

What timing and depth of emission reductions imply for innovation support policy in the materials sector

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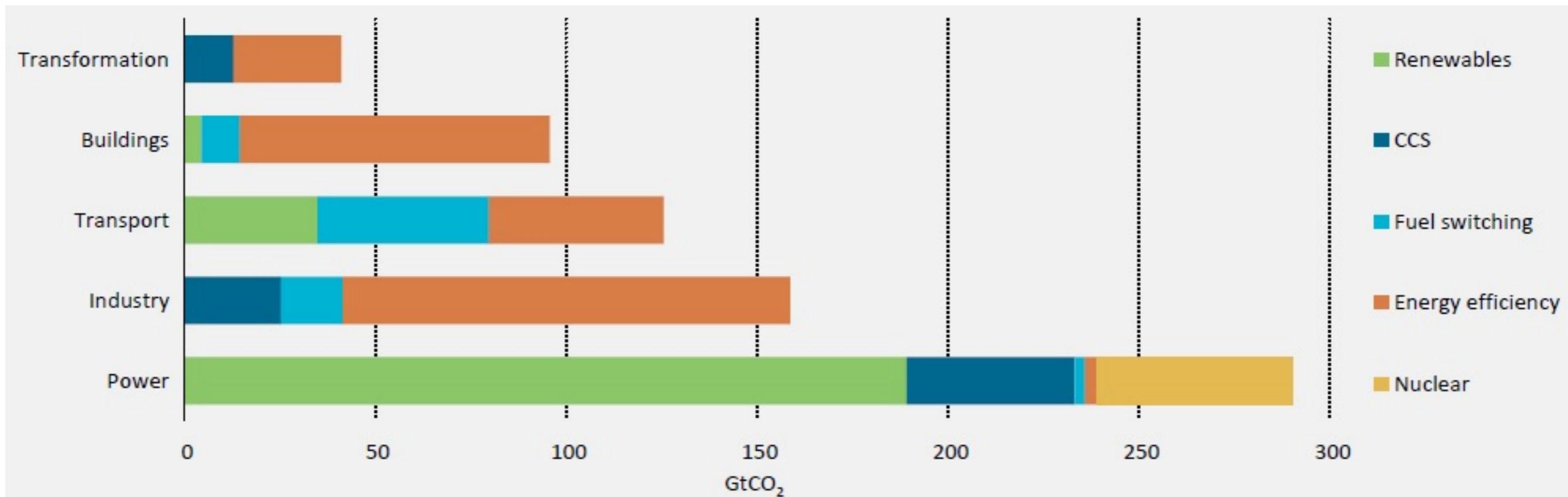


Outline

- Technologies: lower-carbon or low-carbon?
- State of the low-carbon technological innovation systems for materials industry
- Work plan & questions to you

Overall question: how should the public sector organise innovation support for deep emission reductions in the materials sector?

What they say



Global cumulative mitigation in 2DS 2013-2050: energy efficiency, fuel switching (biomass, electricity), CCS (in cement)

Timing over the course of the decades?

Could lock-in appear in the materials industry?

Discrepancies between incremental and radical change

- Relevant for materials industry production but **also downstream** and material efficiency (depending on market conditions!)
- Processes may change radically, making incremental investments obsolete – **sunk costs**
- Also **inter-industry dependence** in the context of industry clusters (e.g. heat recovery and use vs. CCS)

Which (incremental) technologies will we in 2045 see as “**historical accidents**”?



Technological innovation system

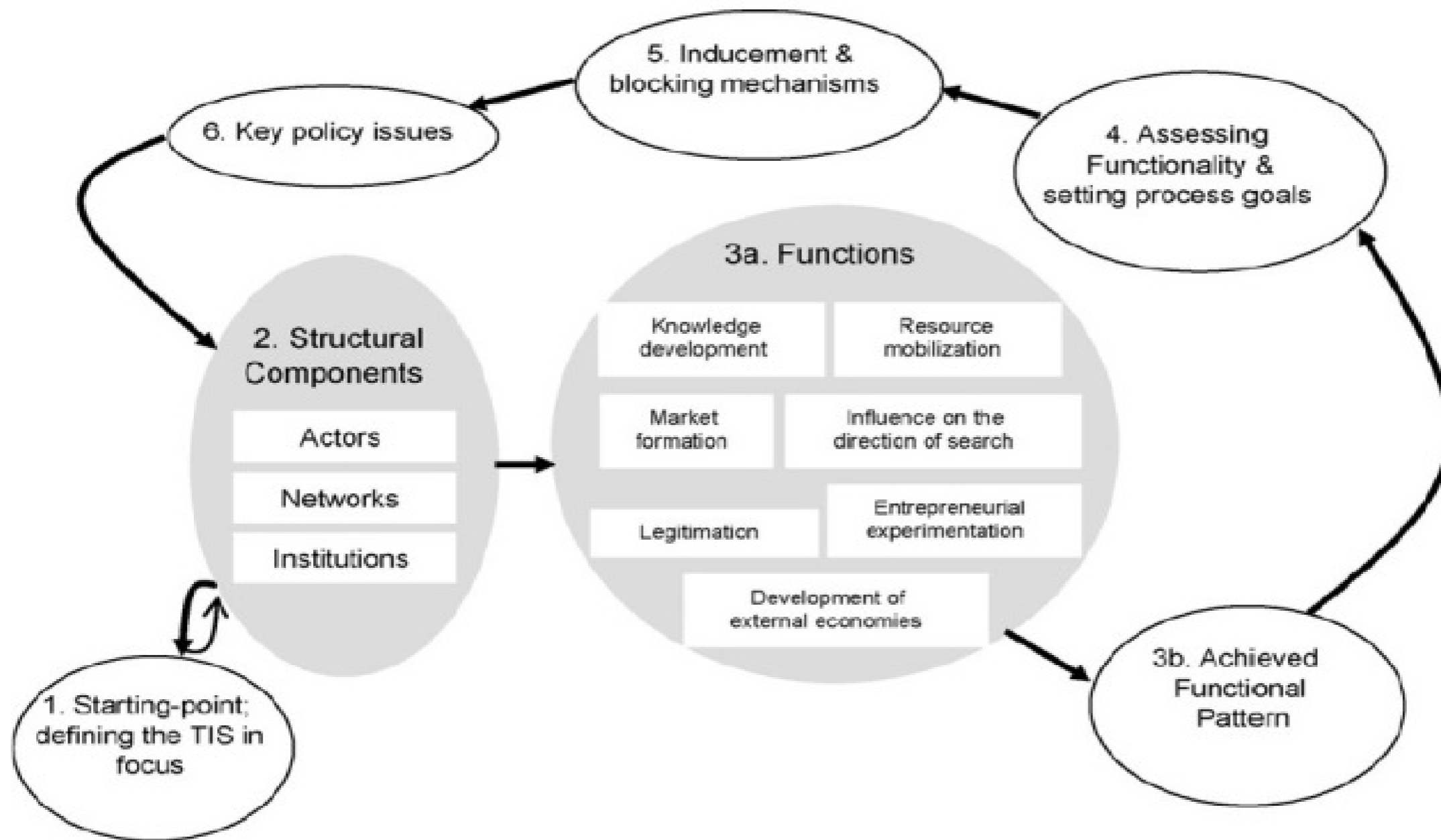


Fig. 1. The scheme of analysis (adapted from Oltander and Perez Vico, 2005).

Weak functions in the TIS around deep emission reductions in industry (NB: Blatant generalisations!)

Knowledge development: independent information on technology and costs?

Resource mobilisation: for bridging the valley of death? Capital availability?

Market formation: what creates the demand for low-carbon materials, or for the technologies enabling them?

Entrepreneurial experimentation: what does that mean in a highly competitive, international trade-sensitive, deeply incumbent-dominated sector?

Legitimation: limited public involvement and legitimation (CCS: public resistance)

Influence on the direction of search: Who determines what investment is made?

External economies: Few other sectors benefit

Work plan

February – April, and September 2017 onwards

Zahra Janipour (PhD candidate RU): focus on steel, cement and chemical industry

March – July 2017:

Floris Swennenhuis (student chemistry, management and innovation at DIW/RU): focus on chemical industry:

1. Current technologies in highest-emitting chemical industry sectors (probably ethylene and ammonia production – to be discussed)
2. Most promising technologies for deep emission reduction
3. Technological Innovation System analysis in Germany and potentially the Netherlands; potentially comparative
4. Characterise the potential discrepancy between lower-carbon (near-term, shallow, incremental) innovations and low-carbon (longer-term, deep, radical) innovations

Preliminary conclusions and questions to you

Comparatively weak functions in the TIS of low-carbon technologies in industry

Potential lock-in and path dependency and discrepancies between incremental and radical change?

How should public innovation support respond?

- For sure, not (just) with increasingly strong pricing signals and some demonstration subsidies to correct market failures!

Questions to you!

Where do you think the main discrepancies between shallow and deep emission reductions in the materials industry occur (if any)?

What are your views on the use of the TIS-methodology for industry?

Do these questions make sense?

