



**Wuppertal  
Institut**

*Industrial Efficiency 2020 | Panel 6, Session III*

# **Dynamics of Cross-Industry Low-Carbon Innovation in Energy-Intensive Industries**

---

Annika Tönjes (*speaker*) | Katharina Knoop | Tobias Lechtenböhmer | Helena Mölter | Katja Witte

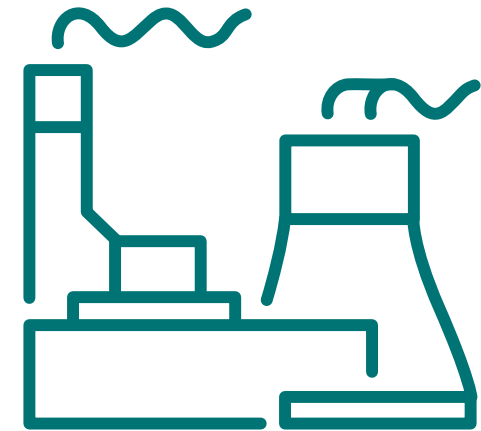
## Research objective



**Wuppertal  
Institut**

### *Background:*

- **Energy-intensive industries** all face the same challenges:
  - Reduce emissions from production processes
  - Move away from fossil feedstocks
- **Radical innovation** required in 'hard to abate' sectors
- **Collaboration** across industry lines to find shared solutions (e.g. through industrial symbiosis)



### *Research question:*

What are key factors influencing the successful implementation of cross-industry collaboration projects for low-carbon innovation in EIs?

## Conceptual focus



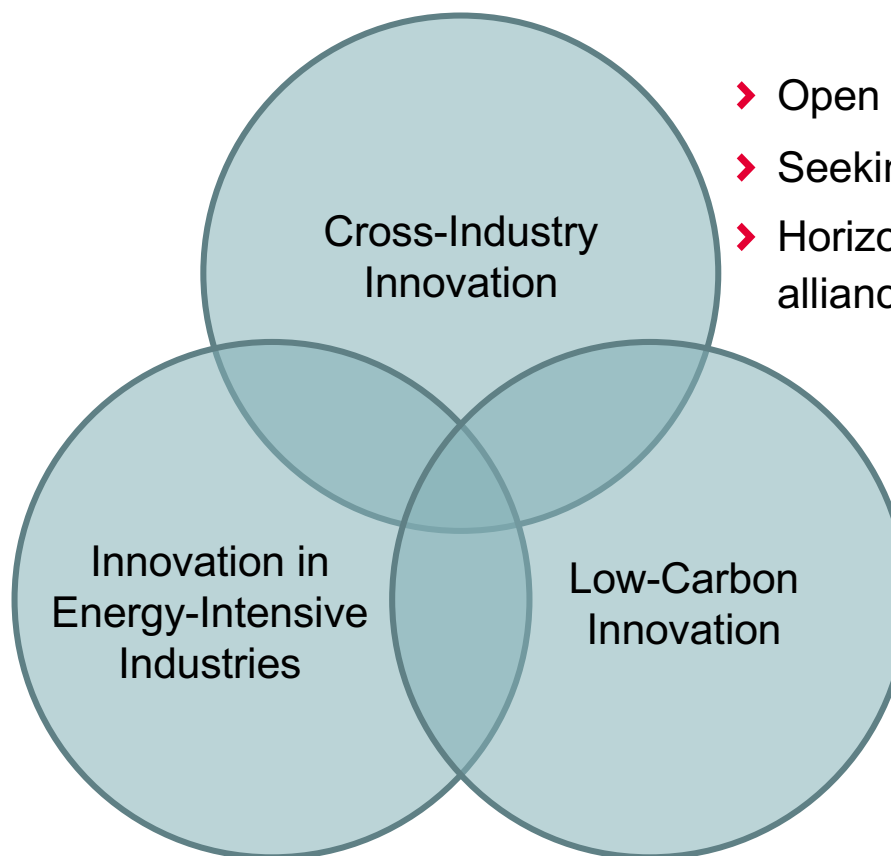
SCI4  
CLIMATE  
.NRW

reINVENT  
towards a zero-carbon society



Wuppertal  
Institut

- › Deep decarbonisation requires radical innovations (‘hard to abate’)
- › Challenges to radical innovation: high capital-intensity, long investment cycles & equipment lifetimes, price-driven commodities market ...



- › Open innovation approach
- › Seeking knowledge across industry lines
- › Horizontal collaboration/ innovation alliances
- › Sustainable innovations focussed on decarbonisation of products and processes
- › Goal: GHG reduction (+ fossil fuel phase-out)

- **Research approach:** inductive / explorative
- **Research design:** multi-step qualitative case-study analysis of 4 cross-industry innovation processes

Enerkem Waste-to-chemicals Plant (NL)	DuraSense Biocomposite (SE)	Carbon2Chem (DE)	IN4Climate.NRW (DE)
Production of syngas for the chemical industry from municipal waste	Biocomposite material embedding wood fibres in plastic	CCU technology for chemical production from steelmaking off-gases	Platform for collaboration between different industrial sectors, science & politics

- **Limitations:** small selection of cases, not all EIs covered, innovations still in early stages

## Five key factors



Wuppertal  
Institut

1

### Mitigation of financial risk

- Radical low-carbon innovation in EIIIs is often lacking a **business case** (high investment and operating costs, no established market for green materials)
- Cross-industry collaboration can help by way of sharing **financial risk** among collaborating companies, involving downstream companies as 'customers' & attracting public funding as large consortia



## Five key factors



**Wuppertal  
Institut**

1 Mitigation of financial risk

2 **Political framework  
conditions**

- › Companies from different industries have started to actively seek out opportunities to collaborate to shape the low-carbon transition themselves (**proactive approach**)
- › **Clear political signals** (e.g. Paris Agreement) & framework conditions (e.g. EU ETS) play a key role for this shift in mind-set



## Five key factors



Wuppertal  
Institut

1 Mitigation of financial risk

2 Political framework conditions

3 **Institutionalised cross-industry exchange**

- Strategic assessment of opportunities across industry lines is still not a part of many companies' innovation strategies, emphasising the role of **opportunities for cross-industry exchange** provided by third parties (e.g. government, scientific actors, intermediaries)
- Institutionalising such exchange by providing a **platform**, neutral spaces and formats for targeted discussion and exchange of knowledge can therefore be a strong driving factor



## Five key factors



**Wuppertal  
Institut**

1 Mitigation of financial risk

2 Political framework conditions

3 Institutionalised cross-industry exchange

4 **Professional management and coordination**

- **Large innovation consortia** comprising a wide range of partners with different perspectives, knowledge bases and interests are slow-moving and involve a lot of bureaucratic “red tape”
- Having **professionally managed processes** instead of a ‘trial-and-error’ approach can help organise on-going work, reduce information asymmetries and maintain mutual trust





## Five key factors



Wuppertal  
Institut

1 Mitigation of financial risk

2 Political framework conditions

3 Institutionalised cross-industry exchange

4 Professional management and coordination

5 **Regional integration**

- **Regional proximity** of partners can be a key driver, especially with regard to infrastructure build-up or industrial symbiosis
- Beyond that, clustering of knowledge and experience can be key, and regional integration can be a **multiplier** for more cross-industry innovation



## Overall findings and future research



**Wuppertal  
Institut**

### *Overall findings:*

- **Cross-industry collaboration** can be beneficial for
  - helping companies from different industries identify **common goals and needs**
  - the formation of **new pathways** that may otherwise have been left unexplored
- The identified five key factors can promote the **initiation and successful implementation** of cross-industry collaboration projects in EIs

### *Future research could further explore:*

- the role of these (and any additional) key factors in **other cases** of cross-industry innovation
- influencing factors in **later stages** of cross-industry innovation processes (e.g. scale-up)
- the **benefits and drawbacks** (e.g. potential lock-in effects) of cross-industry low-carbon innovation in EIs
- the conceptualisation of a **holistic theoretical approach** for cross-industry low-carbon innovation in EIs



Annika Tönjes | [annika.toenjes@wupperinst.org](mailto:annika.toenjes@wupperinst.org)

# Thank you for you attention

---

For further information please see:

[www.wupperinst.org](http://www.wupperinst.org) | [www.in4climate.nrw](http://www.in4climate.nrw) | [www.reinvent-project.eu](http://www.reinvent-project.eu)

*This presentation was created in the context of the SCI4climate.NRW project, which is funded by the Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia, Germany.*

*This presentation was created in the context of the REINVENT project, which has received funding from the European Union's Horizon 2020 Research and Innovation Programme.*