

Carbon lock-in and institutions: outlines of a political economic approach to emissions reduction inertia

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Outline

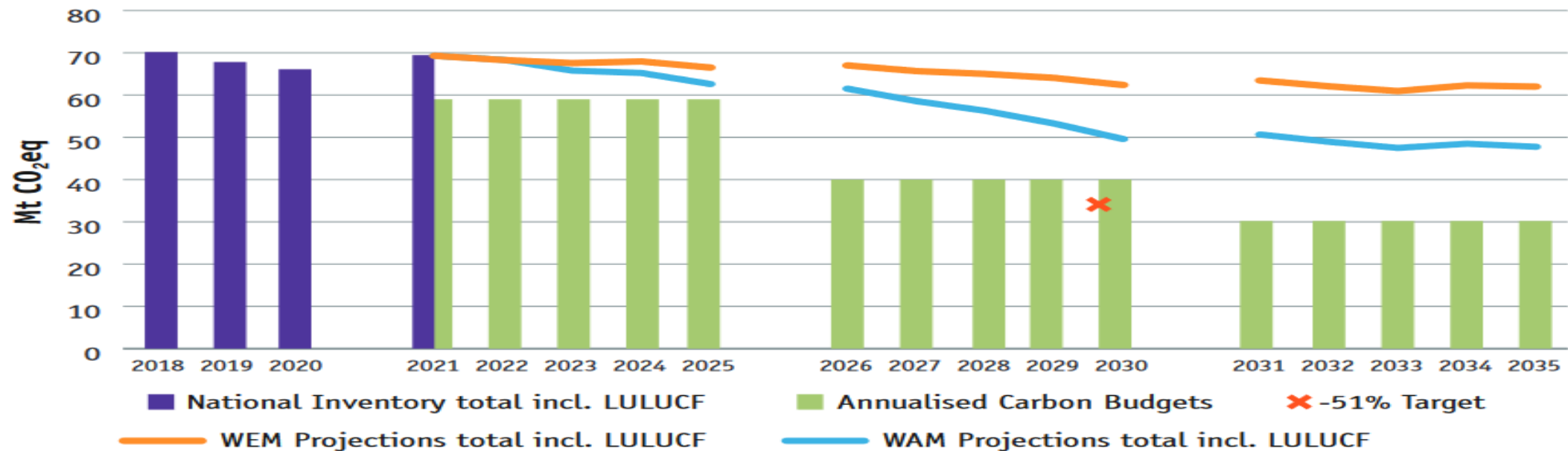
- Background
- Path Dependency and Carbon lock-in
- The Multi-Level Perspective Framework
- Combining Historical Institutionalism and the MLP
- Adding wider Comparative Political Economy
- Conclusion

Background

- Despite relatively stringent climate legislation, states like the Republic of Ireland continue to see emissions growth.
- This occurs despite the increasing consensus around the need to act on emissions and existence of low carbon technologies.
- If this is essentially a story of market switching, why haven't we seen more progress?
- This leads us to the questions of transition: what factors aid or impede them?
- Why are some states performing better than others?

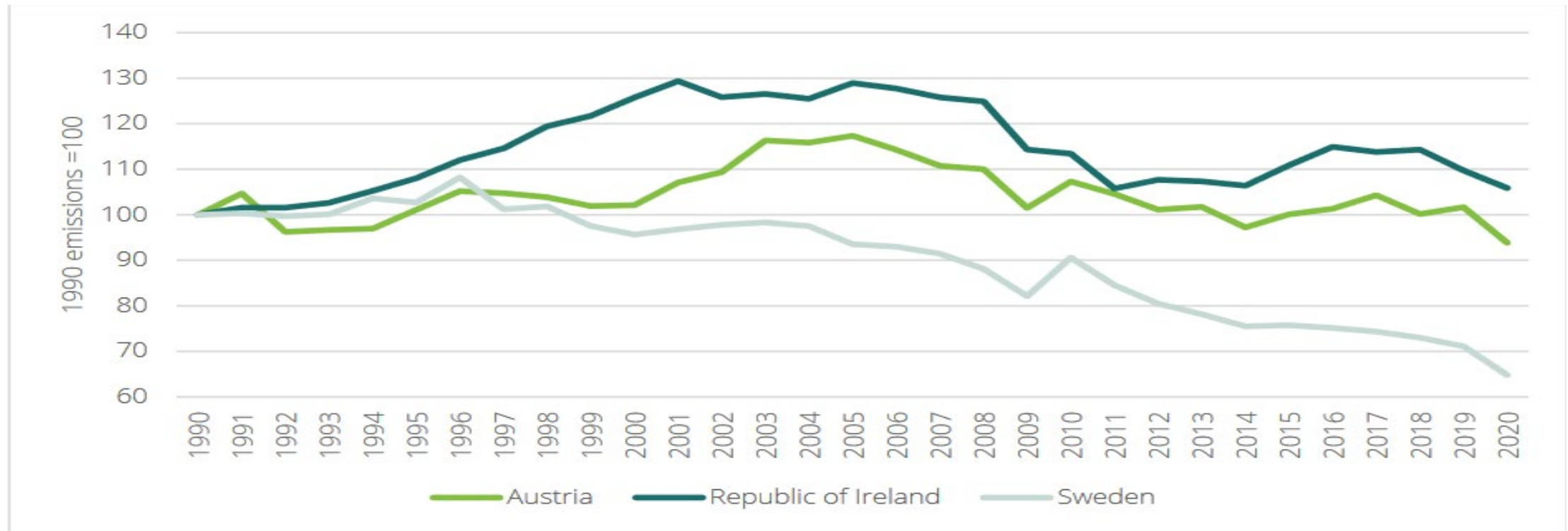
EPA emissions projections vs Climate Budgets

Figure 4: Annualised carbon budgets (2021-25, 2026-30 and 2031-35) and projected emissions data (Mt CO₂ eq) (including LULUCF) under the *With Existing Measures* and *With Additional Measures* scenarios



For illustrative purposes the budget is split evenly across each period. LULUCF is included in the carbon budgeting process so the projections in Figure 2 also include LULUCF emissions.

Distinct Trends for otherwise similar states



Goldrick-Kelly (2023) comparison of emissions trends for three small open economies. NERI Research InBrief

Path Dependency

- An influential stream of research emerges in the 1980s within evolutionary economics.
- Arthur (1989; 1990) and Davids (1985) point to widely adopted technologies which come to dominate markets despite apparent inferiority.
- “Random” events can lend an advantage to particular technologies given self-reinforcing mechanisms driven by (Arthur 1994):
 - Large set up or fixed costs
 - Learning effects
 - Coordination effects
 - Self-reinforcing expectations
- History matters, and once you start upon a particular path, the probability of remaining on that path increases and the costs of switching rises (Lowndes & Roberts 2013; Pierson 2004).

Carbon lock-in defined

- The inertia regarding emissions reductions arising from mutually reinforcing social, economic and physical factors (Unruh, 2000; Seto et al. 2016).
- Seto et al. (2016) identify three main types:
 - Technologies/infrastructures
 - Institutional lock-in
 - Behavioural lock-in
- Institutions, the focus of this project, have some distinct properties:
 - Institutions are meant to lock-in outcomes.
 - Institutions are political.
 - Actors within political systems seek to maintain a status quo or shift to a new one which they find more favourable.

Multi-Level Perspective on transitions

- Part of wider *sociotechnical transitions* literature which try and explain the necessary social and technical facets of transitions.
- According to the MLP, transition involves change at three levels (Geels 2019):
 - Niche-innovations - micro
 - Social technical system - meso
 - Landscape- macro
- General dynamic entails:
 - A build-up of momentum at the niche-innovation level
 - Pressure at the niche level, or landscape level change put pressure on the social technical system.
 - This destabilisation creates a window for the new disruptive technology.

Social technical system analytic dimensions

Socio-technical system

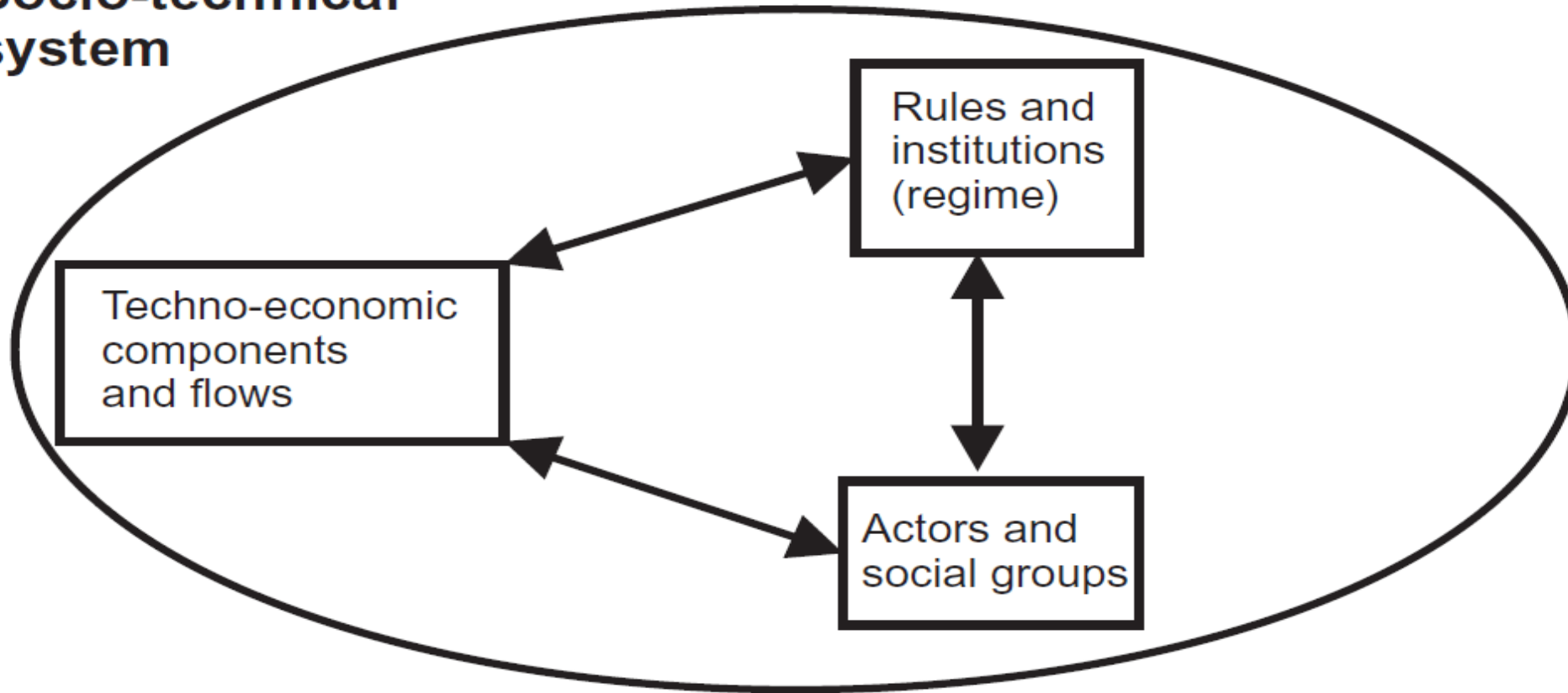


Figure 1.3 from Geels, F. W., & Turnheim, B. (2022). *The Great Reconfiguration*. Cambridge University Press.

Standard transition phases in the MLP

- Experimentation:
 - Trial and error learning about techno-economic performance, acceptance and feasibility
 - Building of coalitions and networks willing to develop and protect new development.
 - Articulation of vision
- Stabilisation:
 - Establish a foothold in market niches
 - Emergence of design rules, models, standards etc which reduce uncertainty
- Diffusion/Disruption:
 - Struggle with incumbents
- Institutionalisation/Anchoring

Lock-in within social technical systems (Geels 2020)

- Techno-economic
 - Sunk investments
 - Material persistence of infrastructures
 - Costs/Performance
- Social and Cognitive
 - Routines
 - Lifestyles
- Institutional/political
 - Existing regulation/standards which favour current systems
 - Procedures which facilitate access for incumbents

Recent advances

- Geels and Turnheim (2022) point to several criticisms of standard MLP accounts:
 - Classic account sees singular niche innovation driving process of change.
 - Transition can occur from within existing socio-technical systems.
 - Low carbon systems involve multiple niche innovations
 - Multiple systems interact – within the electricity system for example, or between electricity and transport.
 - Change can be gradual, rather than occur according to a “punctuated equilibrium” model.
 - Existing socio-technical systems and incumbents aren’t monoliths – there are internal tensions which can drive changes within a system.
- In response, they add a framework for dynamics within existing systems:
 - Techno-economic reconfiguration
 - Reorientation of mainstream actors
 - Policy reconfiguration

Centring institutions in the analysis

- This transition framework tends to focus on technology – this represents the typical entry point.
- For this analysis, I propose beginning with institutions at the middle and upper layers of the framework.
 - Socio-technical system and Landscape levels.
- The socio-technical system offers tangible insights at the level of “sector” while landscape brings the macro-scale into the analysis.
- Institutionalism and wider political economy can “fill in” the framework at these levels.



Introducing historical institutionalism (HI)

- Distinct strand within institutional studies alongside (Lowndes and Roberts 2013):
 - Sociological
 - Rational choice
 - Discursive institutionalism
- Defines institutions as “Formal and informal procedures, routines, norms and conventions” (Lowndes and Roberts 2013 from Hall 1986)
- Lockwood et al. (2017) point to two broad (PE) concerns:
 - A theory concerned with agency within institutional constraints.
 - How institutions are formed, and how do they evolve ?

HI as a complement to the MLP

- The perspective offers insight into mechanisms of inertia.
- This can relate to specific institutions within sectors or broad configurations of institutions.
- HI focus on providing general explanation of patterns across cases using a comparative rather than case study approach (Lockwood, Kuzemko, Mitchell and Hoggett 2017) .
- Raises possibility of identifying institutional arrangements which may be more or less conducive to low carbon transitions.

HI perspectives on institutional inertia

- Institutional analogue to evolutionary economic perspective RE path dependency: Positive feedback in politics (Pierson 2004):
 - The need for collective action imposes high entry costs.
 - Institutional set ups make reversals unattractive – investments are made, and identities formed.
 - Actors likely to use their power to change the rules such that their power is maintained/increased.
 - Difficulty assessing outcomes given the complexity of politics.
- There are different types of institutional change which may be more or less likely depending on the context (Mahoney and Thelen 2012):
 - Displacement – removal and replacement of old rules
 - Layering – introduction of new rules alongside old ones
 - Drift – impact of existing rules changes given shifts in the wider environment.
 - Conversion – formal rules are interpreted or enacted in new ways.

Relevant factors from the HI literature for environmental performance

- Countries with PR are more likely to adopt environmental policy than first past the post systems (Lockwood et al. 2017; Finnegan, 2022).
- The presence or non-presence of veto players (Harrison and Sundstrom 2010; Jacobs 2011).
 - Constitutional arrangements, presidential vs parliamentary, federalist versus centralised.
 - Mixed effects, e.g., German Lander defend feed-in tariff in face of major energy utility opposition 1994 (Jacobsson and Lauber 2006).
- The extent to which decision making is delegated, particularly on the regulatory side effects policy (Kuzemko 2016).
 - Introduces new veto players, where remits of regulatory agencies aren't consistent with change and where they have a high degree of latitude in action, we expect higher regulatory inertia.
 - This can be institutionalised in different ways – UK as part of privatisation, continental states where they're under more parliamentary control.

Other factors

- Finnegan (2022) argues that corporatist arrangements (“concertation”) enables bargaining between policy makers and those who lose out, helps overcome opposition.
- Steffen, Karplus and Schmidt (2022) find that state owned utilities dedicate higher shares of investment to renewables, particularly in situations of stringent climate policy and high regulatory quality.
- HI suggests that institutional variation results in variations in (Lockwood et al. 2017)
 - Incumbent power:
 - tax revenue/employment, strategic role of energy within economy, centralisation/size
 - Incumbent interests:
 - nature of relevant organisations, asset specificity
 - Ease of policy and regulatory capture:
 - privatisation, “marketised” decision making (Kuzemko 2016).

Institutional complementarity

- Institutional complementarity the presence or form of an institution in one area reinforces the existence, function or efficacy of an institution elsewhere (Amable 2003).
- A model of capitalism isn't simply a random collection of institutions, but a particular combination tied together via complementarity (Amable 2003; Hall and Soskice 2001).
- This could, itself, be a source of path dependency/lock-in – complementary institutions reinforce one another, leading to persistence (Magnin 2018)
- At a point in time, a particular institution may play a decisive role relative to others, organising complementarity and the evolution of the wider institutional configuration.

Institutional hierarchy

- Reflects the balance of power and compromises, but that doesn't make it intentional.
- This can tie into issues of complementarity:
 - "Fordist" era sees predominance of wage-labour nexus, which shaped other institutional forms which reinforced it.
 - With the rise of finance, the wage-labour and social protection nexus sees changes guided by its influence (Magnin 2018).
- Okuma (2017) argues that the environment-economy nexus has been lower down in the hierarchy and policy can be understood as complementary with other higher forms.
- These co-evolving relationships may also imply interlinkages between social problems and, possibly, solutions.

Comparative Political Economy

- Concepts of complementarity and hierarchy are influential in comparative political economy:
 - A means to examine the diversity of economic models
 - A way of examining evolution in capitalism.
- Major strands include:
 - Varieties of Capitalism approach defines countries according to their coordination approach in key spheres. Produces a basic two type split between LME and CME (Hall and Soskice, 2001).
 - Amable (2003) five types of capitalism-based building on regulation school, VoC, comparative welfare state, institutions differ in product markets, labour markets and labour relations, social protection, education and financial systems.
 - Baccaro & Pontusson (2016) emphasise the macroeconomy, sources of demand shape the institutional set up.
 - Hassel and Palier (2023) composite approach – growth regime includes institutions organising economy and strategies, sources of aggregate demand and sectoral leaders. Welfare states are also important components.

Comparative PE and environmental outcomes

- Varieties of Capitalism framework:
 - Feldman (2014) argues that firm governance in CMEs favours environmental investment relative to LMEs – stakeholder vs shareholder value governance results in better alignment with longer term objectives.
 - Mikler and Harrison (2012) CME arrangements result in better coordination towards development of low carbon tech.
 - Cetovic and Buzogany (2016) CME's face less structural constraints in relation to advancing renewables – German success cited as tied to specialisation in innovation supported by government-industry-funder interaction and government willingness to promote supply and create markets.
 - This may overstate coherence within an economy – some sectors may be more or less coordinated etc. (Kern et al. 2014)
- Other approaches:
 - Regulationist approaches such as Cahen-Fourot (2020) which include social relation to environment as new grouping factor in clustering analysis.

Combining literatures

- The MLP framework offers analytic specificity:
 - Sectors are subject to specific technical issues.
 - Possible discrete sources of inertia
 - Analysis of various levels can point to alignments that can aid transition efforts.
- On the other hand, institutionalism and political economy:
 - Offers insights into bigger picture selective pressures.
 - The politics of these pressures/systems configurations.
 - The “assemblage” shaping/maintaining institutions.
 - Insight into complementarities, possible win/wins.
- A combined approach can “politicise” the MLP framework, while greening HI/PE.

Conclusion

- Lock-in/path dependency can draw attention to the integrated nature of transition problems.
- Institutionalism and wider political economy can offer a different window than the typical tech focus, while keeping an eye on specifics.
- Combining a higher-level focus on institutional configurations can help us identify potentially unforeseen effects of economic strategies.
- Comparative analysis can point to institutions and wider complementarities that aid transition efforts.

Conclusion

- Concepts like complementarities/hierarchies and their relationship to politics could be very relevant to transition efforts.
 - How do we build a constituency for climate policies that promotes a desirable lock-in?
 - Are piecemeal institutional changes enough?
 - If some institutions are relevant for multiple issues, perhaps win wins are on the table?
- Goldstein et al. (2023) also point to similar concepts in other fields, such as Political Ecology and Development studies.
- These literatures could offer insight and broaden the focus.
- A conversation between different approaches may be what's needed to address a “wicked problem” like climate change.

References

- Amable, B. (2003). *The diversity of modern capitalism*. OUP Oxford.
- Amable, B., Regan, A., Avdagic, S., Baccaro, L., Pontusson, J., & Van der Zwan, N. 2019. New approaches to political economy. *Socio-economic review*, 17(2), 433-459.
- Baccaro, L., & Pontusson, J. (2016). Rethinking comparative political economy: the growth model perspective. *Politics & society*, 44(2), 175-207.
- Cahen-Fourot, L. 2020, Contemporary capitalisms and their social relation to the environment. *Ecological Economics*, 172, 106634.
- Četković, S., & Buzogány, A. (2016). Varieties of capitalism and clean energy transitions in the European Union: When renewable energy hits different economic logics. *Climate Policy*, 16(5), 642-657.
- Environmental Protection Agency (2023) Ireland's Greenhouse Gas Emissions Projections 2022-2040
- Fieldman, G. (2014). Financialisation and ecological modernisation. *Environmental politics*, 23(2), 224-242.
- Geels, F. W. (2019). Socio-technical transitions to sustainability: A review of criticisms and elaborations of the Multi-Level Perspective. *Current opinion in environmental sustainability*, 39, 187-201.
- Geels, F. W. (2020). Transformative innovation and socio-technical transitions to address grand challenges. *European Commission R&I Paper Series, Working Paper*, 2.
- Geels, F. W., & Turnheim, B. (2022). *The Great Reconfiguration*. Cambridge University Press.

References

- Goldrick-Kelly, P. (2023) A Comparison of emissions trends for three small open economies. *NERI InBrief Series No.82*
- Goldstein, J. E., Neimark, B., Garvey, B., & Phelps, J. (2023). Unlocking “lock-in” and path dependency: A review across disciplines and socio-environmental contexts. *World Development*, 161, 106116.
- Hall, P. A., & Soskice, D. (2001). An introduction to varieties of capitalism. *op. cit*, 21-27.
- Harrison, K., & Sundstrom, L. M. (Eds.). (2010). *Global commons, domestic decisions: The comparative politics of climate change*. MIT press.
- Hassel, A., & Palier, B. (2023). Same Trend, Different Paths: Growth and Welfare Regimes Across Time and Space. *Annual Review of Political Science*, 26.
- Jacobs, A. M. (2011). *Governing for the long term: Democracy and the politics of investment*. Cambridge University Press.
- Jacobsson, S., & Lauber, V. (2006). The politics and policy of energy system transformation—explaining the German diffusion of renewable energy technology. *Energy policy*, 34(3), 256-276.
- Kern, F., Smith, A., Shaw, C., Raven, R., & Verhees, B. 2014. From laggard to leader: Explaining offshore wind developments in the UK. *Energy Policy*, 69, 635-646.
- Lockwood, M., Kuzemko, C., Mitchell, C., & Hoggett, R. 2017. Historical institutionalism and the politics of sustainable energy transitions: A research agenda. *Environment and Planning C: Politics and Space*, 35(2), 312-333.

References

- Lowndes, V., & Roberts, M. 2013. *Why institutions matter: The new institutionalism in political science*. Bloomsbury Publishing.
- Magnin, E. (2018). Varieties of capitalism and sustainable development: Institutional complementarity dynamics or radical change in the hierarchy of institutions?. *Journal of economic issues*, 52(4), 1143-1158.
- Mahoney, James, and Kathleen Thelen, eds. 2012. *Explaining Institutional Change: Ambiguity, Agency, and Power*. Cambridge, England: Cambridge University Press
- Mikler, John, and Neil E. Harrison. 2012. "Varieties of Capitalism and Technological Innovation for Climate Change Mitigation." *New Political Economy* 17(2):179–208.
- Okuma, K. (2017). *The evolving relationship between economy and environment: theory and the Japanese experience* (Vol. 8). Springer.
- Pierson, J. 2004, *Politics in Time: History, Institutions and Social Analysis*. Princeton University Press
- Seto, Karen C., Steven J. Davis, Ronald B. Mitchell, Eleanor C. Stokes, Gregory Unruh, and Diana Ürge-Vorsatz. 2016. "Carbon Lock-in: Types, Causes, and Policy Implications." *Annual Review of Environment and Resources* 41(1):425–52
- Steffen, B., Karplus, V., & Schmidt, T. S. (2022). State ownership and technology adoption: The case of electric utilities and renewable energy. *Research policy*, 51(6), 104534.