

# Energy transition perspectives

Petr Ocelík & Colin Kimbrell

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# Outline

- Transition perspectives
- Multi-level perspective
- Case study

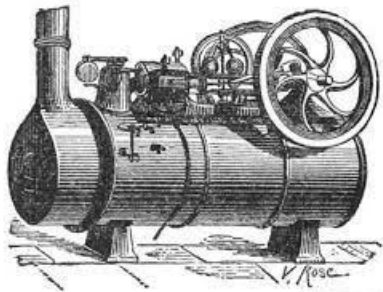
# Transition perspectives

# Socio-technical systems

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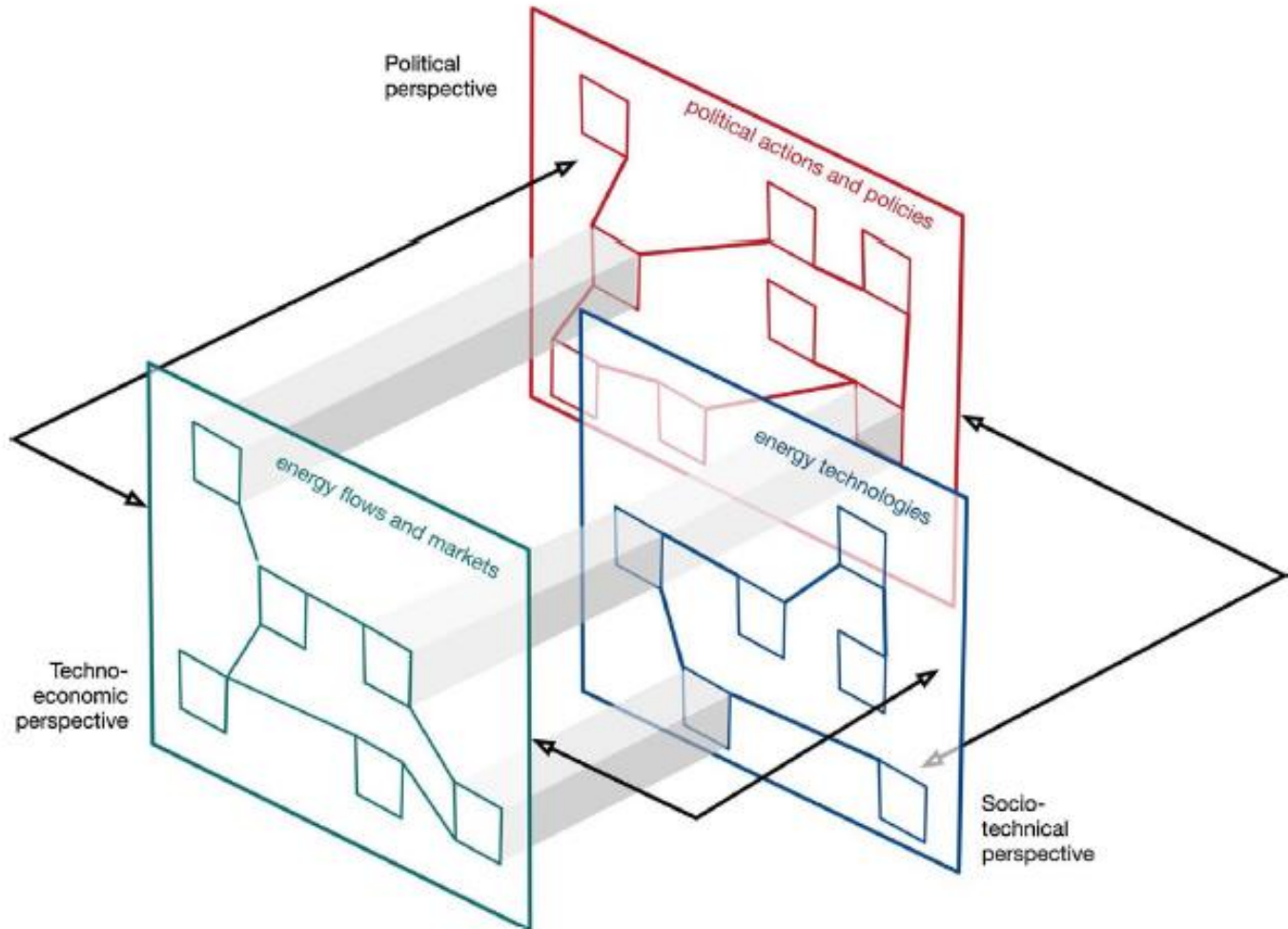
# Socio-technical systems

- **Socio-technical systems** are involve complex interactions among social actors, technologies, and environmental aspects (Emery & Trist 1960).
- **Adaptive:** STS are able to respond to external environment and pursue goals (e.g., decarbonization).
- **Interdependent:** STS consist of separate yet **co-evolving** technical (e.g., energy infrastructure) and social subsystems (e.g., energy governance).
- **Equifinal:** STS goals (e.g., decarbonization) can be achieved through more than one pathway → STS design choices.

# What is (energy) transition?

- **Socio-technical systems** involve complex interactions among social actors, technologies, and environmental aspects (Emery & Trist 1960).
  - **Socio-technical transition** is a shift from one STS to another.
  - **Energy transition** is a fundamental change in the structure of primary supply to a new energy system (Smil 2010).
- **transition theories** provide insights on how such transition evolve

# Typology of energy transition perspectives





# Technico-economic perspective

- **Technico-economic systems (TES)** are defined by **energy flows** associated with energy extraction, conversion, and use processes coordinated by **energy markets**.
- TES extract energy from (1) **natural resources** and (2) deliver **energy services** to consumers through markets.
- TES respond to **supply-demand (in)balance** → enabling/preventing development of specific resources and/or technologies
- TES susceptible to **long-term cycles** of macro-economic and technological development → enabling/preventing transition

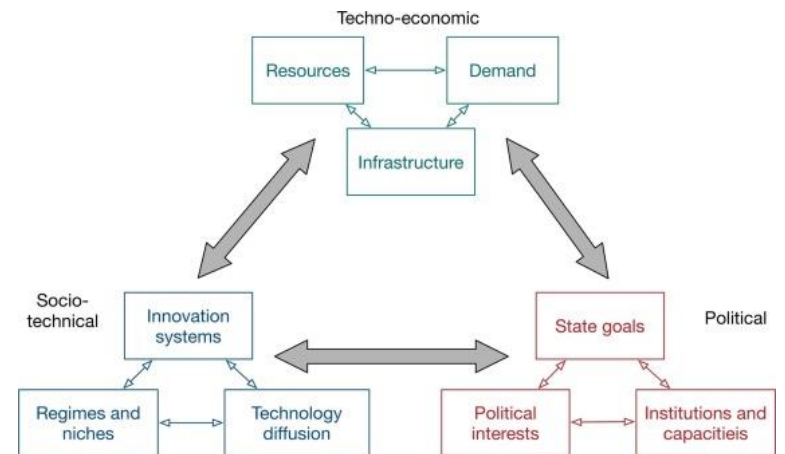
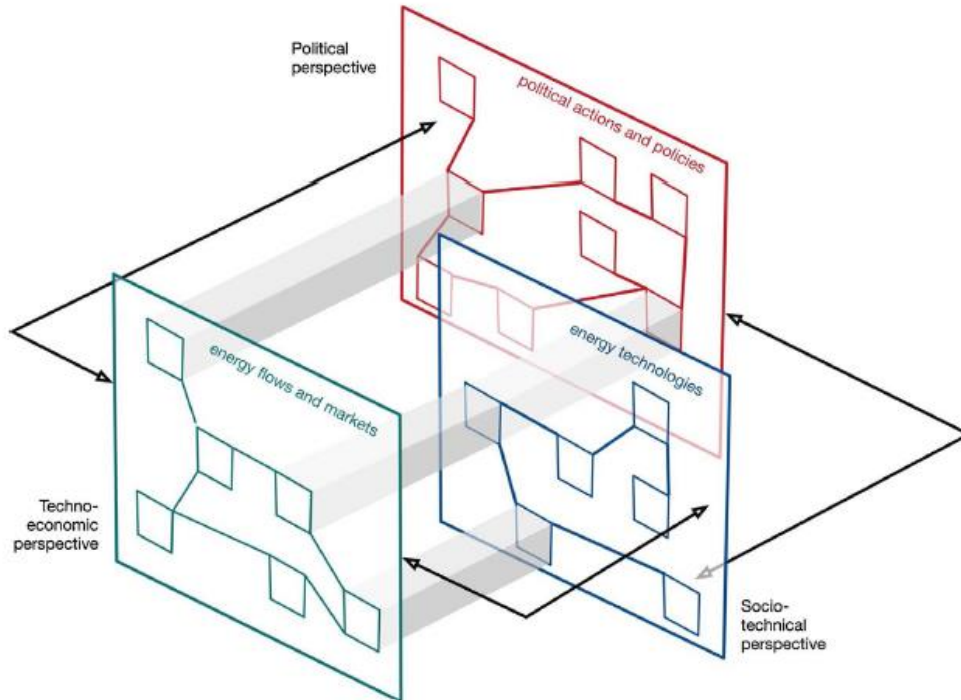
# Socio-technical perspective

- **Socio-technical systems** are defined by networks of knowledge, norms and practices associated with energy technologies.
- STS focus on the emergence and **diffusion of new technologies**.
- STS defined by conflicting relationship between **innovation subsystems** (Markard 2012) and **socio-technical regimes** (Geels 2002).
- Regimes are maintained by existing **path-dependencies** and **technological lock-ins** constraining spread of innovation.

# Political perspective

- **Political action systems** are defined by networks of actors influencing the political regulation of energy systems (Cherp et al. 2018).
- **PAS** is not really a coherent perspective → recognition that politics constitute a semi-autonomous sphere of (energy) transition
- Different transition pathways produce different configurations of “winners” and “losers” → **who gets what, when, and how** (Lasswell 1966)

# Typology of transition perspectives



Multi-level perspective

# Multi-level perspective

- **MLP** (Geels 2002) assumes that transitions occur through interactions within and across three analytical level: regimes, niches, and landscapes.
  - **(Socio-technical) regime** is a set of embedded rules and practices enabling or constraining actors in relation to the existing energy system (Geels 2014).
  - **Niche** is a protected space for innovative activities.
  - **Landscape** is a wider context influencing niche and regime dynamics including social, spatial, and material structures.
- transition is a **shift from one regime to another**

# Regime resistance

- Regime is reproduced by **incumbents** – established actors who profit from the existing regime (Smink 2015)
- Key assumption: **incumbents and policymakers** form coalition oriented towards the maintaining **status quo** (Geels 2014)
  - **coalition dynamics**: the nature and pace of energy transition is contested by policy actors and their coalitions (Markard et al. 2016)
  - They use various **strategies** to influence transition pathways (Geels 2014; Johnstone et al. 2017)

# Regime actors' power resources

- The **regime actors** rely on various **forms of power** (Geels 2014).
- **Instrumental:** using resources in immediate interactions with others (lobbying, subsidies, campaigns, etc.) → policy process control
- **Discursive:** shaping public debates to control what is being discussed (agenda setting) and how it is being discussed (framing) → dominant discourse
- **Material:** technological lock-ins through clean fossil technologies (CCS) → delay of renewable infrastructures development
- **Institutional:** design of formal and informal political institutions more congruent with incumbents' interests → closed opportunity structures



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- **Securitization:** incumbents' interests framed as a matter of security.



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- **Re-invention:** regime and/or its components are reframed to appear innovative.



# Incumbents' strategies

- **Incumbent actors** use various **strategies** to resist regime change (Johnstone et al. 2017).
- **Masking:** suppression, socialization or externalization of the full costs of the regime

#EXXON  
KNEW

## B. Summary of Major Topic Issues

### (f) Climatic Change, Carbon Cycle

The global biogeochemical carbon cycle is a very complex system. It is assumed that the major contributors of CO<sub>2</sub> are the burning of fossil fuels which has been level at  $4.5 \times 10^{15}$  grams per year and oxidation of carbon stored in trees and soil humus. The major sinks are the atmosphere and the oceans. The atmosphere in 1978 contained  $695 \times 10^{15}$  grams.

New research from Harvard University, in collaboration with the University of Birmingham, the University of Leicester and University College London, found that more than 8 million people died in 2018 from fossil fuel pollution, significantly higher than previous research suggested—meaning that air pollution from burning fossil fuels like coal and diesel was responsible for about 1 in 5 deaths worldwide.

The study, “Global Mortality From Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion,” published in Environmental Research, is based on a groundbreaking analysis that enabled the researchers to directly attribute premature deaths from fine particulate pollution (PM 2.5) to fossil fuel combustion.

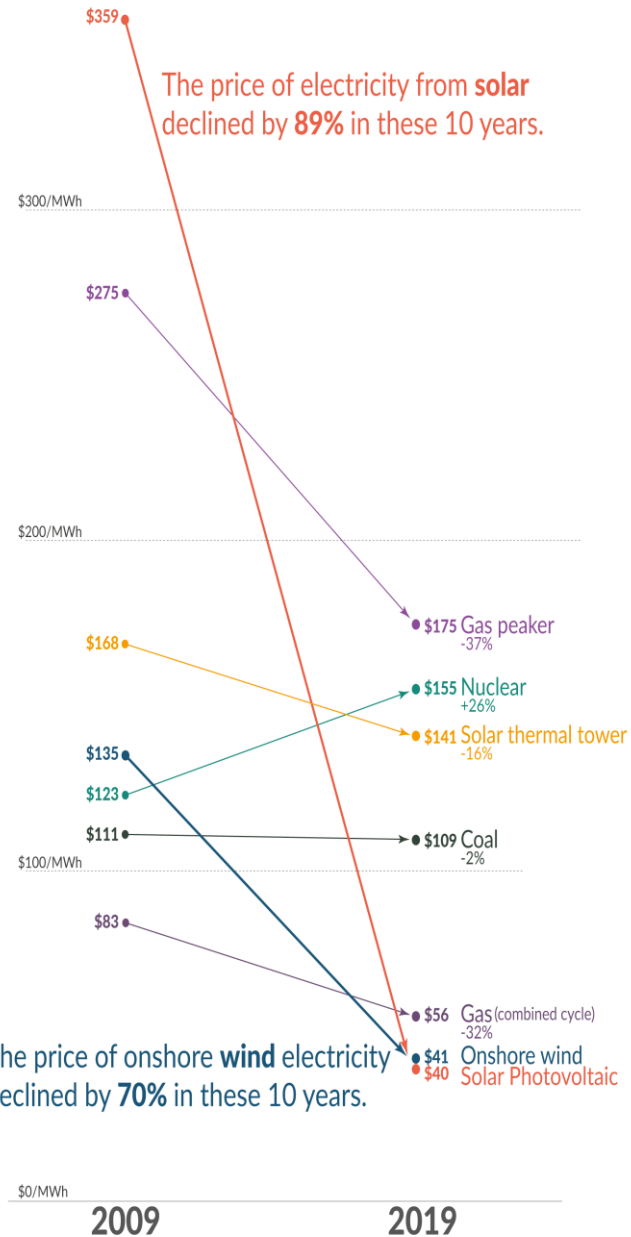
# Incumbents' strategies

- **Incumbent actors** use various **strategies** to resist regime change (Johnstone et al. 2017).
- **Capture:** incumbents in a position of political and regulatory power; “revolving-doors”.



# The price of electricity from new power plants

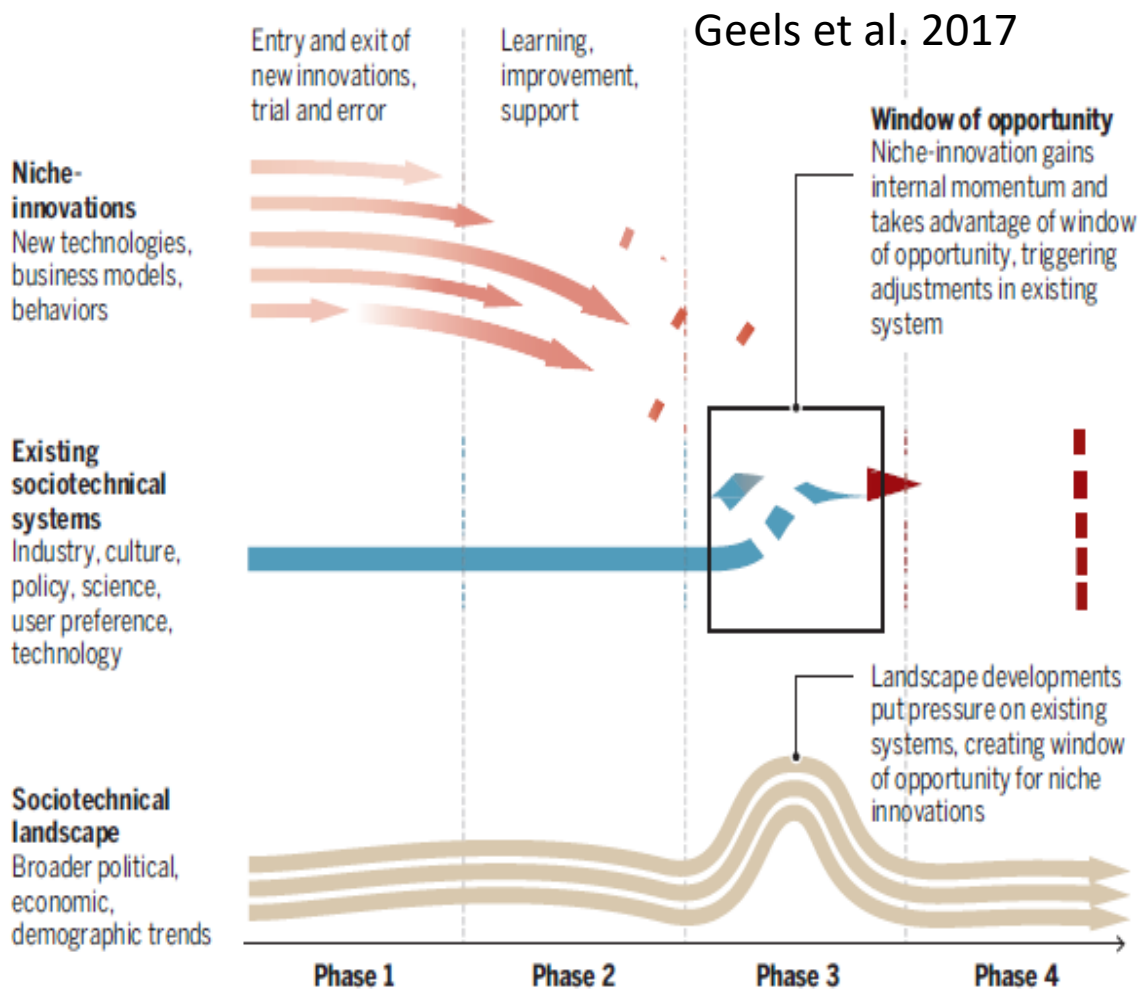
Electricity prices are expressed in 'levelized costs of energy' (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.



The price of onshore wind electricity declined by 70% in these 10 years.

# Foster innovations to take advantage of windows of opportunity

Internal and external forces pressure the existing system, which can realign around maturing innovations



Case study:  
Incumbent's discursive strategies

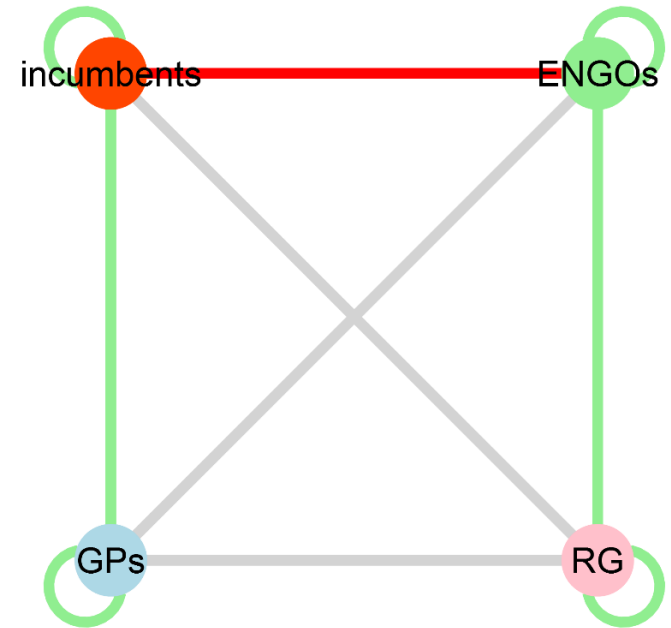
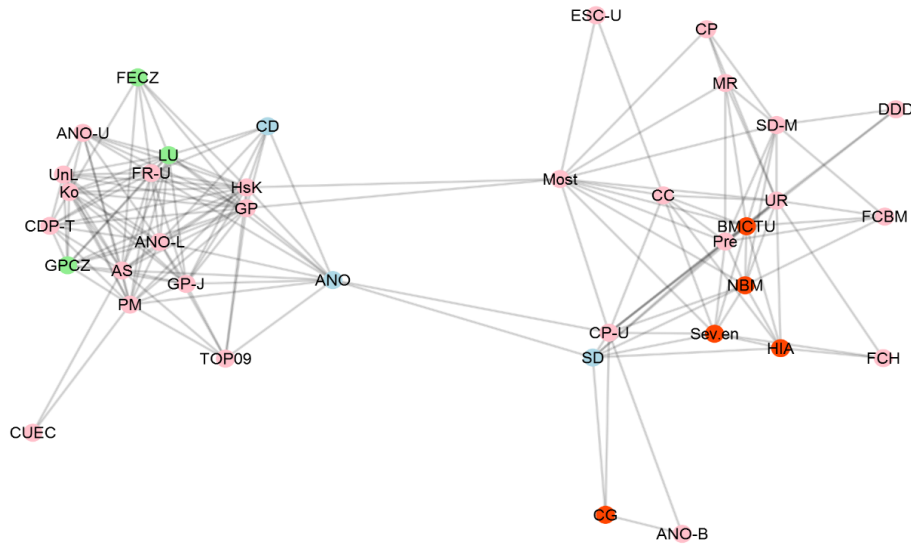
# Policy debate on mining limits

- Policy debate on the limits → rescindment on the Bílina mine in 2015
- Media discourse analysis of daily newspapers
- **Discourse coalition:** group of actors who share a social construct (Hajer 1993)
  - E1.** There are **two coalitions** with low-compatible beliefs (Ocelík et al. 2019; Weible 2008)
- **Discourse alignment:** similarity-based relationship between specific actor groups
  - E2.** There is a **discourse alignment** between **incumbents** and **governing parties** (Geels 2014; Johnston et al. 2017; Smink 2015)

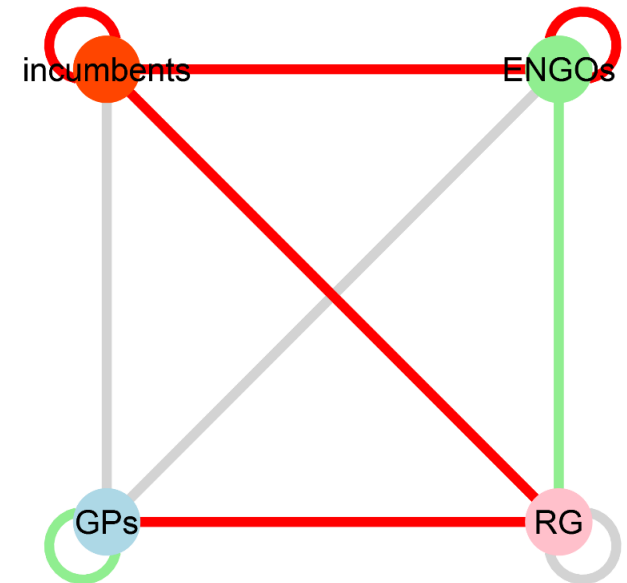
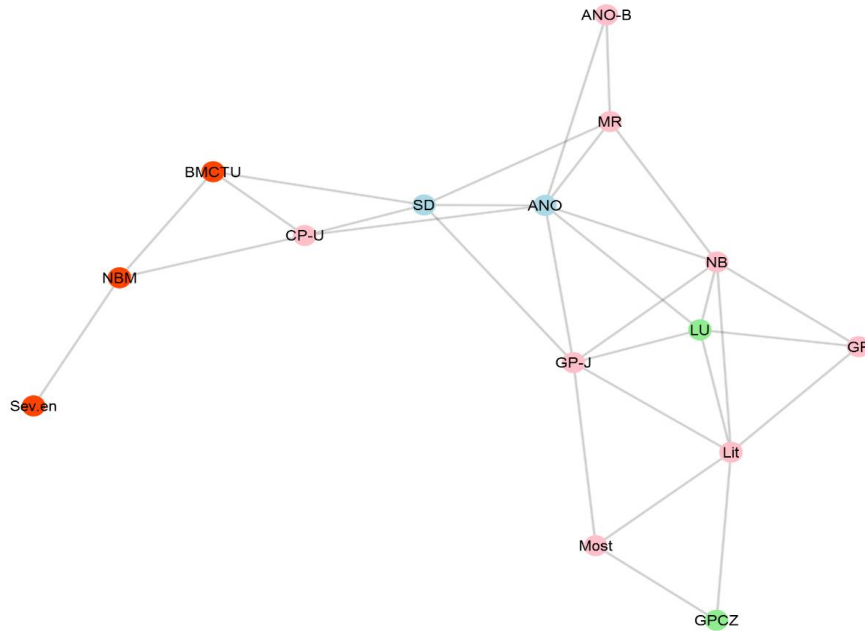




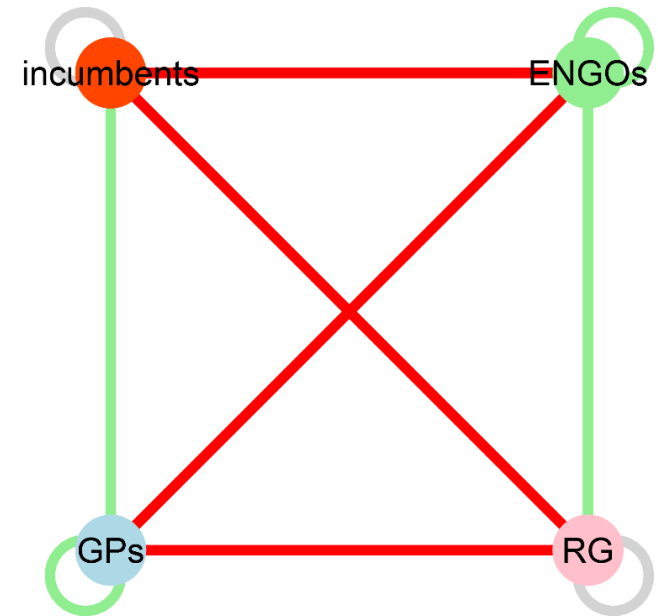
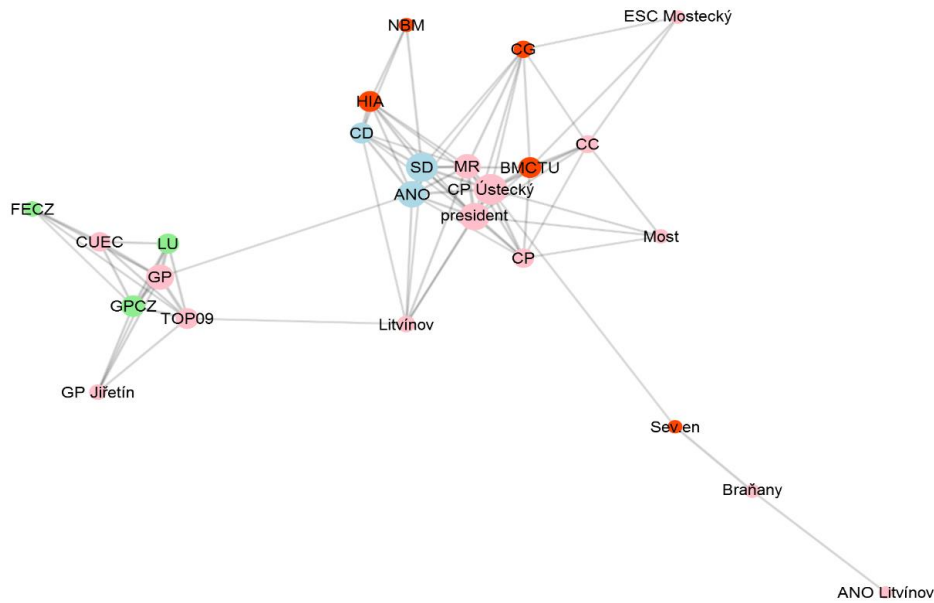
# Stage 1 (Jan-Apr 2015): Incumbents mobilization

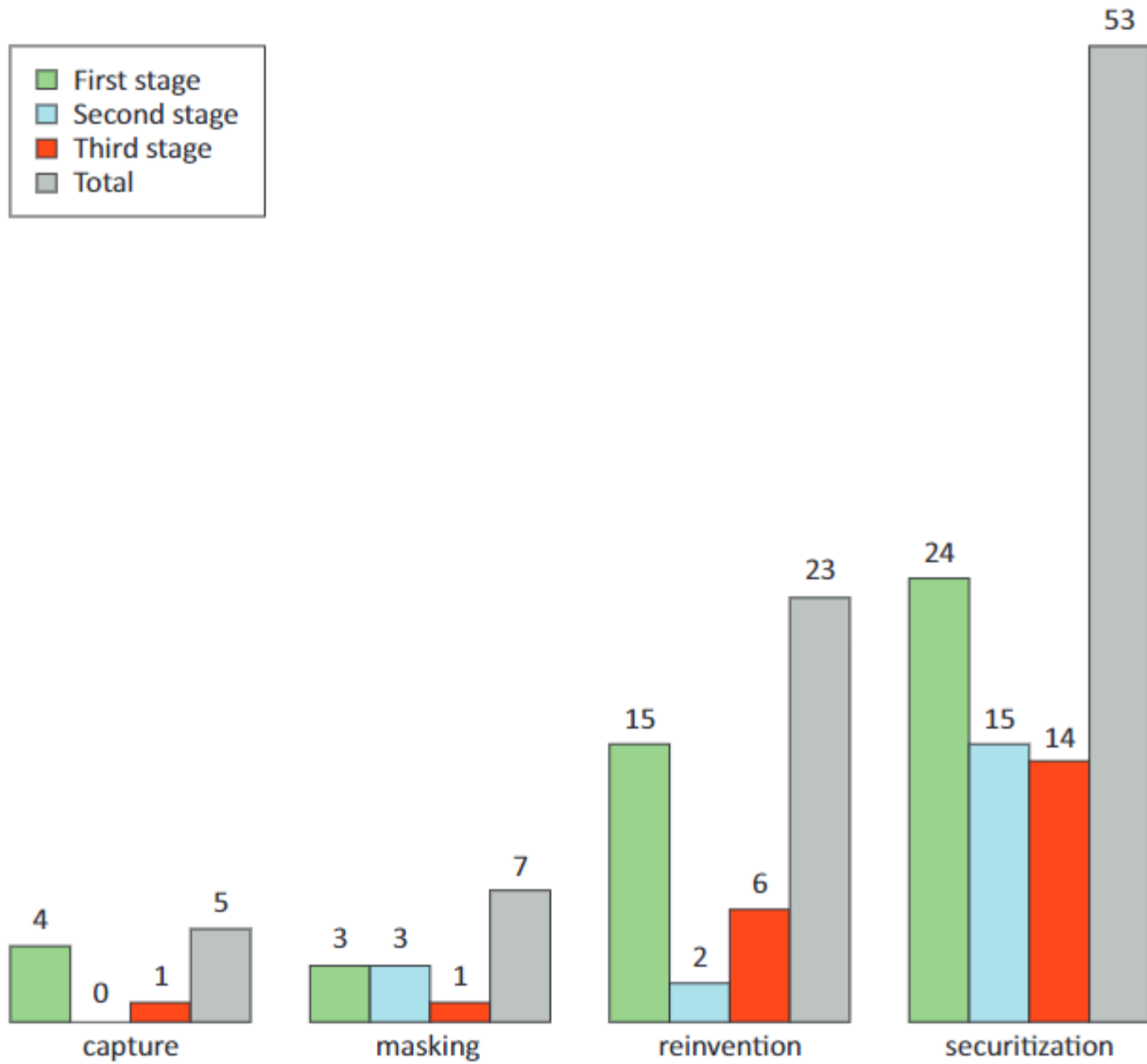


# Stage 2 (May-Aug 2015): Incumbents retreat



# Stage 3 (Sep-Oct 2015): Incumbents dominance





**Figure 5.** Frequencies of incumbents' discursive strategies.

# Incumbents' discursive strategies

- **Masking:** environmental issues, displacement
- **Securitization:** socioeconomic
- Reinvention: cleaner technology, heat supplies
- Capture: not articulated, already in place  
(Černoč & Osička 2018)
- Surprisingly, little emphasis on **supply dependency**

## *Masking*



Hiding, socializing, or externalizing the full costs of an incumbent regime or sociotechnical system

## *Capture*



Placing stakeholders with vested interests in positions of political or regulatory power

## *Reinvention*



Changing the frame of an incumbent system or regime so that it appears new or innovative

## *Securitization*



Connecting an incumbent to a pressing national security issue, topic, or compelling threat

Johnston et al. 2017

# Main findings

- **Two competing coalitions:** Industry vs. Environmental (**E1**)
- The **discourse alignment** between incumbents and GPs in the **1<sup>st</sup> and 3<sup>rd</sup> stages** (**E2**)
  - Consistent support of the Social Democrats
  - Fragmented position of the ENGOs
  - Absence of countervailing industries
- Incumbents mostly relied on **securitization**, masking, and reinvention strategies
  - Inability of the Environmental Coalition to formulate efficient counter-narrative