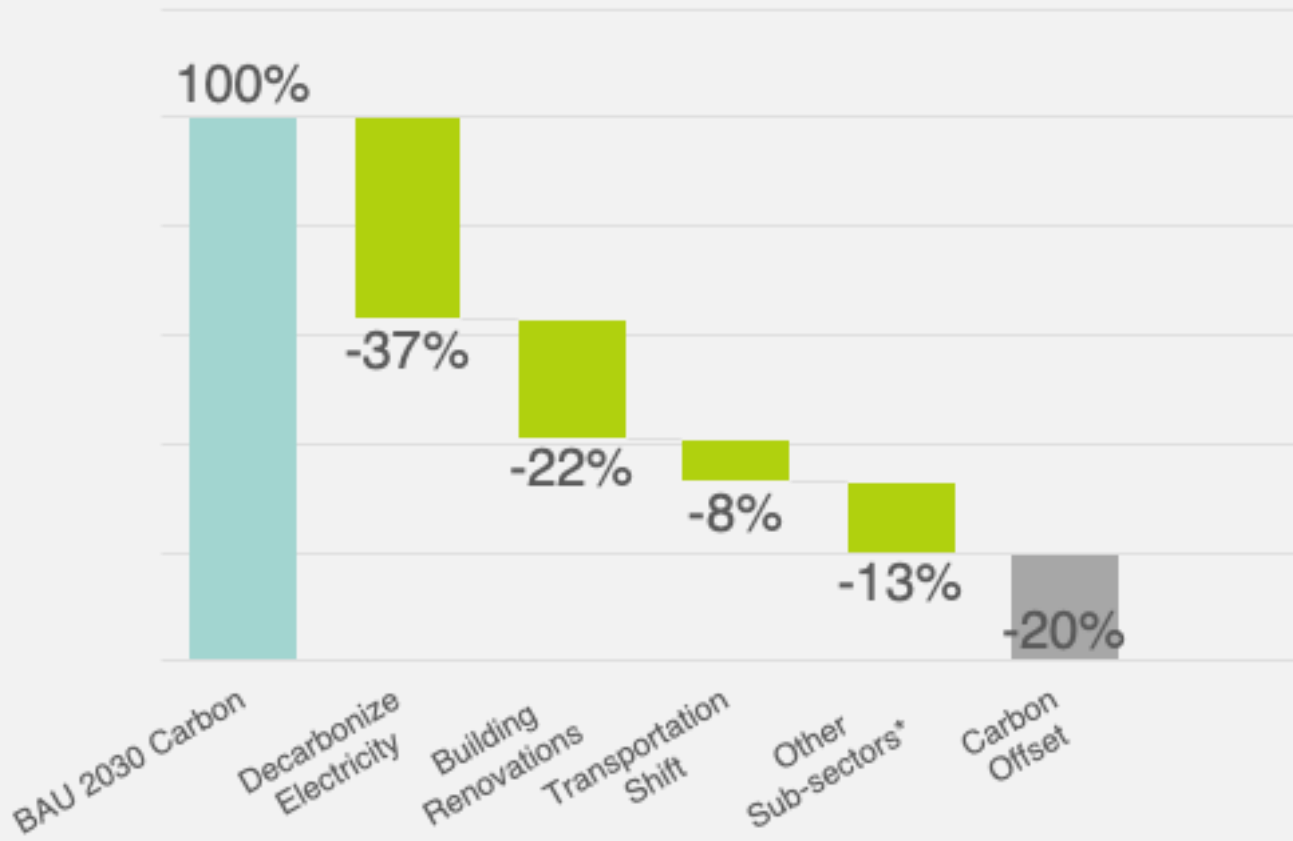
The Climate Action Plan (CAP) iteration process requires a quantitative analysis of progress toward decarbonisation goals to allow for learning and adjustment as needed to achieve carbon neutrality



Review of cities across Europe shows which levers drive majority of decarbonisation in Climate Action Plans



Carbon reductions for 16 NZC cities
% reductions from the 2030 BAU case



* Other sub-sectors include: Increased car-pooling, Optimized logistics, New energy-efficient buildings, and increased waste recycling)

Main insights of the review:

- 37% of the total reduction comes from decarbonizing the electrical grid.
 - Cities have limited control over utilities, so they depend on the successful implementation of regional and national plans for the shift to renewables. Implementation of local renewables can speed this transition.
- 22% of the total reduction comes from building renovations.
 - Optimistic assumptions of over 3X increase in annual renovation rates could pose a risk in city CAPs.
- 8% of the total carbon reduction comes from ambitious targets for a 27% reduction in motorized trips and a 27% shift from cars trips to public transportation.
 - The shift to electric vehicles reduces carbon another 6%.

Benefits of using NetZeroPlanner



- The tool is **free for cities to use**.
- It produces both carbon and financial analysis tables that can be downloaded in Excel format for inclusion in city Climate Action Plans.
- NetZeroPlanner can be used for “**what-if**” **analysis and updated easily over time**, so the Climate Action Plan becomes a working document and roadmap to help the city achieve its goals (see Module 4: Learning and Plan Iteration).
- Calculating Return on Investment **including co-benefits** helps to make the case to city leaders for allocations of limited budget resources. It also helps citizens and businesses understand the returns they can expect from the substantial decarbonisation investments that will be required of them. (More on co-benefits in Module 2: Module overview.)
- It provides high level backup to support incremental investment planning and provide guidance on the financing necessary to fill budget shortfalls.
- It can serve to bridge the **communication gap** between city climate teams and city finance departments, so they can work together to make sure the Climate Action Plan is properly funded.
- A consistent analytical approach allows for the **comparison of results across cities** improving accuracy and highlighting decarbonisation best practices to be shared (the [Portal group](#) of this learning program can be used to exchange results and discuss among cities).

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Scope of economic case analysis



Key considerations

GHG emissions scope – what to include?

- Include scope 1 & 2 emissions in the economic case, as cities can often influence these emission sources
- Scope 3 emissions are included only for city waste disposed of outside of city borders

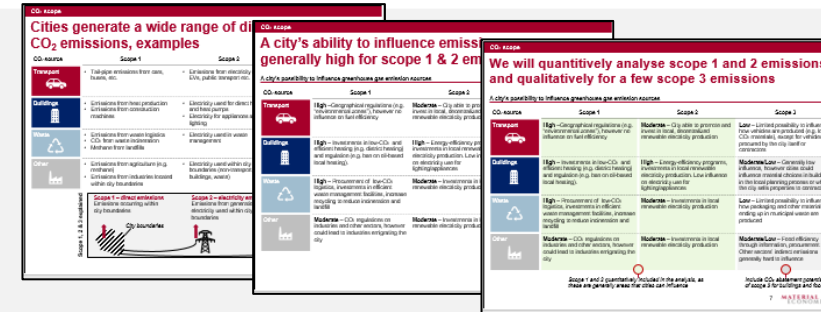
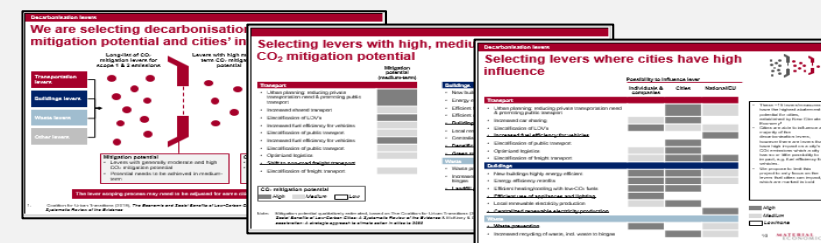
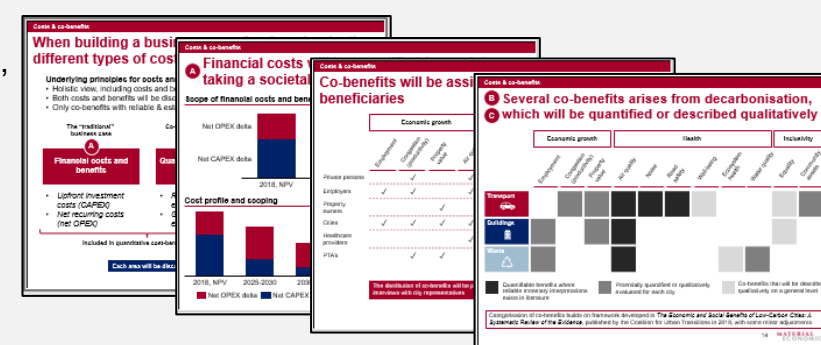
decarbonisation sub-sectors – which sub-sectors to model?

- Quantify economic case for 13 abatement sub-sectors within *Transportation, Buildings & Heating, Electricity, and Waste*
- Selection of sub-sectors based on expected impact and possibility for cities to influence

Costs & co-benefits – which costs to include and co-benefits to quantify?

- Societal perspective on costs and benefits (not limited to city boundaries), net OPEX & CAPEX delta
- Quantify financial costs/benefits, *air quality, noise and road safety*

Proposed scope



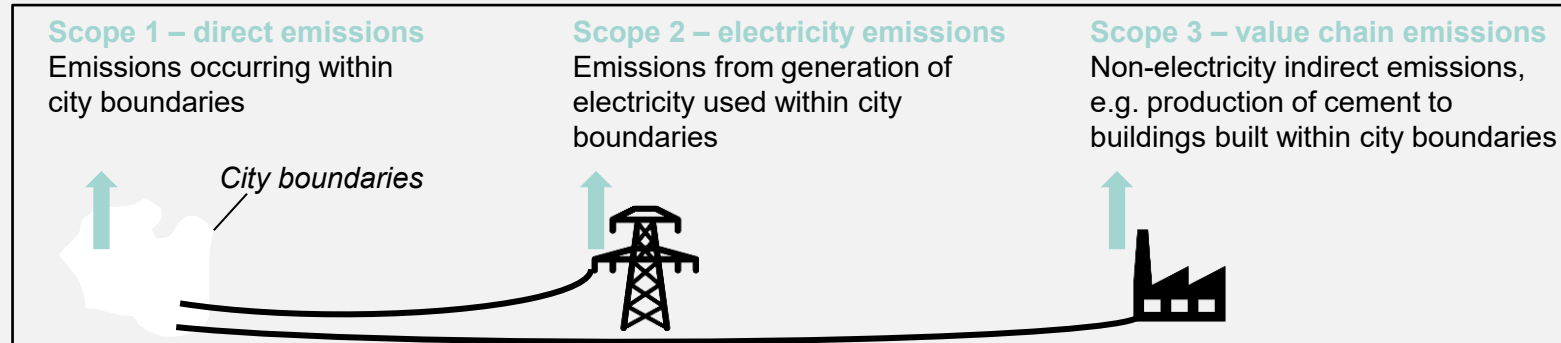
NetZeroPlanner models GHG scopes 1 and 2 along with scope 3 for solid waste



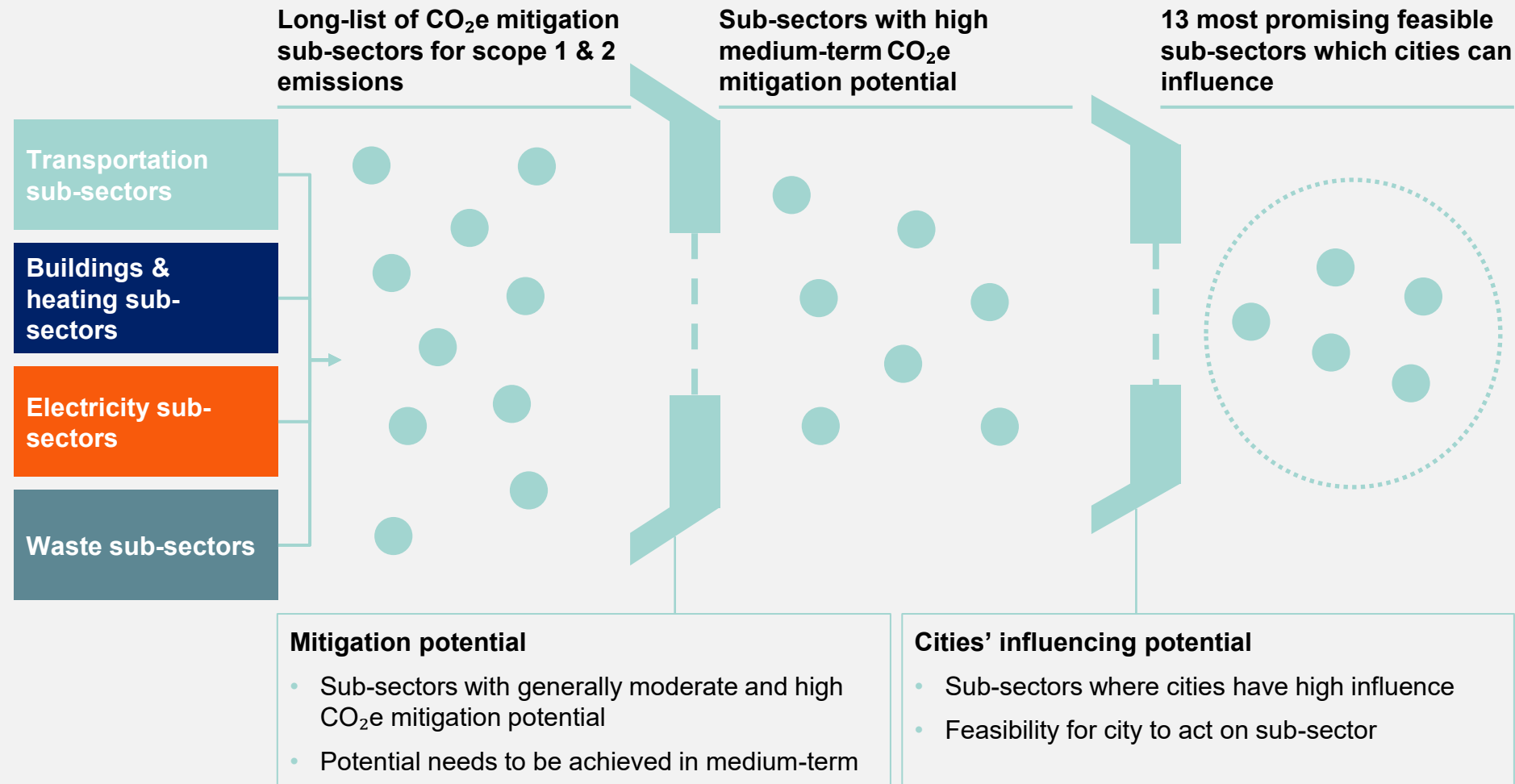
Non-exhaustive

GHG source	Scope 1	Scope 2	Scope 3
Transport 	<ul style="list-style-type: none"> Tail-pipe emissions from cars, buses, etc. 	<ul style="list-style-type: none"> Emissions from electricity used in EVs, public transport etc. 	<ul style="list-style-type: none"> Materials emissions from production of vehicles Transportation of fuels
Buildings & energy 	<ul style="list-style-type: none"> Emissions from heat production Emissions from construction machines 	<ul style="list-style-type: none"> Electricity used for direct heating and heat pumps Electricity for appliances and lighting 	<ul style="list-style-type: none"> Material-related emissions, e.g. process emissions from cement production
Waste 	<ul style="list-style-type: none"> Emissions from waste logistics CO₂e from waste incineration Methane from landfills 	<ul style="list-style-type: none"> Electricity used in waste management 	<ul style="list-style-type: none"> Material embedded emissions in waste (e.g. plastic packaging)
Other 	<ul style="list-style-type: none"> Emissions from agriculture (e.g. methane) Emissions from industries located within city boundaries 	<ul style="list-style-type: none"> Electricity used within city boundaries (non-transport, buildings, waste) 	<ul style="list-style-type: none"> Food value chain emissions Other indirect emissions (non-electricity related)

Scope 1, 2 & 3 explained



Selection of 13 decarbonisation sub-sectors: based on mitigation potential and cities' influencing potential

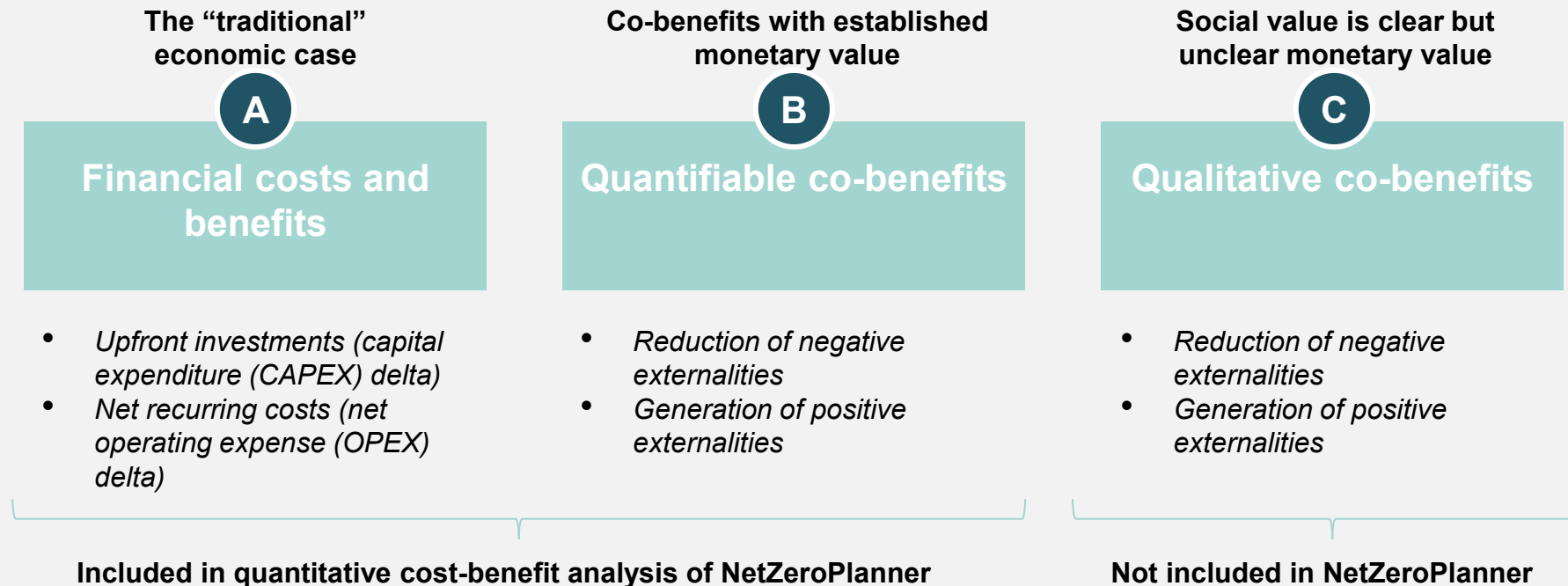


When building an economic case for decarbonisation, different types of costs and benefits are considered



Underlying principles for costs and benefits

- Holistic view, including costs and benefits for citizens, businesses, and city
- Both costs and benefits are discounted on a Net Present Value* basis in order to calculate Return on Investment
- Only co-benefits with reliable & established cost data are quantified in the project



*Net Present Value (NPV) refers to the discounted value of all future cash flows resulting from implementation of the Climate Action Plan.

NetZeroPlanner includes a number of quantifiable co-benefits arising from decarbonisation



	Economic growth			Health				Inclusivity		
	Employment	Time savings	Property value	Air quality	Noise	Road safety	Physical health	Well-being	Equality	Community assets
Transport 										
Buildings & Energy 										
Waste 										

 Quantifiable benefits where reliable monetary interpretations exist in literature

 Qualitatively evaluated co-benefits



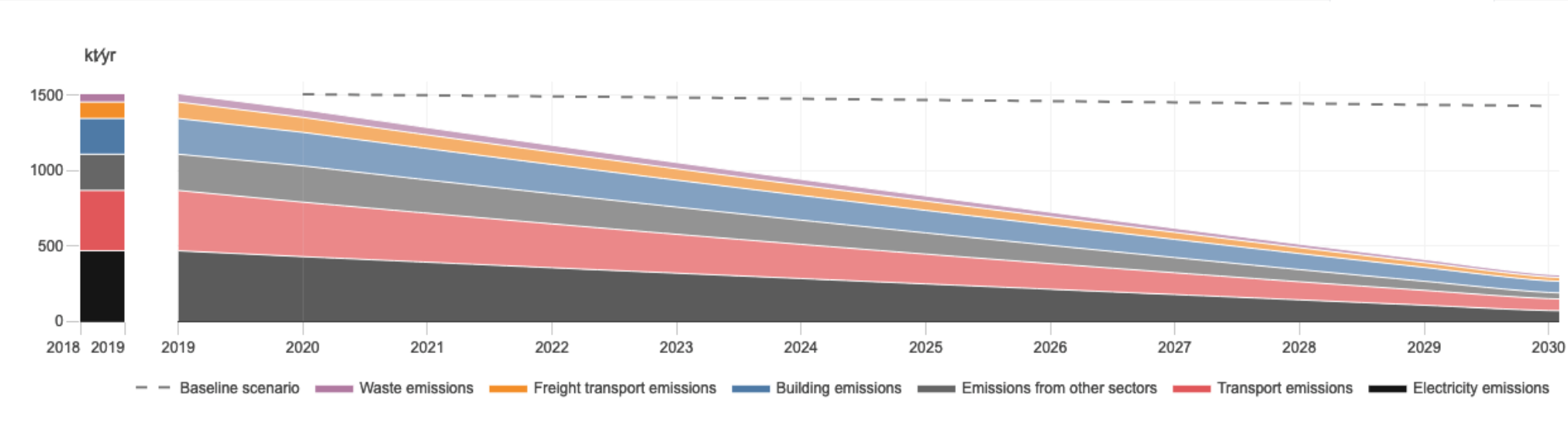
NZP Economic Model overview:

Mathematical calculations broken down by:

- Annual results
- Business as Usual (BAU) case (without Climate Action Plan (CAP))
- decarbonisation case (based on assumed benefits of city Climate Action Plan)
- Incremental costs and benefits of decarbonisation Case versus BAU allows for calculation of Return on Investment (ROI)
- 4 main carbon sectors (Transportation, Buildings & Heating, Electricity, and Waste) and 13 sub-sectors
- Emissions outside of 4 main sectors are included in "Other" sector (e.g., Industry, Agriculture)
- Investment required (CAPEX)
- Operational savings / costs (OPEX)
- Co-benefits
- Allocation of costs and benefits to asset owner groups (Citizens, Businesses, Cities, Transport Operators, Utilities)

Note: NZP model only includes the Direct Costs of each sub-sector / lever, not the Indirect Costs.

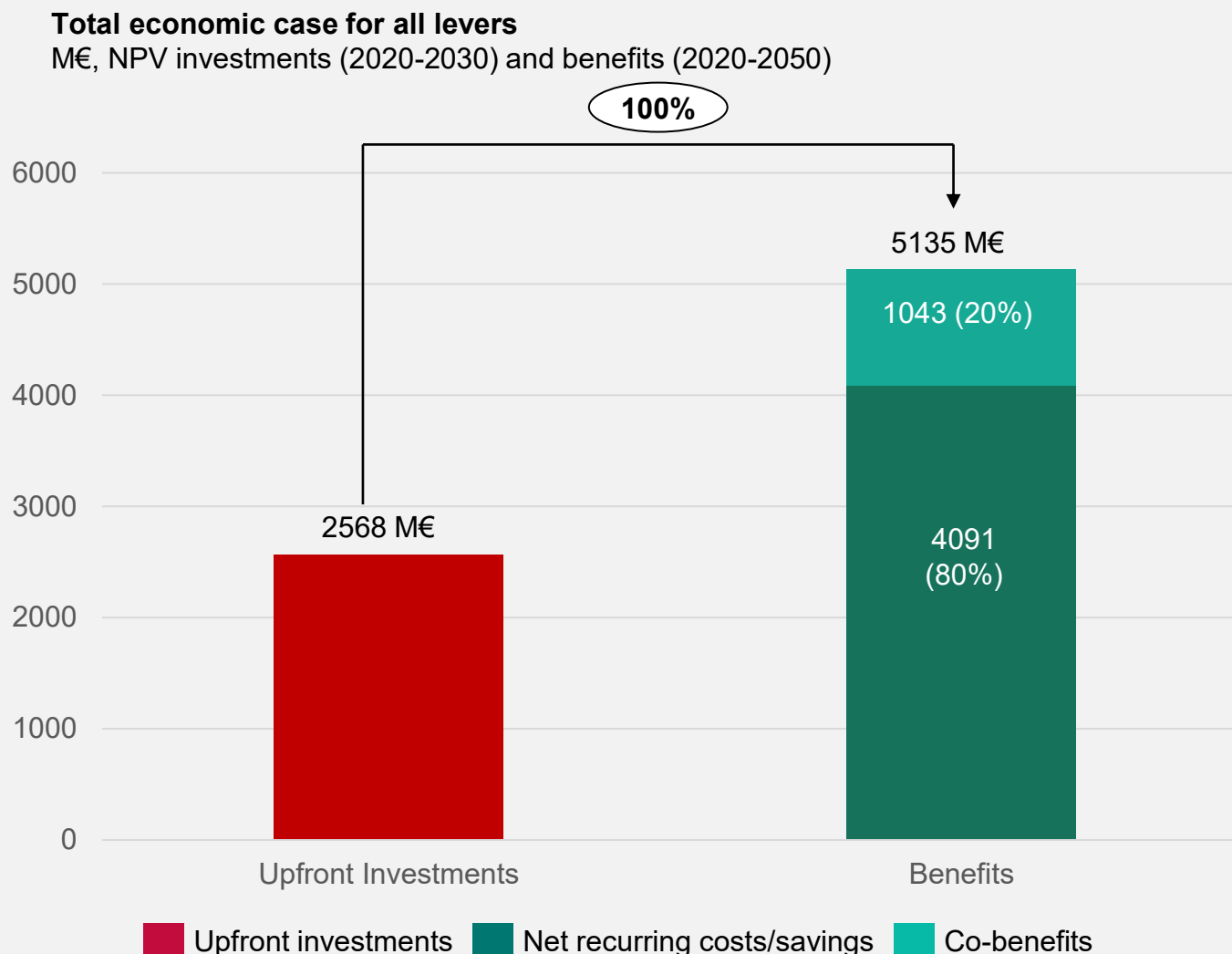
NetZeroPlanner Dashboard shows emissions reduction in 2030 compared to the Business as Usual (BAU) case resulting from implementation of Climate Action Plan



Subsectors

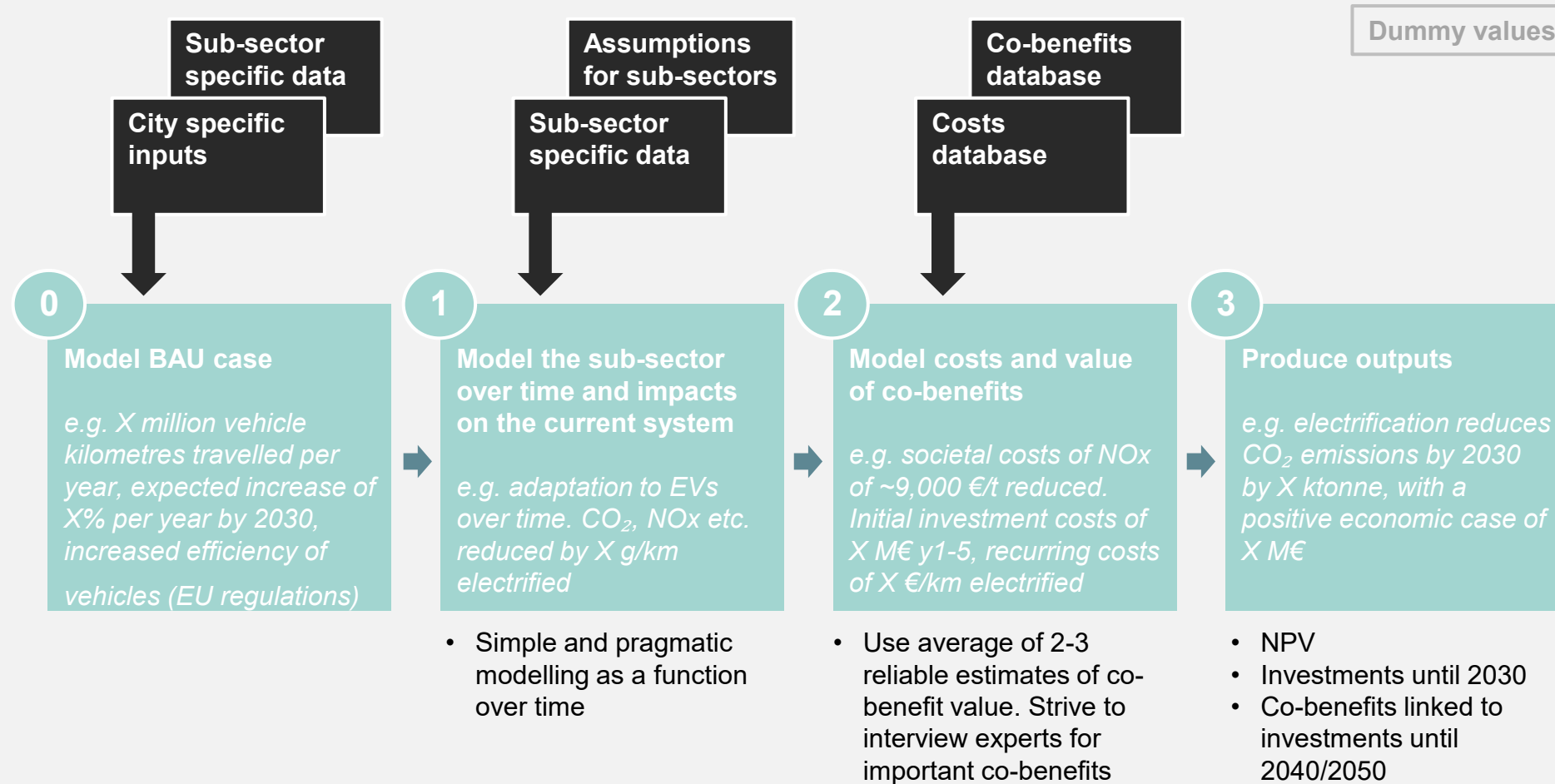
Electricity emissions	Transport emissions	Emissions from other sectors	Building emissions	Freight transport emissions	Waste emissions
Scenario forecast 2030 70 kt/yr	Scenario forecast 2030 79 kt/yr	Scenario forecast 2030 41 kt/yr	Scenario forecast 2030 78 kt/yr	Scenario forecast 2030 26 kt/yr	Scenario forecast 2030 17 kt/yr
Change 2019 - 2030 -85%	Change 2019 - 2030 -80%	Change 2019 - 2030 -83%	Change 2019 - 2030 -67%	Change 2019 - 2030 -76%	Change 2019 - 2030 -69%

Example: Total economic case shows a very positive Return on Investment (ROI)



- In this example, 2.6 Billion EUR in incremental investment over and above the Business as Usual (BAU) case is required to implement the Climate Action Plan.
- 1.0 BEUR comes from co-benefits adding substantially to the overall ROI.

Model methodology - overview



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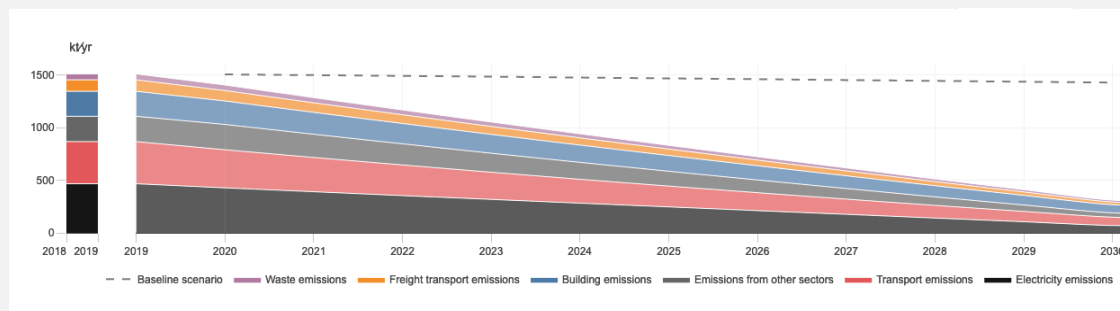
Module 4 - Economic Case and Plan Iteration



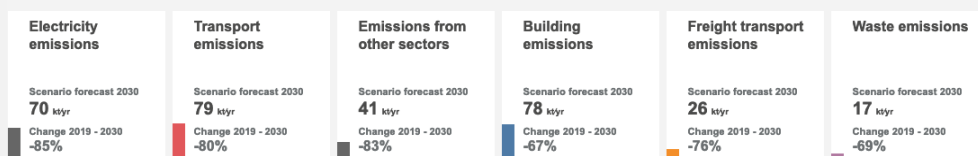
NetZeroPlanner user flow



Cities access the tool through the NZC portal



Subsectors



Valencia CAP 2030

Data completion score: 100%

Your score rates how complete city data is, weighing important local values for accurate predictions. Enter city data to improve your score and get better projections.

1 High priority: 132/132 2 Moderate priority: 38/38 3 Low priority: 29/29

[View Outcomes Dashboard](#)

[Export Outcomes as Excel](#)

Data collection center

Data collection (2019)

Future assumptions (2030)

Collect essential data about your city's current state across key sectors. This phase focuses on gathering raw data to establish a baseline for your city's climate initiatives.

1. Demographic data

2/2 1/1

2. Passenger transportation

10/10 4/4 7/7

Label	Value	Unit	Comparative City Value	Priority	Internal Notes
Transportation need					
Total transportation need - passenger transport					
Transport need - passenger cars + motorcycles	2,935	Mpkm/year	2,595	High	https://data.net.upw.es/handle/10251/175281

Dashboard shows plan results versus baseline by sector and sub-sector.

Create a new plan



Create new plan

×

Muenster 3 (2019)

What's your city's population? *

Is your city warm or cold? *

Warm (Above 12°C yearly average)

Cold (Below 12°C yearly average)

Previous

Add plan

Create new plan

×

Muenster 3 (2019)

What's your city's population? *

Is your city warm or cold? *

What's the percentage of renewable energy in your electricity mix? *

High (50-100% renewable)

Low (0-50% renewable)

Unit

Fallback value

Priority

Click on the button:
Create new plan in
NZP. A window will
appear with these
three questions.

*What are the answers
to these questions for
your city?*



Input data and assumptions for your city

Valencia CAP 2030

Data completion score: 100%

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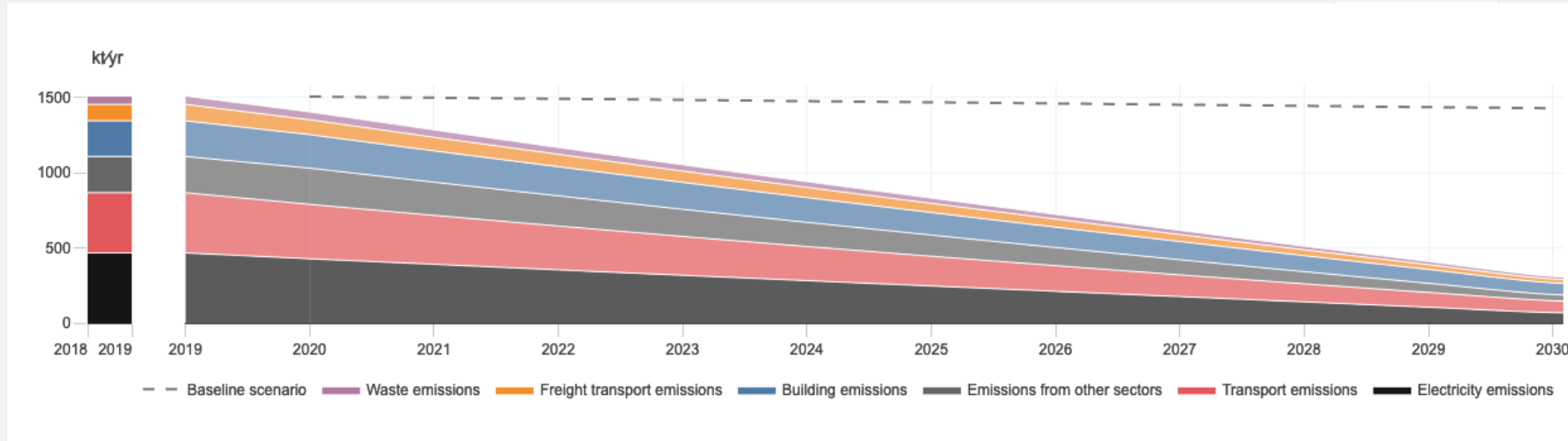
Label	Value	Unit	Comparable City Value	Priority	Internal Notes
Transportation need					
Total transportation need - passenger transport					
Transport need - passenger cars + motorcycles	2,935	Mpkm/year	2,695	High	https://inec.upv.es/handle/10251/175281

Answer the 3 questions about your city, and you are ready to start planning:

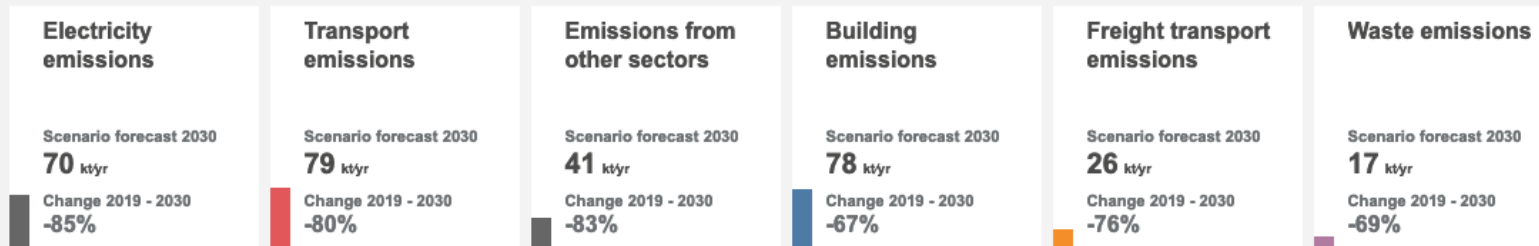
- All input fields include a **Comparable City Value** that is based on a population-adjusted average of European cities comparable to yours (based on your response to the earlier three questions). If you do not input a number in any field, the system will default to the Comparable City Value. The Comparable City Value can also be used to validate the inputs you do have.
- All input fields are marked as **High, Moderate, or Low priority** to make it easier for you to know which ones to focus on, and which ones where you might decide to just use the Comparable City Value.



Resulting Climate Action Plan forecast



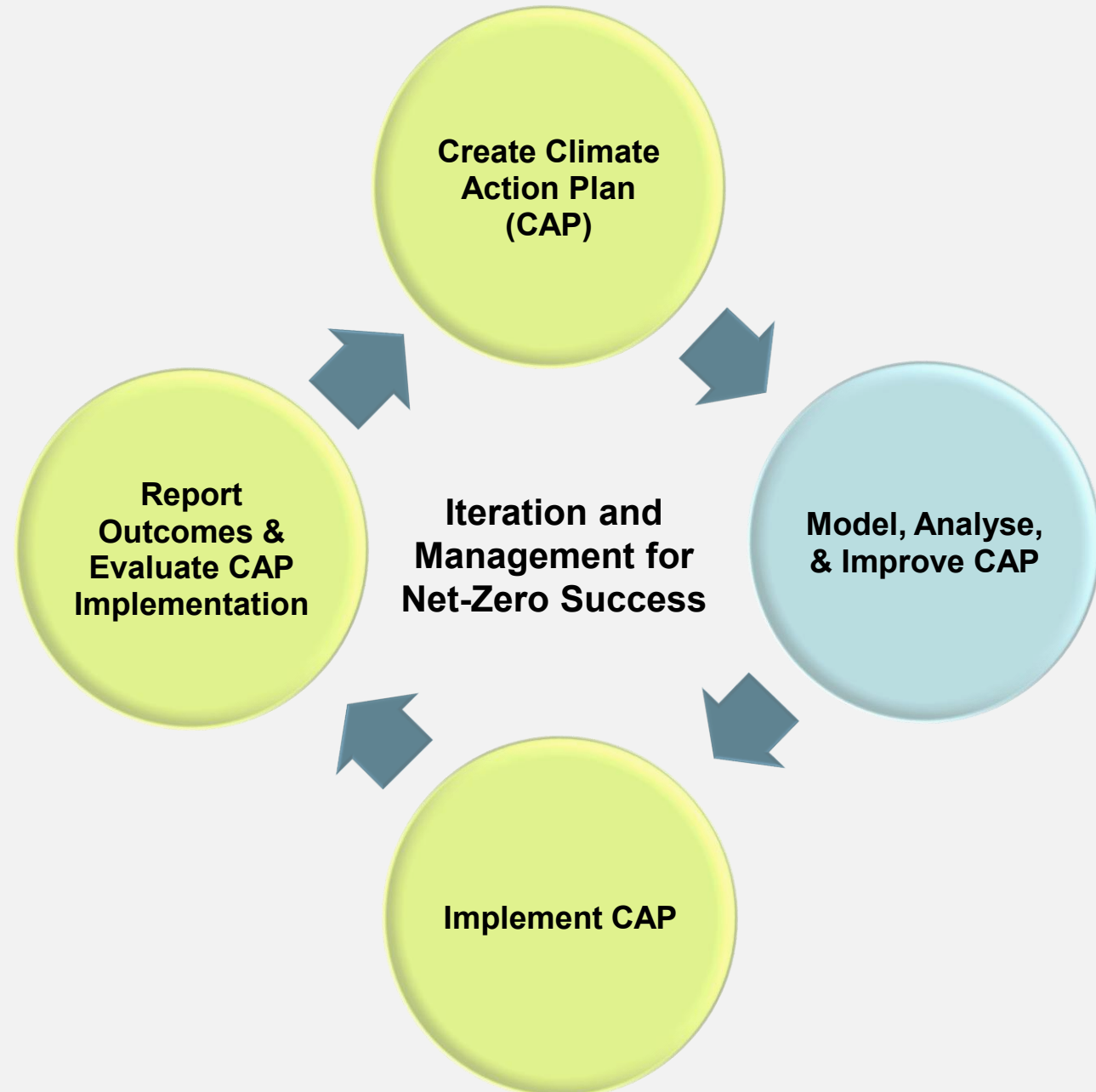
Subsectors



Click on [View Outcomes Dashboard](#) to open a separate window displaying model results.



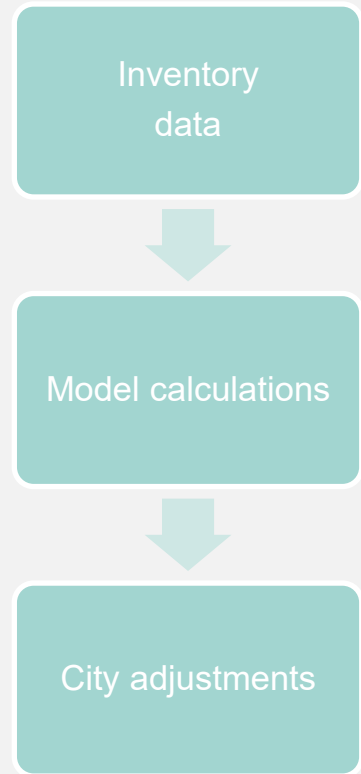
By modelling the impacts of your Climate Action Plan, NetZeroPlanner allows you to run scenarios to improve your plan before you begin implementation



Working with NetZeroPlanner to create an economic case



- **Getting the most accurate inputs for the model data input sheet is critical to getting the most accurate forecast of carbon and cost / benefits aligned with each city's Climate Action Plan**
 - Comparable City Values based on the similar city average are provided for each input cell to serve as an accuracy check for city specific inputs or a default where data does not exist.
 - Cities fill in emissions inventory data for their baseline year and assumptions for 2030 to reflect the expected effects of their Climate Action Plans.
 - Model calculations by the main sectors of Transportation, Buildings & Heating, Electricity, and Waste are compared to the carbon emissions calculated in the original emissions inventory (e.g. your city's Sustainable Energy and Climate Action Plan or SECAP) to highlight possible issues with data inputs and / or possible issues with emissions inventory calculations.
 - Whatever emissions do not fall in the main sectors (such as Industry, Agriculture, Ports, Airports, Freight Rail etc.) are put in a sector called "Other". The city emissions inventory is assumed to be the best estimate of Other which is then used in the model.
 - Cities adjust 2030 assumptions to better align with their Climate Action Plan and to get closer to the decarbonisation goals for their city.





Frequently Asked Questions



What year should I use as the baseline for my analysis?

It is a good idea to use a baseline year where you have prepared a solid emission inventory. This will allow you to validate the results of the model against your emissions inventory to highlight any data input errors. We do not recommend using the years 2020 or 2021 due to the unusual effects of COVID in those years.



Do I have to fill in every one of the fields in the Data Collection and Future Assumptions tabs? What if I am missing data for some of those fields?

You do not have to fill in every input field. All fields include a Comparable City Value that is based on an average of European cities that are similar to yours. If you do not input a number in any field, the system will default to the Comparable City Value. The Comparable City Value can also be used to validate the inputs you do have. If you decide to use the Comparable City Value, please be sure to review the number to ensure that it well represents your city. All input fields are also marked as High, Moderate, or Low priority to make it easier for you to know which fields to focus on, and which ones where you might decide to just use the Comparable City Value.



Frequently Asked Questions



In the emissions inventory section of the Data Collection tab, how do I handle electricity used in the Transportation and Buildings & Heating sectors?

All electricity should go into the Electricity sector. The Transportation and Buildings & Heating sectors should include no carbon from electricity.



I have also created a SECAP emission inventory. Why does the output of the model not exactly match my SECAP?

There are likely some small methodological differences between your SECAP emission inventory and the NetZeroPlanner model. The biggest difference may be that electricity is separated into its own sector called “Electricity” whereas your SECAP emissions inventory may include electricity in the Transportation and Buildings & Heating sectors.



How should I handle carbon sinks such as forestation in the model?

The model does not calculate the carbon benefits of carbon sinks.



Frequently Asked Questions



The model calculates the carbon reduction from the 2030 Business as Usual (BAU) case. How is the BAU case calculated?

The BAU 2030 case is designed to represent what would have happened if you had not implemented your Climate Action Plan. It increases carbon over time based on population growth and reduces carbon over time through the natural replacement of worn-out equipment (cars, trucks, heating etc.) with newer more efficient fossil fuel equipment.

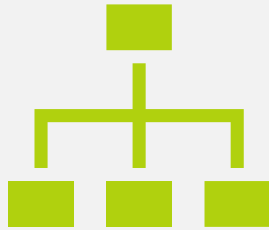


How does the model analyse just the impact of the Climate Action Plan separately from what would have happened if the plan had not been implemented?

The model calculates the incremental effect of your Climate Action Plan. This means that any decarbonisation effects as well as any costs and benefits are incremental to what would have happened if you did not implement your Climate Action Plan (otherwise known as the Business as Usual case).



Frequently Asked Questions



How does the model handle Scope 1, 2, and 3 emissions?

The model includes Scope 1 and 2 emissions. It only includes Scope 3 for solid waste (rubbish) that is discarded in the city but processed outside of the city.



The model calculates carbon and costs and benefits for four major sectors (Transportation, Buildings & Heating, Electricity, and Waste). How does it handle emissions outside of those four main sectors?

All emissions that do not fall into the four main sectors are grouped together in a sector called “Other”. This sector includes emissions from IPPU and AFOLU among other emissions. The model does not calculate the carbon reductions or costs and benefits in the “Other” sector. There is an input on the Future Assumptions tab where you can say how much you believe this “Other” sector will decline in emissions through 2030 so these emissions can be included in your planning.



Frequently Asked Questions



The expense produced by the model for the city does not exactly match what we have budgeted. Why is this?

One of the main reasons the numbers will likely not match is because the model calculates Incremental Cost, while your city likely budgets Total Cost. As an example, the model only includes the additional cost of an electric bus over an above the cost of a replacement diesel bus. Since your budget likely includes the total cost of the electric bus, your budget may be higher than what the model shows.

Another reason is that the model only includes the Direct Cost of each sub-sector or lever, not the Indirect Cost. In our bus example, it would calculate the incremental cost of the electric bus plus charging infrastructure, but it would not include the cost of a dedicated bus lane for those electric buses.



The model breaks out Capital Expense (CAPEX) and Operating Expense (OPEX). What is the difference between those two types of expenses, and why should they be separated?

CAPEX (often called Investment Expense) is the money required upfront to purchase an asset necessary for decarbonisation. OPEX is the ongoing expense necessary to use that asset. In decarbonisation projects, incremental OPEX is usually a cost savings as the cost of running the new asset is cheaper than the old asset (for example, electricity is usually cheaper than diesel fuel). City finance departments need to split CAPEX and OPEX because they are treated differently from an accounting perspective and are often funded differently.



Frequently Asked Questions



In the results tables produced by the model, the financials are shown in both “Cash” and “Net Present Value”. What is the difference and how should I use each type of analysis?

Some of the financials are expressed in cash (not discounted) and some are expressed in Net Present Value (NPV)(discounted). Cash tends to be most useful to your finance / budget departments because they need to know how much money will actually be spent. NPV is most useful in financial analysis because it brings all money back to a point in time for the calculation of Return on Investment (ROI).



The output Excel tables show that the citizens of our city are responsible for a very large amount of the investment needed to decarbonise. Our national government provides subsidies, so the investment burden on our citizens will not be so large. Where do those subsidies show up in the analysis?

The model only includes Uses of Funds, not Sources of Funds. It says how much things cost, but it does not say where the funds will come from to pay for those costs. The costs you see in the model outputs do not take into account any subsidies provided by the government to reduce that cost to citizens.

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NetZeroPlanner is a tool for climate strategic planning and performance management



City provides city-specific baseline year data inputs and 2030 Climate Action Plan assumptions

Valencia CAP 2030

Data completion score: 100%

Your score rates how complete city data is, weighing important local values for accurate predictions. Enter city data to improve your score and get better projections.

High priority: 132/132 Moderate priority: 38/38 Low priority: 29/29

View Outcomes Dashboard Export Outcomes as Excel

Data collection center

Data collection (2018) Future assumptions (2030)

Collect essential data about your city's current state across key sectors. This phase focuses on gathering raw data to establish a baseline for your city's climate initiatives.

1. Demographic data 2/2 1/1

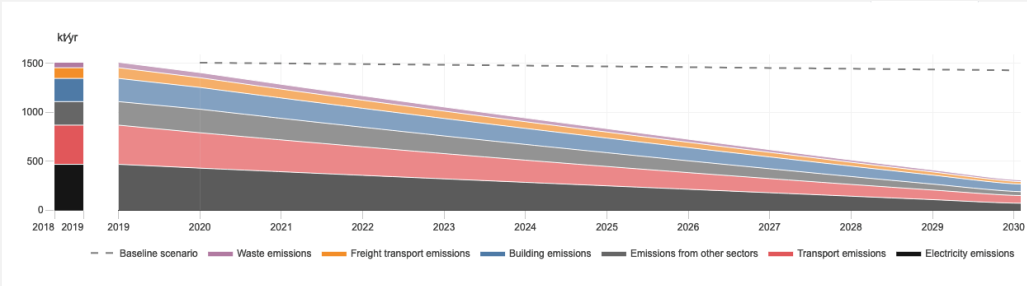
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Transport need - passenger cars + motorcycles	2,935	Wpkm/year	2,695	High	https://lulmet.upv.es/handle/10251/175281

NetZeroPlanner tool:

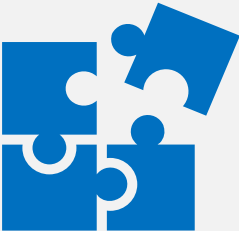
mathematical calculations for validation and analysis

Decarbonisation Dashboard and downloadable Excel tables



Subsectors					
Electricity emissions	Transport emissions	Emissions from other sectors	Building emissions	Freight transport emissions	Waste emissions
Scenario forecast 2030 70 kt/yr Change 2019 - 2030 -85%	Scenario forecast 2030 79 kt/yr Change 2019 - 2030 -80%	Scenario forecast 2030 41 kt/yr Change 2019 - 2030 -83%	Scenario forecast 2030 78 kt/yr Change 2019 - 2030 -67%	Scenario forecast 2030 26 kt/yr Change 2019 - 2030 -76%	Scenario forecast 2030 17 kt/yr Change 2019 - 2030 -69%

NZP Database: Research-based non-city-specific data and assumptions



A-2.1: Emissions Gap (kt CO2e)									
	Baseline Emissions (BAU 2030)	Emissions Reduction Resulting from CNAP		Remaining Emissions		Residual Emissions Offsetting		Emissions Gap (amount necessary to achieve net-zero)	
	(Absolute value)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)	(Absolute value)	(% of BAU 2030)
Transport	380	276	73%	104	27%	104	27%	0	0%
Buildings & Heating	319	297	93%	22	7%	22	7%	0	0%
Electricity	459	390	85%	69	15%	69	15%	0	0%
Waste	71	61	86%	10	14%	10	14%	0	0%
Other (incl. IPPU & AFOU)	239	199	83%	40	17%	40	17%	0	0%
Total	1469	1224	83%	245	17%	245	17%	0	0%



Downloadable Excel tables help with analysis, learning, and plan creation

- NetZeroCities (NZC) provides templates on the web portal which may be helpful to you in creating your [Climate Action Plan](#) and the supporting [Climate Investment Plan](#).
- NetZeroPlanner provides tables that are downloadable in Excel and formatted to the NZC plan templates.
- These downloadable tables can be very helpful to you in analysing your Climate Action Plan and funding needs whether you use the NZC plan templates or not.

Valencia CAP 2030

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2 Moderate priority: 36/38

3 Low priority: 29/29

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[Export Outcomes as Excel](#)

Investment Plan example: Sectoral Costing (NPV basis)



B-1.1: Table 6 Sectoral Costing (Net Present Value - NPV)						
Sector	Subsector	NPV Investment Expense - CAPEX (MEUR 2020-2030)	NPV Operational Savings - OPEX (MEUR 2020-2040)	Year 2030 kton CO2e Reduction	NPV MEUR Investment Expense / Year 2030 kton CO2e Reduction	NPV Co-benefits (MEUR 2020-2040)
Transport	Reduced motorized passenger transportation need	€ -	€ 1,443	103	€ -	€ 340
	Shift to public & non-motorized transport	€ (127)	€ 253	45	€ 2.84	€ 364
	Increased car pooling	€ -	€ 423	26	€ -	€ 122
	Electrification of cars + motorcycles	€ (48)	€ (1)	23	€ 2.10	€ 12
	Electrification of buses	€ (39)	€ 23	14	€ 2.81	€ 17
	Optimized logistics	€ -	€ 195	43	€ -	€ 66
	Electrification of trucks	€ (102)	€ 6	22	€ 4.64	€ 15
Buildings & Heating	Building renovations (envelope)	€ (1,315)	€ 255	24	€ 54.87	€ 20
	New energy-efficient buildings	€ (121)	€ 77	7	€ 18.27	€ 6
	Efficient lighting & appliances	€ (421)	€ 938	74	€ 5.70	€ 7
	Decarbonizing heating generation	€ (197)	€ 163	193	€ 1.02	€ 73
Electricity	Decarbonizing electricity generation	€ (202)	€ 312	390	€ 0.52	€ -
Waste	Increased waste recycling	€ 5	€ 5	61	€ (0.08)	€ 2
TOTAL		€ (2,568)	€ 4,091	1024	€ 2.51	€ 1,044

* Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

- All financial information in this table is on a Net Present Value (discounted) basis which is most helpful in calculating Return on Investment.
- In this example, it will take an NPV investment of 2.51 MEUR to reduce CO2e in the year 2030 by one kton. Building renovations are the most expensive investments (at 54.87 MEUR) per kton CO2e reduced.
- In the NZC plan template, this table is input for B-1.1 table 6.



Exercise: Sectoral Costing

Look at the previous table (*answers to following questions can also be found on previous slide*):

- How much in total will this city have to invest (CAPEX: Capital Expense) to decarbonise?
- Which sub-sector requires the most investment? Why do you think it is the most expensive?
- Which sub-sector is the most expensive per kton of CO₂e reduced in 2030? Which is the cheapest? How might this help you prioritize which sub-sectors to invest in?

Savings in OPEX (Operating Expense) and Co-benefits can help make the case to city leaders about why they should invest in climate actions.

- How much will the city save in OPEX that will serve to defray the CAPEX costs over time?
- Which sub-sector saves the most money over time? Why do you think it saves so much money?
- How much will the city save in health costs (Co-benefits) by implementing their Climate Action Plan?

Investment Plan example: Capital Planning by Stakeholder (Cash Basis)



B-2: Table 8 - Capital Planning by Stakeholder - Total Investment-CAPEX (Cash Basis MEUR 2020-2030)							
Sector	Subsector	Citizens	Businesses	City	Transport Operators	Utilities	Total
Transport	Reduced motorized passenger transportation need	€ -	€ -	€ -	€ -	€ -	€ -
	Shift to public & non-motorized transport	€ (21)	€ -	€ (9)	€ (126)	€ -	€ (156)
	Increased car pooling	€ -	€ -	€ -	€ -	€ -	€ -
	Electrification of cars + motorcycles	€ (42)	€ (11)	€ (1)	€ -	€ -	€ (54)
	Electrification of buses	€ -	€ -	€ -	€ (48)	€ -	€ (48)
	Optimized logistics	€ -	€ -	€ -	€ -	€ -	€ -
	Electrification of trucks	€ -	€ (21)	€ (3)	€ (103)	€ -	€ (127)
Buildings & Heating	Building renovations (envelope)	€ (1,083)	€ (387)	€ (77)	€ -	€ -	€ (1,548)
	New energy-efficient buildings	€ (43)	€ (86)	€ (14)	€ -	€ -	€ (143)
	Efficient lighting & appliances	€ (348)	€ (124)	€ (25)	€ -	€ -	€ (497)
	Decarbonizing heating generation	€ (67)	€ (24)	€ (32)	€ -	€ (109)	€ (232)
Electricity	Decarbonizing electricity generation	€ (29)	€ (10)	€ (2)	€ -	€ (205)	€ (247)
Waste	Increased waste recycling	€ -	€ -	€ 6	€ -	€ -	€ 6
TOTAL		€ (1,634)	€ (664)	€ (158)	€ (277)	€ (314)	€ (3,046)
% of Total		54%	22%	5%	9%	10%	100%
Euros Per Capita (2030 population)		€ (1,994)	€ (810)	€ (192)	€ (337)	€ (384)	€ (3,718)

* Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

- All financial information in this table is on a Cash (not discounted) basis which is most helpful when comparing to city budgets. Because it is on a cash basis, the total CAPEX will not match the prior table which is on an NPV basis.
- In this example, 3 BEUR in incremental investment will be required through 2030 with 158 MEUR (5%) spent by city directly.
- In the NZC plan template, this table is input for B-2 table 8.

Exercise: Capital Planning by Stakeholder



Look at the previous table (*answers to following questions can also be found on previous slide*):

- How much of the required investment to implement the Climate Action Plan does the City control?
- Which stakeholder group will have to invest the most to achieve the CAP?
- How will you influence, motivate, and support citizens and businesses to invest their own funds to decarbonise? What funding and policies are in place at the regional, national, and EU level to help change citizen and business behaviour to decarbonise?

Based on the list of selected actions in your group's concept Climate Action Plan (see module 3) :

- Who are the stakeholders to involve?
- Which co-benefits could be of interest to them?

Investment Plan example: Key Performance Indicators by Sector

B-3.1 Table 10: Economic Indicators by Sector				
Sector	Indicator	Indicator Unit	Indicator Baseline	Indicator Target 2030
Transport	Reduced motorized passenger transportation need	% reduction by 2030		35%
	Reduced passenger kilometers by car through shift to public & non-motorized transportation	% reduction in car passenger kilometers by 2030		30%
	Car pooling	average passengers per car	1.2	1.5
	Electrification of cars + motorcycles by 2040	% of fleet electrified	0%	35%
	Electrification of buses	% of fleet electrified	0%	100%
	Optimization of trucking logistics - light duty trucks (< 3.5 t)	average utilization of maximum load weight for light duty trucks (< 3.5t)	23%	45%
	Optimization of trucking logistics - heavy duty trucks (> 3.5 t)	average utilization of maximum load weight for heavy duty trucks (< 3.5t)	45%	60%
	Electrification of light duty trucks <3.5t by 2040	% of fleet electrified	0%	90%
	Electrification of heavy duty trucks <3.5t by 2040	% of fleet electrified	0%	60%

- By showing baseline and 2030 target side by side for the Key Performance Indicators, cities can make better decisions on how ambitious they want to be in their Climate Action Plans.
- In the NZC plan template, this table is input for B-3.1 table 10.



Exercise: Key Performance Indicators

Look at the previous table *(answers to following questions can also be found on previous slide)*:

- Do you think this city's 2030 goals for transportation are too high or too low? How do they compare to your own goals?
- This city will be investing a lot of money in electric buses to get from 0% electric to 100% electric by 2030. How would you track their success in implementing this action over the next six years?
- Electrification of transport is a large part of this city's Climate Action Plan. In order for electrification to be successful, what other sector needs to decarbonise?

Investment Plan example: Return on Investment by Sector (NPV basis)



B-3.1 Table 11: Financial Indicators by Sector

Sector	Subsector	NPV Investment Expense - CAPEX (MEUR 2020-2030)	NPV Operational Savings - OPEX (MEUR 2020-2040)	NPV Co-benefits (MEUR 2020-2040)	NPV Return on Investment (ROI) (MEUR 2020-2040)	% Return on Investment (ROI)	Year 2030 kton CO2e Reduction	NPV MEUR Investment Expense / Year 2030 kton CO2e Reduction
Transport	Reduced motorized passenger transportation need	€ -	€ 1,443	€ 340	€ 1,783	0%	103	€ -
	Shift to public & non-motorized transport	€ (127)	€ 253	€ 364	€ 489	384%	45	€ 2.84
	Increased car pooling	€ -	€ 423	€ 122	€ 545	0%	26	€ -
	Electrification of cars + motorcycles	€ (48)	€ (1)	€ 12	€ (38)	-78%	23	€ 2.10
	Electrification of buses	€ (39)	€ 23	€ 17	€ 2	5%	14	€ 2.81
	Optimized logistics	€ -	€ 195	€ 66	€ 262	0%	43	€ -
	Electrification of trucks	€ (102)	€ 6	€ 15	€ (81)	-80%	22	€ 4.64
Buildings & Heating	Building renovations (envelope)	€ (1,315)	€ 255	€ 20	€ (1,040)	-79%	24	€ 54.87
	New energy-efficient buildings	€ (121)	€ 77	€ 6	€ (37)	-31%	7	€ 18.27
	Efficient lighting & appliances	€ (421)	€ 938	€ 7	€ 524	124%	74	€ 5.70
	Decarbonizing heating generation	€ (197)	€ 163	€ 73	€ 38	19%	193	€ 1.02
Electricity	Decarbonizing electricity generation	€ (202)	€ 312	€ -	€ 110	54%	390	€ 0.52
Waste	Increased waste recycling	€ 5	€ 5	€ 2	€ 12	-248%	61	€ (0.08)
TOTAL		€ (2,568)	€ 4,091	€ 1,044	€ 2,567	100%	1024	€ 2.51

* Note: negative numbers denote outflows of money (investment / cost) and positive numbers denote inflows of money (savings / co-benefits)

- All financials on this table are shown on an NPV basis in order to calculate Return on Investment (ROI).
- In this example, the overall Return on Investment (ROI) is 100%.
- Co-benefits make up 20% of the return.
- In the NZC plan template, this table is input for B-3.1 table 11.



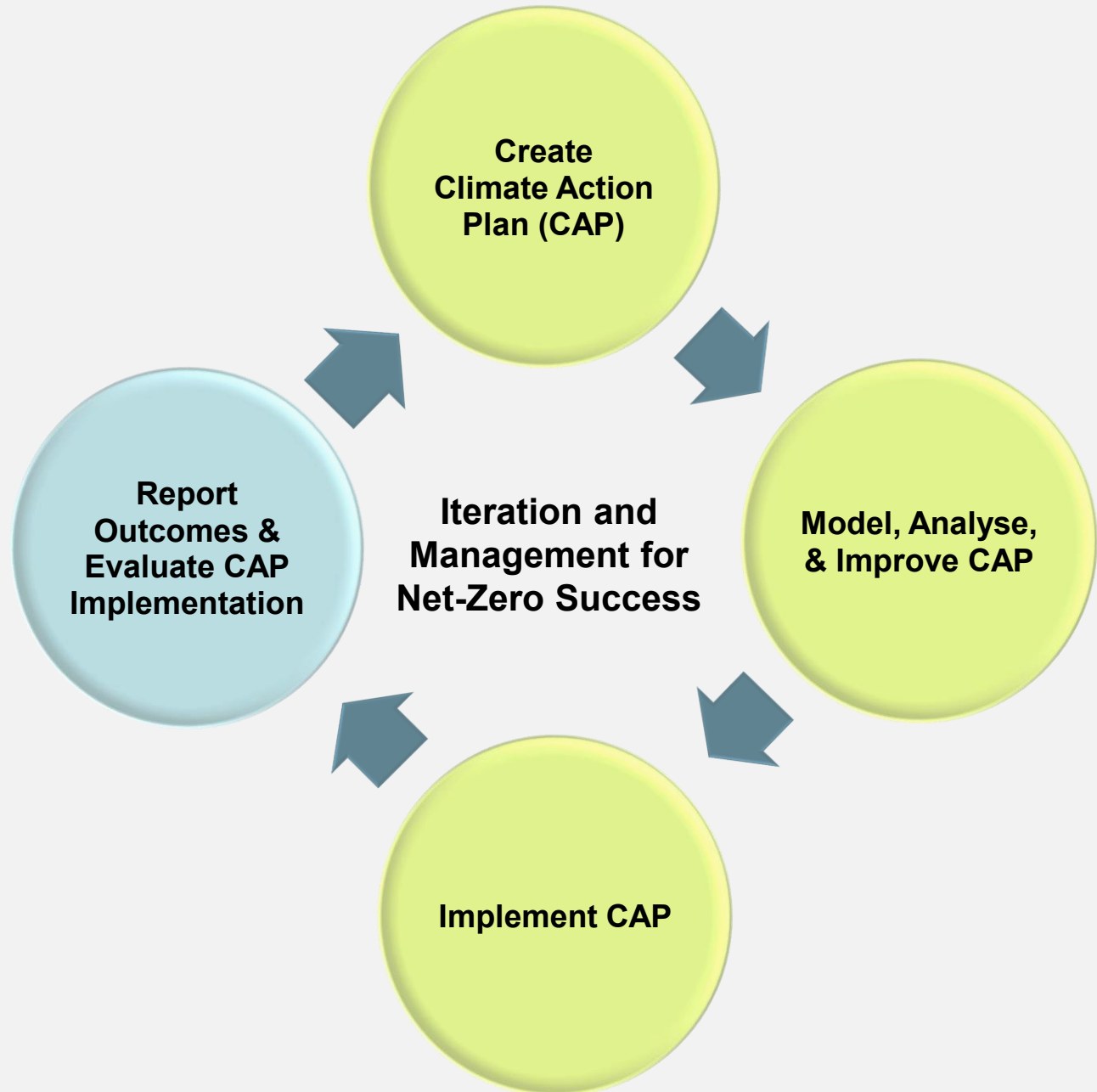
Exercise: Return on Investment by Sector

Look at the previous table *(answers to following questions can also be found on previous slide)*:

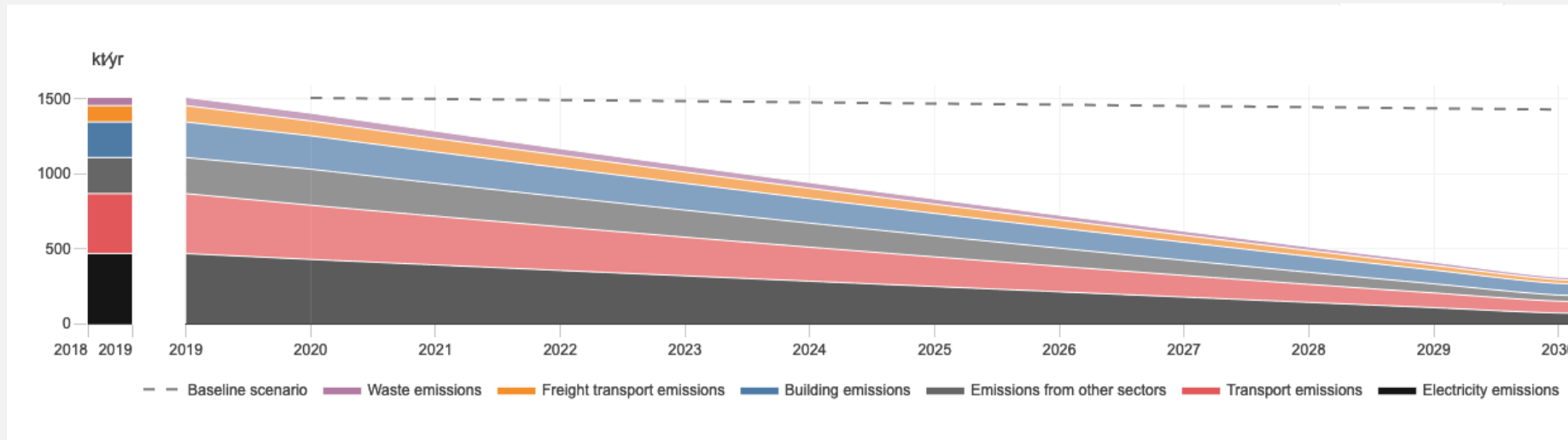
- How much of the total Return on Investment is made up of co-benefits? Would this city's Climate Action Plan still have a positive ROI even without co-benefits?
- Electric cars and trucks show a negative ROI because they are still more costly than ICE vehicles. This should change as the cost of electric vehicles continues to fall.
- Building renovations has a negative ROI and a high cost per kton of 2030 carbon reduced. Building renovations are still play an important climate role because buildings generate such a high proportion of city emissions.



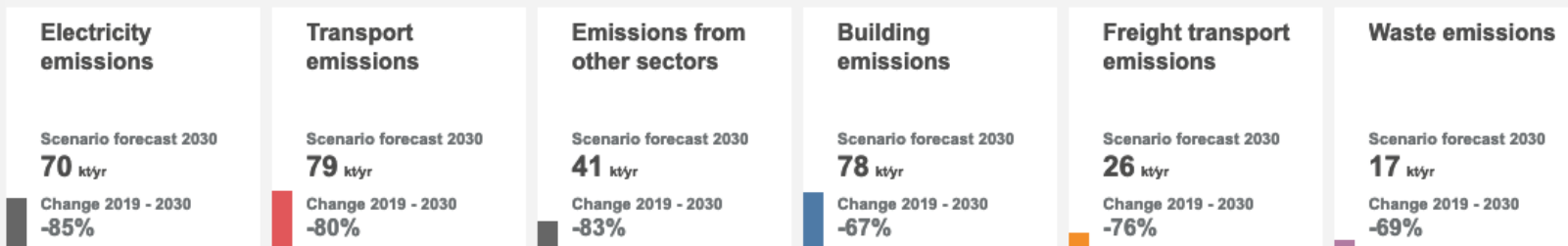
**Progress Tracker
allows cities to
report actual results
against their original
plan by sector to
learn and adjust
based on what is
working and what is
not**



Progress Tracker allows for informed progress management based on actual results to plan



Subsectors



Scheduled to be available in NetZeroPlanner by year-end 2024