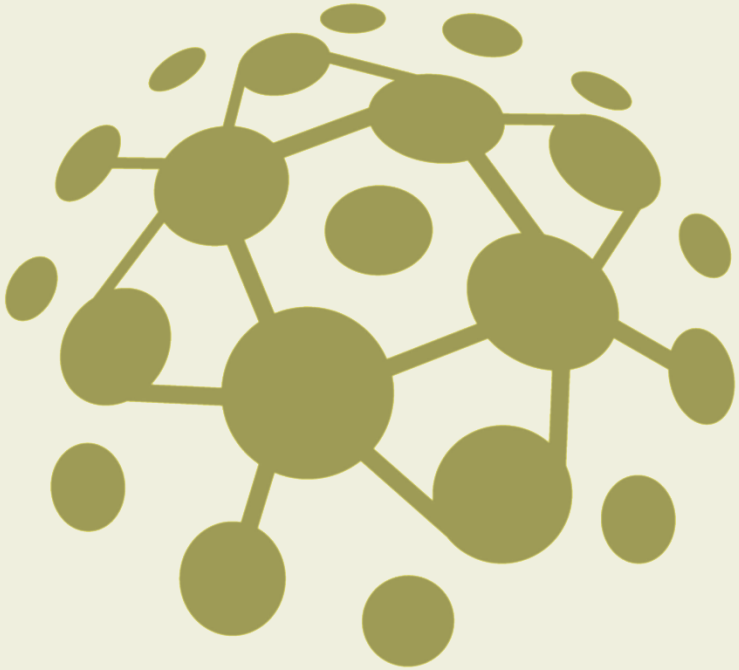
ENERGIEINSTITUT
an der Johannes Kepler Universität Linz

JOHANNES KEPLER UNIVERSITÄT LINZ



Forum Alpbach2018

» Breakout session Industrial energy revolution: resilience through innovation?«

R&D ROADMAPS

Horst Steinmüller & Simon Moser *24. August 2018*

Present situation

The transition perspective in the energy sector implies the urgent need for new energy efficient and low carbon technologies in industry.

As investments during the phase of operation are limited to incremental efficiency improvements, which are subject to short payback periods, it is difficult to achieve major steps in boosting energy efficiency.

However, significant effort is needed in order to comply with the EU's 2050 targets and the Paris agreement.

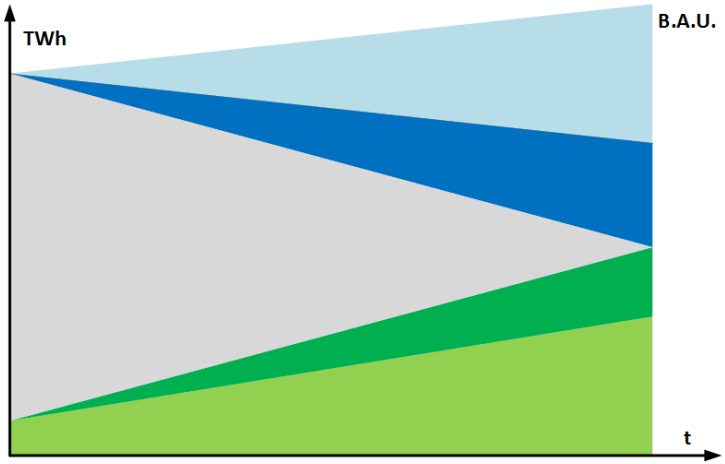
Motivation

Multi-dimensional political objectives

- Production location Europe: Carbon Leakage solves neither employment nor climate issues.
- Achieving the energy and climate goals requires innovation.

→ What are the - from the perspective of industry - pending / expected research needs for

- the increase in energy efficiency industry?
- the matching of the energy demand of industrial plants and the energy supply from fluctuating renewables?



First steps for concrete answers

3 R&D roadmaps on behalf of the Austrian climate and energy funds

- **R&D roadmaps**
  „energy efficiency in energy-intensive industries“ 2014 (iron & steel, non-ferrous metals, pulp and paper, chemistry and petrochemistry, cement & glass)
  „energy efficiency in the textile and food & beverages industries“ 2016

- **R&D roadmap & project „Renewables 4 Industry“ 2017**

Method

IEA Guideline for Energy Technology Roadmaps

- Discussion papers constitute a scientific basis for the participation process:
  - Where is an industry developing in terms of energy / technology?
  - What are technologies applicable in the short-term? What are long-term technologies with high impact and high expectations (i.e. “breakthrough technologies”)?
  - Cooperation of the Energy Institute with AIT Energy Department, Vienna University of Technology IET, MU Leoben EVT, AEE INTEC.

- Workshops (industry participation):
  - Visioning: Description of a desirable status for the year 2050 as a basis for backcasting.
  - Roadmapping: What are the topics and technology fields to be explored? What are the policy instruments needed to support the achievement of the desirable status.
  - Cooperation of the Energy Institute with AIT Innovation Systems Department

- Consultation process:
  - A consultation process allows every stakeholder to place his arguments.
  - This leads to a high acceptance and robustness of the roadmap.

Results from the “vision” process

… with a focus on the efficiency roadmaps

- Note: **This vision was developed by the participating industrial companies and industrial interest groups**.
- A politicization of the "vision“, i.e. extracting statements and using them in legally defined targets, would be misleading and should be avoided. The vision and the roadmap do not review current technical feasibility or develop energy scenarios.
- The roadmap defines research tasks necessary to achieve a desirable status. However, without success in these research tasks, desirable status cannot be achieved.
- „(Only) if the conditions are right …“,
  „… there will be a high-efficient use of energy taking a holistic perspective“,
  „Given an attractiveness of the location for research and technological innovation …“,
  „… Austria (Europe) is a long-term secured industrial location“.

Results concerning the R&D topics

… with a focus on the efficiency roadmaps

Note the restrictions of the roadmap:

- Individual industrial branches embrace heterogeneous industries.
- In some cases, only individual companies produce certain products.

The research fields were determined industry-specific and can not be compared or generalized. However, the following overview is possible:

- All sectors foresee a technological change in energy supply (energy carrier) and use: new sources of energy and their storage are essential issues.
- Materials and processes are to be completely rethought (radical innovation). Wherever efficiency potentials are realizable through incremental improvements or near-market technologies, enforcement is needed.
- The coordination of industrial material and energy flows with regional supply and disposal can contribute to CO2 savings, increased use of (local) renewable energy sources and higher primary energy efficiency.

Supplementary results

The R&D roadmaps on efficiency also resulted in …

R&D roadmap "Renewables4Industry"

- Similar optimism concerning the R&D roadmap results on the use of renewables in industrial processes.
- There are not enough electricity potentials in Austria to electrify the whole industry and supply the rest of the economy (result from EI-JKU and MU Leoben).
- Austria does not have enough electricity storage potentials to supply its own demand.
- The Austrian energy system needs synthetic gases for storage and back-up capacities.
- Ability of buildings to use low-temperature excess heat is *more important* than efficiency (primary energy efficiency) (this does not imply that building end-use efficiency should not be increased!).

Energy model region "New energy for industry"

- Primary energy savings due to sector coupling.

Energy model region "WIVA P&G"

- Hydrogen and renewable methane as key energy carriers in the future

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Die F&E-Fahrpläne wurden aus Mitteln des Klima- und Energiefonds gefördert/finanziert.