CZ-AT EEG

3 November 2009

What transition for our energy system?

Stefan P. Schleicher

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The challenge

EU targets for 2020

Minus 20 percent greenhouse gases
20 percent share of renewables
in (gross) final energy consumption

EU visions for 2050

Minus 80 to 95 percent greenhouse gases

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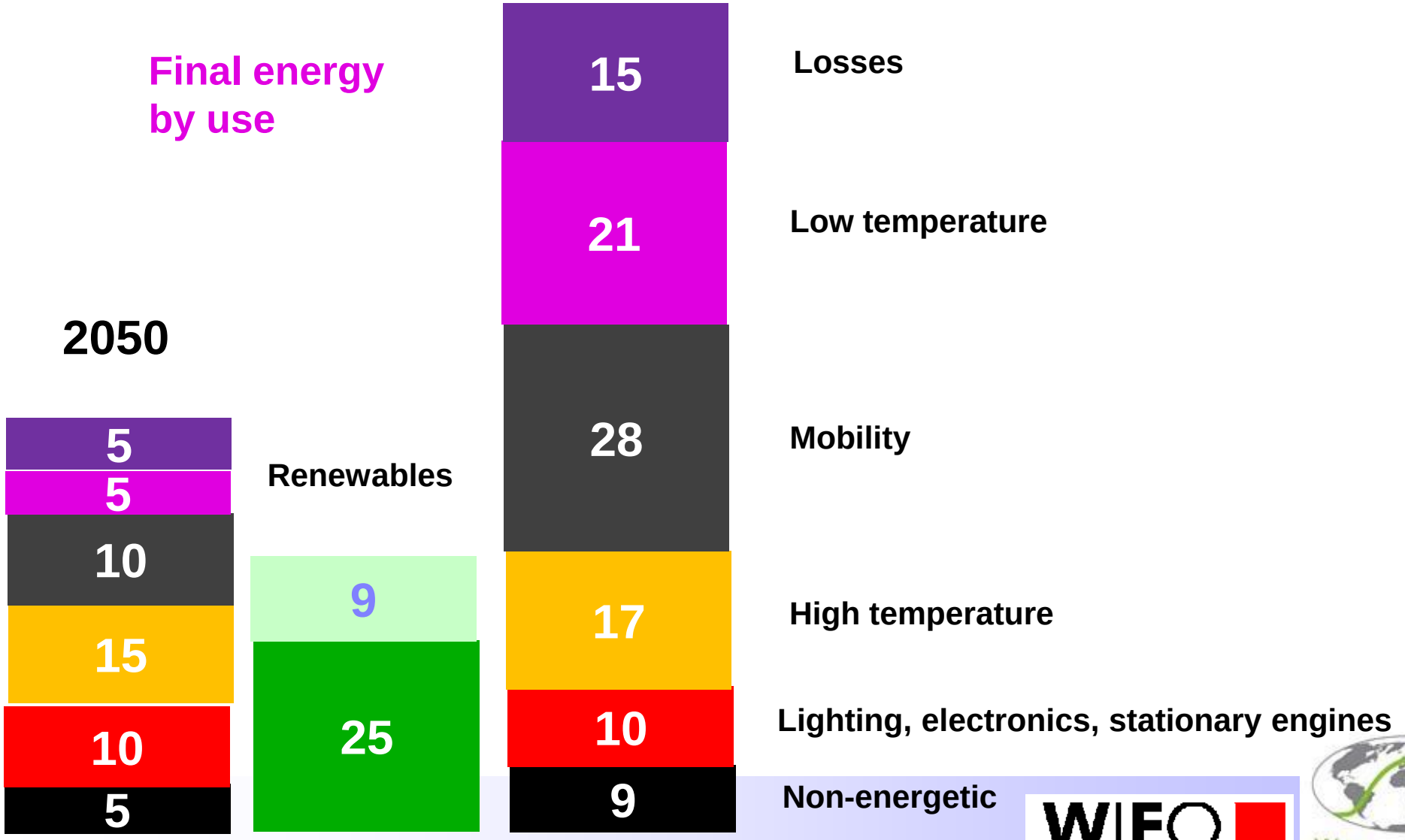
The transformations needed



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The quantum leaps required

- **Low temperature energy**
  Now flames below 100 °C
    Increase of thermal quality of buildings
    Renewables

- **Mobility**
  Transition to full-electric cars

- **Combine electricity + heat**
  Phase-out of standalone technologies
    High-efficient co-generation
    at ever lower scales
    total mass efficiency beyond 75%

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Trapped in paradigms?

These quantum leaps
are becoming visible and realizable

From energy-autonomous to plus-energy buildings

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Zero-emissions in production

AKS DOMA Solartechnik
Satteins

Solar-Fabrik
Freiburg

Plug-in electric cars in light-weight design

Aptera Typ-1

- 2(+1) Persons
- **386 kg** (90% Composite)
- > 190 km
- < 0,9 l/100 km
- ca. 25.000 – 30.000 $

www.aptera.com

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Micro heat-power generation

- VW – Lichtblick
- 100.000 installations =
  2 nuclear power plants
- Efficiency > 90 %
- Is leased to customers
  generates day-peakload
  electricity
- Smart grid integration

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Guidelines for innovative energy strategies

Strategy 1
Buildings

- **Massive renovation programs**
  - ↗ **Factor 4:**
    Low energy standards
- **Quantum leap for new buildings**
  - ↗ **Factor 10**
    Passive-house standards
- **The long-term vision**
  - ↗ **Energy-autonomous and**
    plus-energy buildings

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Strategy 2
Mobility

- **The charm of full-electric cars**
  - ↗ **R & D**
  - ↗ **The example of London**
- **The evolution from transport to mobility**
  - ↗ **Integration of all modes of transport**

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Strategy 3
Energy supply

- **High-efficient co-generation**
  - ↗ Small and micro scales
- **Solar strategies**
  - ↗ Solar heat
  - ↗ Solar electricity
  - ↗ Wind and hydro
- **Biomass strategies**
  - ↗ Residual use of biogenic waste
  - ↗ Gasification

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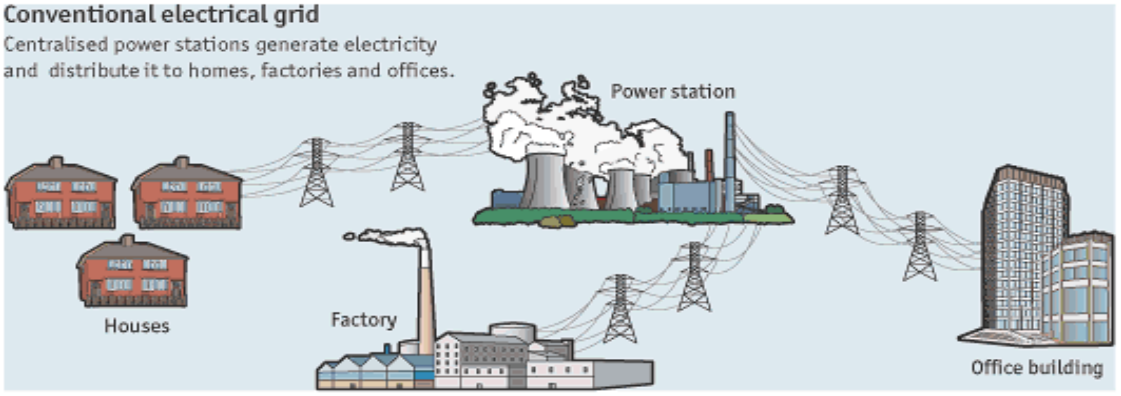
Visions of the new structures

Energy systems to come
Smart grids and distributed generation

Internet-structures for heat and electricity

The shape of grids to come?

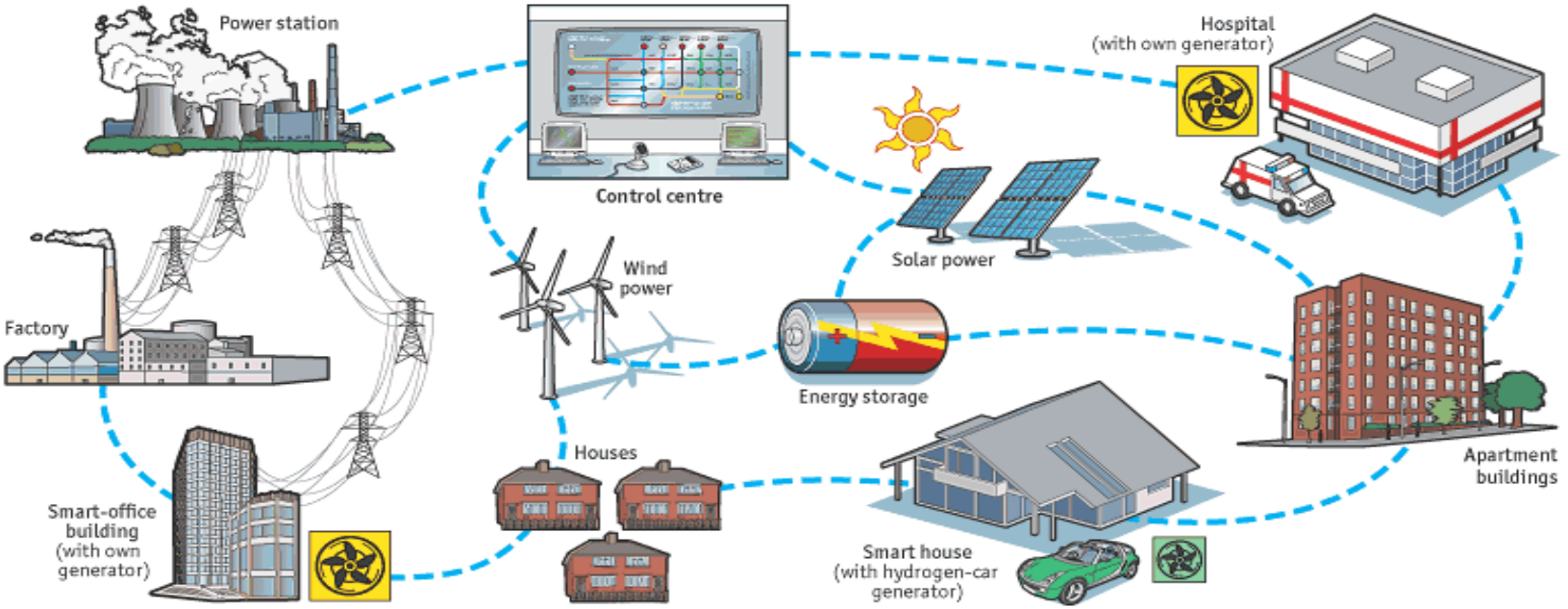


Energy internet

Many small generating facilities, including those based on alternative energy sources such as wind and solar power, are orchestrated using real-time monitoring and control systems.

Offices or hospitals generate their own power and sell the excess back to the grid. Hydrogen-powered cars can act as generators when not in use. Energy-storage technologies smooth out fluctuations in supply from wind and solar power.

Distributing power generation in this way reduces transmission losses, operating costs and the environmental impact of overhead power lines.



Sources: *The Economist*; ABB

Thank you.

Stefan P. Schleicher

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