Integrated scenario building in energy transition research

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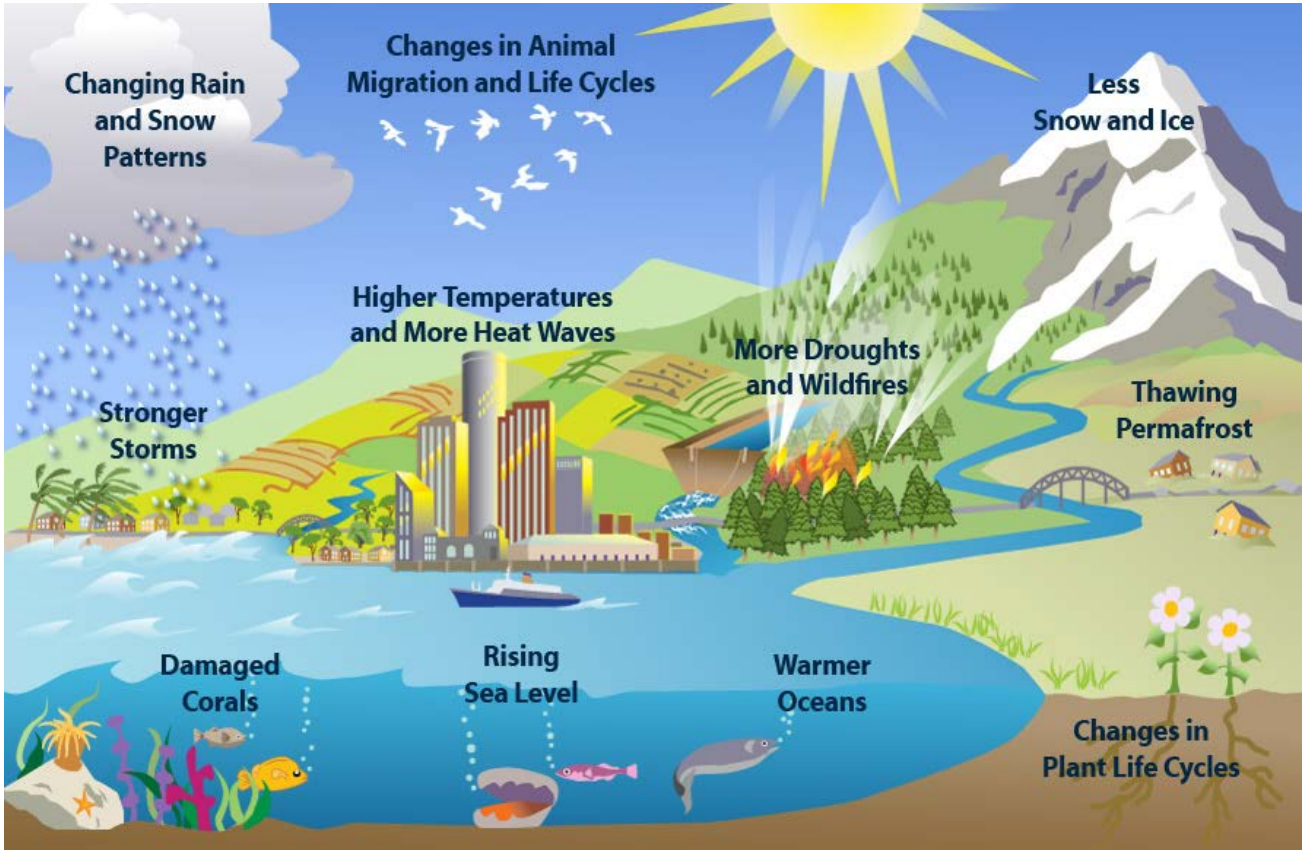
http://www.presseurop.eu/files/images/article/CHAPPATTE-nuclear-490.gif?1381824695

Energy transition – Driving forces (I): Climate change



http://www3.epa.gov/climatechange/kids/scientists/clues.html; 07.12.2015

Energy transition – Driving forces (II): Anti-nuclear movement

http://historyofnonviolence.wiki.lovett.org/Anti-Nuclear+Movement; 07.12.2015

https://josna.wordpress.com/tag/margaret-thatcher/; 07.12.2015

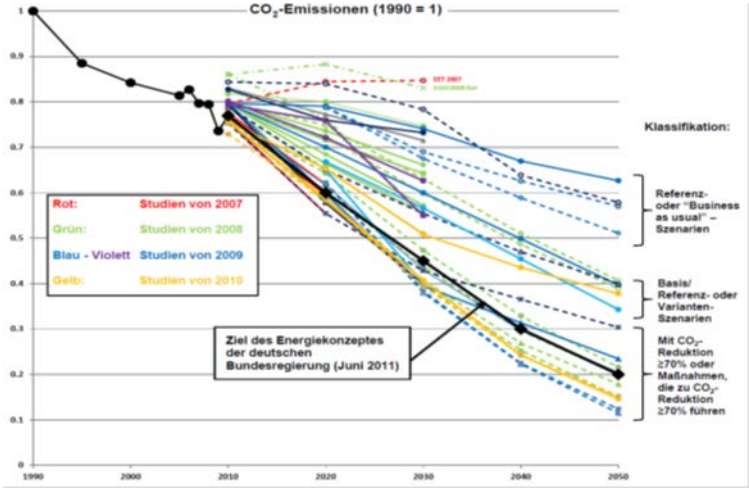
https://upload.wikimedia.org/wikipedia/commons/4/48/One_of_a_set_of_two_billboards_in_Davis%2C_California_advertising_its_nuclear-free_policy_2.jpg; 07.12.2015

Climate neutral energy system

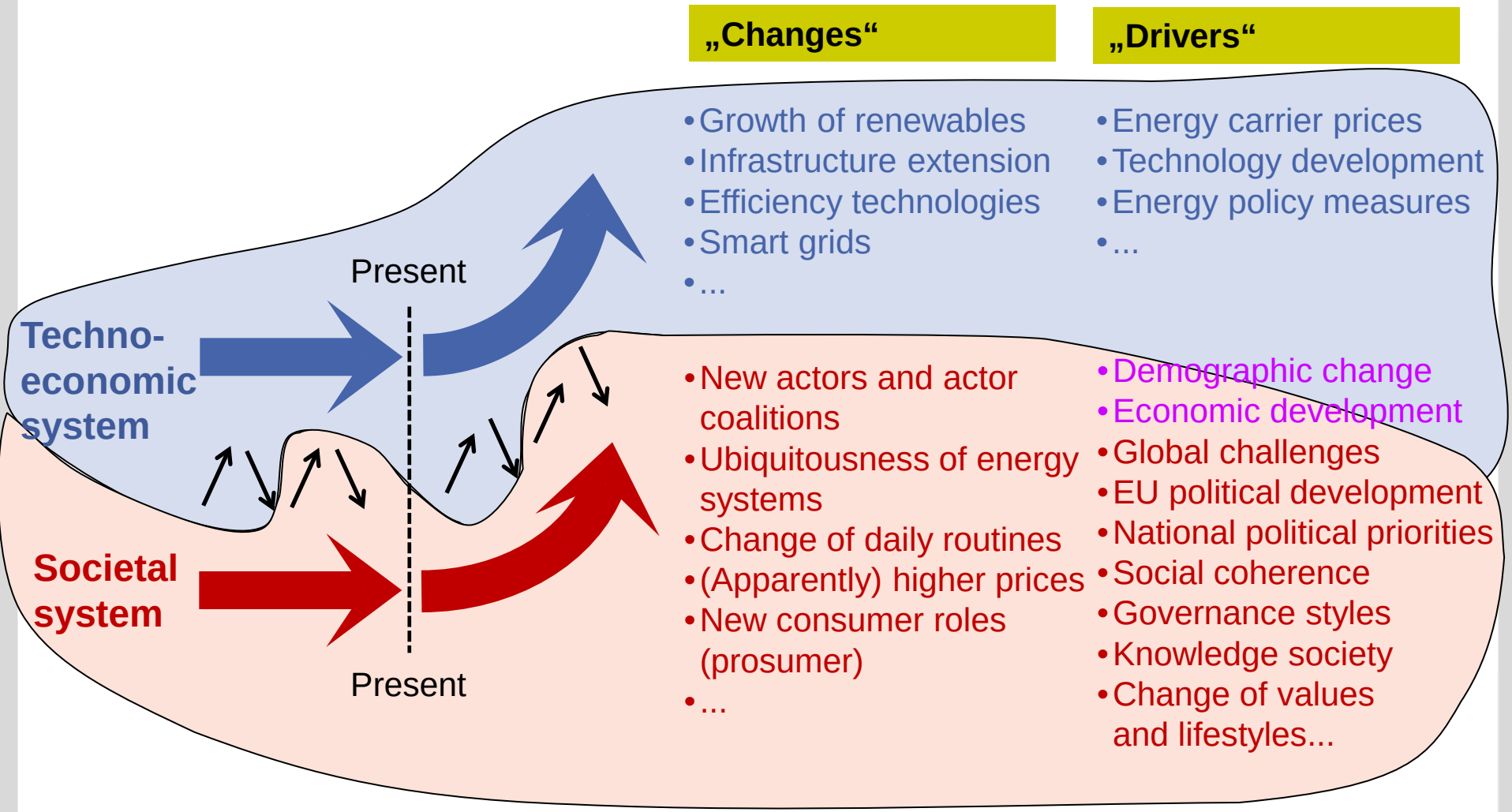
Scenarios (I)

- Main questions
  - Q1: How it could look like?
  - Q2: How to transform to such an energy system?

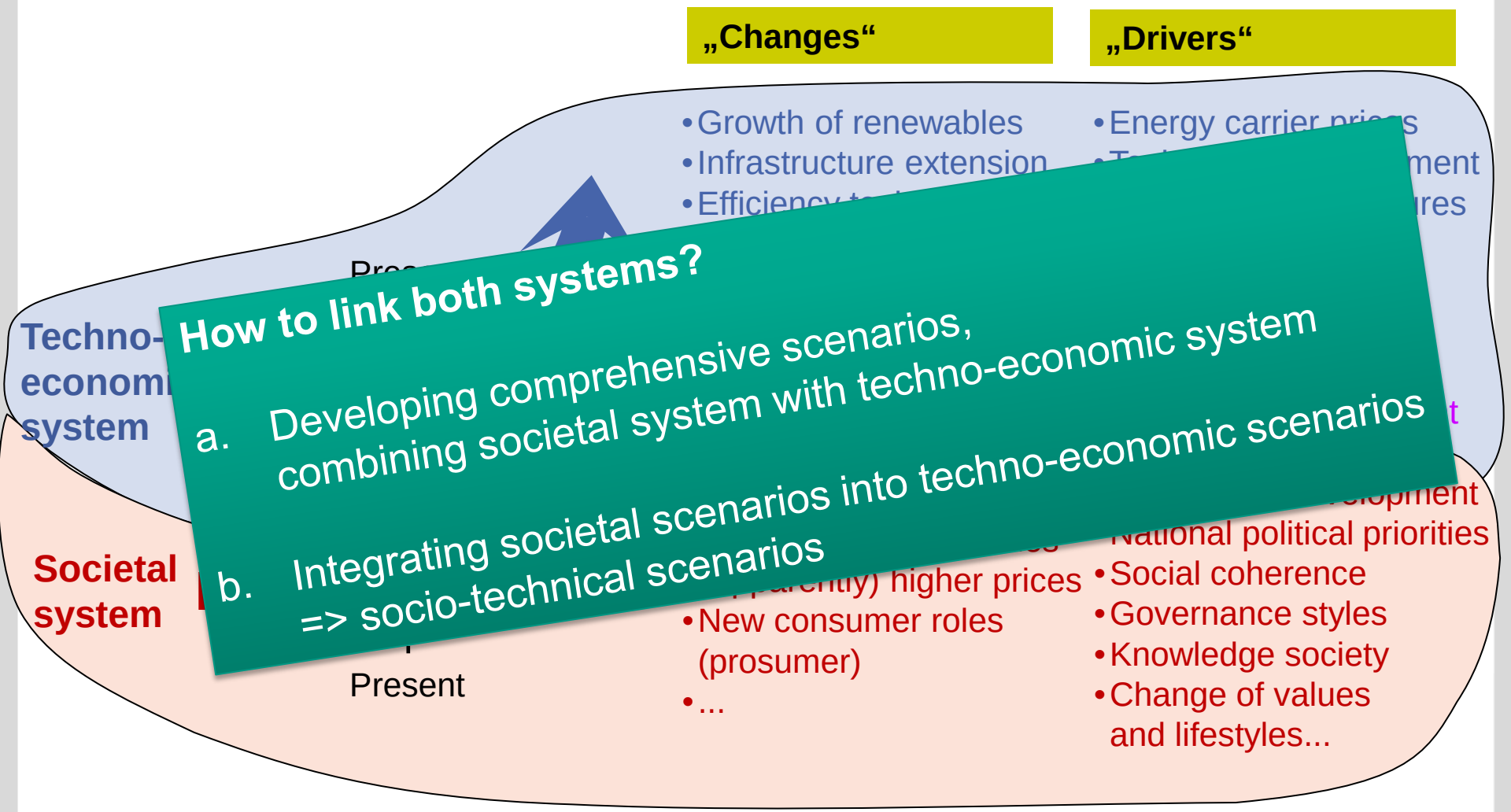
- Main approach: scenarios
  - General aim: describing of “potential futures”, i.e. ways and means over a desired time horizon
  - Different purposes
    - improving the understanding of possible cause-effect relations
    - to trigger or structure a debate on certain issues
  - Different systems boundaries and assumptions



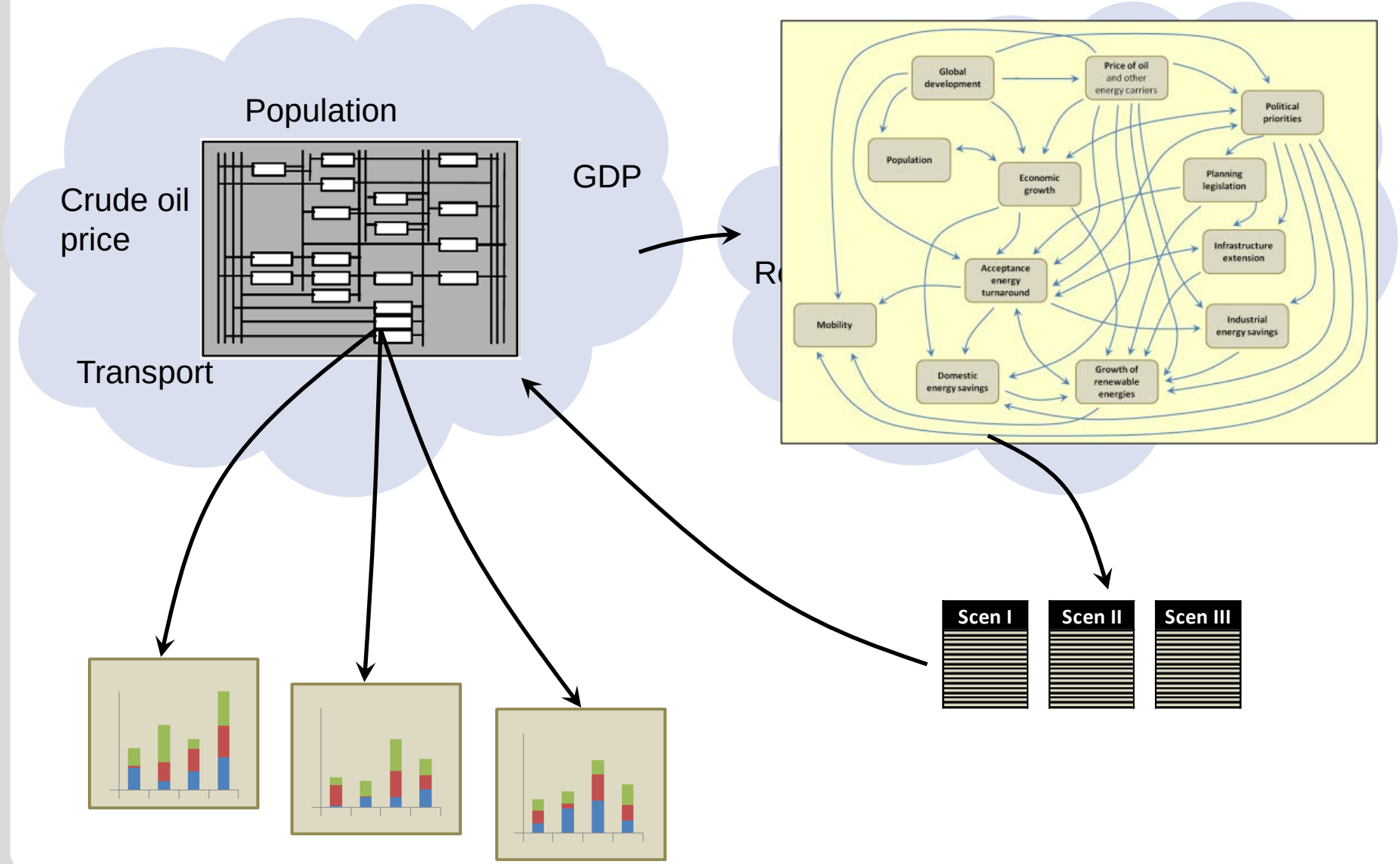
Scenarios (II)



Scenarios (II)



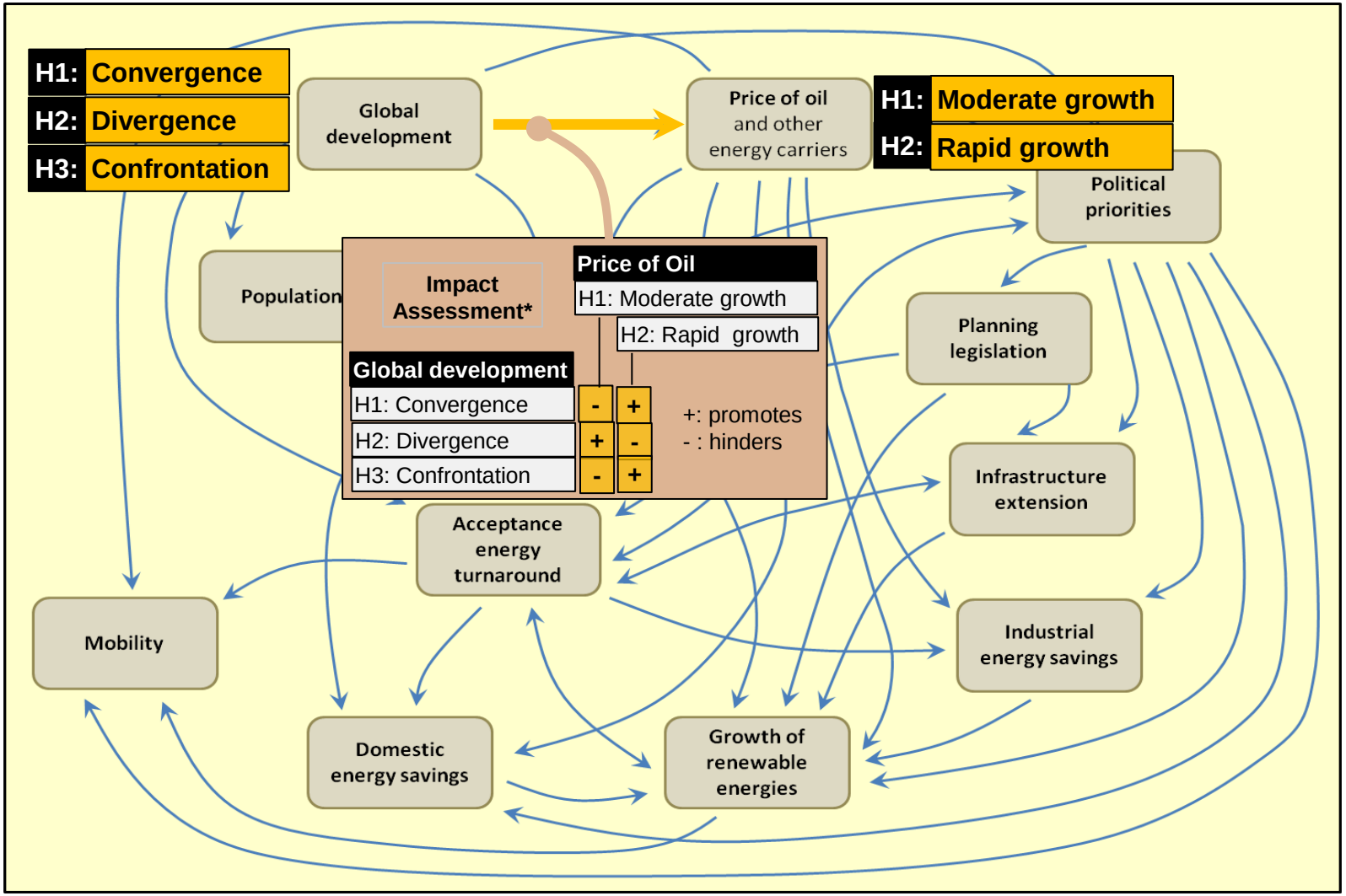
Socio-technical scenarios – Concept



CIB-based context scenarios Germany 2040: Descriptors and alternative futures

A. Global development	A1 convergence and prosperity	A2 divergence	A3 confrontation
B. Oil price	B1 moderate growth	B2 rapid growth	
C. Population	C1 slowly decreasing	C2 strongly decreasing	
D. Economic growth	D1 weak	D2 strong	
E. Political priority	E1 energy turnaround	E2 security	E3 economy
F. Acceptance energy turnaround	F1 scepticism	F2 approval	
G. Planning legislation	G1 incoherent	G2 promoting speed	G3 promoting participation
H. Infrastructure extension	H1 slow	H2 fast	
I. Growth of renewable energies	I1 slow	I2 medium	I3 fast
J. Domestic energy savings	J1 small	J2 strong	
K. Industrial energy savings	K1 small	K2 strong	
L. Mobility	L1 persistent structures	L2 downscaling	L3 downscaling and e-cars

Using cross-impacts for expressing descriptor interdependence

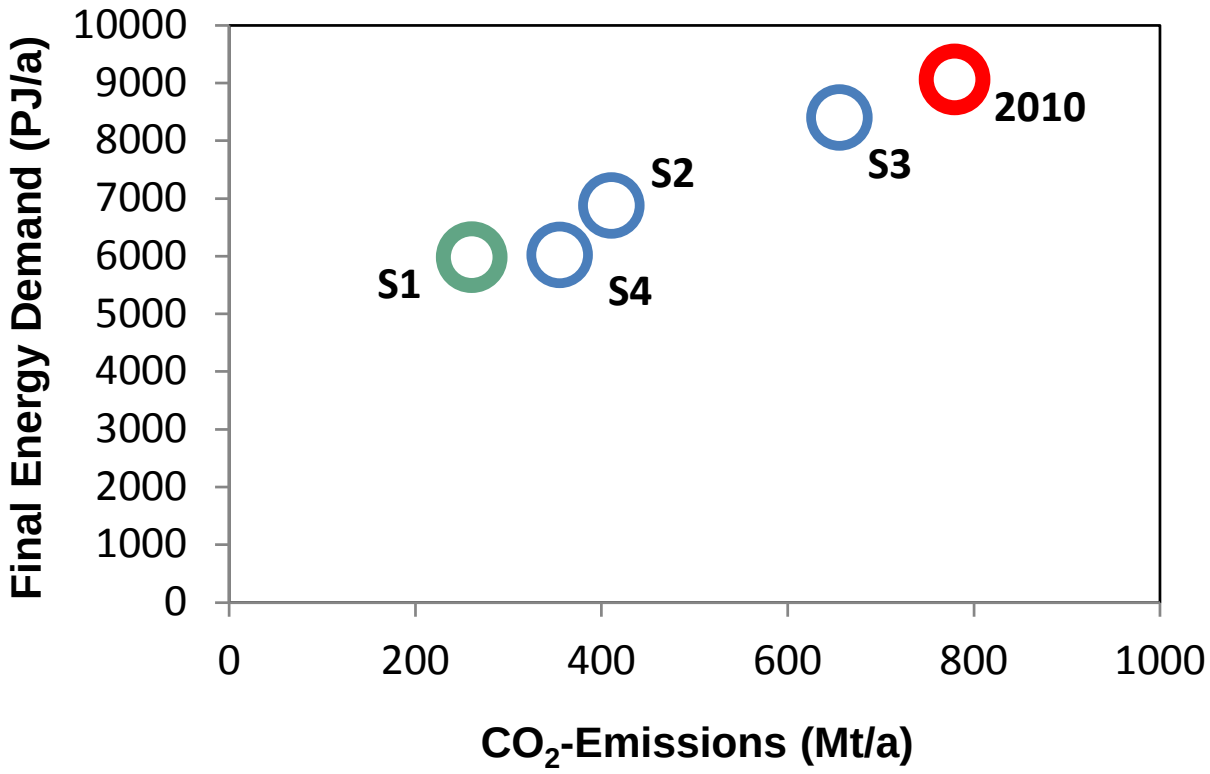


Context scenarios

Scenario no. I Consensus in a lucky environment	Scenario no. II D21 - Revolution from above	Scenario no. III 'It's the economy, stupid!'	Scenario no. IV Stormy waters ahead
A. Global development: A1 convergence and prosperity		A. Global development: A2 divergence	A. Global development: A3 confrontation
B. Oil price: B2 rapid growth		B. Oil price: B1 moderate growth	B. Oil price: B2 rapid growth
C. Population: C1 slowly decreasing			C. Population: C2 strongly decreasing
D. Economic growth: D2 strong			D. Economic growth: D1 weak
E. Political priority: E1 Energy Change		E. Political priority: E3 economy	E. Political priority: E2 security
F. Acceptance Energy Change: F2 approval	F. Acceptance Energy Change: F1 scepticism		
G. Planning legislation: G3 promoting participation	G. Planning legislation: G2 promoting speed	G. Planning legislation: G1 incoherent	G. Planning legislation: G2 promoting speed
H. Infrastructure extension: H2 fast		H. Infrastructure extension: H1 slow	H. Infrastructure extension: H2 fast
I. Growth of renewable energies: I3 fast	I. Growth of renewable energies: I2 medium	I. Growth of renewable energies: I1 slow	I. Growth of renewable energies: I2 medium
J. Domestic energy savings: J2 strong	J. Domestic energy savings: J1 small		
K. Industrial energy savings: K2 strong		K. Industrial energy savings: K1 small	K. Industrial energy savings: K2 strong
L. Mobility: L3 downscaling and e-cars	L. Mobility: L1 persistent structures		L. Mobility: L2 downscaling

Model results

Energy balances 2040
Estimations based on DLR modell



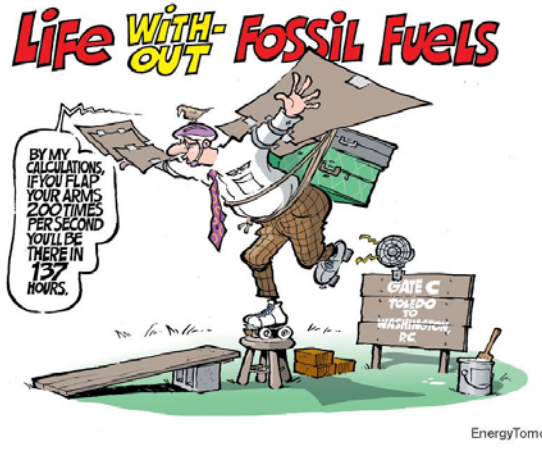
Remember:
Concept demonstration!
No final results.

S1: Consensus in a lucky environment
S2: D21 - Revolution from above
S3: “It‘s the economy stupid“
S4: Stormy waters ahead

Concluding remarks

- Potentials
  - Improved understanding of socio-technical systems
  - Improved quality of the findings
- Methodological challenges
  - Methodological rigor of the societal scenarios
  - Accountability – Linking qualitative with quantitative information
  - …
- Outlook
  - Assessing scenarios?

Source: http://andysrant.typepad.com/.a/6a01538f1adeb1970b017c370046b7970b-800wi; 28.05.2013



Source: http://jesseparent.files.wordpress.com/2012/11/airplane_cartoon.jpg, 28.05.2013

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Source: http://www.thehindu.com/multimedia/dynamic/00003/INDIA_GREENPEACE_3890f.jpg; 28.05.2013