

# The City Performance Tool- How cities use LCM based decision support

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# The challenge for cities: Environmental, economic, short-long term

## Europe

### GHG emissions reduction targets

Copenhagen	100% by 2025
Stockholm	100% by 2050
Oslo	95% by 2030
Helsinki	92% by 2050
London	60% by 2025

## Americas

### GHG emissions reduction targets

Seattle	100% by 2050
Portland	80% by 2050
Washington DC	80% by 2050
Houston	36% by 2016
Los Angeles	35% by 2030

## Asia

### GHG emissions reduction targets

Seoul	40% by 2030
Tokyo	25% by 2020
Wuhan	20% by 2015



“How can infrastructure improvements help us achieve our sustainability targets?”



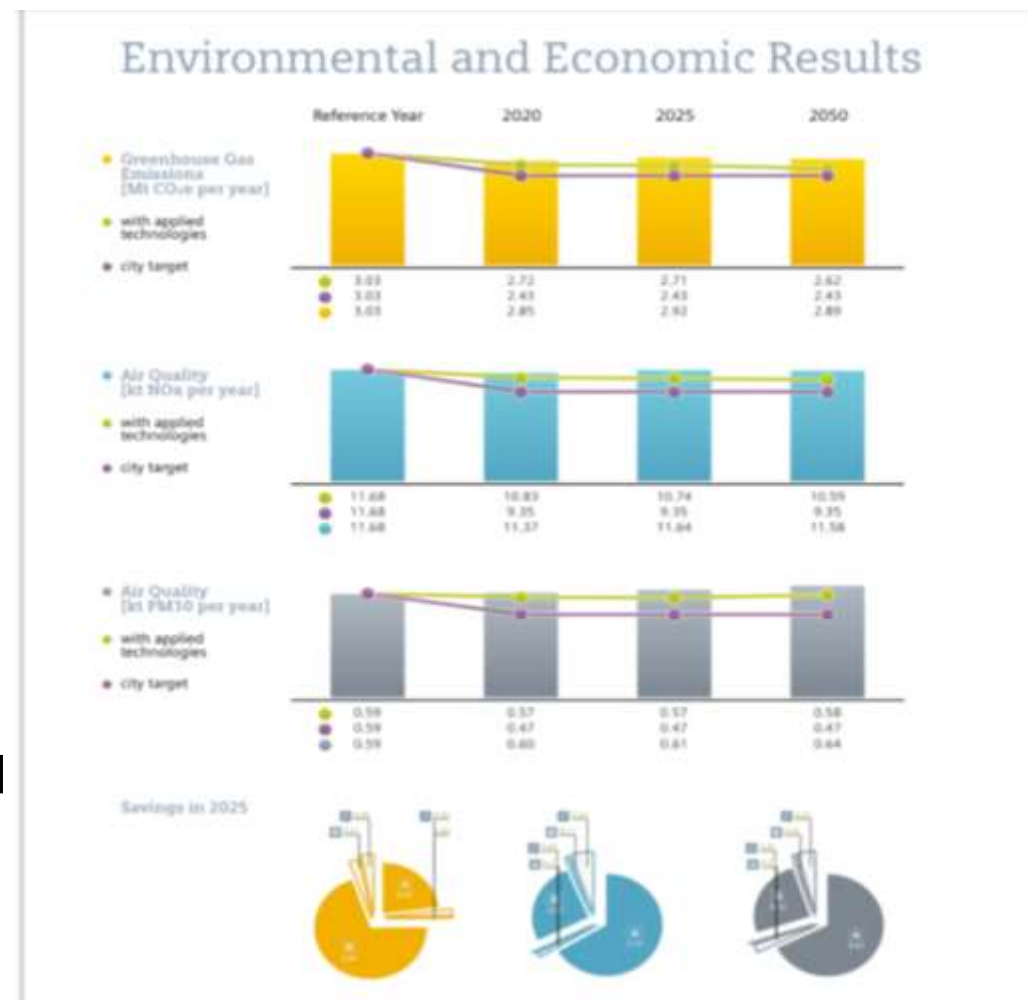
“What are the economic and environmental implications of our plans?”



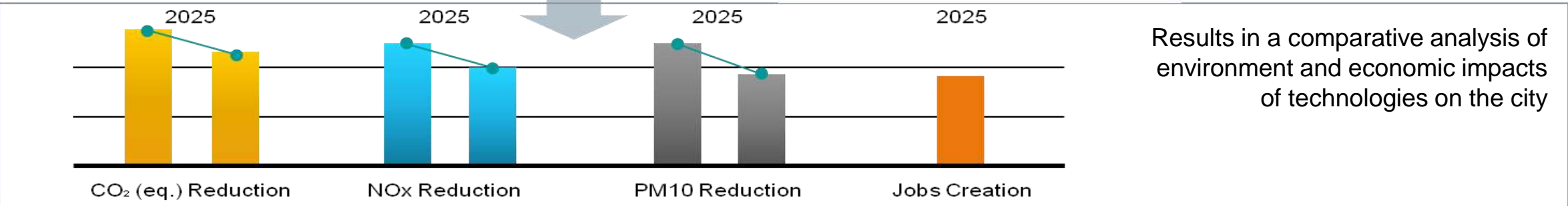
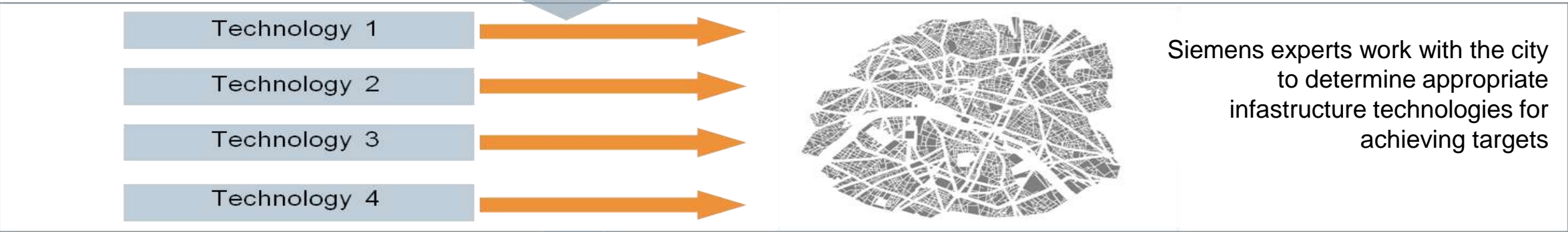
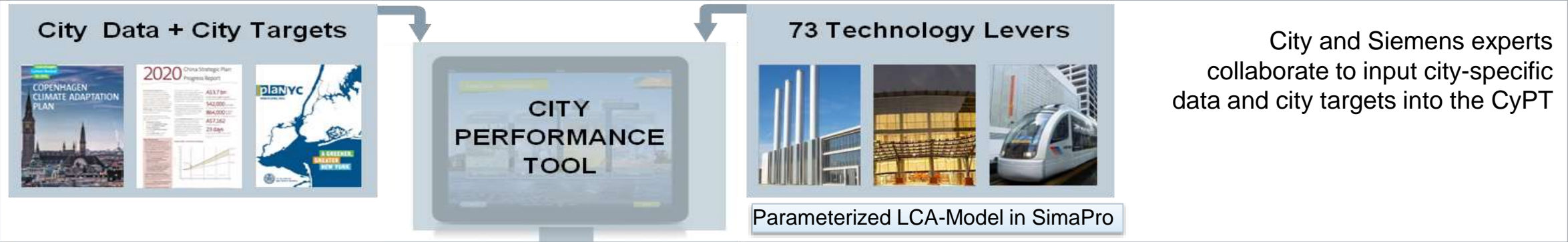
“How quickly do we need to build infrastructure to meet our targets?”

## What is the CyPT?

- The City Performance Tool- CyPT is a long-term strategic planning tool, which models how different combinations of energy, buildings, and transport technologies impact:
  - **Air Quality** (NOx and PM10)
  - **GHG Emissions**
  - **CAPEX and OPEX**
  - **Job Creation**
- The City Performance Tool (CyPT) builds on **Siemens' proven experience** to help city decision makers exceed targets.
- Results are published in an **infrastructure strategy report**



# The CyPT- Workflow



# Model and process: Baselineing the city status

## Collect data

City provides its data and targets, which is used to customize the model.



Months 1 - 4

### Buildings

80+ data points including:

- Floor space
- Electricity usage
- Building envelope

### General

5 data points including:

- Population
- Emissions targets

### Transport

120+ data points including:

- Passenger & freight demand
- Public transport & infrastructure
- Building envelope

### Energy

50+ data points including:

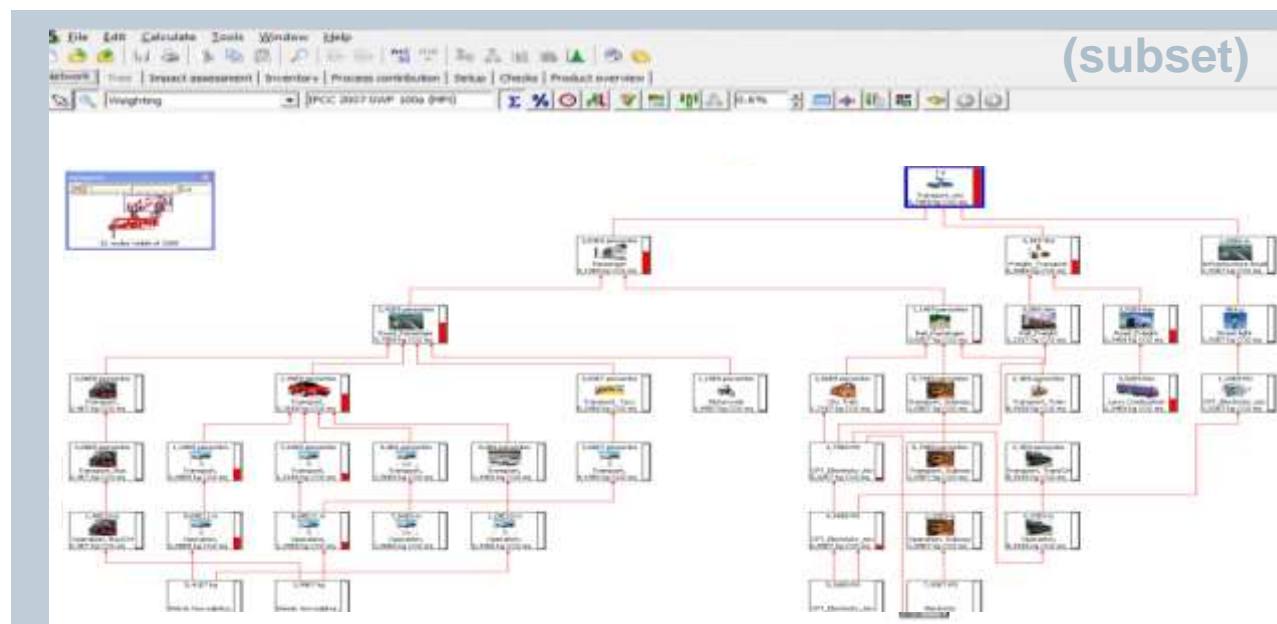
- Consumption
- Source mix
- Grid losses



## CyPT –Baseline and Lever Impact Model based on LCA

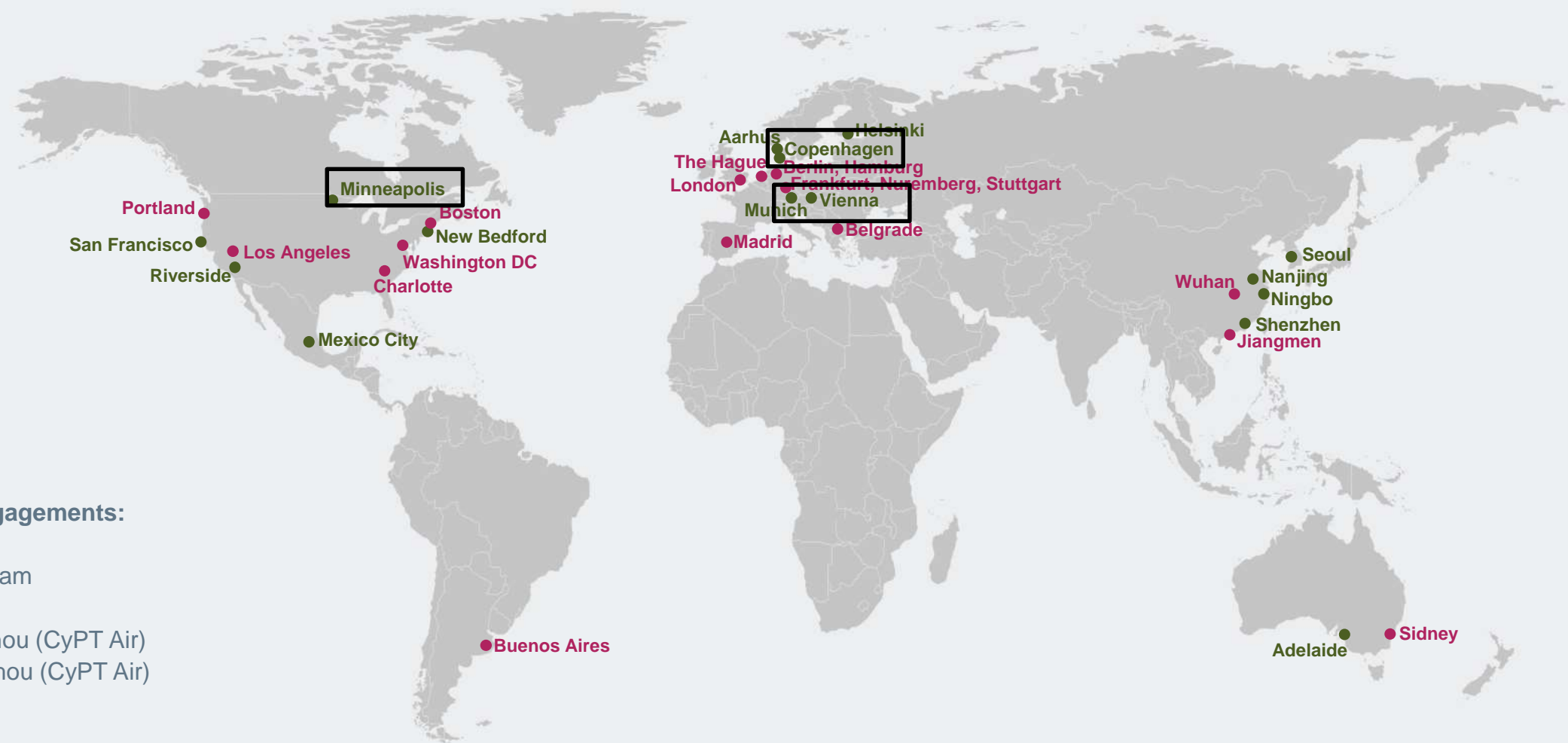
- Bottom-up simulation of emission baseline
- Which and how much **energy is required** to serve the city's demand in transport and buildings?
- Which **infrastructure technologies** are available, what is the **efficiency** of, how can the **demand shifted** or reduced?
- From the **implementation rate** and specifics of the cities transport system we calculate the impact to KPI's like CO<sub>2</sub> or air quality in SimaPro

### The city model in a professional LCA tool (SimaPro)



240 Impact assessments per 70+ levers to serve 3 implementation rates and 3 observation years= 17000 result sets (consists 9 KPIs values) each are calculated and transferred to CyPT APP

# CyPT Engagements



## Next Engagements:

- Zurich
- Amsterdam
- Prague
- Zhengzhou (CyPT Air)
- Guangzhou (CyPT Air)

● Projects Completed (15)

● Projects Initiated (17)

## Vienna: Defined scenarios to achieve -35% GhG by 2030

### Vienna First Technologies implemented

Increased CHP contribution

Residential wall insulation

Residential double/triple glazing

Commercial wall insulation

Commercial double/triple glazing

LED street lighting

Metro ATO

CNG cars

Hybrid electric vehicles

Intermodal traffic management

### Vienna Accelerated Technologies fit to Vienna's strategy

Photovoltaic power generation

Residential efficient lighting

Residential home energy monitoring

Commercial efficient lighting

Commercial demand oriented lighting

Commercial building efficiency monitoring

Commercial building performance optimization

Demand controlled ventilation

Metro – new line

Urban bike sharing

Plug in hybrid electric car

Electric bus

Intelligent traffic light management

### Vienna Experimental Additional technologies to be implemented

Residential home automation

Commercial heat recovery

Hybrid electric bus

Train - ATO

Electric cars

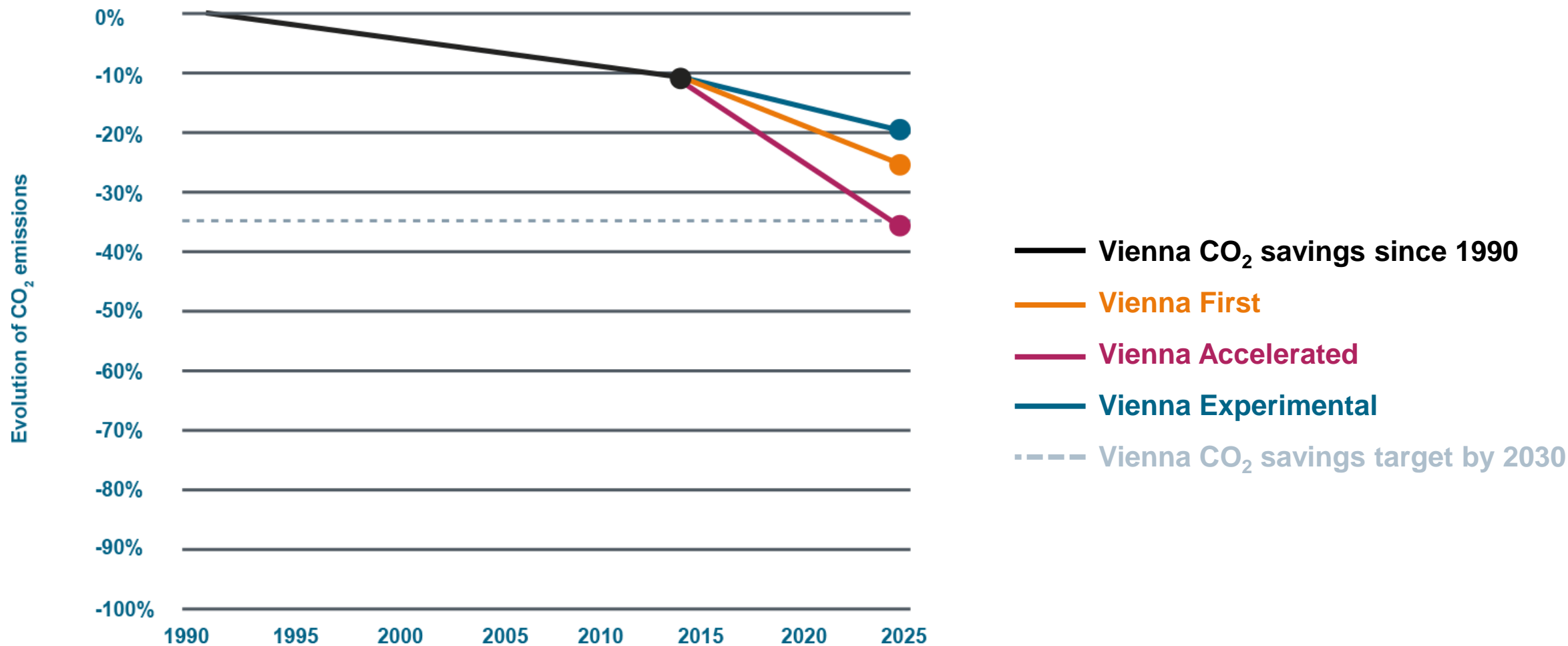
Electric taxis

Demand oriented street lighting

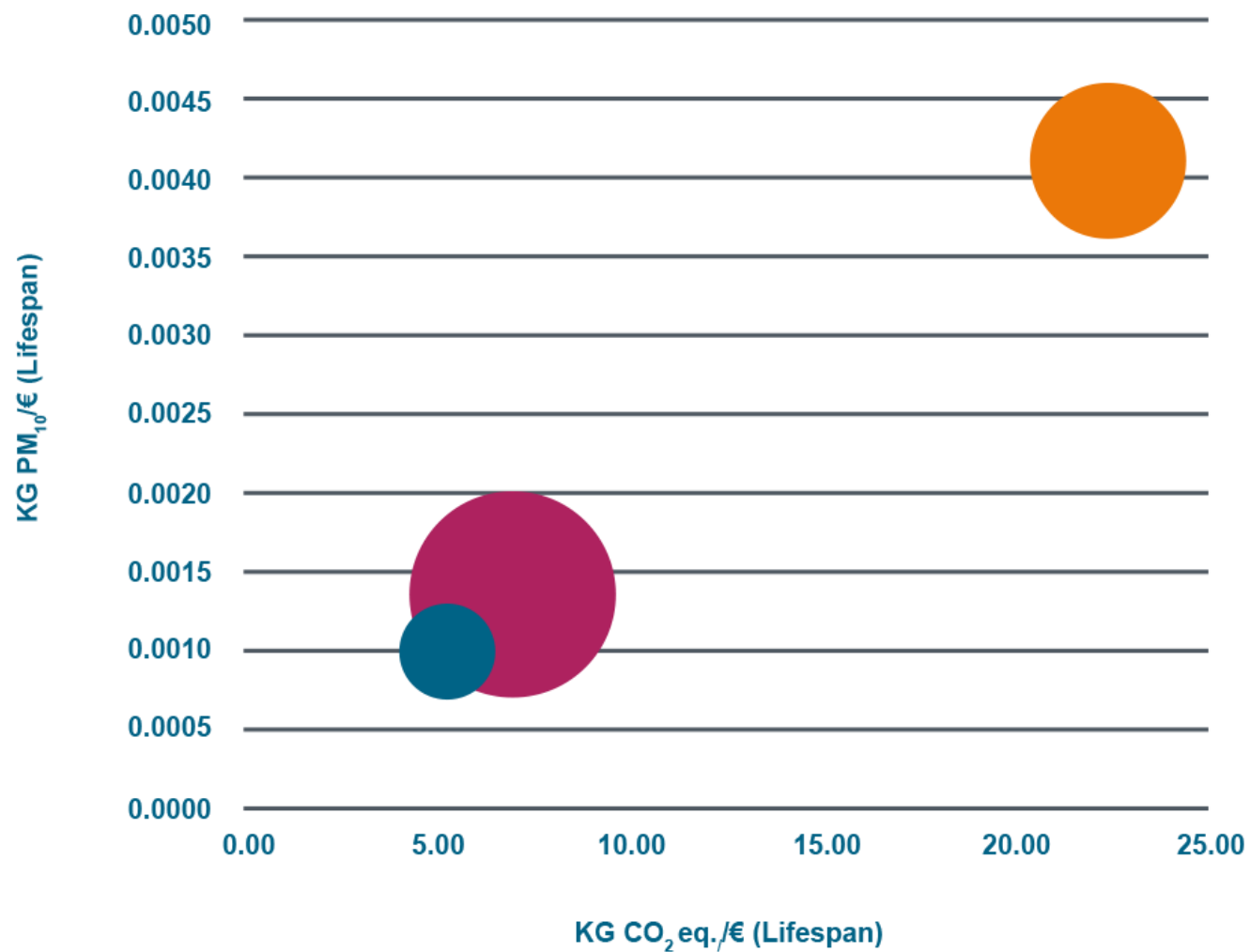
Electric car sharing



## Case study: Vienna can reach its target by 2025

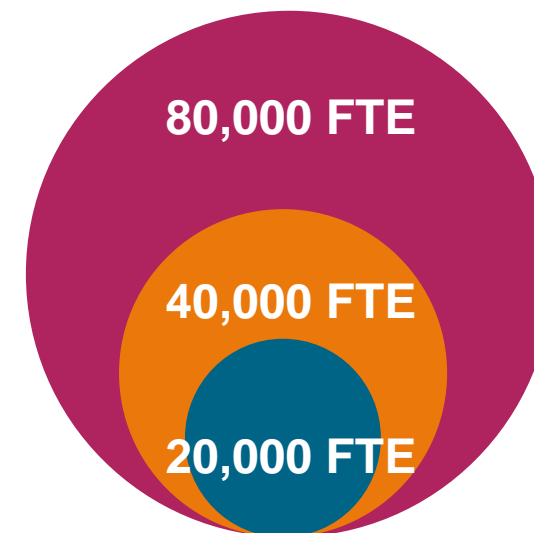


## Case study: Vienna First is most cost competitive



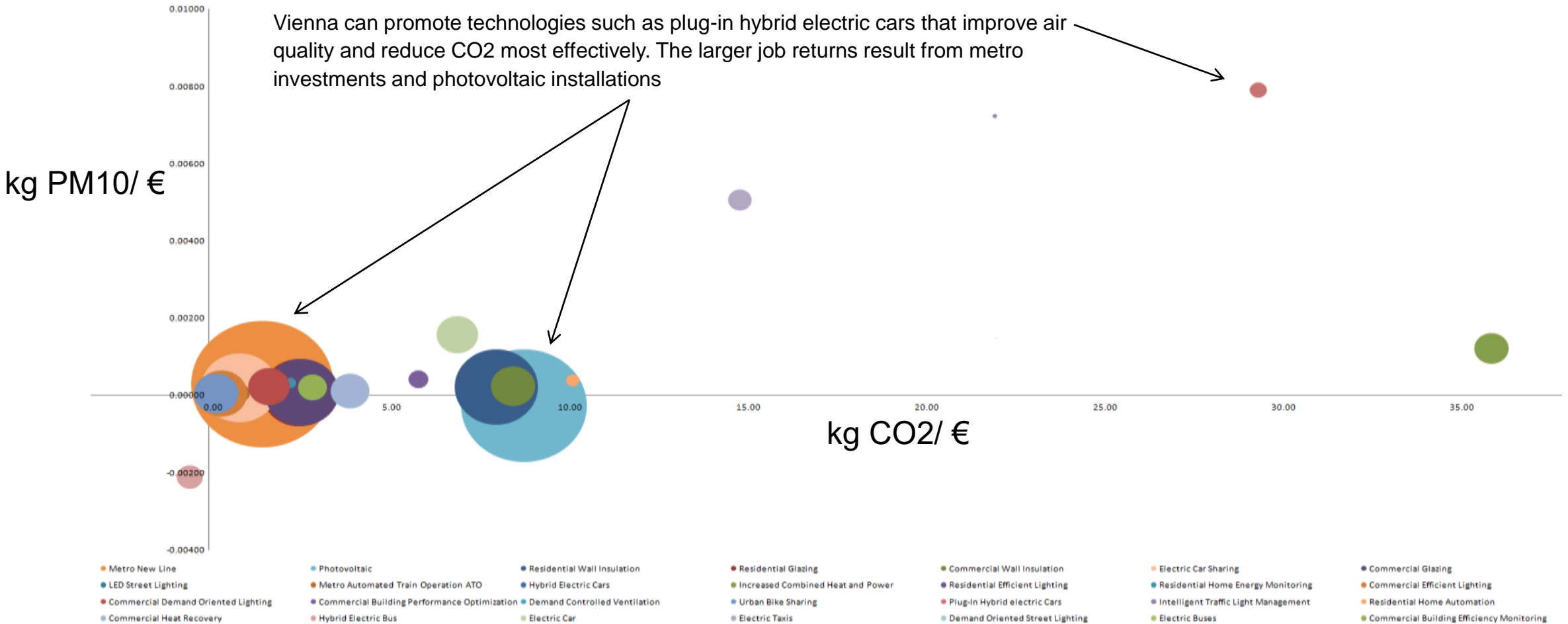
## Comparisons per scenario

- Vienna First
- Vienna Accelerated
- Vienna Experimental



**Jobs creation**

# Vienna's top technologies



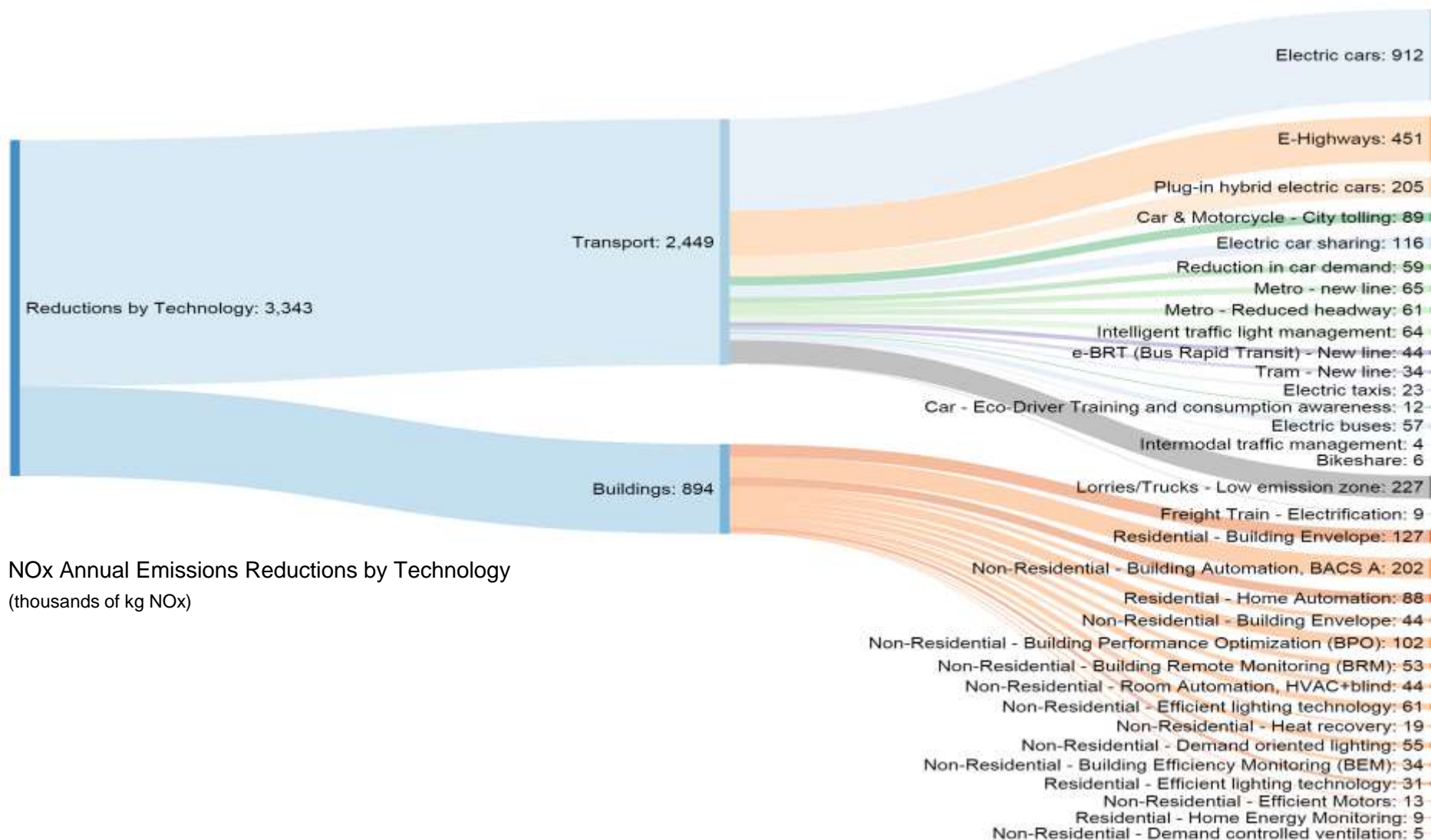
Key: The larger the bubble the more jobs the technology will induce.

Bubbles on the top right of the chart, reduce the larger amount of green house gases and PM10 levels per unit of investment

# Mineapolis: Required technology mix for clean air plans

73%

Reduction in **NOx**  
Annual Emissions  
between 2006 and 2050



## Case study Copenhagen: Responsibility outside of City boundaries

Lever	% Reductions CO <sub>2</sub> e	kg CO <sub>2</sub> eq savings / CAPEX	Total jobs
Building Efficiency Monitoring (BEM)	0.7%	1.3	900
Building Performance Optimization (BPO)	2%	5	400
Heat recovery	1.3%	0.1	2,600
Building Automation, BACS A	4%	0.1	5,400
Room Automation, HVAC+blnd	1%	0	8,000
Building Remote Monitoring (BRM)	1%	2	1,400

Figure 9: Shortlisted smart technologies providing the largest savings

6 technologies,  
10% reductions

40 building  
owners own  
20%

5 mill. EUR  
investment per  
year

18.000+ jobs to  
the local  
economy

## Summary and conclusion

- Cities vary in focus (environmental, economic or social aspects/KPIs)
- CyPT is to recognize and select technologies, using a LCA based decision support approach.
  - (example Mineapolis and the underlying technology mix for air quality improvement)
- CyPT is parameterized LCA model but also determines capital and operational investments across the lifespan
  - (example of Vienna, where cost effective technology opportunities meet its CO<sub>2</sub> mitigation targets)
- CyPT helps to optimize investment strategies for your city's long term needs.
  - (example of Copenhagen, where technology investments must come from outside budgets)

## Siemens City Performance Tool

[www.siemens.com/cypt](http://www.siemens.com/cypt)

<https://www.siemens.com/global/en/home/company/topic-areas/intelligent-infrastructure/city-performance-tool.html>

<https://www.cyptportal.siemens.com/#!/welcome>

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