

Energy Transition 2.0

A sustainability transitions perspective

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Energy transition week, NTNU, Trondheim

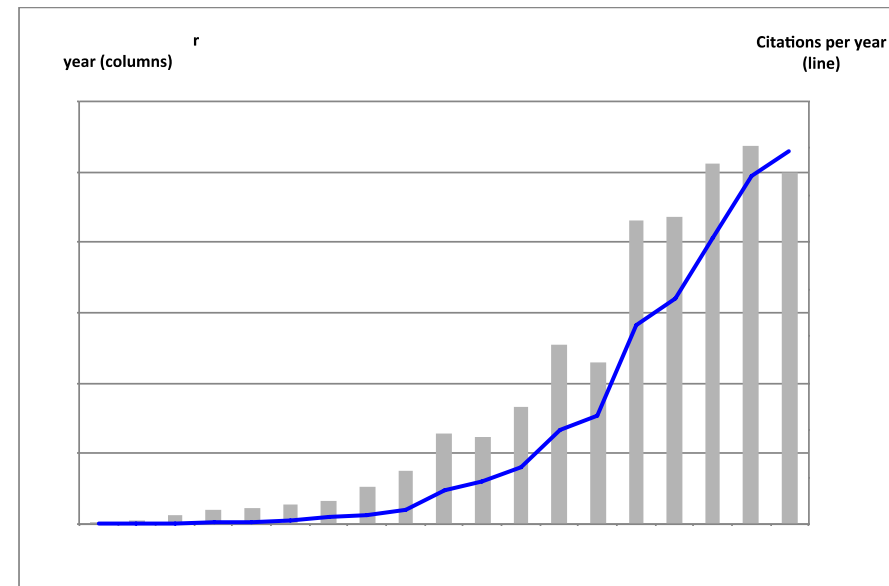
March 1, 2018



1 Sustainability Transitions

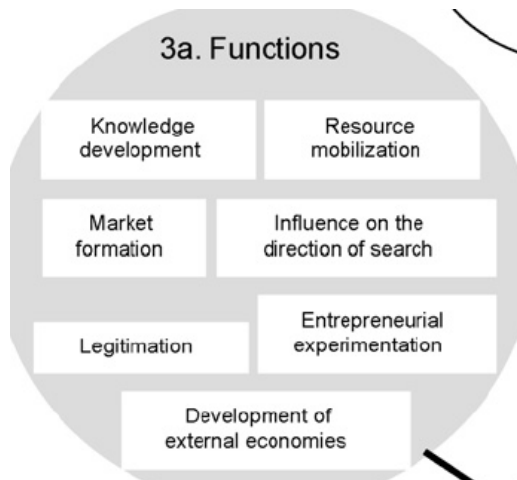
- Rapidly expanding field of research in **innovation studies**
- Focus: **Fundamental transformation of existing sectors** (→ **radical innovation!**)
- Connects to **multiple disciplines**
→ engineering & natural sciences, political sciences, management, STS, evolutionary economics
- Network of >1'600 researchers
(transitionsnetwork.org)
- Dedicated journal,
yearly conference,
PhD schools ...

STRN

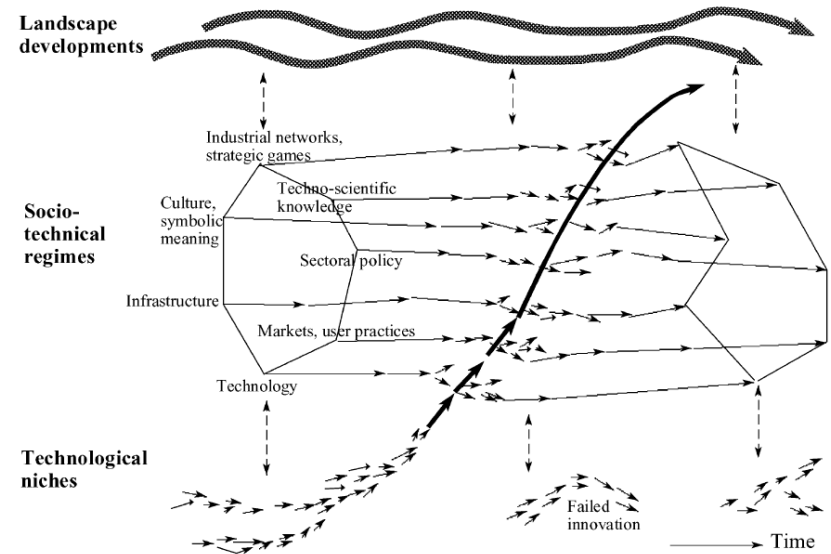


1.1 Different Frameworks

- Multi-level perspective
- Technological innovation systems
- Strategic niche management
- Transition management



Bergek et al. 2008



Geels 2002

- Systems perspective
- Non-linearities, path-dependency
- Institutions, public policies
- Organizations, strategies, politics

1.2 Sustainable



A research agenda for the Sustainability Transitions Research Network

December 2017

Working group:

Jonathan Köhler, Frank Geels, Florian Kern, Elsie Onsongo, Anna Wieczorek

With contributions from:

Floortje Alkemaade, Flor Avelino, Anna Bergek, Frank Boons, Harriet Bulkeley, Lea Fuenfschilling, David Hess, Georg Holtz, Sampsa Hyysalo, Kirsten Jenkins, Paula Kivimaa, Jochen Markard, Mari Martiskainen, Andrew McMeekin, Marie Susan Mühlemeier, Bjorn Nykvist, Bonno Pel, Rob Raven, Harald Rohracher, Björn Sandén, Johan Schot, Benjamin Sovacool, Bruno Turnheim, Jeroen van den Bergh, Dan Welch, Peter Wells.

→ transitionsnetwork.org

- How to explain
- How to explain
- What role for pc
- Role of (incumb
- Role of social r
- Geography of tr
scales & places
- Transitions in e

2 Energy Transition 2.0

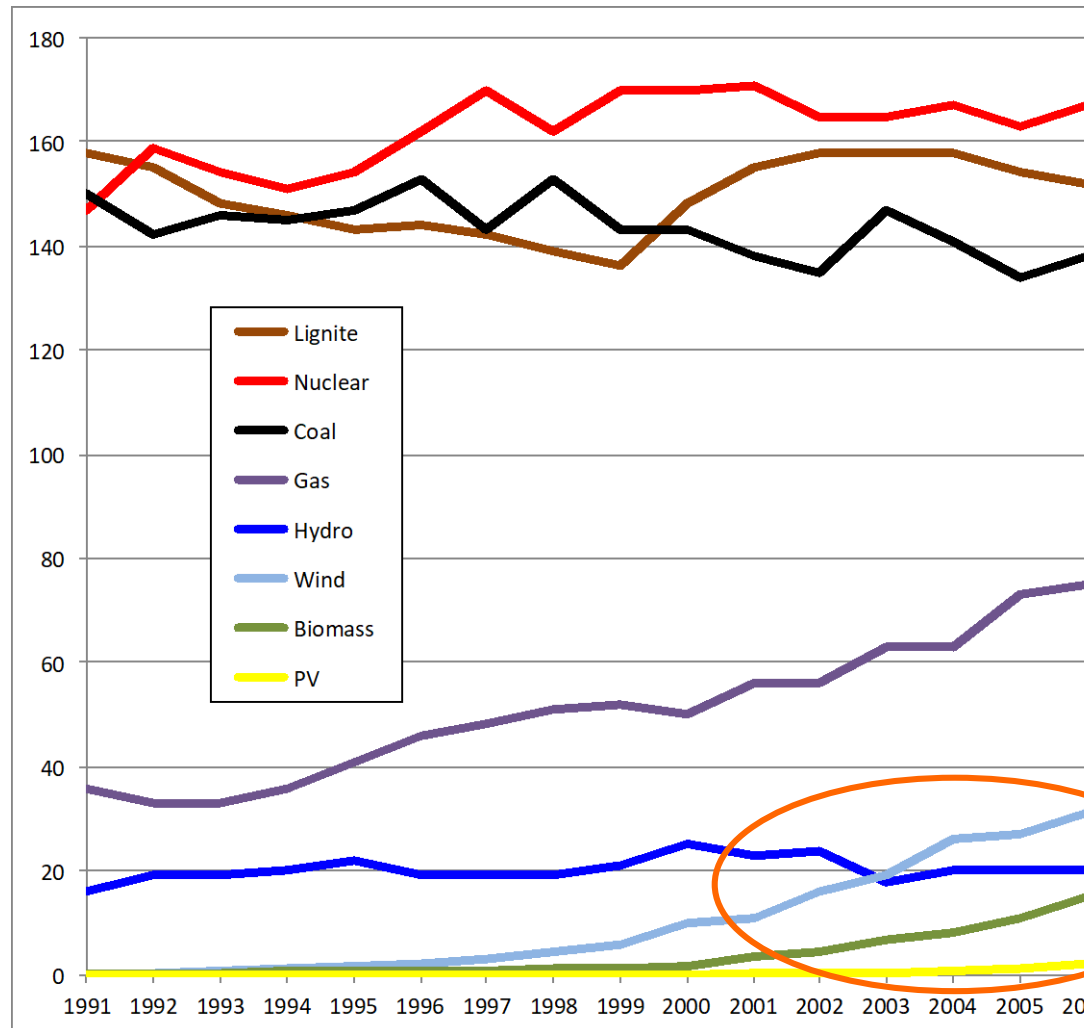
1. In some places, we currently see a **new phase** of the energy transition with **new phenomena**
2. The new phase comes with a **new type of challenges**
3. These new challenges have **implications** for the **conceptual frameworks** we use, and for **policy making**

2.2 Different countries

	Denmark	Germany	UK	Spain
Variable renewables (no hydro)	58%	27%	26%	23%
Fossil / nuclear	42%	70%	71%	57%
Decline 10yrs	-66%	-19%	-33%	-33%

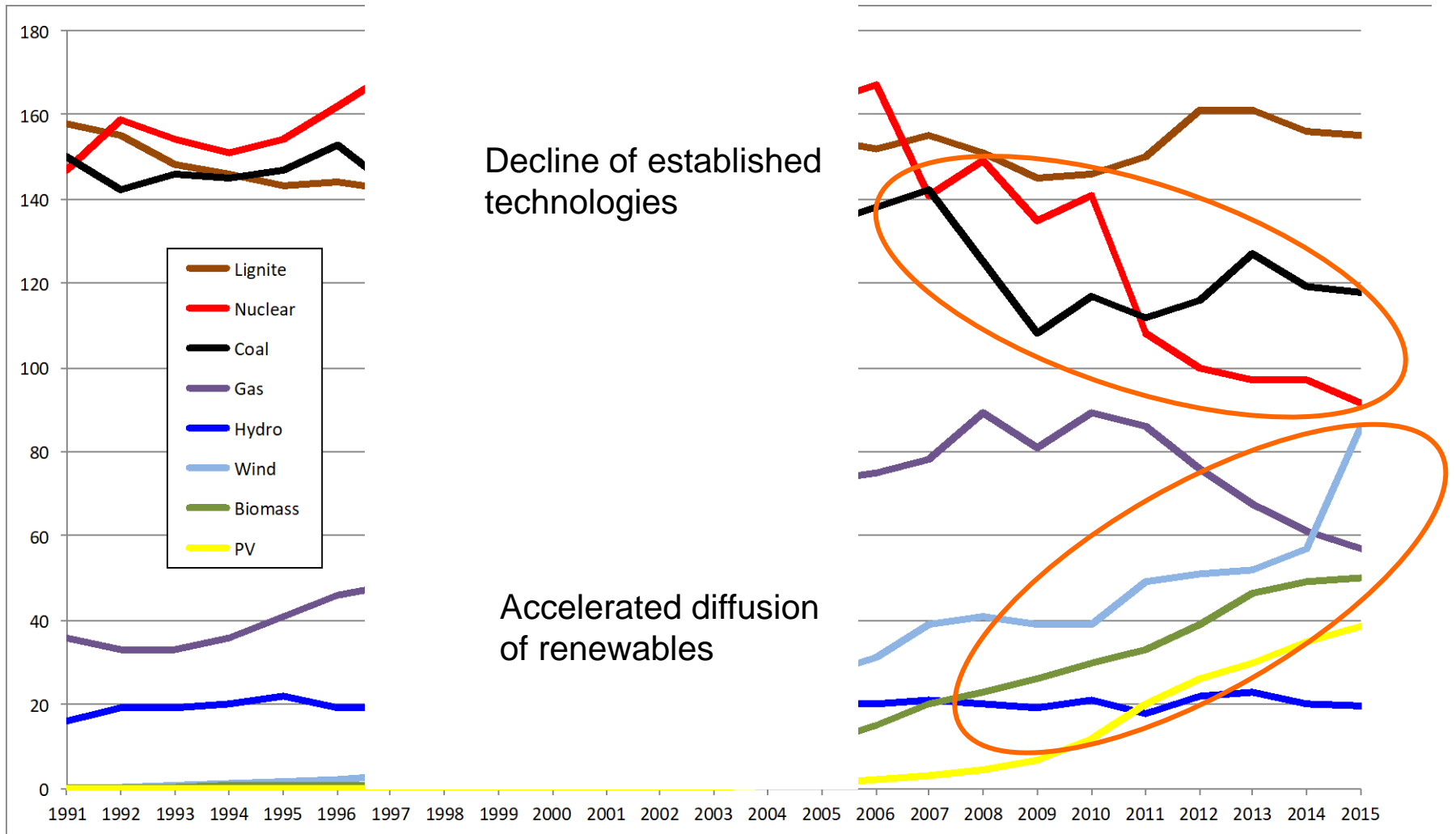
2.3 Germany: Earlier developments

Power generation in TWh (2015: 647 TWh total)



1st phase – emergence of renewable alternatives

2.3 Germany: Recent developments

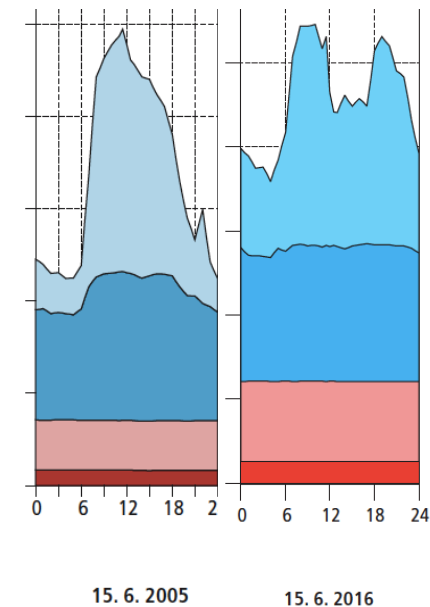


3 Four challenges

- Multi-tech interaction
- Decline
- Escalating struggles
- Sector level functioning

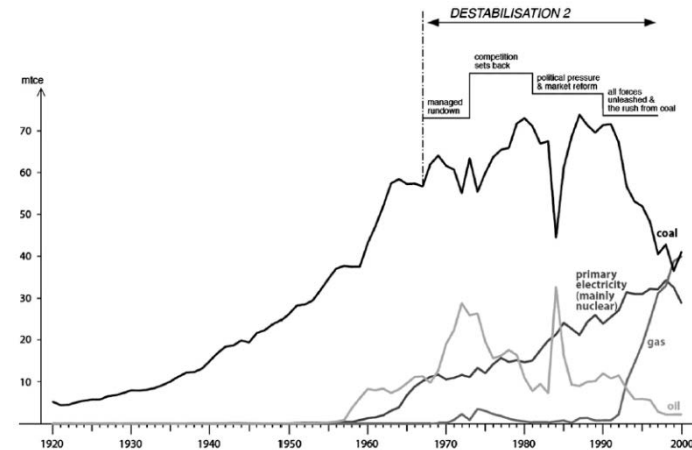
3.1 Multi-tech interaction

- Past:
focus on selected technology (and its main competitors)
e.g. solar, wind, biogas, batteries
- New:
 - interplay of diff. technologies,
complementarities, **bottlenecks**;
 - value chains / networks,
context, sector boundaries

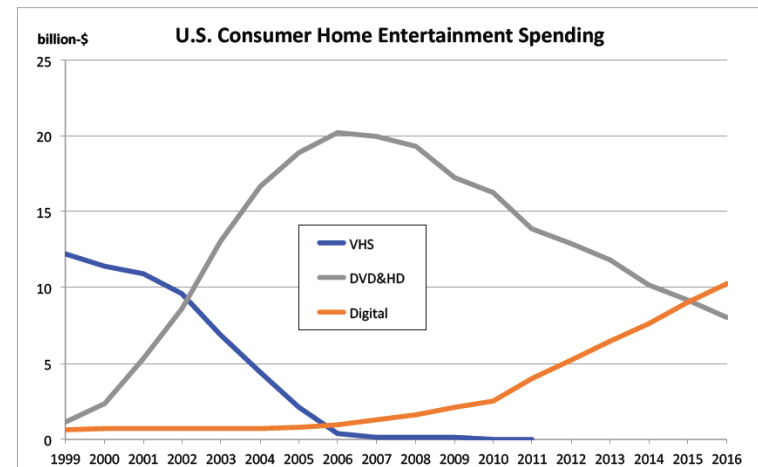


3.2 Decline

- Past: could be ignored
- New: Important part of the dynamics
 - How long does it take?
 - Local vs. global issues
 - How can it be accelerated?
 - How to compensate losers?



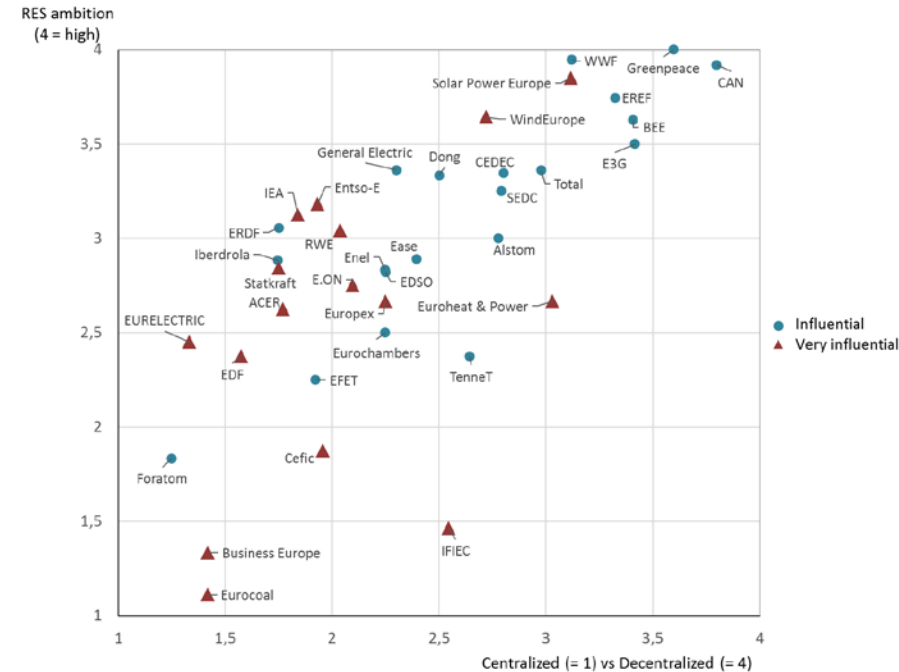
Turnheim & Geels 2012



Source: The Digital Entertainment Group, diverse reports. Figures include movie rentals.

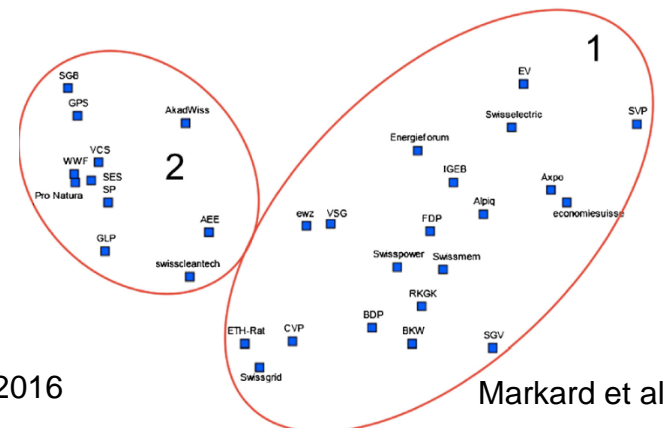
3.3 Struggles

- Past:
Ignored or simplified
(e.g. newcomers vs. incumbents)
- New:
Systematic analysis of
strategies, positions, coalitions



Lindbergh et al. under review

Pro Spending (\$ Thousands)	Con spending (\$ Thousands)
Total raised, followed by largest donors	Total raised, followed by largest donors
\$1446 total: Mostly env. orgs	\$1284 total: Excel, rural cooperatives (utilities)
\$61,886 total:	\$94,404 total:
\$49,581 S. Bing (film)	\$38,000 Chevron
\$2043 V. Khosla (finance)	\$32,824 Area Energy
	\$9550 Occidental Oil & Gas
	\$3025 ConocoPhillips

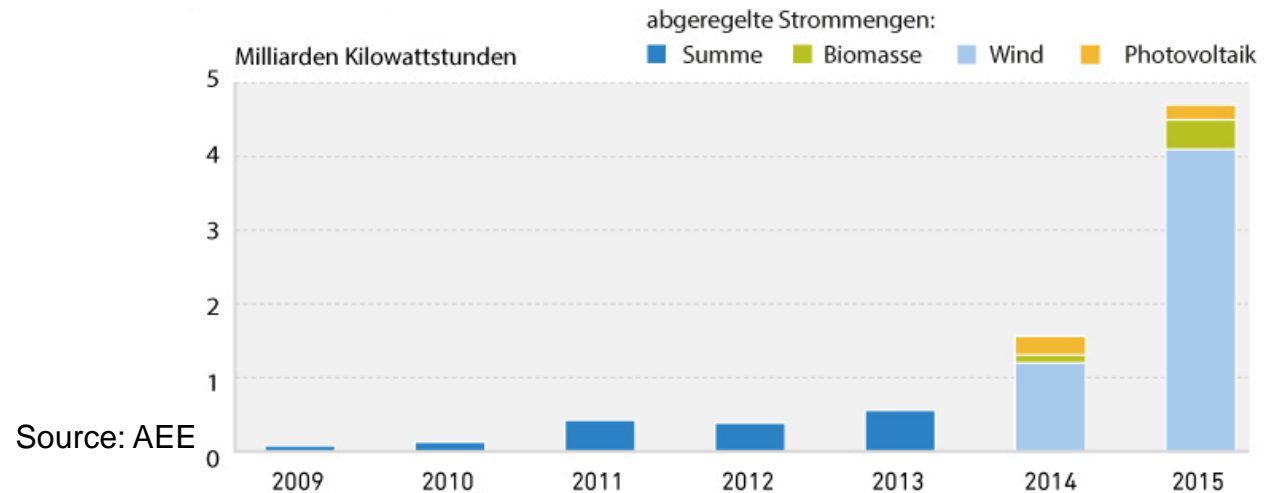


Hess 2016

Markard et al. 2016

3.4 Sector level functioning

- Past:
hardly affected
- New:
“system integration”
“sector level complementarities”
system functioning



4 Implications for research

- Integrate multi-tech interaction
- More studies on decline, regional vs. global level
- Politics of transitions
- Normative guidance?

5 Implications for policy

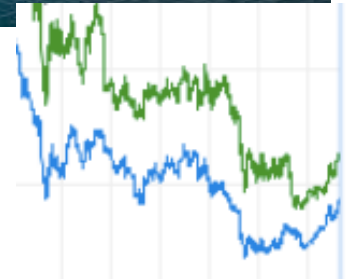
- Adaptation of support for mature technologies
- Increasing support of complementary technologies & infrastructures
- Mix of policies
- Long-term targets vs. short-term gains

6 Summary

Energy transition as we know it ...



New developments, new challenges ...



EON
RWE

