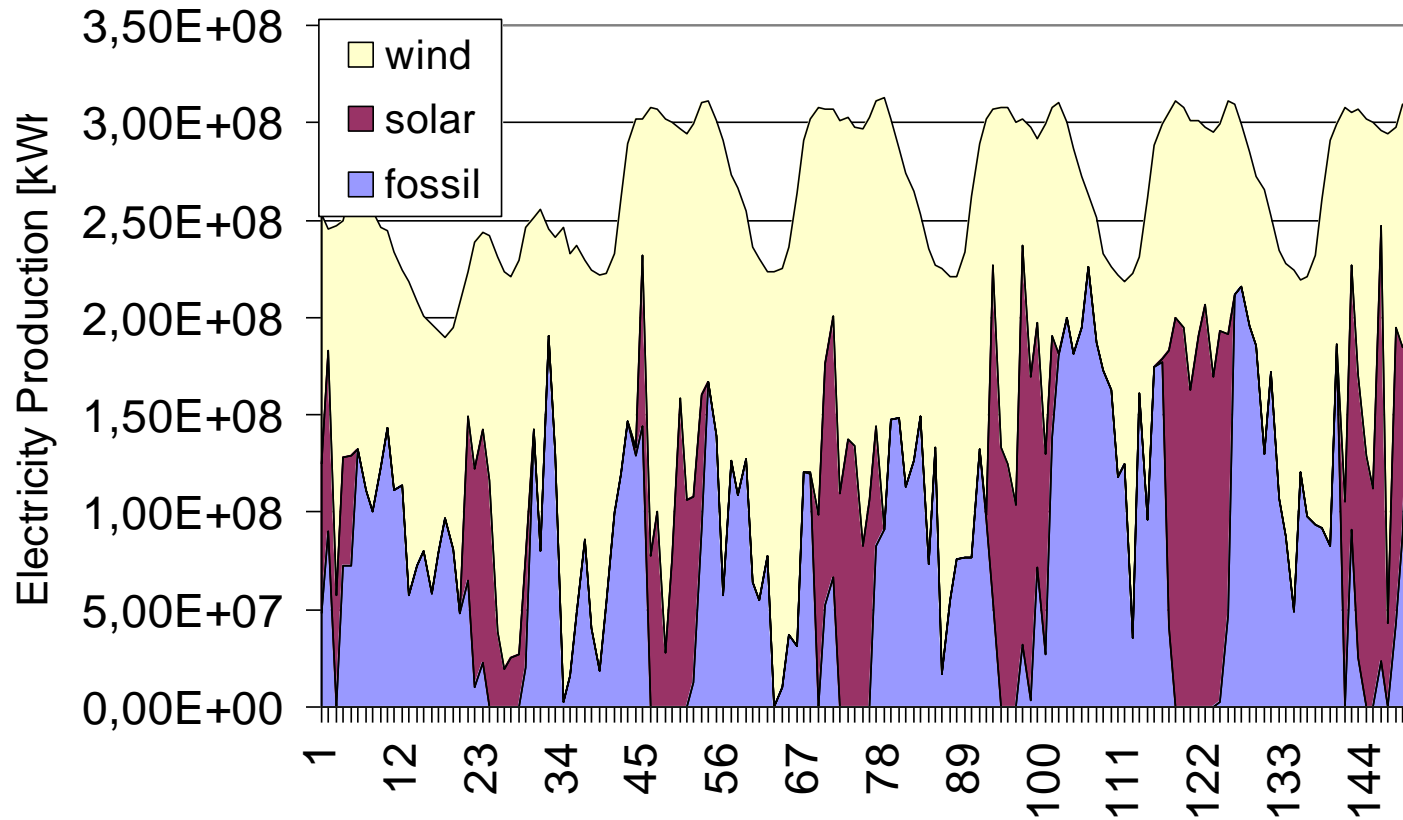


Source: web.bcsdny.org



Source: VLEEM, final presentation
November, 2002

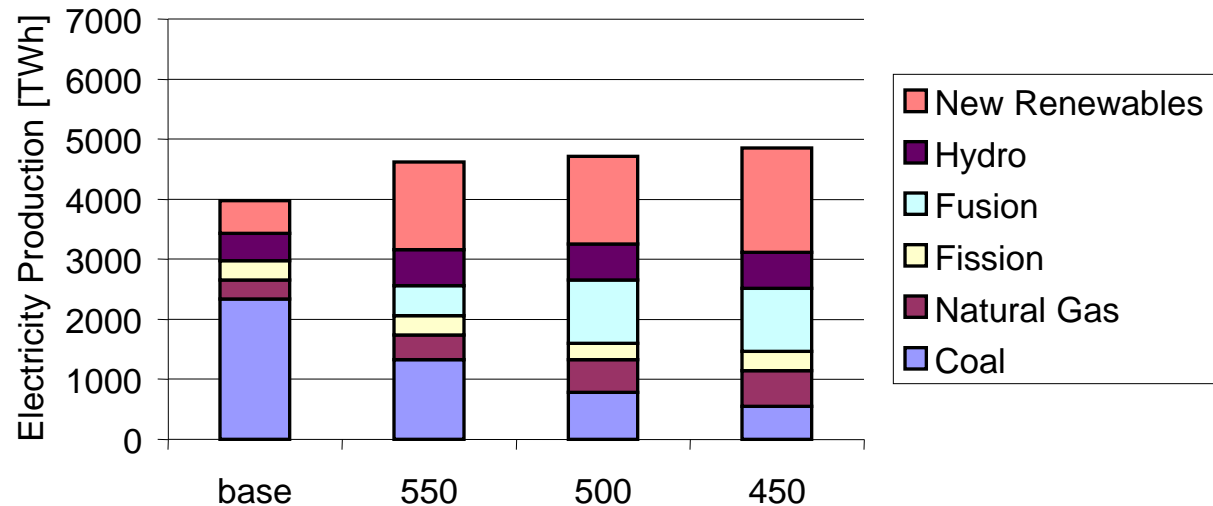
The economic and environmental prospects of fusion and fission in the long term

Will nuclear fit into a „renewable“ eco-technological-system?

- + Base, middle, peak load versus must-run and back-up, or the extinction of nuclear power in a renewable energy future
- + Review of older studies and the role of climate change
- + The electricity-economy nexus, the world goes electric
- + Coal and Co: a dark future
- + Revolution for renewable energies: storage, super grid, smart grid, ...
- + Nuclear and renewable in a new balance

Electricity in Europe in 2100

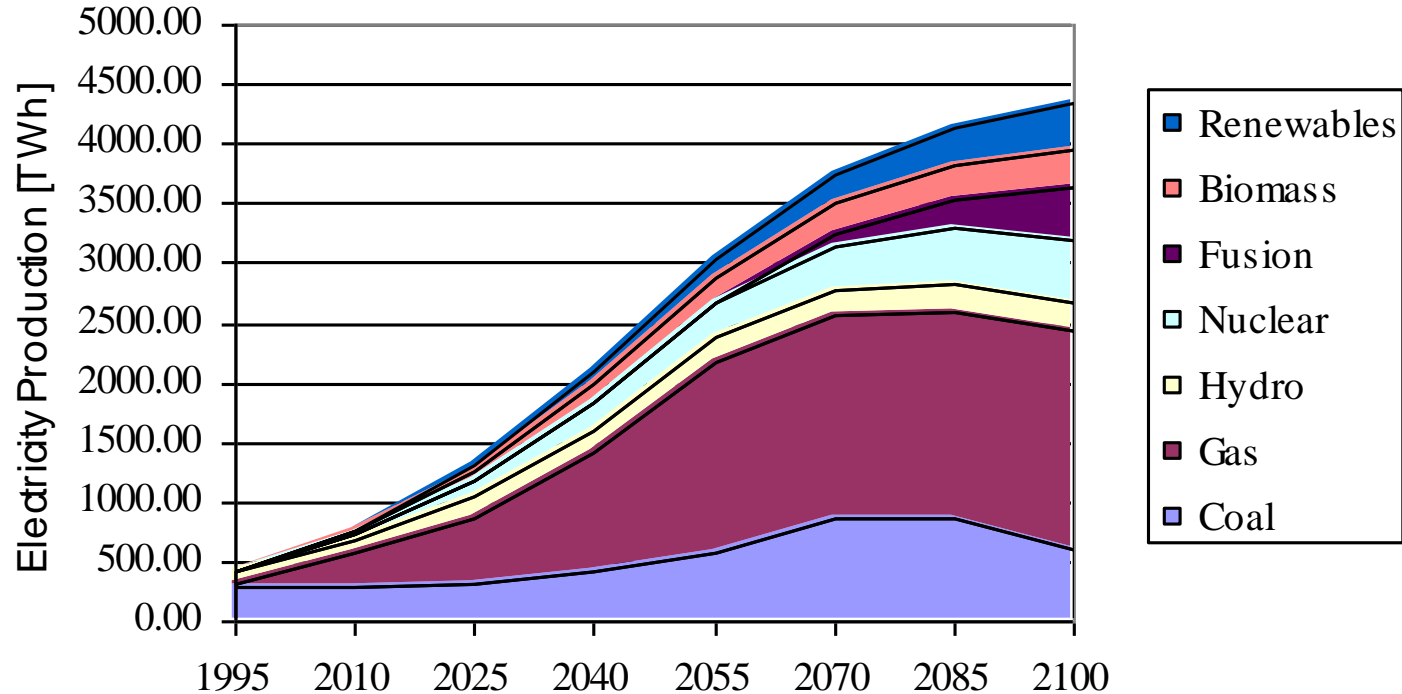
Scenario Rationale Perspective



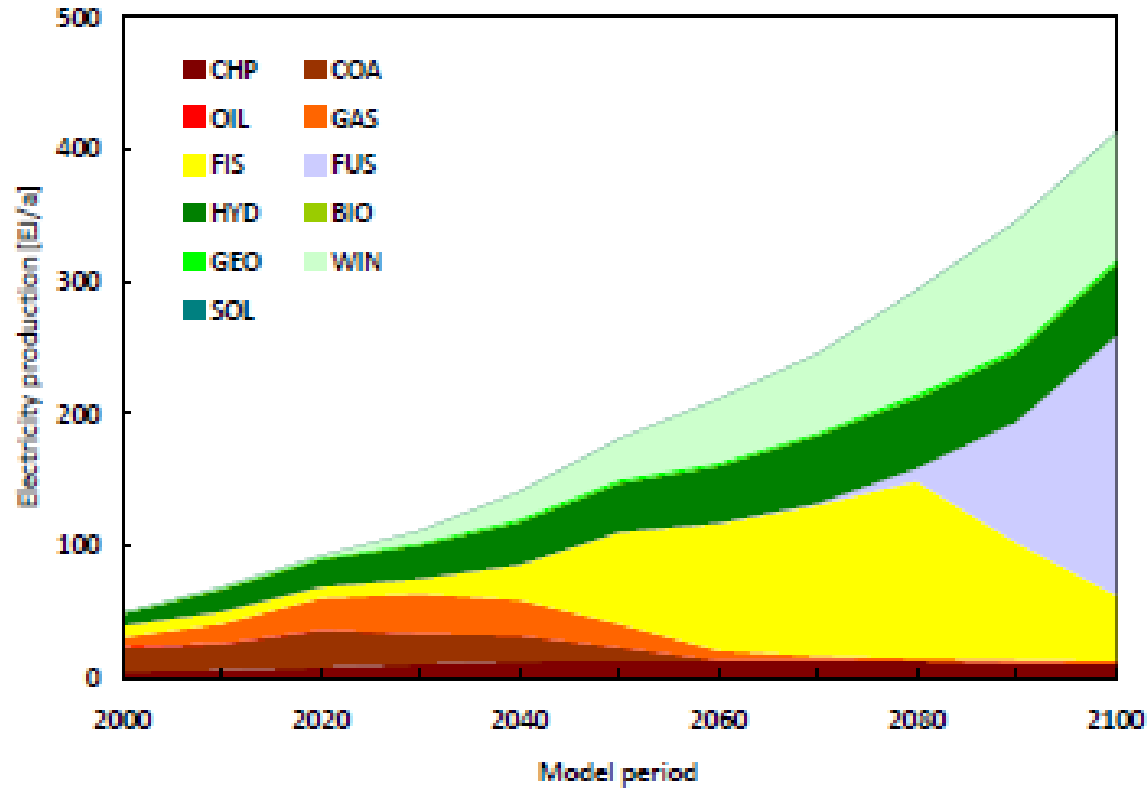
→
 increasing restrictions of CO₂-emissions
 (stabilised atmospheric
 CO₂-concentration)

Source: Long-Term
 Scenarios and the Role of
 Fusion Power,
 ECN-C--98-095

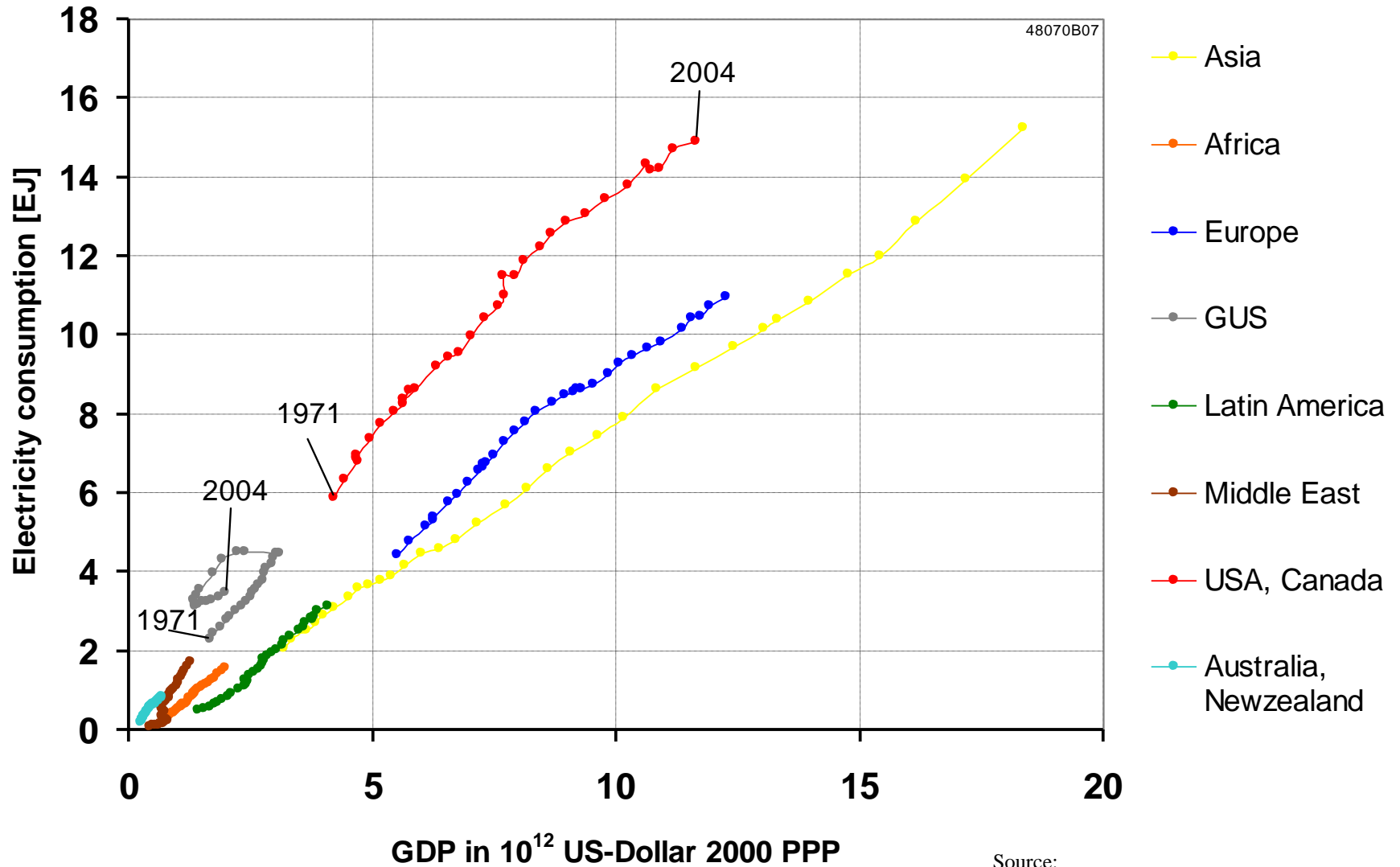
550 ppm atmospheric CO₂ stabilisation case



Source: Shukla et al, Long-term energy Scenarios for India, 2002



Source: Mühlich et. al.



Source:

Two simple estimates:

1. Example:

Global economic growth: 3 %

Electricity intensity: 0.3 kWh/US \$

Electricity demand in 2050: 52430 [TWh] (188 [EJ])

2. Example:

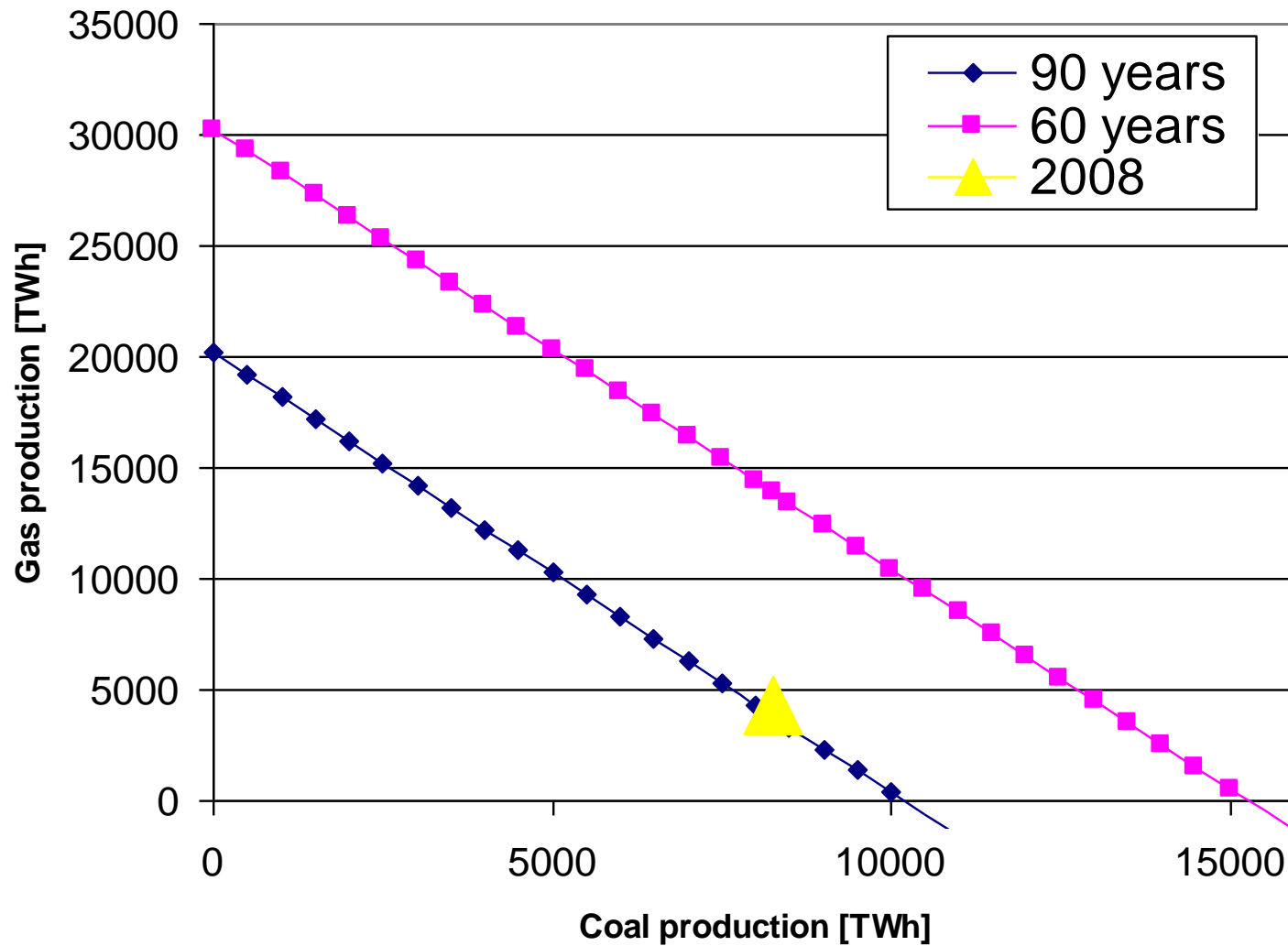
Average per capita demand 2050: 7000 kWh/cap (average in Germany 2010)

Global population in 2050: $9 \cdot 10^9$

Electricity demand in 2050: 63000 [TWh] (226 [EJ])

	Reserve [EJ]	Resources [EJ]
Natural Gas	7291	9142
Shale Gas	65	17329
Tight Gas	46	7970
CBM	80	9652
Gas in Aquifere	-	30400
Gas hydrates	-	38000
Coal	17906	425886
Lignite	3216	49861

Source: BGR



Integrating renewable
electricity sources

Flexible demand

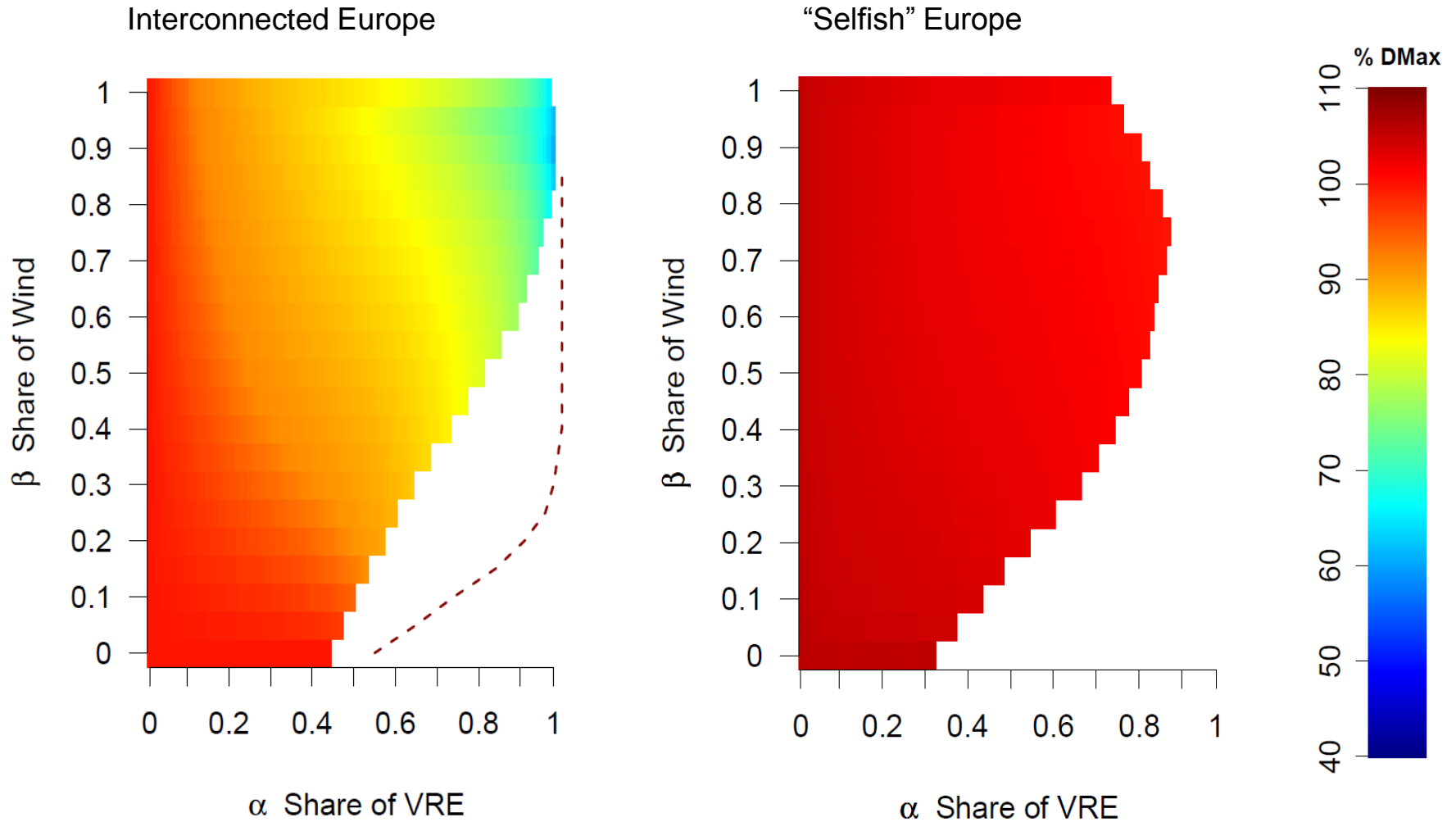
Super grids

Storage

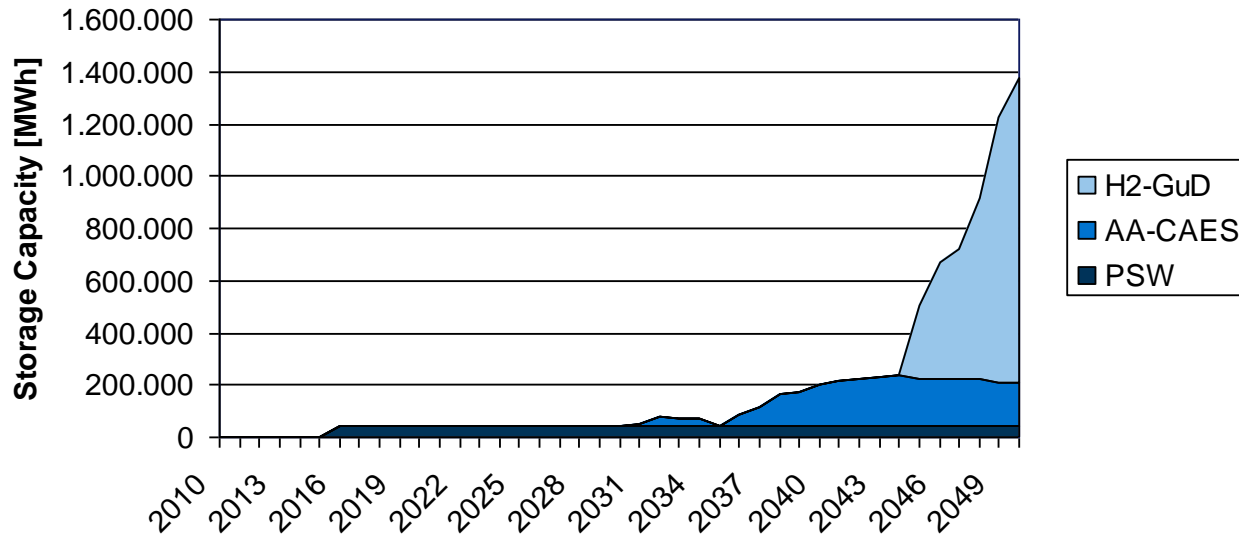
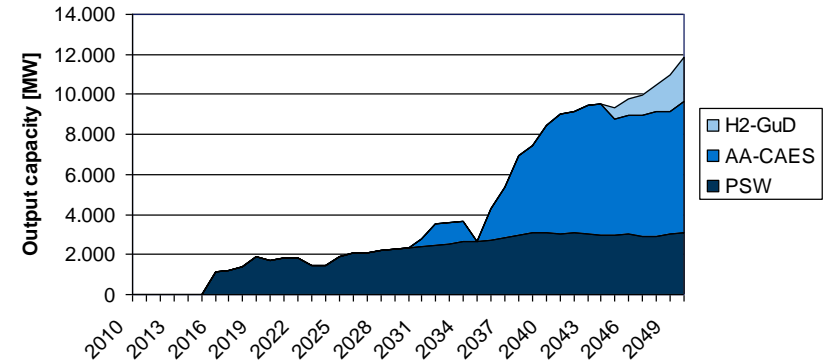
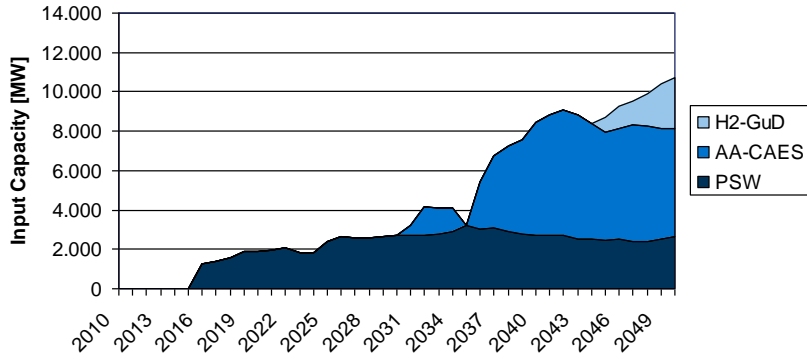
Balanced Mix

Savings

The new eco-system



Source: Schaber et al.



Source: Kuhn

Summary and conclusion:

Globally the electricity demand is expected to increase even after 2050.

Intermittent renewable will only play a major role if new systems designs are implemented. Fluctuations are smoothed or the demand is shifted to the times of production.

This new flexibility would also apply to the base load nuclear plants. First calculations show. Subtracting a base-load supply in a “Supergrid” simplifies the remaining supply task.

The same holds for storage options.