

Making Russia Energy Efficient - Energy Efficient Cities and Towns

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Why is there a need in the 50-th round table...



Agenda

1. The Challenge - Sustainable Urban Infrastructure

2. Energy Efficiency Studies

3. Siemens Solutions for the Cities

4. Pre-requisites for success in Russia

Cities are the growth engines for national economies

Megatrends imply significant challenges for city decision makers

Megatrends



- **Globalization & Urbanization**
 - Global players/trade volume increase
 - 2030: 60% of population in cities
 - energy / buildings / mobility / water infrastructure are key



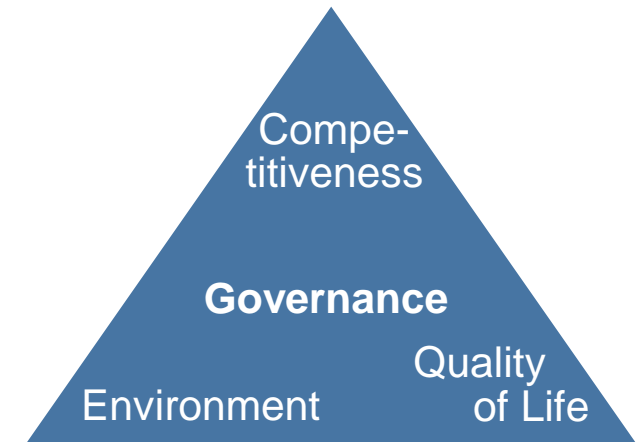
- **Demographic Change**
 - 65+ generation will nearly double by 2030 (from 7% to 12%)
 - Need for adequate infrastructures as well as health- and elder care



- **Climate Change**
 - Cities responsible for ~80% GHG
 - Need for **resource efficiency** and **environmental care**

Sustainable Urban Development

- **Cities are competing globally** to make their urban areas attractive to live and to invest in



- **Challenge to balance** between competitiveness, environment and quality of life

Demand for power in Russia is increasing

Power consumption in Russia in January-April 2010 **increased in 5.3%** versus 2009

Demographic dynamics



- **Growth of cities and urban population**
in Russia 103.8 million people (73.1% of total population) live in the cities

Increasing power consumption

Climate change



- **High level of CO2 emission**
Russia ranks #3 in largest CO2 emission countries (~ 430 million tons a year)

Growing demand for “clean” power

Industrial trends



- **GDP energy intensity**
in Russia ~ 3 times higher than in USA and Europe
- **Growth of oil and gas prices at domestic market**

Need for efficiency

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Siemens insights into “how to become energy efficient”, **SIEMENS** jointly developed with major world cities

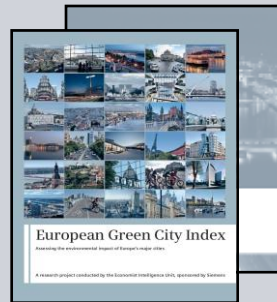
City sustainability trends & challenges



Megacity Challenges Study

- 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**

Green City Index



Green City Index

- **Index compares cities across 8 dimensions of sustainability:** CO₂, Energy, Buildings, Transport, Waste & Land Use, Water, Air, Governance
- Started in **Europe**, rollout in other regions started

Implementation studies in major cities

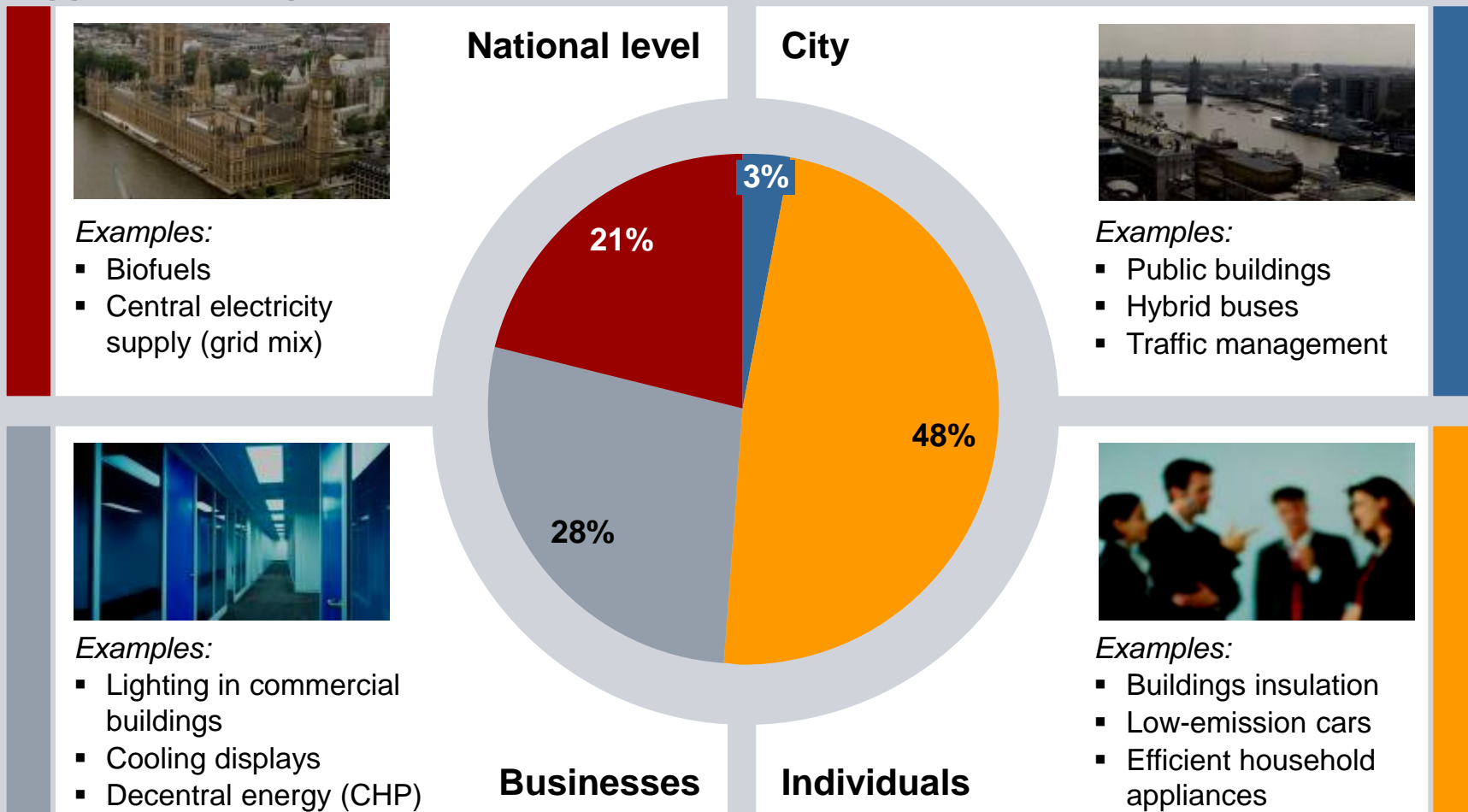


Sustainable urban infrastructure studies / projects

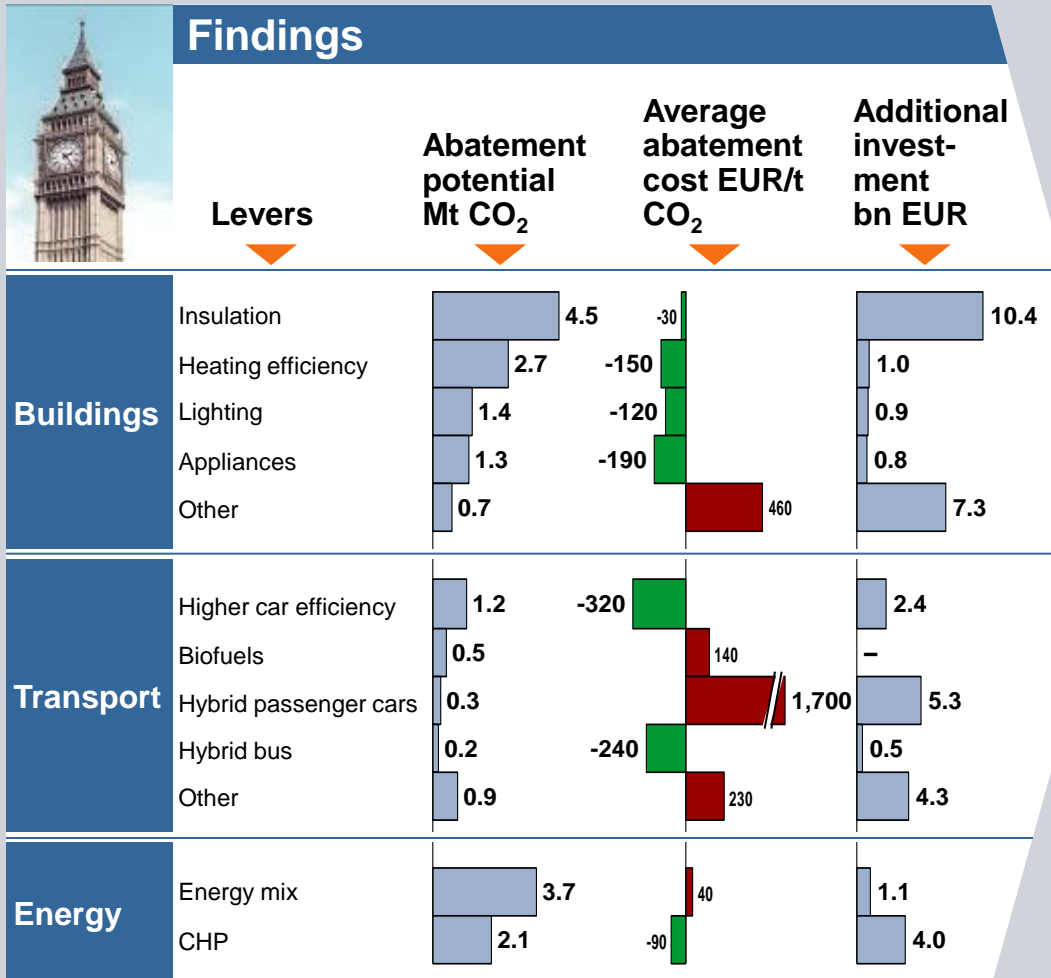
- Studies on “**how to become a sustainable city**” with focus on **resource efficiency**
- Examples: London, Munich, Yekaterinburg Shanghai, Dublin, Trondheim, ...

Siemens Sustainability Study – Example London

London's own measures combined with effective policies and supervision trigger the changes



The study results are implemented only if private sector supports the state initiatives



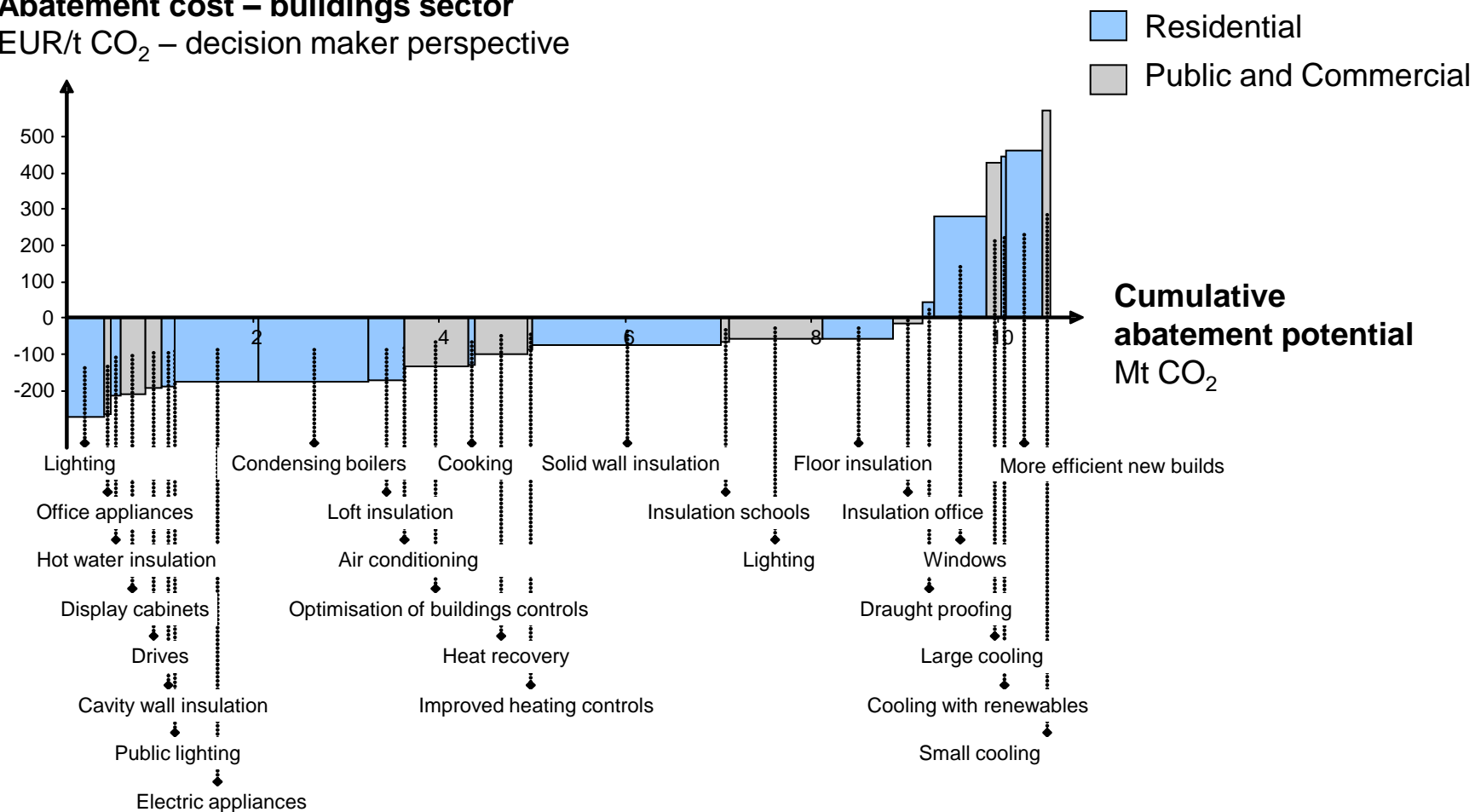
Conclusion

- Two-third of all CO₂-abating technologies pay back their investment
- Around 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

Abatement cost curve methodology offers quantitative scenarios for all sustainability issue

Abatement cost – buildings sector

EUR/t CO₂ – decision maker perspective



Source: McKinsey & Company

Russia develops international partnerships in sphere of energy efficiency



rudea

Российско-Немецкое
Энергетическое Агентство

*Energy Dialogue
Russia – European Union*



*IPEEC - International Partnership
for Energy Efficiency Cooperation*



Targets of cooperation:

- Significant decrease of power resources consumption in Russia
- Increase of Russian goods competitive ability
- Increase of export potential of oil & gas sector
- Maintenance of natural resources for the future generations
- Improvement of environmental situation
- Economy of budget funds
- Economy of private savings of families

Energy Efficiency in Ekaterinburg – Pilot study in Russia conducted by Siemens

Adoption of "common" technology can save 44% of primary energy by 2020



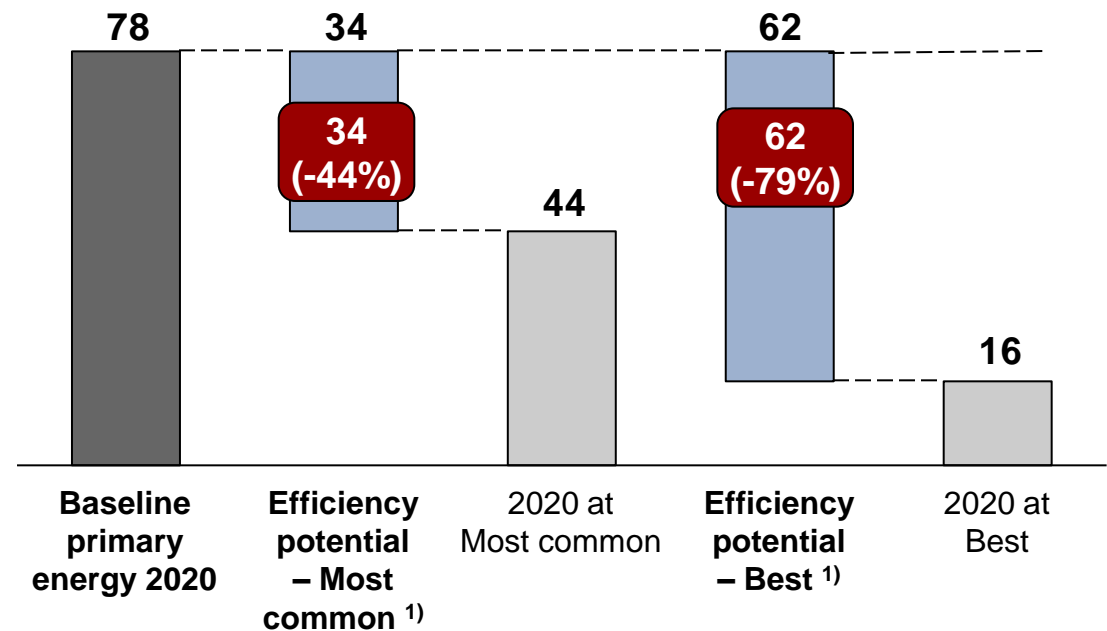
Energy efficiency potential 2020 in TWh/a

Most common

- Basic wall insulation
- 2-plane windows
- Efficient drives
- Optimization of district heating boilers
- ...

Best

- Super insulation
- 3-plane windows
- Frequency converters
- Combined Cycle
- Smart Grid
- ...



Different parties benefit from energy saving

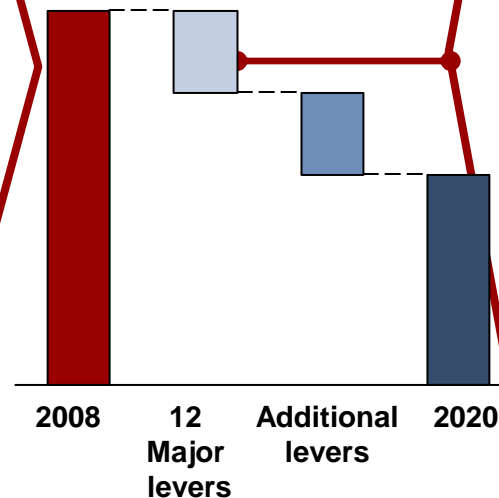
Half of the energy efficiency potential in Ekaterinburg can be achieved with the 12 levers

Energy usage reduction

- 44% primary energy reduction by applying "common technology" (~50 levers)
- **Most relevant 12 levers:**
 - Achieve 22% points of reduction potential
 - Require €3.6 bil. investments

Ekaterinburg

Total potential of energy saving:
- 44%



Two-fold impact

City: decrease of energy consumption



Gas suppliers:

Export (or economy) of gas becomes available thanks to reduction of power consumption in the city



Total:

extra profit from country point of view: 3,1 bln. Euro by 2020

Implementation would pay back in ~6 years

12 Key levers

Key levers		Effic. potential in TWh/a of primary energy	CAPEX in mil. EUR	Expertise provided by	Avg. savings p.a. 2010–2020 city in mil. EUR	Payback city & gas provider w/o capital costs, years	Payback city & gas provider with capital costs, years
Buildings	① Heating controls ¹⁾	3.8	41	SIEMENS	125	0.3 <i>Better</i>	0.3 <i>Better</i>
	② Wall insulation ²⁾	3.5	2,400	BASF	115	21	-
	③ Water saving devices	1.2	16		40	0.4	0.4
	④ Building automation (e.g. HVAC)	0.5	57	SIEMENS	18	3.3	4.5
	⑤ Energy-saving lamps	0.5	9	SIEMENS	14	0.6	0.6
	⑥ Triple-glazed windows	0.4	427	BASF	14	31	-
	⑦ Heat recovery ventilation (HRV)	0.2	11	SIEMENS	6	1.9	2.2
Industry	⑧ Process improvement., e.g. steel	0.5	35	SIEMENS	15	2.3	2.9
	⑨ Frequency converters	0.4	98	SIEMENS	34	2.9	3.8
Transport	⑩ Traffic management system	0.5	21	SIEMENS	12	1.8	2.0
Energy	⑪ Cogeneration (CHP)	5.7	483	SIEMENS	223	2.2	2.6
	⑫ Insulation of district heating pipes	tbd	tbd	BASF	tbd	tbd	tbd
		17.2 TWh primary => 22% points of potential	~3,600			5.8	11.0

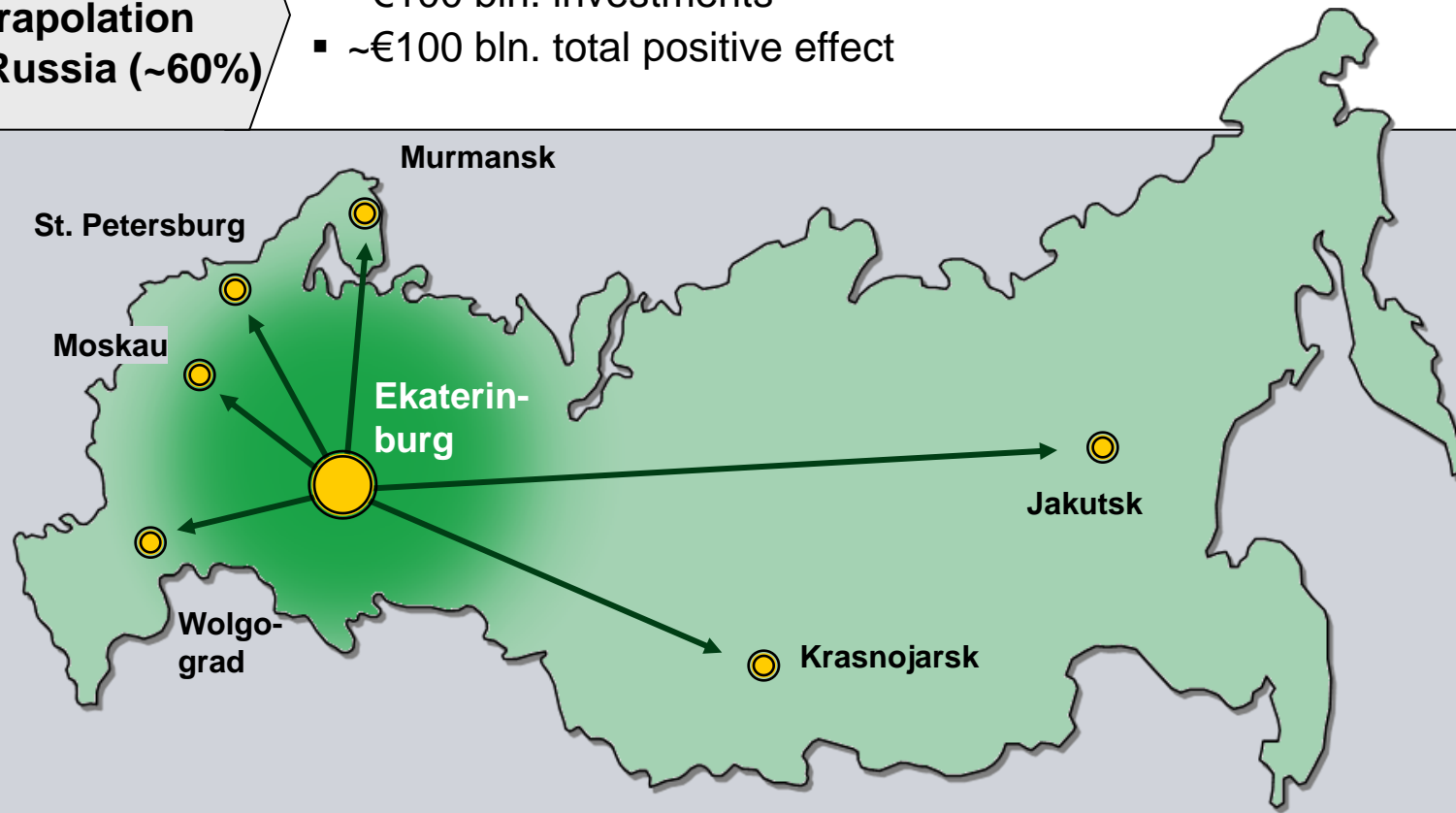
1) Shown impact is after Wall Insulation and Triple-glazed windows are implemented
Source: Team Ekaterinburg

2) Suggested to implement before levers related to automation of buildings

Rollout of Ekaterinburg's energy efficiency to Russia would generate ~100 billion EUR benefits by 2020

**Key 12 levers:
Extrapolation
to Russia (~60%)**

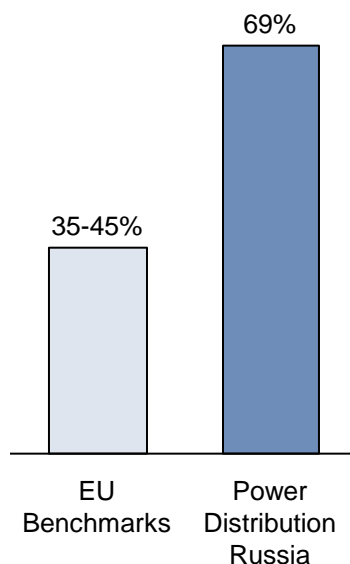
- ~€100 bln. investments
- ~€100 bln. total positive effect



Major underinvestment resulted in high wear-off level and high energy losses level compared to foreign utilities

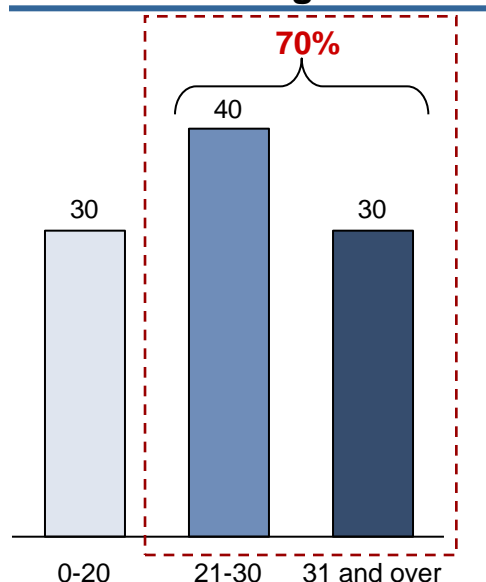
Top-down benchmarking

Wear-off level [%]



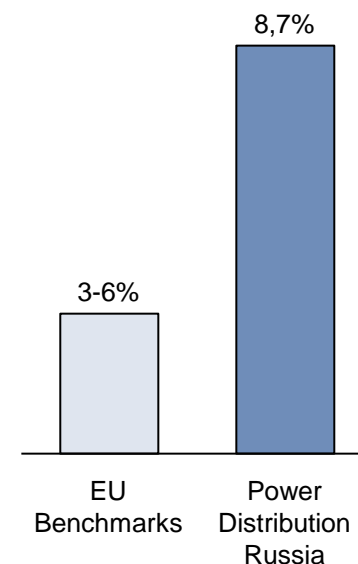
- Stronger wear-out level due to underinvestment in previous years

Assets age



- Especially high level of wear-off in substations. Old assets (21 – 40 years and over) form 70% of volume

Energy losses [%]



- High level of losses due to
 - Partially – objective reasons (climate, share of overhead ETLs, etc.)
 - Wear-out level of assets
 - Ineffective metering
 - Commercial losses

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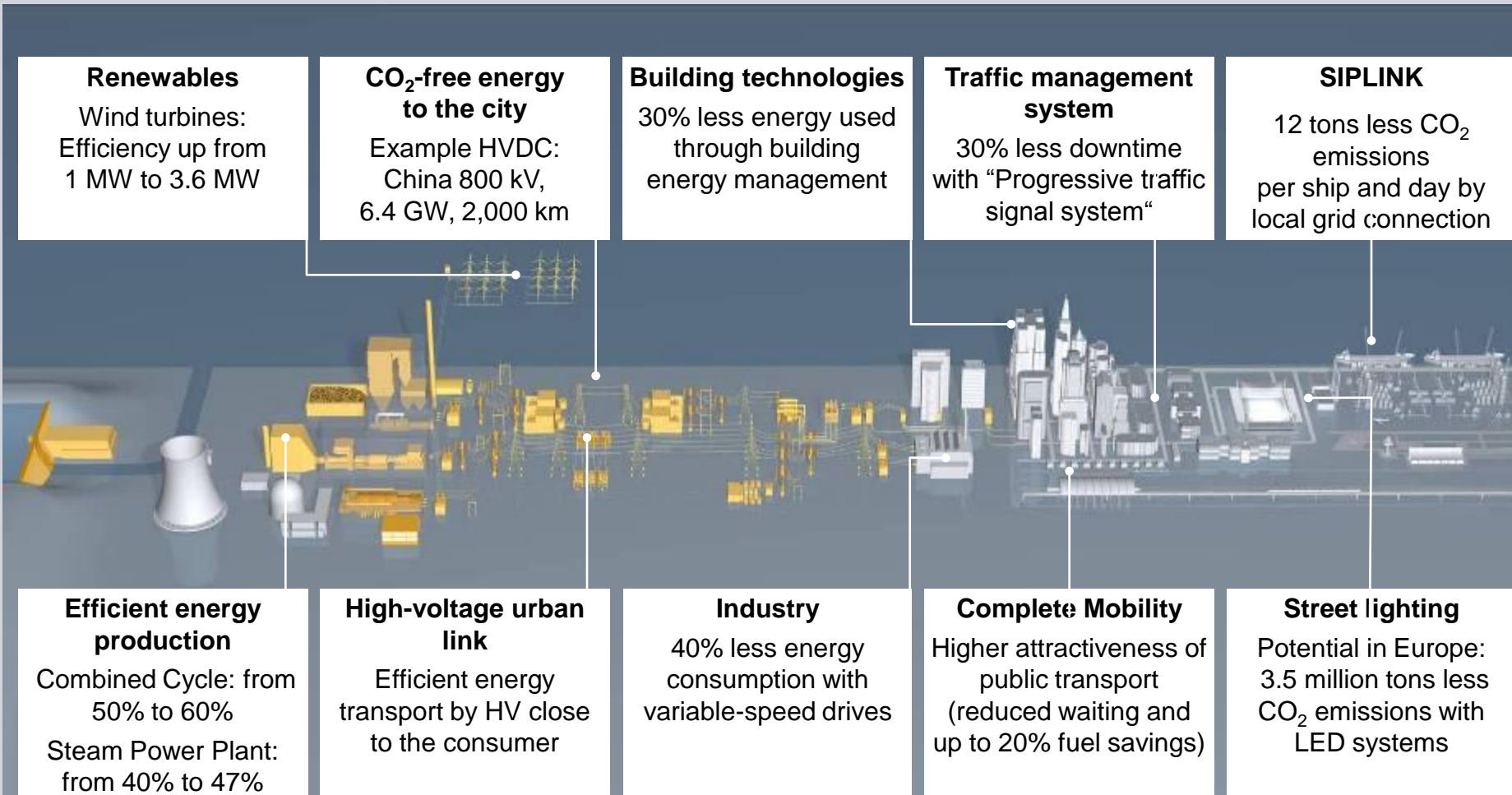
**We can not solve everything with technology,
but we can not solve anything without**

SIEMENS



Examples for energy efficiency in the city

Existing technology achieves high gains in efficiency and CO₂ abatement



Localization contributes to modernization of Russian industry

Siemens Energy in Russia is fully localized

Gas turbines



Compressors



High Voltage products



I&C components



Transformers



Towers, nacelles and blades



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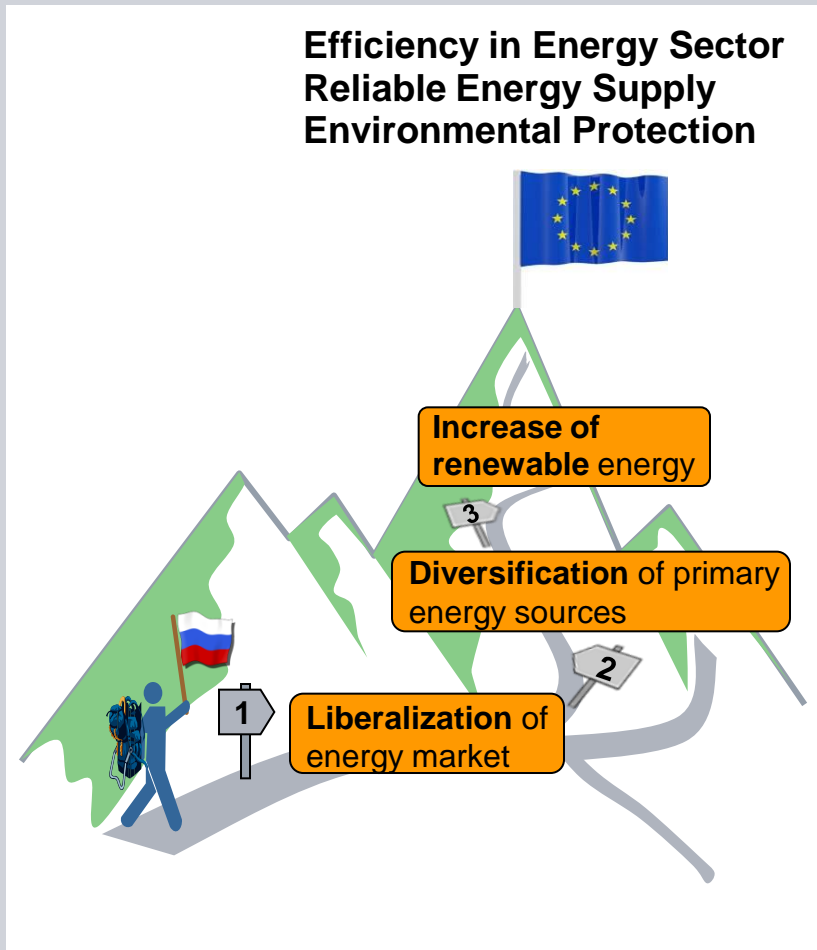
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In achieving Russian energy efficiency goals international experience can be leveraged

Goals of energy programs worldwide and ways to achieve them

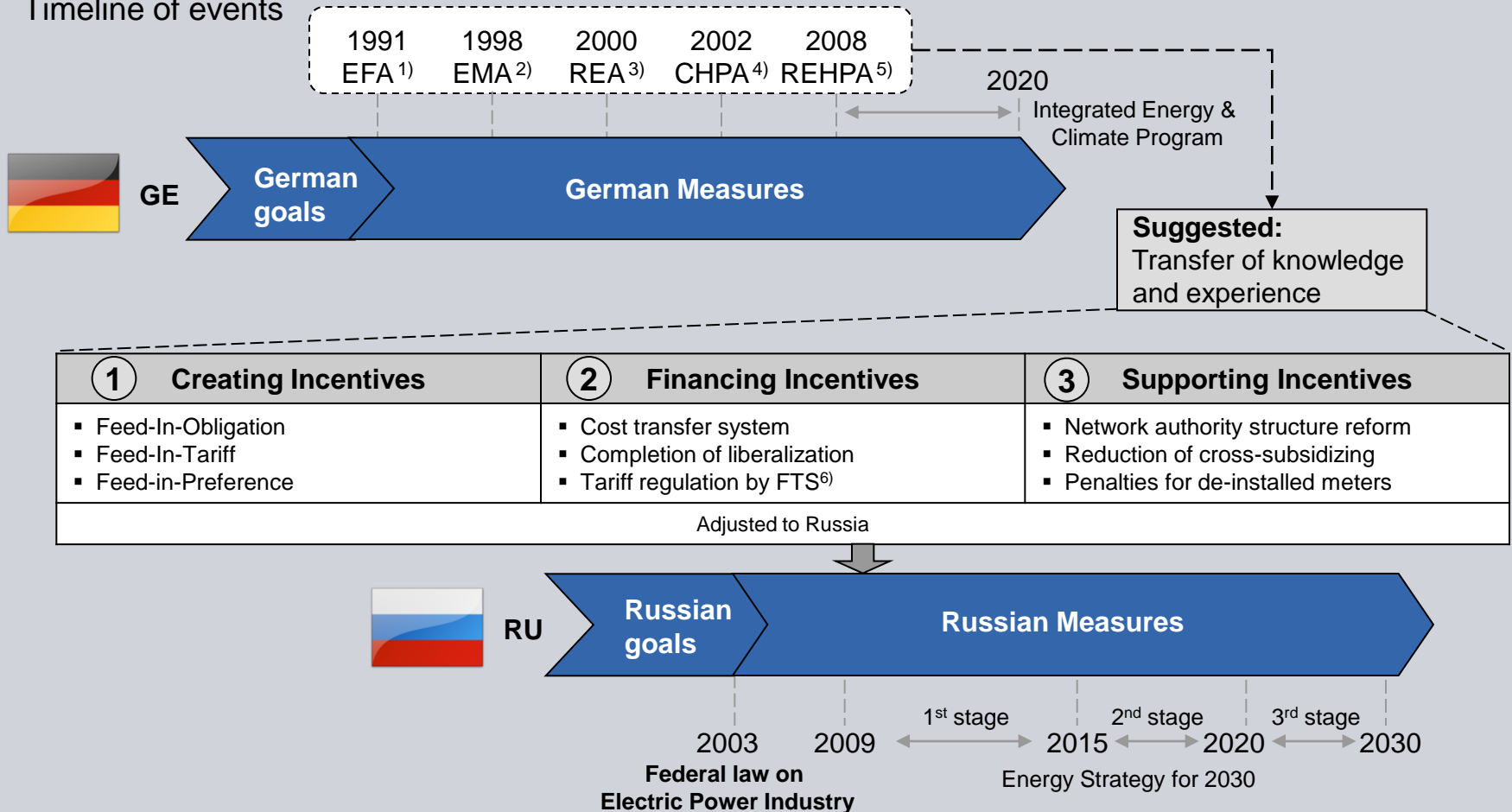


- The European Union created different directives for its member countries in order to reach goals
- German incentive model for renewables (and CHP)
 - was most successful and served as an example for 47 countries worldwide
 - can be implemented in Russia due to similar goals (**Energy Strategy for 2030**)
- Russia already created good preconditions for reaching energy efficiency goals:
 - Liberalization of electricity market in progress
 - Feed-in tariffs being discussed

Source: European Council Directives (96/93, 2003/54, 2001/77, 2009/28, 2004/8/EC); Russian Energy Strategy for 2030; German Electricity Feed Act (1991); German Renewable Energy Sources Act (2000, 2004, 2009); Renewables Global Status Report 2009 Update

Cooperation between Russia and Europe can be optimized

Timeline of events



1) Electricity Feed Act

2) Energy Management Act

Source: TEAM Smart CHP Russia

3) Cogeneration Act

4) Renewable Energies in the Heat Sector Promotion Act

5) Renewable Energy Sources Act

6) Federal Tariff Service

Beyond technology, there are 4 prerequisites for successful energy efficiency program

Prerequisites for successful implementation

Implementation systematic

- Well defined energy efficiency program office at the country level with clearly assigned responsibilities
- Targets cascaded from the country level down to regions, cities / towns
- Implementation systematic (tools, access to necessary data, clear milestones to reach targets)

Statistics

- Country-wide defined KPI consistently used across the country
- Energy consumption statistics at multiple levels: city, region, country
- Transparency of and accessibility to energy consumption and efficiency measures across cities

Financing / Legislation

- Comprehensive energy efficiency stimulus measures (e.g. loan subsidies, attractive tariff structure)
- Involvement of key beneficiaries of gas savings (gas providers e.g. Gazprom)
- Legally worked out “menu” of financing mechanisms, e.g. Energy Contracting

Social Mobilization

- Advertising geared towards changing consumer behavior
- PR campaigns

Do we need 51-st round table to start actions in Russia?



«By 2010 Russia should become 40% more energy efficient»

July 2008

Д.А. Медведев

Президент Российской Федерации

«The key is not to produce something on paper, but actually do something about it»

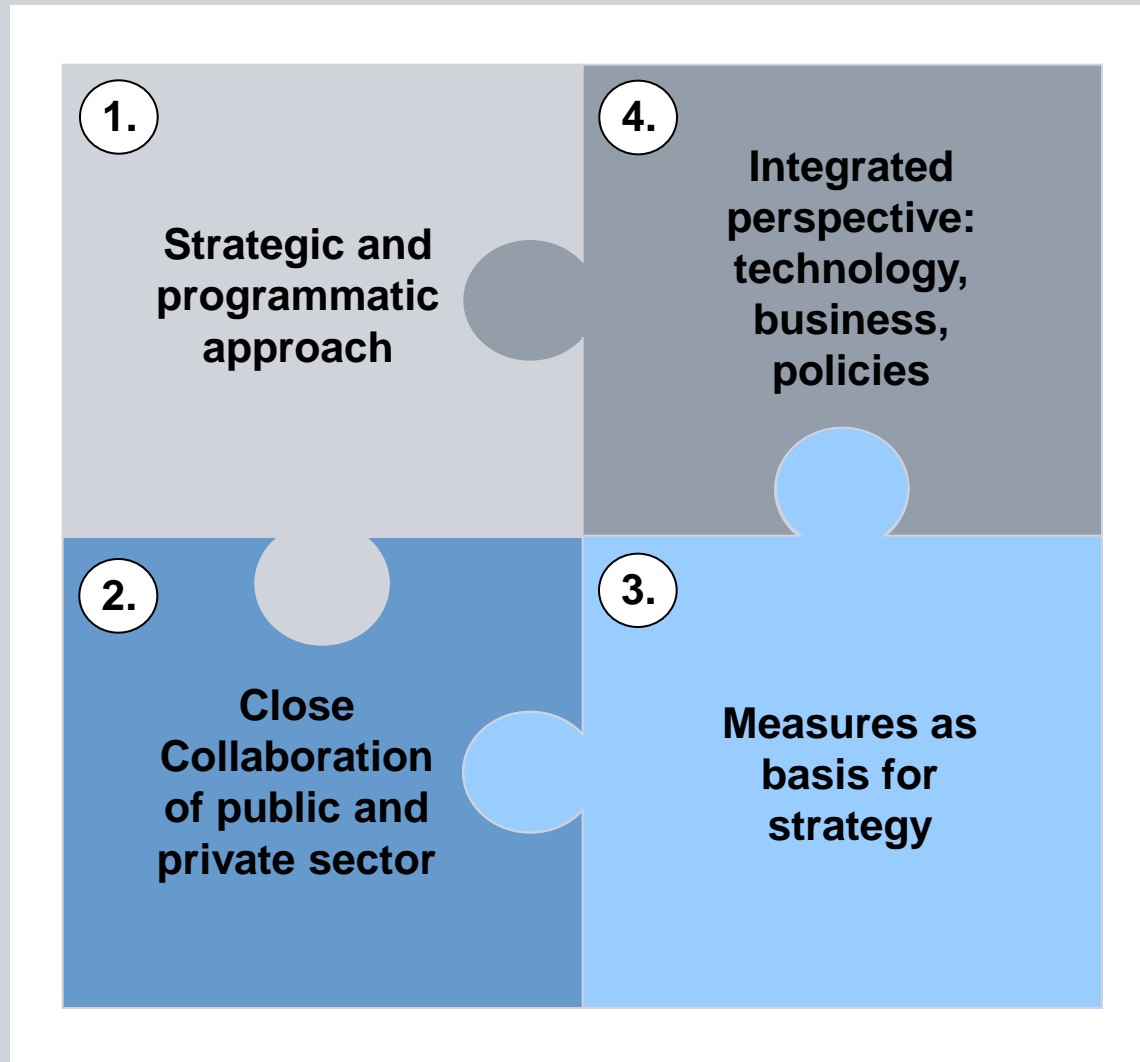
September 2009

D.A. Medvedev

President of the Russian Federation

BACK-UP SLIDES

Four Success Factors for Sustainability Programs – lessons learned from our work with major world cities



Our learning - Four success factors determine effective decision making on sustainable cities

Prioritization: Hypes versus important trends

- Differentiation between **pure hypes** and **mission critical trends** (challenges, technologies, solutions) influencing cities sustainable development

Integration of technological, economical & political perspectives

- **Consideration of all relevant perspectives:** effectiveness, feasibility, cost efficiency, ease of implementation / barriers to change

Establishment of Intelligent Financing & Business Models

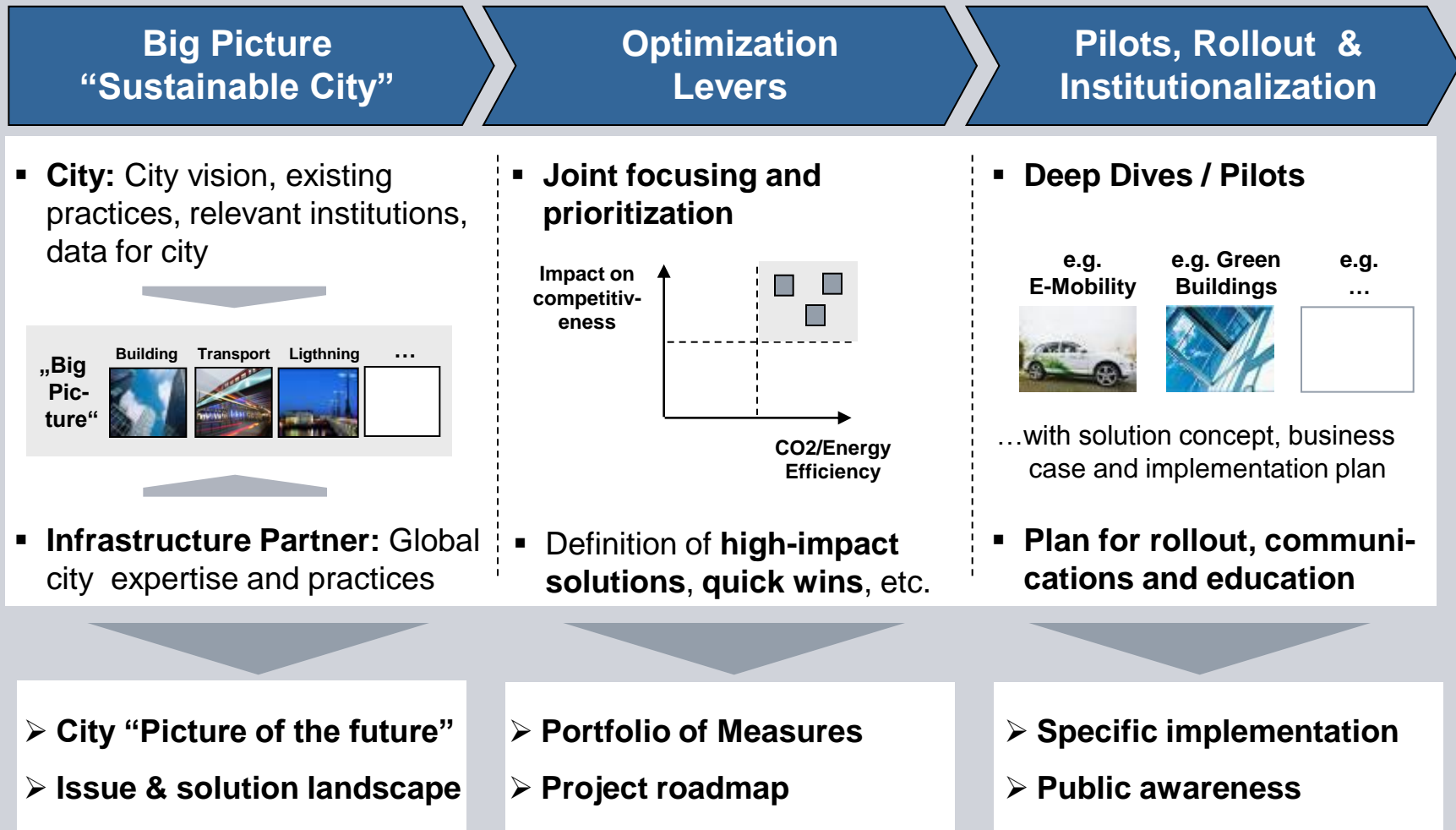
- **Life cycle cost perspective, performance contracting, public-private partnerships** for sustainable solutions

Stringent Execution & Implementation

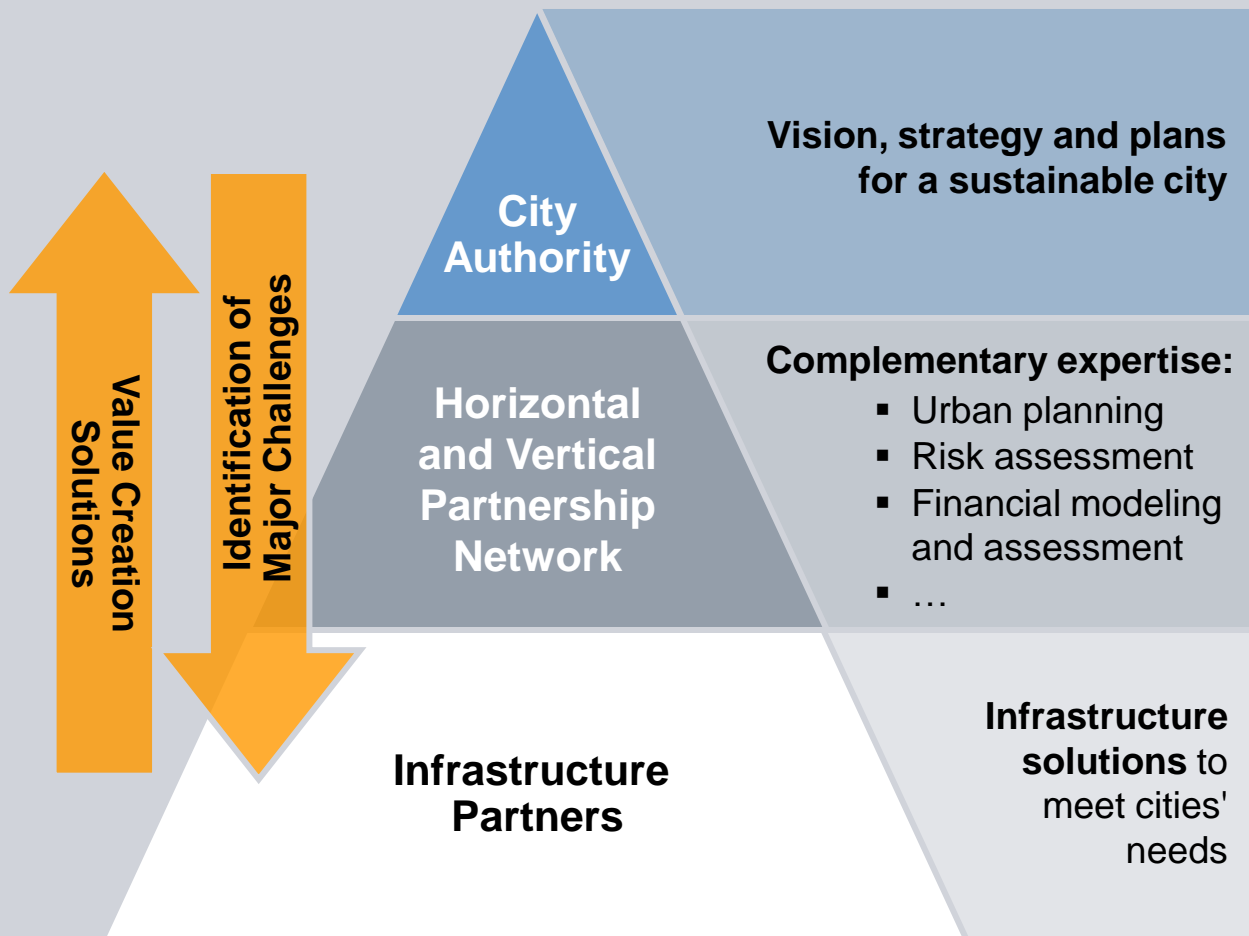
- **Stringent implementation programs,** integrating individual investment into a **big picture** for decision makers and public

Situation in Russia: the one who pays is not the one who enjoys the benefits

From incoherent infrastructure decisions towards a strategic and programmatic approach



Close, early phase collaboration between public and private sector as well as academia is key



- **Early phase** involvement
- **Close collaboration** of
 - public authorities
 - private sector
 - academia
- Joint understanding as „**transformation team**“ with long term view