

Industrial Efficiency 2020 | Panel 6, Session II

Meta-analysis of industry sector transformation strategies in German, European and global deep decarbonisation scenarios

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Approach and aims of the work



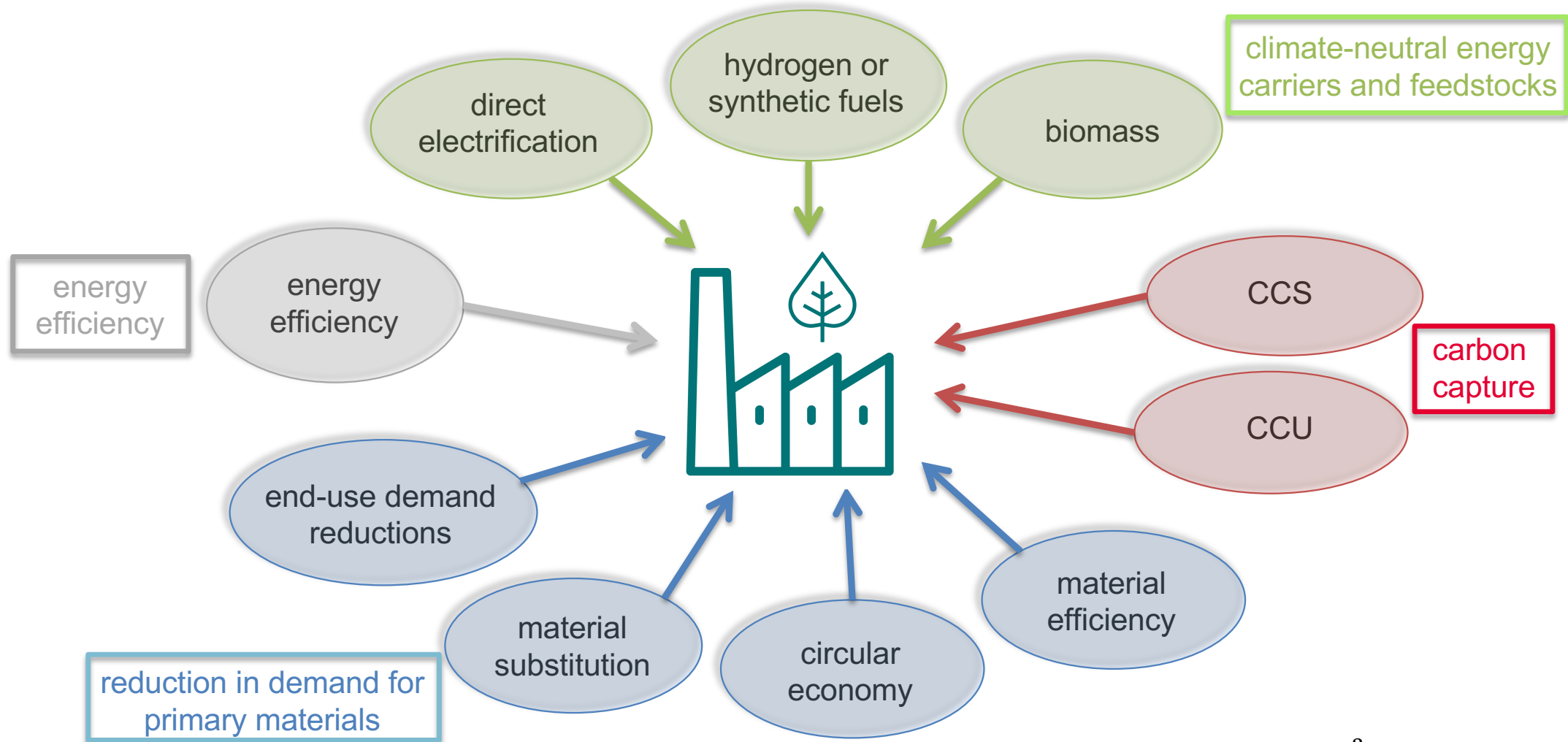
Approach

- Identification and categorisation of key strategies to achieve deep emission reductions in the industry sector
- Meta-analysis of the respective roles of these key strategies in selected German, European and global deep decarbonisation scenarios

Aims of the work

- To identify similarities and differences in the available visions on how to achieve deep emission reductions in the industry sector
- To support the discussion on how deep emission reductions in the industry sector can be achieved and which strategies will need to be pursued to what extent

Ten key strategies that can contribute significantly to achieving climate neutrality in industry



Overview of the ten scenarios selected for the meta-analysis



Institution and year of release	Name of the study	Scenario included in the meta-analysis	Change in GHG (or CO ₂) emissions by 2050 vs. 1990	
			All sectors	Industry
GERMANY				
UBA 2019	Resource-Efficient Pathways towards Greenhouse-Gas-Neutrality	GreenEe1	-96 %	-95 %
		GreenSupreme	-97 %	-97 %
dena 2018	dena Study Integrated Energy Transition	TM95	-95 %	-91 %
		EL95	-95 %	-91 %
BDI 2018	Climate Paths for Germany	95 % path	-95 %	-95 %
EUROPE				
EC 2018	A Clean Planet for all – A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy	1.5TECH	-100 %	-92 %
		1.5LIFE	-100 %	-93 %
ECF 2018	Net-Zero by 2050: From Whether to How	Shared-efforts	-99 %	-92 %
WORLD				
IEA 2017	Energy Technology Perspectives 2017	B2DS	-78 %	-38 %
ETC 2018	Mission possible – Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century	Supply Side	-91 %	-74 %

Role of climate-neutral energy carriers in final energy demand of the analysed scenarios



Scenario	Share of electricity		Share of hydrogen and synthetic fuels		Share of biomass	
	Base year	2050	Base year	2050	Base year	2050
GERMANY						
GreenEe1	31 %	39 %	0 %	58 %	4 %	4 %
GreenSupreme	31 %	39 %	0 %	58 %	4 %	3 %
TM95	35 %	36 %	0 %	49 %	3 %	4 %
EL95	35 %	69 %	0 %	20 %	3 %	3 %
95 % path	32 %	34 %	0 %	0 %	4 %	34 %
EUROPE						
1.5TECH	31 %	55 %	0 %	19 %	9 %	16 %
1.5LIFE	31 %	51 %	0 %	20 %	9 %	18 %
Shared-efforts	31 %	54 %	0 %	11 %	12 %	22 %
WORLD						
B2DS	23 %	29 %	0 %	n.s. (but small)	6 %	11 %
Supply Side	23 %	57 %	0 %	23 %	6 %	6 %

Role of CCS and CCU in the analysed scenarios



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Scenario	CO ₂ captured and <u>stored</u> in 2050 relative to base year emissions of industry	CO ₂ captured and <u>used</u> in 2050 relative to base year emissions of industry
GERMANY		
GreenEe1	0 %	0 %
GreenSupreme	0 %	0 %
TM95	9 %	3 %
EL95	9 %	3 %
95 % path	49 %	0 %
EUROPE		
1.5TECH	35 %	11 %
1.5LIFE	9 %	9 %
Shared-efforts	8 %	0 %
WORLD		
B2DS	41 %	0 %
Supply Side	52 %	12 %

Strategies to reduce demand for primary materials – focus on two selected German scenarios



Scenario	Applied strategies to reduce demand for primary materials
GERMANY	
GreenSupreme	<ul style="list-style-type: none"> • <i>Material efficiency</i>: Stronger increase in material efficiency than in the past (to 1.2 %/a), among other things by reducing losses in manufacturing. Consumers buy high-quality and durable or repairable goods. • <i>Circular economy</i>: Strong increase in recycling rates (e.g. by 2050, 67 % of steel production is sourced from recycled material compared to 40 % today). • <i>Material substitution</i>: Much stronger use of timber in buildings construction and use of textile concrete, substituting 20 % of reinforced concrete in 2050. • <i>End-use demand reductions</i>: More sustainable lifestyles, especially in regard to mobility (e.g. strong use of car sharing and ride sharing (by 2050 car density in cities is only 1/3 of today's level), smaller cars, fewer flights).
TM95	<ul style="list-style-type: none"> • <i>Circular economy</i>: Increase in the recycling rate for steel relative to the reference scenario (48 % instead of 40 % of 2050 steel production is from recycled material).

Overview of the role of nine key industry sector mitigations strategies in the analysed scenarios



Scenario	Use of climate-neutral energy carriers			Carbon capture		Reduction in demand for primary materials			
	Direct electrification	Hydrogen or Synfuels	Biomass	CCS	CCU	Material efficiency	Circular economy	Material substitution	End-use demand reductions
GERMANY									
GreenEe1	++	+++	0	0	0	++	+++	++	++
GreenSupreme	++	+++	0	0	0	+++	+++	+++	+++
TM95	0	+++	0	+	+	0	+	0	0
EL95	+++	++	0	+	+	0	+	0	0
95 % path	0	0	+++	+++	0	0	+	0	0
EUROPE									
1.5TECH	++	++	++	+++	+++	0	0	0	0
1.5LIFE	++	++	++	+	++	+	+	+	++
Shared-efforts	++	+	++	+	0	++	++	++	++
WORLD									
B2DS	+	0	++	+++	0	+	+	0	0
Supply Side	+++	++	0	+++	++	0	0	0	0

0 = strategy is not pursued or pursued very lightly, +/++/+++ = strategy is pursued to a moderate/strong/very strong extent

Findings and further research needs



Some general findings:

- The analysed scenarios pursue many different combinations of mitigation strategies
 - Different pathways towards deep decarbonisation of the industry sector could be feasible
 - No widespread consensus so far on the most likely or preferred combination of strategies
 - There may be room for societies to choose not to pursue certain strategies
 - If all strategies were pursued, this could constitute a more robust approach to achieving ambitious climate targets
- Not surprisingly, the main priorities of each study's client appear to be reflected in the scenarios' choice of strategies

Further research needs:

- Similar analysis focussing on key subsectors (e.g. steel, chemicals or cement)
- Analysing in detail the specific challenges and opportunities of each strategy

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Thank you for your attention

For further information about our work, please visit:

www.wupperinst.org/en

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(<https://www.in4climate.nrw/en/stakeholders/scientific-community/>)*