



## **European Sustainable Energy Seminar 2010**

**Organized by INFORSE-Europe and EREF  
Brussels, 27 April, 2010**

**Proceedings:**

[http://www.inforse.org/europe/seminar\\_2010\\_BXL.htm](http://www.inforse.org/europe/seminar_2010_BXL.htm)

# **Global Energy Assessment**

[http://www.inforse.org/europe/seminar\\_2010\\_BXL.htm](http://www.inforse.org/europe/seminar_2010_BXL.htm)

**Thomas B Johansson**

International Institute for Industrial Environmental Economics,  
Lund University, Lund, Sweden, and  
Global Energy Assessment, IIASA, Austria

# Assesment

Process:

25 Knowledge Modules, ~200 authors, geographically diversified

Stakeholder consultations

External pee rreview

# Supporting the GEA:

## ***International Organizations***

UNDESA  
UNDP  
UNEP  
UNIDO  
World Bank  
IIASA

## ***Country Governments/Agencies***

Austria  
Brazil  
European Union  
Germany  
Italy  
Sweden  
USA

## ***Corporations***

Petrobras  
TEPCO  
First Solar

## ***Industry groups***

WEC  
WBCSD

## ***Foundations***

UN Foundation  
Climate Works

# Challenges requiring actions on Energy

- a. Energy services for growing populations and economies
- b. access to modern forms of energy (the 2 billion w/o access)
- c. affordable energy services (@\$100/bbl??)
- d. secure supplies, from households to nations
- e. local and regional environmental challenges
- f. climate change mitigation
- g. ancillary risks

**⇒ Major Energy System Changes Needed!**

These challenges must be addressed

**adequately**

**timely**

**simultaneously**

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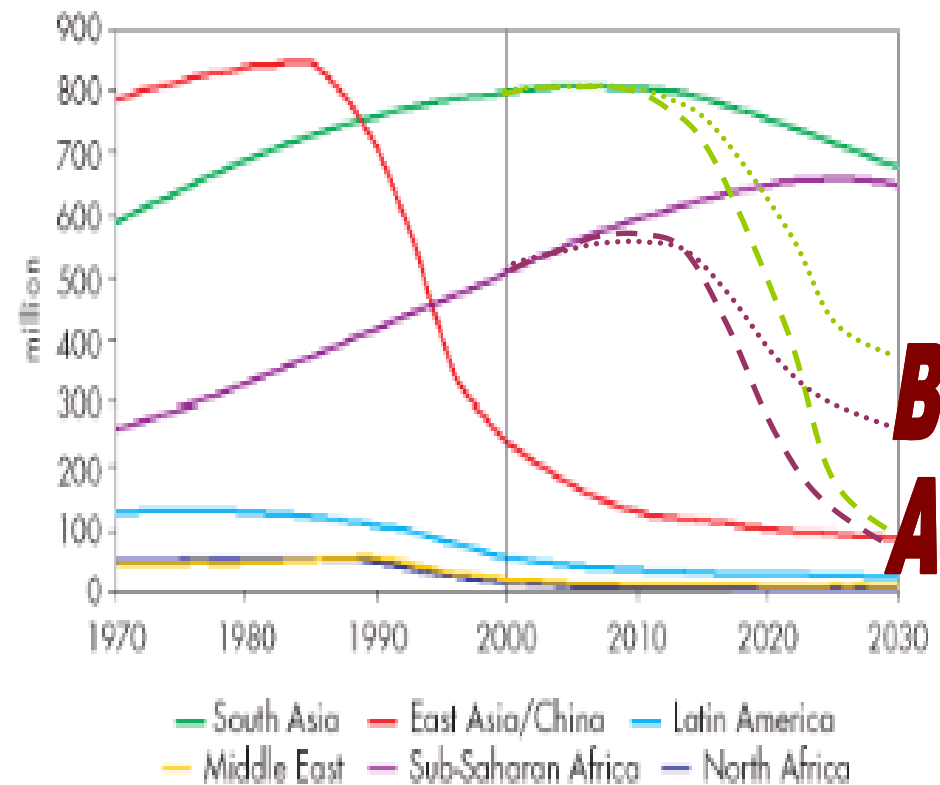
*=> Multiple challenges – multiple benefits possible*

# Electricity

## ● Electricity for All in the Medium Term

(may be achievable)

- Use of both grid-extension and decentralized systems + conventional and renewable energy technologies
- Smart use of subsidies and other innovative financing mechanisms (global effort would be required)

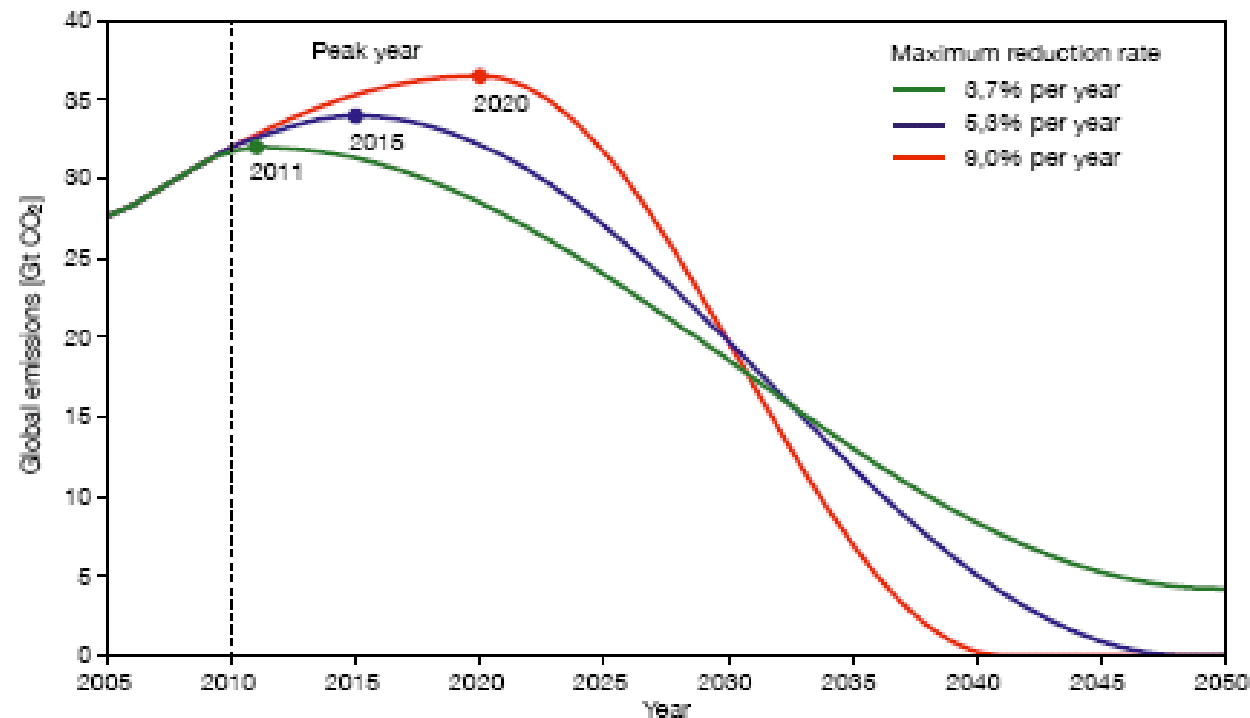


# Clean Cooking Fuels

- Multiple benefits: development, situation of women and children, health, mitigation:
- Biogas, LPG, alcohols, kerosene, electricity
- Stove efficiency



# Global emission pathways in compliance with a 2 °C guardrail



**Figure 3.2-1**

Examples of global emission pathways for the period 2010–2050 with global CO<sub>2</sub> emissions capped at 750 Gt during this period. At this level, there is a 67 % probability of achieving compliance with the 2 °C guard rail (Chapter 5). The figure shows variants of a global emissions trend with different peak years: 2011 (green), 2015 (blue) and 2020 (red). In order to achieve compliance with these curves, annual reduction rates of 3.7 % (green), 5.3 % (blue) or 9.0 % (red) would be required in the early 2030s (relative to 2008).

Source: WBGU

# this translates into a need for a major energy systems transformation

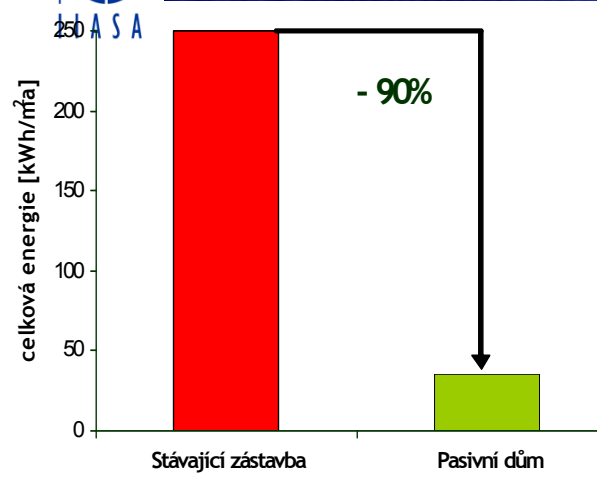
## Main elements:

- Energy end-use efficiency
- Renewable energies
- Carbon Capture and Storage (for CC only)
- **Efficiency and Renewables are INSTRUMENTS for addressing all the challenges at the same time!**



G E A

# “PassivHaus”



Source: Jan Barta, Center for Passive Buildings, [www.pasivnidomy.cz](http://www.pasivnidomy.cz)

# Example of savings by reconstruction

Before reconstruction

Reconstruction according to the passive house principle



over 150 kWh/(m<sup>2</sup>a)

-90%

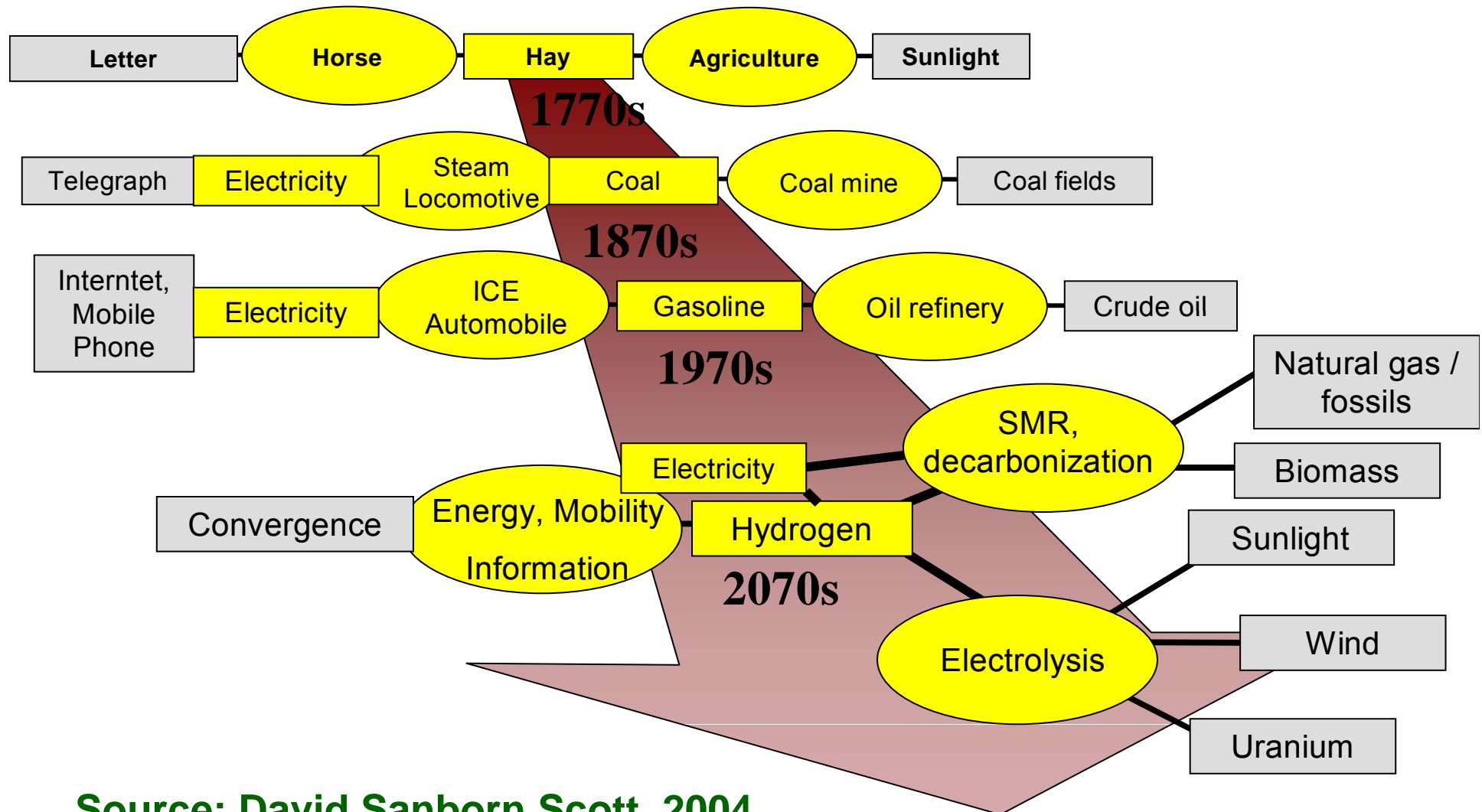


15 kWh/(m<sup>2</sup>a)

# *How far can buildings take us?*

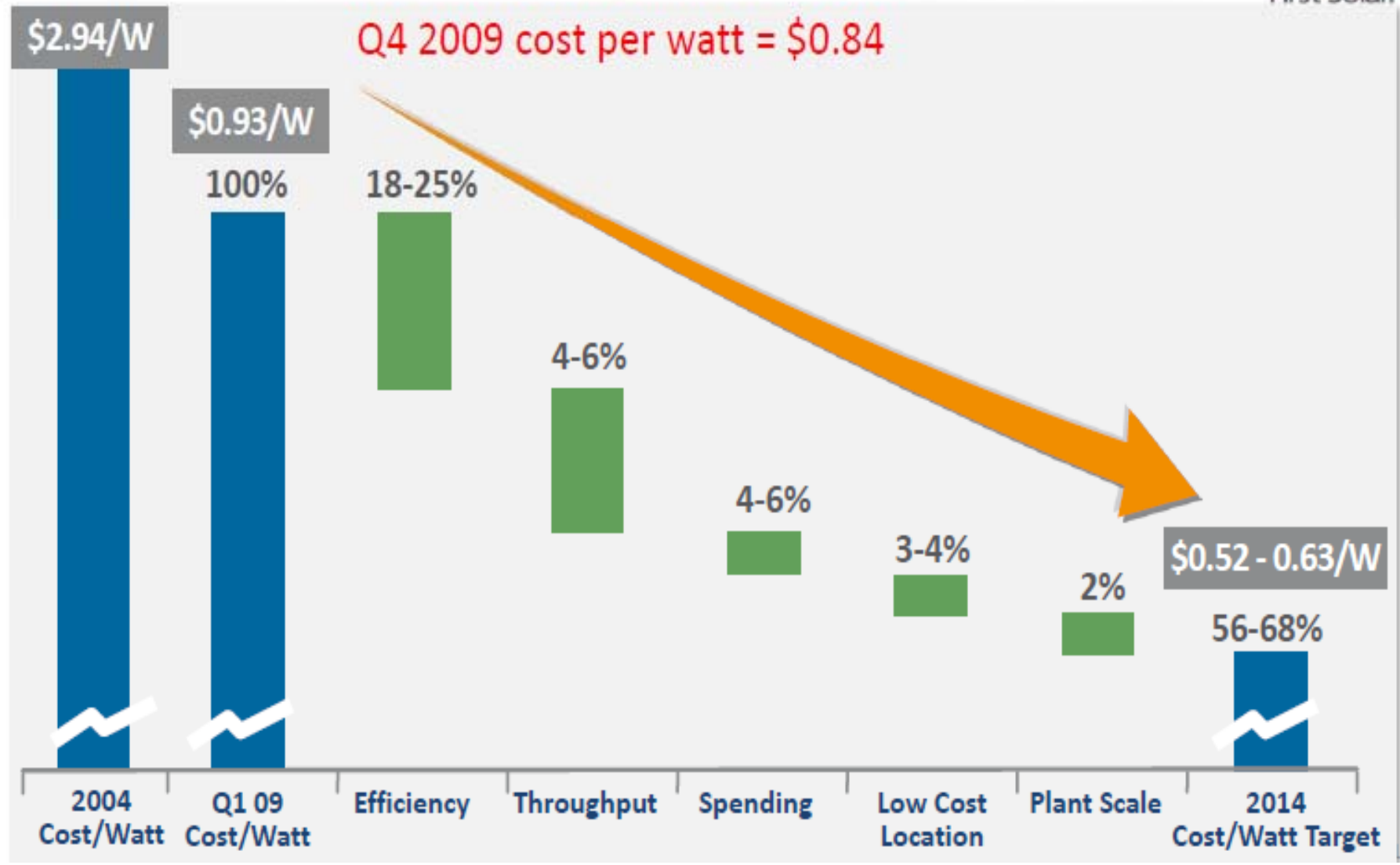


# Mobility and Communication Through Time

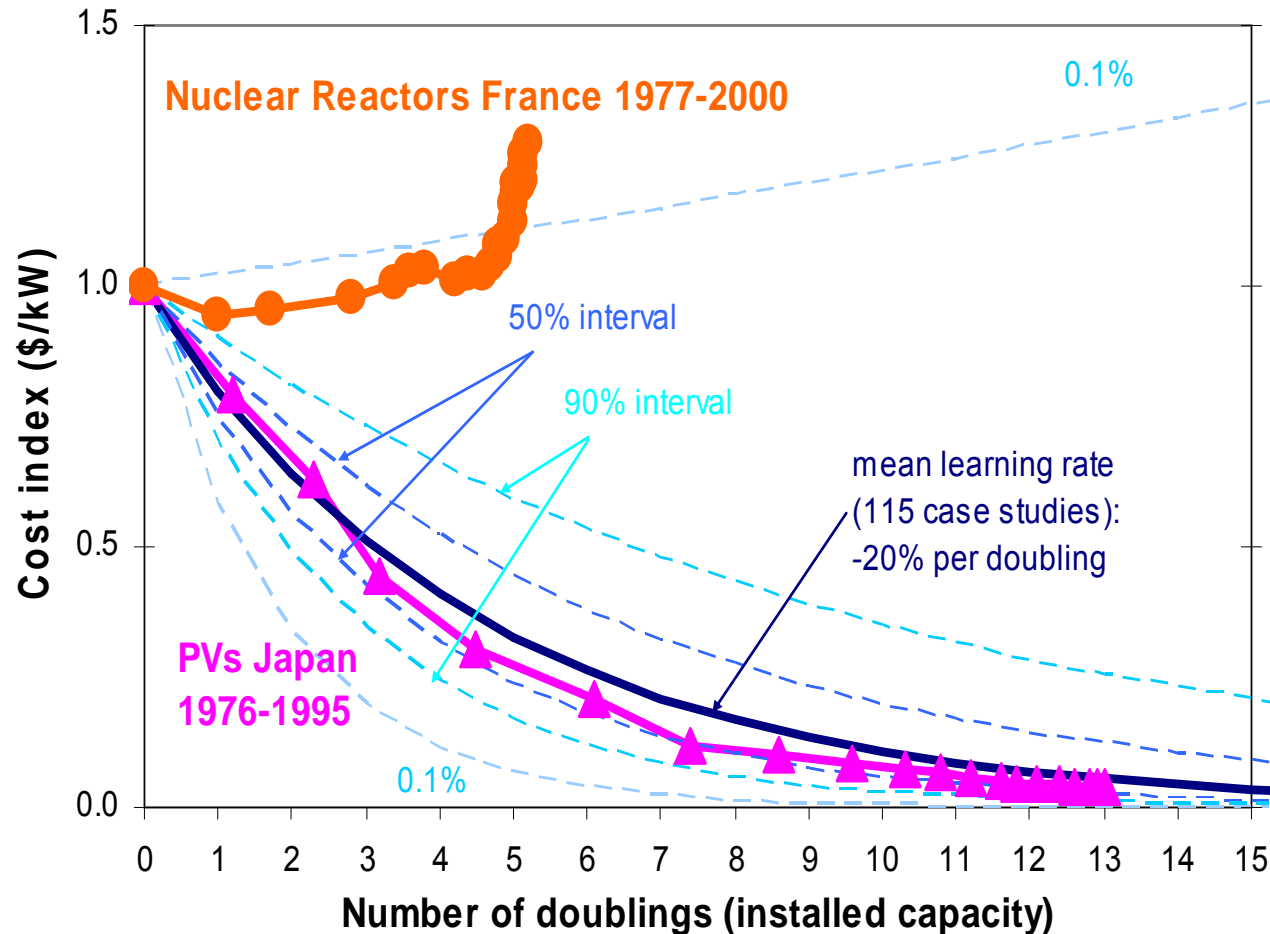


Source: David Sanborn Scott, 2004

# Module Cost Reduction Roadmap

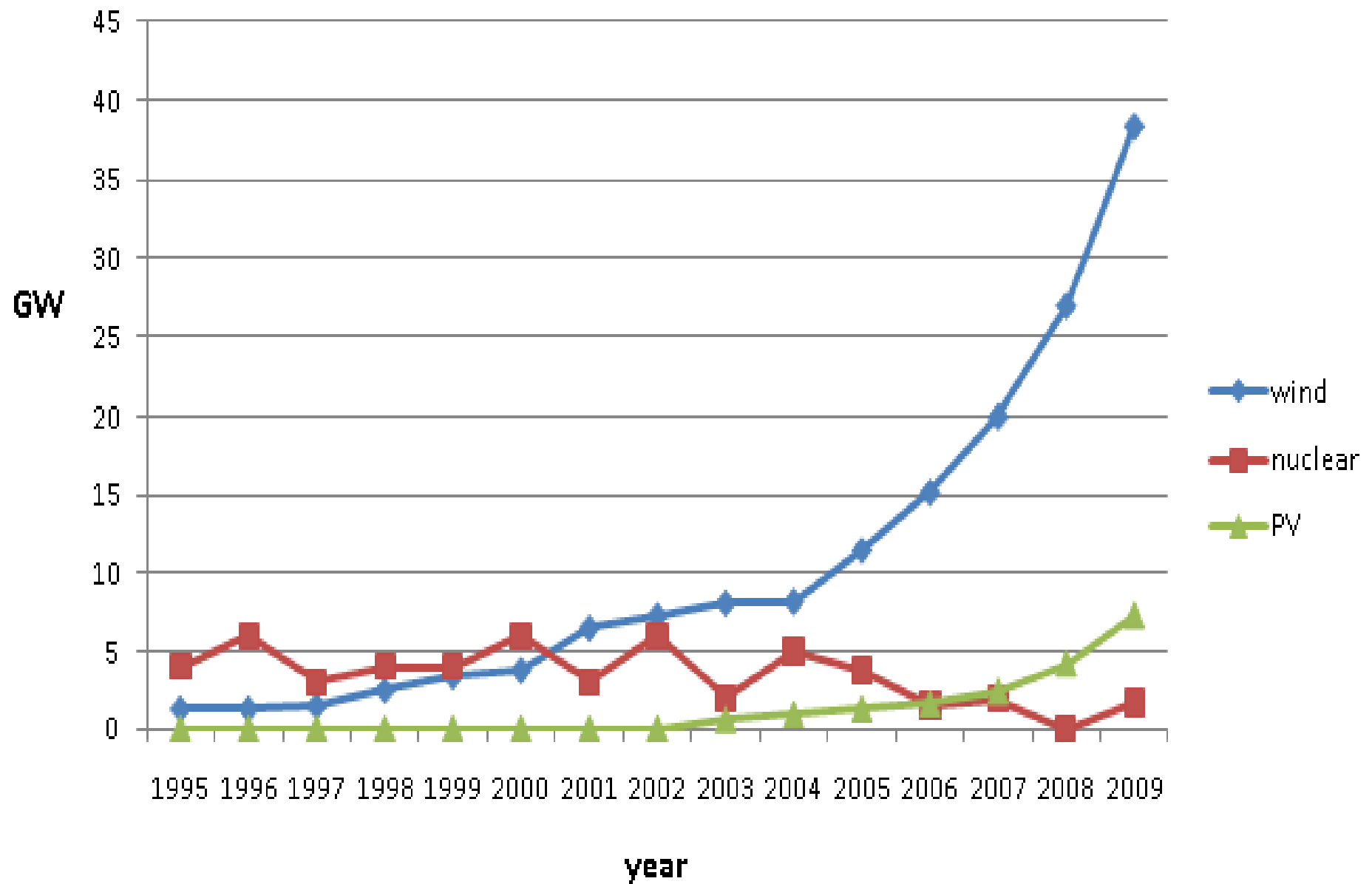


# Technology Uncertainties: Learning Rates and Market Growth



Source: Grubler & Gritsevskiy, 2002

## Annual new grid connections 1995 - 2009



# HVDC Light cable development

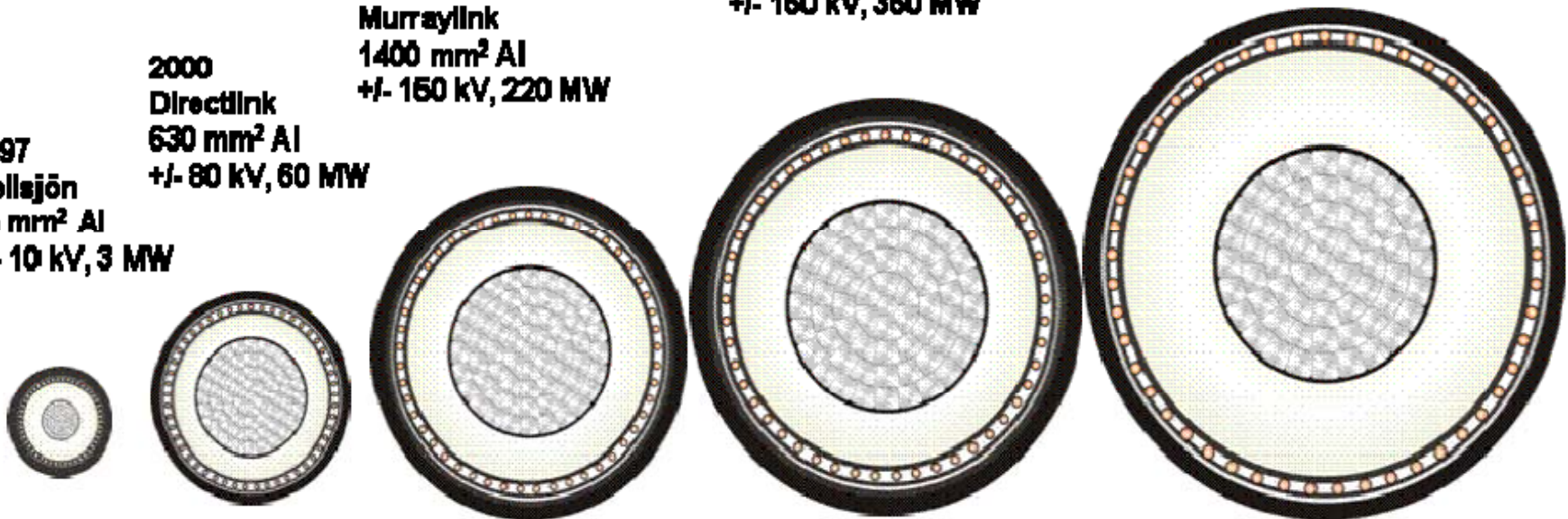
1997  
Hellsjön  
95 mm<sup>2</sup> Al  
+/- 10 kV, 3 MW

2000  
Directlink  
630 mm<sup>2</sup> Al  
+/- 80 kV, 60 MW

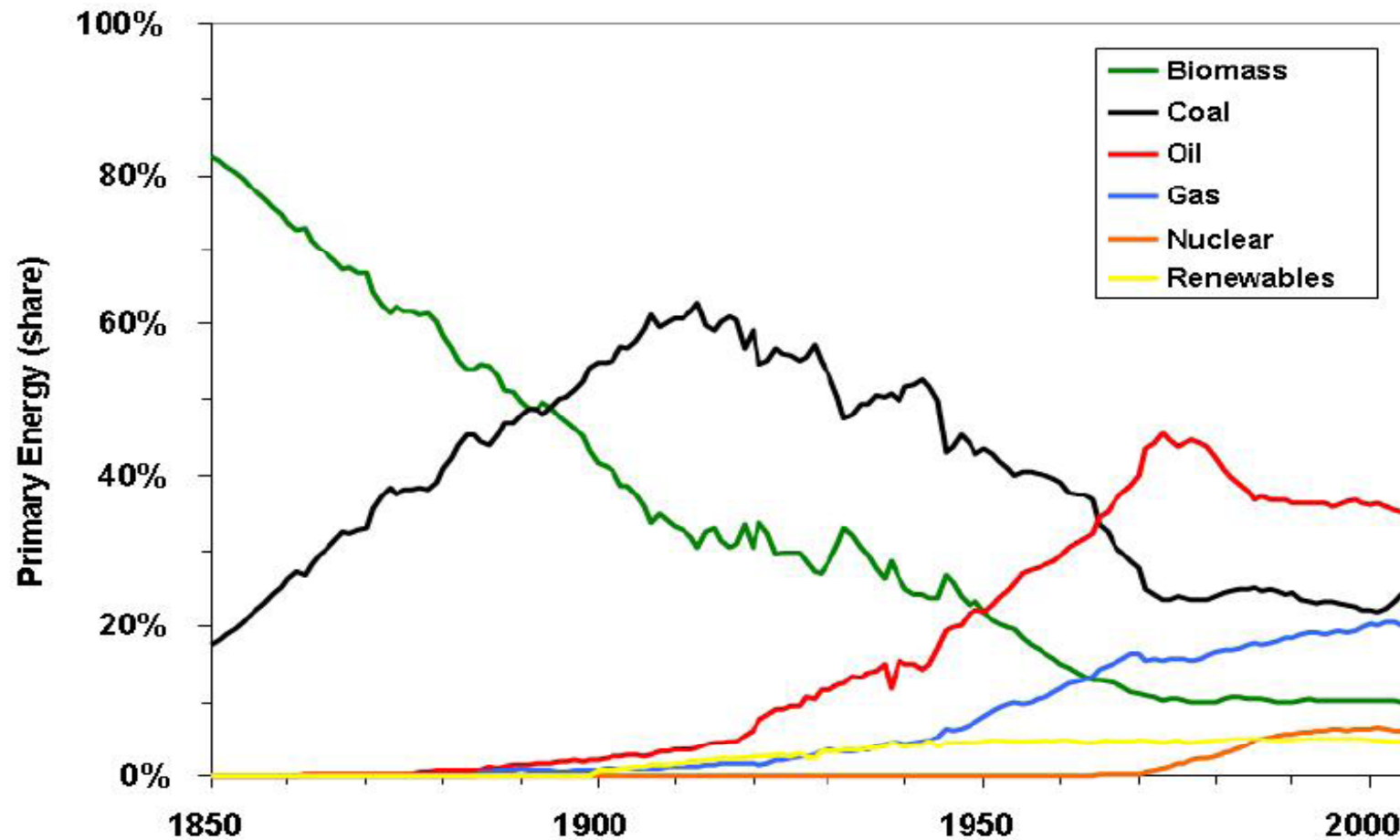
2001  
Murraylink  
1400 mm<sup>2</sup> Al  
+/- 150 kV, 220 MW

2004  
Estlink  
2000 mm<sup>2</sup> Al  
+/- 150 kV, 360 MW

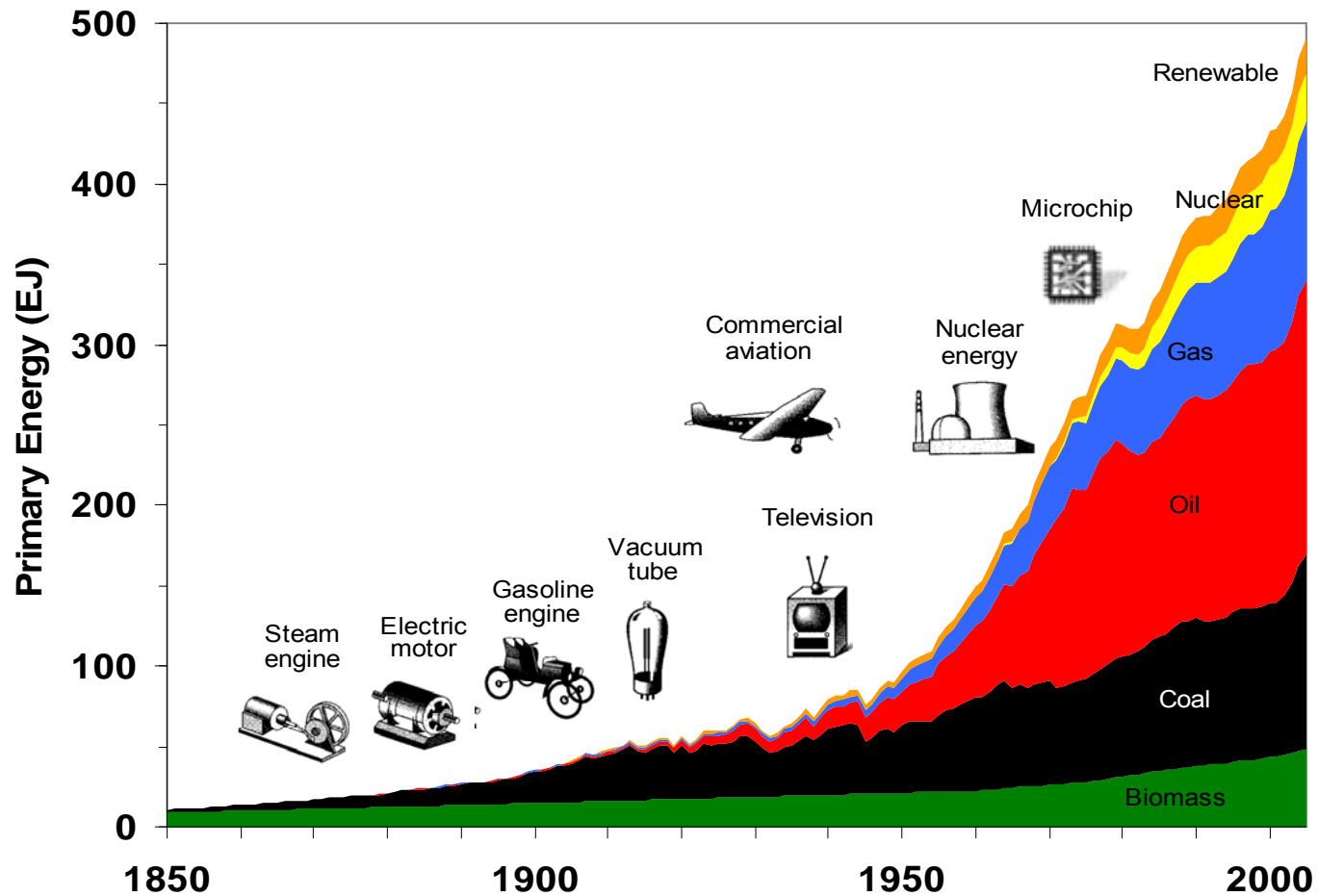
2006 - 2007  
1600 mm<sup>2</sup> Al (Cu)  
+/- 300 kV, 700 MW (1100 MW)



# Global energy transitions



# World Primary Energy



# Can pathways be realised?

- General: integrating with other social, economic and environmental policies
- Balancing markets and governments
- Investment and finance
- International cooperation
- Capacity development and institution building globally
- Fostering innovation

# Key policy tools

- Criteria: delivering change very fast
- Politically possible, low risks for politicians and investors
- Energy end-use efficiency (codes)
- Renewable energies (feed-in-tariff or others with equivalent performance)
- Modernized coal and CCS
- Nuclear (?)

# Major findings and conclusions

- Rapidly changing world
- Energy pivotal
- Window of opportunity exists
- Resources and technologies exist
- Electricity (and hydrogen) growing importance
- Transformative changes needed
- Policies and institutions critical



**[www.GlobalEnergyAssessment.org](http://www.GlobalEnergyAssessment.org)**

**Thomas B Johansson**  
Co-Chair, GEA Executive Committee