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Bundesamt für Energie BFE
Office fédéral de l'énergie OFEN
Ufficio federale dell'energia UFE
Swiss Federal Office of Energy SFOE

Smart Grid Road Map: A Facilitator for RES in Switzerland

Dr. Matthias Galus, Expert Energy Supply

serec – „ Electromagnetics in Renewable Energies", ETH Zürich, 9th November 2012

Overview

- Introduction - Energy Strategy 2050
- Upcoming challenges for power systems and approaches for solutions
- Smart Grid Road Map (SGR-CH) for Switzerland
  - Introduction to roadmapping
  - Actors to be involved
  - Outcome boundary conditions
  - Roadmapping process
  - Anticipated Smart Grid topics
- Summary

First action package of the Energy Strategy 2050
- Timeline -

May 25th, 2011
Decision Bundesrat and Parliament
Phase out of Nuclear Power
until 2034

May 23rd, 2012
Decision Bundesrat
Create a Strategy for Electricity Networks

November, 9th 2012
Today

Time

March 11th, 2011
Accident Fukushima

April 18th, 2012
Decision Bundesrat
First Action Package of ES 2050

October 31st, 2012
Publication of Concept for
Strategy for Electricity Networks

Possible adaption of political frameworks for power systems

Energy Strategy 2050

1. Increase **energy efficiency**

2. Increase **renewbale energy production**

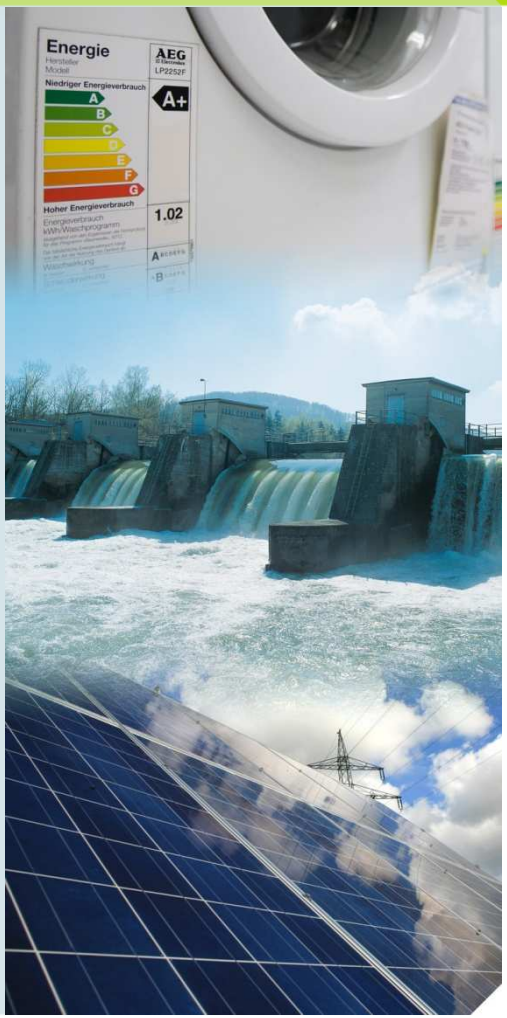
   – Hydro power 3,2 TWh and
   Pumped storage 7,5 TWh

   – „new Renewables“: Complete utilization of available potentials
   (22.6 TWh)

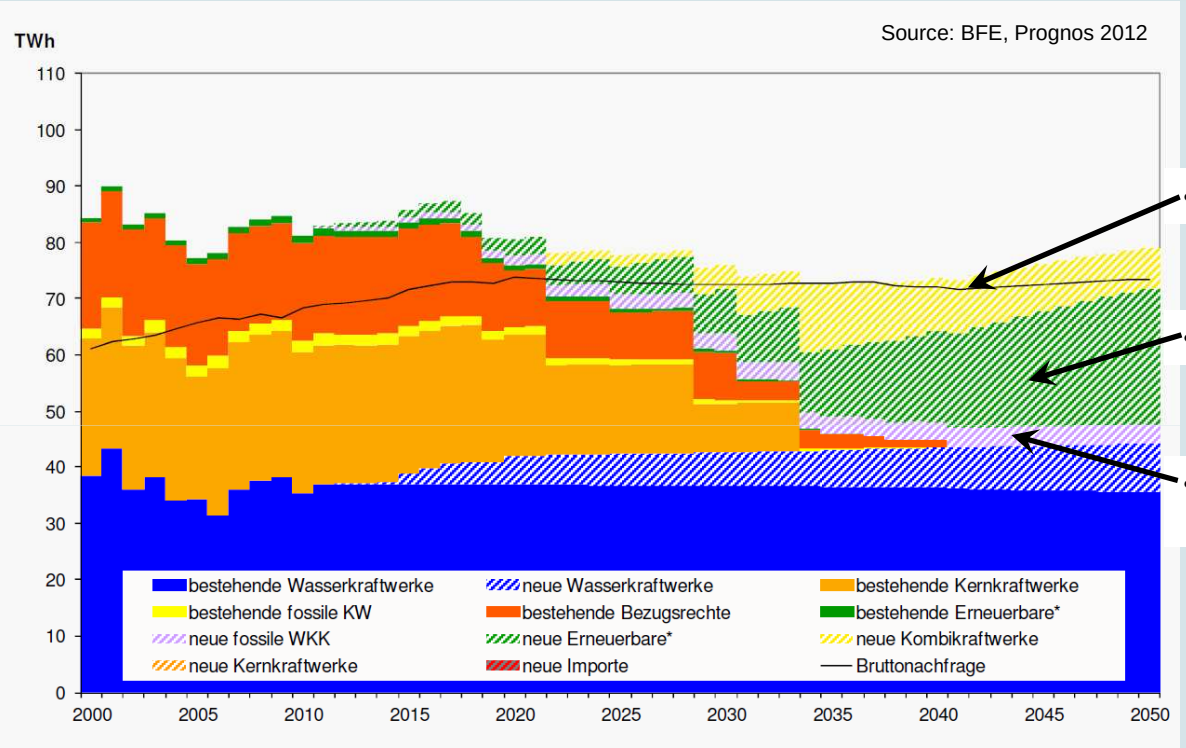
3. Supply of **remaining demand**

   – Fossil fuel production (Gas)

   – Imports



Swiss Energy Perspectives until 2050 for ES 2050

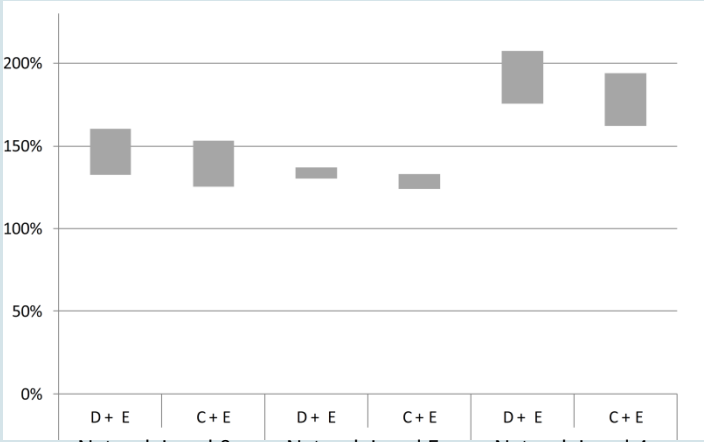


- Reduction of consumption
- Decentralized RES
- Centralized / decentralized CHPs

- Reduction of consumption
- Centalized and decentralized CHPs
- Large increase in decentralized RES

Challenges for electricity networks …

- Transmission / distribution infrastructure is old (> 40 Years)
- Power system stability
- Network expansion (mostly distribution)
- Achieving energy efficiency
- Ensuring power quality
- …



Source: BFE, Consentec 2012

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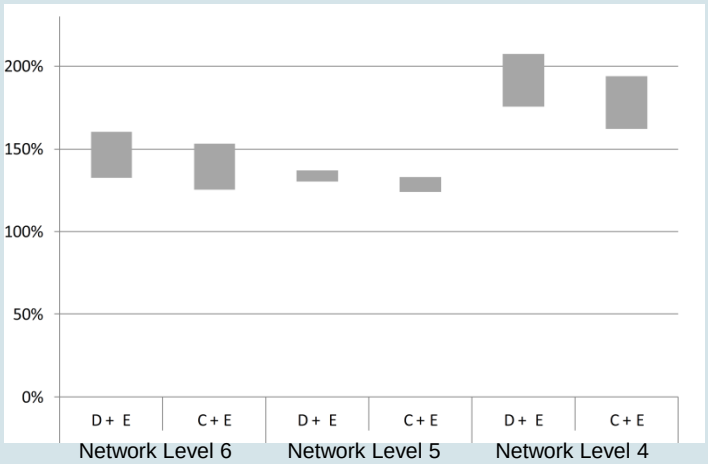

Source: BFE, Consentec 2012

Mio. CHF	wwb		nEP	
	Bis 2035*	Bis 2050*	Bis 2035*	Bis 2050*
C+E	5.550	8.750	6.200	11.150
D+E	6.750	10.100	7.500	12.600
D+E, ESM90				
D+E, ONS-Regelung				

Source: BFE, Consentec 2012

… and solution approaches

- Update transmission / distribution networks
- Avoid network expansion through power infeed management
- Enable active distribution systems
- Smart Metering supports energy efficiency
- Flexibilize demand in power systems
- Integrate storage in power systems
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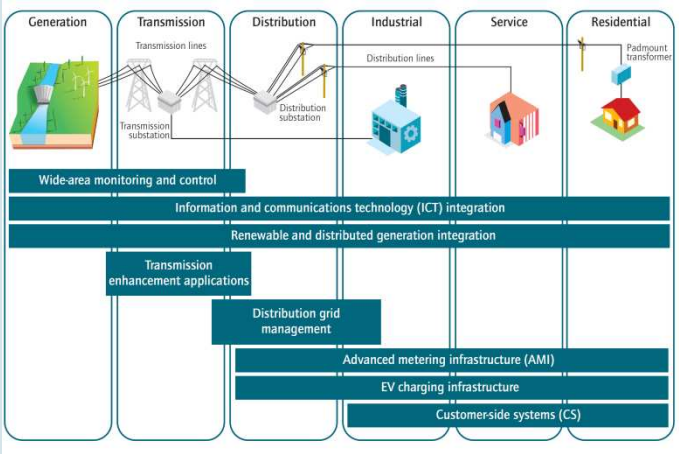

Source: IEA 2011

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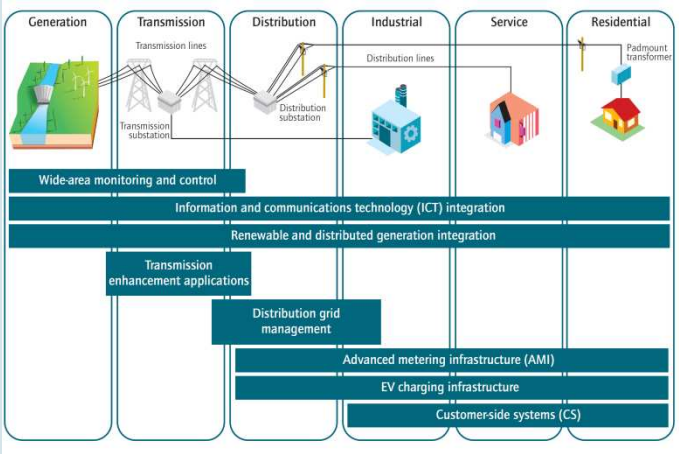

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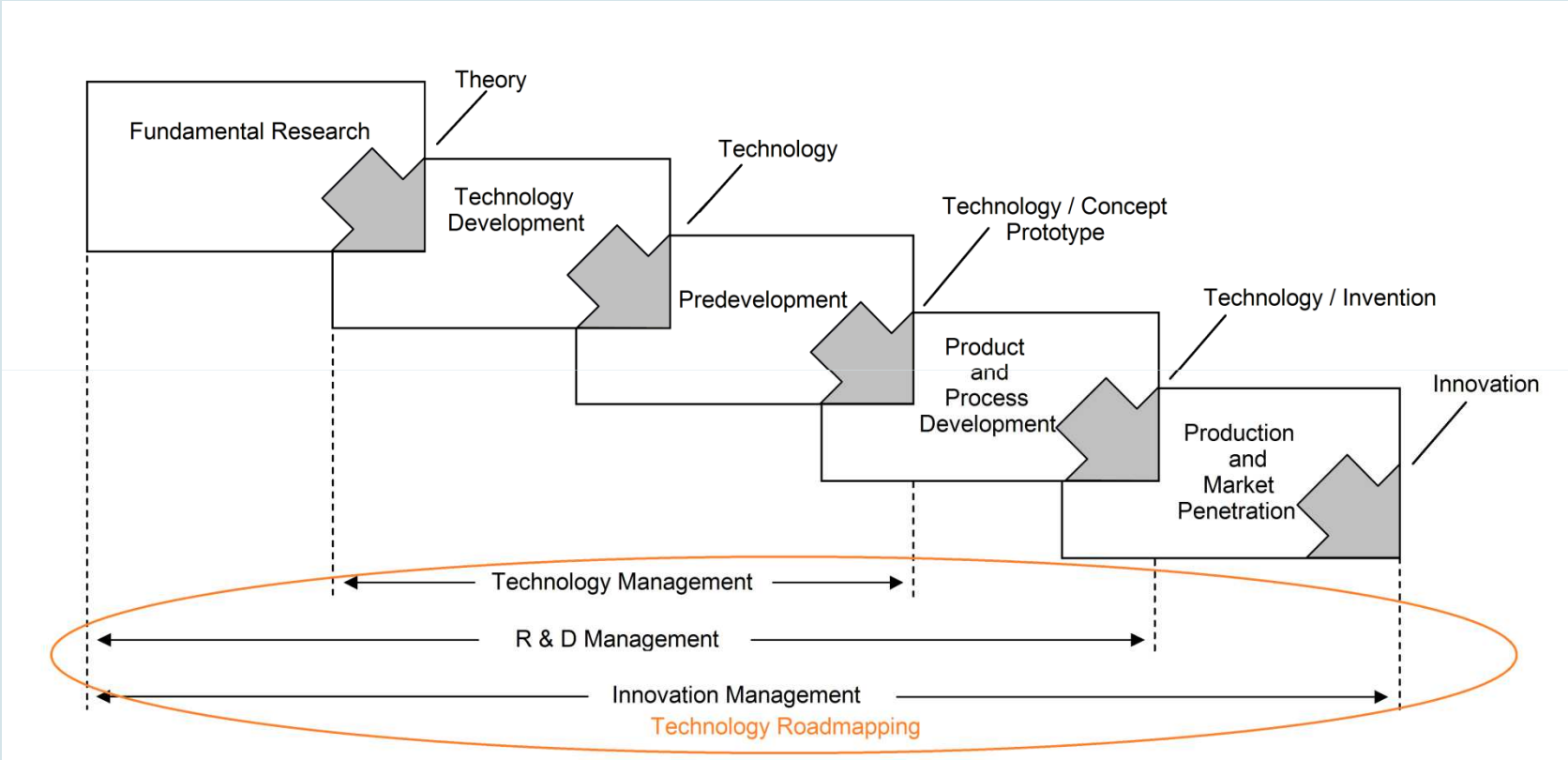
Coordination and facilitation of solutions: The Smart Grid Roadmap (SGR-CH)



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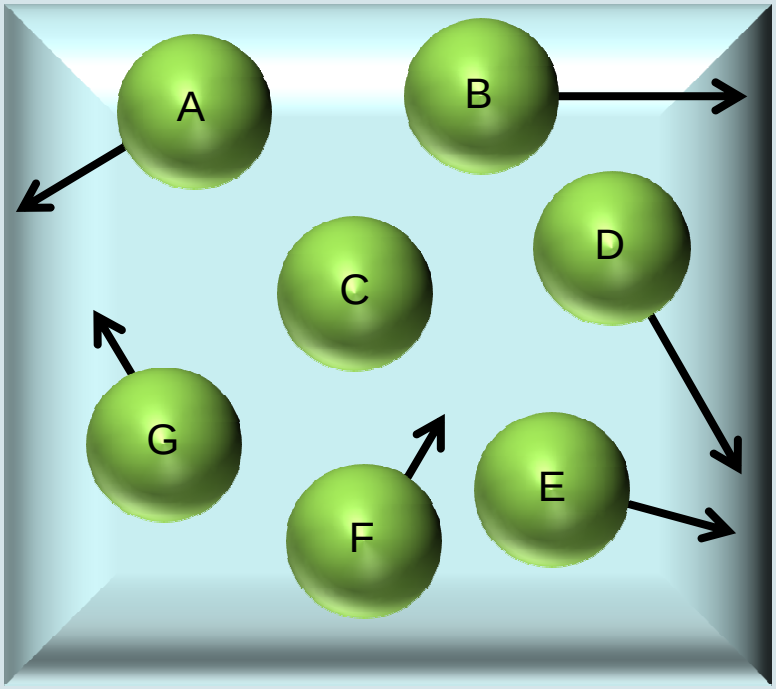

- The goal of the Smart Grid Road Map is to streamline the efforts for developing and implementing a Smart Grid in Switzerland

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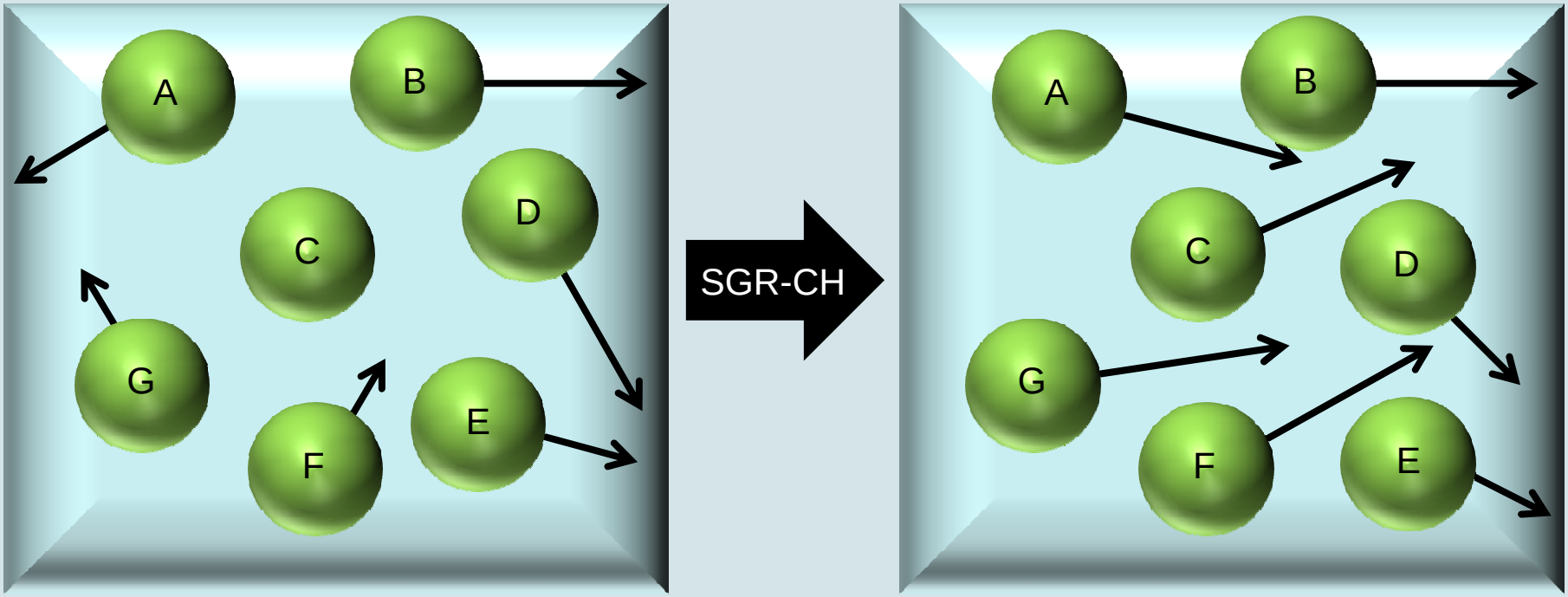

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Actors and interest groups
Smart Grid Road Map (SGR-CH)

- Actors and interest groups:
  - Utilities
  - Network operators
  - Companies: primary / secondary equipment
  - Companies: information and communication technology
  - Environmental interest groups
  - Economic interest groups
  - Consumer interest groups
  - Policy makers, regulator

Smart Grid Road Map (SGR-CH) and boundary conditions

Outcome:

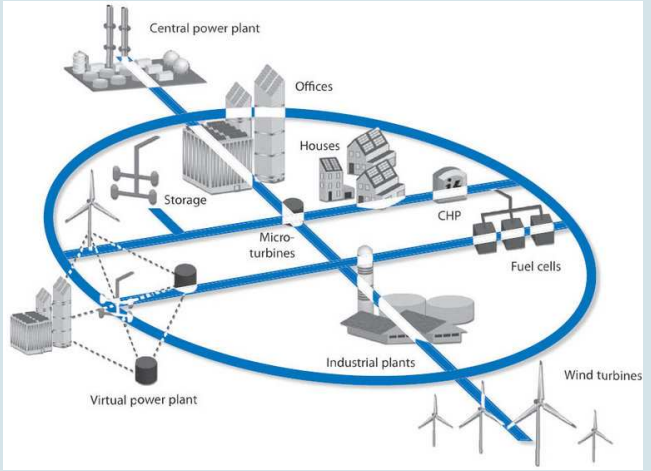
Consensus based and content oriented guide for the development and implementation of smart grid functionalities.

It delivers a timeline for the needed technological and political developments.

Visions of all actors regarding the characteristics of the Swiss Smart Grid will be developed and consolidated to a coherent future system defintion.

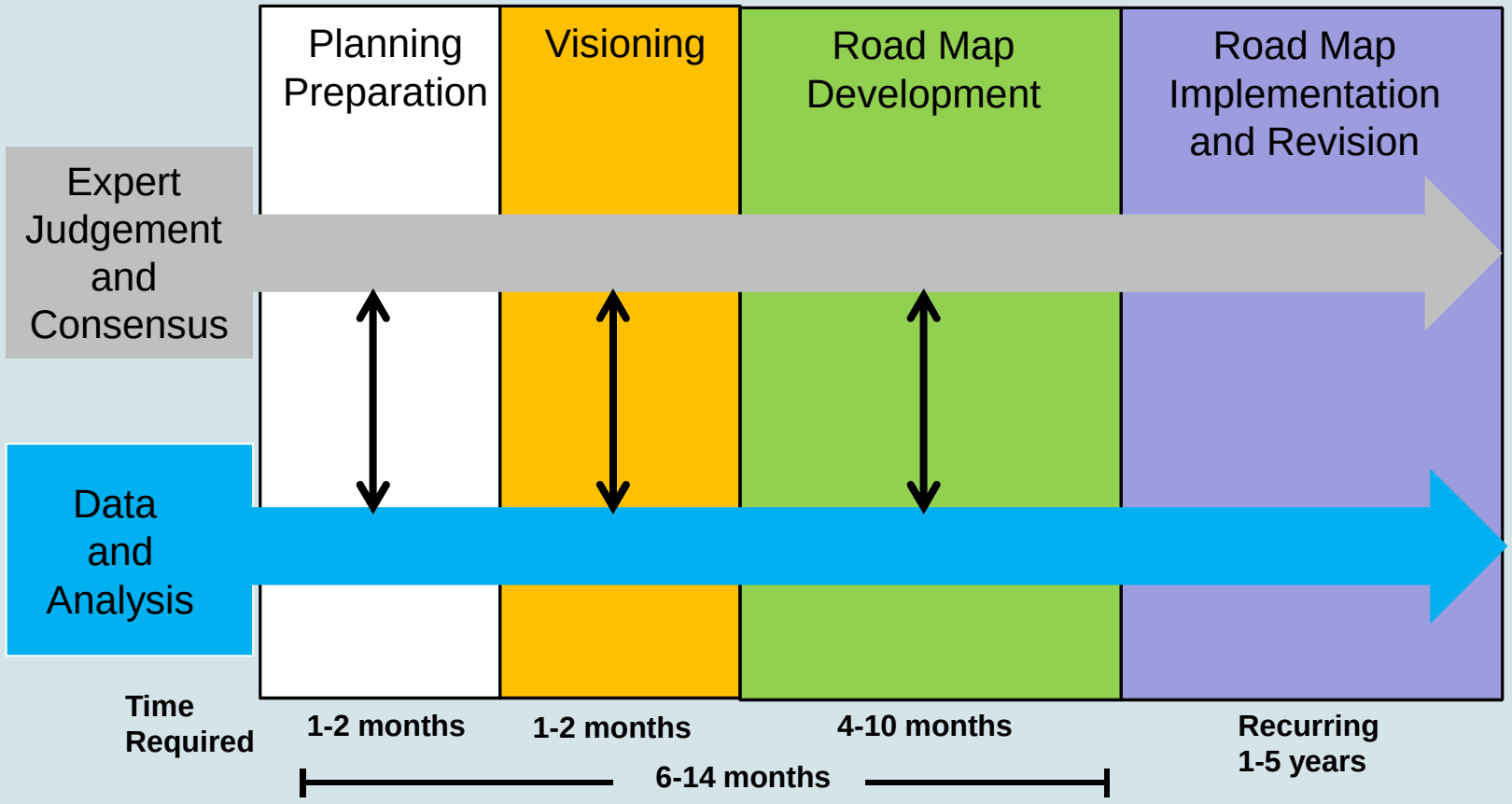
Boundary conditions
„What could / should be discussed“:

- Functionalities
- Roles
- Interfaces
- Costs
- Benefits
- Demonstration projects
- Timeline



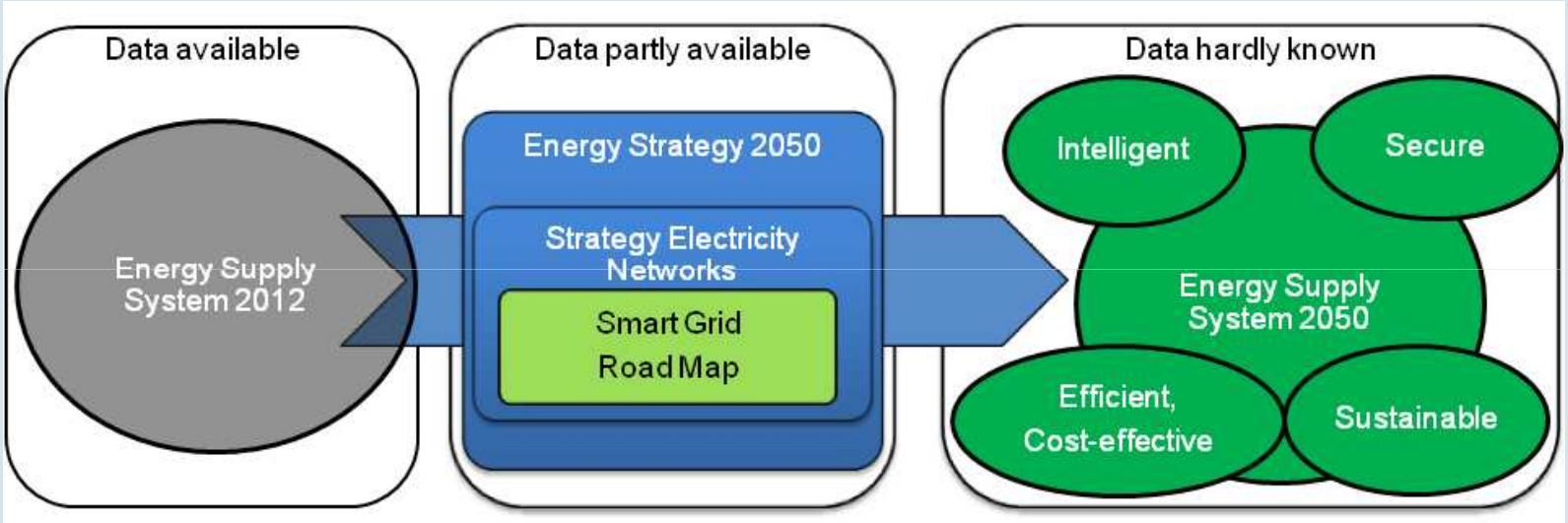
Source: ETP Smart Grids

Roadmapping Process by IEA

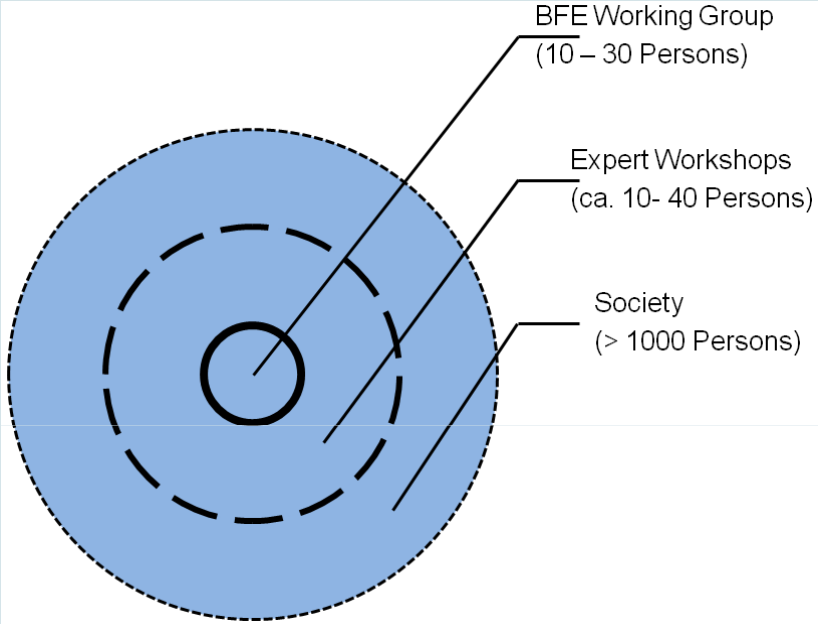


Source: IEA 2011

Planning phase: data acquisition and analysis



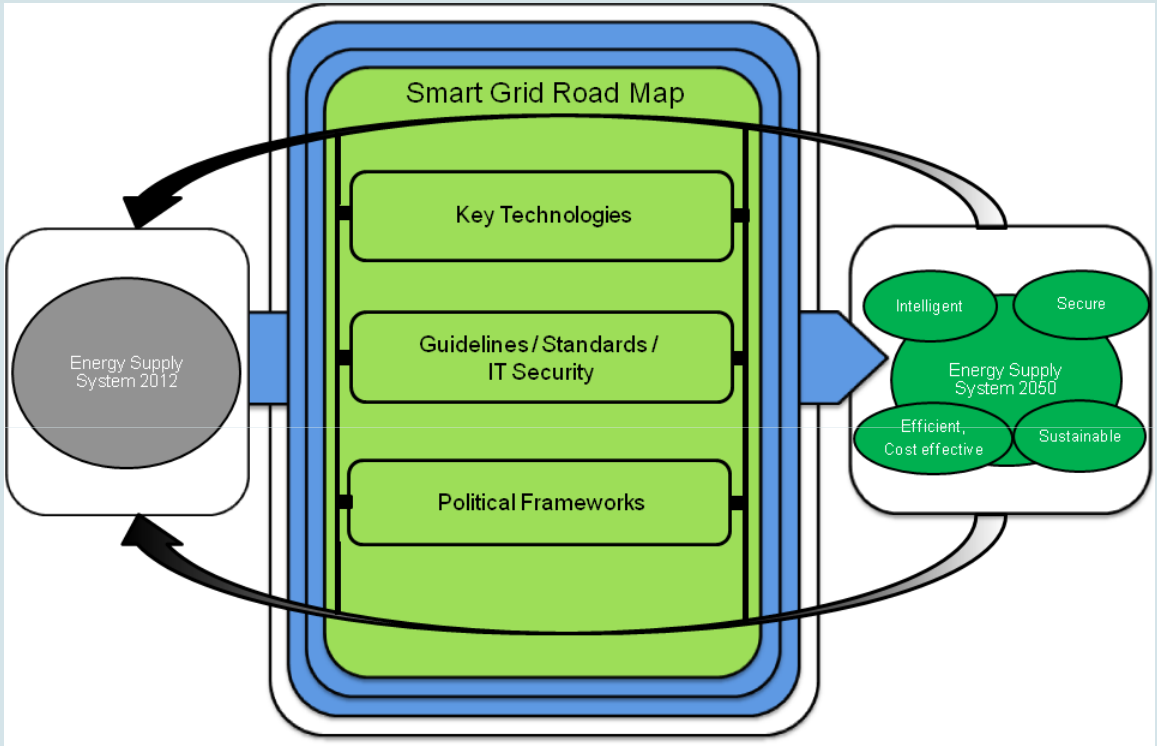
Visioning phase: Vision and dissipation process



Basis for visioning process: definition of a Smart Grid in Switzerland (BFE 2010):

A Smart Grid is an electrical system, which utilises measurement and digital information and communication technology for the exchange of energy between sources of varying kind and consumers with differing consumption characteristics. Such a system accommodates the needs of all market actors and the society. The usage and the operation of the system can be optimised and hence costs and environmental impacts are minimised as well as quality and security of supply are ensured.

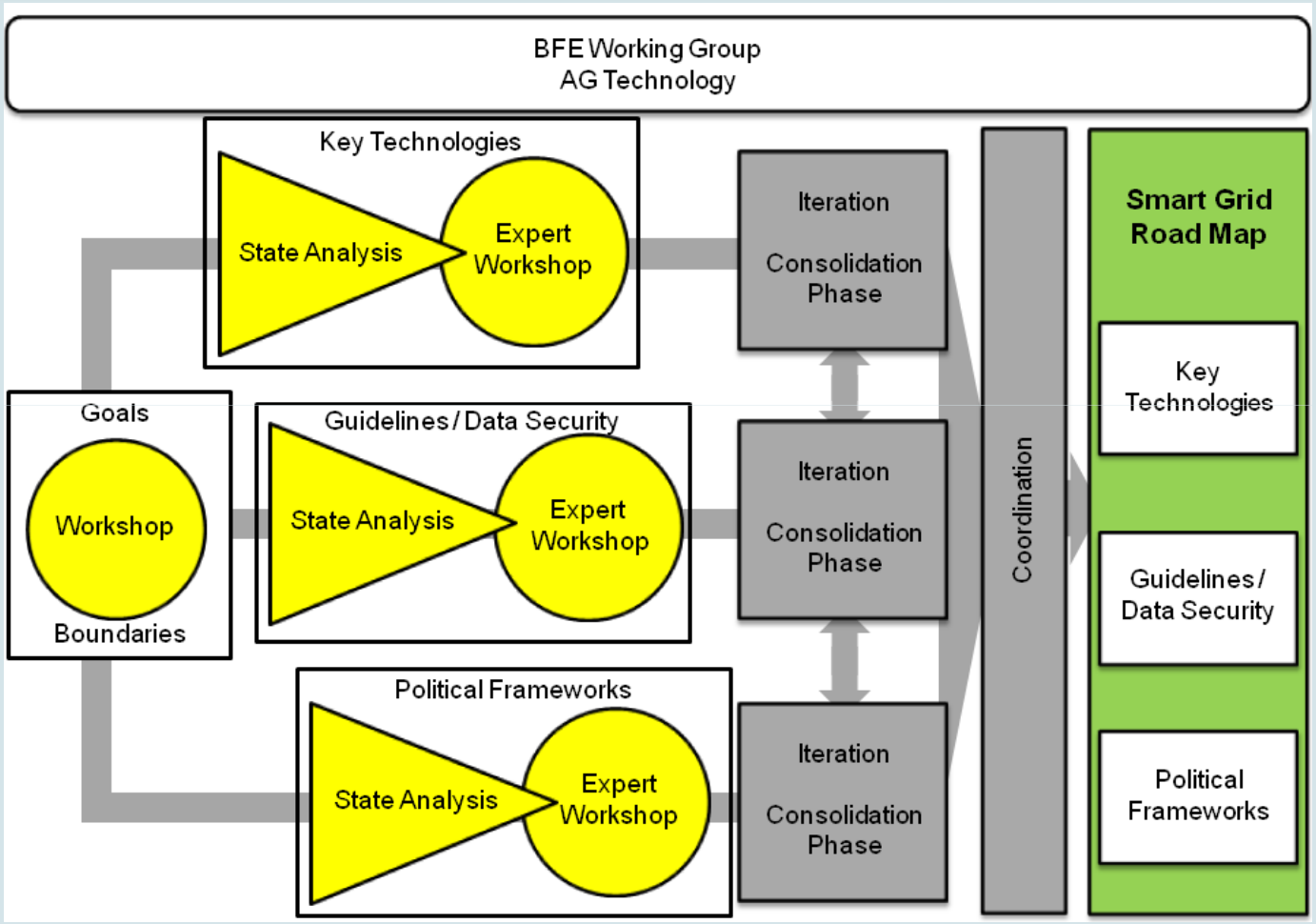
Roadmap development phase:
Using backcasting for roadmapping in Switzerland



- Purpose of a Smart Grid in Switzerland?
- Functionalities?
- Scenarios based on Energy Strategy 2050 → definition of future system

→Functionalities and characteristics of Smart Grids must be Swiss specific

Road Map development process
Smart grid roadmapping process in Switzerland



Topics of the Smart Grid Road Map

Smart Grid Road Map
Switzerland

Key Technologies

- Direct Load Control
- Automated Meter Reading
- Wide Area Monitoring Systems
- Phasor Measuremet Units
- Energy Storage
- Electric Mobility
- Virtual Power Plants
- Adaptive Protections
- …

Guidelines Standards

- Data Security
- Cyber Risks
- Direct Load Control
- Automated Meter Reading
- Interoperability
- Electric Mobility
- Virtual Power Plants
- Controlability of RES
- …

Political Frameworks

- Consumer Education
- Smart Meter Functionalities
- Cost Allocation
- Dynamic Tarifs
- Promotion of RES
- Promotion of Energy Storage
- Interoperability
- …

Summary

- Path to a more sustainable energy supply has been developed (ES 2050)
- Upcoming challenges for power networks
- Solutions can be provided
- Smart Grid Road Map will coordinate actors and efforts for the development of solutions
- Smart Grid Road Map will enable an efficient implementation of needed functionalities for future electricity networks

Thank you for your attention!

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