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Bioökonomie – Impuls und Chance für Wald- und Holzwirtschaft ?

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Chance Bioökonomie?

Definition des Konzepts einer Bioökonomie laut OECD (2006):

"… transforming life science knowledge into new, sustainable, eco-efficient and competitive products".

Kritischer Faktor um diese Vision zu realisieren:

INNOVATION

Abbildung: The European Bioeconomy in 2030: Delivering Sustainable Growth by Addressing the Grand Societal Challenges

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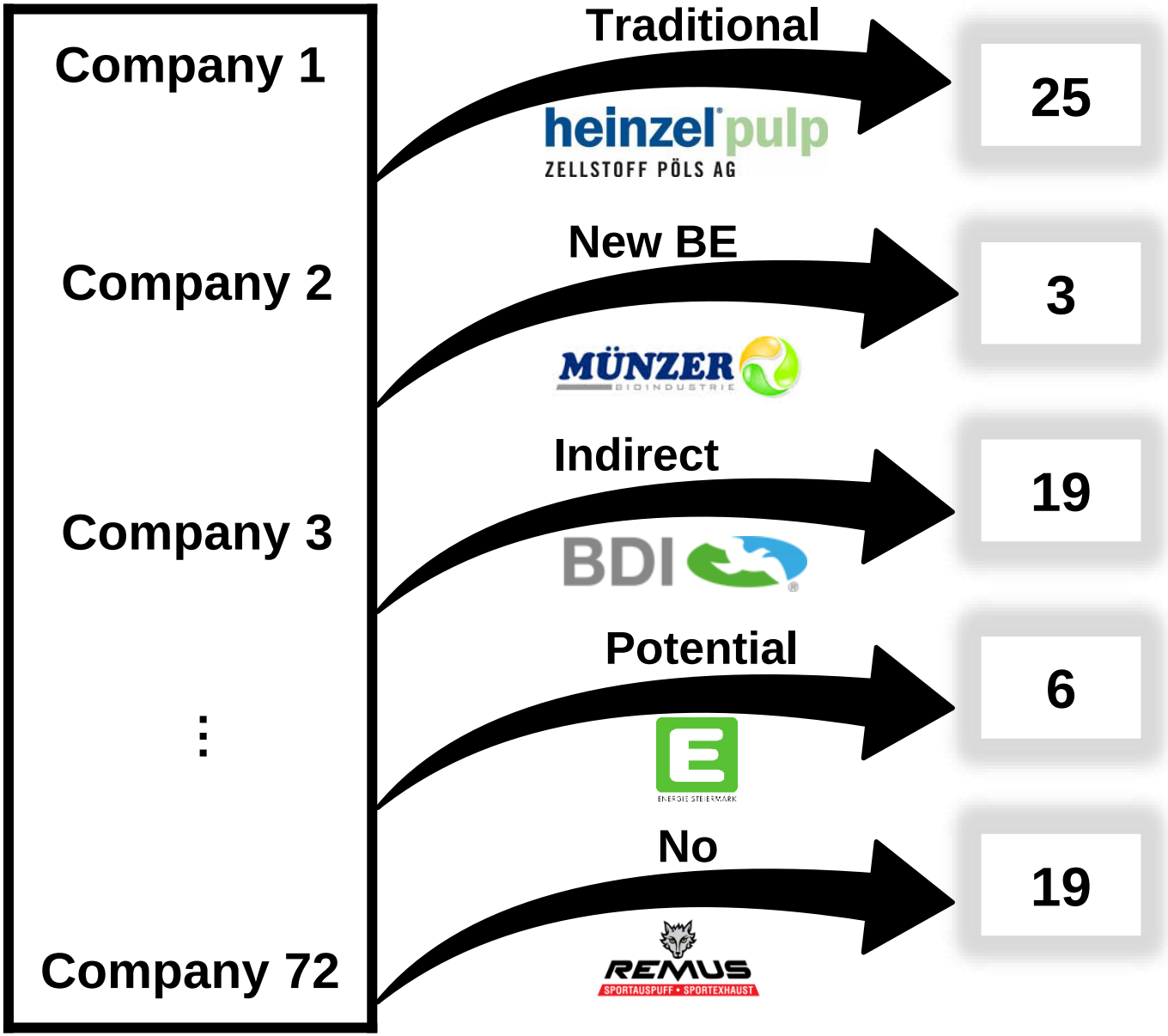
Welche Bioökonomie?



Stern et al. (2016). Transition towards Bio-economy? Evaluating different definitions in Styria, ÖGA conference 2016, Book of Proceedings, 67-68

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Welche Rohstoffe werden für eine Bioökonomie benötigt?

Bioraffinerie Feedstocks

(Wenger & Stern, 2019)

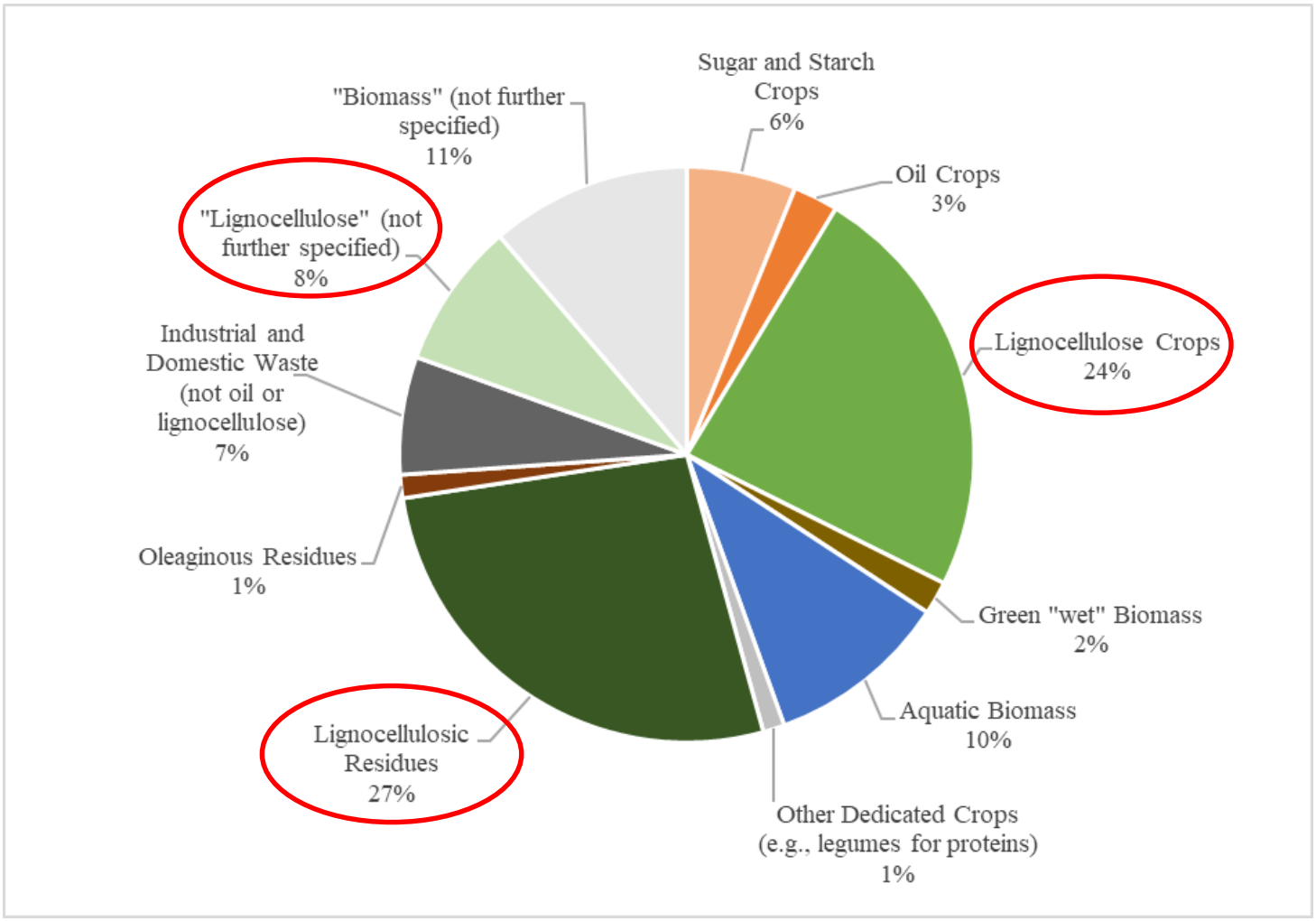
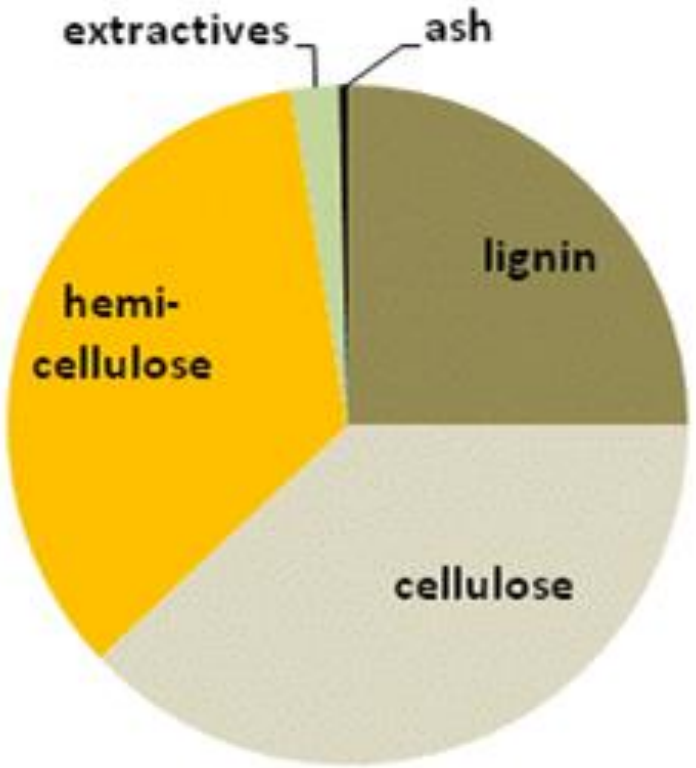
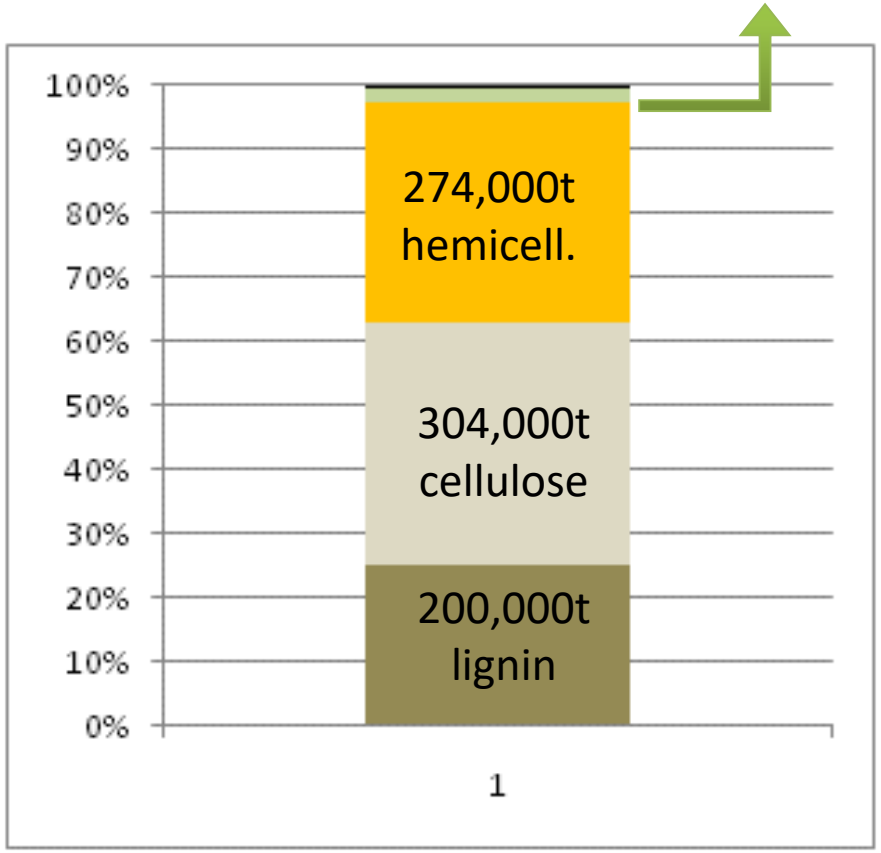


Figure 7: Relative frequencies of biorefinery feedstock mentioned in the scientific literature (1999 - 2017; database: Scopus; n = 1072)

Das Potential am Beispiel Buchenholz





Quelle H. Sixta (1986) Lenzinger Berichte 61, 5-11)

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Welche Prozess- und Produktinnovationen umfasst die Bioökonomie?

Produkte der Bioraffinerie

(Wenger & Stern, 2019)

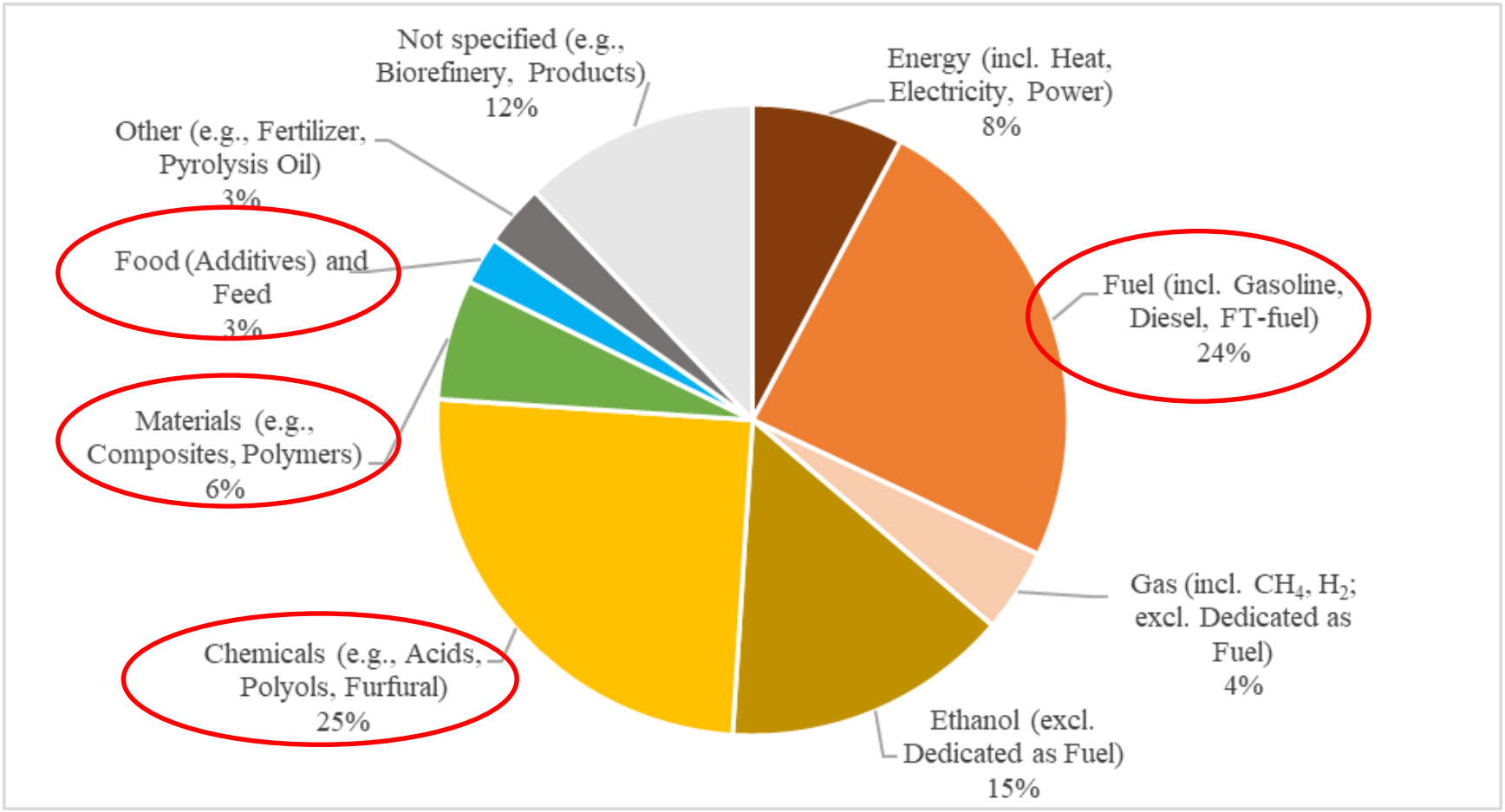
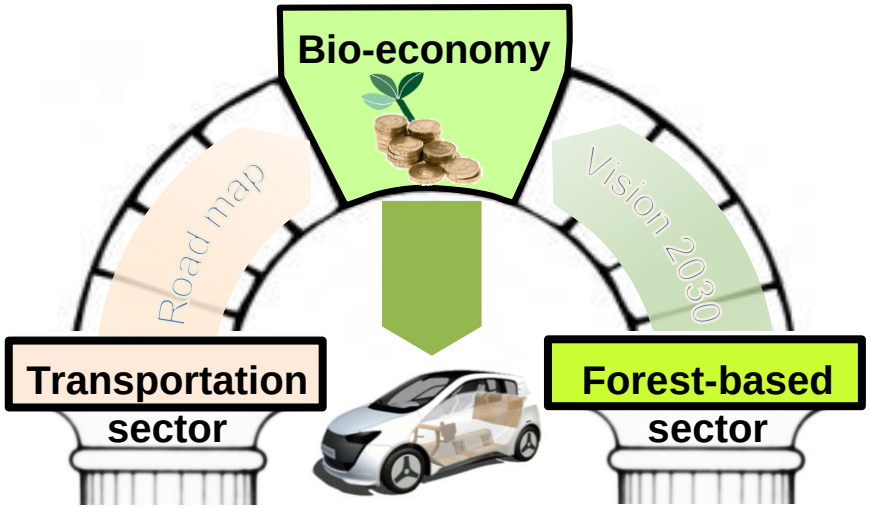


Figure 10: Products identified in scientific abstracts on the topic of biorefinery feedstocks (1999 - 2017; database: Scopus; n = 1378 products/intermediates)

Wood C.A.R.

www.woodcar.eu



Green vehicle
Electro mobility
Weight reduction
Fuel consumption
Security of supply
Cost reduction
Material efficiency

Building with wood
Functional products
New products
New concepts
New markets
Improved value chain
Resource efficiency
Bio-refinery concepts

Company partners

doka
IB STEINER
DYNA MORE
LEAN
EJOT
MAGNA
FHP FORST HOLZ PAPIER
MAN
holzcluster steiermark gmbh
Weitzer Parkett
VOLKSWAGEN
Collano

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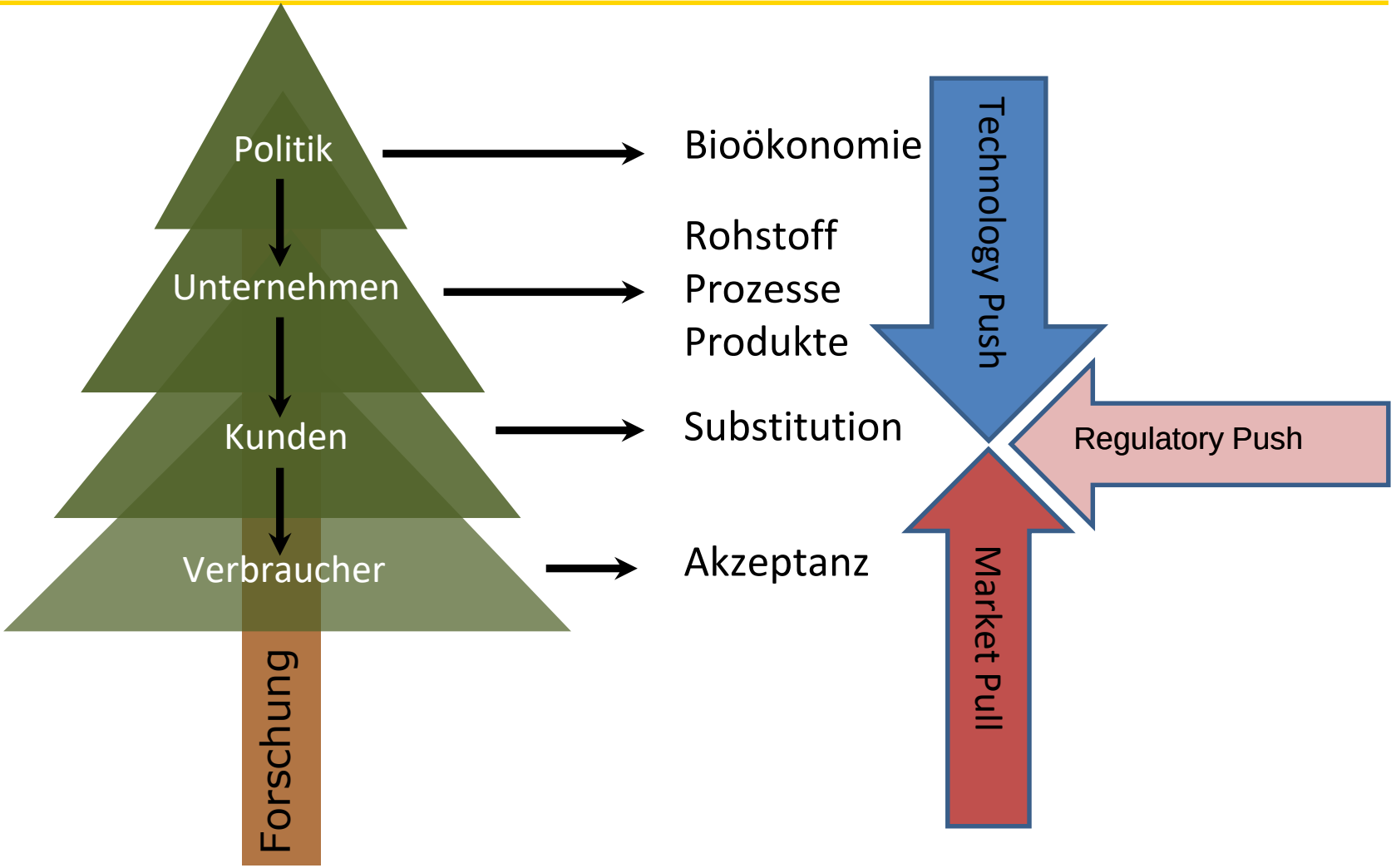
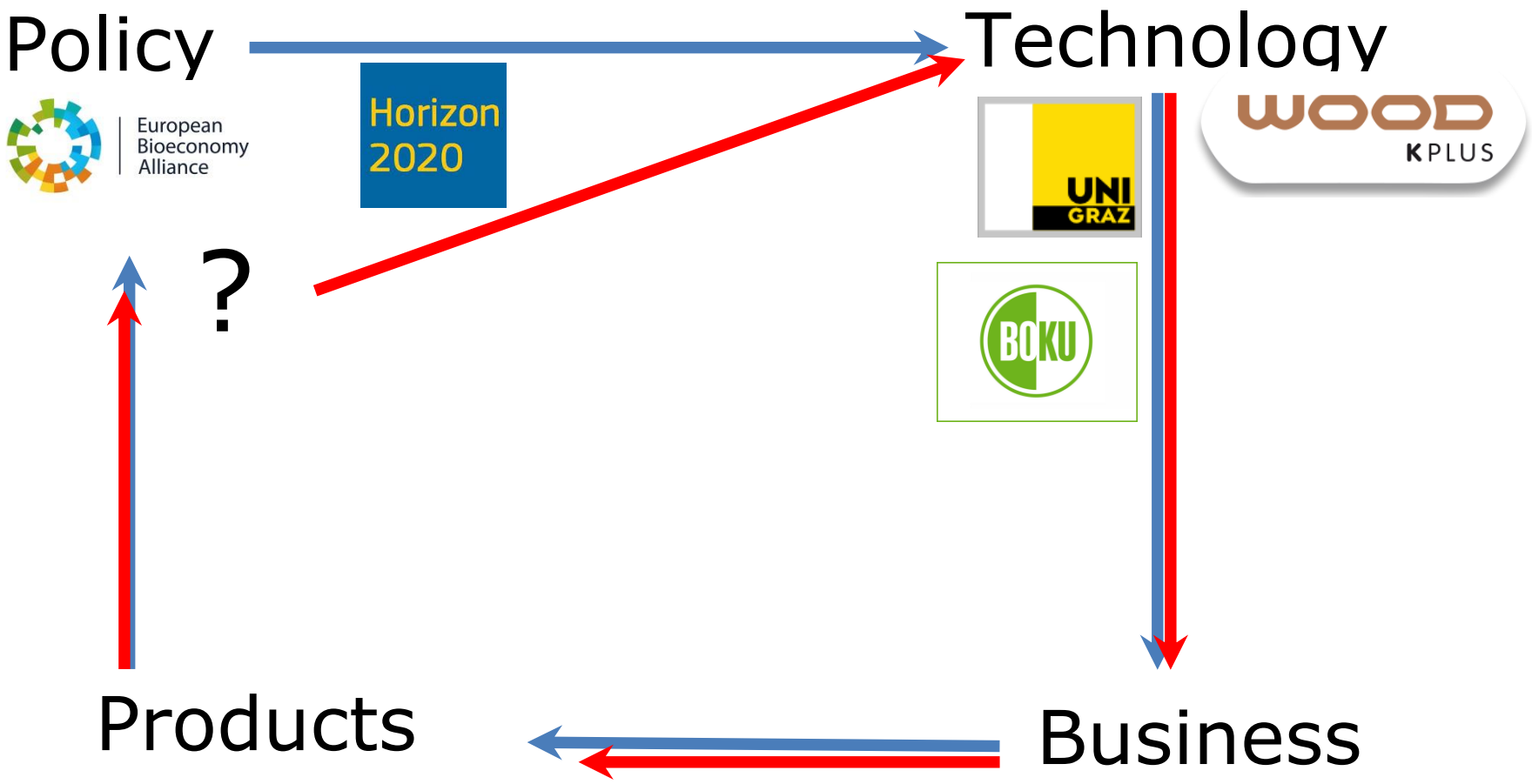
Was behindert den Innovations- und Transitionsprozess?

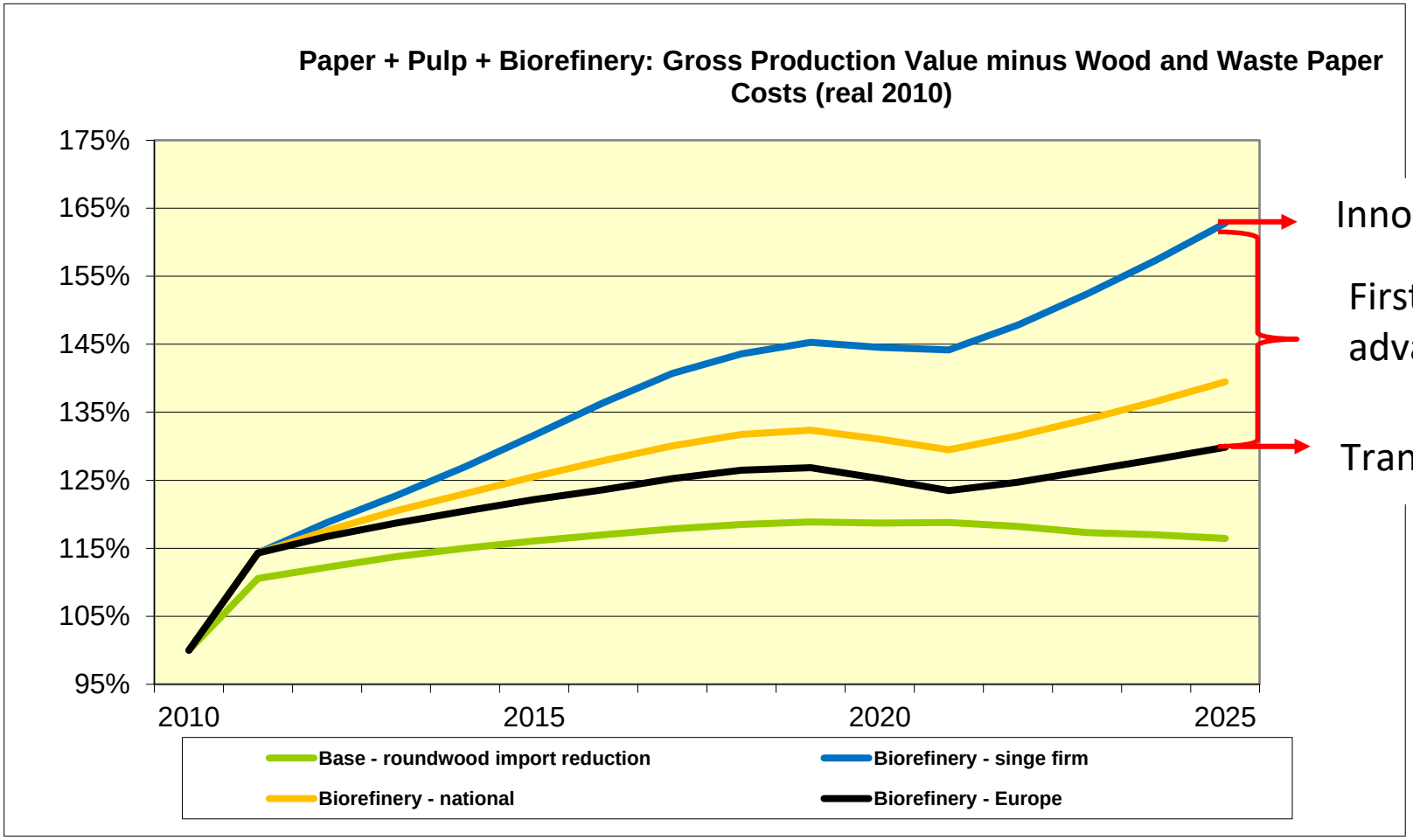
Innovationssystem-Bioökonomie



Entwicklungszyklus der Bioraffinerie



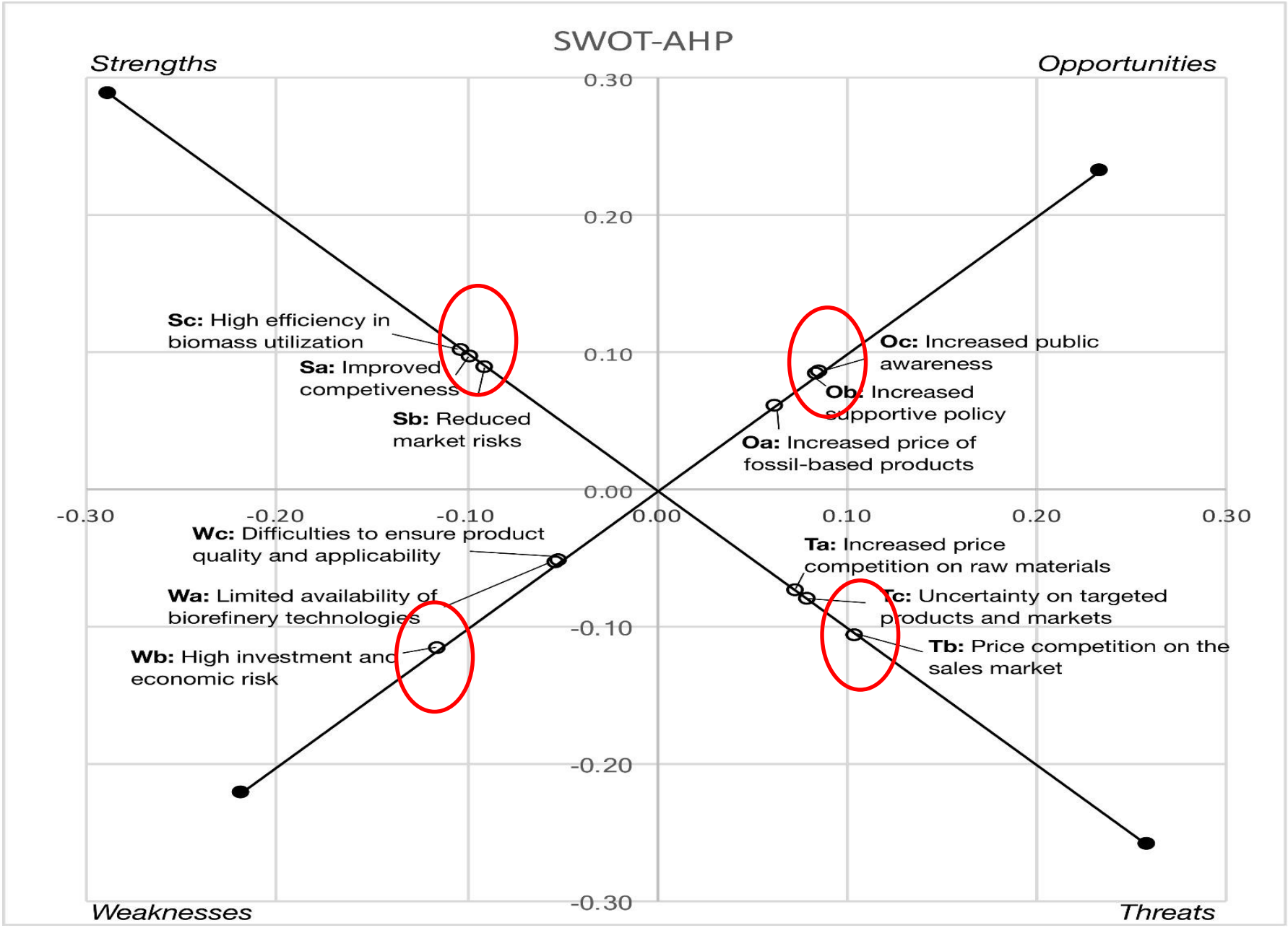
BE Innovation Impact Assessment



Stern et al. (2015). Biorefineries' impacts on the Austrian forest sector: A system dynamics approach, Technological Forecasting & Social Change 91, pp. 311-326.

	Base scenario with roundwood import reduction		Biorefinery scenario Single firm		Biorefinery scenario National		Biorefinery scenario Europe	
	2025	change 2025/ 2010 (%)	2025	change 2025/ 2010 (%)	2025	change 2025/ 2010 (%)	2025	change 2025/ 2006 (%)
Growing stock (mio. m^3 o.b.)	1031	*-10*	1041	*-9*	1039	*-9*	1038	*-9*
NAI (mio. m^3 o.b.)	31.7	*+2*	31.7	*+2*	31.7	*+2*	31.7	*+2*
Total removals (mio. m^3 u.b.)	29.3	*+36*	28.4	*+31*	28.6	*+32*	29.7	*+38*
thereof industrial roundwood	17.6	*+6*	20.0	*+20*	20.1	*+21*	19.1	*+15*
thereof fuelwood	11.7	*+134*	8.5	*+70*	8.5	*+70*	8.7	*+74*
Conif. sawlog price (real 2010) €/m^3	131.8	+32	142.0	+42	138.4	+38	136.9	+37
Conif. pulpwood price (real 2010) €/m^3	92.9	+87	145.3	+193	129.5	+161	119.7	+141
Non-conif. fuelwoodprice (real 2010) €/ m^3	161.7	+102	152.1	+90	141.9	+78	142.4	+78
Gross production value (real 2010) in mio. €	3961	+120	4086	+127	3940	+119	3876	+115

Stern et al. (2015). *Biorefineries' impacts on the Austrian forest sector: a system dynamics approach*, Technological Forecasting & Social Change 91, pp. 311-326.



Brunnhofer et al. (2019): The biorefinery transition in the European pulp and paper industry – a three-phase Delphi study including a SWOT-AHP analysis, Forest Policy and Economics

Bioökonomische Innovationen

Case name	Vehicles	Construction	Textiles	Chemicals (residue use)
Substituting sectors	Transport equipment (34–35)	Construction (F)	Chemicals and Chemical Products (24)	Chemicals and Chemical Products (24)
Substituted inputs	Basic metals and fabricated metal (27–28)	Other Non-Metallic Mineral (26); Basic metals and fabricated metal (27–28)	Coke, Refined Petroleum and Nuclear Fuel (23)	Coke, Refined Petroleum and Nuclear Fuel (23)
Fraction	0.93%	0.42%	3.56%	3.56%
Value	10^9 USD (2009)	10^9 USD (2009)	10^9 USD (2009)	10^9 USD (2009)
Substituting inputs	Wood and products of wood and cork (20)	Wood and products of wood and cork (20)	Pulp, Paper, Printing and Publishing (21–22)	Exploitation of unused capacities
Value	10^9 USD (2009)	10^9 USD (2009)	10^9 USD (2009)	–
Volume calibration	1	1	1.87	–
Type	Products	Products	Products	Residues

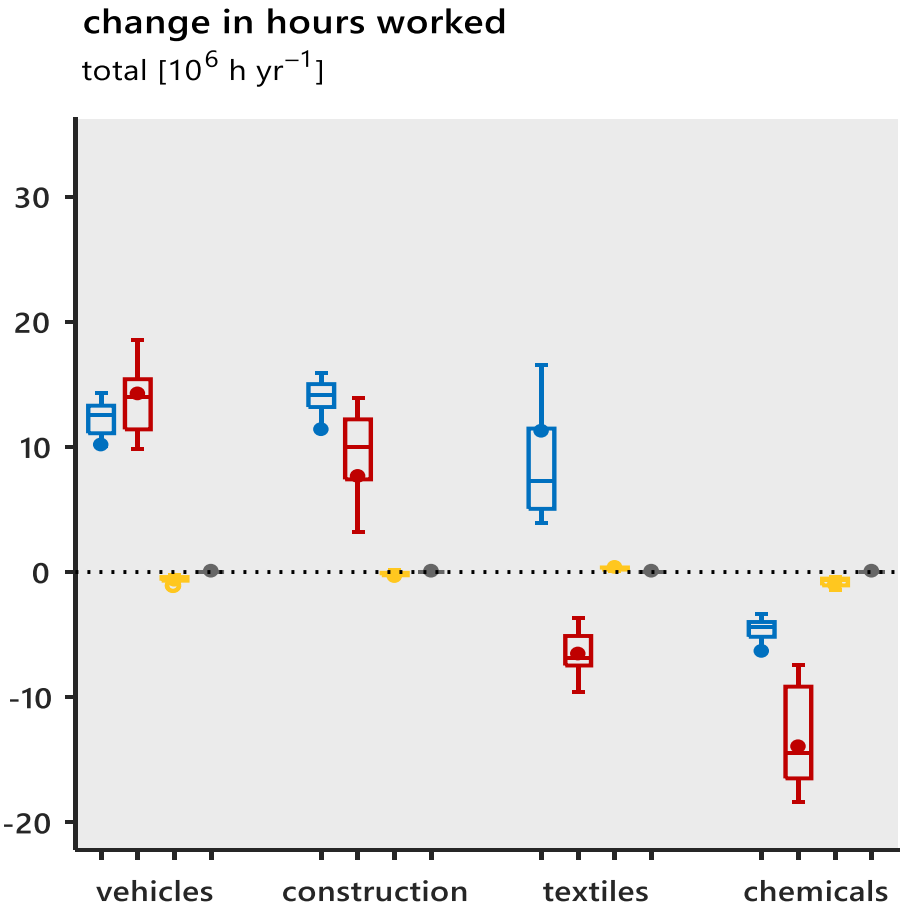
EU-27 (EU-27)

BRIC+
Brazil, China, Indonesia, India, Russia, Taiwan

NEMO (non-European major OECD countries) Australia, Canada, Japan, South Korea, Mexico, Turkey, USA

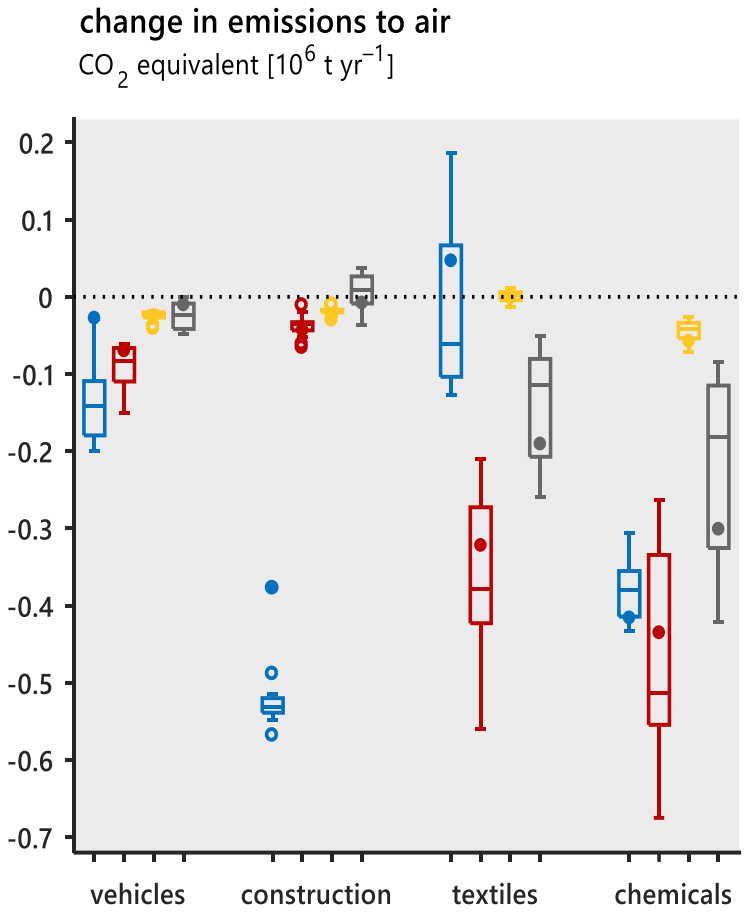
ROW (rest of the world).

Arbeitsplätze



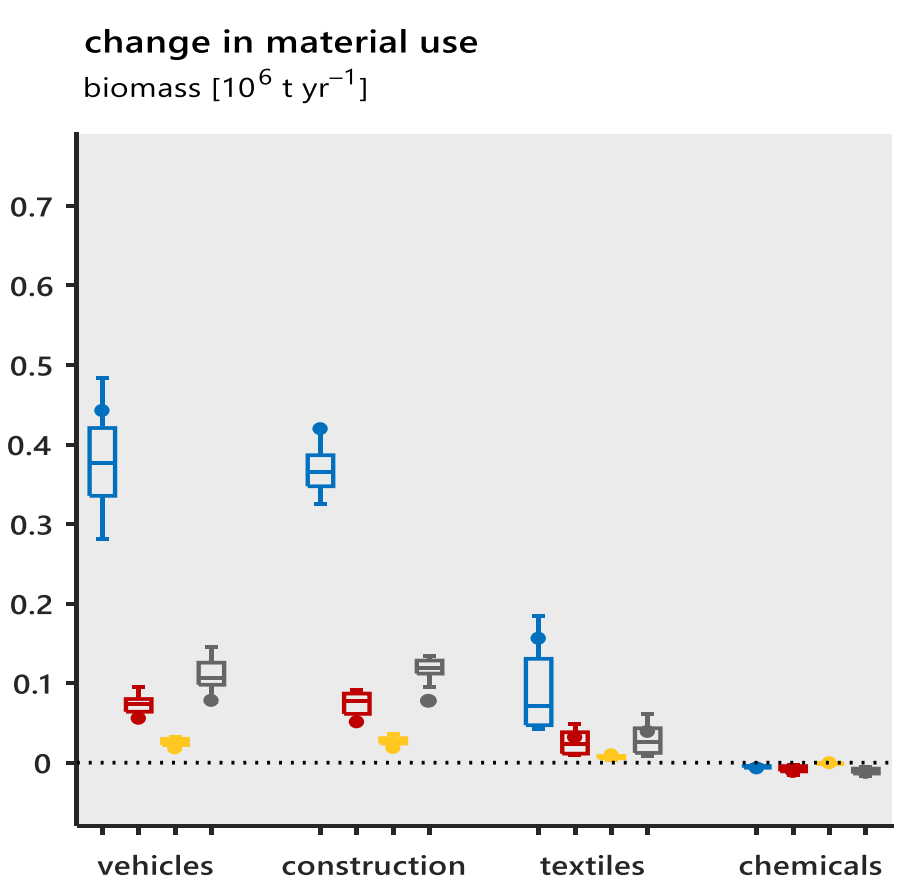
Absolute changes in hours worked by region (EU-27 [blue]; BRIC+ [red]; NEMO [yellow]; ROW [grey]) under the respective substitution scenario. Filled circles represent point estimates for the year 2009. Boxplots include results for each year from 1995 to 2009 (n = 15)

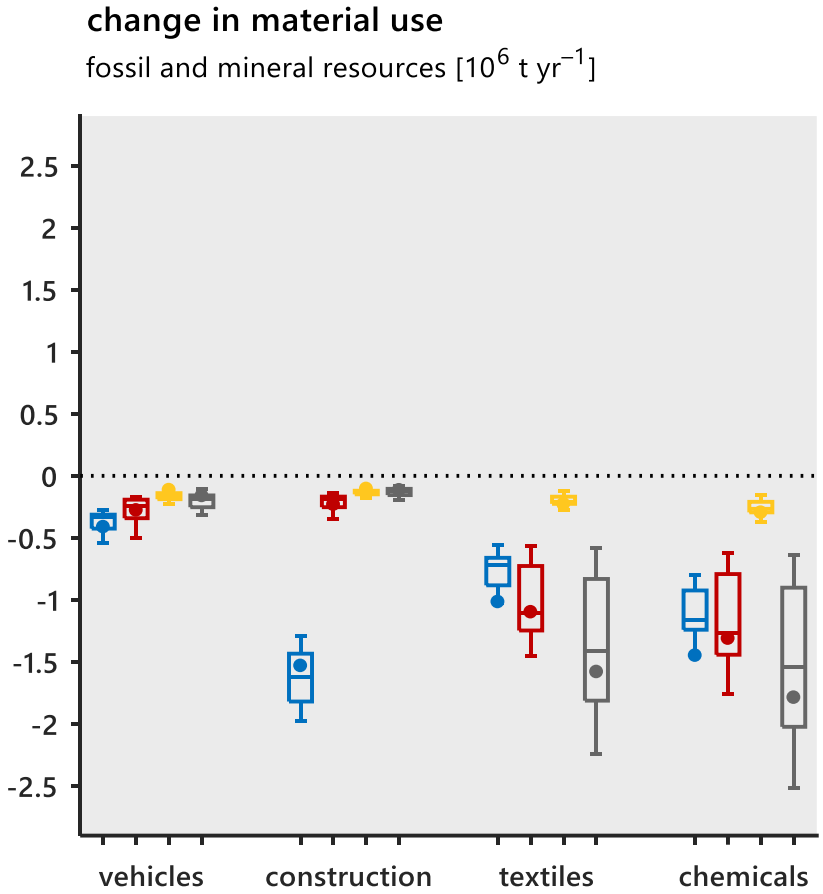
Emissionen



Absolute changes in emissions to air by region (EU-27 [blue]; BRIC+ [red]; NEMO [yellow]; ROW [grey]) under the respective substitution scenario. Filled circles represent point estimates for the year 2009. Boxplots include results for each year from 1995 to 2009 (n = 15)

Materialnutzung





Entwicklung der Bioökonomie

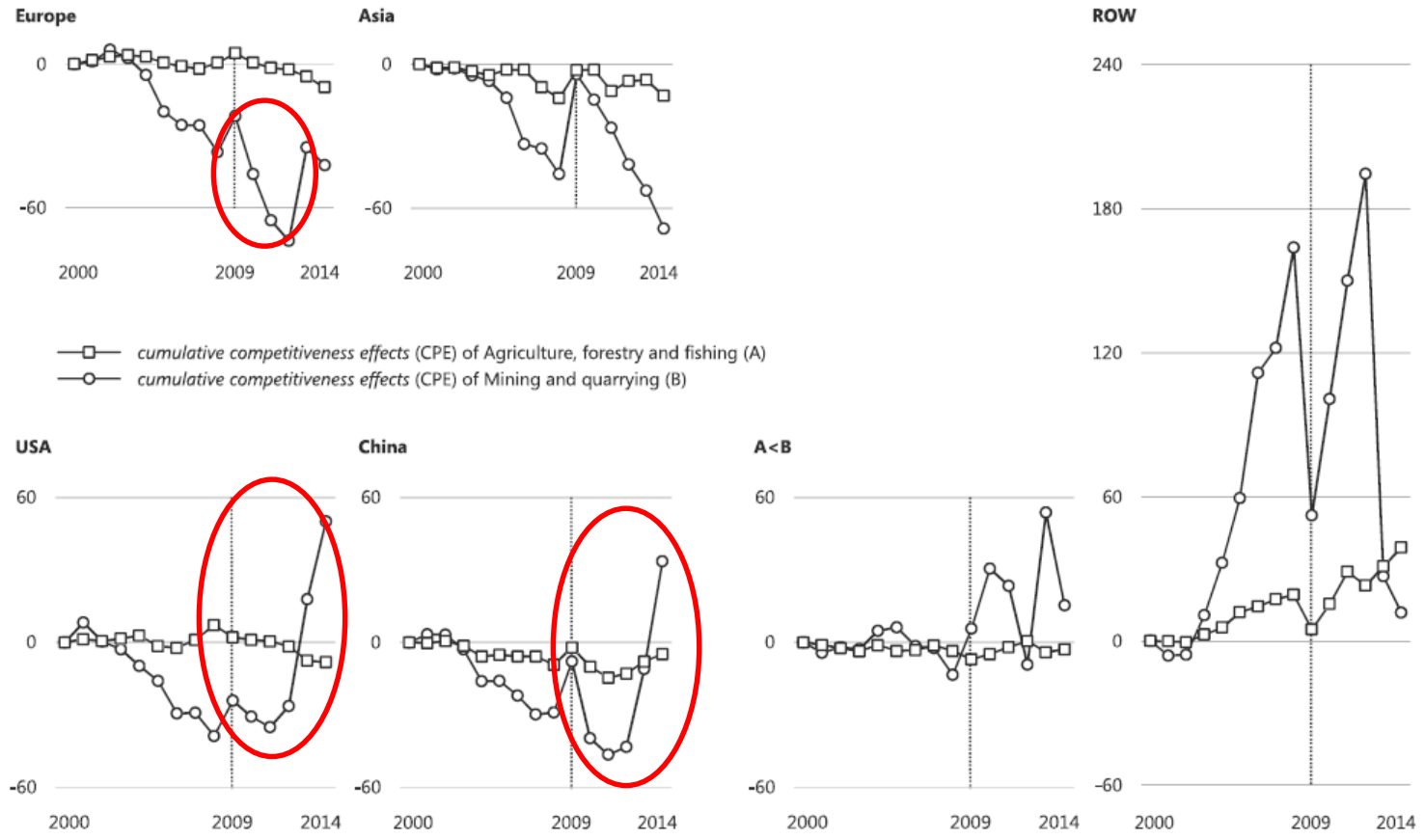


Fig. 4. Cumulative *competitiveness effects* of primary sectors (2000–2014) in 10^9 USD (nominal) by regions. Squares represent *competitiveness effects* of sector A, circles *competitiveness effects* of sector B. The sum over all regions in any year and sector equals zero. Note that effects refer to output changes between the current year and the year before. The vertical dotted line represents the year 2009.

Asada & Stern (2018). Competitive bioeconomy? Comparing bio-based and non-bio-based primary sectors of the world. Journal of Ecological Economics, 149, pp. 120-128

Ausblick
Neue wirtschaftliche Netzwerke

- Bioökonomie verlangt nach (neuen) industriellen Symbiosen
- Koppelprodukte bekommen eine neue Bedeutung
- Biogene Wertschöpfungsketten werden erweitert (neue Teilnehmer)
- Machtverhältnisse und Stoffströme verschieben sich

Neue sektorale Systeme!

Ausblick
Ende der „Skalenökonomie“

- Die Skalen in biogenen Prozessen sind limitiert (dezentrale Rohstoffquellen)
- Bioökonomie noch nicht kostenkompetitiv

Industrie 4.0 !
Wirtschaftspolitische Rahmenbedingungen
Economies of Scope

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Vielen Dank für Ihre Aufmerksamkeit!