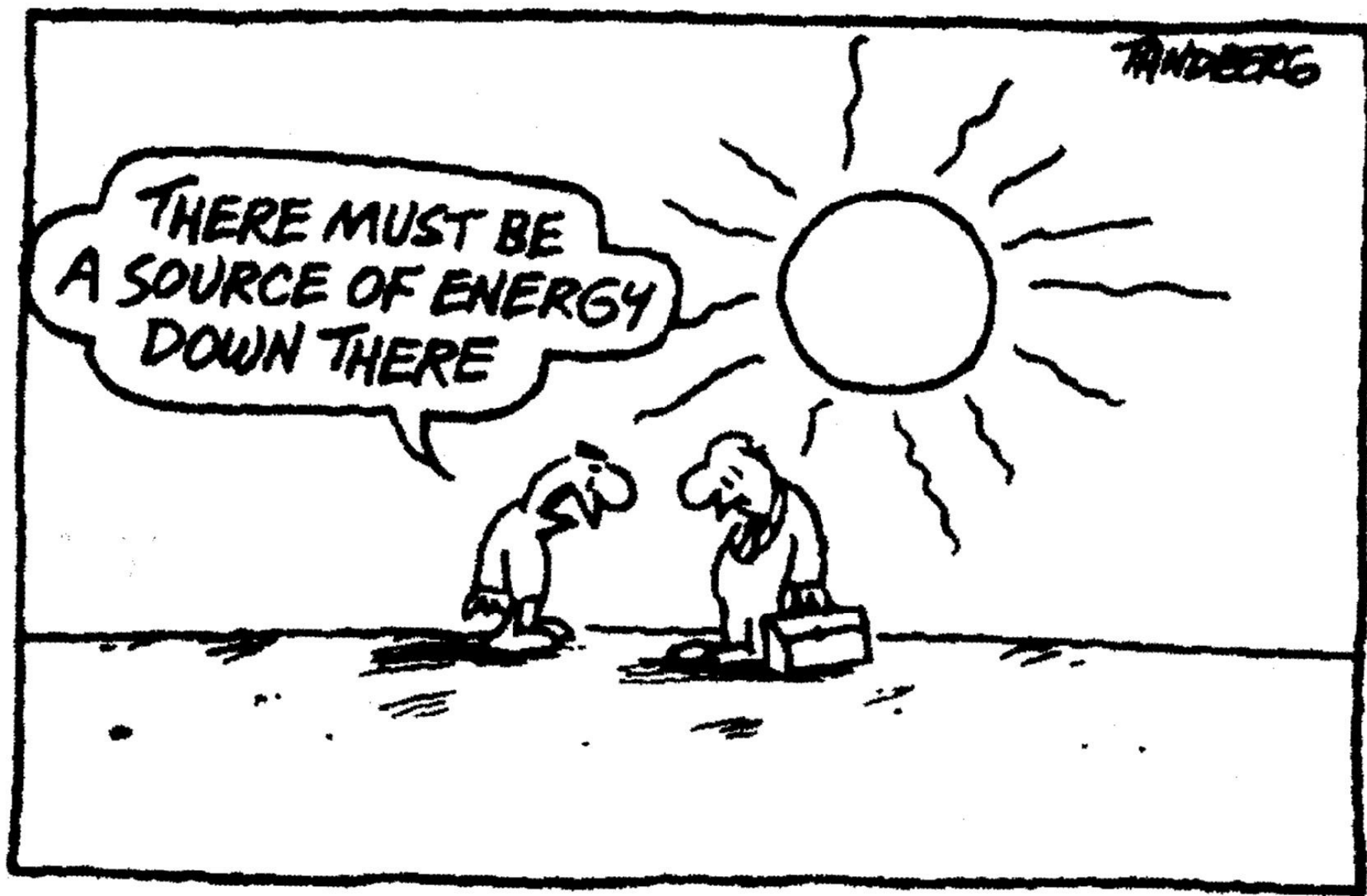


Circa: sometime in 1800s...the moment when they thought of digging for oil...

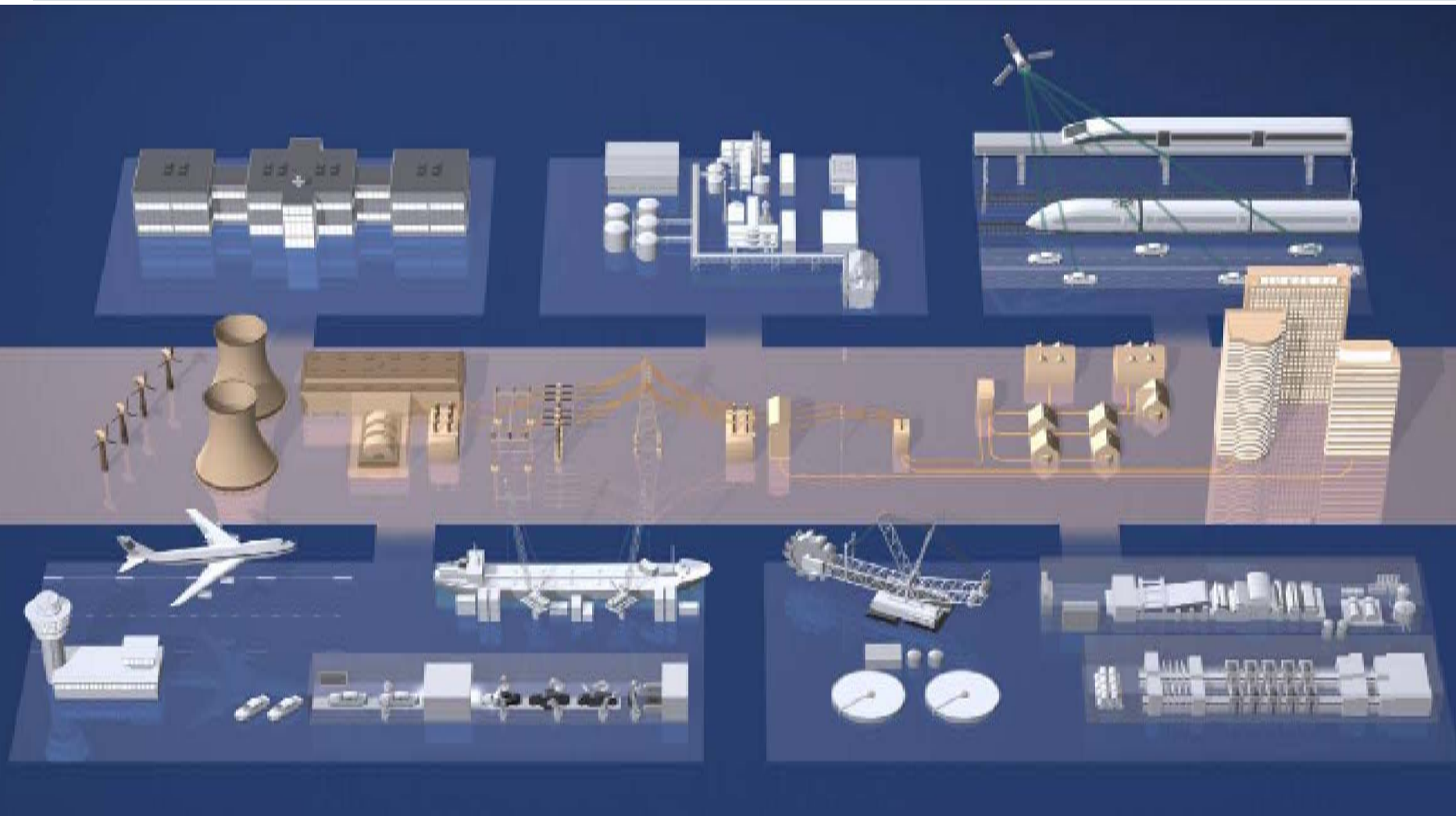
SIEMENS



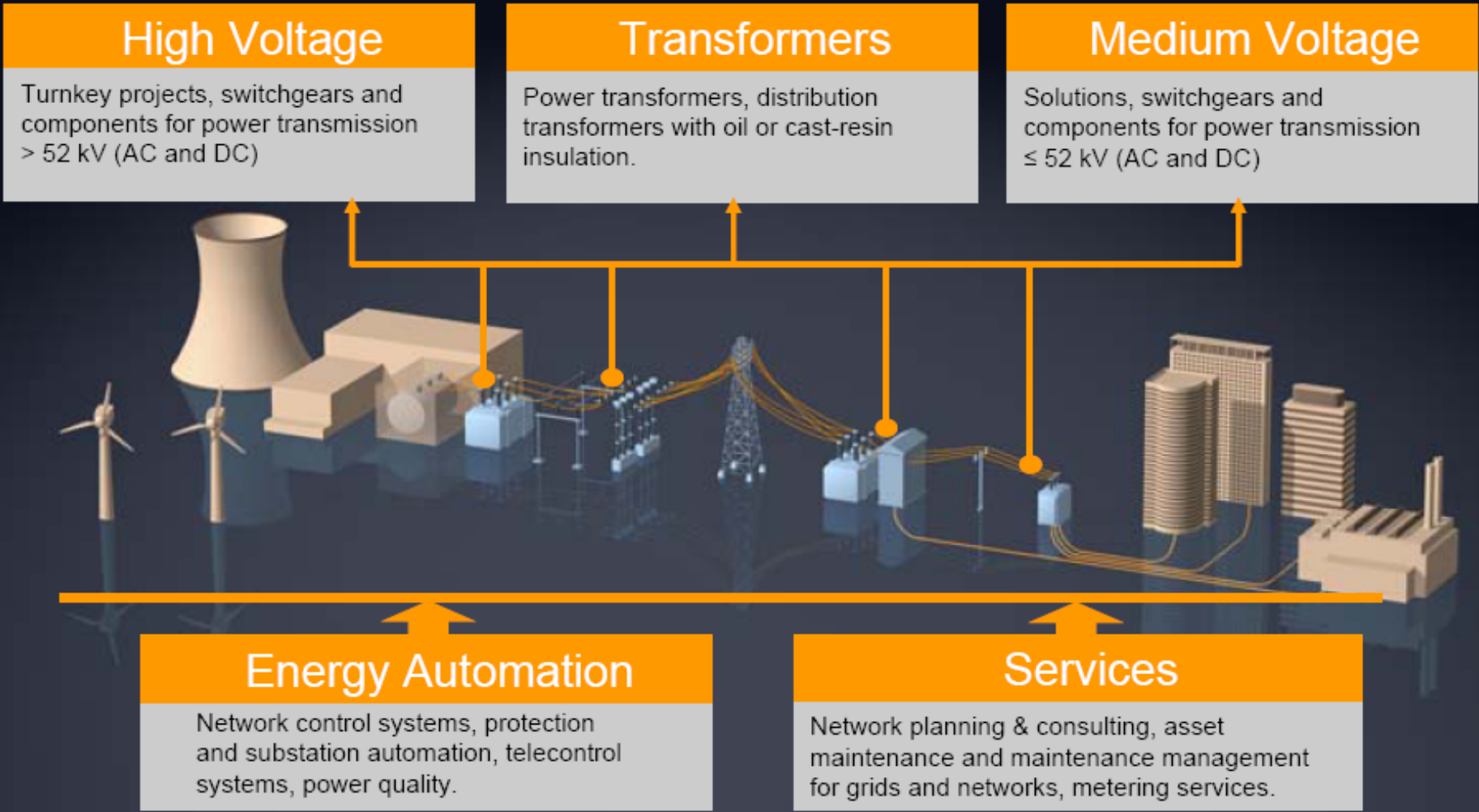
Agenda

- Introduction
- Marketplace Drivers
- Evolution to a Smart Grid
- Smart Grid
- Picture of the Future

Electrical Energy has been the backbone of our society



Energy Portfolio



High Voltage

Turnkey projects, switchgears and components for power transmission > 52 kV (AC and DC)

Transformers

Power transformers, distribution transformers with oil or cast-resin insulation.

Medium Voltage

Solutions, switchgears and components for power transmission ≤ 52 kV (AC and DC)

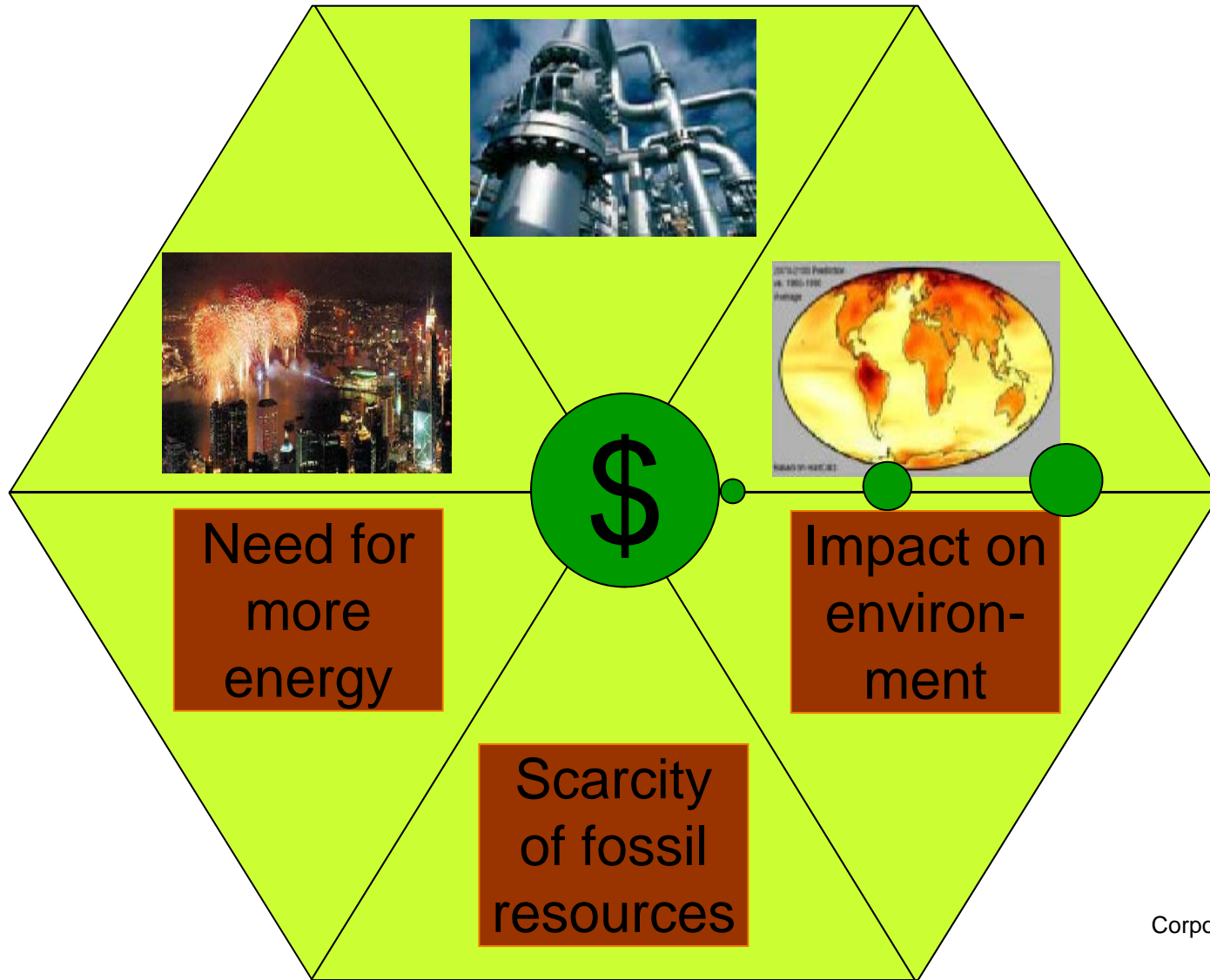
Energy Automation

Network control systems, protection and substation automation, telecontrol systems, power quality.

Services

Network planning & consulting, asset maintenance and maintenance management for grids and networks, metering services.

Current Marketplace Drivers



Focus on Energy Electronics & Environment

Evolution to a Smart Grid

From

Central generation and
central control

Load flow by Kirchoff's law

Manual switching,
trouble response

Periodic maintenance

To

Distributed generation and
distributed control

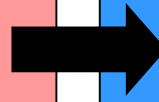
Load flow by power electronics

Automatic, anticipatory
response

Prioritized condition-based
predictive maintenance

Evolution to a Smart Grid

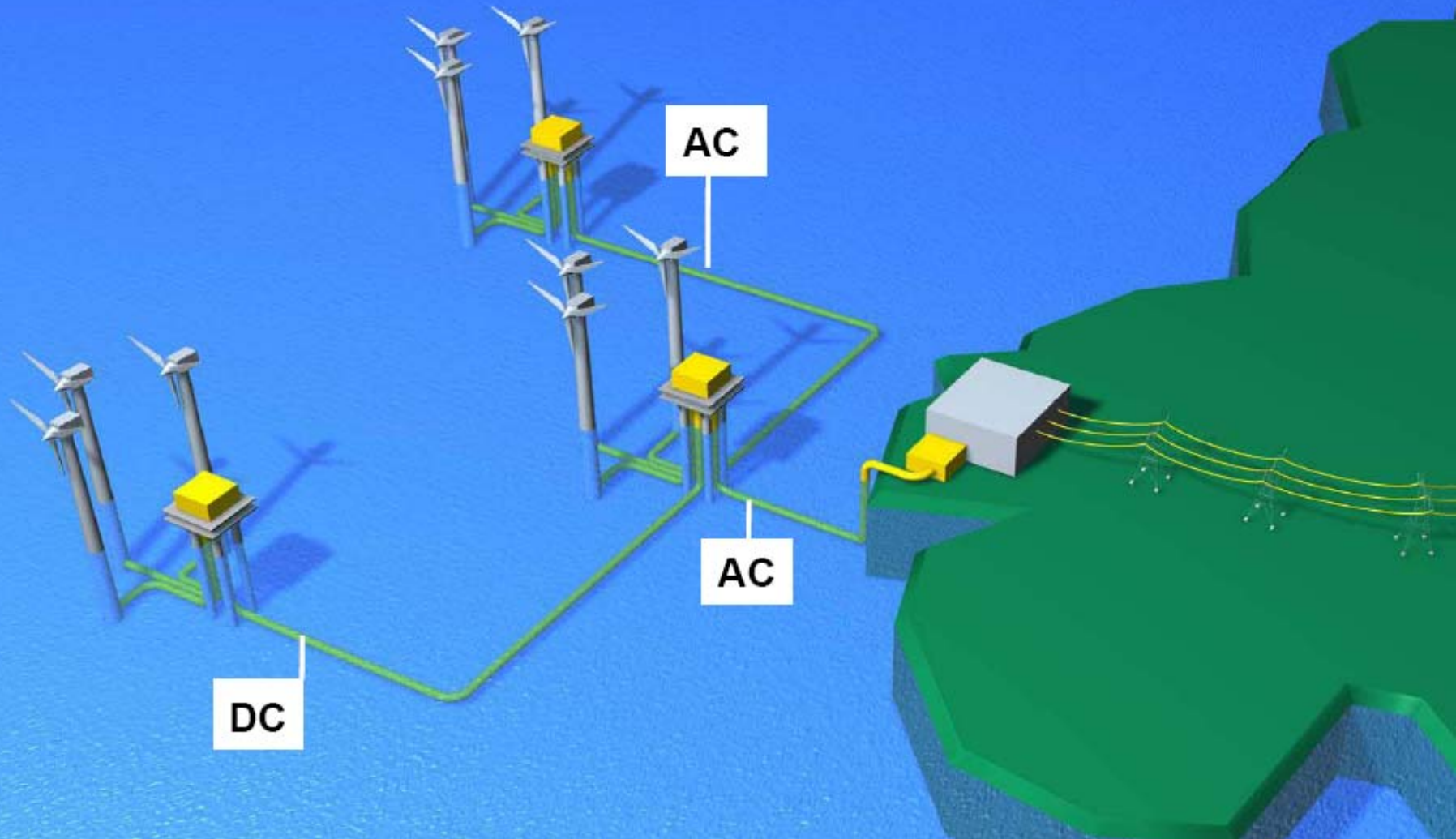
Central generation and central control



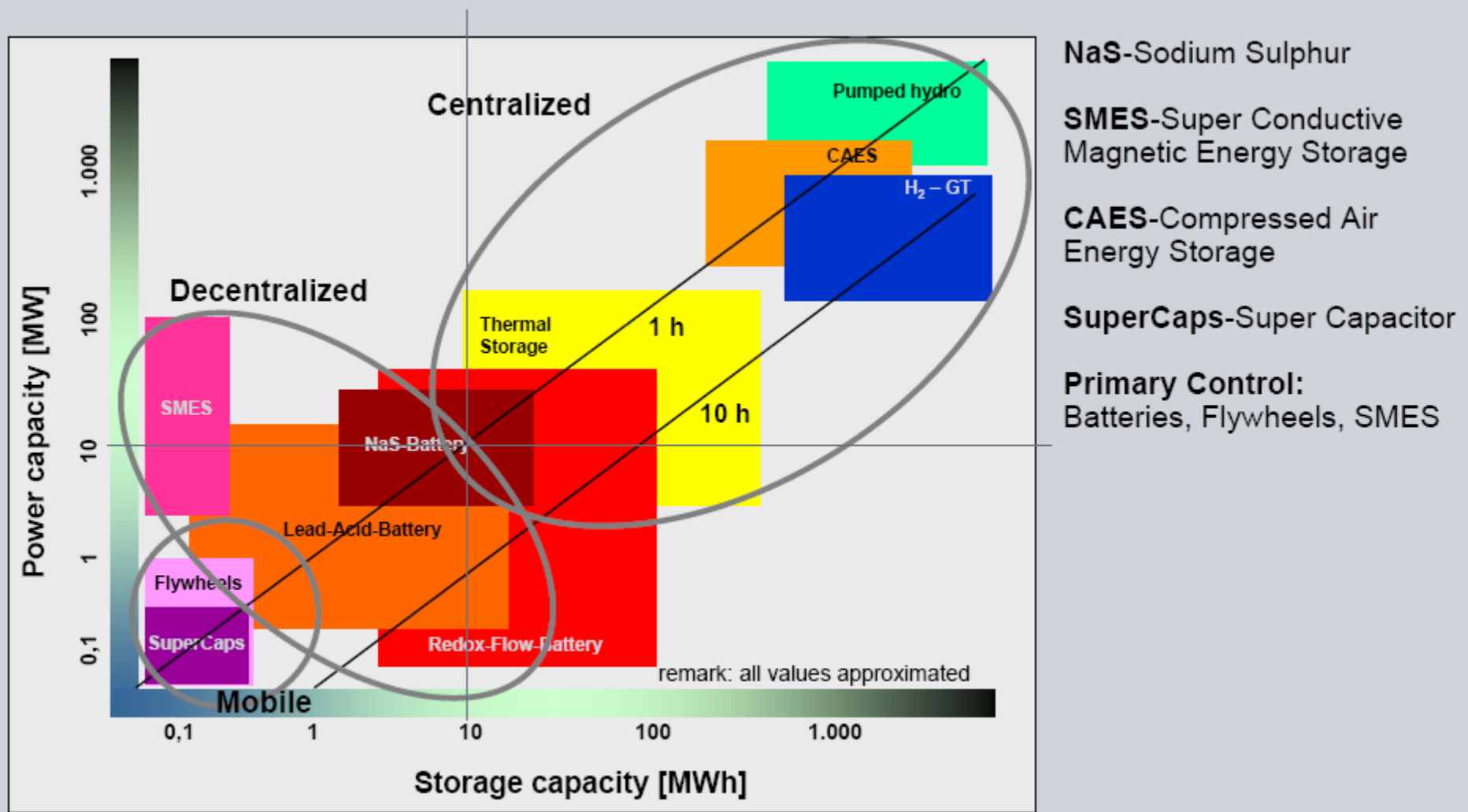
Distributed generation and distributed control



Evolution to a Smart Grid – penetration of renewables



Evolution to a Smart Grid – inclusion of energy storage

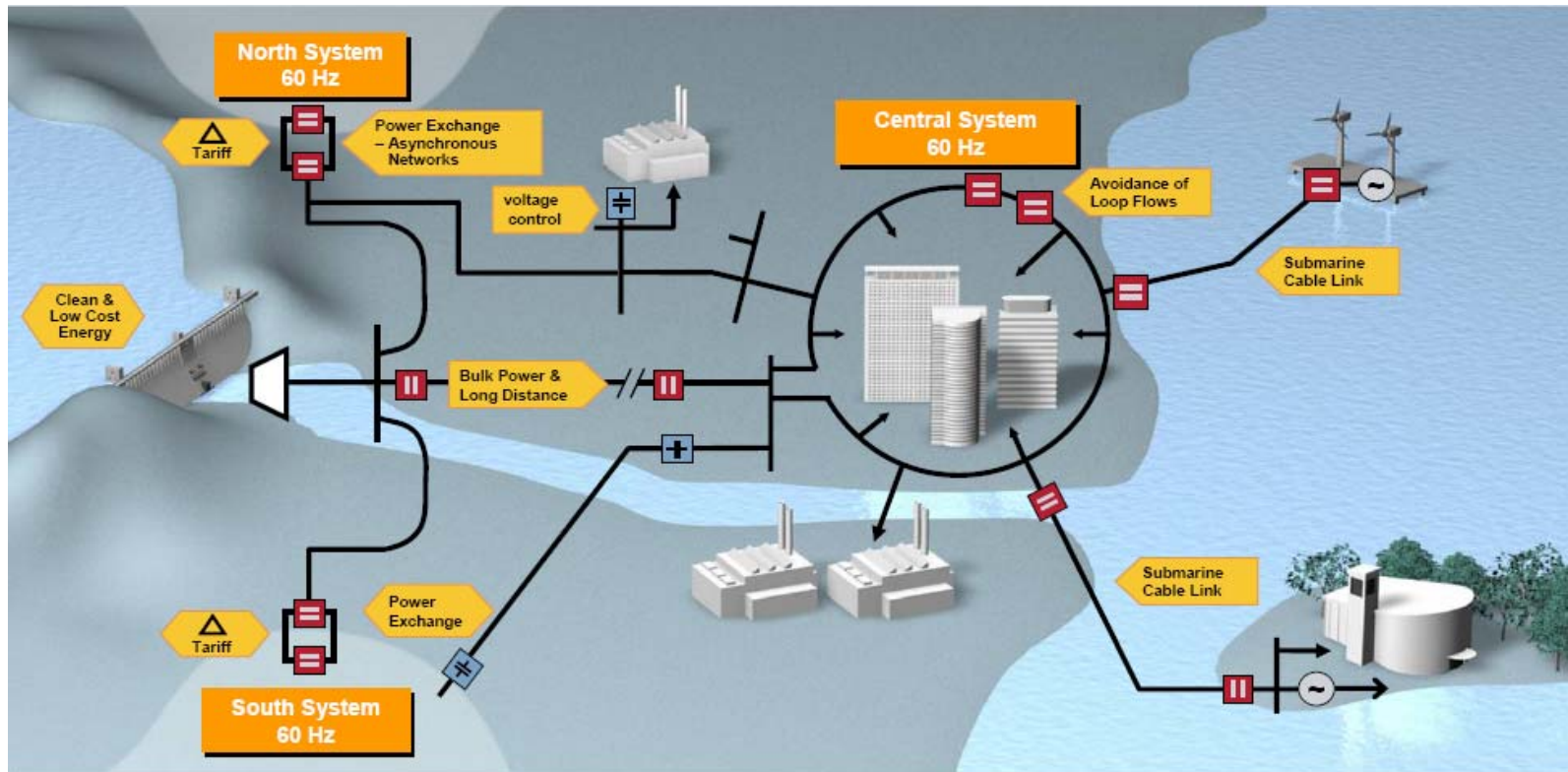


Evolution to a Smart Grid




Load flow by Kirchoff's law



Load flow by power electronics



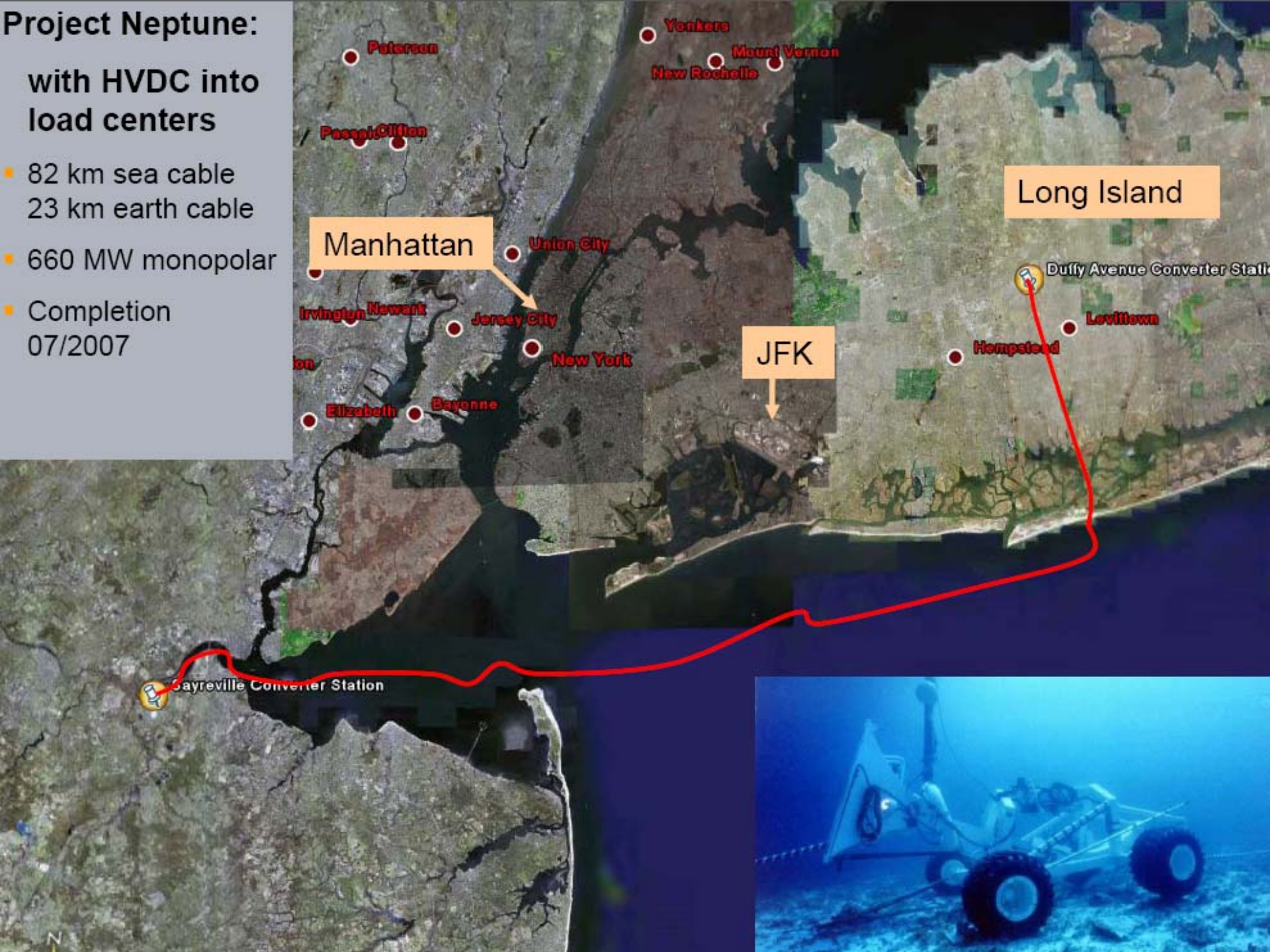
Symbols:

-  DC Transmission & Interconnection
-  Series compensation
-  Parallel compensation

Project Neptune:

with HVDC into
load centers

- 82 km sea cable
- 23 km earth cable
- 660 MW monopolar
- Completion 07/2007

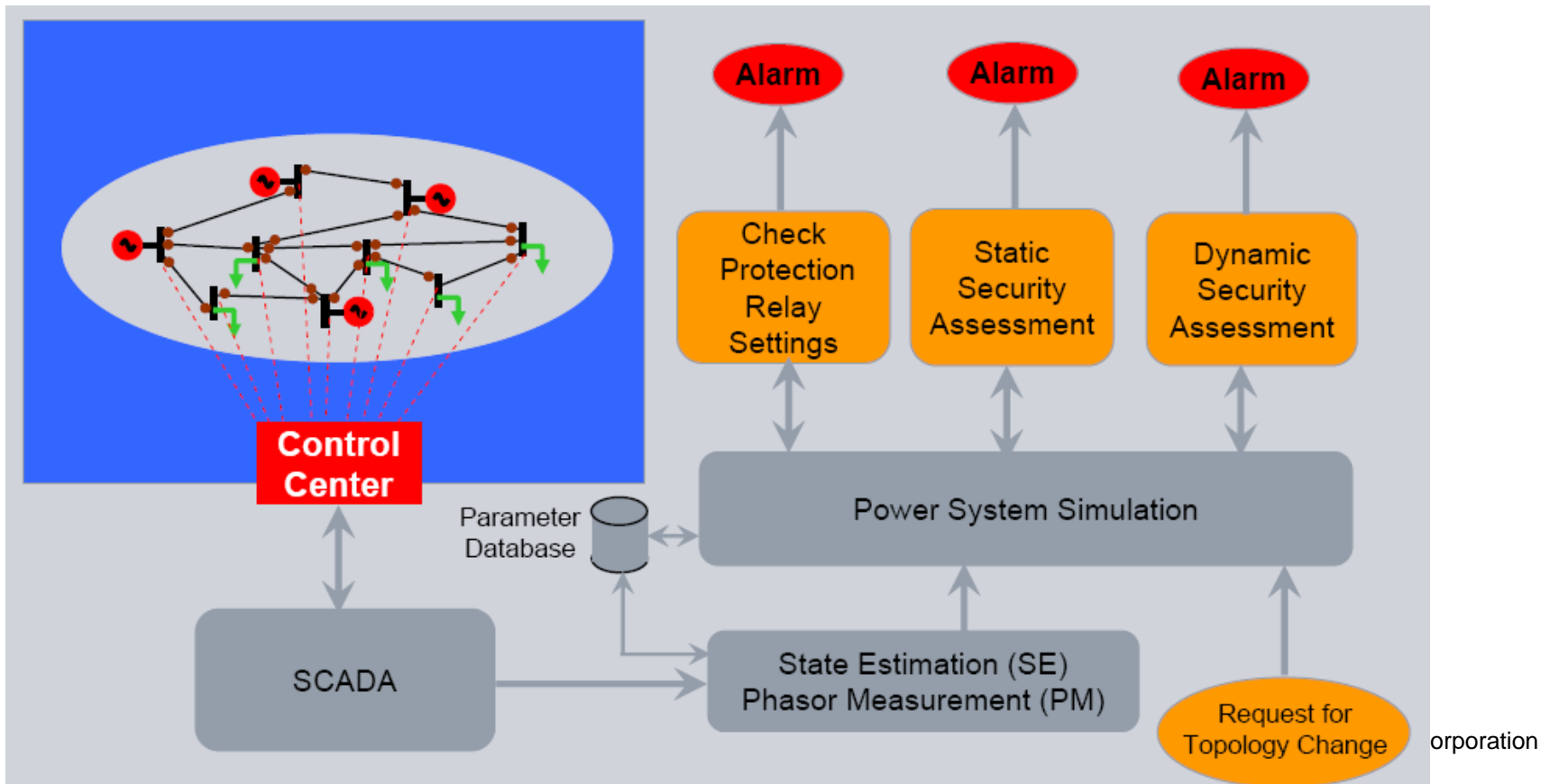


Evolution to a Smart Grid

Manual switching,
trouble response



Automatic, anticipatory
response



Evolution to a Smart Grid – built-in intelligence

Supplement the message reports

By clear decisions

**2000 MW
Pump Load
OFF**



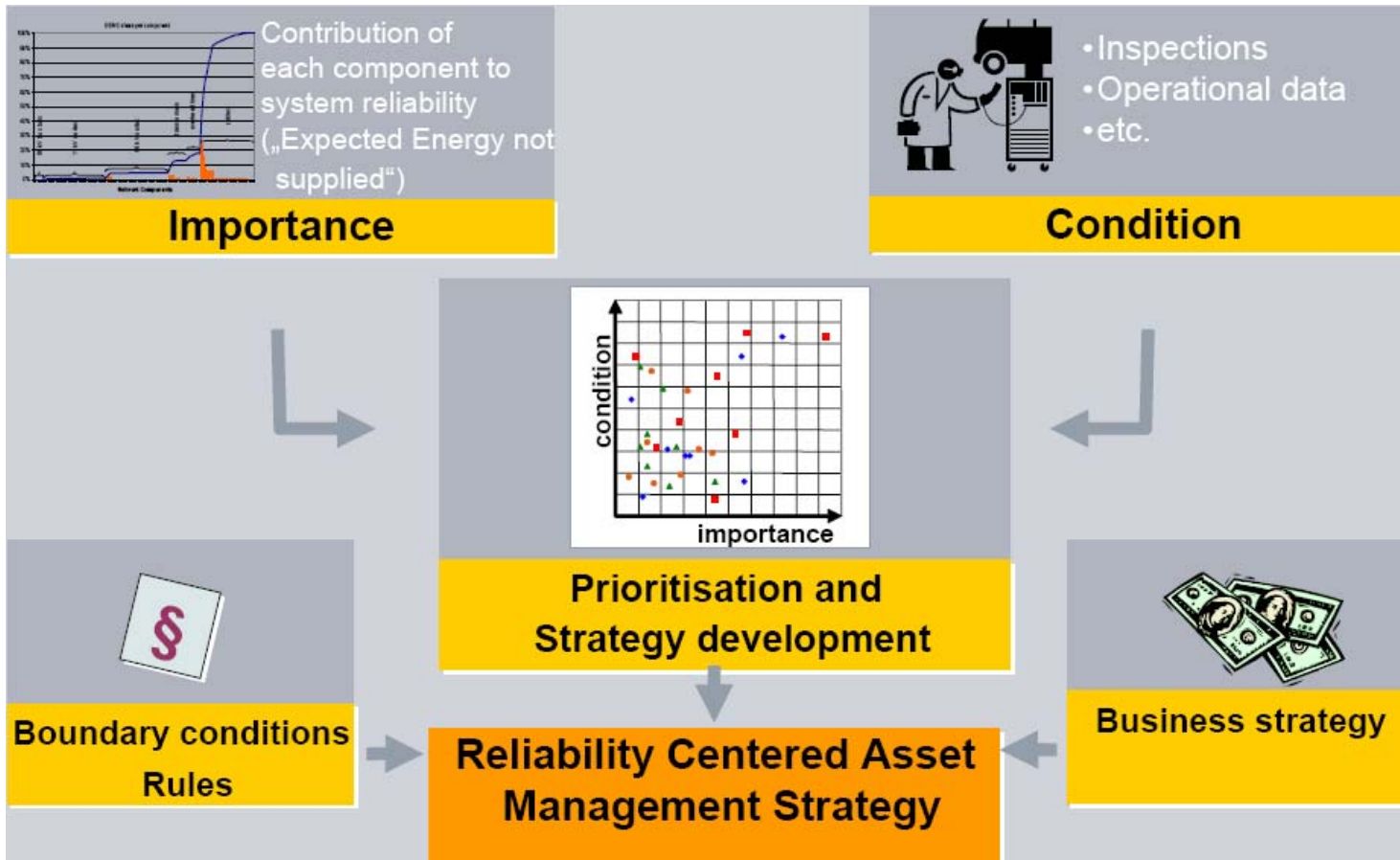
The grid dispatcher has to decide within seconds....
Incorrect decisions or inactivity may lead to Blackouts.

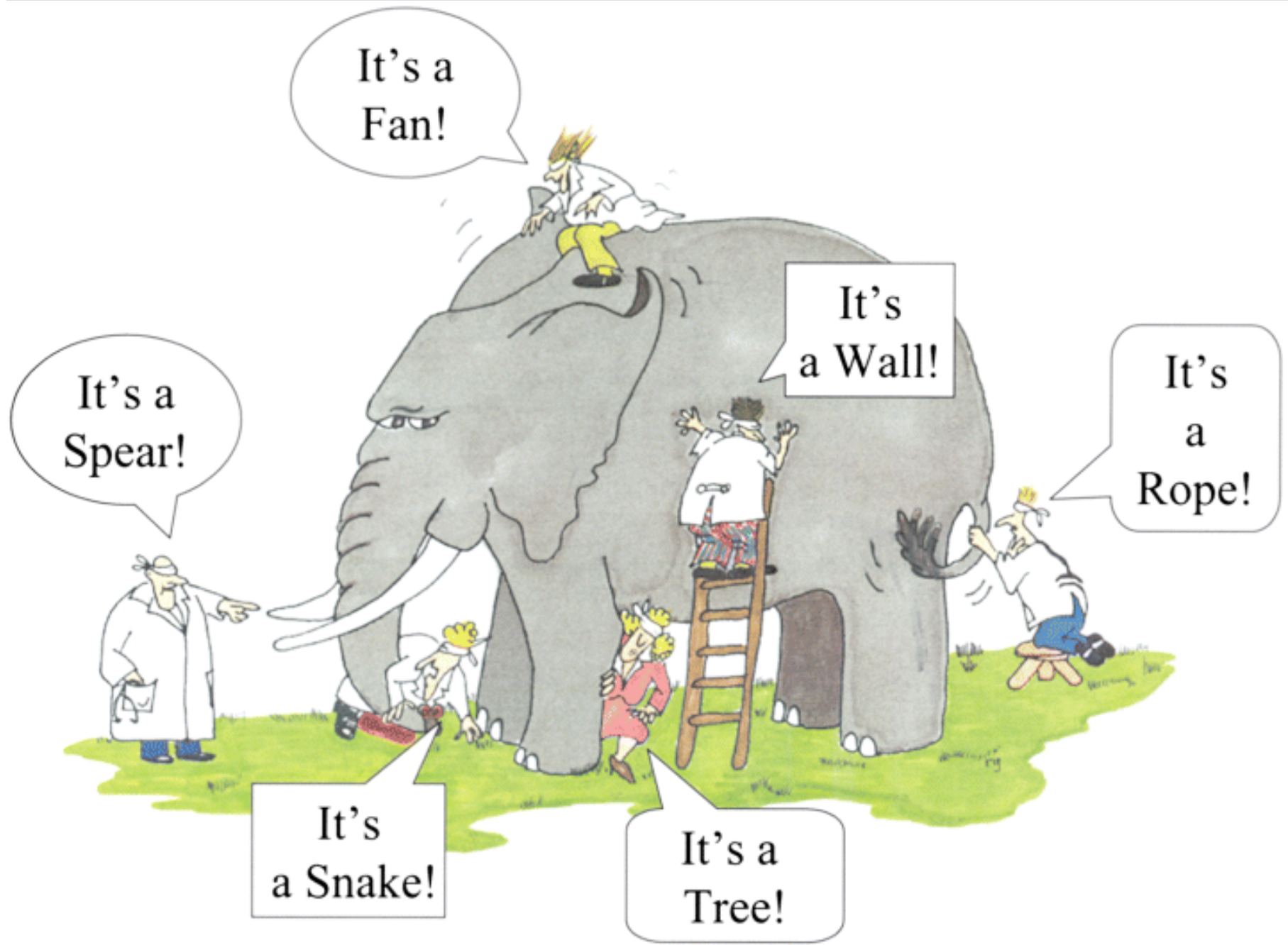
Evolution to a Smart Grid

Periodic maintenance

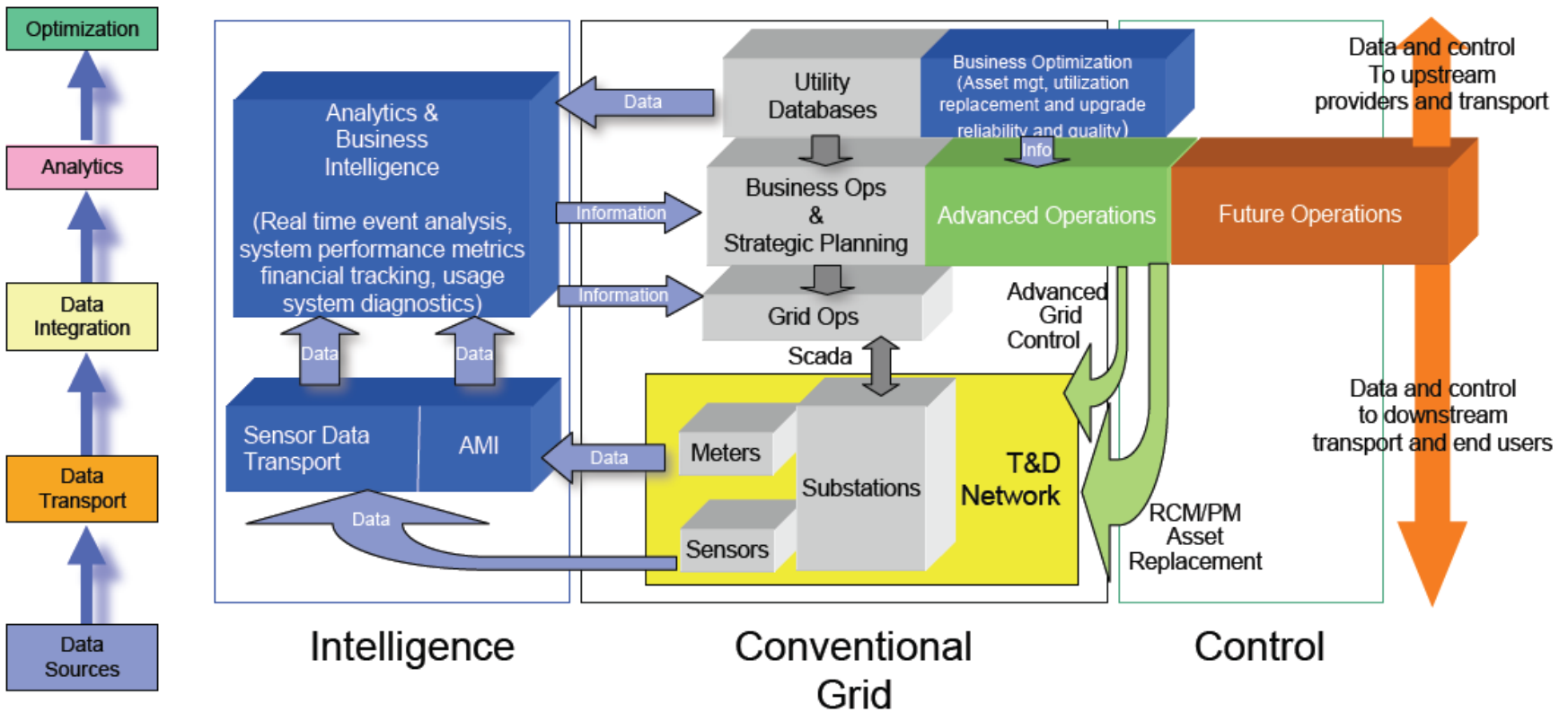


Prioritized condition-based predictive maintenance

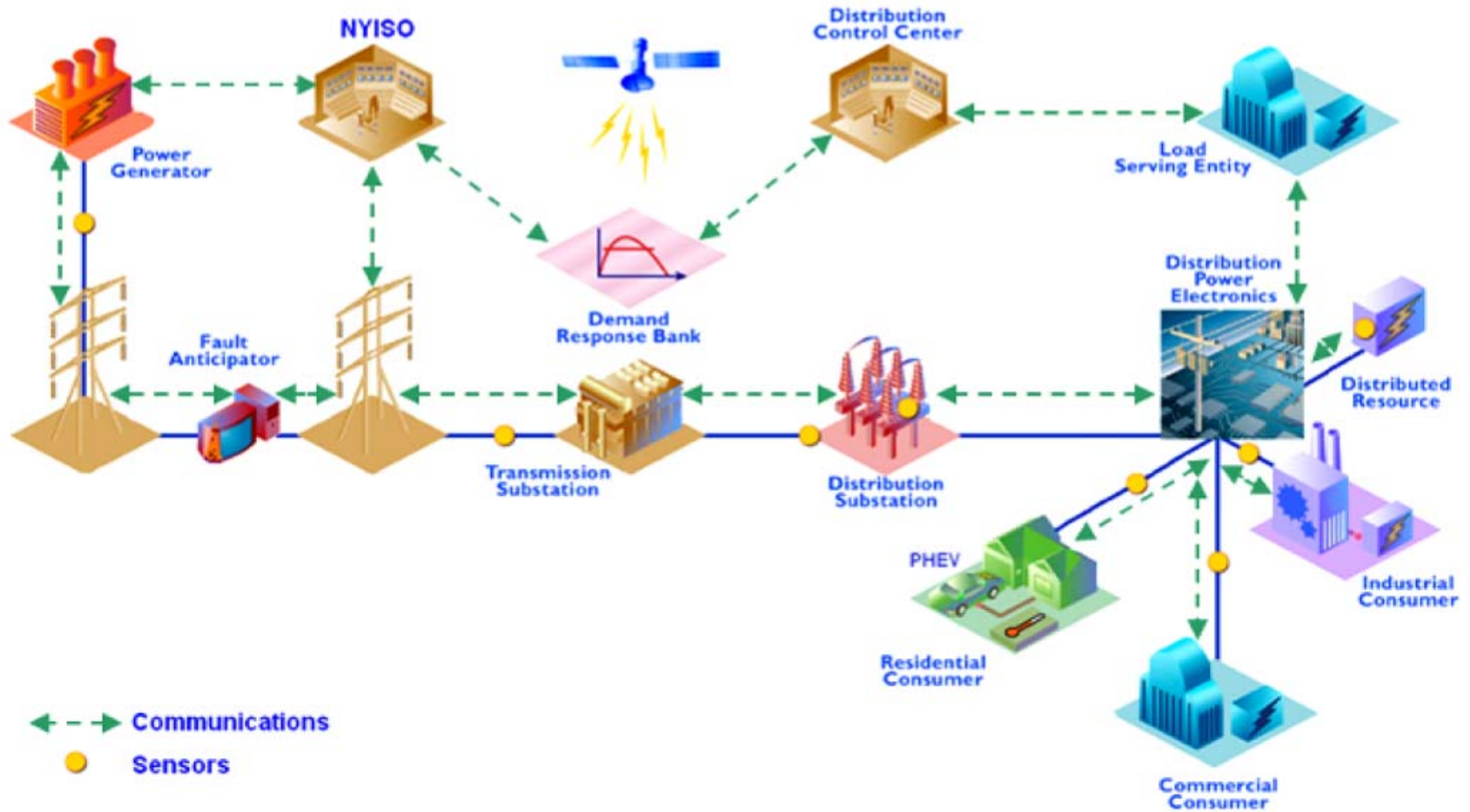




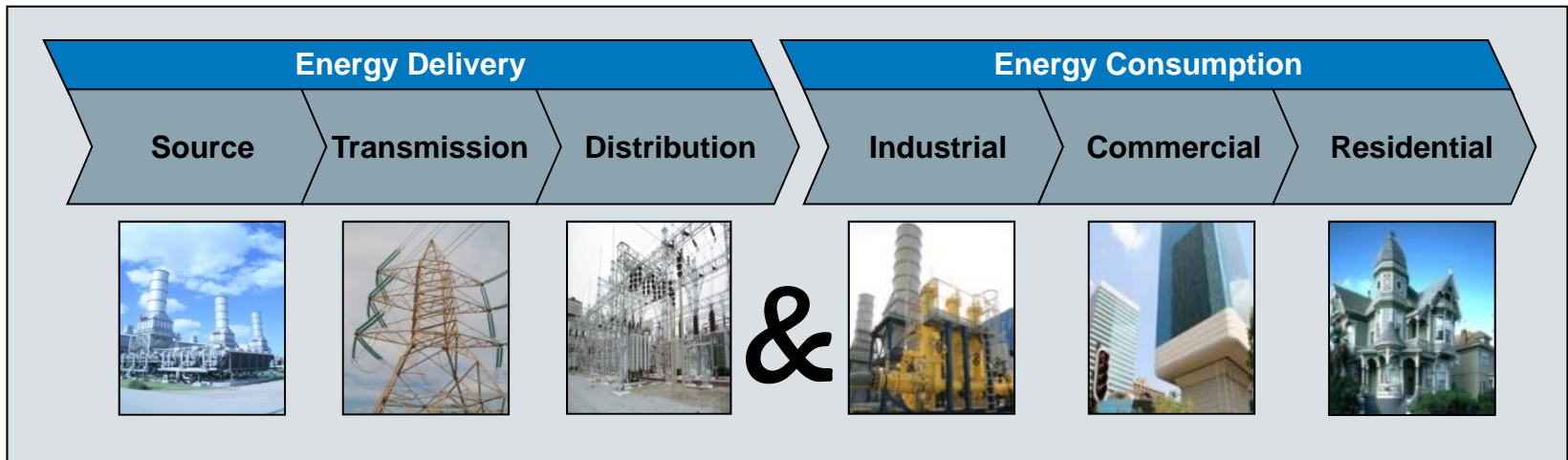
If one asks the SMART Grid - people...e.g. IBM



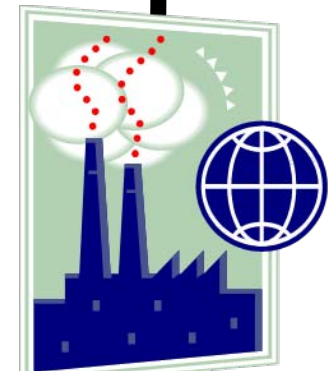
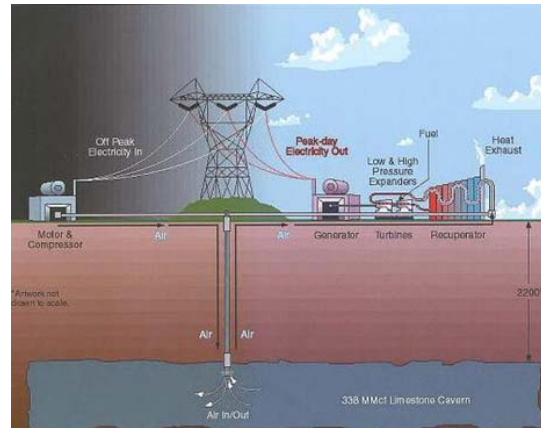
If one asks the Smart GRID - people...e.g. NYISO



Scope of Smart Grid

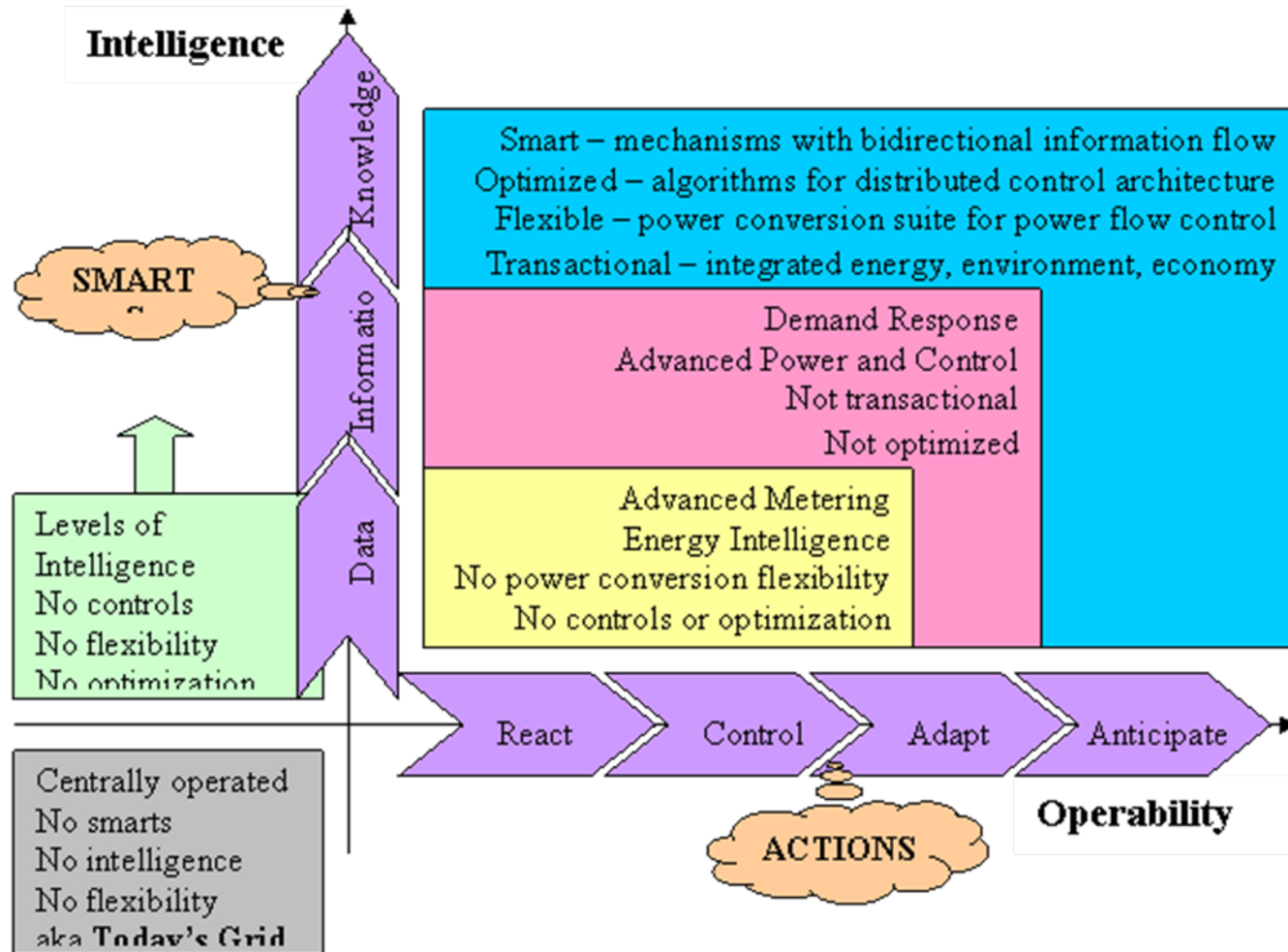


Smart Grid Portfolio

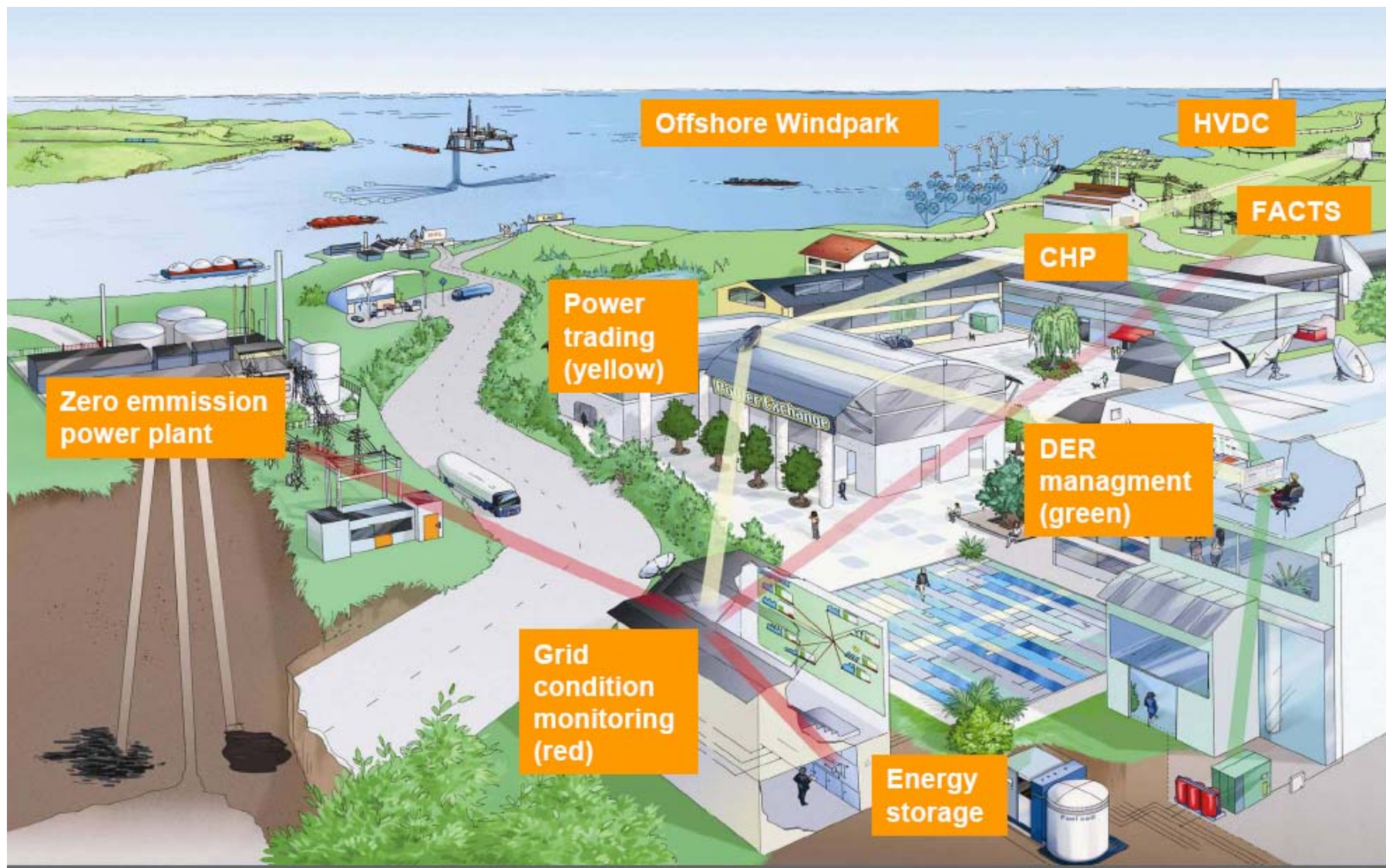


Corporate Research, Siemens Corporation

Intelligence v/s Operability



Picture of the Future





Green Energy and Power Systems

Thank you very much!

Name: Dr. Madhav D. Manjrekar

Organization: Corporate Research, Siemens

Address: 755, College Road East

Princeton, NJ 08540, USA

Phone: +1 (609) 734 – 6566

Mail: madhav.manjrekar@siemens.com