

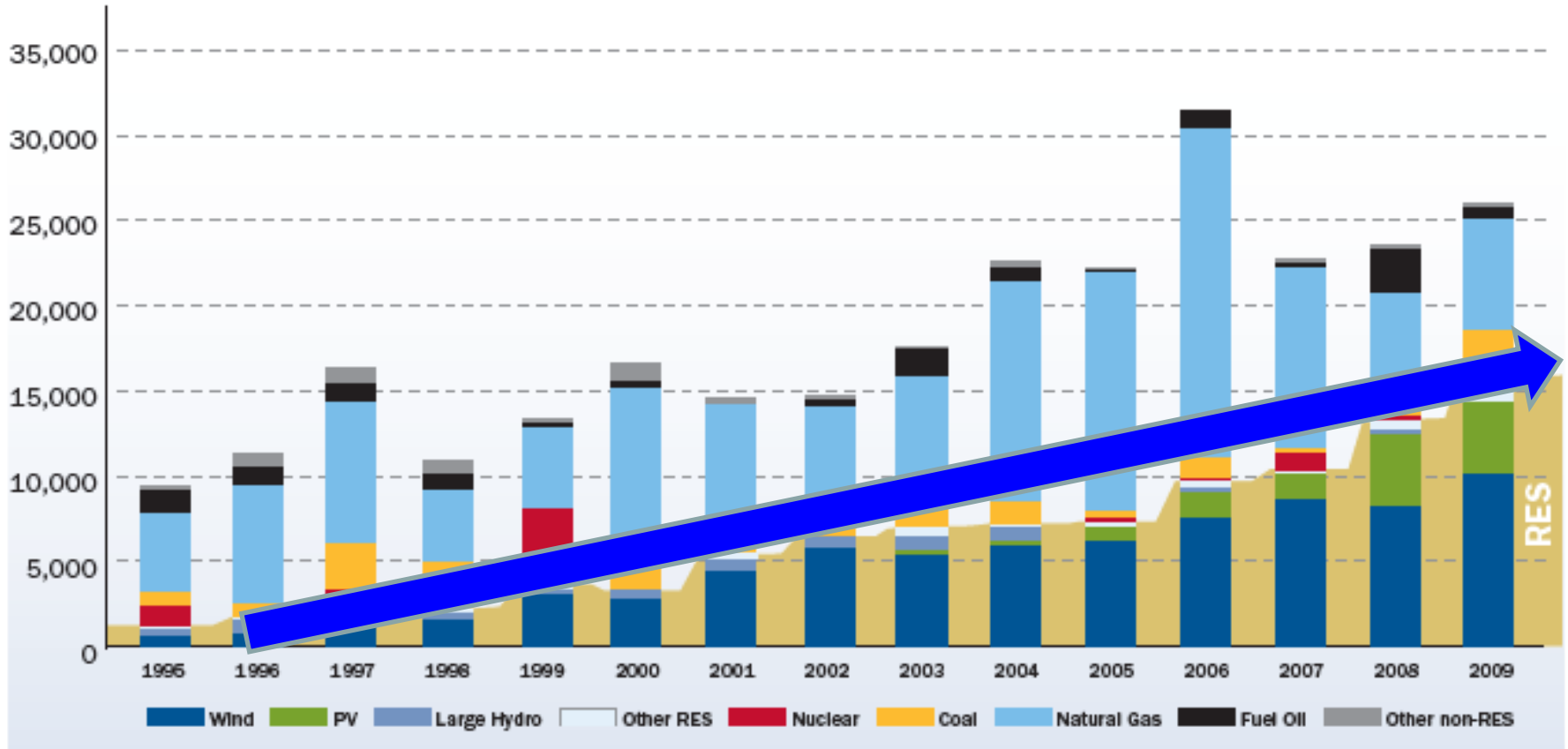
**with**  
**What comes after the Smart Grid ?**

**Presentation Oct 13 ,2010**  
IEEE PES Conference on Innovative Smart  
Grid Technologies Europe

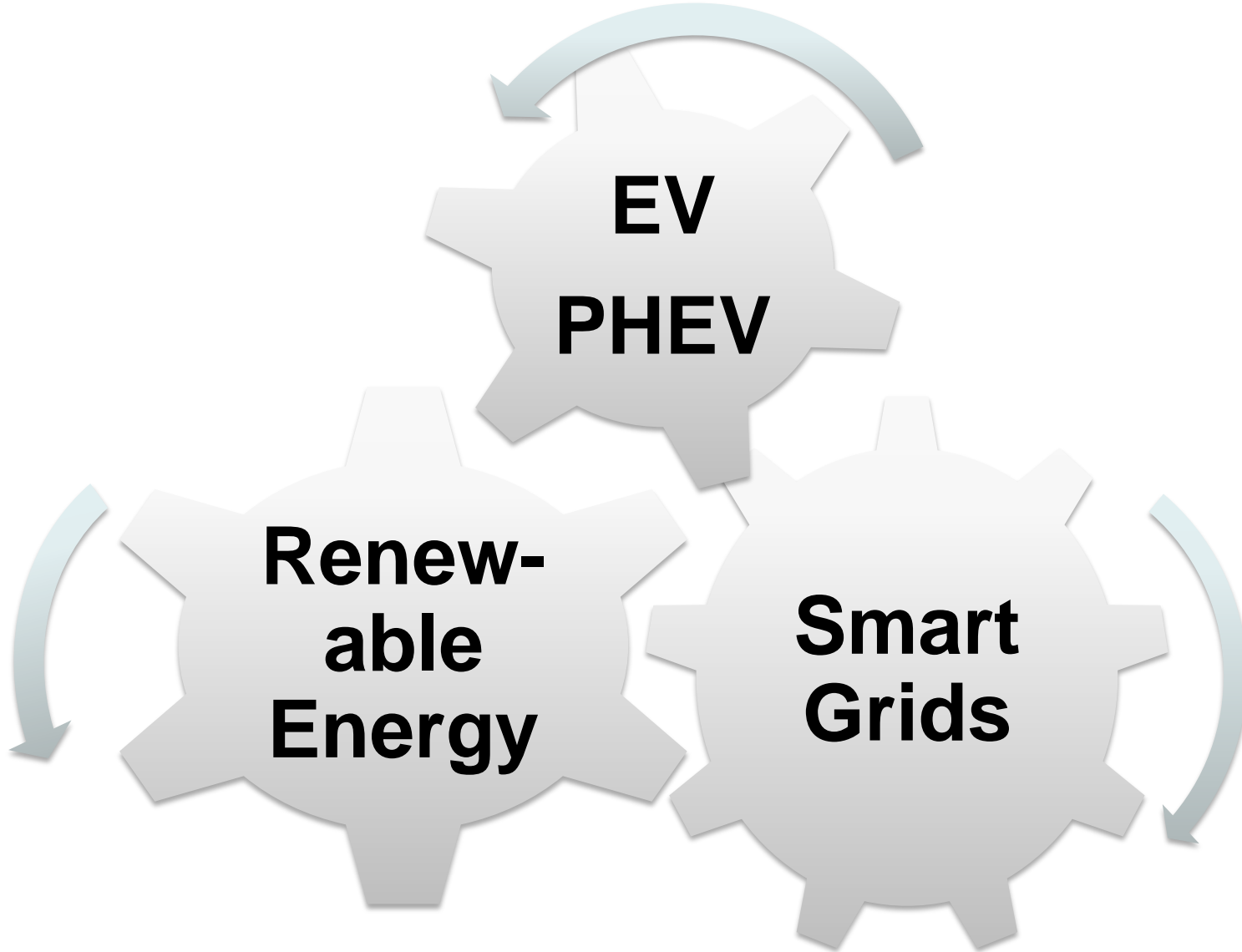
Bo Normark

# Smartgrids is a key enabler for Renewable Energy

# Europe is going towards a CO-2-free Electricity System



# Linked activities



# Wind power and EV:s, a good fit...

Together towards zero

Banbrytande laddhybridteknologi för bekväm, ekonomisk och utsläppfri bilkörning.

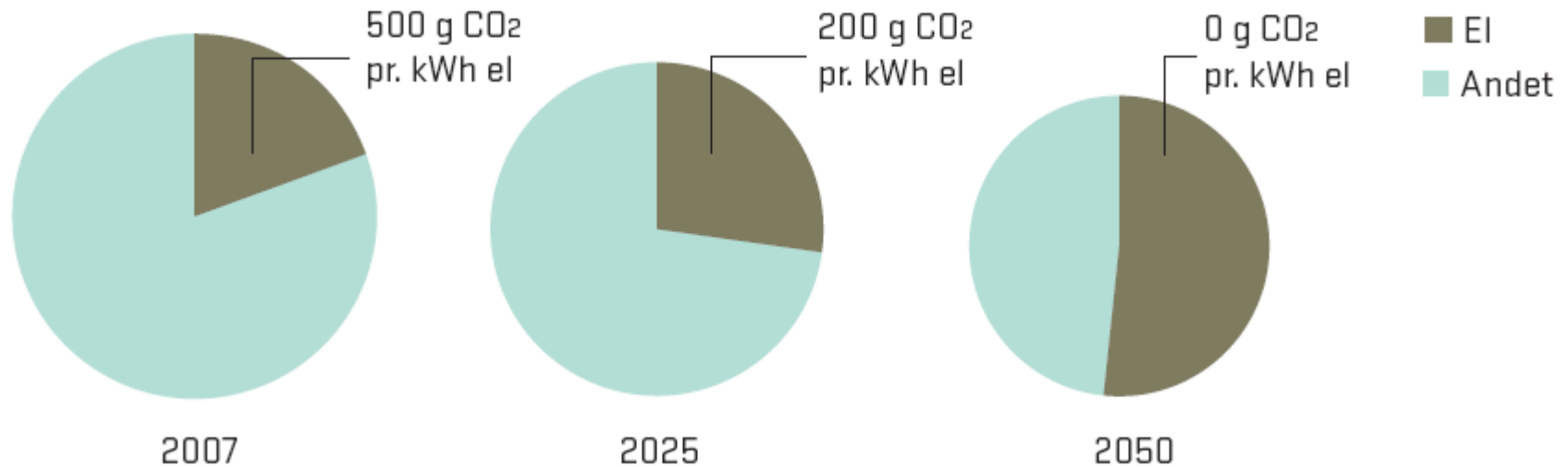
The advertisement features a white Volvo V40 GTE station wagon parked in front of a building. A yellow charging cable is plugged into the car's charging port. In the background, a large wind turbine is shown with a bright yellow beam of light emanating from its base, directed towards the car. The overall scene is set against a light blue sky and a white building facade.

**VOLVO**

**VATTENFALL**

Development of Smartgrids  
will stimulate overall  
optimisation of power system

# Denmark, electrification roadmap



CO<sub>2</sub>-neutral strøm, varme og transport

Dynamisk energimarked

Aktive forbrugere

El som den foretrukne energiform

POWER TO  
THE PEOPLE

- DANMARKS ENERGIFORBRUG CO<sub>2</sub>-NEUTRALT I 2050

# Smart grid plans in Denmark

## Effektiv anvendelse af vindkraft-baseret el i Danmark

Samspil mellem vindkraft, varmepumper og elbiler



### **Danmark kan nå en stor del af sine 20-20-20 mål med vindkraftbaserede varmepumper og elbiler**

Varmepumper og elbiler kan blive en meget vigtig faktor for Danmarks muligheder for at nå 2020-målsætningerne. 40 pct. af Danmarks mål for CO<sub>2</sub>-reduktion i de ikke-kvoteomfattede sektorer kan nås i 2020 ved at satse på intelligent styrede varmepumper og elbiler baseret på vindkraft

# Energy storage 22 kWh

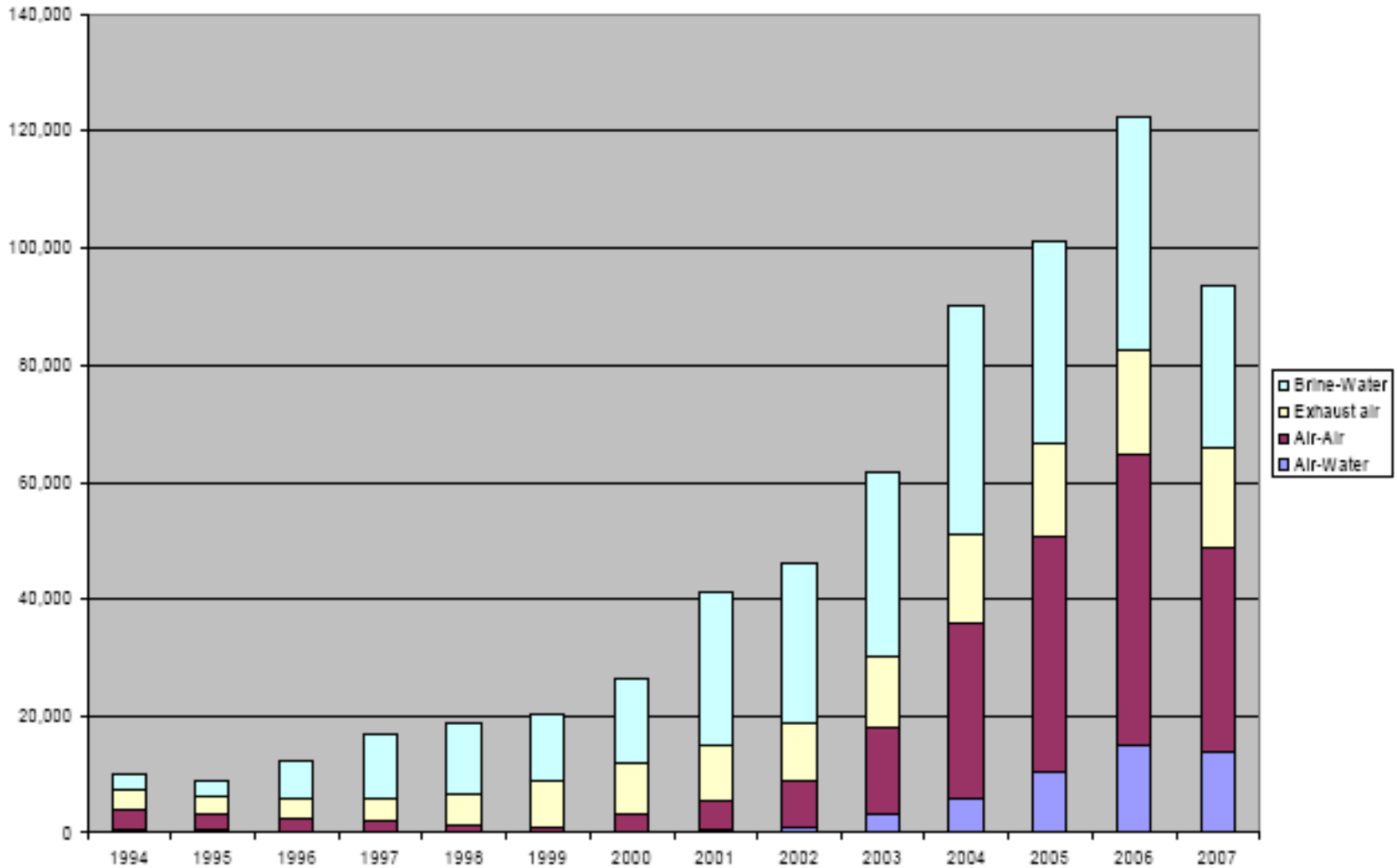
300 kg water tank / 60 C delta

250 kg Li-Ion- Battery



But with a heat pump you can charge the water tank with 22 kWh using only 6 kWh from the battery!

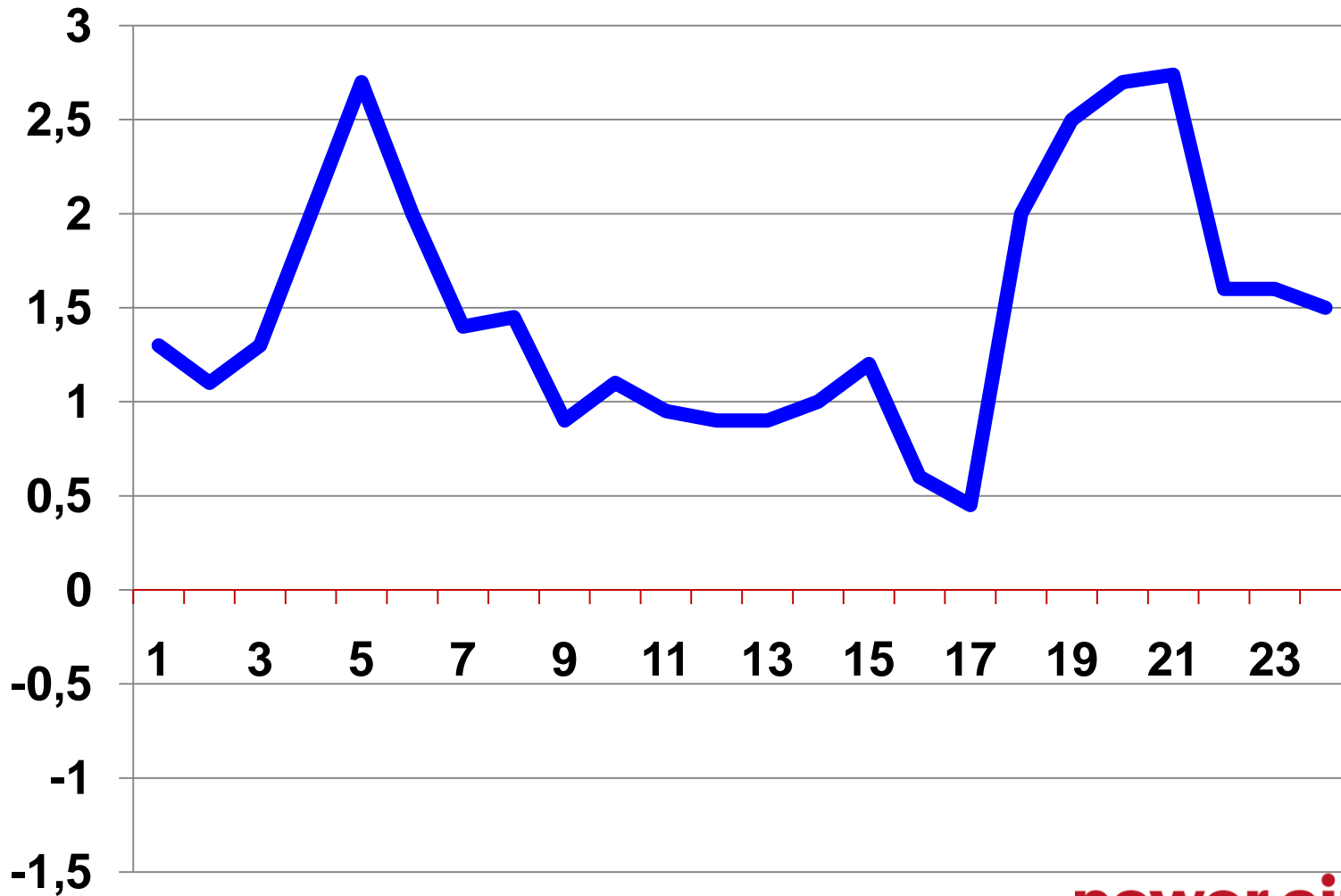
# Sweden has about 800.000 heatpumps



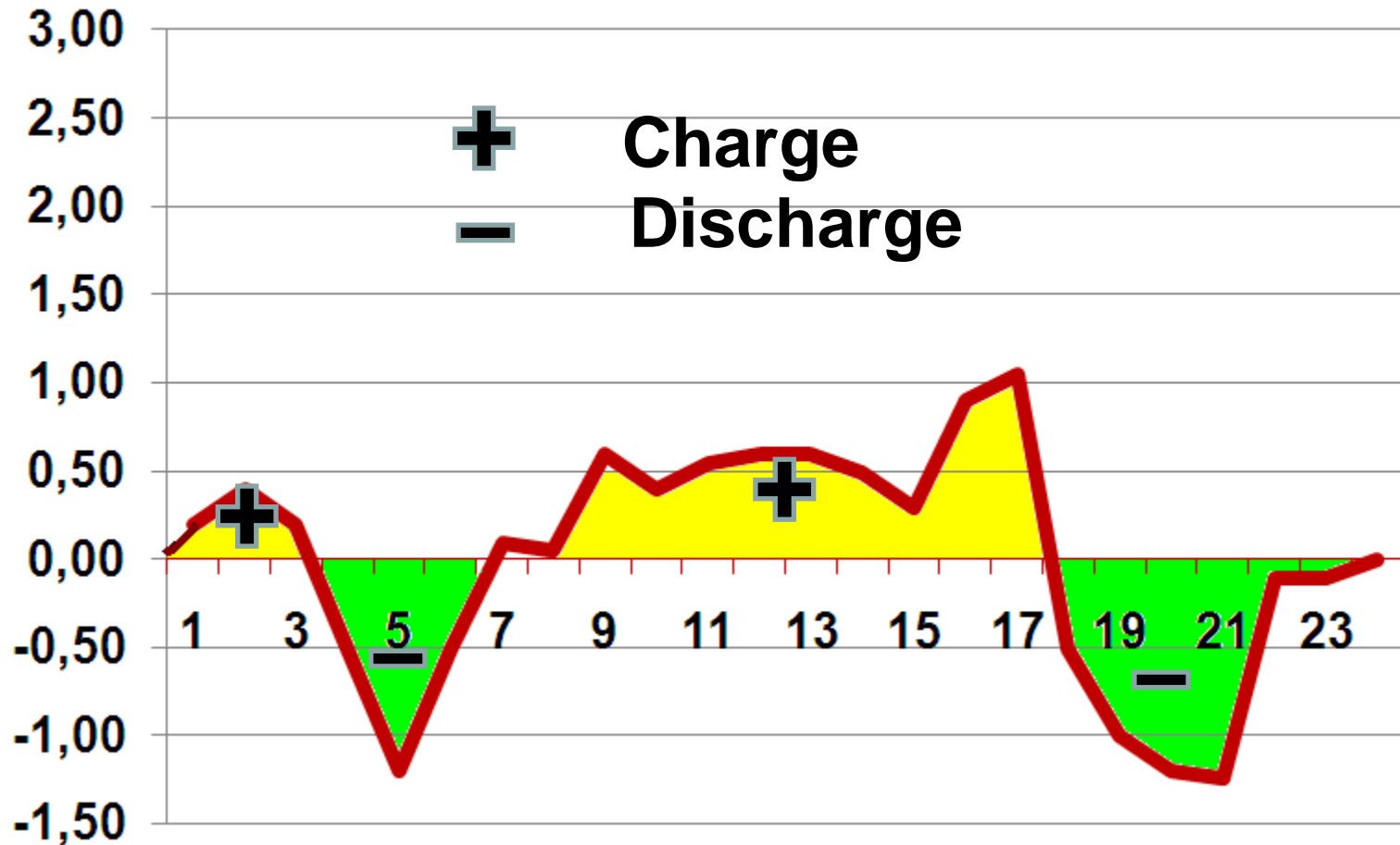
Development of Smartgrids  
will stimulate development of  
local solutions

# Electric consumption 24 h

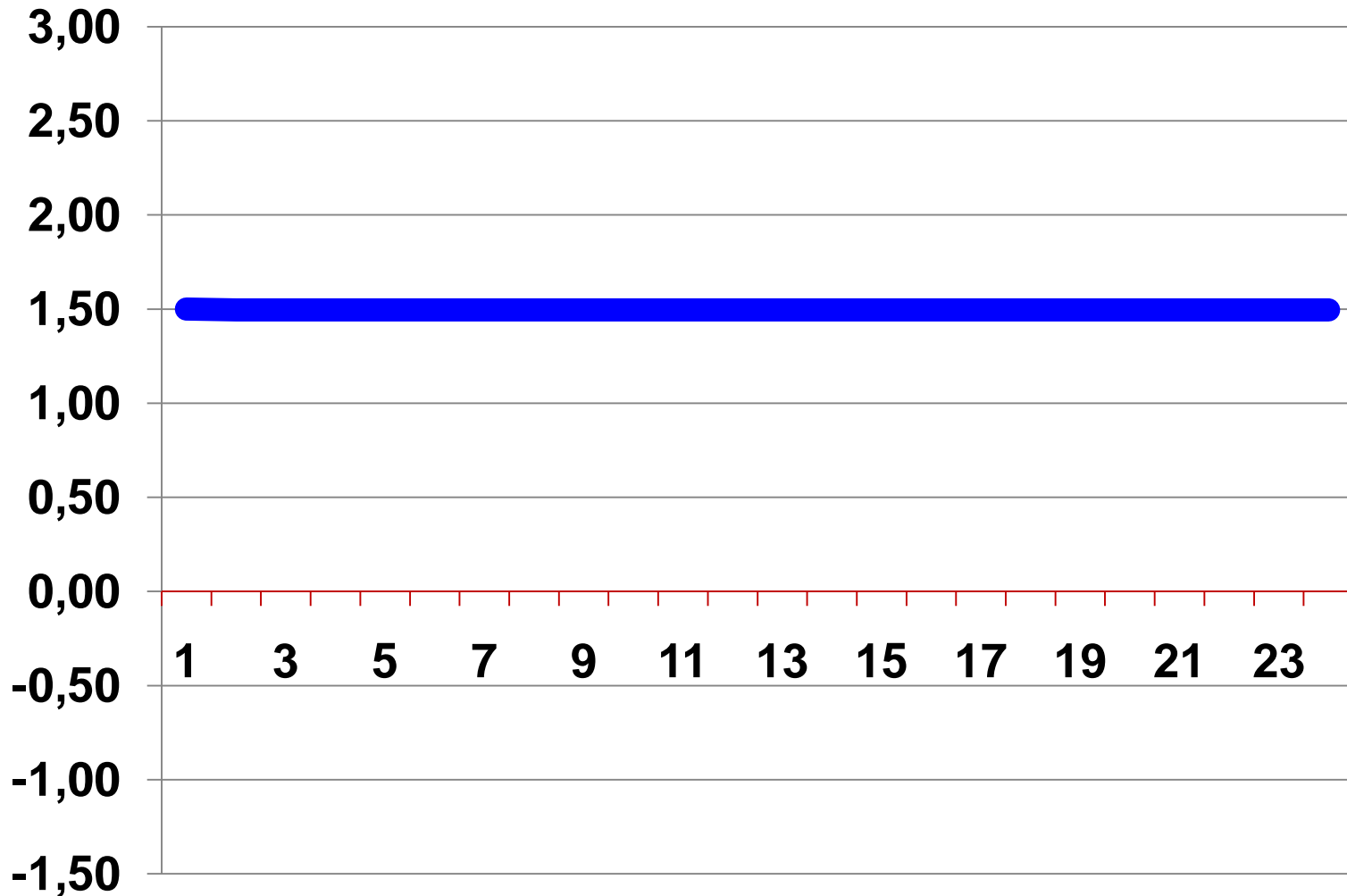
## Swedish home



# Use 1/6 of the battery capacity of an EV



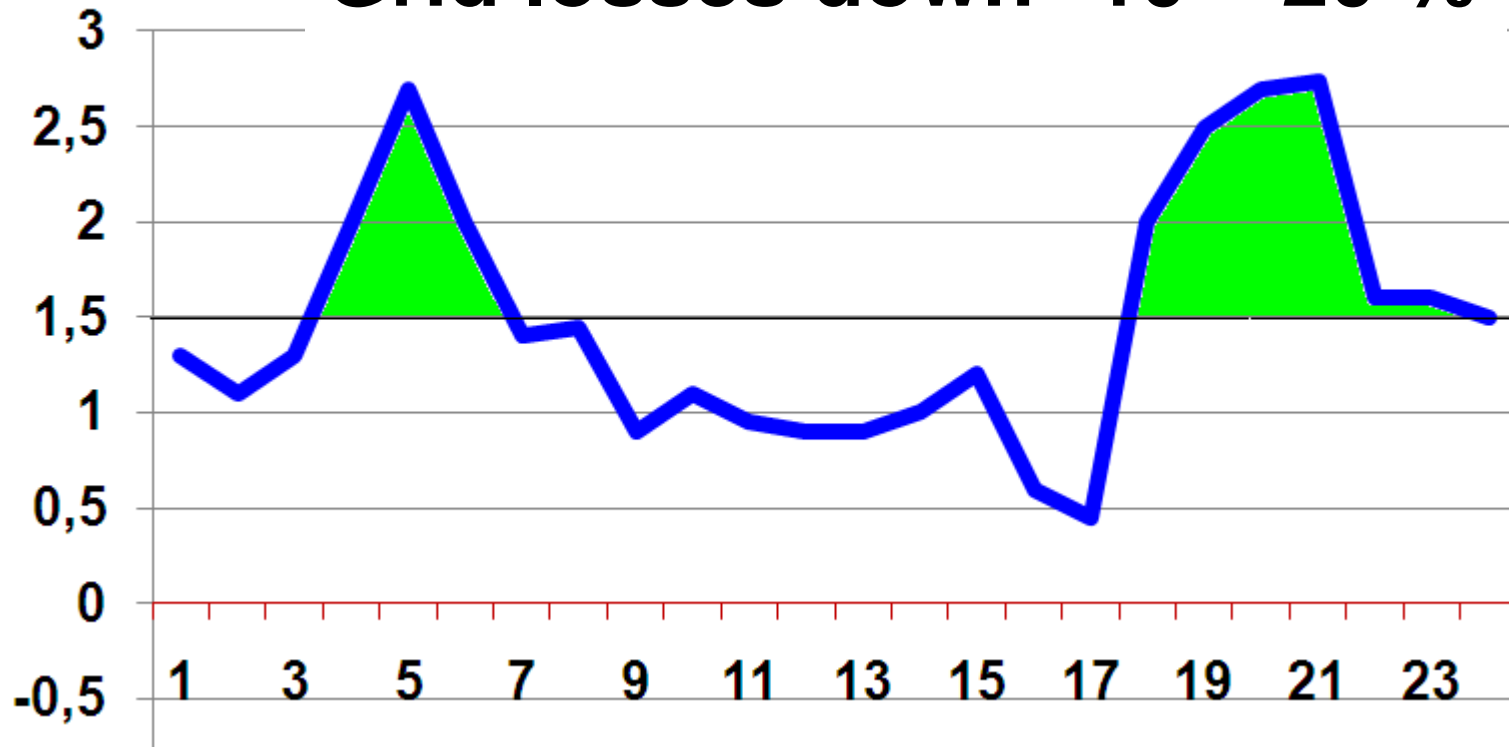
# And the result is constant load from the grid.....



# Resulting in ...

**Peak load down 45 %**

**Grid losses down 10 – 20 %**



Electrification of cars will drive  
the automotive industry

# Electrification is driving technology...

**The development of electrified cars is driving the development of diesel and gasoline cars towards lower emissions.....**

Quote: Dr. Wolfgang Steiger, future technologies VW

# 2010 VW Polo "Blue Motion"



# auto motor & sport



Nr 6 juni  
1995

Pris 39:50 kr

inkl moms

Norge 44:-



## Allt om nya Saab 9000

*Folkan som drar*

# 0,3

*l/mil!*



**power circle**  
ELECTRICITY FOR SUSTAINABLE ENERGY



# Electric cars brings innovation to the automobile industry

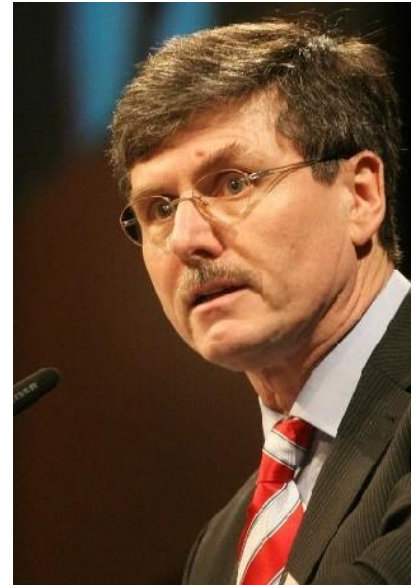
## Toyota invests in Tesla

*Through this partnership, by working together with a venture business such as Tesla, **Toyota would like to learn from the challenging spirit, quick decision-making, and flexibility that Tesla has. Decades ago, Toyota was also born as a venture business.** By partnering with Tesla, my hope is that all Toyota employees will recall that ‘venture business spirit,’ and take on the challenges of the future.*

—TMC President Akio Toyoda

# And maybe Dudenhoeffer is right...

Slowly, but surely, even performance-orientated European automakers will fully convert their fleets to hybrid cars and electric vehicles according to German automotive expert Ferdinand Dudenhoeffer. "Hybrids and electric vehicles are going to be profitable, everyone is getting quickly into the act," stated Dudenhoeffer. **By 2025 Dudenhoeffer believes that all cars sold in Europe will be either hybrids or electric vehicles.**



Smartgrids stimulates the communication between regulators and industry

# Regulators and Smart Grids



**Smart Grids and smart  
regulation help implement  
climate change objectives**

A Fact Sheet by the European Energy Regulators on how smart grids can help meet climate change objectives and empower customers

Smartgrids will stimulate cross  
learnings between industries

# Affected Industries

## Examples

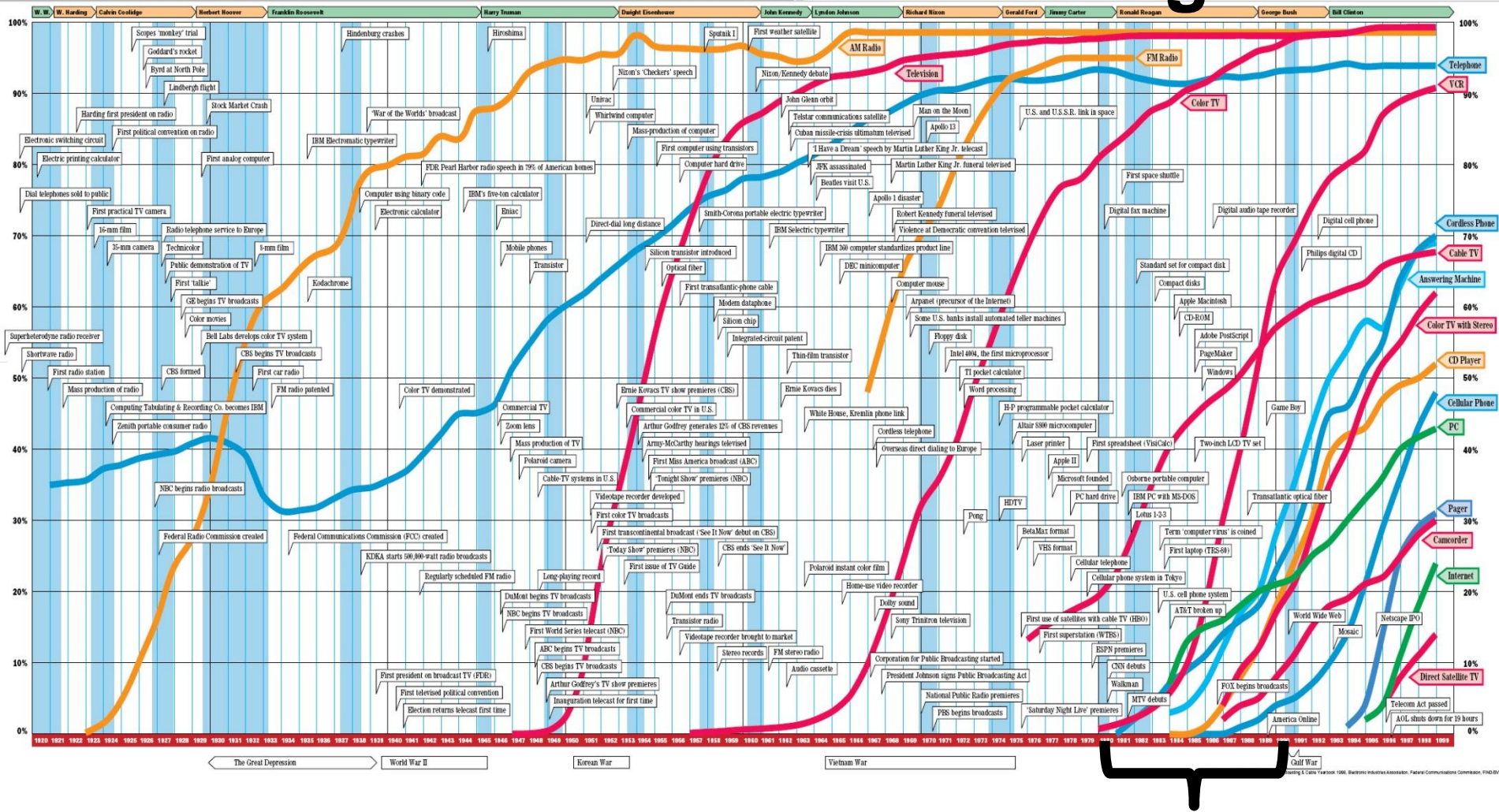
- Power
- Automotive
- IT
- Construction

# Affected Industries

## Examples

- Power Reliability
- Automotive Production
- IT Innovation
- Construction Logistic

# Introduction of new technologies...



**10 years**  
**power circle**  
 ELECTRICITY FOR SUSTAINABLE ENERGY

Source: <http://news.bookweb.org/graphics/articles/200903/adoption.jpg>

# What comes with the Smartgrids

- Increased focus on the role of the grid
- Electricity becomes even more competitive
- Better communication between industry and regulators
- More learning between industries, more innovation and faster introduction of new technologies