# The Political Economy of The Clean Energy Transition\*

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### Abstract

Why are some countries more successful at advancing the clean energy transition than others? Existing research, centered on industrialized democracies, often frames international collective action against domestic distributive explanations. This review synthesizes many previous explanations in a credibility framework that clarifies when governments can reduce opposition and expand climate coalitions. Applying it to both developed and developing countries reveals how institutions, state capacity, and international constraints jointly shape decarbonization trajectories and suggests a new research agenda for the political economy of climate change.

Keywords: climate change; international political economy; comparative political economy; credibility; clean energy transition; decarbonization

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# 1 Introduction

Limiting climate change requires a rapid, large-scale shift from fossil fuels to clean energy. While the technologies exist to begin this energy transition, current decarbonization trajectories remain too slow to avert the worst damages (Davis et al., 2018; IPCC, 2022). Two decades of social science research identifies politics as a significant cause of this impasse.

We first overview political science theories of the clean energy transition. Early political economy work built upon global public goods models, which emphasized free riding as the fundamental constraint and the need for international solutions such as reciprocal cooperation, trade barriers, and information provision (e.g., Barrett, 2003; Keohane and Victor, 2016). More recent research shifted the focus to domestic distributive conflict, showing how business-labor coalitions, green interest group strength, and institutional arrangements shape climate politics (e.g., Aklin and Urpelainen, 2013b; Harrison and Sundstrom, 2007, 2010). Both waves of scholarship have centered mostly on industrialized democracies.

While research has differed in its emphasis on domestic and international factors, emphasis does not imply theoretical exclusivity. Climate change, by definition, is a global collective action problem—whose solution depends on domestic politics. This review highlights how these two levels of analysis are not mutually exclusive but interact.

To synthesize many of the explanations in the debates we outline, we advance credibility as an organizing concept. Strategic credibility refers to commitment problems that arise from time-inconsistent incentives and information asymmetries (Kydland and Prescott, 1977; Rodrik, 1989). Structural credibility concerns whether clean energy investments can in fact create local jobs, tax revenue, and growth, given technological and market constraints (Gazmararian and Tingley, 2023).

We argue that this dual conception of credibility helps integrate previous explanations for when governments can address political barriers to the clean energy transition. Credibility influences when governments can diffuse opposition by compensating the losers of policy reforms and expand climate coalitions by creating economic benefits from green investments (e.g., Meckling et al., 2015). Not all ideas can be reduced to credibility challenges, but this framework provides a useful theoretical foundation.

The paper then uses this framework to review three forces that affect the government's ability to address credibility challenges: institutions, state capacity, and international constraints. We apply these factors to illustrate how clean energy transition outcomes could vary across countries, with a particular focus on emerging economies. This exercise shows how credibility offers a generative organizing concept for many previous climate politics theories. The conclusion sketches a research agenda anchored around and beyond the credibility lens.

# 2 Clean Energy Transition Theories

The clean energy transition is not a single, uniform shift but a constellation of overlapping sectoral transformations that together decarbonize the economy. In electricity, coal- and gas-fired generation are replaced by carbon-neutral alternatives, supported by expanded transmission lines and storage technologies. In transport, internal-combustion engines give way to battery-electric drivetrains, backed by charging networks and critical-mineral supply chains. Heavy industries, such as steel, cement, chemicals, and aluminum, must develop new processes to curb emissions. Buildings need efficient electrified heating and cooling, and agriculture must curb pollutants like methane.

We review research on the conditions when countries transition their economies away from fossil fuels to cleaner energy sources. While this is a positive question, the energy transition also raises normative issues beyond our purview that remain crucial inquiries (Carley and Konisky, 2020; Newell and Mulvaney, 2013; Sovacool et al., 2016). Also outside of our scope are important questions such as the downstream consequences of decarbonization and climate change for domestic politics and international relations (Colgan and Hinthorn, 2023; Gazmararian and Milner, 2026).

## 2.1 Early Approaches to Energy Transitions

Early work on energy transitions came primarily from economists, engineers, and natural scientists concerned with sustainability, energy needs, and innovation (Fisher, 1974; Grübler, Nakićenović, and Victor, 1999; Jevons, 1865). Many analyses focused on historical transitions, such as from biomass to coal in Europe, and portrayed transitions as technology-driven responses to scarcity and rising consumption (Grubler, 2012; Smil, 2010). Some political scientists, prompted by the 1970s oil shocks, examined energy politics, but focused on energy independence not decarbonization (Hughes and Lipscy, 2013).

In the 1990s and 2000s, scholars largely outside of mainstream political science advanced "socio-technical transition" theories that examine how technologies and societies co-evolve within systems (Köhler et al., 2019). They showed, for example, how new technologies secure protected niches, gain momentum through learning, and ultimately displace incumbents after external disruptions (Geels, 2014; Geels et al., 2017). Some work in this vein is prescriptive, outlining how policymakers can guide these processes (Loorbach, 2010).

These perspectives initially focused more on technology than politics, an oversight critics highlighted (Meadowcroft, 2009; Shove and Walker, 2007). Scholars responded by incorporating variables familiar to political scientists such as incumbent interest groups, institutions, and path dependence (Hess, 2014; Köhler et al., 2019; Roberts et al., 2018; Scoones, Leach, and Newell, 2015).

A prominent concept in this literature is "carbon lock-in," which refers to how decades of fossil fuel development have hard-wired infrastructures and lifestyles around carbon-intensive energy, which can only be dislodged by exogenous shocks (Seto et al., 2016; Unruh, 2000). Political scientists have engaged with these ideas, examining how politics influence path dependence (Aklin and Urpelainen, 2013b), and how responses to exogenous shocks depend on a country's institutions (Aklin and Urpelainen, 2018; Lipscy and Schipper, 2013; Meckling et al., 2022).

### 2.2 Global Collective Action Problem

The first wave of political science research on climate change focused on international explanations. Stopping global warming requires collective action since greenhouse gas emissions, no matter where they originate, have the same climatic influence. Solving the problem necessitates that all polluters curtail emissions, but the individual costs of mitigation outweigh the expected benefits, so mitigation falls short of what's optimal from the global perspective (Barrett, 2003; Ostrom, 2009; Sandler, 2004; Victor, 2011).

Political scientists identified three factors that made climate change challenging to solve (for a review, see Bernauer, 2013). First, there is a global asymmetry in mitigation's costs and benefits, where the countries most harmed by higher temperatures often have the fewest resources to curb emissions (Roberts and Parks, 2007; Sprinz and Vaahtoranta, 1994). Second, mitigation policies face domestic political hurdles because they can impose concentrated costs on industries and consumers (Keohane and Victor, 2016). Third, because benefits accrue decades later, politicians, businesses, and voters discount them and doubt long-term commitments (Bechtel and Hainmueller, 2011; Bechtel and Mannino, 2023; Gazmararian, 2025b; Hale, 2024; Healy and Malhotra, 2009; Hovi, Sprinz, and Underdal, 2009).

Motivated by the global public goods model, scholars asked how institutions can dampen free-riding incentives (Young, 2011). International relations research shows that mitigation becomes likelier if a dominant country or small group take the lead, nations link issues together, or governments build institutions for monitoring and enforcement (Barrett, 2003; Keohane and Victor, 2016; McAllister and Schnakenberg, 2021; Nordhaus, 2015). Countries could also act unilaterally if they anticipate private benefits such as reduced air pollution (Kennard and Schnakenberg, 2023). These international institutional design choices also affect the public's climate policy support (Bechtel and Scheve, 2013; Bechtel, Scheve, and van Lieshout, 2022).

Early diplomacy aimed for a legally binding treaty with strict enforcement, exemplified by the Kyoto Protocol. When these negotiations stalled, countries turned to a more decentralized, pledge-and-review process formalized in the Paris Agreement (Falkner, 2016; Keohane and Oppenheimer, 2016; Keohane and Victor, 2011; Victor, 2011; Victor, House, and Joy, 2005). This ground-up commitment setting process has led to debates over its effectiveness without strong sanctions (Melnick and Smith, 2025; Rowan, 2025; Tingley and Tomz, 2022), and renewed focus on domestic political processes.

### 2.3 Domestic Distributive Politics

More recent political science research on the clean energy transition focuses on domestic political factors. Aklin and Mildenberger (2020) refer to domestic distributive politics as the "meta-theoretical alternative" to the collective action problem. Although it's important to reinforce that these waves are not mutually exclusive. Scholars often integrate domestic factors into global public goods models (Kennard and Schnakenberg, 2023). The distinction simply highlights how scholarly emphasis has evolved.

Domestic distributive theories start from the premise that energy transition policies create "winners" and "losers." Conflict between these groups explains when governments cut green-house gas emissions and cooperate internationally (Breetz, Mildenberger, and Stokes, 2018; Harrison and Sundstrom, 2007, 2010). The asset revaluation framework, for instance, casts climate politics as an existential struggle between "climate-forcing" and "climate-vulnerable" asset holders (Colgan, Green, and Hale, 2021; Green, 2025).

The core theoretical building blocks are societal groups, their interests and beliefs, and the institutions that aggregate those preferences into policy (Cao et al., 2014; Harrison and Sundstrom, 2007). The societal groups that matter most are those facing concentrated benefits or costs. When a policy's economic effects are diffuse, political actors have incentives to free-ride on the lobbying of others, whereas concentrated stakes encourage them to organize collectively since groups internalize the gains from political action (Olson, 1965).

Finnegan et al. (2025) connects concentrated costs to political outcomes by distinguishing insulation and compensation strategies. Insulation refers to the extent that policymakers can

pursue reforms without opposition from the "losers," which could be due to diffuse costs or the harmed group's political weakness. Compensation refers to the explicit side-payment strategy of buying off politically influential "losers" that could otherwise obstruct a reform.

#### 2.3.1 Concentrated Costs

Three groups confronting concentrated costs have received the most attention: carbon-intensive businesses; the workers and residents of places where coal, oil, and gas extraction occurs; and consumers reliant on fossil fuel-intensive energy. We first examine the interests of these groups, before turning to the credibility framework which helps synthesize institutional explanations that aggregate these preferences into policy outcomes.

Firms Businesses harmed by climate policy have several strategies. The primary response is to lobby the government to block reforms (Brulle, 2014; Kim, Urpelainen, and Yang, 2016; Meckling, 2015). Lobbying can also aim to shape a policy's approach and implementation (Meckling, 2011; Stokes, 2020; You, 2017). Beyond direct lobbying, companies use tactics such as "astroturfing" (Oreskes and Conway, 2011), diversifying business models (Green et al., 2022; Meckling, 2015), and adopting internal governance reforms (Hale et al., 2022; Hsueh, 2019; Lerner and Osgood, 2023; Prakash, 2000).

Deriving firm preferences is central to political economy theorizing. One approach is to infer preferences from carbon-intensity, such as fossil fuel use (Cheon and Urpelainen, 2013; Downie, 2017a,b; Kim, Urpelainen, and Yang, 2016; Mildenberger, 2020; Newell and Paterson, 1998). Although companies do not need to directly use fossil fuels to be affected by mitigation policy since they could depend on carbon-intensive inputs (Cory, Lerner, and Osgood, 2021). Asset specificity also shapes interests. Automakers can pivot from internal combustion engines to electric drivetrains, whereas coal mines have fewer viable alternatives (Colgan, Green, and Hale, 2021; Kelsey, 2018; Kupzok and Nahm, 2024). In a global market, firms also judge policy costs relative to competitors and may even endorse regulations

that hurt rivals more than themselves (Genovese, 2019; Kennard, 2020; Meckling, 2015; Vogel, 1997). Researchers increasingly draw on new data, such as earning call transcripts, to proxy for policy preferences that are challenging to observe directly (Baehr, Bare, and Heddesheimer, 2025; Green et al., 2022; Mahdavi et al., 2022).

Firms must also understand how energy and climate policies affect their profits for their preferences to shape corporate strategy. However, businesses can sometimes misjudge policy consequences, especially in novel issue areas (Stokes, 2020; Stokes and Breetz, 2018).

Labor and Communities Since fossil fuel production is place-bound, its decline impose spatially concentrated costs, such as lost jobs and tax revenue (Hanson, 2023; Raimi, Carley, and Konisky, 2022). Fossil fuel companies engage in non-market strategies to highlight the industry's centrality to the local economy (Bell and York, 2010; Martinez, Moudgalya, and Tingley, 2025). These potential and actual losses shape the alignment of carbon-intensive labor with capital (Mildenberger, 2020), the policy preferences of residents (Bechtel, Genovese, and Scheve, 2019; Gaikwad, Genovese, and Tingley, 2022; Tvinnereim and Ivarsflaten, 2016), and electoral outcomes (Egli, Schmid, and Schmidt, 2022; Gazmararian, 2025a; Gazmararian and Tingley, 2023; Heddesheimer, Hilbig, and Voeten, 2025; Stutzmann, 2025). Without credible compensation, fossil fuel communities have increasingly backed parties that oppose climate policy (Bolet, Green, and Gonzalez-Eguino, 2024). Compensation also helps increase broader societal support for climate policy (Gazmararian and Tingley, 2023; Mares, Scheve, and Toenshoff, 2025).

Consumers Although consumers are numerous and uncoordinated, highly salient costs, such as higher power bills, can still affect political behavior (Beiser-McGrath and Bernauer, 2024; Dechezleprêtre et al., 2025; Gazmararian, Mildenberger, and Tingley, 2025). For example, energy price caused exposed Dutch households to support far-right populist parties (Voeten, 2025b), while Milan's vehicle restriction sparked similar backlash (Colantone et al., 2024).

#### 2.3.2 Concentrated Benefits

The clean energy transition also creates concentrated benefits that could expand climate policy coalitions.

Firms and Industries Businesses involved in clean energy and technology supply chains, such as solar panel manufacturers, stand to gain from decarbonization. Supportive interest groups may not already exist in places where clean energy industries are nascent, so political reformers have sought to protect and expand such industries with the aim of building climate coalitions (Cullenward and Victor, 2021; Meckling and Allan, 2020). The shift from carbon pricing to industrial policy reflects this political logic to create benefits instead of costs (Green, 2025; Jenkins, 2014; Rabe, 2018; Ross, 2025).

Labor and Communities Clean energy projects could also create economic benefits such as jobs and tax revenue. The magnitude of these benefits may vary based on an investment's characteristics, such as its capital or labor intensity (Gazmararian and Tingley, 2023). Reformers often calibrate policy to create benefits for specific groups, such as prevailing wage requirements to benefit unionized labor (Department of Labor, 2024).

These economic benefits could appeal to communities where projects are built, potentially counterbalancing local opposition to energy development. However, scholars debate whether local benefits outweigh costs such as land use and visual disruption (e.g., Mills, Bessette, and Smith, 2019). Studies have found that wind project siting, for example, has produced both electoral rewards and punishment for incumbents (Stokes, 2016; Urpelainen and Zhang, 2022).

Climate-Vulnerable Groups Decarbonization, if successful, will also limit future climate damages, which represent a delayed but concentrated benefit in the locations most vulnerable to global warming. Colgan, Green, and Hale (2021) conceptualize these groups as "climate-vulnerable" asset owners, but assume they are politically inconsequential in the

short-run. Experience with climate change's effects, however, could make the threat more proximate (e.g., Arias and Blair, 2024; Hazlett and Mildenberger, 2020; Howe et al., 2019). Gazmararian and Milner (2025a, 2026) show that global warming exposure leads people, businesses, and governments in the most vulnerable places to increasingly mobilize to support mitigation. Consistent with these findings, public opinion research shows a correlation between vulnerability and climate policy support (Dechezleprêtre et al., 2025; Gaikwad, Genovese, and Tingley, 2022; Kim and Wolinsky-Nahmias, 2014; Reny, Reeves, and Christenson, 2025).

### 2.3.3 Beyond Distributive Politics

Distributive politics theories tend to focus on voters and businesses. Yet non-state actors such as civil society groups also shape outcomes, especially in global climate negotiations, where their influence has been well documented (Hale, 2020). Unlike businesses, these groups often base their advocacy on normative commitments, rather than on direct material gains from mitigation.

Beyond material explanations, scholars highlight partisanship, ideology, and culture. Right-wing populist parties often oppose climate policy (Huber, Fesenfeld, and Bernauer, 2020; Lockwood, 2018), and in the United States partisan polarization shapes both legislature behavior (Shipan and Lowry, 2001) and public attitudes (Egan and Mullin, 2017). Untangling these correlations is difficult, because voters could follow messages from leaders (Lenz, 2012), or they support such parties because they bear disproportionate costs. Rural residents tend to be more conservative while also relying on automobiles and, therefore, often bear the cost of fuel price increases (Arndt, Halikiopoulou, and Vrakopoulos, 2023; Tallent, 2025). Moreover, patterns observed in wealthy democracies do not always travel. The gender gap in climate attitudes, for example, is much weaker in many developing countries (Bush and Clayton, 2023).

## 2.4 Generalizability to Developing Countries

Foundational climate politics theories draw on evidence from industrialized countries, which are responsible for historical greenhouse gas emissions. Yet as developing countries grow, they will account for an ever-larger share of global emissions, making it essential to investigate whether those theories travel.

Large-N cross-national studies link mitigation policy adoption to disaster exposure (Gazmararian and Milner, 2025b; Peterson, 2021, but see Rowan, 2022), green-group strength and legislator ideology (Cheon and Urpelainen, 2013; Schaffer and Bernauer, 2014; Schulze, 2021; Ward and Cao, 2012), energy supply system characteristics (Schaffer and Bernauer, 2014), pre-existing climate institutions (Fankhauser, Gennaioli, and Collins, 2015), regime type and veto points (Bayer and Urpelainen, 2016; Bayulgen and Ladewig, 2017; Levi, Flachsland, and Jakob, 2020; Madden, 2014), and policy diffusion (Baldwin, Carley, and Nicholson-Crotty, 2019; Kammerer and Namhata, 2018). While many of these analyses focus on policy adoption, other studies of fossil fuel tax rates show that country- and leader-specific factors explain little variation (Mahdavi, Martinez-Alvarez, and Ross, 2022; Martinez-Alvarez et al., 2022).

Comparative research tracks energy transition politics in emerging economies, including China (Cao, Kleit, and Liu, 2016; Gong, 2025; Lewis, 2012; Tan et al., 2021), India (Aklin, Cheng, and Urpelainen, 2021; Busby and Shidore, 2021; Dubash, 2013), Indonesia (Chelminski, 2022; Hsiao and Kuipers, 2025; Yuliani, 2017), Brazil and South Africa (Baker, Newell, and Phillips, 2014; Bradlow, 2024; Hochstetler, 2020). Related studies of power sector reform and subsidy removal in developing countries reveal parallel political challenges (Inchauste and Victor, 2017; Victor and Heller, 2007).

Do theories tested with industrialized country evidence apply elsewhere? Interest groups look different in many developing nations, where some are still expanding basic electricity infrastructure rather than phasing out fossil fuels (Aklin and Urpelainen, 2018; Urpelainen, Aklin, and Bayer, 2018), and elite competition often hinges on patronage networks (Bayul-

gen, 2022). The politics of energy expansion raises questions of who gets access to electricity, where distributive politics considerations often revolve more around issues such as vote buying than interest group conflict (Golden and Min, 2013; Min, 2015).

Still, domestic distributive politics theories could travel, perhaps, with adjustments. Many developing countries have fossil fuel endowments. The largest coal producing nations include China, India, Indonesia, Colombia, Mongolia, South Africa, Turkey, and Vietnam. There are also large petro-states in the Middle East. Even at lower income levels, these countries have entrenched interest groups that may resist mitigation.

Empirical parallels already exist. There are similar debates over compensation for fossil fuel workers and communities in industrialized and emerging economies (Busby et al., 2021; Gaikwad, Genovese, and Tingley, 2022; Gong and Lewis, 2024). There is also local backlash to renewable energy development in countries such as China, South Africa, and Brazil, mirroring Europe and North America (Davidson et al., 2016; Dunlap, 2019; Hochstetler and Tranjan, 2016; Shen, Cain, and Hui, 2019; Vallejos-Romero et al., 2020). These patterns suggest scholars need not invent new theories. Instead, they should specify how existing distributive politics frameworks adapt to settings with different societal groups, interests, and institutions.

# 3 Credibility as a Unifying Framework

We use the concept of credibility to integrate domestic and international climate politics literatures. This synthesis, first, provides a structured mechanism to review clean energy transition theories. It also offers an approach to bring greater theoretical coherence to climate politics scholarship, facilitating the identification of research priorities and extension of theories to the developing world.

Not all political economy challenges in the clean energy transition are reducible to credibility challenges, as the conclusion discusses. Still, credibility offers a useful lens for under-

standing many theoretical themes in the field.

Following Gazmararian and Tingley (2023), we consider strategic and structural conceptions of credibility. Strategic credibility refers to commitment problems stemming from time inconsistency and incomplete information: laws implemented today can be unwound in the future as political and economic circumstances change (Kydland and Prescott, 1977; Rodrik, 1989). If reforms are not self-enforcing, the lack of a third party to ensure that policies will not be reversed can yield inefficient policies (Acemoglu, 2003; Fearon, 2011). These challenges are relevant for the decarbonization since policies, such as compensation and clean energy subsidies, must be implemented over the long run (Aklin, 2024; Brunner, Flachsland, and Marschinski, 2012; Hale, 2024; Hovi, Sprinz, and Underdal, 2009; Ulph and Ulph, 2013).

Trust, though analytically distinct from commitment problems, shapes perceptions of government credibility (Anderson, 2017; Levi and Stoker, 2000). There is declining trust in government in the United States (Hetherington, 1998), and particular concern in regions most affected by decarbonization about whether the government will follow through on its promises (Gazmararian and Tingley, 2023).

Structural credibility is the ability of clean energy investments to create benefits such as jobs and tax revenue, which depends on underlying factors such as technological constraints. Industries vary in labor and capital intensity, skill requirements, and ease of taxation, shaping the benefits green projects bring communities. Investments that make workers and communities as well or better off than before are likelier to receive public support (Bain et al., 2016; Caggiano et al., 2024; Stokes and Warshaw, 2017), but there are limits to framing (Aklin and Urpelainen, 2013a; Bayulgen and Benegal, 2019; Bernauer and McGrath, 2016).

Together, these credibility concepts help explain when governments are able to address political barriers to the clean energy transition: creating allies and diffusing opposition.

First, credibility helps explain when climate policy can cultivate allies through concentrated benefits (Meckling et al., 2022; Ross, 2025). Strategically, more credible government

commitments to the clean energy transition create more certain market signals that make costly green investments more likely to manifest (Blyth et al., 2007; Bosetti and Victor, 2011; Fabrizio, 2013; Noailly, Nowzohour, and Heuvel, 2022). Structurally, the public and interest groups are more likely to anticipate gains from climate reforms when green investments are more economically feasible and capable of generating local benefits. Expected benefits matter not just for building a coalition to adopt mitigation policies, but for implementing such policies via the required infrastructure deployment.

Credibility also shapes the government's ability to mute opposition. The standard political economy prescription is compensation: assist workers, communities, and firms in adjusting to decarbonization's costs through policies such as retraining and place-based investments (Arel-Bundock and Pelc, 2024; Finnegan et al., 2025; Gaikwad, Genovese, and Tingley, 2022; Gazmararian, 2024; Green and Gambhir, 2020; Meckling and Nahm, 2022). Yet credible such bargains can collapse when recipients doubt that payments will continue (strategic) or suspect compensation cannot fully offset losses (structural) (Dixit and Londregan, 1995; Jacobs and Matthews, 2017; Patashnik, 2014).

Three interrelated domestic and international factors shape both types of credibility: institutions, state capacity, and international constraints. We show how differences in each affect the government's ability to make credible commitments and generate local benefits. When hypothesizing how these variables affect outcomes, researchers will also need to specify the interests of political actors, which could differ across industrialized and emerging economies.

### 3.1 Political and Economic Institutions

Institutions are rules, procedures, and norms that constrain interactions (North, 1990). We examine four institutional features that vary across countries and affect credibility challenges: business-state relations, labor market arrangements, electoral rules, and transparency. We also consider informal institutions, which may be more prevalent in developing contexts.

#### 3.1.1 Business-State Relations

The institutions governing business-state relations can shape whose voice prevails in distributive conflict over decarbonization. In pluralist systems many autonomous groups vie for influence while remaining outside formal decision-making. In corporatist systems a small set of centralized business and labor associations play a more direct role in policymaking (Dahl, 1961; Martin and Swank, 2012; Mildenberger, 2020).

Corporatist systems could bolster credibility in two ways. First, long-term policymaking access makes societal groups less worried about political reversals because they have leverage to block retrenchment attempts (Meckling et al., 2022). Second, businesses have more frequent interactions with the government and societal groups, which allow political actors to develop reputations and creates a shadow of the future, enhancing the prospects for cooperation (Axelrod, 1984).

Business-state relations matter for both compensation and investment-driven climate policies. Carbon-intensive workers and firms may accept a climate bargain if provided credible compensation (Gazmararian, 2024; Gazmararian and Tingley, 2023; Meckling et al., 2022; Meckling and Nahm, 2022). In pluralist contexts there could be greater concern about whether the government will uphold commitments. Hold-up problems are acute since firms and workers will see their economic position diminish, which is a substantial source of political power (Dixit and Londregan, 1995; Williamson, 1989).

By the same logic, corporatist institutions can also strengthen commitments to support clean energy investments. When firms know they will have future policymaking influence, they are less worried about reversals due to changing circumstances. These dynamics primarily involve strategic credibility, though lasting reforms can indirectly enhance structural credibility by encouraging larger, locally beneficial projects.

Most climate politics research on corporatism and pluralism centers on industrialized democracies (Finnegan, 2022b; Finnegan et al., 2025; Martin and Swank, 2012; Meckling et al., 2022; Meckling and Nahm, 2018b; Mildenberger, 2020). Emerging work shows their

relevance in developing countries as well (Hochstetler and Kostka, 2015; Hutchful, 2019; Nyang'oro, 2019; Pretorius, 1996).

#### 3.1.2 Labor Market Institutions

Labor market institutions encompass government programs that develop skills and support workforce training, such as vocational colleges (Thelen, 2004). Although most scholarship studies wealthy economies, developing countries also display wide variation in such institutions (Betcherman, 2012).

Labor market arrangements interact with structural credibility. When communities lack a clean energy workforce, investments are less likely to create local jobs. Many countries confront green workforce shortages due to limited vocational training (IRENA, 2021; Strietska-Ilina and Mahmud, 2019). Where institutions can quickly "retrain" or "upskill" workers, the transition could become more politically feasible because local co-benefits are structurally more credible.

Workforce challenges vary across contexts. In countries with fossil fuel endowments, "re-skilling" looms large in both developed and developing nations (Lim, Aklin, and Frank, 2023). Mobility also differs; in the United States, for example, many displaced workers have remained in place after economic shocks (Autor, Dorn, and Hanson, 2013), heightening the need for local training programs. This limited mobility may be due to place-based attachments (Bell and York, 2010; Gaikwad, Genovese, and Tingley, 2022), which may vary cross-nationally (Blankenship et al., 2022).

"Brain drain" complicates the situation in developing countries (Docquier and Rapoport, 2012). Workforce training might equip people with skills to earn more money abroad, inadvertently encouraging migration, unless paired with complementary incentives such as job guarantees.

#### 3.1.3 Electoral Rules

Electoral institutions can affect the government's ability to make credible commitments. In proportional representation (PR) systems, losing a few percentage points may not cost parties all their seats. PR also yields coalition governments whose written agreements serve as multi-year contracts, raising the reputational costs of reneging (Finnegan, 2022a,b; Finnegan et al., 2025; Iversen and Soskice, 2006; Jacobs, 2011, 2016; Lockwood, 2021). Together, these features may reduce fears that future leaders will unwind investments or compensation programs.

However, there are theoretical reasons that even PR institutions cannot fully insulate politicians from short-term pressures. Ruling parties could be more vulnerable to defeat in PR systems since small shifts in support can have consequences for coalitions, more so than in majoritarian systems when the dominant party has a solid advantage (Matland and Studlar, 2004; Powell, 2000).

More theoretical and empirical work is needed to explain when electoral institutions lengthen time horizons and affect policy output. Tsebelis (2002), for example, makes a compelling case for focusing on veto points rather than features such as presidential and parliamentary systems, a claim partly explored in climate policy studies (Bayulgen and Ladewig, 2017; Madden, 2014).

Regime type also matters. Democracies expose leaders to electoral accountability and may sustain reforms more credibly than autocracies (Fearon, 1994, 1997). There is a long tradition of studying the relationship between democracy and the environment (e.g., Bättig and Bernauer, 2009; von Stein, 2022) Although certain authoritarian institutions can also bind rulers to long-term plans (Fang and Owen, 2011; Gandhi and Lust-Okar, 2009; Weiss, 2013), and greenhouse gas emissions vary across autocracies (Kakenmaster, 2024).

### 3.1.4 Transparency

Transparency matters for credibility in global climate cooperation. By revealing which government shirk their commitments, it enables monitoring and sanctions (Dai, 2010; Dubash, 2021; Keohane, 1984; McAllister and Schnakenberg, 2021). It also shapes the behavior of multinational corporations and international organizations (Hale, 2008).

Transparent domestic political and economic processes can also influence clean energy investments. In a principal-agent model, the government (principal) wants projects that maximize local benefits, but they cannot fully judge a firm's (agent) promises in advance and imperfectly afterward. These information gaps are particularly acute when governments rely on tax credits and subsidies (Jensen and Malesky, 2018; Jensen and Thrall, 2021), and can be even larger in autocratic countries (Shen, 2024).

Greater transparency makes accountability more likely because governments can more easily monitor firm behavior (Heald, 2006; Holmstrom, 1979). Transparency can also emerge from non-governmental monitoring (Anderson et al., 2019). Yet sunlight alone is insufficient without enforcement (Alt, 2019; Bartik, 2019; Hood and Heald, 2006).

Transparency-enhancing institutions can, in principle, sustain clean energy reforms. However, the effect could be bidirectional. If disclosure reveals that clean energy projects are not delivering local benefits, public support may decline. Conversely, limited transparency sometimes allows reformers to hide policy costs (Arnold, 1990; Kono, 2006).

### 3.1.5 Informal Institutions

Informal institutions vary within and across countries (Helmke and Levitsky, 2004). Local norms of trust, reciprocity, and peer sanctioning can substitute for state regulation when communities manage common pool resources (Ostrom, 1990). These reputational mechanisms can strengthen strategic credibility, because political actors know that violating an agreement or mismanaging a project will trigger social sanctions even when formal enforcement is weak (Gazmararian and Tingley, 2024; Korppoo, Stensdal, and Korsnes, 2020; Os-

trom, 2010). Such ground-up efforts are related to the "experimentalist approach" in which businesses and governments jointly test new technologies and monitor one another's performance (Sabel and Victor, 2022).

Informal rules also influence structural credibility. In off-grid solar programs, for instance, community norms determine who pays for, maintains, and profits from off-grid solar systems; when these norms function well, projects can more credibly promise jobs. Their effectiveness often depends on how they interact with formal institutions such as property rights and electoral rules (Aklin, 2021). Where the two sets of rules complement each other, informal monitoring can deter free riding while well-governed projects generate tangible gains.

Informal institutions are especially relevant in developing countries, where formal rules often rest on pre-existing social practices (Tsai, 2007). Robust community sanctions can reassure investors that commitments will be honored and help ensure that promised cobenefits materialize. Over time, these bottom-up norms can lay the groundwork for stronger formal policies that reduce commitment problems.

# 3.2 State Capacity

State capacity refers to the government's ability to design, fund, and enforce policy (Berwick and Christia, 2018). Scholars have linked it to outcomes such as long-run economic growth and government service provision (Alik-Lagrange et al., 2021; Besley and Persson, 2010; Dincecco and Katz, 2016). For climate politics, it conditions both strategic and structural credibility. Scholars usually disaggregate state capacity into coercive power, bureaucratic capacity, and revenue extractive (Cingolani, 2013; Levi, 1988; Migdal, 1988). Research links state capacity to climate politics outcomes in high and low-income contexts (Meckling and Nahm, 2018a, 2022; Ward, Cao, and Mukherjee, 2014), including variation in climate policy instruments (Meckling and Benkler, 2024). We explore two channels through which state capacity affects credibility: property rights and bureaucratic capacity.

### 3.2.1 Property Rights

Secure property rights bolster strategic credibility by reducing hold-up problems from expropriation fears (Acemoglu and Johnson, 2005; Frye, 2004; North and Weingast, 1989; Weiss, 1998). Outright expropriation is rare today but occurs in subtle ways like intellectual property theft. The risks are still tangible. Chile plans to nationalize the country's lithium industry, which will not have an isolated effect, since clean energy technologies depend on long supply chains. When these investments involve specific assets, such as a mine, hold up problems are acute and can deter investment (Klein, Crawford, and Alchian, 1978; Williamson, 1989).

### 3.2.2 Bureaucratic Capacity

The ability to implement laws despite societal group opposition is critical to institutionalize reforms (Evans, 1995; Johnson, 1982; Skocpol, 1985; Skocpol and Finegold, 1982). This capacity is particularly relevant for industrial policy, which depends on striking a balance between autonomy and embeddedness of government officials and business (Rodrik, 2004). Professional agencies in many industrialized democracies can enforce laws despite political fights (Miller, 2000). In much of the developing world, by contrast, limited resources, patronage politics, and clientelistic legacies reduce the state's independence (Cruz and Keefer, 2015; Dubash and Morgan, 2012; Hicken, 2011).

Limited bureaucratic capacity can undermine both strategic and structural credibility (Cingolani, Thomsson, and De Crombrugghe, 2015). Without skilled staff and clear lines of authority, governments cannot monitor energy transition policies, enforce compensation schemes, or adjust them when they underperform. Weak oversight also leaves room for capture, as rival agencies and special interests reshape programs to serve their own goals. In South Africa, bureaucracies involved in renewable energy operate under coal-oriented superiors and lack autonomy to deliver on green mandates. In India, political parties can manipulate electricity provision for electoral reward (Baskaran, Min, and Uppal, 2015; Min

and Golden, 2014).

The European Union's Carbon Border Adjustment Mechanism (CBAM) shows how bureaucratic capacity affects domestic clean energy politics abroad. While compliance falls to firms, this process depends heavily on national infrastructure and capacity for monitoring and reporting. Many developing countries lack the administrative infrastructure to meet technical requirements (Eicke et al., 2021). Where capacity is weak, CBAM may impose costs without catalyzing investment; where it is strong, the policy could reinforce local support for green industrialization.

### 3.3 International Constraints

International constraints affect credibility in three main ways. First, countries have differing access to international finance and global value chains, which influences their capacity to fund clean energy projects and deliver local benefits (Allan and Nahm, 2025). Second, domestic commitment failures in wealthy countries can freeze climate finance flows that developing countries need, which undercuts credibility in emerging economies (Gaikwad, Genovese, and Tingley, 2025). Third, international regimes and organizations influence resources and information, shaping expectations of accountability for broken promises (Koremenos, Lipson, and Snidal, 2001).

### 3.3.1 Industrial Capabilities and Global Supply Chains

Industrial capacity influences the co-benefits a country can capture from the energy transition. In electric vehicle supply chains, for example, some states own critical minerals but cannot refine or assemble them, whereas others can manufacture but lack inputs (Meckling and Nahm, 2019). Governments are already crafting strategies to bolster local capacity (Lebdioui, 2022). South Africa's Localization Support Fund channels resources into domestic transmission hardware production, for instance. Industrial capacity varies with factors such as natural resource endowments, industrial legacies, global value chain position, and

technological complexity (Cingolani, 2013; Hughes and Meckling, 2018; Nahm, 2017).

Policies that could create local benefits, such as nationalization, can undermine efforts to foster a stable investment environment via secure property rights (Henisz, 2000). Multinationals posses the capital and know-how for large projects, but may stay away if they fear expropriation. Solving one credibility problem can worsen another.

### 3.3.2 International Climate Finance

Adequate climate finance is essential for clean energy projects in developing countries. Without it, policies lack structural credibility because promised investments rarely materialize (Landis and Bernauer, 2012).

Domestic politics in donor countries can dampen the supply of climate finance (Buntaine and Prather, 2018; Gaikwad, Genovese, and Tingley, 2025; Timperley, 2021). When donor countries cannot build domestic constituencies around climate finance, it undermines the credibility of their international promises. This logic follows the classic two-level game dynamic, where domestic outcomes influence international negotiations and vice versa (Milner, 1997; Putnam, 1988).

Climate finance commitment problems are not insurmountable. Countries could structure aid to enhance its credibility. Gaikwad, Genovese, and Tingley (2025) show that having donor country firms partner with recipient country actors builds public support in the donor country, potentially making commitments more credible.

Climate finance challenges can also collide with emerging trade measures like CBAM. Critics argue that carbon tariffs unfairly penalize countries that contributed little to historical emission and, without foreign finance, lack capacity to comply (Pisani-Ferry, Mauro, and Zettelmeyer, 2025).

### 3.3.3 International Organizations

International organizations influence credibility challenges through trade regimes, development banks, and information provision. First, green industrial subsidies meant to build domestic coalitions can violate WTO rules, pitting the goal of local support against commitments to open trade (Colgan, Green, and Hale, 2021; Lewis, 2014; Meckling, 2021). Ironically, policymakers designed these same trade regimes so that countries could credibly commit to open trade despite domestic opposition (Maggi and Rodriguez-Clare, 2007). Navigating these trade-offs will depend on each country's reliance on global commerce.

Development banks can enhance credibility by lowering green project capital costs. For example, the World Bank could fund renewables and withdraw from fossil fuel ventures (O'Brien-Udry, 2023). Yet their leverage may be limited due to weak enforcement and geopolitical considerations (Stone, 2012; Vreeland, 2003).

International organizations also provide information that could promote transparency, making it easier for publics, investors, and governments to monitor commitments (Florini, 2007; Grigorescu, 2003; Keohane, 1984; Koremenos, Lipson, and Snidal, 2001). When information is reliable, leaders who renege on green pledges face stronger domestic and international sanctions; where it is scarce, credibility erodes.

# 4 Research Priorities

# 4.1 Decarbonizing the Developing World

Institutions, state capacity, and international constraints use old theory to open new inquiries into how governments can address credibility challenges in the clean energy transition. Our review illustrated how these ideas apply to developing countries and noted existing work that does so, yet systematic tests remain scarce outside industrialized democracies.

Future research should examine each factor—institutions, state capacity, and interna-

tional constraints—independently and in combination. The variables could act as complements or substitutes. A country might, for example, offset fragmented business-state relations with strong bureaucratic capacity and secure property rights.

Studying institutional features such as transparency, for example, will require new data at national and subnational scales. Although transparency metrics exist (Hollyer, Rosendorff, and Vreeland, 2014), similar indices for clean energy investment are rare (but see Deese et al., 2025). Since many clean energy investments involve local decisions, such wind turbine siting, such measures should be spatially granular.

# 4.2 Disaggregating Policy Adoption

Most research asks whether countries adopt any mitigation laws. A credibility lens pushes scholars to disaggregate policies to consider factors such as which actors are targeted, which could affect their incentives to oppose or repeal reforms. Business-state relations, for example, might be more important for understanding when laws focus on compensating businesses, while electoral institutions might be more salient for climate policies that affect consumers (Finnegan et al., 2025).

Measuring climate policymaking remains difficult (Lieberman and Ross, 0025). Existing databases, such as the Grantham Institute's Climate Change Laws of the World, catalog statues but do not assess their credibility, although these policies correlate with emissions reductions (Eskander and Fankhauser, 2020). Promising research avenues include examining quantifiable metrics such as fossil fuel taxes and subsidies (Ross, Hazlett, and Mahdavi, 2017), and surveying climate policy experts (Victor, Lumkowsky, and Dannenberg, 2022). More work is needed to capture the nuances of climate policy instruments across countries and time.

Researchers should continue to examine subnational climate policy-making. Provincial and municipal governments often control siting, permitting, and local taxes, which are factors that could affect mitigation policy's durability and tangible benefits. Much existing work

examines the United States and European countries (Bassesches, Forthcoming; Bulkeley and Kern, 2006; Karapin, 2016; Rabe, 2004; Stokes, 2020; Trachtman, 2020). Emerging economy studies provide opportunities to study how factors such as administrative capacity and business-state relations travel (Bradlow, 2024; Gong, 2025).

Finally, scholars should examine climate institutions, the formal arrangements for how states organize climate policymaking (Dubash, 2021; Guy, Shears, and Meckling, 2023). These institutions could enhance strategic credibility by insulating rules from day-to-day politics and fostering expertise needed for enforcement. Understanding these institutions could explain why similar laws are more effective in certain countries than others.

## 4.3 Policy Implementation

Implementation has received relatively less attention than adoption, despite being a cause of the gap between commitments and emissions (Fransen et al., 2023). The credibility framework suggests that scholars should examine two linked questions: whether rules are enforced, subsidies disbursed, and penalties applied over time (strategic credibility), and whether projects materialize quickly enough and generate the promised local benefits (structural credibility).

Studying implementation will require analysis at the level of the transformations required by the clean energy transition, such as grid expansion, renewable deployment, and vehicle electrification. Relevant outcomes include permitting time, construction speed, and local economic benefits. Speed matters because the energy transition must occur rapidly to avoid global warming's worst damages.

Scholars should explore the relationship between these outcomes and the factors thought to enhance credibility. Aklin (2021), for example, shows how governments that can better solve commitment problems have deployed more renewable energy.

Moving beyond executives and legislatures, future work must analyze how regulators draft rules, agencies enforce them, and courts review disputes (Voeten, 2025a). These are all vital

facets of implementation, and the extent to which governments can address issues such as regulatory autonomy could affect their ability to resolve credibility challenges. Cross-national work could link agency budgets, administrative staff, and judicial review to decarbonization.

## 4.4 Public Opinion

Public opinion research anchored around credibility would study whether citizens believe governments will stick to climate commitments (strategic), and whether households and workers expect the transition to deliver local benefits (structural). Most opinion research still measures belief in climate science or general climate policy support (for reviews, see Bergquist, Konisky, and Kotcher, 2020; Egan and Mullin, 2017; Gazmararian, Mildenberger, and Tingley, 2025). However, research in high-income democracies has begun to probe credibility-related considerations, such as expected benefits from clean energy (Ansolabehere and Konisky, 2014; Carley et al., 2020; Gazmararian and Tingley, 2023). Comparable evidence is sparse in developing countries, with some exceptions (Aklin et al., 2015; Aklin, Cheng, and Urpelainen, 2018; Alkon, Hadden, and Su, 2025; Hsiao and Kuipers, 2025).

Because the clean energy transition's effects are spatially concentrated, national surveys can miss communities with coal mining, automobile manufacturing, or wind farms, whose credibility beliefs matter most (Gaikwad, Genovese, and Tingley, 2022; Gazmararian, 2024). Targeted surveys, interviews, and focus groups in places affected by decarbonization have demonstrated promise (Carley, Evans, and Konisky, 2018; Carley and Konisky, 2025; Cha et al., 2021; Raimi and Whitlock, 2023; Silva, Carley, and Konisky, 2023), and should be expanded to incorporate high-resolution labor-market and project-deployment data to connect local perceptions with energy transition and electoral outcomes.

### 4.5 Elites

Because elites write and enforce climate policy, their beliefs and preferences are central to the clean energy transition, especially in developing countries (e.g., Bayulgen, 2022). Research

in the United States shows that legislative staffers systematically underestimate how much constituents support climate policy (Hertel-Fernandez, Mildenberger, and Stokes, 2019), while recent work documents similar misperceptions in Indonesia (Hsiao and Kuipers, 2025). Future work should build on these studies to understand the interaction of public opinion and elites in shaping climate policy adoption and implementation.

Researchers should also examine causal mechanisms linking institutions, state capacity, and international constraints to the beliefs, attitudes, and behaviors of political leaders. Although the correspondence between public opinion and public policy is well-studied in other domains (e.g., Page and Shapiro, 1992; Wlezien, 1995), the climate arena remains under-explored (Schaffer, Oehl, and Bernauer, 2022).

# 4.6 Compensating Energy Transition "Losers"

While research on compensating climate policy "losers" is growing (Bolet, Green, and Gonzalez-Eguino, 2024; Kono, 2020), findings from individual countries may not travel cross-nationally. Single case studies are valuable for parsing causal mechanisms, but more systematic work is needed to understand the political effects of compensation, and credibility's moderating role.

Scholars also know less about when governments offer compensation. Previous research predicts higher likelihood where corporatist business-state ties ease bargaining (Meckling et al., 2022; Mildenberger, 2020). Yet few studies treat the supply of compensation as the outcome, which might not be automatic due to elite misperceptions or budget constraints.

We also know little about the implementation of compensation, which could matter for its perceived durability and practical effects. Policy analysts viewed the Inflation Reduction Act's energy community tax credit, for instance, as ineffective because the qualification thresholds were too broad and the bonus was too little to shift firm investment decisions (Raimi and Pesek, 2022). Comparative research should track the design and implementation of compensation policies, such as conditionality rules and monitoring capacity, to explain

why some programs convert opponents into supporters while others fail.

Climate politics should build upon insights from scholarship on past economic transformations such as agriculture mechanization, trade liberalization, and technological displacement. There is a vast literature on compensating globalization's losers that is informative (Walter, 2021). Mapping similarities and differences with the clean energy transition can clarify when tools, such as income support, retraining, and place-based aid succeed in building local support and ameliorating economic disruption (Hanson, Rodrik, and Sandhu, 2025; Mukherjee and Raimi, 2023).

## 4.7 Policy Feedback Effects

Scholars should study the conditions when climate policies have positive feedback effects, where reforms create constituencies that support the clean energy transition. There is already work that helps understand how sequencing could enable mitigation policy to ratchet up stringency (Meckling, Sterner, and Wagner, 2017; Pahle et al., 2018). There are also analogs from other issue areas such as healthcare and welfare reform (Hopkins, 2023; Jacobs and Mettler, 2018; Patashnik, 2023; Pierson, 1993). It is an open question the extent to which policy reforms in these other issue areas generalize to the clean energy transition, given the intense, geographically concentrated distributive effects of the clean energy transition and long time horizons involved. While there are some policy feedback studies of the clean energy transition in the United States (e.g., Stokes, 2020; Trachtman, 2023), there is less work in developing countries.

It would be useful for studies to differentiate between policy feedbacks that alter the political behavior of businesses and citizens. Some reforms could sustain themselves by creating supporters among businesses beneficiaries, whereas other policies could build a base of public support (Campbell, 2012). Moreover, scholars should examine how firms and voters respond to policy retrenchment, especially considering the partial repeal of the Inflation Reduction Act.

Finally, scholars should explore trade-offs with policies to lead to the enactment of durable mitigation policies. Green industrial policies create more concentrated local economic benefits that could expand climate coalitions, but also introduce risks such as rent seeking and regulatory capture (Meckling, Sterner, and Wagner, 2017; Rodrik, 2014). While there is extensive economics research on industrial policy (Juhasz, Lane, and Rodrik, 2024), political scientists have focused more on how climate policies are adopted than trade-offs in their implementation (but see Matsuo and Schmidt, 2019).

## 5 Conclusion

The transition from a fossil fuel-based to a carbon-neutral economy confronts significant political barriers. This review integrates many of previous theories around credibility challenges and, in doing so, identifies new lines of research.

There are, of course, many aspects of climate politics that cannot be reduce to credibility. Our use of the framework is to provide an integrative review rather than assert a singular theoretical approach. For example, there are coordination challenges with transforming complex energy systems that would exist even if governments could make perfectly credible commitments and offer maximal local benefits to supporters (Goedeking and Meckling, 2024). Our aim is to provide a political economy foundation upon which scholars could layer additional factors such as norms (Besley and Persson, 2023), identity (Zucker, 2024), scientific expertise (Haas, 1992), and altruism (Bechtel, Genovese, and Scheve, 2019; Kennard, 2021).

The review also bridges domestic and international climate politics explanations. Rather than treating domestic distributive politics and international collective action problem as competing paradigms, we emphasize their interactions. To understand the opportunities and challenges that developed and developing countries face in combating climate change requires accounting for the interplay of credibility with domestic and international politics.

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