SIEMENS

Corporate Technology

Energy Efficiency and Smart Cities

Dr. Wolfgang Heuring

November 21st, 2012

The goal: improvement of energy efficiency in cities

The main levers are

- Technologies (e.g., energy conversion and storage)
- Behavior of people (e.g. awareness, responsible actions)
- Urban policies and regulations (e.g., incentive systems)
- Infrastructure (e.g., properties and configuration of the installed base)

SIEMENS

Systemic approach to realize energy efficiency in the city

Development of new business models

Monitoring of
- Energy Consumption
- Installed Base

Multi-modal Energy Network

Smart Grid

Combination of

Business Intelligence

and

Innovative Infrastructure Solutions

SIEMENS

Infrastructure for urban energy supply

Upgrading Smart Grids to multi-modal energy networks enables high overall energy efficiency in cities

SIEMENS

MULTI-MODAL ENERGY SYSTEMS

Key question:

How to network and operate the infrastructures for power generation, energy storage, heat/cold and water in a smart way?

1) Combined Heat and Power

Self-Organizing Energy Automation Systems (SO EASY) have shown their potential for smart power networks

SIEMENS

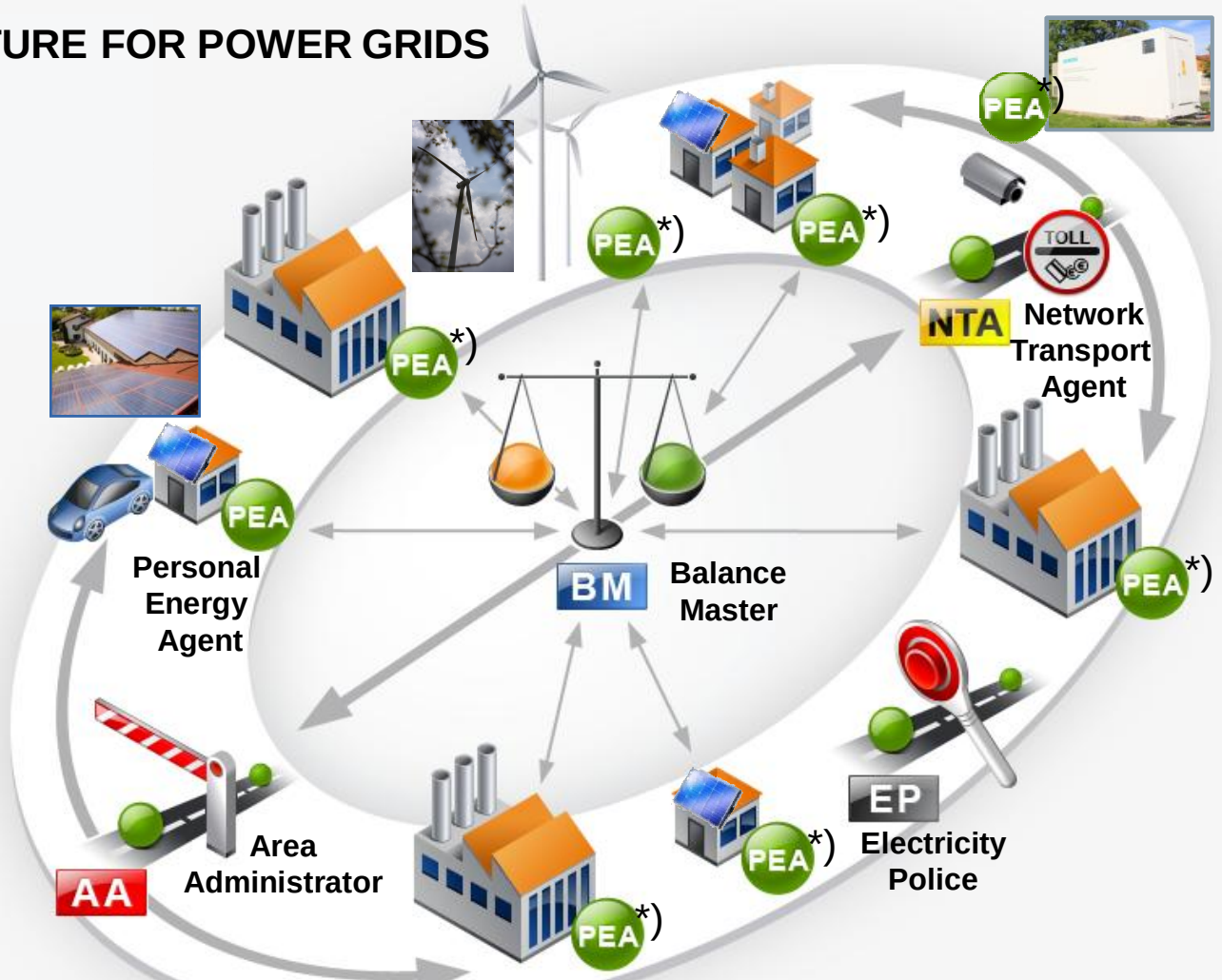
SO EASY ARCHITECTURE FOR POWER GRIDS
(SCHEMATIC)

Customer Benefit:

- Significant reduction of CAPEX

Design Principles:

- Keep as much functionality as possible on lower layers.
- Use plug and play for engineering.



*) Personal Energy Agent

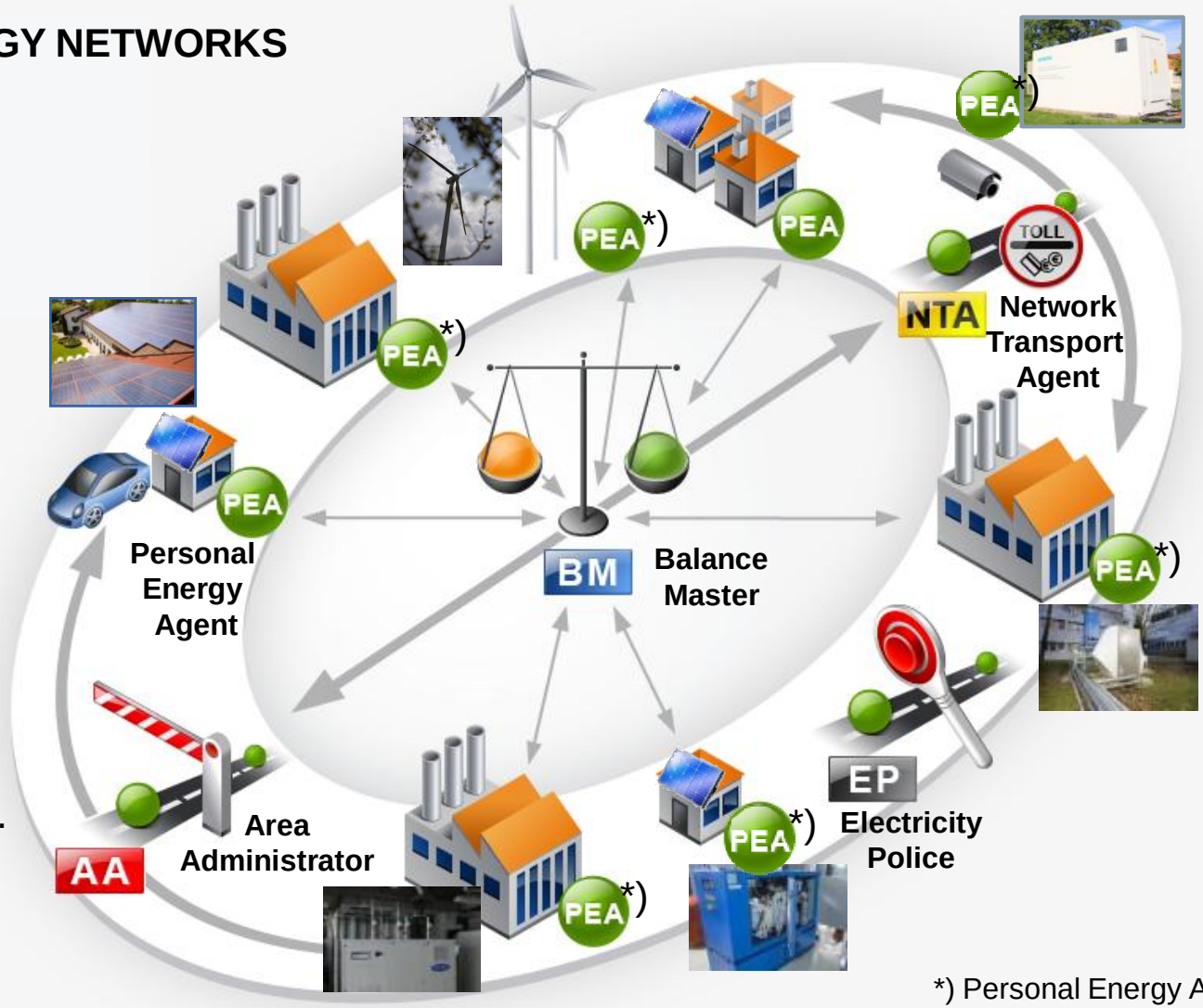
Self-Organizing Energy Automation Systems can be upgraded to multi-modal energy networks

SIEMENS

MULTI-MODAL ENERGY NETWORKS
(SCHEMATIC)

Extensions:

- District cooling & heating, water networks, Power to Gas (H_2)
- Coupling via conversion units (e.g. compression chiller).
- Energy agents (PEA) provide interface to the new sub-systems too.



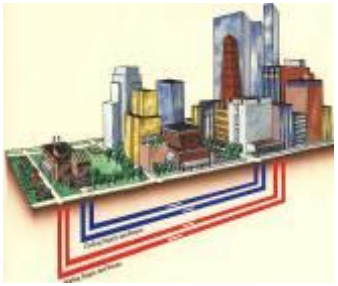
*) Personal Energy Agent

District cooling offers a potential to reduce power demand by 50 % compared to local A/C

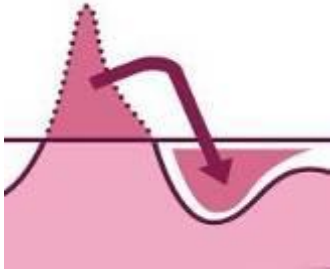
SIEMENS

BENEFITS OF URBAN MULTI-MODAL ENERGY SYTEMS
EXAMPLE: DISTRICT COOLING

Benefit	Facts and figures

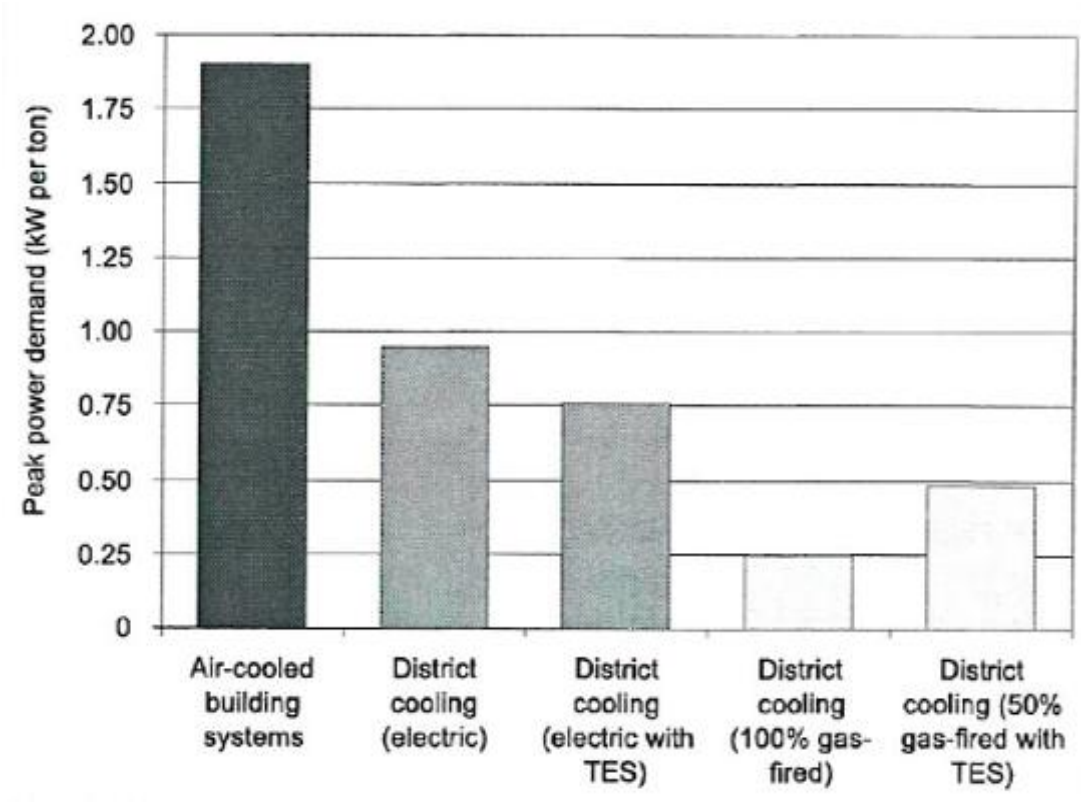


Comfortable and reliable cooling for communities



High efficiency and peak load reduction using thermal storage

Targeting zero CO_2 emission by implementing renewable power plants



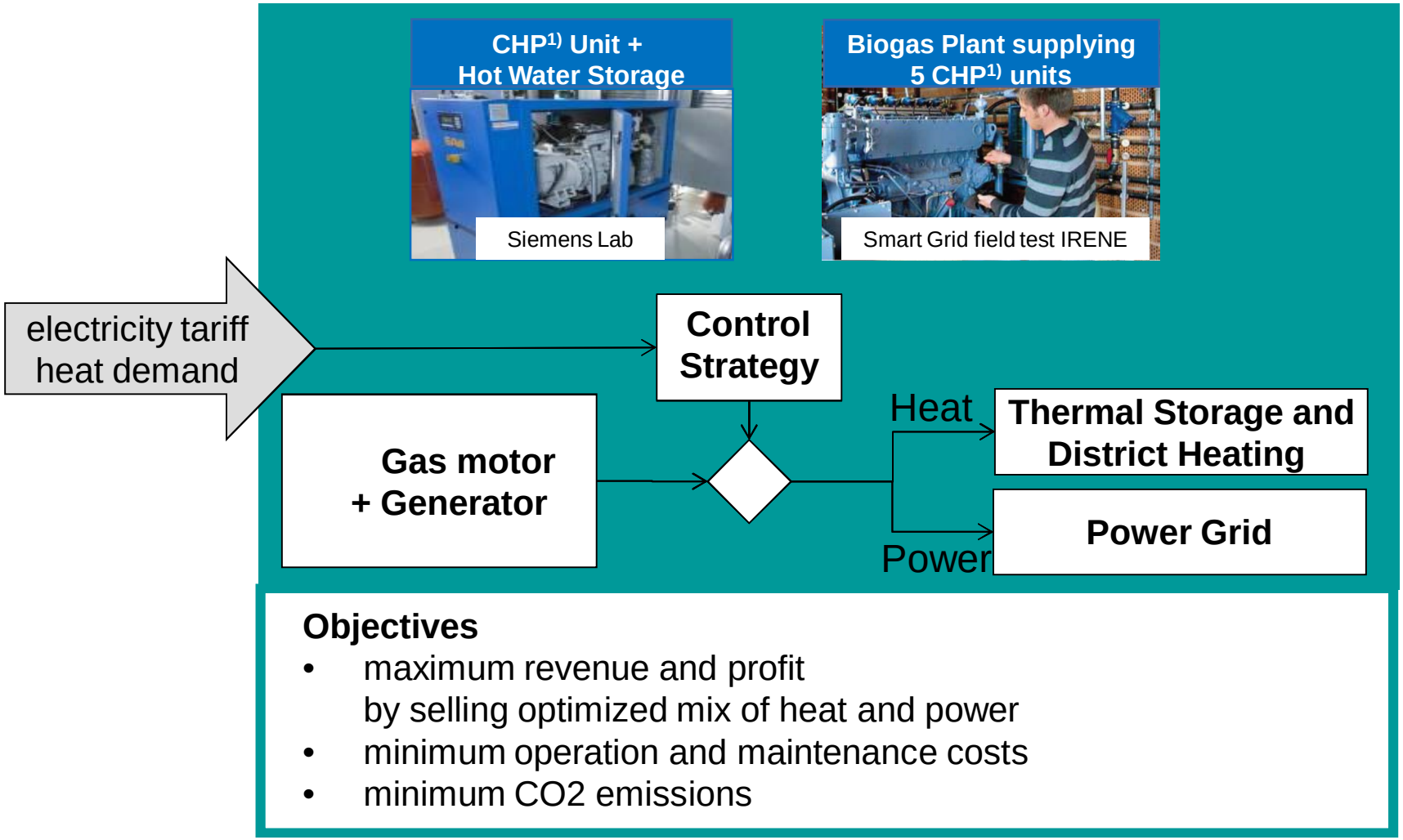
TES Thermal Energy Storage

Sources: International District Energy Association (IDEA)

Urban multi-modal energy systems: Combined Heat and Power Plants optimize production of heat and electricity

SIEMENS

CONTROL STRATEGY FOR OPTIMIZATION OF HEAT AND POWER GENERATION



1) Combined Heat and Power

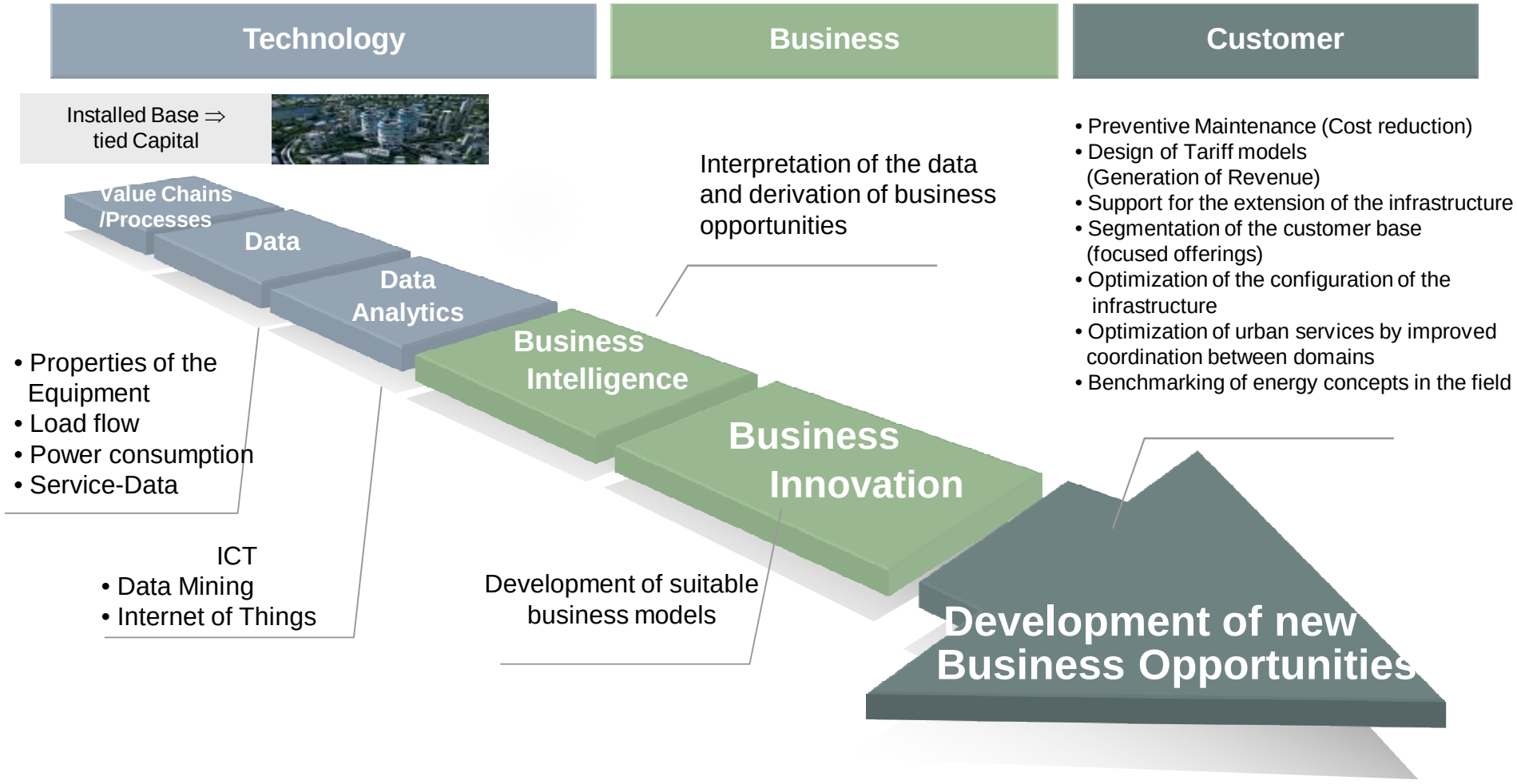
SIEMENS

Service for the City

Enhancement of the urban Energy Efficiency as a new Business Opportunity

Service for the City
From the data to new business opportunities

SIEMENS



Source: Leverage Service @Siemens

SIEMENS

Implementation in a City

Project Vienna's Urban Lakeside - Aspern

Vienna‘s Urban Lakeside - Aspern

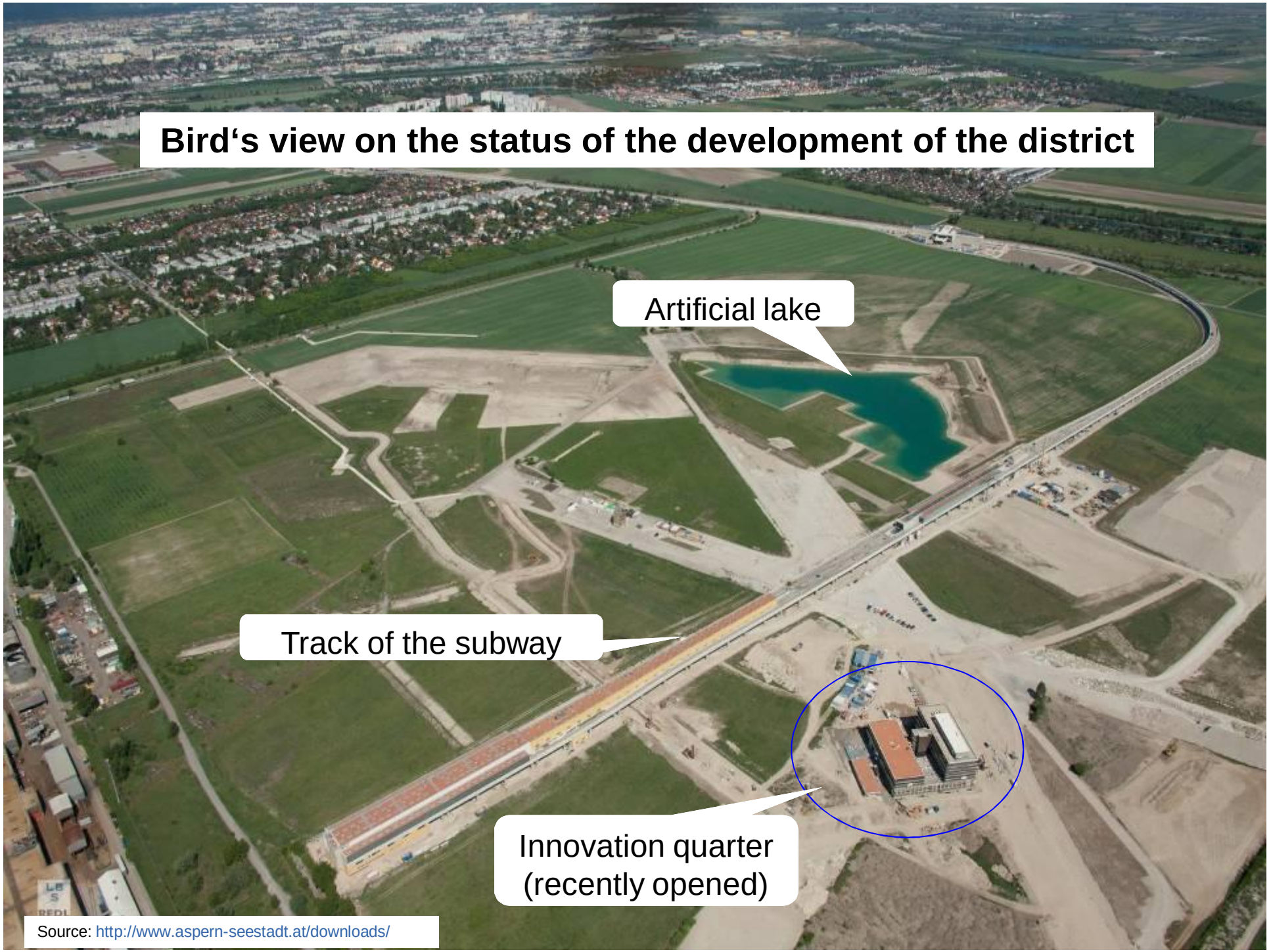
- Aspern – one of the most important city extension programs in Europe
- Area: 240 ha
- Residential area for 20.000 inhabitants and 20.000 work places

4 principles:

- Public space and micro climate (to investigate the relations between building and outdoor amenity)
- Cross-building energy distribution (to investigate the options of inter-building energy exchange)
- Demonstration buildings for residential, office and production
- Monitoring (evaluation of the achievement of goals)

Source: http://www.hausderzukunft.at/results.html/id6793

Bird‘s view on the status of the development of the district



Source: http://www.aspern-seestadt.at/downloads/

Summary

SIEMENS

- Systemic approach to realize energy efficiency in the city
- Upgrading Smart Grids to multi-modal energy networks enables further increase of overall energy efficiency in cities
- Decentralized self-Organizing Energy Automation Systems have shown their potential for smart power networks
- Self-Organizing Energy Automation Systems can be upgraded to smart multi-modal energy networks and thereby offer further potential to substantially increase the efficiency and utilization of the infrastructure in cities substantially
- New business opportunities and customer value will be based on ICT-driven innovations
- Lighthouse projects like the Vienna Urban Lakeside Aspern serves as as a living labs and will provide valuable proof points of modern energy efficient city concepts