

Interdisciplinary understanding of macro rebound effects

The background of the central section is a photograph of a modern building's interior, featuring a large, curved, light blue structure that resembles a staircase or a large architectural element. The lighting is soft and blue-toned.

VESTLANDSFORSKING

FOSSHAUGANE CAMPUS SOGNDAL

Presentation 3. October 2013, Hans Jakob Walnum

Outline

- 1. Background
- 2. Defining rebound effects
- 3. Strategies for curbing energy use and emissions
- 4. Different perspectives on rebound effects:
 - Energy economics
 - Degrowth
 - General purpose technologies
- 5. Multiple reasons for rebound effects
- 6. Conclusion

Background 1

Rebound seminar Aalborg University 31st of October 2012 as part of the PhD course "Advanced LCA – consequential modeling, EIO LCA, iLUC, and rebound effects"

Lecturer	Presentation title
Jin Xue (Post Doc, AAU)	Decoupling housing-related environmental impacts from economic growth
Carlo Aall (Prof, Head of research, Vestlandsforskning)	Domestic household energy-use in Norway: a case of decoupling?
Jørgen Stig Nørgaard (Professor emeritus, DTU)	Growth Mania is the problem, not Rebound Effect
Jannick Schmidt (Ass Prof, DCEA-Plan)	LCA & rebound effects
Petter Næss (Professor UMB)	Rebound & urban planning
Frede Hvelplund (Prof, Energy-Plan)	Energy policy and rebound effects
Bo Weidema (Prof, DCEA-Plan)	Rebound effects - Policy implications and research needs

Background 2

PhD workshop “Interdisciplinary understanding of macro rebound effects”. Aalborg University 15th of August 2013

Lecturer	Presentation title
Carlo Aall (Prof, Head of research, Western Norway Research Institute)	The rebound- effect: A useful concept in the climate discourse?
Anders Rhiger Hansen PhD Scholar, Aalborg University, Danish Building Research Institute	A sociological perspective
Luisa Sievers, Fraunhofer-Institute for System and Innovation Research ISI	Sustainability of environmental protection strategies considering meso and macro economic rebound effects
Davide Maneschi, PhD Scholar, Aalborg University	Rebound effect in energy efficiency in buildings
Fredrik Moltu Johnsen, PhD Scholar, Aalborg University and Østfoldforskning	Rebound effects attached to Carbon capture and storage
Matthias Pfaff, Fraunhofer ISI	Resource Efficiency and Macroeconomic Rebound Effects in the r2 Research Project
Grace Viera, PhD scholar , Aalborg University	Rebound effects - Policy implications and research needs
Hans Jakob Walnum, PhD Scholar, Aalborg University and Western Norway Research Institute	Four perspectives on rebound effects

Three strategies for reductions of energy use and emissions:



- 1. Efficiency
 - We need to develop technological solutions that are more efficient with regard to energy use and emissions
- 2. Substitution
 - The key point is not how much we consume, but what we consume and produce
- 3. Reduction in absolute volume
 - It is not enough with improvement in technology or a change in consumption pattern, we must also simply consume less

Rebound effect definition

- According to Maxwell et al (2011), a rebound effect could be understood through the use of the IPAT equation (Holdren and Ehrlich 1974, Commoner 1972):

I (Impact) =
P (Population)



A (Affluence)

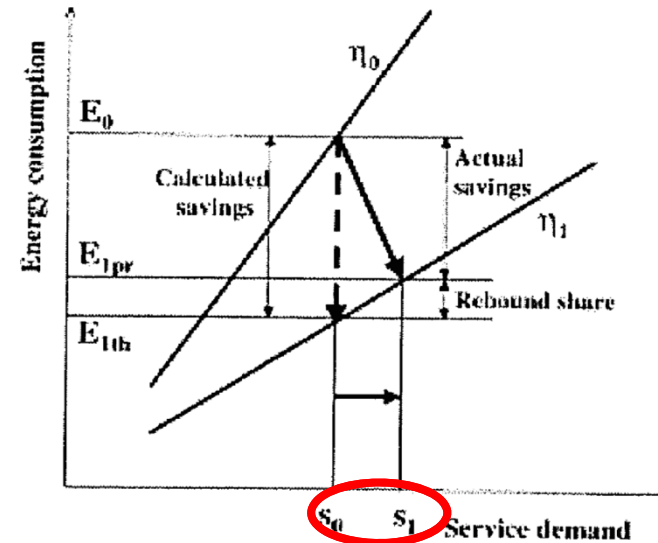


T (Technological Efficiency)

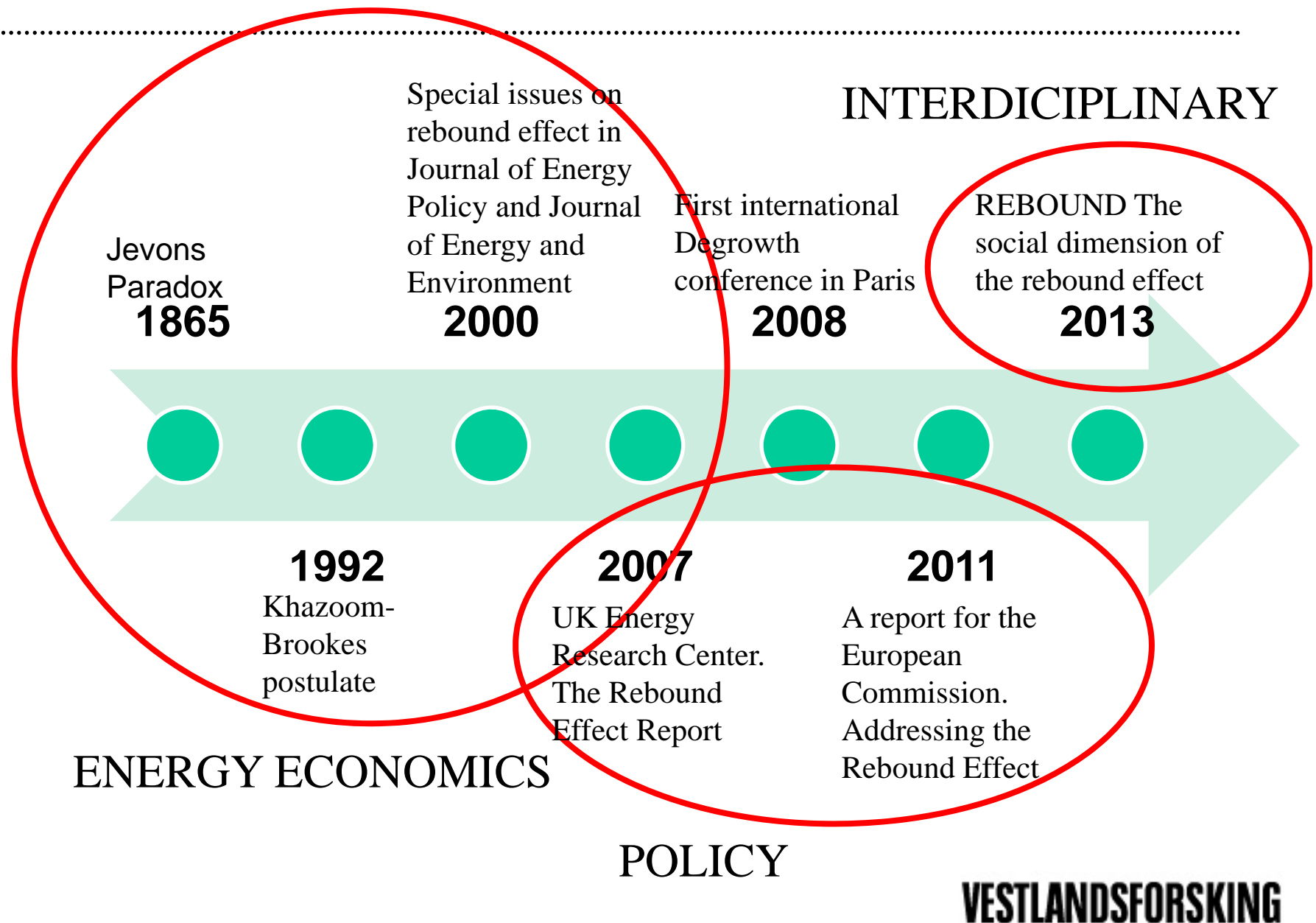
- **Rebound effect refers to the relationship between improvements in technological efficiency (T) which lead to an increase in per capita consumption (A).**
- Rebound effect is the differences between actual and potential savings often measured in percentages
 - Potential savings are not realized due to behavioral or other systemic responses

Rebound effect

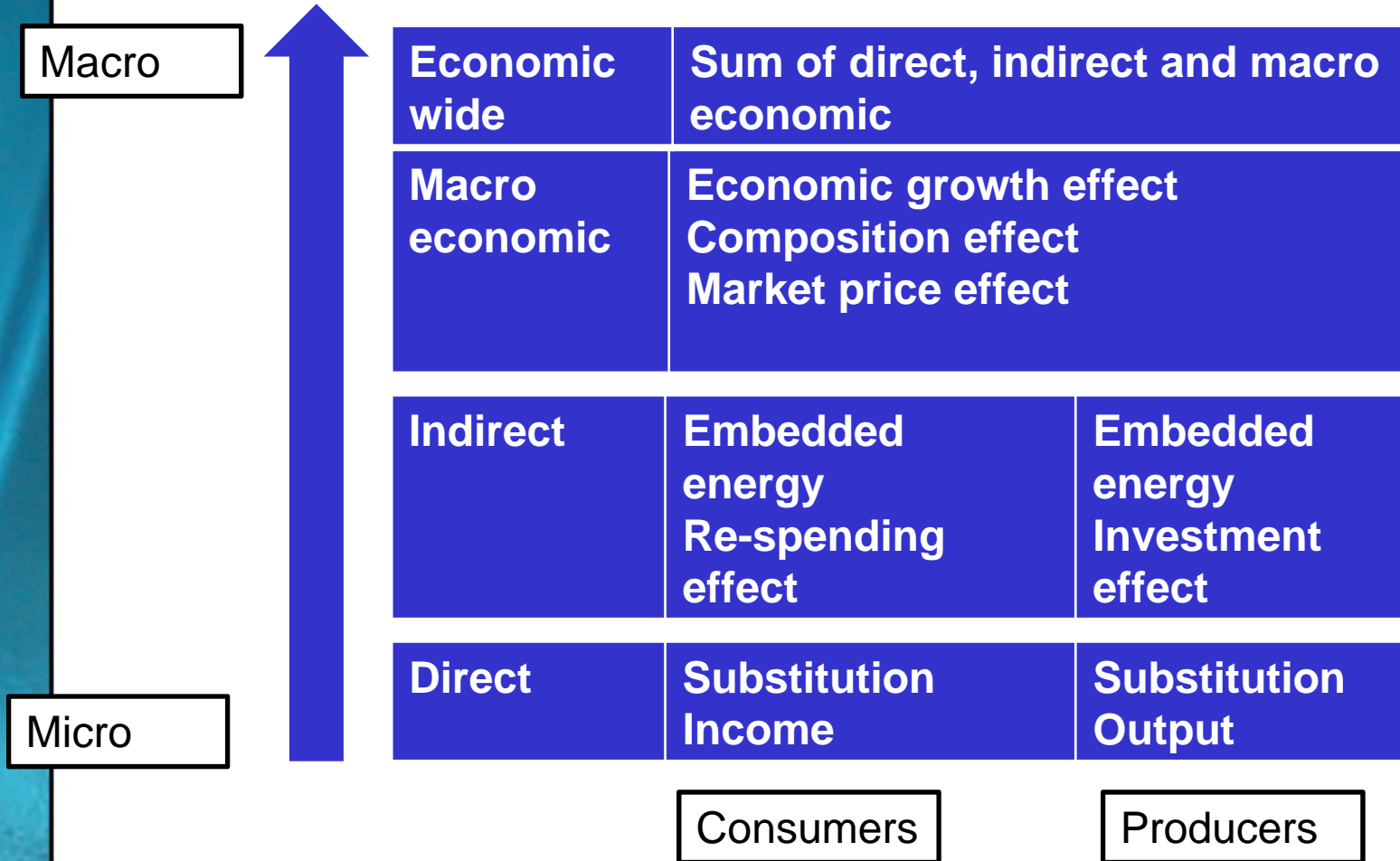
Basic economic theory states that there will be a behavioral change, so that consumption after an efficiency improvement will not follow the "engineering estimate"



Historical overview of the rebound discourse



Energy economic perspective

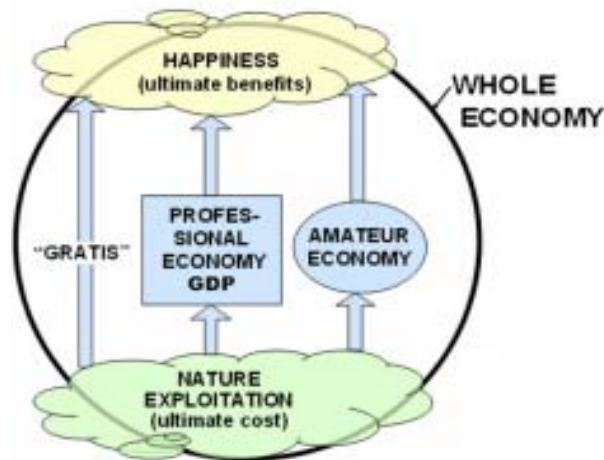


Energy economic perspective

Macro	Economic wide	Many studies above 50 % some > 100 %	
	Macro economic		
	Indirect	5-35 %	<10 %
Micro	Direct	10-30 %	14-120 %
		Consumers	Producers

Degrowth perspective

- A position that is fundamentally critical of neoclassical economics
- Economic growth constantly outstrips the efficiency gains at the macro level
- The problem lies within the conventional economic request for higher flows
- *“Happy Degrowth through more amateur economy”* article published by Jørgen Nørgård in the journal of cleaner production (2013).



- The paper proposes a means for happy and sustainable degrowth for affluent countries
- A key element in the analysis is the combined reduction in consumption with a reduction in production,

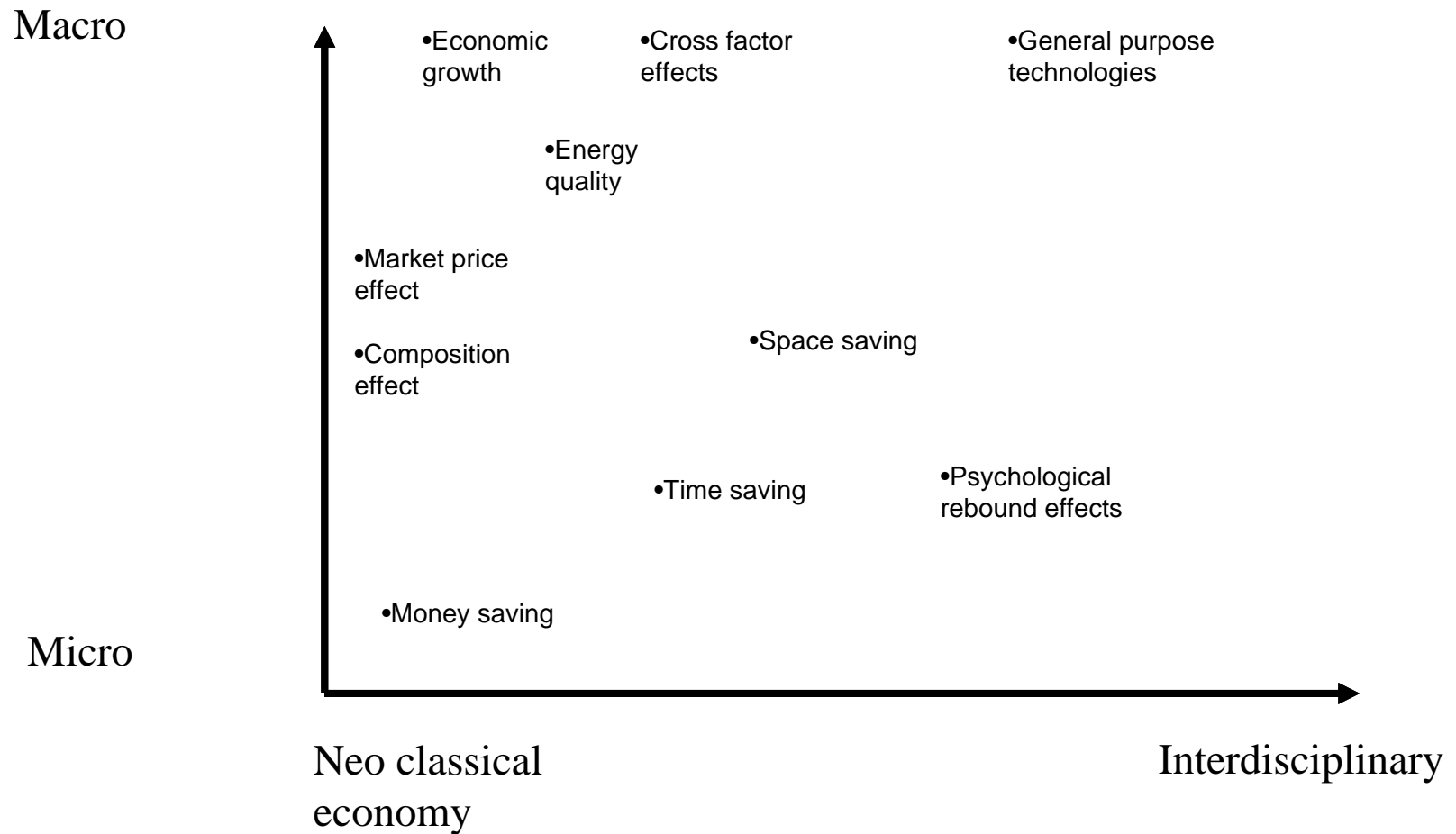
General-purpose technologies (GPTs)

“General-purpose technologies (GPTs) have a wide scope for improvement and elaboration, are applicable across a broad range of uses, have potential for use in a wide variety of products and processes and have strong complementarities with existing or potential new technologies” (Lipsev, et al., 2005 as cited in Sorell et. al 2007)

Increased automotive use may change society in unexpected ways: Buying a car increases both the use of the existing roads and the demand for more roads.

Economy-wide energy consumption is increased (Sorell et. al 2007)

Categorization of reasons for rebound effects



Conclusion

STRUCTUR

- Is it possible to mitigate rebound effects under situation with economic growth?
 - Rebound Effect should be counteracted by demand saturation
- Policies can change markets, and transform rebound effects
 - Taxes and regulations directly targeting the 'rebound activities'
 - Change from fossil fuel systems to renewable energy
 - Redirecting money spending (the saved money) to green technologies

ACTORS

- Consumers need to be aware of rebound effects
- Ensure that we spend money on low impact products
- Ensure that we spend time on low impact activities

Further research

- Better understanding of rebound effects are needed:
 - A. Improvements modeling :
 - Better data on marginal consumption patterns, and on time and space elasticity's
 - More knowledge is also required of the best ways to influence consumer behavior, to convert the insights in the rebound effect into reductions in environmental impacts (Weidema 2012)
 - B. Understand rebound effects beyond energy economics
 - How individual behavior could be influenced from a system theory perspective (calls for sociological and political science perspectives)
 - C. What ultimately matters is understanding the energy use and environmental impacts connected to rebound effects at the global level

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