Stockholm Royal Seaport
- a smart grid for a sustainable city project

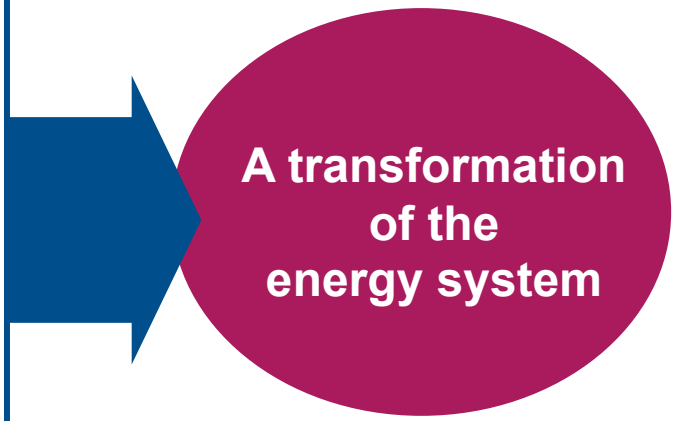
IEA DSM - Program Workshop ”The smartness of smart grids”

Stockholm October 6, 13-18

Tomas Wall, VP R&D Sweden, Fortum Corporation

The ambitious energy policy in Sweden set new requirements on the energy system

- Targets for 2020
  - 50 percent renewable energy
  - 20 percent more efficient energy end usage
  - 10 percent renewable energy in the transport sector
- Fossil free fleet of vehicles by 2030
- Climate neutral energy system by 2050
- Renewable energy production as a third leg beside hydro and nuclear
- Target for wind power 25 TWh by 2020 – 20% of the Swedish power production



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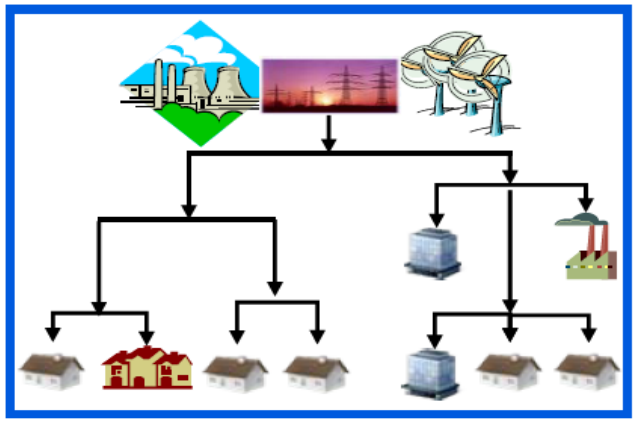
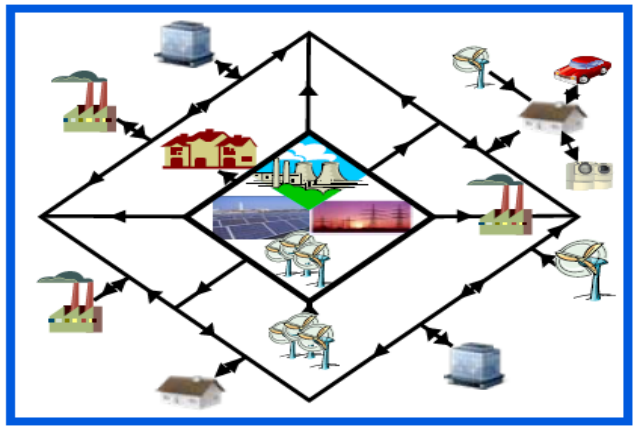
The grids have to develop to accommodate the new renewables and enable active consumption

Traditional grids



Future grids



Consumtion
- Smart meters
- Smart homes/houses
- PHEV
- Storage

Production
- Power stations
- Parks
- Decentralised energy systems

Sorce: ABB

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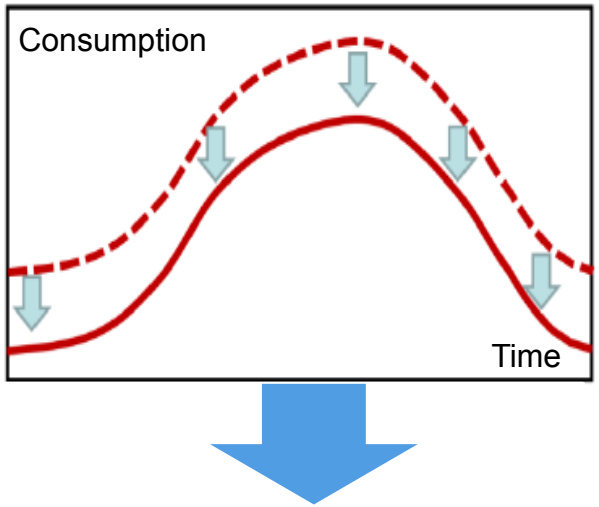
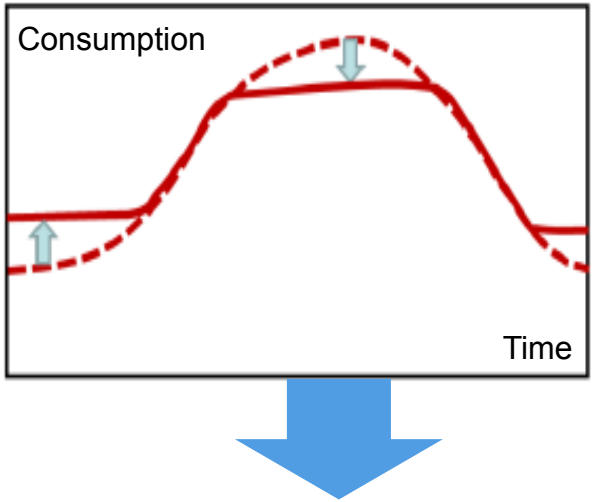
What is energy efficiency about?

Energy conservation



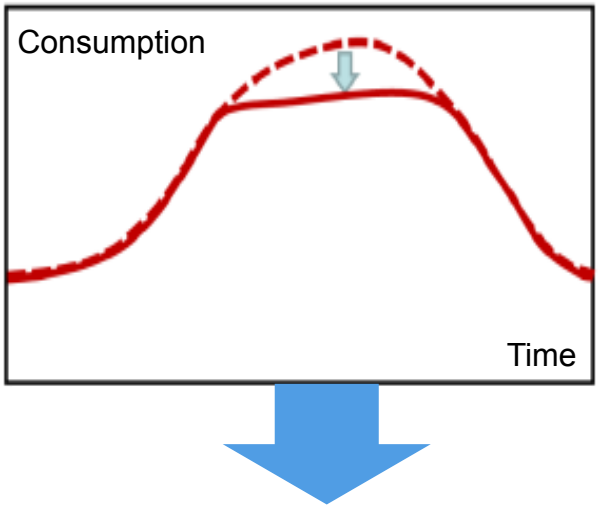
- Reduced CO_2-emissions
- Renewable energy

Load shifting



- Reduced CO_2-emissions
- Renewable energy
- Better capacity utilisation

Peak shaving



- Reduced CO_2-emissions
- Better capacity utilisation
- System stability

Source: Masdar City

Smart solutions must work for the energy consumers

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Stockholm Royal Seaport – a world class sustainable urban city

Vision

- Royal Seaport – A sustainable urban city performing ***world class***

Objectives

- Year 2030 the Royal Seaport is fossil free
- Year 2020 CO2-emissions are below 1.5 ton per person

Focus areas

- Energy efficiency
- Efficient transports
- Re-cycling
- Life style issues

CLINTON CLIMATE INITIATIVE

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A ”world-class” contract confirms the vision and stakeholder commitment for the development

- Local sustainability program
  - Local public areas
  - Energy system
  - Local recycling
  - Water and waste water treatment
  - Transportation
  - Homes and services
  - Life styles and business
- Knowledge sharing and commercialize new solutions

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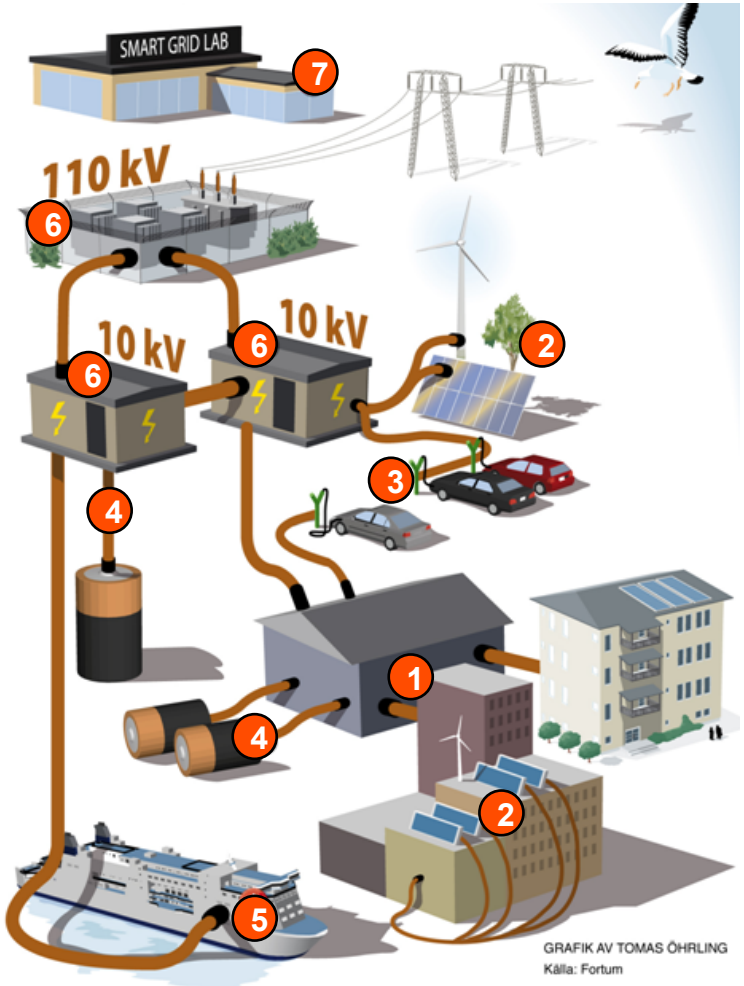
The planned smart grid in Stockholm Royal Seaport is needed for reaching the ambitious sustainability targets



1. **Smart homes/Buildings and Demand Response**
2. **Distributed Energy Systems**
3. **Integration and Use of electric vehicles**
4. **Energy Storage for customers and the grid**
5. **Smart electrified harbour**
6. **Smart Primary Substations**
7. **Smart Grid Lab (part of an innovation Center)**

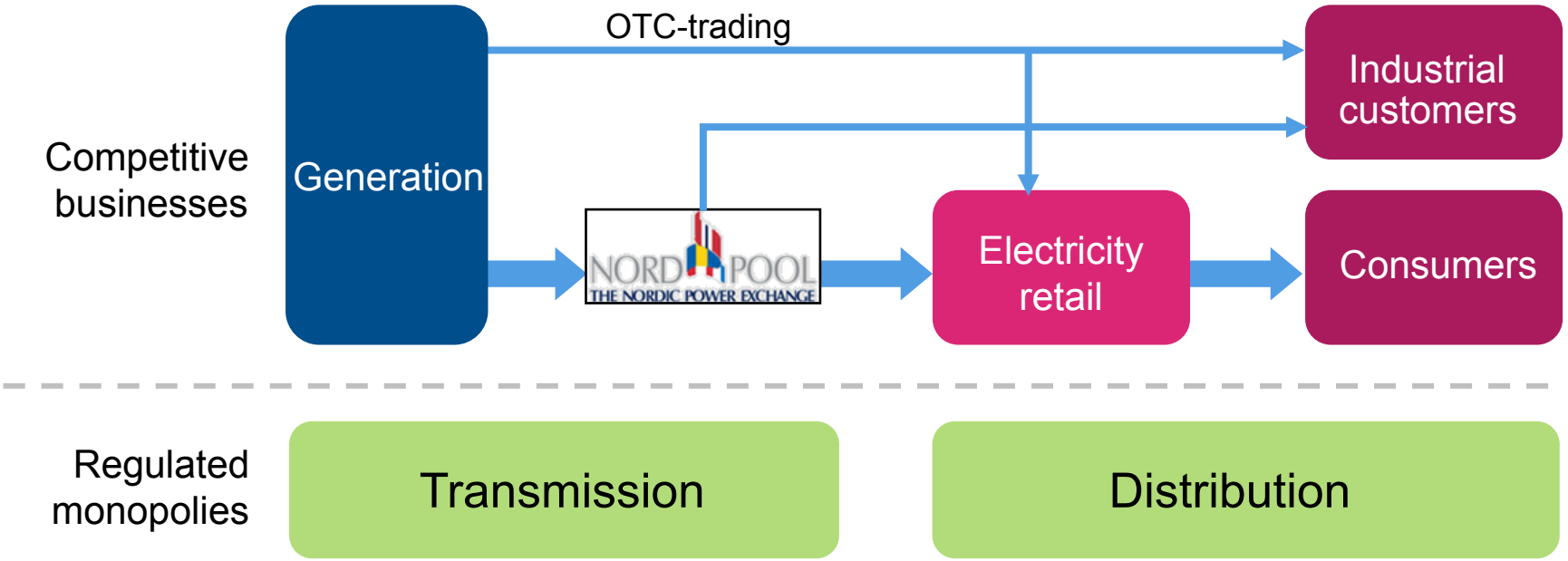
The development of the smart grid is more than using new technology

- Learn about the new functionalities of the grid in the transformed sustainable urban energy system

- # New technology solutions
- # New business models
- # New market rules
- # New role of the customers and customer behaviors

- Transfer learning's into market rules and commercial applications

The organisation of the Nordic electricity market



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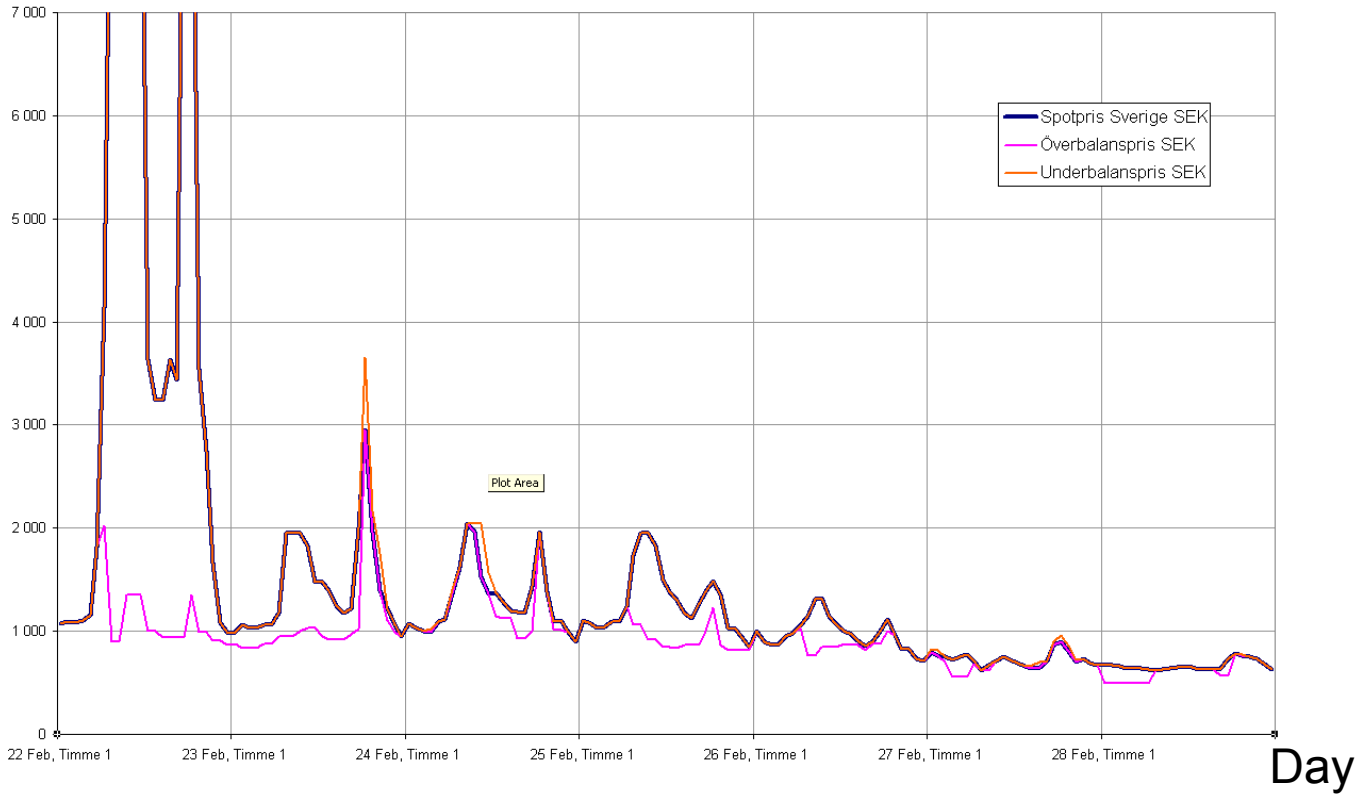
Nordic electricity wholesale price w8, 2010 – price is reflecting capacity usage and environmental impact

SEK/MWh*



*Price area Sweden

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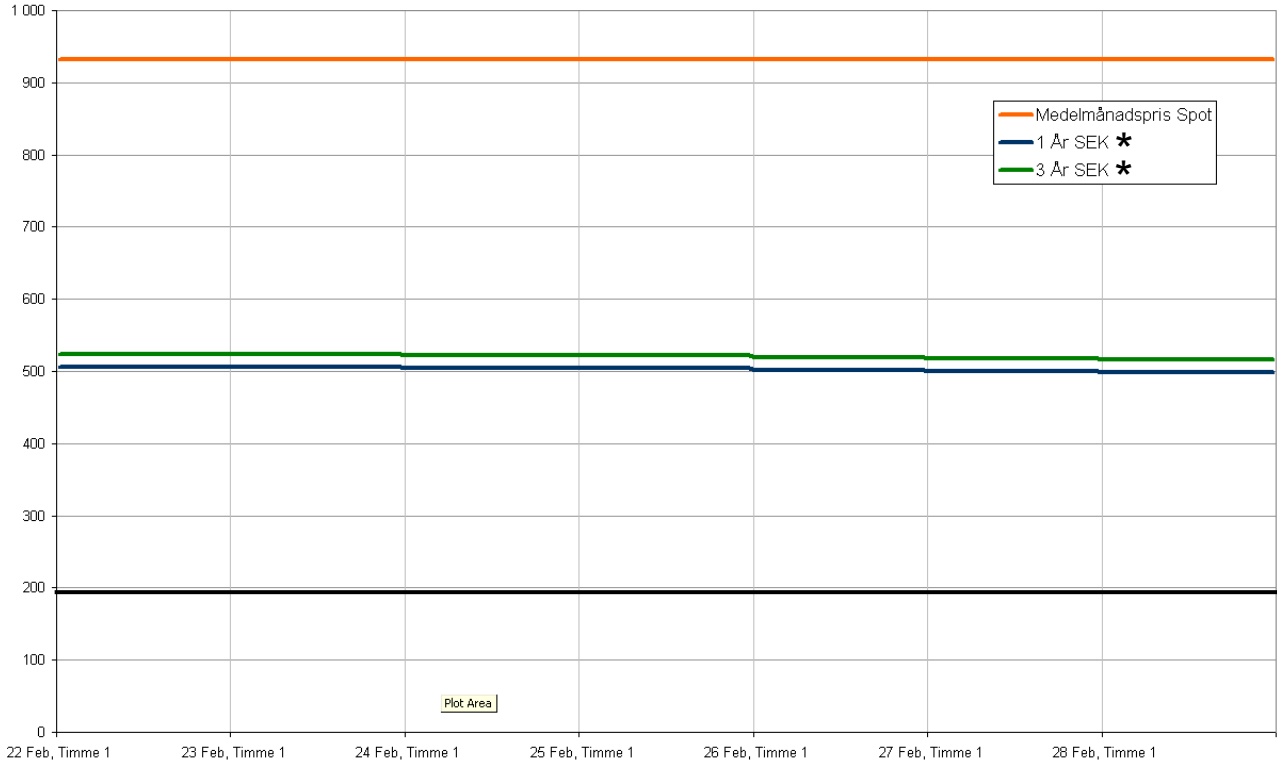
Nordic electricity retail price w8, 2010 – no dynamics

SEK/MWh



Day

Energy dependent share of the distribution tariff 16-160 A**

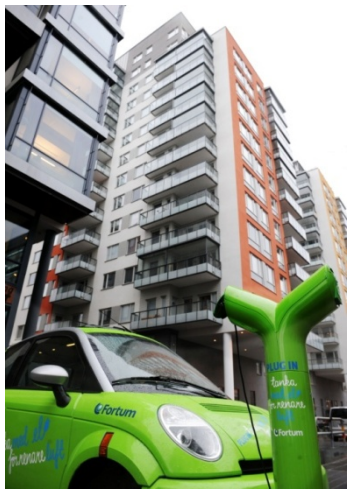
* Fortum fixed price contract, with start of delivery Feb 1, 2010

** Energy dependent share of the distribution tariff in grid area Stockholm at Fortum

An integration of the retail and wholesale systems will transfer the price signals to the consumption

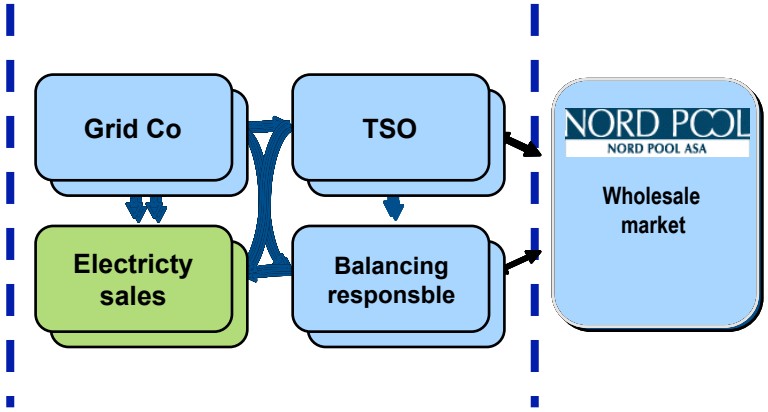
The internal processes of the house and home

The internal processes of The electricity market



Hourly based metering

Dynamic pricing



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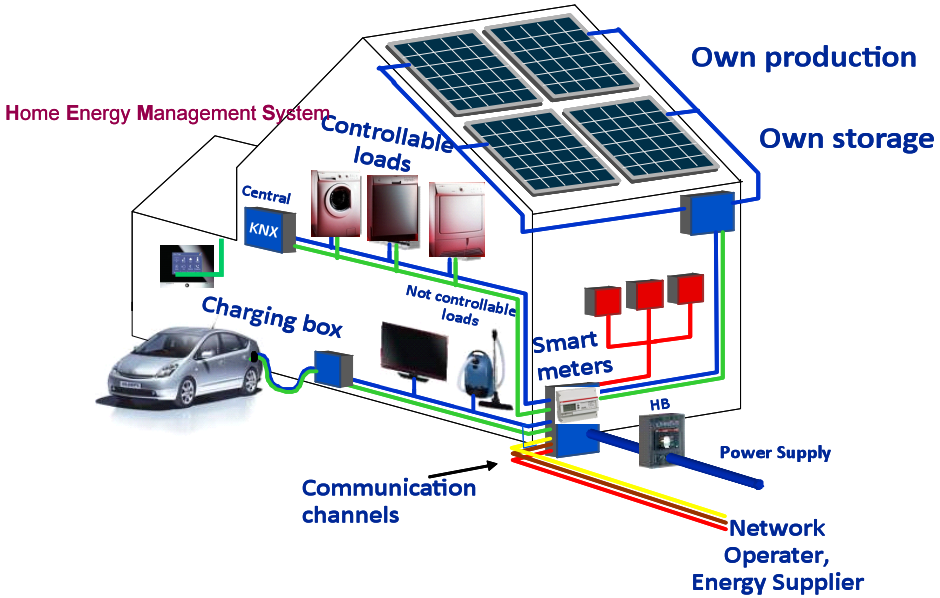
It has to be easy for the consumer to be energy smart

The active house



Compare with a modern car

An innovation centre for meeting, sharing and developing

- Network and demonstration of new solutions
- New solutions and new partnerships
- A platform for commerscialisation of the concepts

STOCKHOLM ROYAL SEAPORT / NORRA DJURGÅRDSSTADEN
INNOVATION

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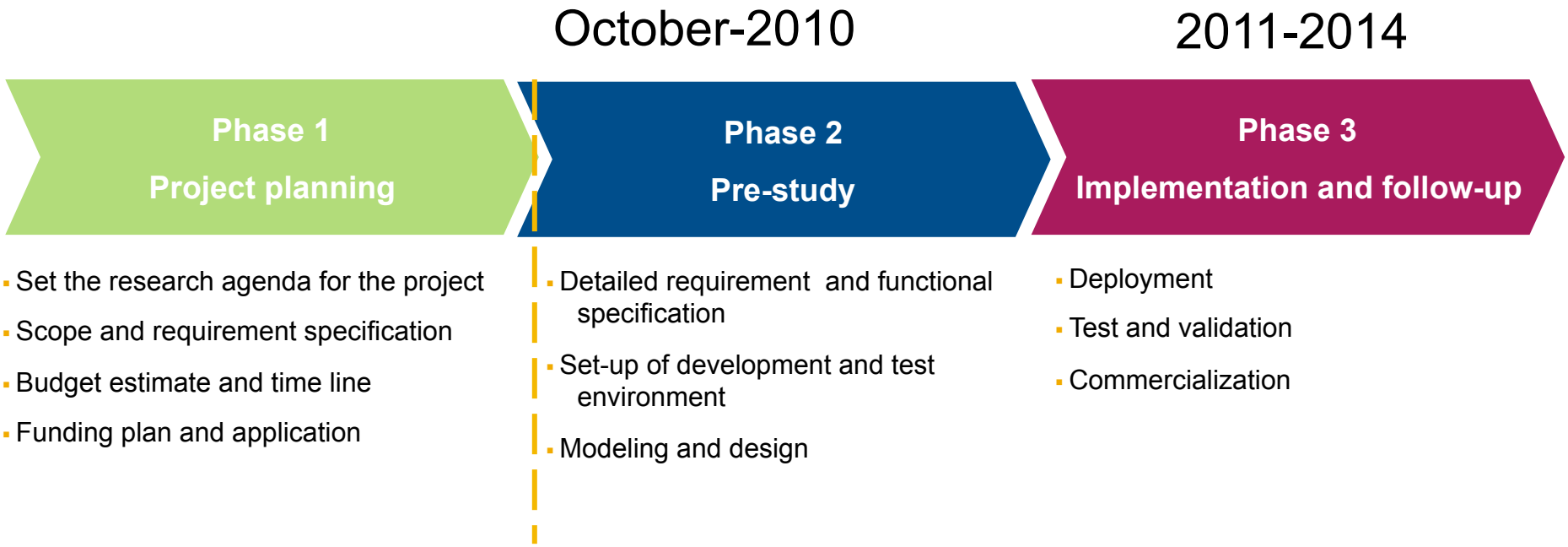
The process for the smart grid project in Stockholm Royal Seaport



Summary - Stockholm Royal Seaport

- A sustainable city with world class targets
- An urban smart grid is developed to enable the city to reach it's sustainability targets
- Interaction between technology, customers and regulation
- A national arena for developing market concepts and regulation for a smarter system
- Business development and knowledge sharing

Thank you!

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