CENTRE FOR RESEARCH INTO ENERGY DEMAND SOLUTIONS

Policy & governance

UK Research and Innovation

# Why don’t governments pay more attention to energy demand?

Investigating systemic reasons for the supply/ demand asymmetry in energy policy

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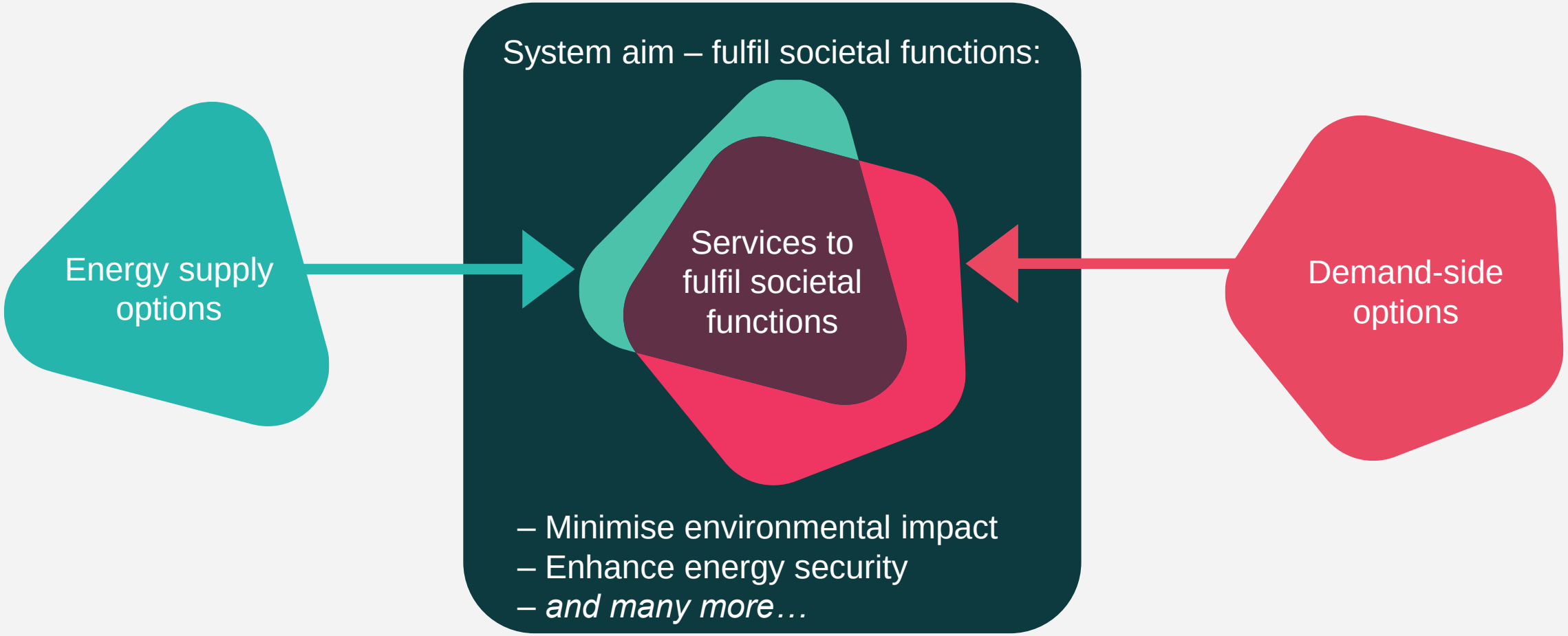
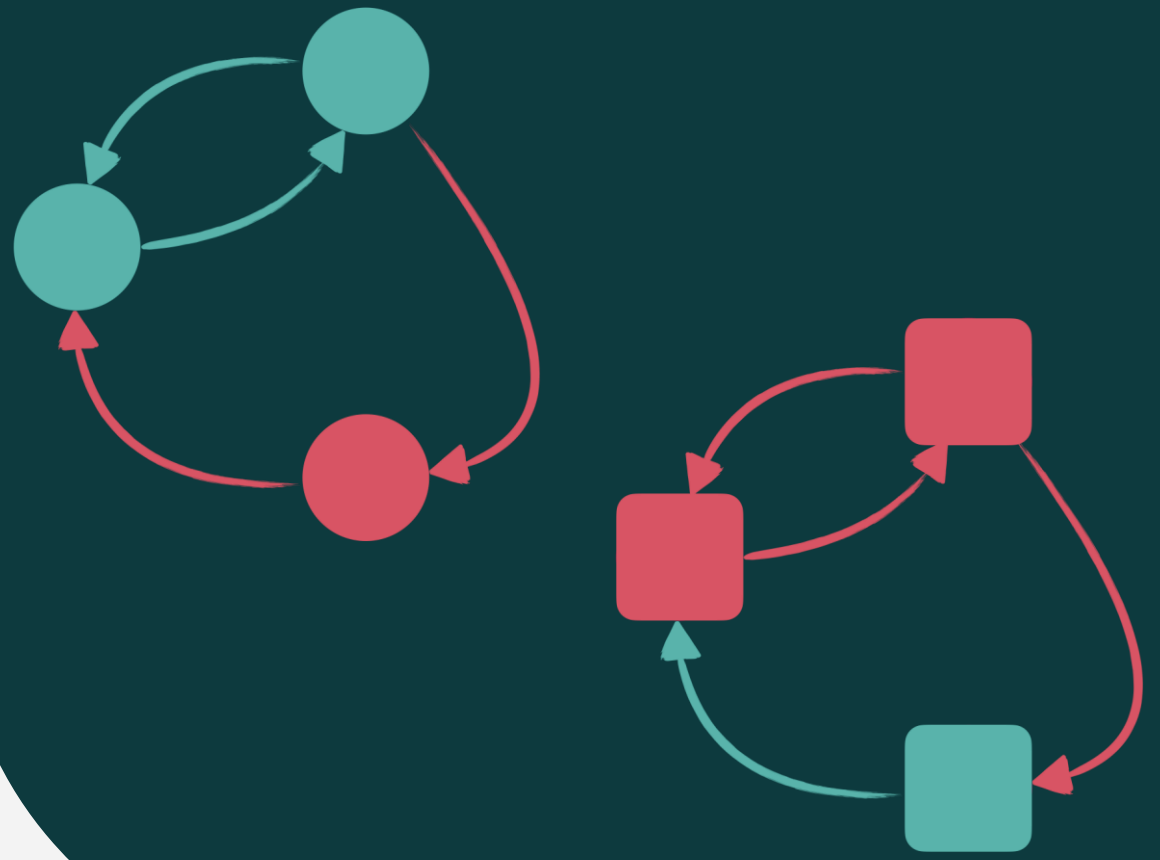
# Supply/demand policy asymmetry



# Systemic problem

Four main elements of **dynamic complexity**: accumulations, rates of change, feedback processes, nonlinear relations.

Even if system purposes and elements are different, the interconnection of elements (**structure**) might be similar enough to make transferable insights possible.




Meadows, D.H., 2008. Thinking in systems: a primer. White River Junction: Chelsea Green Publishing.

Rapoport, A., 1968. Foreword, in: Buckley, W. (Ed.), Modern Systems Research for the Bahavioural Scientist. Aldine Publishing Company, Chicago.

Sterman, J.D., 2002. All models are wrong: reflections on becoming a systems scientist. *System Dynamics Review* 18, 501–531.

# Socio-technical system

Three ontological dimensions:

- Actors
- Rules
- Material reality


Geels, F.W., 2004. From sectoral systems of innovation to socio-technical systems. *Research Policy* 33, 897–920

Geels, F.W., Bruno Turnheim, 2022. *The great reconfiguration: a socio-technical analysis of low-carbon transitions in UK electricity, heat, and mobility systems*. Cambridge University Press, Cambridge.

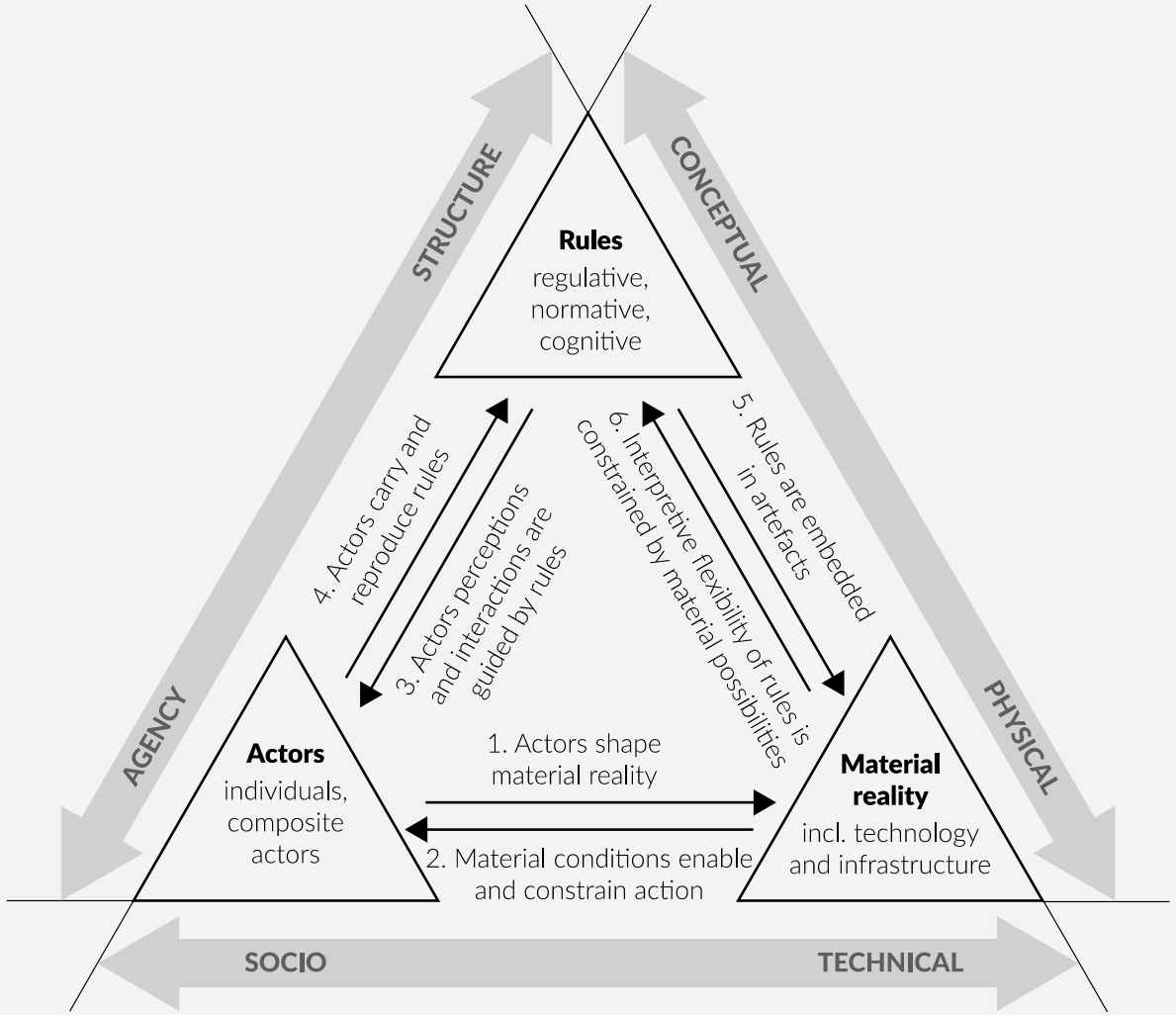




**Figure 1.** Three ontological dimensions of socio-technical systems (based on Geels 2004, p.903 and Geels and Turnheim, 2022, p.9)

# Reasoning by analogy

**Isomorphism** – mapping that preserves structure (relations among elements)


Langley, A., 1999. Strategies for theorizing from process data. The Academy of Management Review 24, 691–710.

Peirce, C.S., 1903. Sundry logical conceptions, in: Houser, N., Kloesel, C. (Eds.), The Essential Peirce: Selected Philosophical Writings. Volume 2 (1893–1914). Indiana University Press, 1998, Bloomington, pp. 267–289.

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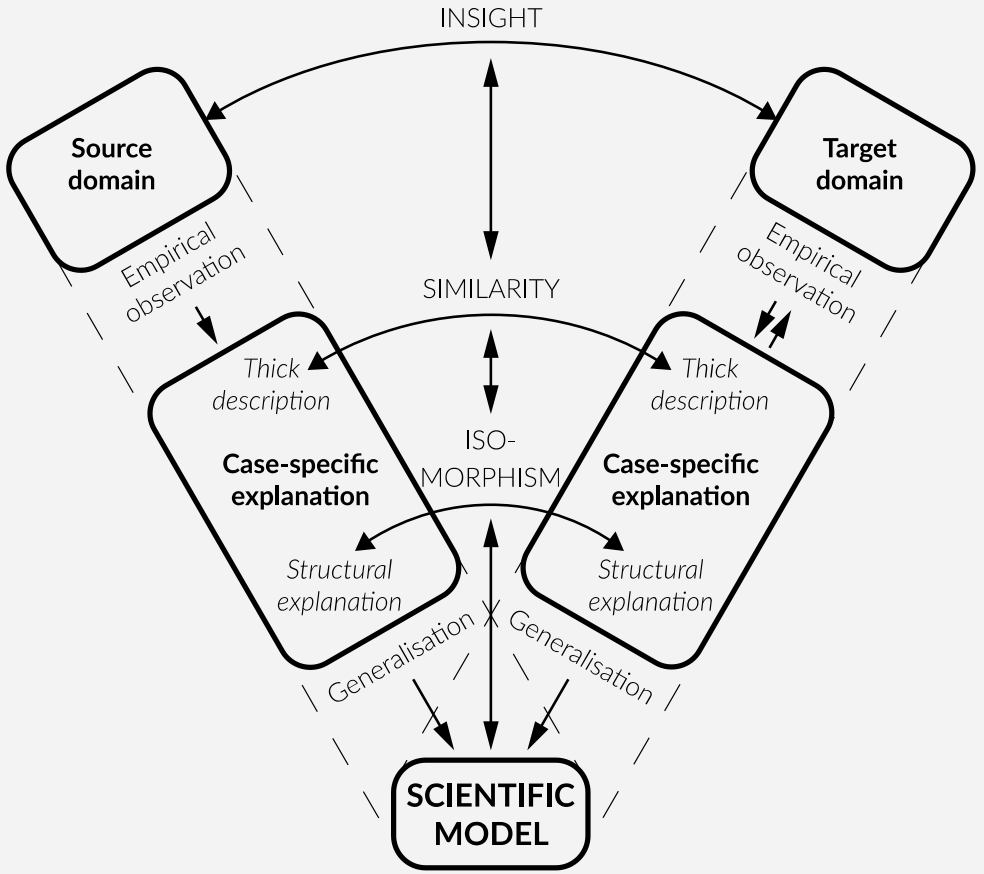


**Figure 2.** Reasoning by analogy (based on Tsoukas, 1991)

# Meta-narrative systematic review

Learning from other social systems that exhibit similar asymmetry, e.g., asymmetry in healthcare between curing illness and investing in preventive healthcare.


Gough, D., 2013. Meta-narrative and realist reviews: guidance, rules, publication standards and quality appraisal. BMC Med 11, 22.

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Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., Kyriakidou, O., Peacock, R., 2005. Storylines of research in diffusion of innovation: a meta-narrative approach to systematic review. Soc Sci Med 61, 417–430.

Kuhn, T.S., 1962. The structure of scientific revolutions. University of Chicago Press, Chicago.

Wong, G., Greenhalgh, T., Westhorp, G., Buckingham, J., Pawson, R., 2013. RAMESES publication standards: meta-narrative reviews. BMC Med 11, 20.

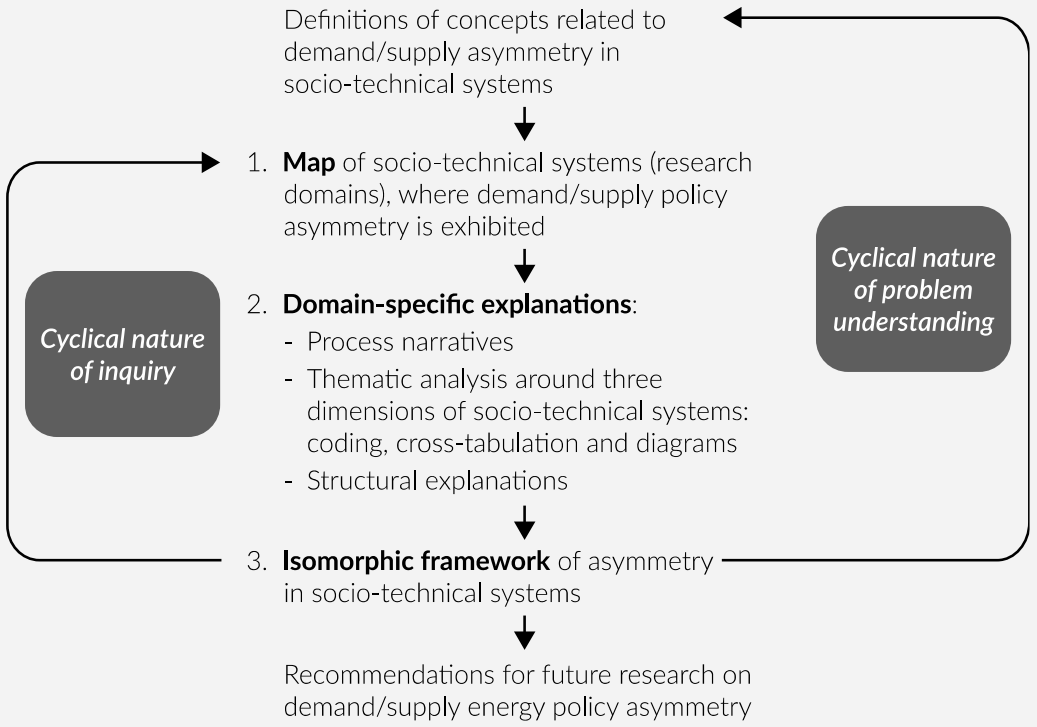




**Figure 3.** Meta-narrative steps

# Systems in the review

| Socio-technical systems | Research scope for asymmetry | Demand/supply symmetry terminology |
|---|---|---|
| 1. Energy system | Production and use of energy | Demand vs supply |
| 2. Water system | Supply and use of water | Demand vs supply |
| 3. Food system | Production and use of food | Demand vs supply |
| 4. Transportation system | Transport control | Demand management vs ‘predict and provide’ |
| 5. Industrial production system | Pollution control | Integrated vs reactive control; wholistic vs end-of-pipe regulation |
| 6. Material production system | Waste control | Waste reduction vs waste management |
| 7. Healthcare system | Population health | Prevention vs cure |
| 8. Management system | Organisation management | Investment vs operation; improvement vs production |
| | Infrastructure management | Proactive vs reactive maintenance; preventing vs correcting defects |

# Hierarchy of solution strategies

| Energy system | | Energy system | Industrial and material production systems | | Health system |
|---|---|---|---|---|---|
| **Energy** | **Carbon** | **Food waste** | **Biodiversity** | **Material waste** | **Healthcare** |
| Avoid | Wasted energy avoidance | Prevention | Avoid | Prevent | Primary prevention |
| Shift | | | | Reduce | Secondary prevention |
| Improve | Efficient conversion | Redistribution | Minimise | Reuse | |
| Renewables | Renewable energy | Animal feed/ compost | Restore | Recycle | |
| | Offset | Energy recovery | Offset | Recovery | Tertiary prevention |
| | | Disposal | | Landfill | |

# Resilience vs productivity

| Socio-technical systems | Research scope for asymmetry | Demand/supply symmetry terminology |
|---|---|---|
| Industrial production system | Pollution control<br>Goal: Reduce harm<br>Rule: End-of-pipe treatment | Goal: Mirror the laws of nature (ecosystem resilience)<br>Rule: Upstream solutions |
| Healthcare system | Goal: Cure disease<br>Rule: Invest in treatment, drug development, etc. | Goal: Build internal resistance to disease<br>Rule: Invest in health promotion |
| Management system | Organisational management<br>Goal: Maximise profit<br>Rule: Exploitation | Goal: Build capacity to adapt to market change<br>Rule: Exploration |
| | Infrastructure manangement<br>Goal: Maximise output<br>Rule: Longer times for infrastructure use | Goal: Maintain the quality of service<br>Rule: Pro-active maintenance |

# Self-organisation

The demand/ supply asymmetry in socio-technical systems and their policies can be partly explained by the lack of adaptive capacity in the systems for renewal and reorganization.


Gunderson, L.H., Holling, C.S., 2002. *Panarchy: understanding transformations in human and natural systems*. Island Press, Washington, D.C., WU, USA.

Holling, C.S., 2010b. The resilience of terrestrial ecosystems: local surprise and global change, in: Gunderson, L.H., Allen, C.R., Holling, C.S. (Eds.), *Foundations of Ecological Resilience*. Island Press, Washington, D.C., WA, USA.

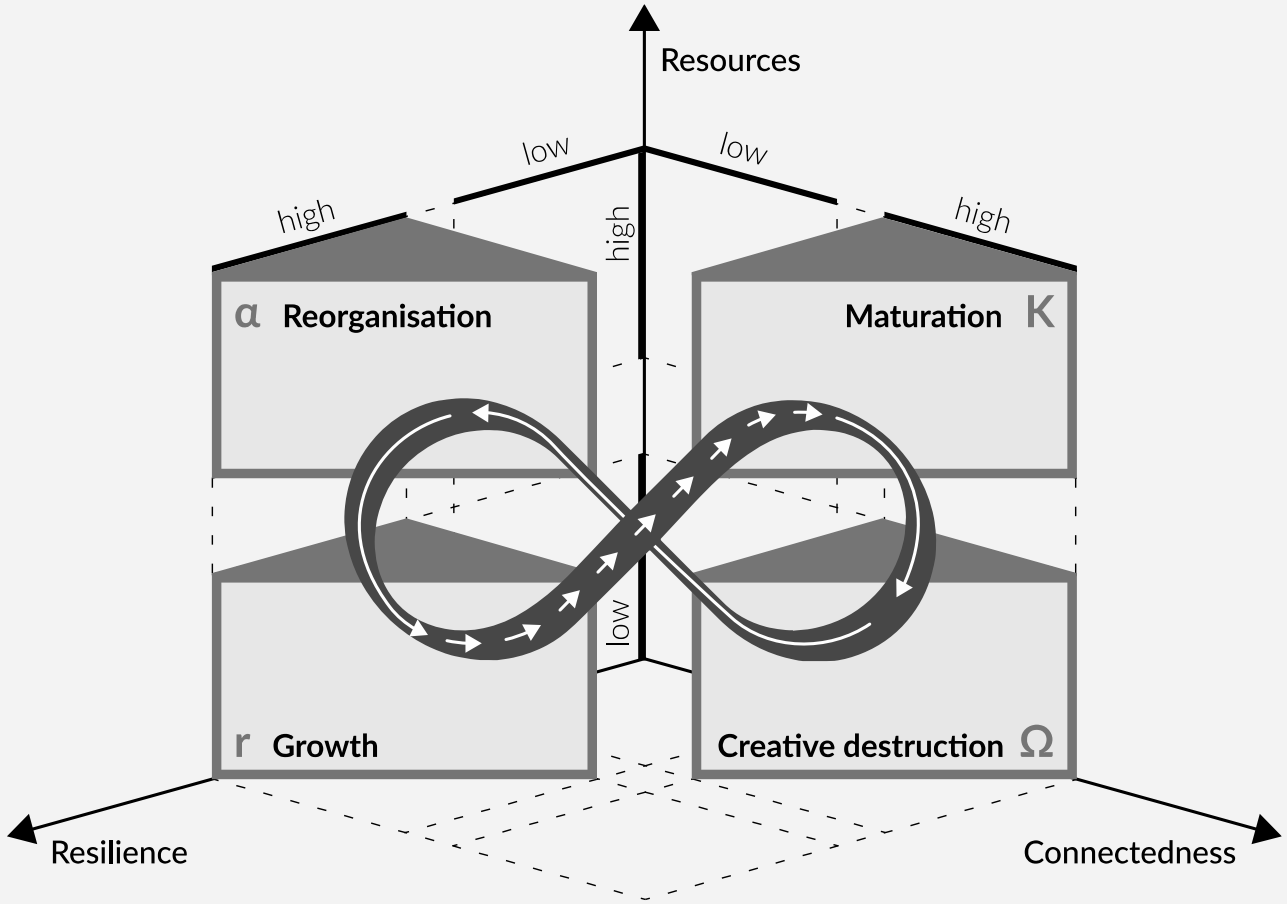




**Figure 4.** Adaptive cycle (based on Gunderson and Holling, 2002, p. 41; Holling, 2010, p. 95)

# Boundary of problem understanding

A tendency of certain systems to quickly expand, and their resistance to shrink

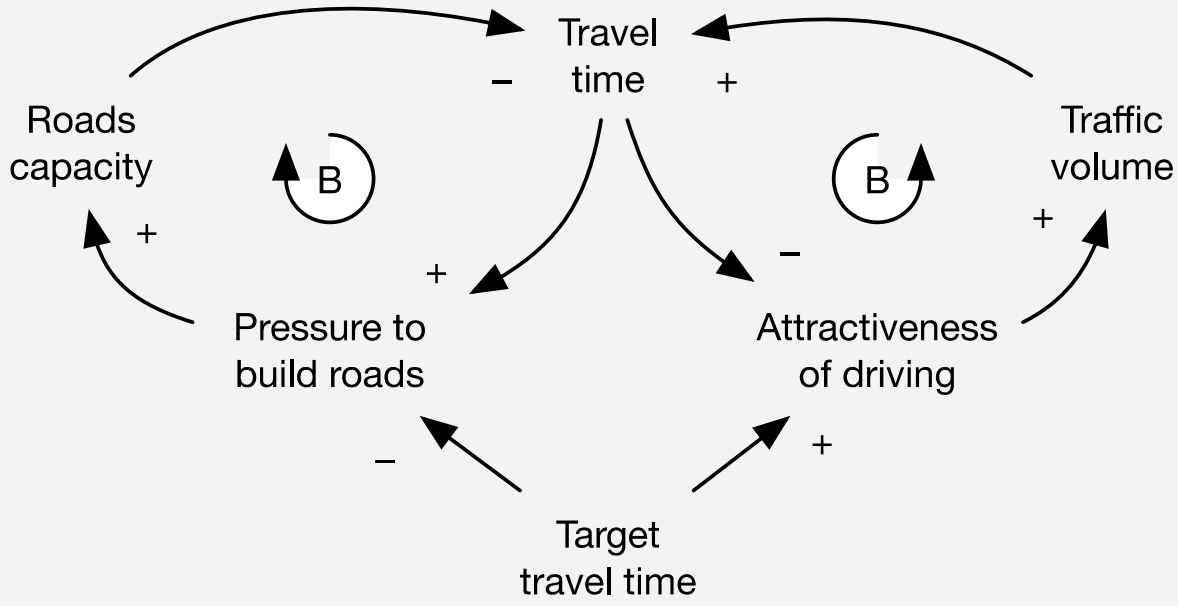



**Figure 5.** Choosing system boundary to control system size

# Actor agency within the system

Capabilities of internal actors as a base for actor agency, and system role to build such capabilities

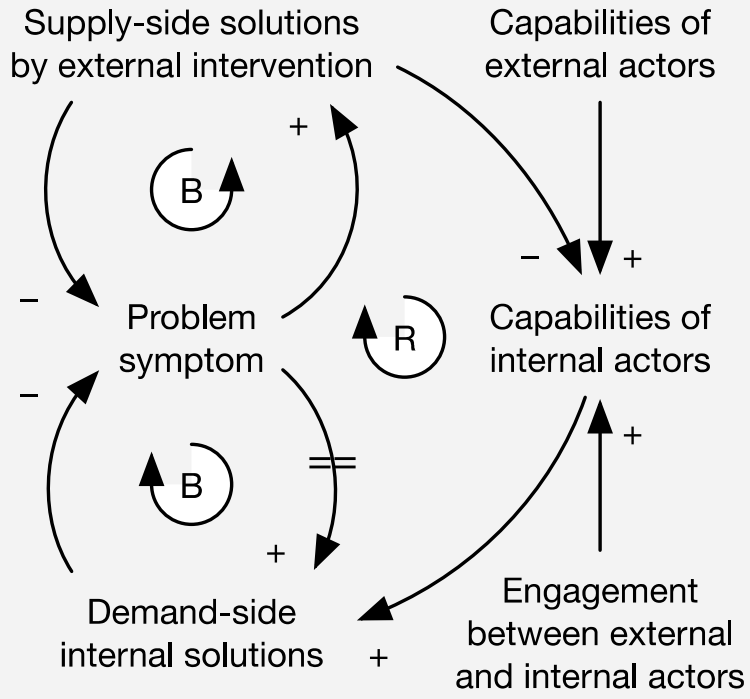
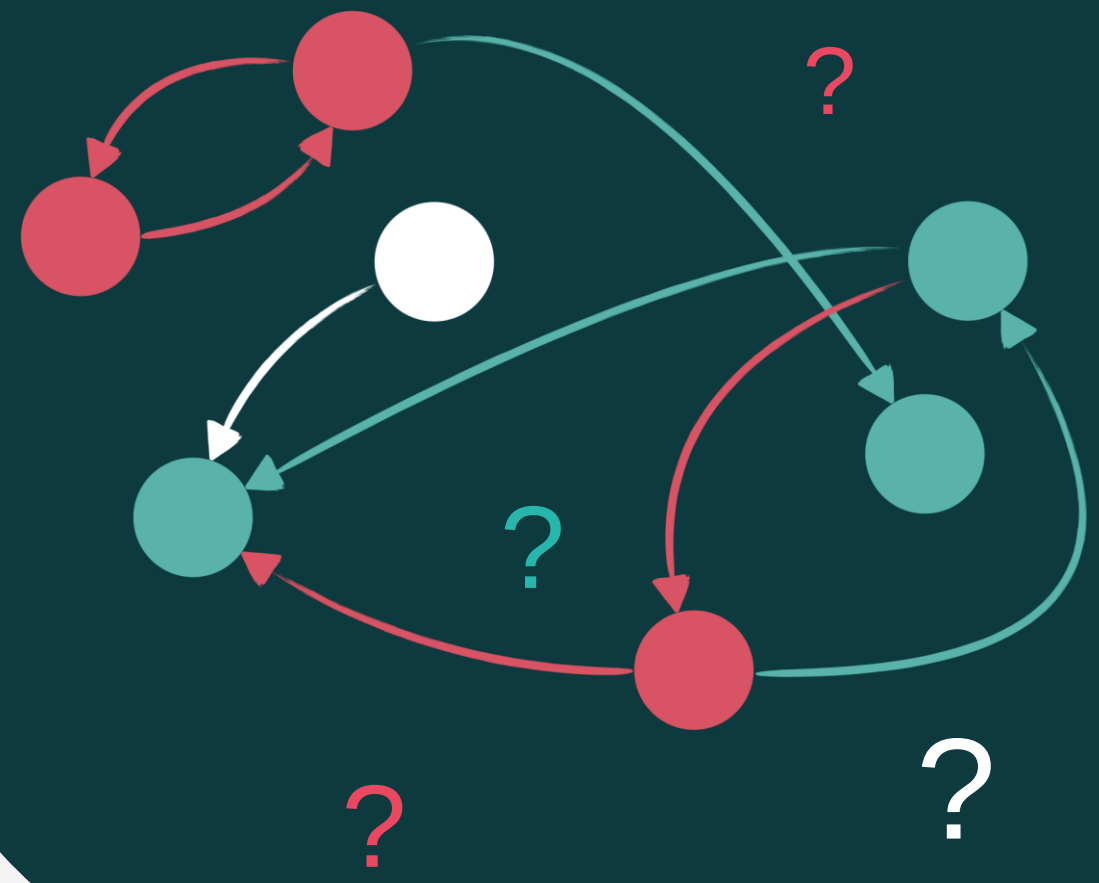



**Figure 6.** System role to nurture capabilities for actor agency

# Insights and further steps

1. We can see policy asymmetry in other social systems (and can hopefully learn from them).
2. Identifying structural reasons for asymmetry is difficult. However, some preliminary insights are drawn.
3. A new systemic conceptual lens for the problem of demand/supply asymmetry in energy system and its policies



# Thank you for listening

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