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Sustainable Cities

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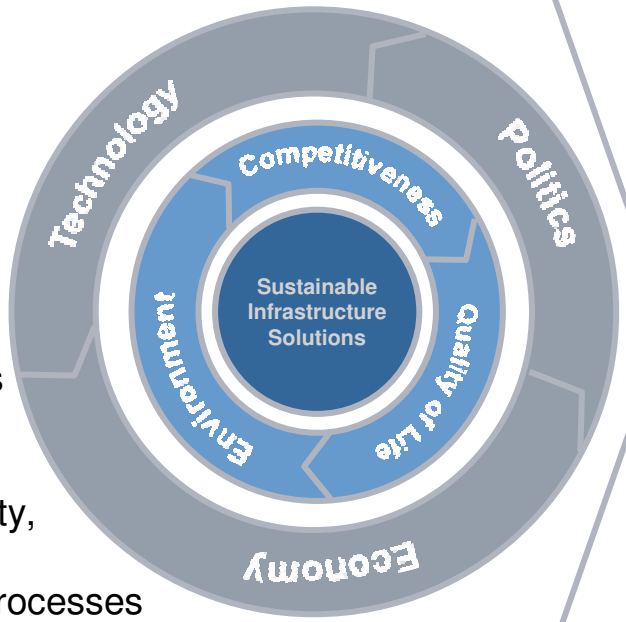
Sustainability is a multi-dimensional challenge...

Challenge is to **balance** between overriding concerns*)

- Economic competitiveness
- Environment
- Quality of life for citizens

while involving decision makers of state, civil society, and market sectors and shaping appropriate processes



Impact

- **Financial prioritization**
- **Sustainable technology platforms**
- **Continuous planning, monitoring, and decision support**

➢ Sustainability requires ***to think and act as one***

Sustainable infrastructure solutions

- support decision makers / entrepreneurs to **design and build** a **challenges-mastering** and **resource efficient** infrastructure
- encompass support, e.g. an **economic assessment** (potential and costs) of **available technologies** to abate greenhouse gas emissions and a **sustainability program**

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What is urbanization?

Urbanization facts and challenges…

- World population will increase from 6.5 billion to 9 billion in 2050
- Cities cover 1 % of the globe but consumes 75 % of the energy and produces 80 % of CO2
- Today 50% of the population lives in the cities and it will be 60% in 2030 and 70% in 2050
- China plans 20 new 1 million population cities and 69 new airports by 2020
- Tokyo creates 40% of the national GDP, Paris 30% and Istanbul 25%
- CO2 emission will be doubled by 2035 and globe will be warmed by 1.5 to 4.5 ℃
- In 2007, 7% of the world population was over 65; in 2050 it will be 16%, more than double
- Consumable drinking water on the globe is less than 1% of the total water

Siemens answers urbanization with Sustainable Cities Initiative

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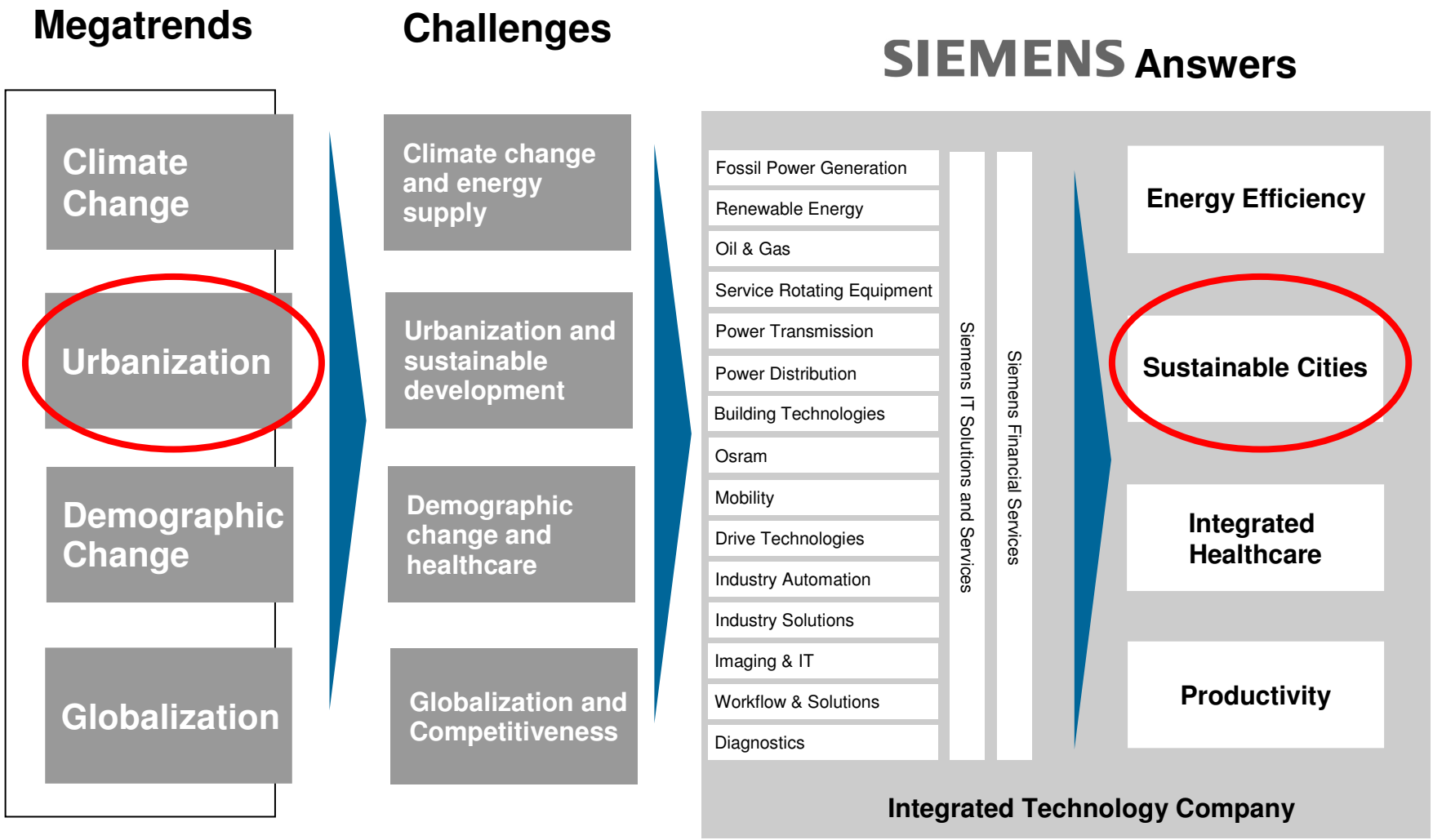

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New York City

Siemens insights into "how to become sustainable" jointly developed with major world cities

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Perception studies

Megacity Challenges

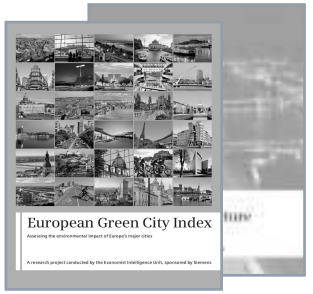
- Comprehensive analysis based on interviews with over **500 city managers in 25 selected megacities**
- Urban infrastructure **trends and challenges** as well as **global best practices**

New: **The Sustainable Cities Challenge in Canada**
ICT for City Management

Comparative studies

Green City Index

- **Index compares cities** across **8 dimensions of sustainability**: CO_2, Energy, Buildings, Transport, Waste & Land Use, Water, Air, Governance
- Started in Europe**, rollout** in Africa, Latin America and Asia



Implementation studies

Sustainable urban infrastructure series

- **"How to become a sustainable city"** with focus on measures for **resource efficiency and CO_2 abatement**
- Examples: London, Munich, Yekaterinburg, Dublin, Trondheim, ...

The European Green City Index assesses 30 major European cities from 30 European countries

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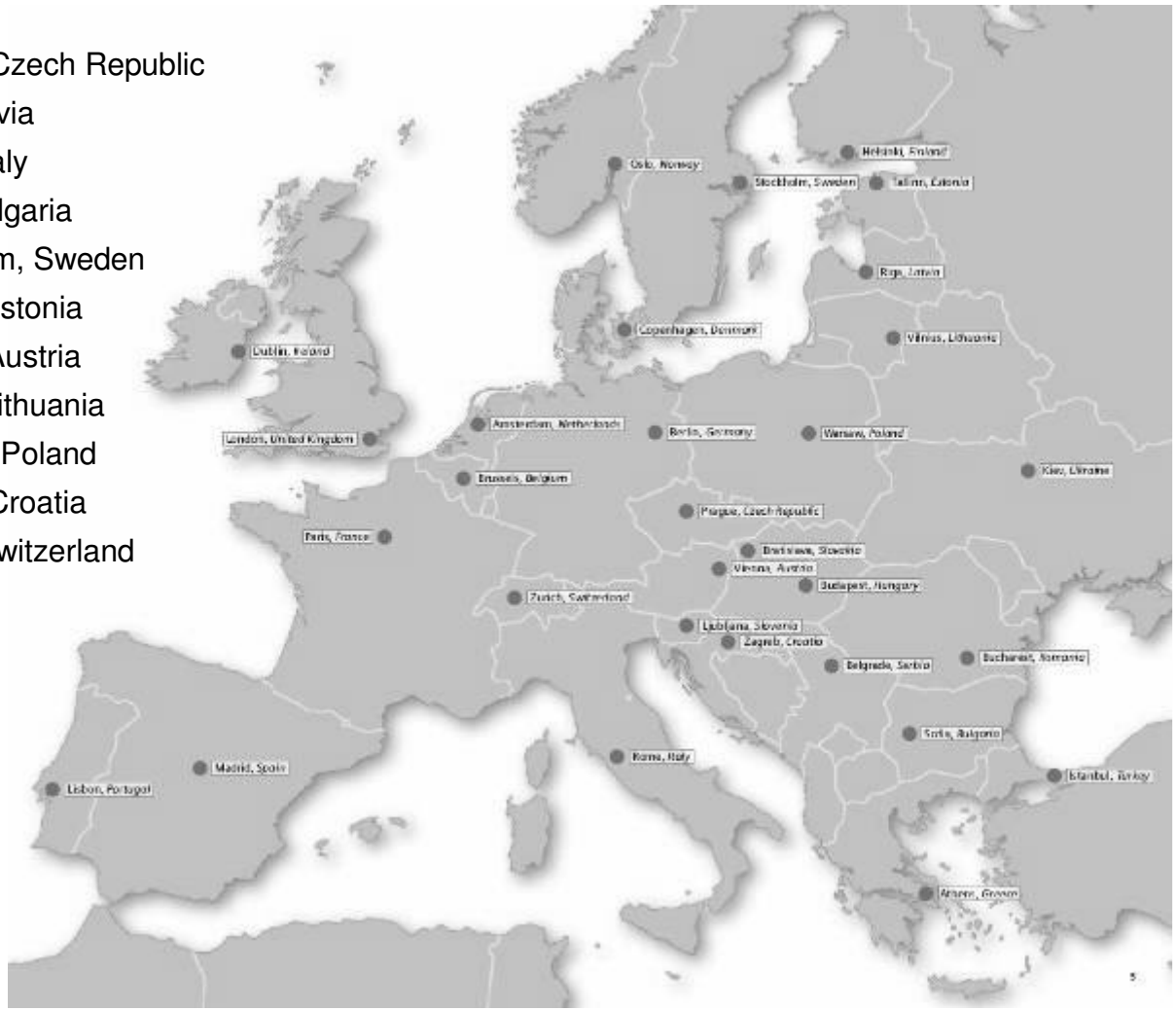
- Amsterdam, Netherlands
- Athens, Greece
- Belgrade, Serbia
- Berlin, Germany
- Bratislava, Slovakia
- Brussels, Belgium
- Bucharest, Romania
- Budapest, Hungary
- Copenhagen, Denmark
- Dublin, Ireland
- Helsinki, Finland
- Istanbul, Turkey
- Kiev, Ukraine
- Lisbon, Portugal
- Ljubljana, Slovenia
- London, UK
- Madrid, Spain
- Oslo, Norway
- Paris, France
- Prague, Czech Republic
- Riga, Latvia
- Rome, Italy
- Sofia, Bulgaria
- Stockholm, Sweden
- Tallinn, Estonia
- Vienna, Austria
- Vilnius, Lithuania
- Warsaw, Poland
- Zagreb, Croatia
- Zurich, Switzerland



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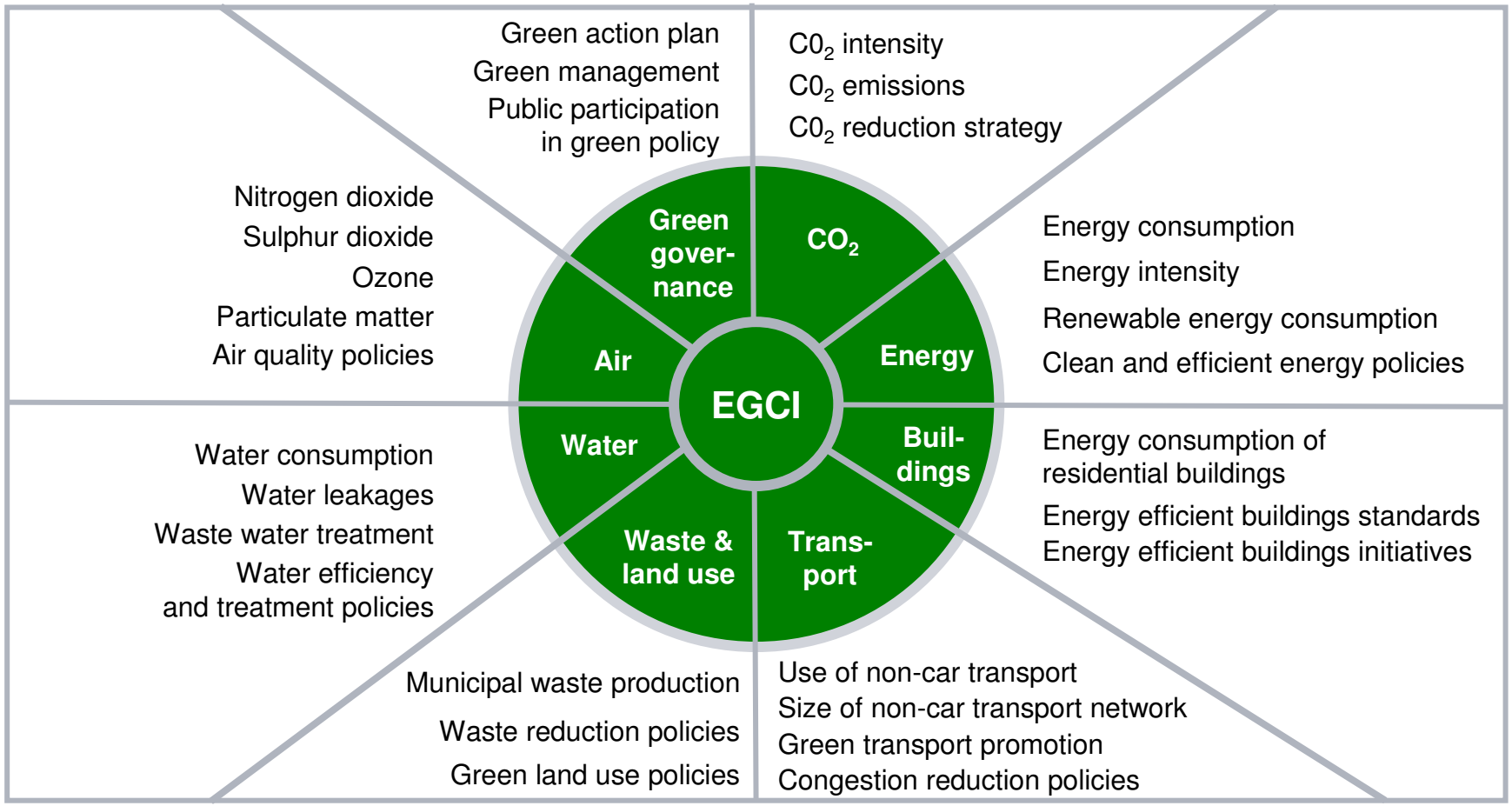
European Green City Index



Overall ranking: Scandinavian countries score best, Copenhagen comes in first overall

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Overall

	City	Score
1	Copenhagen	87,31
2	Stockholm	86,65
3	Oslo	83,98
4	Vienna	83,34
5	Amsterdam	83,03
6	Zurich	82,31
7	Helsinki	79,29
8	Berlin	79,01
9	Brussels	78,01
10	Paris	73,21
11	London	71,56
12	Madrid	67,08
13	Vilnius	62,77
14	Rome	62,58
15	Riga	59,57
16	Warsaw	59,04
17	Budapest	57,55
18	Lisbon	57,25
19	Ljubljana	56,39
20	Bratislava	56,09
21	Dublin	53,98
22	Athens	53,09
23	Tallinn	52,98
24	Prague	49,78
25	Istanbul	45,20
26	Zagreb	42,36
27	Belgrade	40,03
28	Bucharest	39,14
29	Sofia	36,85
30	Kiev	32,33

CO_2

	City	Score
1	Oslo	9,58
2	Stockholm	8,99
3	Zurich	8,48
4	Copenhagen	8,35
5	Brussels	8,32
6	Paris	7,81
7	Rome	7,57
8	Vienna	7,53
9	Madrid	7,51
10	London	7,34

Energy

	City	Score
1	Oslo	8,71
2	Copenhagen	8,69
3	Vienna	7,76
4	Stockholm	7,61
5	Amsterdam	7,08
6	Zurich	6,92
7	Rome	6,40
8	Brussels	6,19
9	Lisbon	5,77
10	London	5,64

Buildings

	City	Score
=1	Berlin	9,44
=1	Stockholm	9,44
3	Oslo	9,22
4	Copenhagen	9,17
5	Helsinki	9,11
6	Amsterdam	9,01
7	Paris	8,96
8	Vienna	8,62
9	Zurich	8,43
10	London	7,96

Transport

	City	Score
1	Stockholm	8,81
2	Amsterdam	8,44
3	Copenhagen	8,29
4	Vienna	8,00
5	Oslo	7,92
6	Zurich	7,83
7	Brussels	7,49
8	Bratislava	7,16
9	Helsinki	7,08
=10	Budapest	6,64
=10	Tallinn	6,64

Water

	City	Score
1	Amsterdam	9,21
2	Vienna	9,13
3	Berlin	9,12
4	Brussels	9,05
=5	Copenhagen	8,88
=5	Zurich	8,88
7	Madrid	8,59
8	London	8,58
9	Paris	8,55
10	Prague	8,39

Waste and land use

	City	Score
1	Amsterdam	8,98
2	Zurich	8,82
3	Helsinki	8,69
4	Berlin	8,63
5	Vienna	8,60
6	Oslo	8,23
7	Copenhagen	8,05
8	Stockholm	7,99
9	Vilnius	7,31
10	Brussels	7,26

Air quality

	City	Score
1	Vilnius	9,37
2	Stockholm	9,35
3	Helsinki	8,84
4	Dublin	8,62
5	Copenhagen	8,43
6	Tallinn	8,30
7	Riga	8,28
8	Berlin	7,86
9	Zurich	7,70
10	Vienna	7,59

Environmental governance

	City	Score
=1	Brussels	10,00
=1	Copenhagen	10,00
=1	Helsinki	10,00
=1	Stockholm	10,00
=5	Oslo	9,67
=5	Warsaw	9,67
=7	Paris	9,44
=7	Vienna	9,44
9	Berlin	9,33
10	Amsterdam	9,11

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Trends' challenges affect infrastructure of cities

		Affected infrastructure of a city				
		Traffic & Transportation	Water & Wastewater	Energy	Healthcare	Safety & Security
Challenges of trends	Growing demand for health- and elder care		Water-borne diseases		Need for efficient healthcare systems	
	Increasing mobility	Traffic jams		Increasing energy demand of transport	Mobile care & health monitoring	Increase of road accidents
	Growing demand for safety and security	Safety of mass transport	Terrorist attack on water supply	Continuity of electricity supply	Medical care in emergencies / crisis	Increasing need for surveillance
	Increasing scarcity of natural resources	Energy cost increase of transport	Sinking ground water by over-extraction	Cost increase of energy generation		
	Growing need for environmental care	Air pollution through cars	Contamination of ground water	Need to improve energy efficiency	Diseases through toxic substances	

- **Cities have to master their most vital challenges**
- **Dedicated solutions must be comprehensive, sustainable, efficient, innovative**

Implementation Study – London

Findings (time horizon: 2025)

Results

- Two-third of all CO_2- abating technologies pay back their invest
- ~75% of the abatement potential lies in the hands of individuals / businesses who make technological choices
- The total investment required constitutes less than 1% of London's total economic output until 2025

Conclusions

- Financial prioritization
- Broad technology expertise across infrastructure areas is mandatory to identify suitable combinations of solutions > roadmap
- Sustainability makes city decision makers to think and act as *one*

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Further examples on implementation studies executed by Siemens

China: business district in a major city - CO_2 abatement

CO_2 abatement potential of 46%

- Gross Floor Area > 10mn m^2, ROI: 3-4 yrs
- Intelligent building automation (14%)
- Lighting automation (7%)
- Energy saving lamps (6%)
- **New Building KPI system (kwh/m^2/a)**
- **"Siemens is the best among low-carbon experts"**

Russia: Yekaterinburg

Energy Efficiency potential 2020

- **44%** with "most common" technology
- **79%** with "best" available technology

Top 12 technological levers:

- Cover all infrastructures in the City
- Account for 51% of top-down potential
- **Save 1bn m^3 of gas or 2 days of Russian gas export (2008)**

European City: Energy Efficiency, CO_2/NO_2 abatement

Top 9 technological levers:

512t CO_2/2,9t NO_2 abatement per year, e.g.

- **Street lighting:** 99 GWh > 67 GWh (-31%)
- **Harbor:** -81% CO_2 emissions
- **Hybrid bus**: -30% CO_2 emissions, 1 mn liter less fuel consumption
- **RoI: 2-8 years**

Italy: Airport

Energy Efficiency

- **68% less energy cost** potential via
  - Solar power
  - Combined heat and power
  - Building insulation and automation
  - Lighting
- **Savings: ~€ 3m per year**

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Thank you!