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Energy Planning in the Urban Context

Swedish approaches

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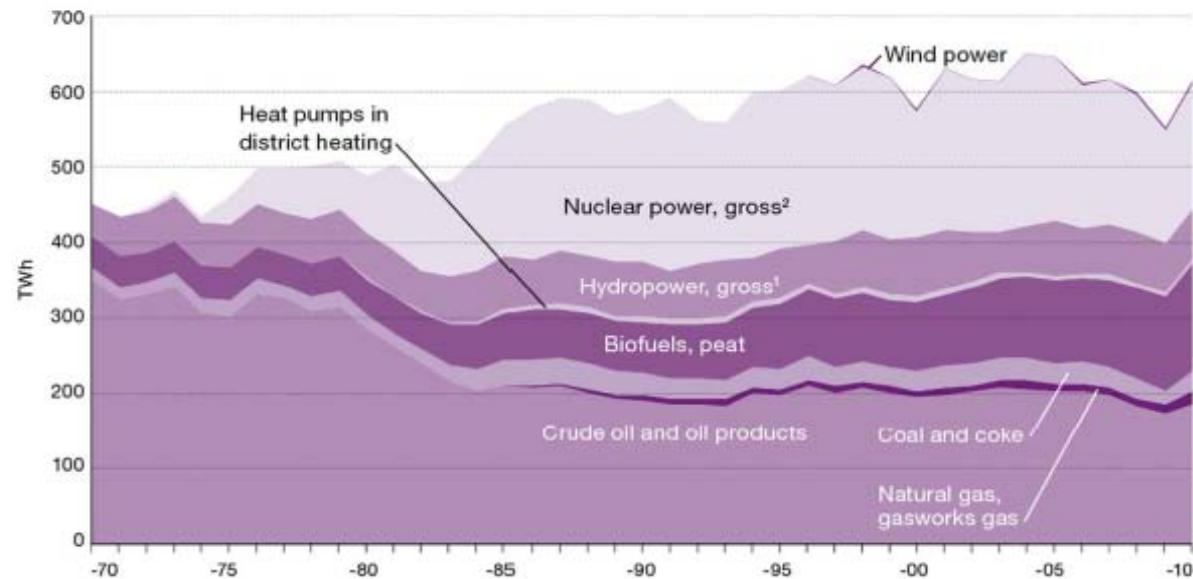
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Energy supply in Sweden 1970-2010, in TWh gradual shift away from fossil fuels

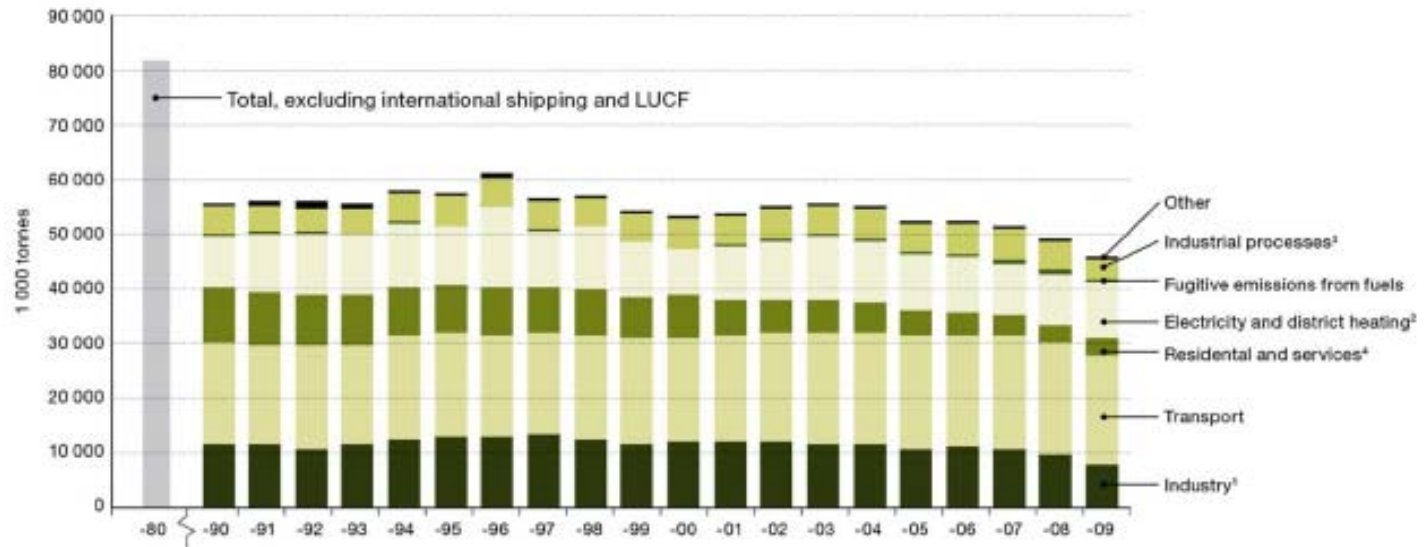


Source: Swedish Energy Agency and Statistics Sweden.

Note: 1. Including wind power up to and including 1996.

2. In accordance with the method used by UNECE to calculate the nuclear fuel energy input.

Carbon dioxide emissions in Sweden 1980, 1990-2009, in 1000 tonnes



Source 1980: Statistics Sweden. Source 1990–2009: Sweden's National Inventory to UNFCCC year 2010.

Note: Revised figures for all years compared with previous editions.

1. Including industrial back-pressure production.
2. Including coking plants, refineries and hazardous waste incineration.
3. Including the use of solvents and products.
4. Including agriculture, forestry and fisheries.



Changing landscape in the energy sector

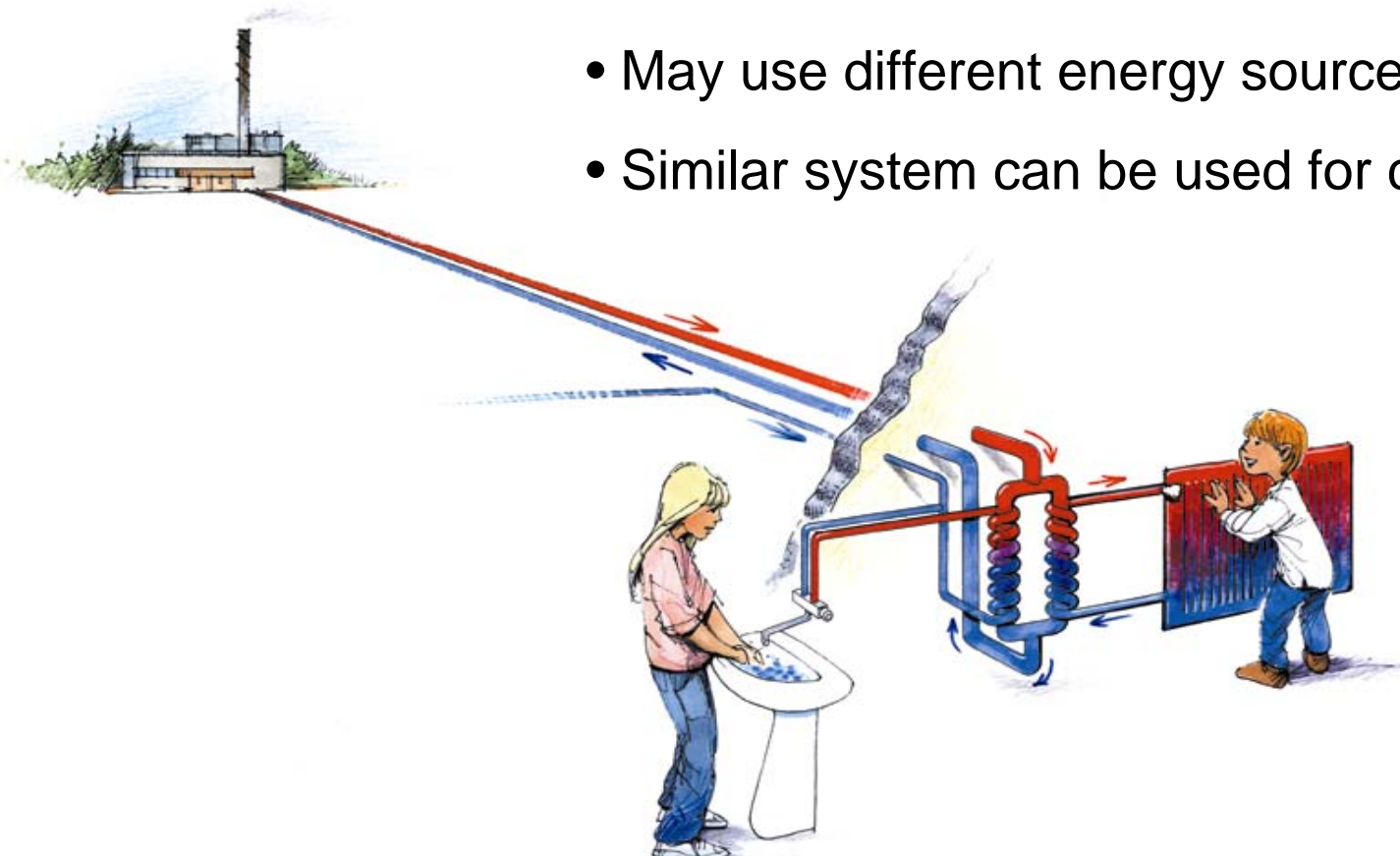
- from centralized to decentralized generation/fuel production
- from segmentation of markets to synergy in generation and uses
- from transmission and distribution grids to smart grids
- from utilities to multiple actors in competitive markets
- technological convergence promoted through research
- new business models and institutional structures taking shape

Technological options and uncertainties, and multiple actors in the market require more careful planning

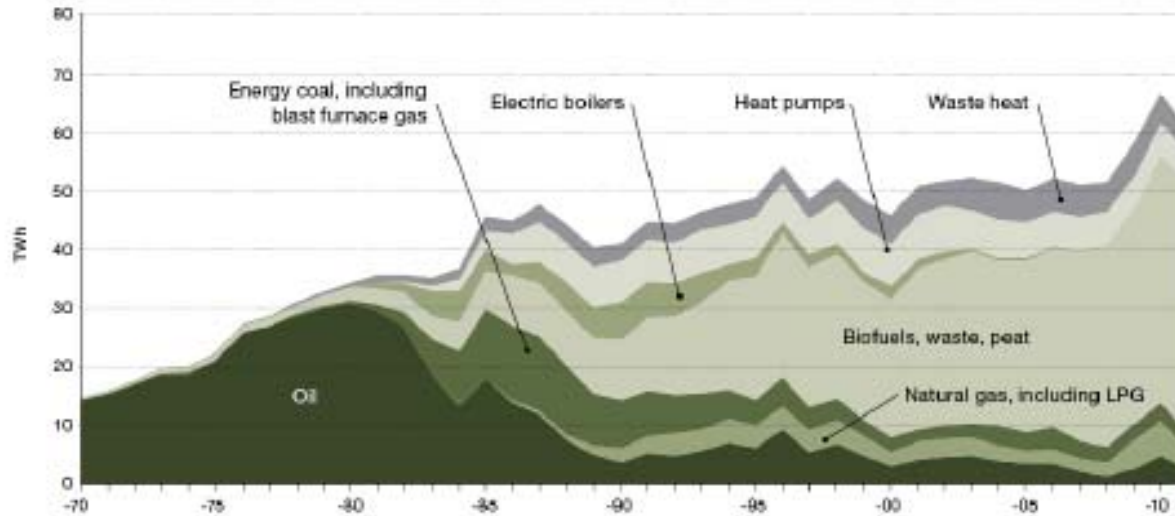


District heating

- Water is heated and distributed in a pipe-system
- May use different energy sources and waste energy
- Similar system can be used for cooling



Energy supplied to district heating – Sweden 1970-2011, in TWh



Source: Statistics Sweden and the Swedish Energy Agency, EN 20 SM.

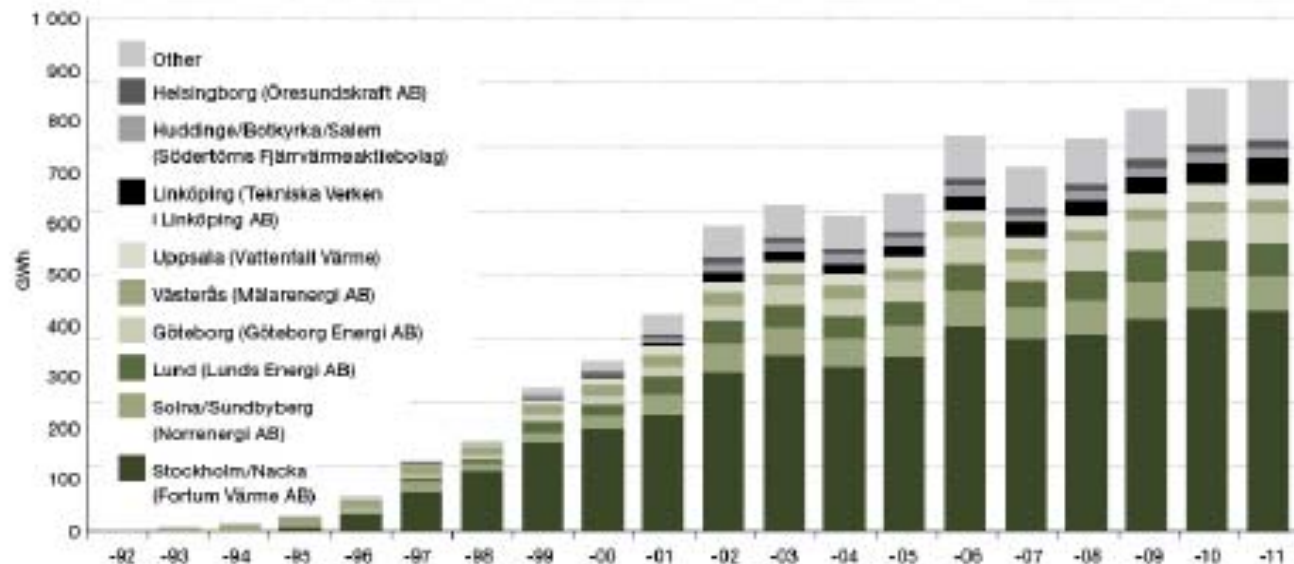
Note: With effect from and including 2009, more fuels are included in the indicator. Figures for 2011 are preliminary, and also from not entirely comparable sources.





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District cooling supplied in Sweden 1993-2011, in GWh



Source: Svensk Fjärrvärme, additional processing by the Swedish Energy Agency.

Note: The statistics show only commercial district cooling, i.e. where the suppliers and property-owners are different companies.

Sweden

Continuous environmental gains since the
Stockholm Environmental Summit 1972



Strong political leadership

Economic instruments – carbon dioxide
taxes, energy tax relief on renewables



Triple helix collaboration

Integrated planning



Synergies

Symbiosis means integration of organisms in a mutually beneficial union. In the city, symbiosis means finding synergies between urban systems and functions so as to save natural and capital resources.

$$1 + 1 = > 3$$

SymbioCity
SUSTAINABILITY BY SWEDEN

Gathers and applies Swedish knowledge in sustainable urban development across the globe



Western harbour/ Bo 01 Malmö



Hammarby Sjöstad, Stockholm



R&D projects – Institutional exp



Gårdsten, Gothenburg

SymbioCity

- Holistic approach in search for sustainable urban development
- Explore synergies between urban functions to satisfy multiple needs while saving resources
- Provide a healthy and livable city environment for growing urban populations while reducing ecological footprint

Sustainable municipality program

- Developed by Swedish Energy System since 2003
- Spreads knowledge
- Provides project resources to establish networks of multiple stakeholders
- Implement and monitor change
- Research programs on energy and climate at local level

At present 38 municipalities work now with focus on

(i) smart energy planning and (ii) energy as a vector for growth

Hammarby Sjöstad – innovation and urban quality



Hammarby Sjöstad

– en unik miljöstatsning i Stockholm



Integrated urban
planning with
environmental goals

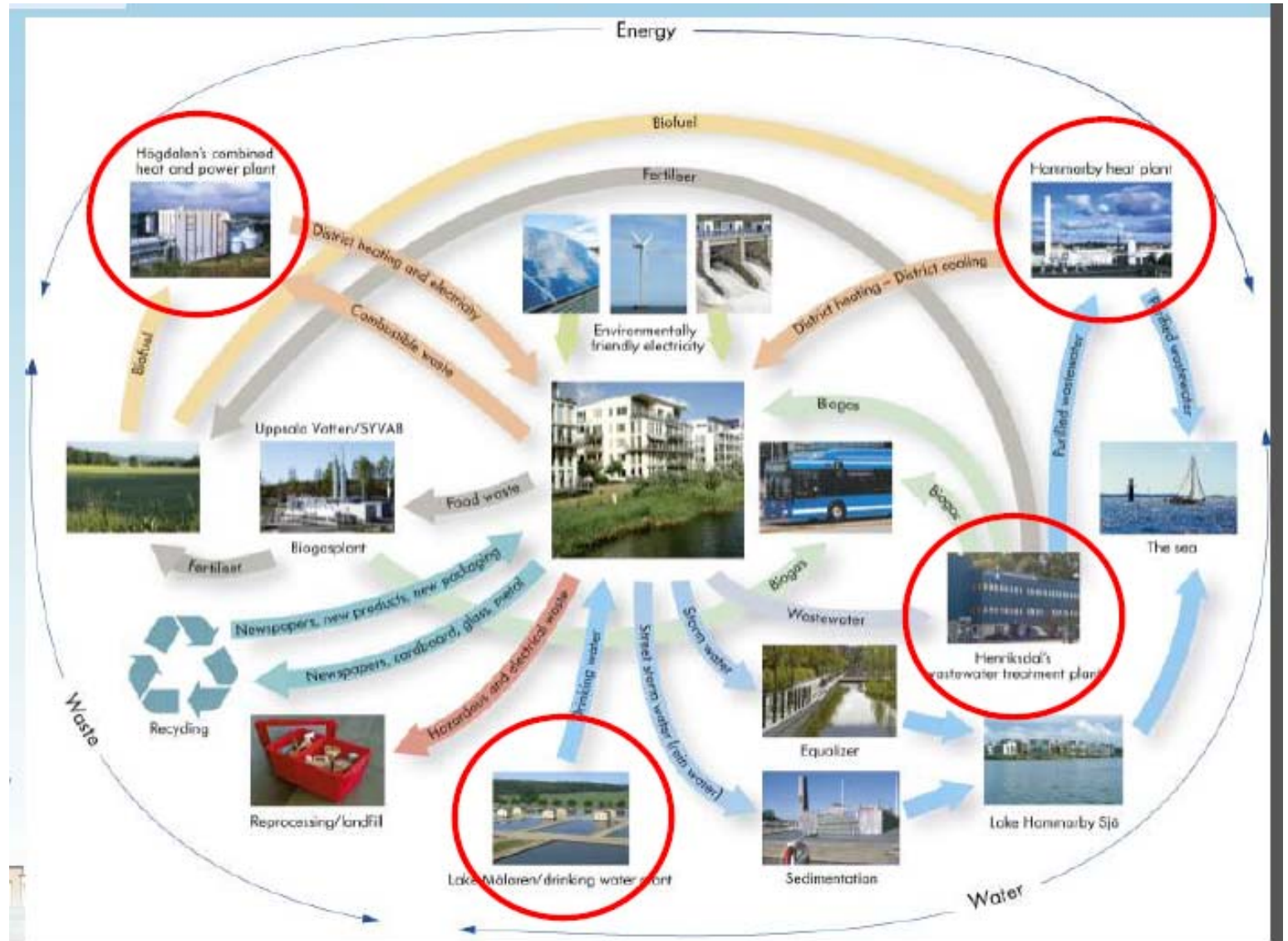
Interaction among
public and private
stakeholders to solve
urban functions

Reference in urban
planning and
sustainability

The Hammarby Model



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Hammarby Sjöstad

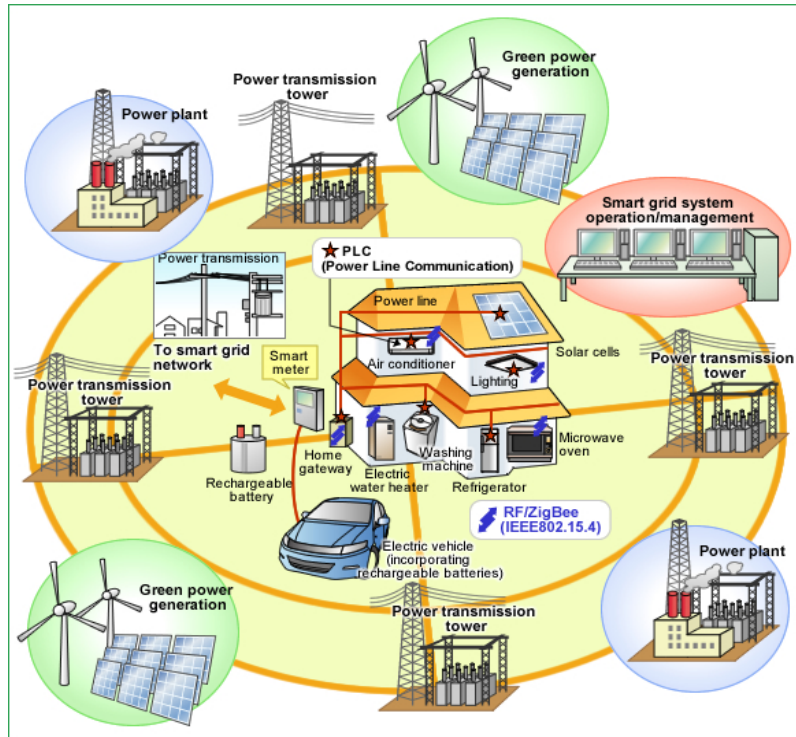
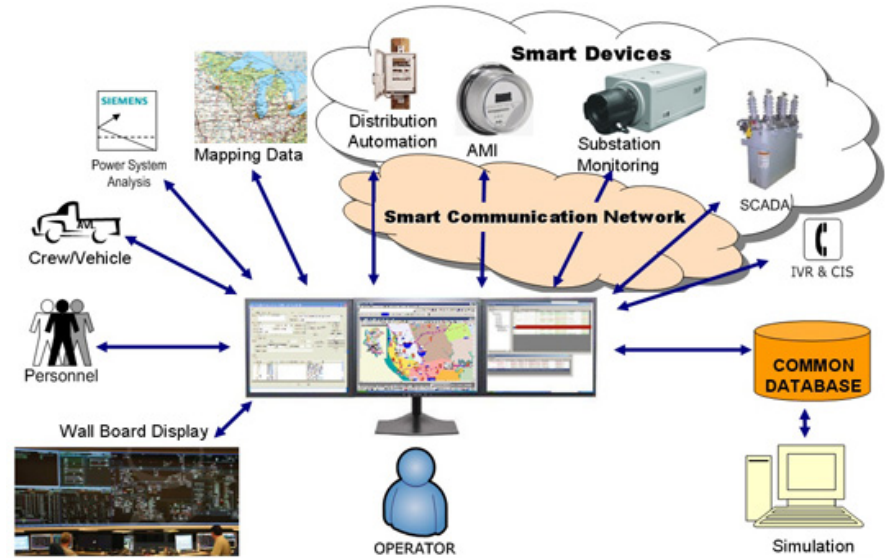
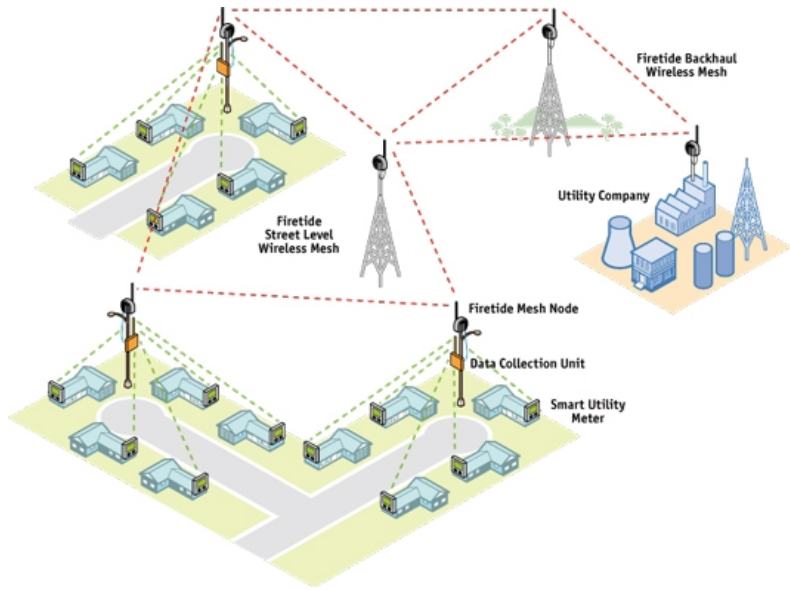


The Stockholm Royal Seaport

From industrial area to vibrant sustainable city

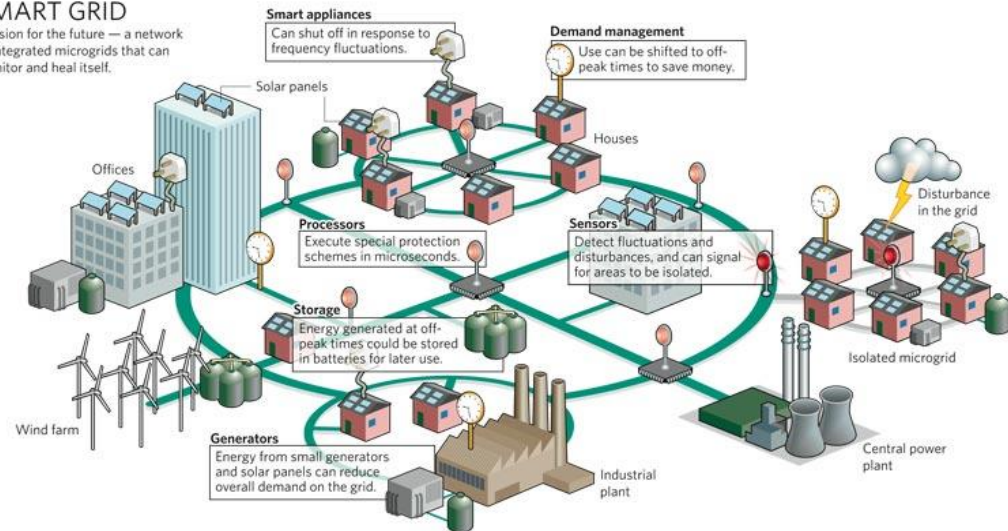


Smart grid approaches



SMART GRID

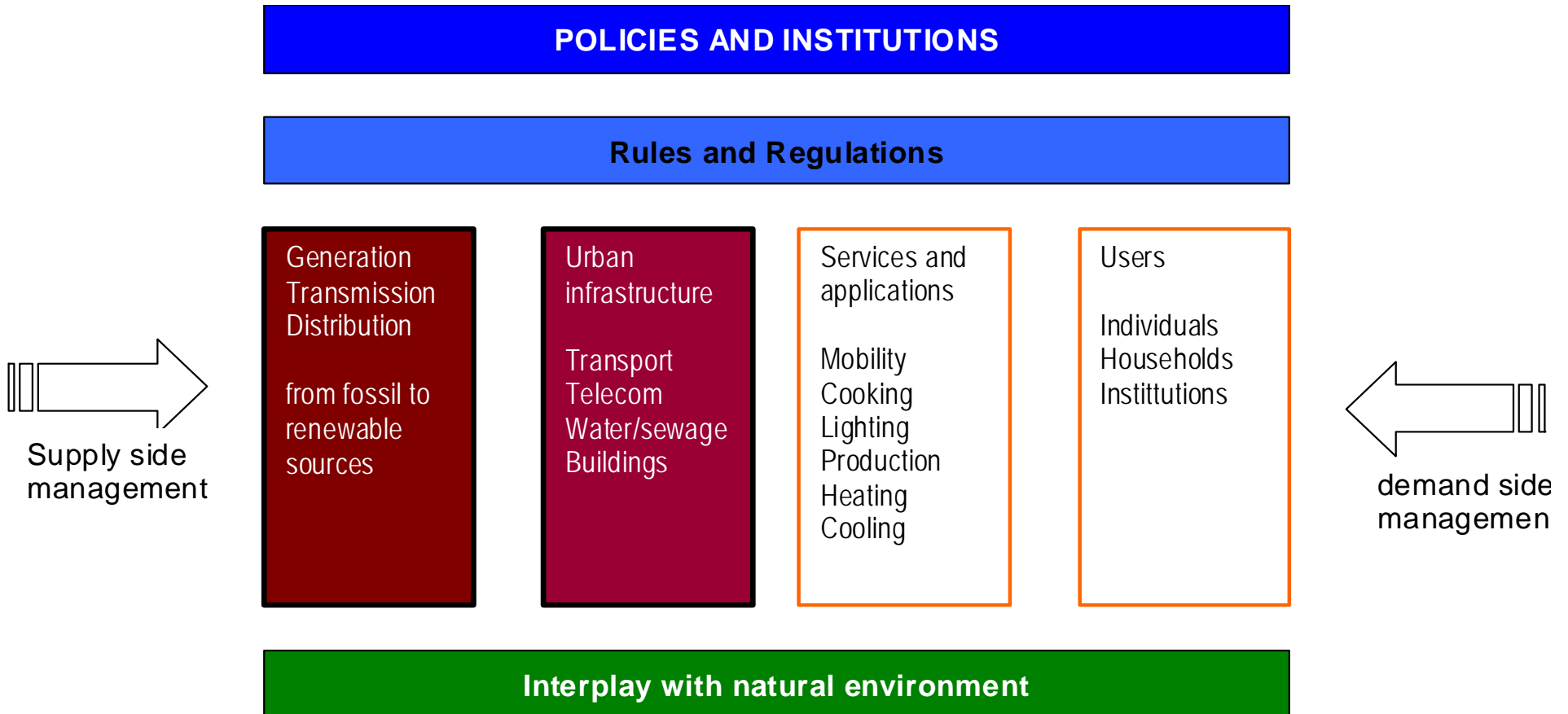
A vision for the future — a network of integrated microgrids that can monitor and heal itself.



More efficient energy flows and reduced environmental impacts – improving the synergies

- Enhancing the role of district heating (e.g. cooling)
- Linking waste management with energy provision
- Substituting fuels in transport while also providing multiple transport options
- Further developing electricity markets (e.g. integrating supply and demand)
- Municipal eco-energy programme
- Local energy offices to disseminate information
- Research programs (incl. new concepts, pilot solutions)

Energy planning for the urban environment





How shall policy and research help manage energy supply and demand in urban planning?

- develop new systems concepts across sectoral borders
- orchestrate creation of new networks
- reduce transaction costs for establishment of new systems
- transform institutional and regulatory basis
- devise new business models (i.e. from supply to service focus)
- focus resource efficiency and low-carbon alternatives

Sustainable urban smart grids - Partners



City of Stockholm
Stockholm Royal Seaport



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Coordination: (ECS) Energy and Climate Studies

Funding for start-up:





USP Sustainable Campus, São Paulo

The Sustainable Campus

New master plan at USP includes technology centre, smart transport on campus, and smart buildings



Examples of opportunities:

New building concepts; student-faculty interactive communication; mobility on campus



The North Vector of Development Belo Horizonte

The North Vector

Macro-structural regional development plan involving infrastructure and logistic improvements in northern part of BHZ



Source: Management report of the macro-structural plan for the North Vector

Example of Smart grid opportunities:

- Airport access axis
- International Airport Tancredo Neves – major logistic hub
- Greenfield projects for industrial and residential areas in the region



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The Green line - Curitiba

The Green Line

A linear park and
new mass transport corridor
around established urban plan
strategy of Curitiba



Source: www.hyperbus.se

Example of Smart Grid opportunities:

Hybrid busses, e.g. Hyper Bus - Hybrid and Plug-in Extended Range
Bus System, by Volvo; other connected services for the community in
urban hubs



Rethinking urban areas to achieve sustainability

- more than technology is needed
- systems approach in planning
- policies can help redirect development
- municipalities need to play a catalytic role
- multiple stakeholders have to be engaged
- urban areas are part of the solution