

CONDUCTING RESEARCH FOR A CHANGING SOCIETY FORSCHUNGSZENTRUM JÜLICH

8.1.2025

Member of the Helmholtz Association



1

FORSCHUNGSZENTRUM JÜLICH - CAMPUS

Mitglied der Helmholtz-Gemeinschaft



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Seite 2





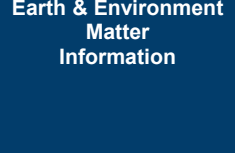

2

AT FIRST GLANCE

<p>Founded in 1956</p>		<p>Revenue: € 987 million in 2023</p>		
	<p>Research priorities: information, energy, bioeconomy</p>			
	<p>Research campus with 14 institutes and 18 branch offices in Germany and abroad</p>		<p>Shareholders: Federal Republic of Germany (90%), federal state of North Rhine-Westphalia (10%)</p>	<p>Member of the Helmholtz Association</p>

3

AT FIRST GLANCE

<p>2,511 publications in 2023</p>		<p>Nobel Prize in Physics 2007: Peter Grünberg</p>	<p>Shaping change: We conduct research into options for a digital society, a climate-friendly energy system, and a resource-efficient economy. We combine the natural, life, and engineering sciences with specialist expertise in high-performance computing and we also deploy unique scientific infrastructures.</p>
<p>Programme-oriented funding (PoF): Energy Earth & Environment Matter Information</p>			
	<p>19 research infrastructures</p>	<p>93 patent applications in 2023</p>	

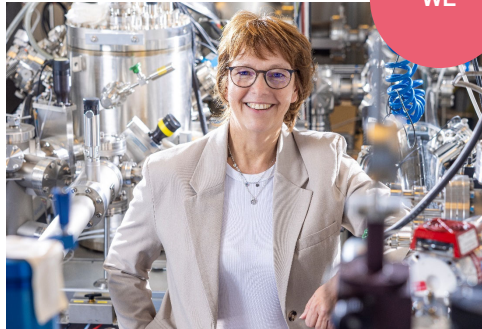
4

WE LOVE RESEARCH



1,603 technical and laboratory employees

2,931 scientists



We seek to be a pioneer in catalysing transformation and progress in society.

More than 7,400 employees from 114 countries



973 administrative employees

Involvement in 638 national research projects



5

WE WORK HAND IN HAND



70 joint professorial appointments within the Jülich Aachen Research Alliance (JARA)



Our network: 167 joint professorial appointments with 19 universities in Germany and Europe

Involvement in 186 EU projects; coordination of 34 of these



6

JÜLICH SYSTEMS ANALYSIS (ICE-2)



The research focus of Jülich Systems Analysis (ICE-2) is on future energy systems, considering material requirements, sector coupling and framework conditions in policy and society.

This is done in an interdisciplinary approach that considers the interaction of energy technologies with economic, ecological and social systems and thus focuses on security of supply, economic efficiency and environmental protection

RESEARCH GROUP: ECONOMICS OF SUSTAINABILITY AND BIOECONOMY

- Transitioning to a sustainable economy and society requires a deep understanding of the transformative processes entailed.
- The Department of Economics of Sustainability and Bioeconomy tackles this challenge, exploring innovative pathways towards a more sustainable future and identifying the best options for shaping these.
- As technological innovations and transformation processes are embedded within evolving economic and social conditions, questions of economic feasibility, environmental compatibility, and social acceptability play a central role.
- Our research goes beyond the energy system, integrating the water–energy–land nexus (WEL nexus) and bioeconomy perspectives.



**ECOMODERNISM AND DE-GROWTH APPROACH: TWO APPROACHES FOR A
WORLD UNDER PRESSURE – A COMPARATIVE WELFARE ECONOMIC
ANALYSIS**
HOLGER SCHLÖR, STEFANIE SCHUBERT, SANDRA VENGHAUS

London – University College, 8. January 2025

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9

THE WORLD UNDER PRESSURE

- In 2024, the World Economic Forum stressed that **the economic and political order** established after the Second World War is under threat from populism, protectionism, trade wars [5], and the wars in Ukraine, Gaza, Lebanon, and Sudan, and that it is not yet clear whether it will be "replaced by something fundamentally different [5]."
- These uncertainties are accompanied by an **earth climate getting increasingly** out of control, as stressed by UN Secretary-General Antonio Guterres:
 - **"In the case of climate, we are not the dinosaurs. We are the meteor. We are not only in danger, we are the danger. But, we are also the solution** (<https://news.un.org/en/story/2024/06/1150661>)."
- The UN demands that the world community has to change the current unsustainable consumption and production patterns and **develop a new economic model** with significantly lower CO2 emissions to meet the Paris Agreement [7, 8].

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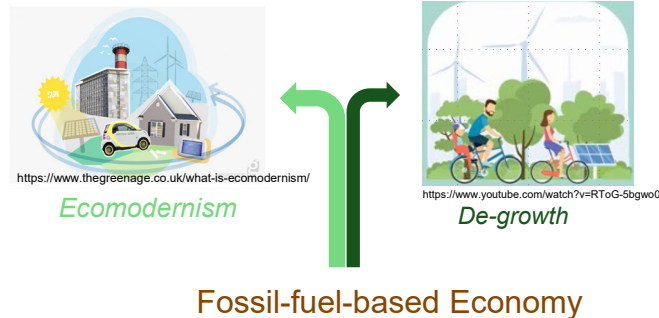
Seite 10



10

TWO ECONOMIC MODELS FOR THE ANTHROPOCENE

- Two models are currently being discussed for achieving the Paris Agreement's goal:
 - Ecomodernism (<https://www.ecomodernism.org/manifesto-English>)



- De-growth approach (<https://degrowth.info/en/degrowth>)

ECOMODERNISM

- Ecological-economic decoupling [11] and the general view that industrialisation, globalisation and modernisation are inextricably linked with climate and nature conservation are the key points of ecomodernism.
- The ideas of ecomodernism were first published in the **Ecomodernism Manifesto in 2015** [12, 13] with the goal to shape the Anthropocene – the age of humans [12].
- The authors are convinced that “a good Anthropocene demands that humans use their growing social, economic, and technological powers to make life better for people, stabilize the climate, and protect the natural world [12].”
- A central element is the assumption of a **decoupling** of economic growth and nature consumption in both relative and absolute terms [12].
- The decoupling of economic growth and nature use can be the result of new technical developments or because of aging societies which need less resources.

DE-GROWTH

- On the other hand, the de-growth approach [14] question the ability of the current linear economic system to decouple GHG emissions and resource consumption from economic growth to meet the SDGs and the Paris agreement goals [15].
- De-growth approaches [16-18] are trying to decrease both GDP and GHG emissions, minimize reliance on emission technologies and “aims to generate progress toward achieving the SDGs by prioritizing redistribution rather than GDP growth.
- The de-growth include as economic measures universal basic income, work-sharing, shifting taxation burdens from income to resource and energy extraction [9].”

DYNAMIC MULTINATIONAL COMPUTABLE GENERAL EQUILIBRIUM MODEL

- The new economic approaches of ecomodernism and de-growth scenarios will have an impact on all economic sectors especially on the Food-Energy-Water Nexus (FEW-Nexus) sector - the key sectors for a sustainable development.
- We analyse the two approaches based on a General Equilibrium Model.
- We present the method here in a stylised economy to illustrate the effects of the two approaches in the absence of disturbances such as the Corona pandemic and the war in Ukraine.

FIRST SUMMARY

- The new green economy approaches of Ecomodernism and De-growth scenarios will have an impact on all economic sectors especially on the Food-Energy-Water Nexus (FEW-Nexus) sector - the key sectors for a sustainable development (EU, 2012, UNEP 2014).
- A General Equilibrium Model is used to analyze the two green economy approaches consisting of two countries:
 - An Ecomodernist country A and a De-growth country B

A TWO COUNTRY DYNAMIC MULTINATIONAL CGE MODEL

- We use a dynamic multinational Computable General Equilibrium (CGE) model [Ecomod, 2003].
 - The consumption sector is represented by one consumer per country $c=A,B$.
 - The consumer maximizes its utility (neoclassical consumption model [Chiang, 1984]).
 - The budget Y is spent on consumption C and savings S .
 - Savings are assumed to finance investment.
 - The production sector of each country consists of three sectors (FEW, Industry, Service).
 - Each sector is represented by a firm, which operates under perfect competition, based on a Cobb-Douglas [Martin, 1997] production function using capital and labor (linear homogeneous).

SOCIAL ACCOUNTING MATRIX (SAM)

- The SAM summarizes all economic transactions in an economy.
- The SAM represents the stylized status quo data set of each country of our model economy.
- The fictitious data sets of the two SAMs were compiled to illustrate and stress the effects of different growth scenarios in a model economy world unbiased (Lehman crash, Euro crises, Corona pandemic, war on Ukraine).

SAM ECOMODERNIST A + DE-GROWTH B

Social Accounting Matrix Country A - in currency units

	FEW	Industry	Service	Consumption	Investment	Exports	Total
FEW	0	0	0	68	6	16	90
Industry	0	0	0	122	39	19	180
Service	0	0	0	184	99	52	335
Capital (K) payments	49	59	99				
Labour (L) payments	20	91	200				
Gross Output (XD)	69	150	299				
Imports	21	30	36				
Total	90	180	335				

Source: Authors, 2021 based on Ecomod, 2003

Social Accounting Matrix Country B - in currency units

	FEW	Industry	Service	Consumption	Investment	Exports	Total
FEW	0	0	0	123	11	21	155
Industry	0	0	0	218	82	30	330
Service	0	0	0	407	207	36	650
Capital (K) payments	99	130	199				
Labour (L) payments	40	181	399				
Gross Output (XD)	139	311	598				
Imports	16	19	52				
Total	155	330	650				

Source: Authors, 2021 based on Ecomod, 2003.

MODEL CALIBRATION

- Our CGE model needs to be calibrated in order to reproduce the data set of the status quo as determined by the Social Accounting Matrix correctly.
- This requires the determination of exogenous parameter values

	Exogenous parameters	
	Ecomodernist country A	Degrowth country B
Interest rate	5.0%	4.0%
Time preference rate	5.0%	4.0%
Steady state growth rate	2.5%	-1.0%
Labor development rate	0.0%	0.0%

Source: Authors, 2022

IEK-STE/SRH 2022

- Ecomodernist country A will grow by 2.5%
- De-growth country B will shrink by 1.0%

TECHNOLOGICAL EFFICIENCY OF THE TWO COUNTRIES

- The three economic sectors of each country includes also a cross-country Food-Energy-Water-Nexus, where the agricultural sector is located in country A, the utility sectors (energy, water) are located in country B.
- Each country has a service and an industry sector.
- The sectors therefore have different states of technology aF_i ; the higher the level of output that can be produced by any particular combination of the inputs.

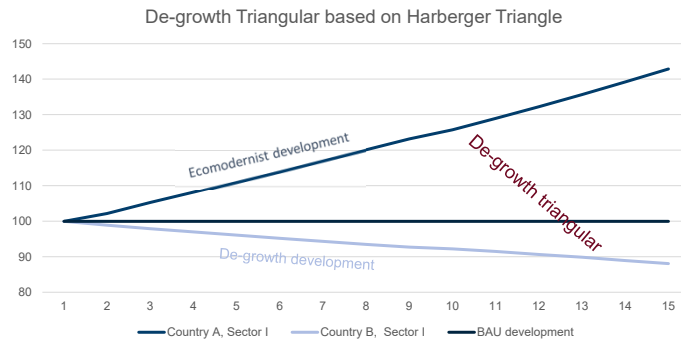
Technological efficiency parameter, aF			
Ecomodernist country A		Degrowth country B	
Agriculture	0.411	Utilities	0.675
Service	0.853	Service	1.125
Industry	0.944	Industry	1.190

Source: Own calculations, 2022

IEK-STE/SRH 2022

THE DE-GROWTH TRIANGULAR & THE HARBERGER TRIANGLE

- The presented idea of the de-growth triangular approach is built on the Harberger triangle approach of welfare economics [Harberger, 1964, 1971], which is used “to calculate the efficiency costs of taxes, government regulations, monopolistic practices, and various other market distortions [Hines, 1999].”
- The de-growth approach can be interpreted as a distortion to the Ecomodernist green economy approach summarized by the de-growth triangular.



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Seite 21

21

MODEL RESULTS

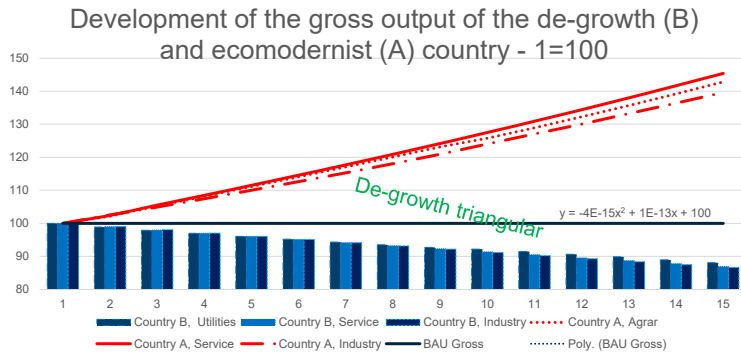
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5-8. July 2022

Seite 22

22

THE GROSS OUTPUT TRIANGULAR



Triangular between the two countries

Triangular	Industry	Service	FEW
between Ecomodernist A and BAU	263	301	285
Degrowth B and BAU	95	94	87
A and B	358	395	372

Source: Own calculations, 2022

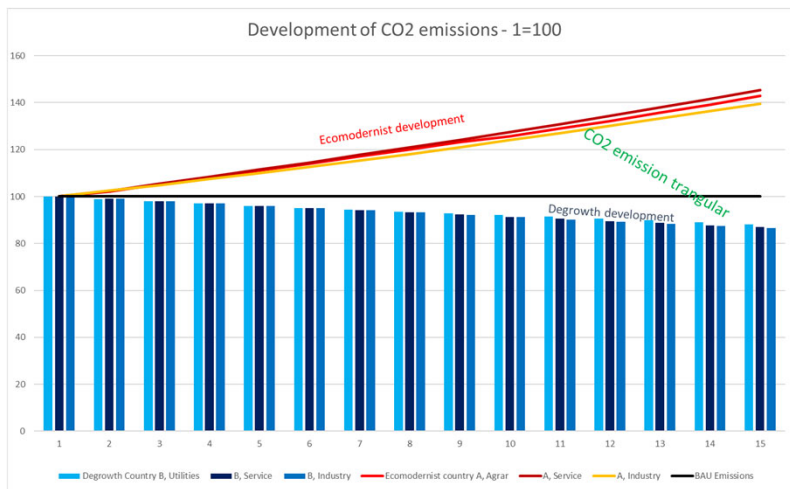
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Seite 23



23

CO2 EMISSION DE-GROWTH TRIANGULAR



Trinagular between the two countries

Triangular	Industry	Service	FEW
between Ecomodernis A and BAU	263	301	285
Degrowth B and BAU	95	94	95
A and B	358	395	380

Source: Own calculations, 2022

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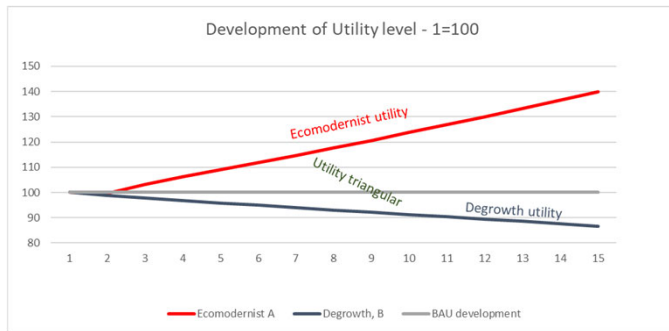
5-8. July 2022

Seite 24



24

UTILITY TRIANGULAR



Triangular between the two countries

Triangular between	Utility All sectors
Ecomodernist A and BAU	255
Degrowth B and BAU	95
A and B	350

Source: Own calculations, 2022

SUMMARY

The Triangulars of the Green Economy

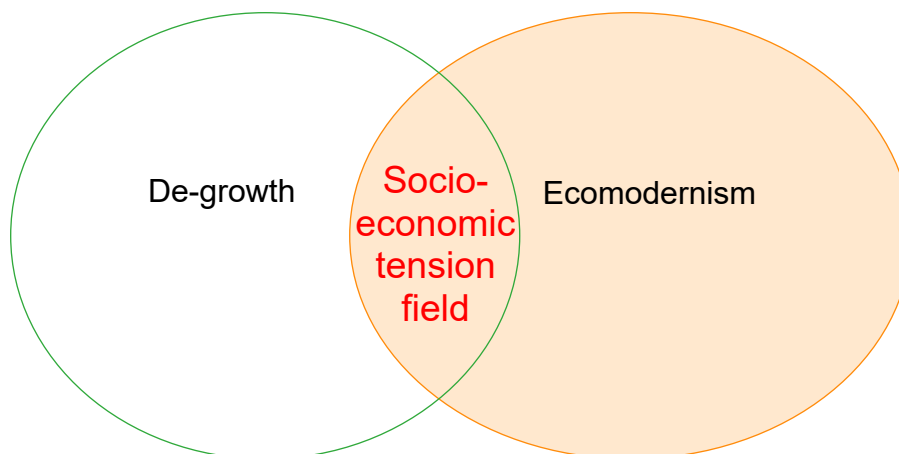
	Ecomodernist A & BAU	Degrowth B & BAU	A & B	Sum
Gross output	849	276	1125	2250
CO2-emissions	849	284	1133	2266
Utility	255	95	350	700

Source: Own calculations, 2022

CONCLUSION FEW-NEXUS

- The challenge for the management of the FEW-nexus is that the cross-country FEW-Nexus is confronted with two different green economy approaches.
- The agricultural sector of country A follows an Ecomodernism pathway, whereas the utility sector of country B is on a De-growth pathway.
- This can cause economic tensions and stresses in the sector and between the countries and poses a major challenge to the management of the FEW-Nexus.
- The war on Ukraine has caused severe distortions on the global food market and raised the question: Should the food sector be excluded from the zero/negative growth assumption of the de-growth approach to avoid an undersupply of the World expressed in the food triangular.

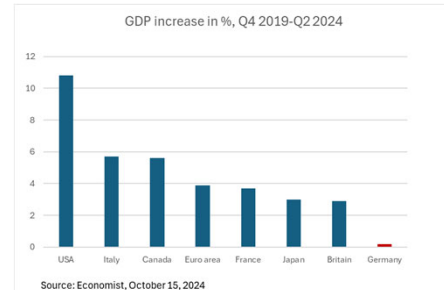
TENSION FIELD OF THE GREEN ECONOMY



The degrowth triangular visualizes the socio-economic conflict zone of the two Green Economy approaches.

POSTSCRIPT: POLITICAL UPDATE

- Germany has failed to achieve positive economic growth since 2019.
- The consequence of this lack of growth over five years has been the collapse of the coalition government in November 2024 and a subsequent crisis surrounding the financing of the federal budget of 2024 and 2025, which has resulted in a further general election scheduled for February 2025.



SOCIAL & POLITICAL STRUGGLE

- A debate concerning the financing of the cultural sector, public health, and the retirement system has started.
- The lack of financial resources resulting from the country's zero economic growth is
 - also impacting government expenditure on research and development (Müller, 2024).
 - New businesses are encountering greater challenges in establishing themselves in markets that are not experiencing growth.
 - And how future military spending should be financed (Müller, 2024).
- In the absence of economic gains, the social and political struggle over the distribution of economic wealth increased.

Thank you for your attention!

**Holger Schlör, Stefanie Schubert &
Sandra Venghaus**