SYSTEMIC JOURNEY INTO THE NEXUS 'OF RESOURCES AND RENEWABLES'

- Integrated Assessment Model (IAM) qualitative explorative stakeholder modeling of the gap between knowledge and action
- Quantitative D3 Model with >4.000 factors to simulate transition of society looking at GHG, environment, economy, welfare, happiness and RMC
- D3 EE model for a closer look at the RMC behind the transition towards renewable energy in Germany
- GEE(R) model to look at the global RMC coming with the transition towards renewable energy ...





IAM



LOCK-IN EFFECT (FROM IAM)



"It's the psychology, stupid!"

Kai Neumann Consideo GmbH www.consideo.com neumann@consideo.com

D3 MODEL

D3-Modell Version 104 Menu Search and Collect >> A This model is too large to be locally cached. Politik Gesellschaft Umweltauswirkung gesamt [Index...] Heimwerk M3 Zufriedenheit Gesamtbevölkerung [Index...] Urban Gardening M3 Eigener Garten M3 Heimwerk M1 Auswirkung auf Wirtschaft insgesamt [Index...] P: NWI Wert d Auswirkungen auf die Wohlfahrt (vergleichbar NWI) [Mrd E...] Hausarbeit M7 Hausarbeit he Hausarbeit M6 Hausarbeit M4 sarbeit M3 RMC [Index...] ►m/ PAR/ MC/OR Formula Kosten des Alkohol-Gesellschaftliche Kosten durch Kriminalitä Tabak- und Drogenko. Ausgaben zur Kompe... Wasserbelastungen Zufriedenhe... [Index...] — Auswirkung... [Index...] — Umweltau... [Index...] Aus Umweltauswirkung $oldsymbol{\odot}$ Wirtsc tische gesamt imente gesamt 2025 2033 2041 2049 2057 2017 2065 mtergebnisse Delete Properties Full screen Hide samtziel) D -) 010 00 Ð 2 \times - \bigcirc Ć

Spillover-effects once we score sustainable behavior to serve our biopsychological needs

D3 MODEL

- Happiness goes up (since new values are easier to achieve)
- Economy goes up to go down (sufficiency after green investments)
- Welfare goes up and then slightly down
- Impact on environment later is clearly reduced
- Raw material consumption goes down with a circular economy

Umweltauswirkung gesamt [Index...]

Zufriedenheit Gesamtbevölkerung [Index...]

Auswirkung auf Wirtschaft insgesamt [Index...]

Auswirkungen auf die Wohlfahrt (vergleichbar NWI) [Mrd E...]

RMC [Index...] MC/OR ► MU **BABU** Formula Umweltau... [Index...] Zufriedenhe... [Index...] - Auswirkung... [Index...] -0.6 0.4 0 2 2033 2041 2049 2057 2017 2025 2065

Spillover-effects once we score sustainable behavior to serve our biopsychological needs



GEE(R) MODEL

- Using the World Energy Outlook as a baseline for the demand...
- ... there would be enough raw materials in the world ...
- ... but not less expansive high grade
- ... and with the need for enormous mining and processing capacities.
- Implications are winners and losers (currently examined with the ICARE project with Ecologic) with game theoretical aspects
- And an overall benefit for the economy despite rising energy prices





GEE(R) BECOMING ICARE

- System dynamics modeling in contrast to rather discrete calculations show interesting dynamics ...
- ... e.g. the doubling of needed capacities when net construction and repowering come together ...
- ... with implications for prices if there are not enough capacities or unused ones ...
- ... what could well lead to some form of resignation





IMPLICATIONS FOR THE NEXUS

- Increase implementation of renewables now to take all the advantages of an early start (don't wait for later leapfrogging)
- Expect the need to support other parts of the world later (unless there is some concerted global action now)
- Rebound: resources we do not use others will
- ... efficiency means less resources for a later domestic value creation in a circular economy ...
- ... however: for geopolitical reasons we should distribute resources and value creation more evenly.
- In the long run it is the nexus between climate change and a global and local bio economy (featured with the ICARE model)



SCIENTIFICALLY

- Grounded Theory (to be falsified)
 with no alternative if we have to look
 into the future
- A connection could be proofed to be wrong...
- ... or a factor missing ...
- ... but there is no empirical evidence for future developments.

Abductive Logic



