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Future-proof urban infrastructure planning.

Siemens City Performance Tool (CyPT)

Agenda

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1 Overview

2 CyPT Process

3 Next Steps

1

Overview

CyPT Process

Next Steps

The Challenge

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Europe
GHG emissions reduction targets

Copenhagen	100% by 2025
Oslo	100% by 2050
Stockholm	100% by 2050
London	60% by 2025
Berlin	40% by 2020
Amsterdam	40% 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
Vancouver	33% by 2020
Buenos Aires	33% by 2030
Sao Paolo	30% by 2012
New York	30% by 2030
San Francisco	25% by 2017
Boston	25% by 2020
Santiago de Chile	20% by 2020

Asia
GHG emissions reduction targets

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

Australia
GHG emissions reduction targets

Melbourne	100% by 2020
Sydney	70% by 2030

Africa
GHG emissions reduction targets

Johannesburg	30% by 2025

Siemens Role in Supporting Urban Sustainability

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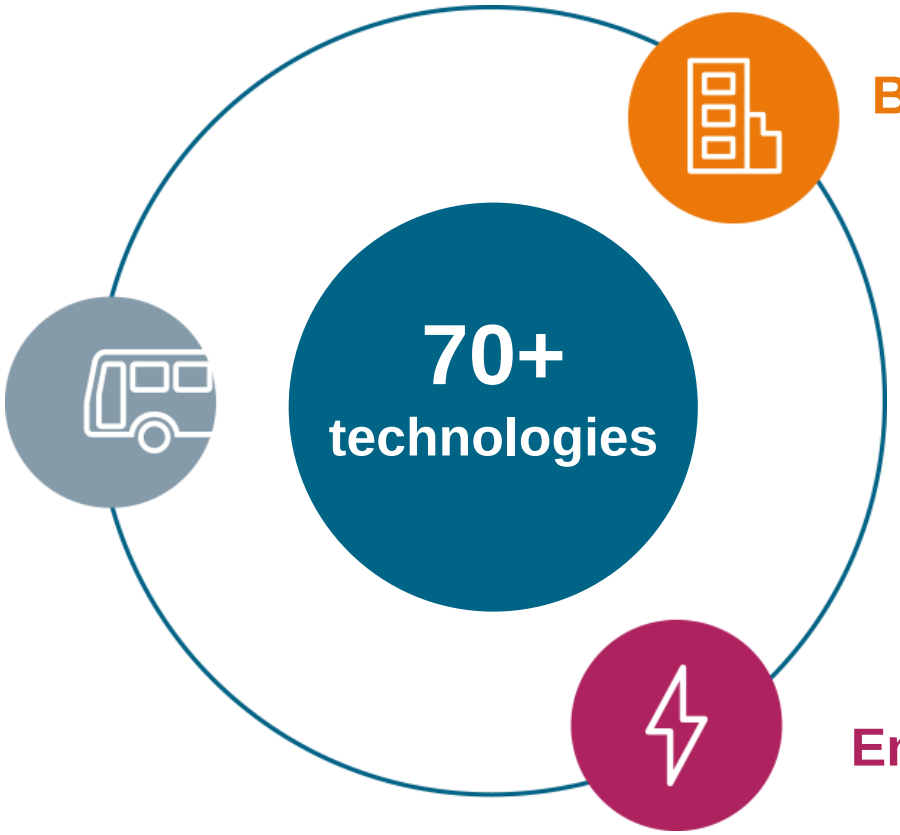


Buildings

- Building envelope
- Building automation
- Monitoring and optimization

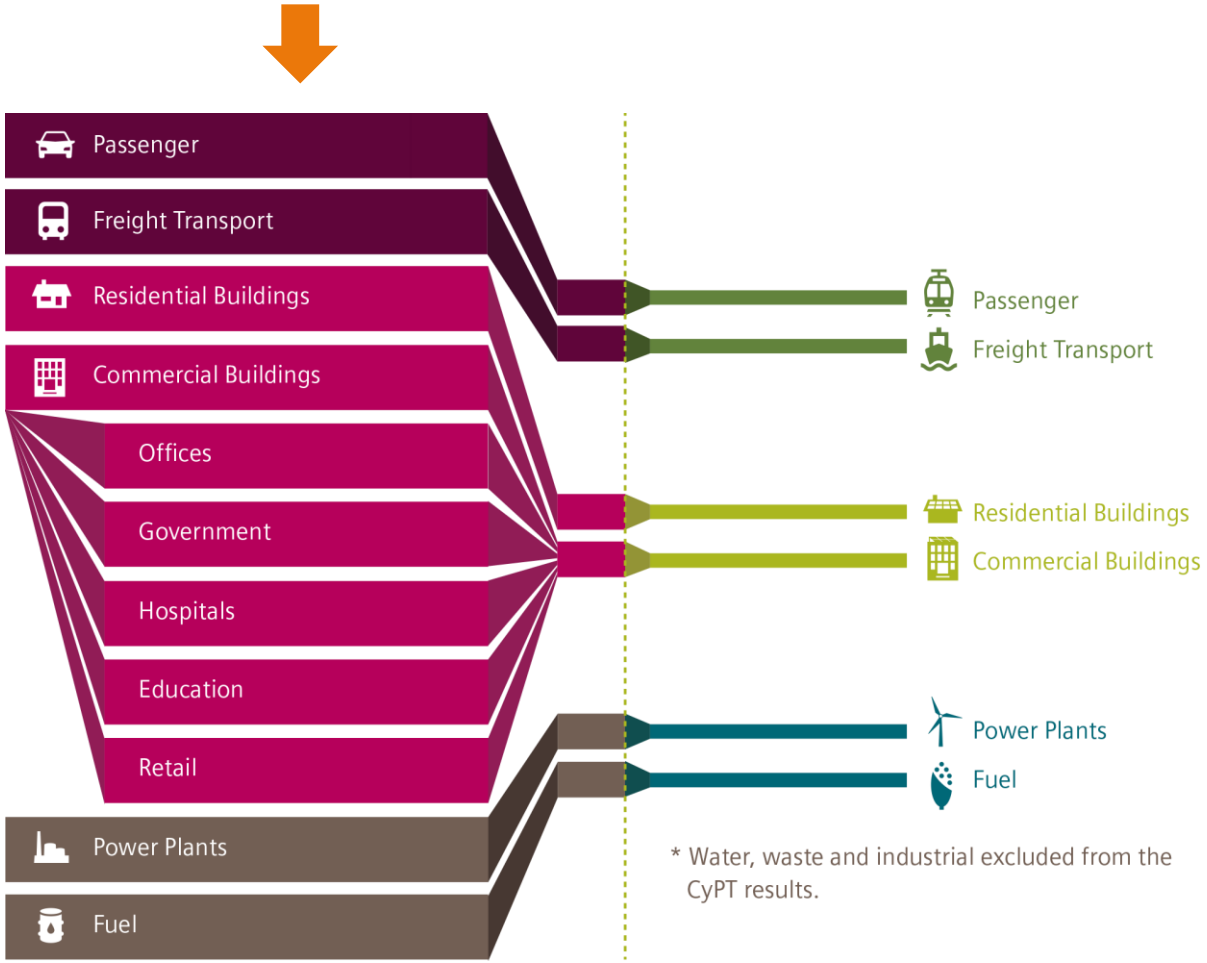
Transport

- Public transport
- Private transport
- Traffic management
- Freight

Energy

- Renewable generation
- Grid management

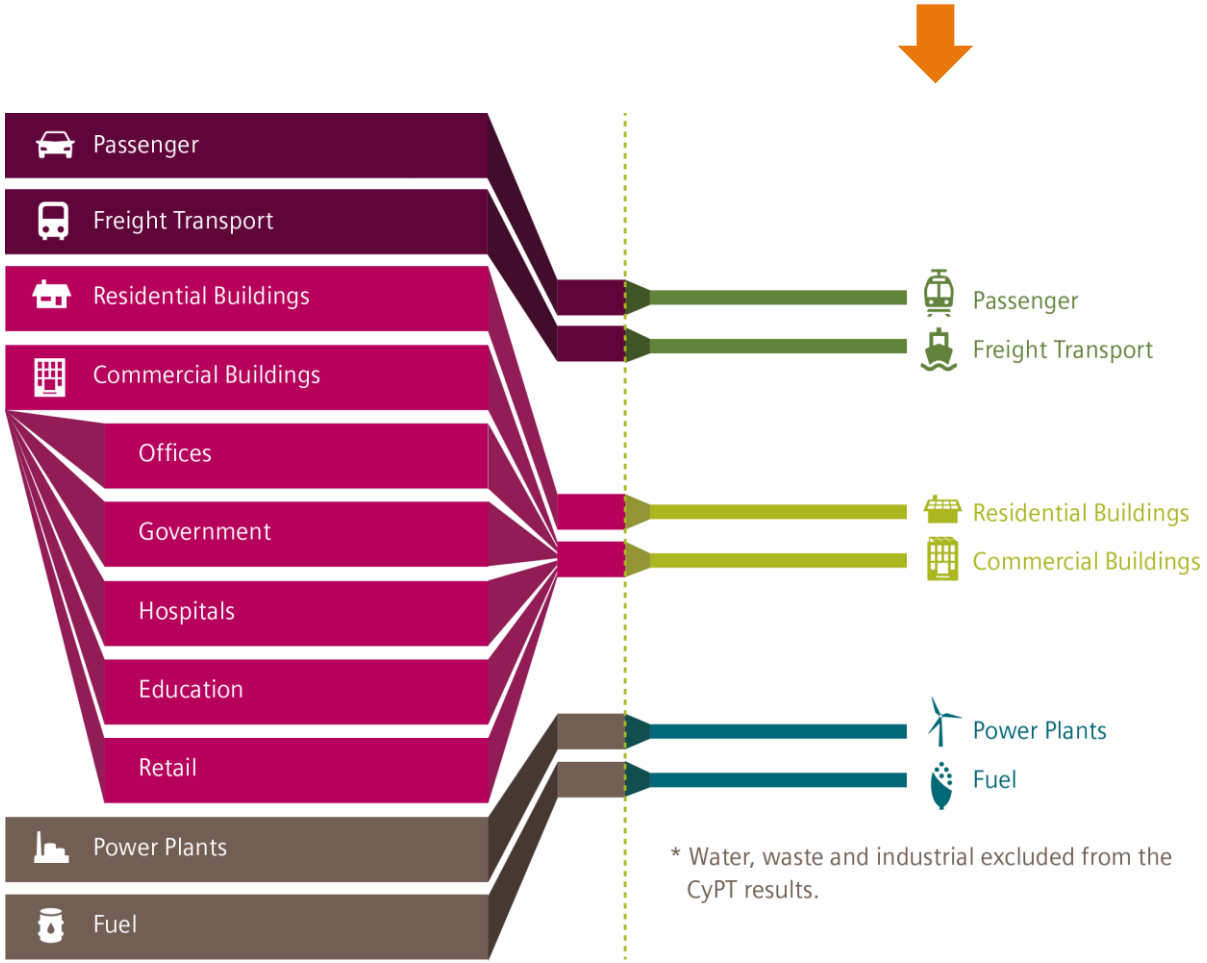
The City Performance Tool (Step 1)



Step 1: Energy Mix Analysis

- 350 data inputs
- Residential and commercial buildings, passenger and freight transport
- Emissions baseline for energy consumption using 2012 GPC Protocol for Community-Wide Emissions

The City Performance Tool (Step 2)



Step 2: CyPT Results

- 73 technologies, each with 3 customizable implementation rates
- Technologies 1) clean underlying energy mix, 2) improve energy efficiency in buildings and transport, and 3) induce modal shift

Outcomes

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GHG

CO_2eq

Air quality

PM10

NO_x

Economy

Jobs

Who We're Supporting

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Who Supports Us

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Evaluated by some of the world's leading institutes

Case Study: San Francisco

Scenarios

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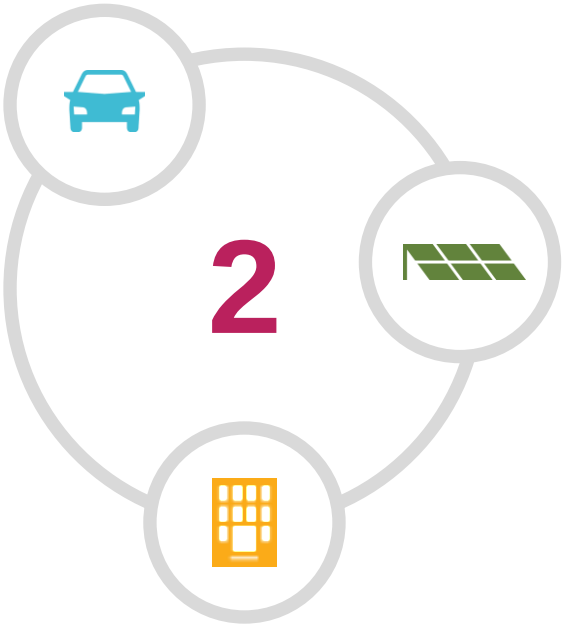
3 Scenarios, **36** Technologies, **3** Objectives

15 Building Technologies + 19 Transport Technologies



15 Building Technologies + 19 Transport Technologies + Rooftop PV

15 Building Technologies + 19 Transport Technologies + Rooftop PV + Electric Heat Pumps

Full report available at http://sfenvironment.org/cas/plans-reports

Case Study: San Francisco

Reaching 80x50

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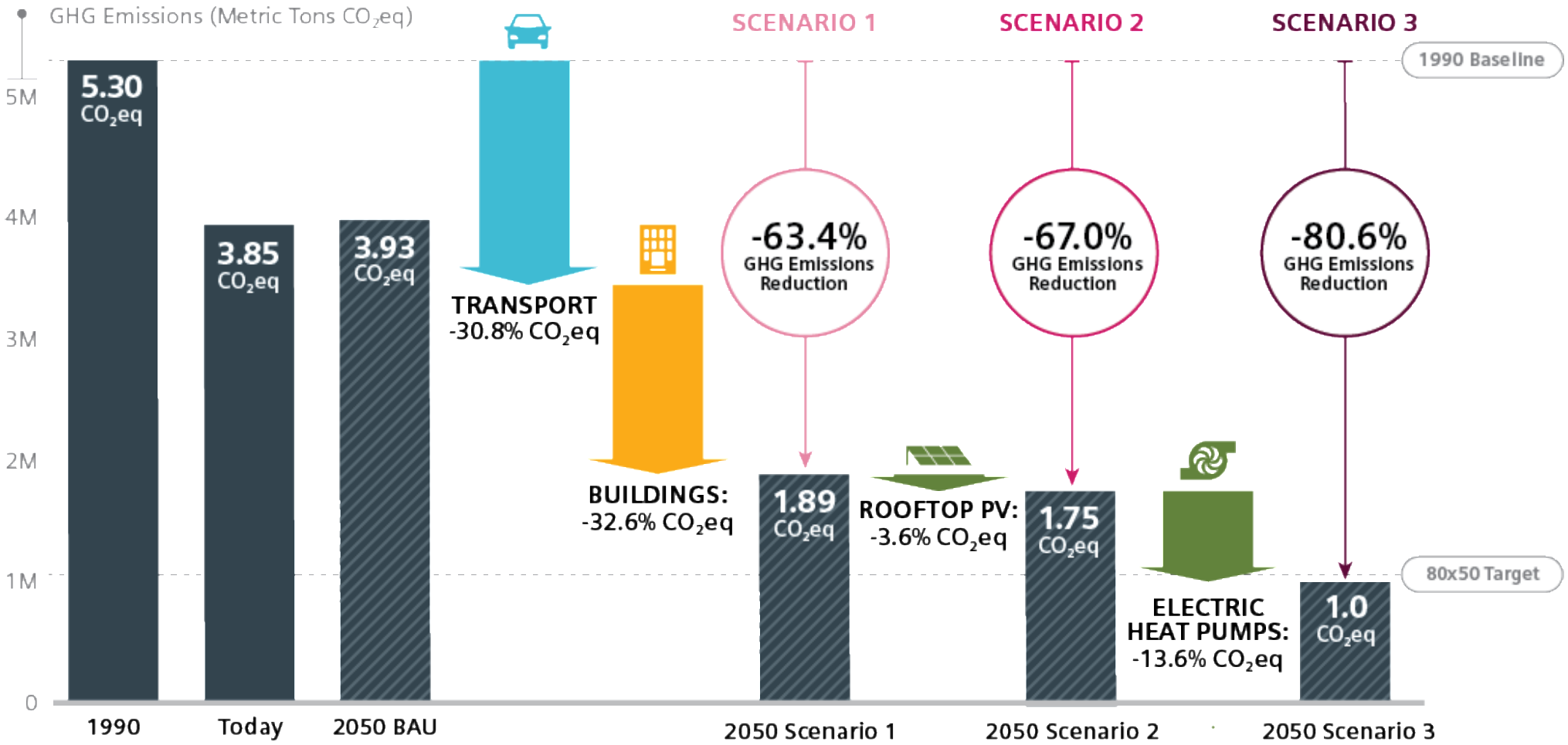

Full report available at http://sfenvironment.org/cas/plans-reports

Case Study: San Francisco

High-Performing Technologies

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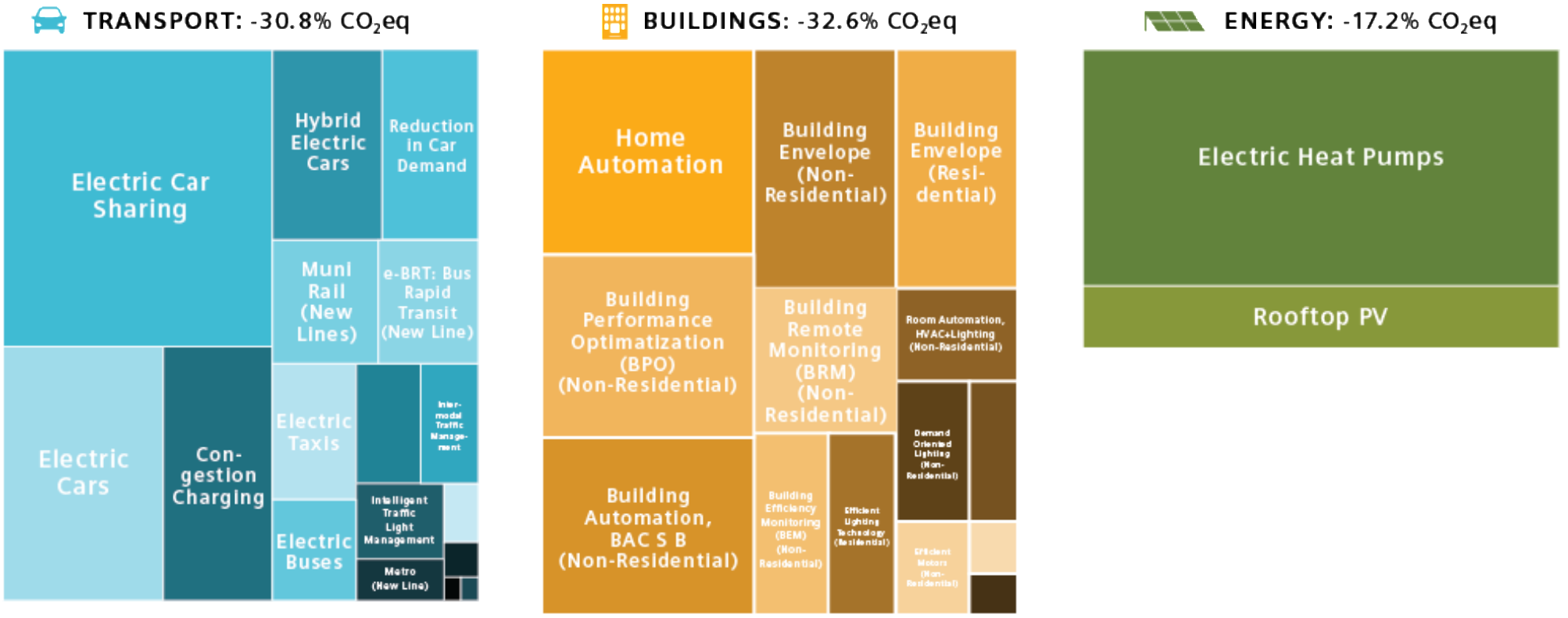


Full report available at http://sfenvironment.org/cas/plans-reports

Case Study: San Francisco

The Big Numbers

SCENARIO 3:

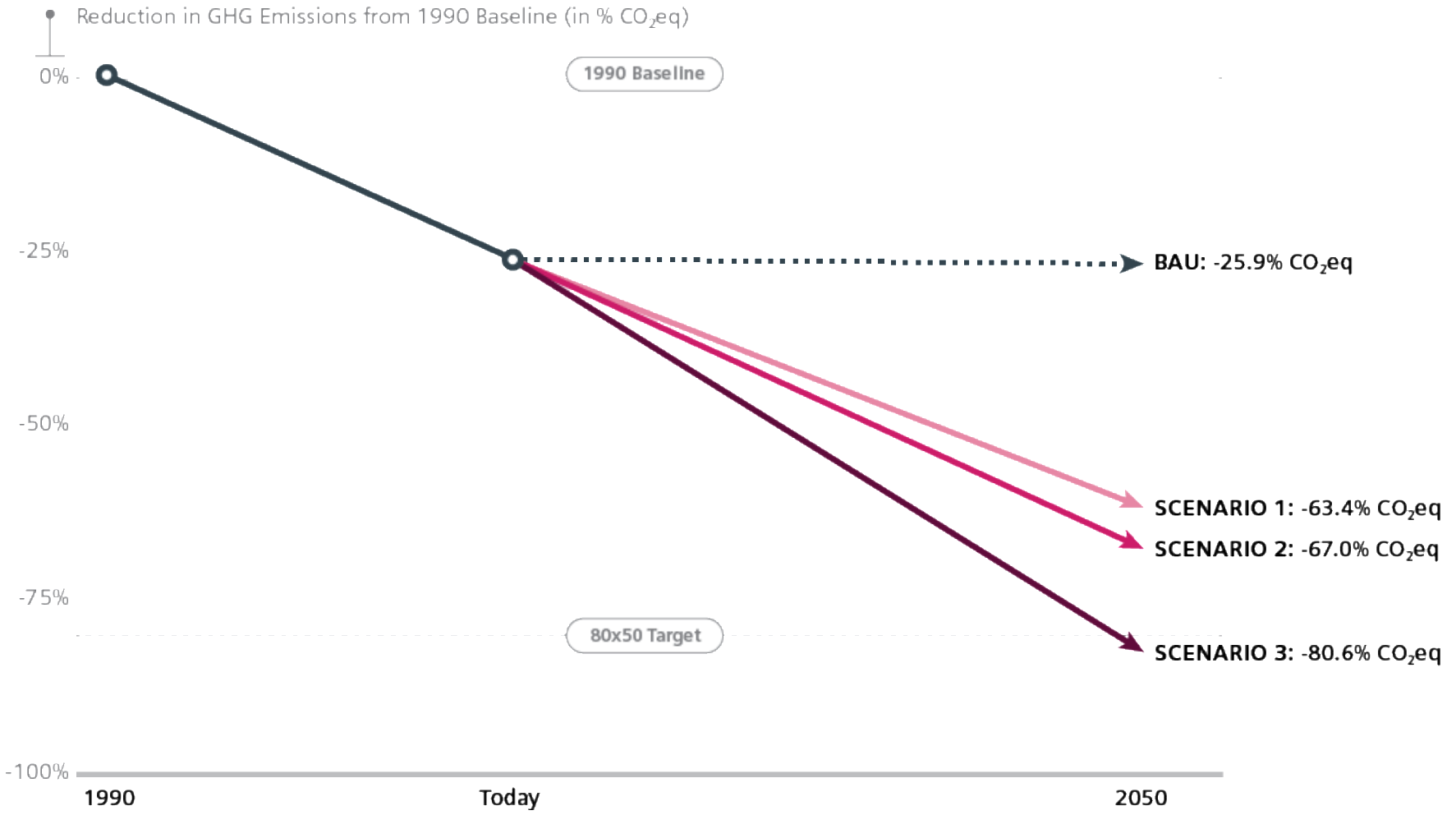
80.6% Emissions Reduction by 2050

COST PER PERSON:

$37,570 Capital & Operating Expenditures

JOBS GENERATED:

420,000 Full-Time Equivalents



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Overview

CyPT Process

Next Steps

Process and Timeline

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Collect data

City provides roughly 20 critical data points, plus its sustainability targets, which are used to customize the model.

Months 1 - 3

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

Process and Timeline

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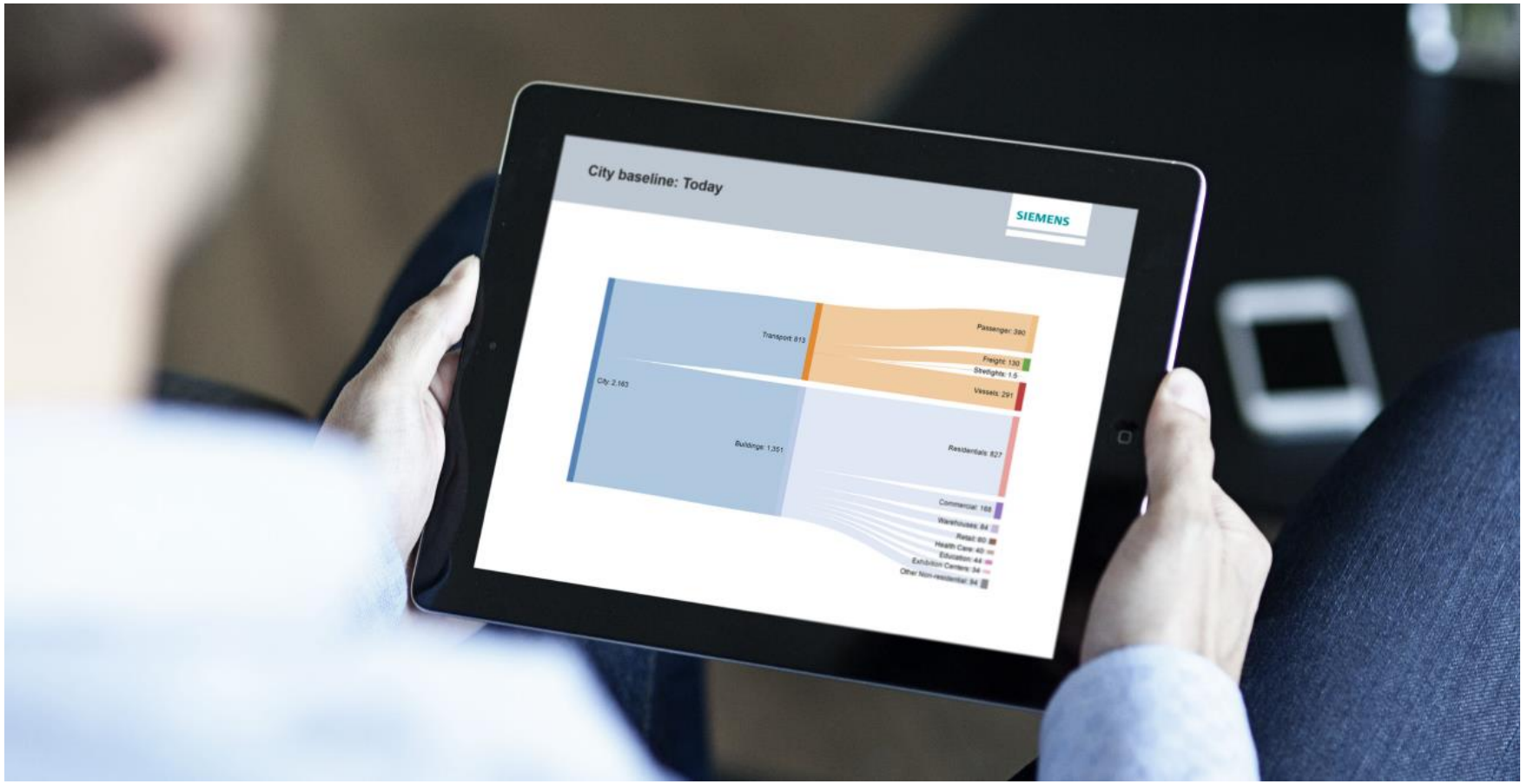
Environmental baseline

The model calculates the city's environmental baseline.



Month 4

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Infrastructure technology impacts

Siemens runs a technology workshop with the City to choose scenarios and demonstrate infrastructure impacts.

Month 5

Process and Timeline

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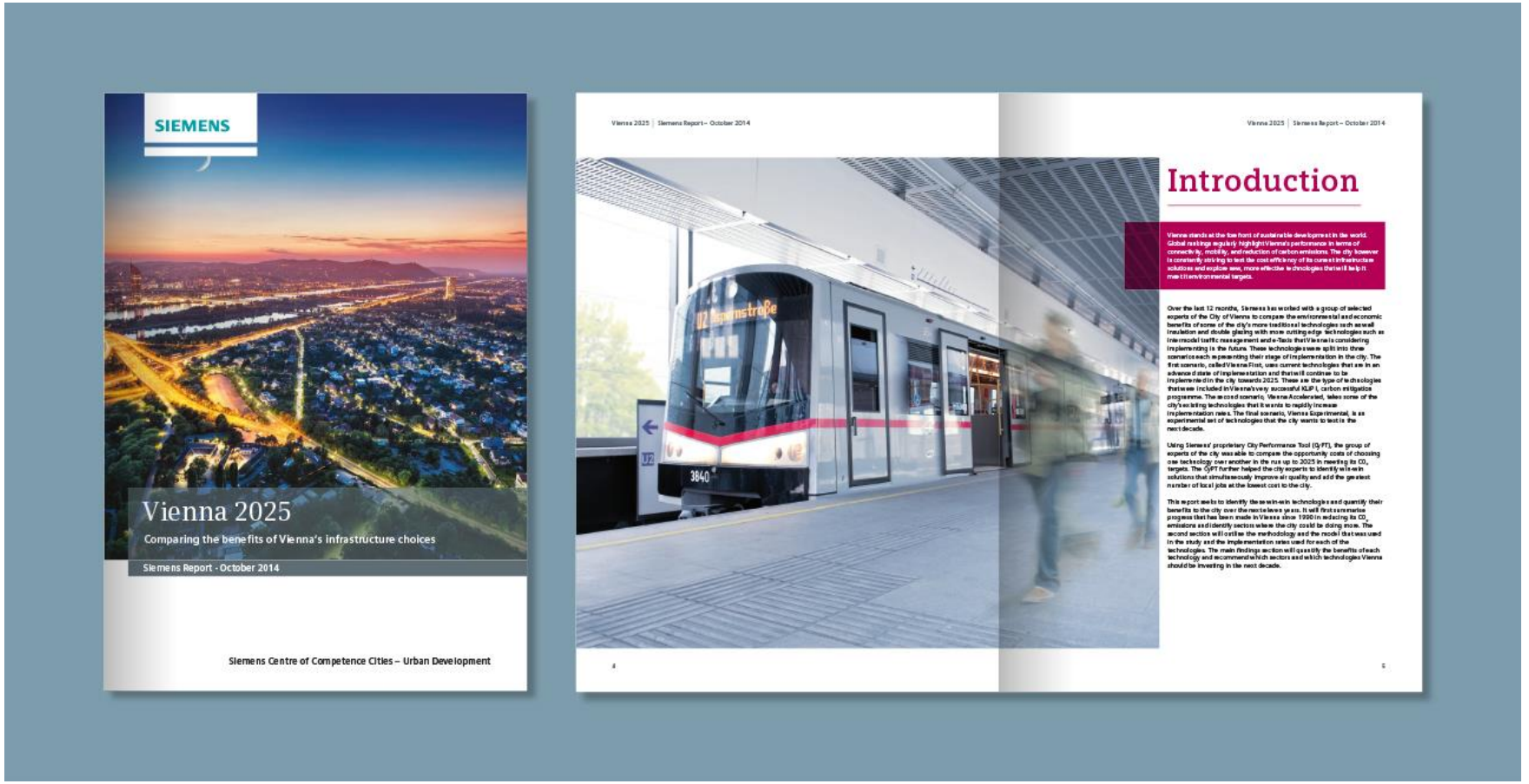
Infrastructure strategy

Siemens works with city to develop an infrastructure strategy based on future scenarios.

Month 6



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Overview
CyPT Process

Next Steps

Next Steps

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1 Legal Agreement

2 Timeline

3 Kick-off

The Team

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Thank you.

Siemens City Performance Tool (CyPT)

List of Critical Data Points

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- Population Growth
- Electricity Mix and Projections
- Building Square Footage by Category
- GHG Inventory, including VMT, Electricity Usage (by Category) and Natural Gas Usage (by Category)
- Transport Data: Separate Call to Discuss Transport Network and Data Sources

CyPT Building Levers

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Commercial buildings
17 levers

- Commercial Wall Insulation
- Commercial Double/Triple Glazing
- Commercial Efficient Lighting
- Demand Oriented Lighting
- Building Efficiency Monitoring
- Building Performance Optimization
- Demand Controlled Ventilation
- Heat Recovery
- Commercial Building Envelope
- Remote Monitoring
- Efficient Motors & Drives
- Room Automation, HVAC
- Room Automation, HVAC & Lighting
- Room Automation, HVAC & Lighting + Blinds
- Room Automation, BACS C
- Room Automation, BACS B
- Room Automation, BACS A

Residential buildings
6 levers

- Residential Wall Insulation
- Residential Double/Triple Glazing
- Residential Building Envelope
- Residential Efficient Lighting
- Home Energy Monitoring
- Home Automation

CyPT Transportation Levers

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Transport
38 levers

- Metro: New Vehicles
- Metro: New Line
- Metro: Reduced Headway
- Metro: Automated Train Operation
- Metro: Regenerative Braking
- Regional Train: Automated Train Operation
- Tram: New Line
- Tram: New Vehicles
- Tram: Automated Train Operation
- Tram: Regenerative Braking
- Freight Tram
- Freight Rail-Electrification
- BRT Electrification Switch to new electric vehicles
- GNG Bus
- GNG Car
- E-Bus
- E-Car
- Hybrid Electric Bus
- Hydrogen Car
- E-Taxi
- Plug-in Hybrid Car
- E-BRT New Line
- Hybrid Car
- E-Ticketing
- E-Car Sharing
- E-Highways
- Demand Oriented Street Lighting
- LED Street Lighting
- Smart Street Lighting
- Intelligent Traffic Light Management
- Intermodal Traffic Management
- Low Emission Zone (Truck)
- Eco Driving Training
- Urban Bike Sharing
- Cycling Highway
- Occupancy Dependent Tolling
- City Tolling

CyPT Energy Levers

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Energy
10 levers

- Photovolatic
- Wind Power Generation
- Combined Cycle Gas Turbine
- Combined Heat and Power
- Network Optimization
- Smart Grid for Monitoring and Automation
- Power System Automation & Optimized Network
- Smart Metering
- Distributed Generation
- On Shore Power Supply in Harbors