

## Designing a Strong Syllabus for Climate Politics

Political science has come a long way in its understanding of climate change. As recently as 2017, most of the top journals in political science were publishing very little on the subject.<sup>1</sup> In the last few years, however, scholars have risen to the challenge to produce an outpouring of research on various topics related to the politics of climate change.<sup>2</sup> Reading all that is published would be a full-time job, if it were possible at all. The challenge now is to turn the huge amount of research into useful knowledge that can be taught and used to generate useful solutions for the climate crisis.

Rather than a standard literature review, our aim in this article is twofold. First, we seek to provide prospective instructors with the substantive building blocks for designing a first-rate syllabus to teach climate politics. We put forward a ‘theories of change’ approach which should prove useful for teaching climate politics courses at any level. Additionally, we provide a detailed framework and an associated literature review of key literature for those instructors looking to build a graduate or advanced undergraduate level syllabus. Second, we hope to provide inspiration for advanced students searching for a research question to answer in an essay, thesis, or research article. These aims reflect our belief that climate change is at least as much about politics as it is about science, technology, or economics, and the study of climate politics is essential for address the challenges posed by climate change.

We focus on climate mitigation (or decarbonization) as the central topic for a generalist course on climate politics, while acknowledging that many instructors will want to include other topics such as adaptation or the links between climate and security. (Throughout, we use the term “decarbonization” as inclusive of decarbonizing efforts and economic development that has relatively low carbon intensity, even if such activities do not eliminate emissions.) There is important research on adaptation, security implications and other climate consequences.<sup>3</sup> Our focus on climate mitigation is based on the premise that it is crucial to understand the root of the emissions problem, why it is politically hard to solve, and what might be done about it. In selecting the literature to review, we also focus on politics, as opposed to more technical, economic, or commercial aspects of decarbonization.

One of our main arguments emphasizes the importance of theories of change about decarbonization, whether they are explicit or implicit. A theory of change is a conceptual

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<sup>1</sup> Keohane 2015; Green and Hale 2017

<sup>2</sup> Colgan and Hinthorn 2023; Ross 2025; Hadden and Prakash 2023

<sup>3</sup> Javeline 2014; Colgan 2018a; Mach et al. 2019; Van de Graaf and Sovacool 2020; Busby 2022; Falkner and Buzan 2022; Benveniste et al. 2022; Fazal and Fortna, unpublished. For energy implications of the 2022 Russia-Ukraine war, see CSL White Paper by [Colgan et al.](#)

map of the conditions under which change happens in a system; for advocates, it often underlies a plan of action. Multiple theories of change exist in climate politics generally, and for decarbonization specifically. That said, not every class offers or analyzes an explicit theory of change, much less multiple theories. Our premise is that students need some sort of theory of change, no matter how rudimentary, to get the most out of existing research (and see where gaps exist). We do not argue for a universal or superior theory of change in this article. Instead, we offer a framework for how theories of change can be identified, understood, and constructed. We show how instructors might use our framework to illustrate the implicit theory of change that underlies relevant policy examples like the Kyoto Protocol, carbon taxes, or the Green New Deal.

Our framework considers climate change as a political imperative to decarbonization, moving through various political actors, institutions, and policies. We disaggregate the politics of decarbonization into five categories of and assess the state of political science knowledge about each of those topics. Each of those categories has 3-5 sub-topics. We conceptualize decarbonization politics as a recursive process by which **units** (individuals, communities, firms, and unions) are organized and mobilized by various **conveyors** (social movements, associations and networks, parties and politicians, the media, and epistemic communities) to affect **authorities** (domestic institutions, international organizations, and transnational governing arrangements) that design **policies** (market-based policies, industrial policies, urban and system design, and technology adoption) to affect the major polluting **sectors** (electricity generation; transportation; buildings; industry; and agriculture), especially through investment and asset revaluation. This process is recursive over time because actions in the present affect preferences and incentives in the future. The framework we sketch out here does not capture everything, and it has a materialist orientation towards political economy (as opposed to an ideational orientation towards narratives and worldviews, for instance). Still, it provides a solid starting point for analysis and teaching. Additionally, we hope to inspire other scholars who view climate politics via alternative orientations to critically engage with the framework. Our aim is to start a broader conversation within the discipline about how we can best distill important information to students, regardless of one's intellectual foundations.

Our framework offers two contributions. First, rather than simply reviewing what research already exists, the framework provides a structured way of assessing the knowledge one would want for a complete theory of decarbonization. This framework allows a kind of “heatmap” assessment of where political science research is strong and where it is relatively weak. In turn, that heatmap can serve as a tool for instructors in crafting courses on climate politics and for students in identifying interesting research questions. We conduct our own assessment as part of this article, not as a final or objective judgment, but as stimulus for further thought. For example, we observe that some sectors associated with

climate politics have received lots of research attention – especially energy, electricity, and transportation – others have received far less, including agriculture and certain industries like cement and glass. Second, our framework can be used by instructors for practical teaching applications. It allows both instructors and students alike to visually illustrate different “pathways” which each indicate a theory of change that links our different elements together. This can be used to understand existing policy approaches to achieving decarbonization or prospectively by students to design their own theories of change based on what they have learnt in their climate politics course.

### Moving from research to knowledge

Classroom instruction is a crucial part of the complex process by which peer-reviewed research diffuses into human knowledge and behavior. Instructors pass on information to students that shapes their knowledge and views. Instructors must make decisions about what to teach and how to do it, because the amount of published research far exceeds what can be covered in any given course. Our aim is not to coach anyone on teaching methods or the use of classroom time. Instead, we imagine our readers as potential instructors (in the present or future) who are engaging in a stylized three-step process as they design a syllabus for an advanced undergraduate or graduate level course on climate politics.

We note here that the stylized process outlined below will likely yield a syllabus that is too advanced for an introductory undergraduate course. Such courses are often more general in nature, touching on topics such as climate science and the history of climate policy implementation. We view the contribution of this paper to such courses as emphasizing the importance of a ‘theories of change’ approach. We argue that encouraging undergraduate students to think about how different policy approaches, or ‘theories of change’, link different elements within our framework provides a useful method for instructors to teach students ‘big concepts’, akin to the tragedy of the commons, co-benefits, or moral hazard.

The first step that an instructor of an advanced undergraduate or graduate-level may take in our stylized process is an effort to synthesize the research literature, as background for identifying the content the instructor plans to teach. This is the step for which we imagine this paper will be most helpful. It provides instructors with a structured way to see past their own academic specializations to the broader landscape of knowledge about climate politics, and to have some confidence about what to teach on far flung topics.

The second step is to consider how the content should be taught. Teaching methods range enormously, from lectures and documentary films to simulations and exercises. For

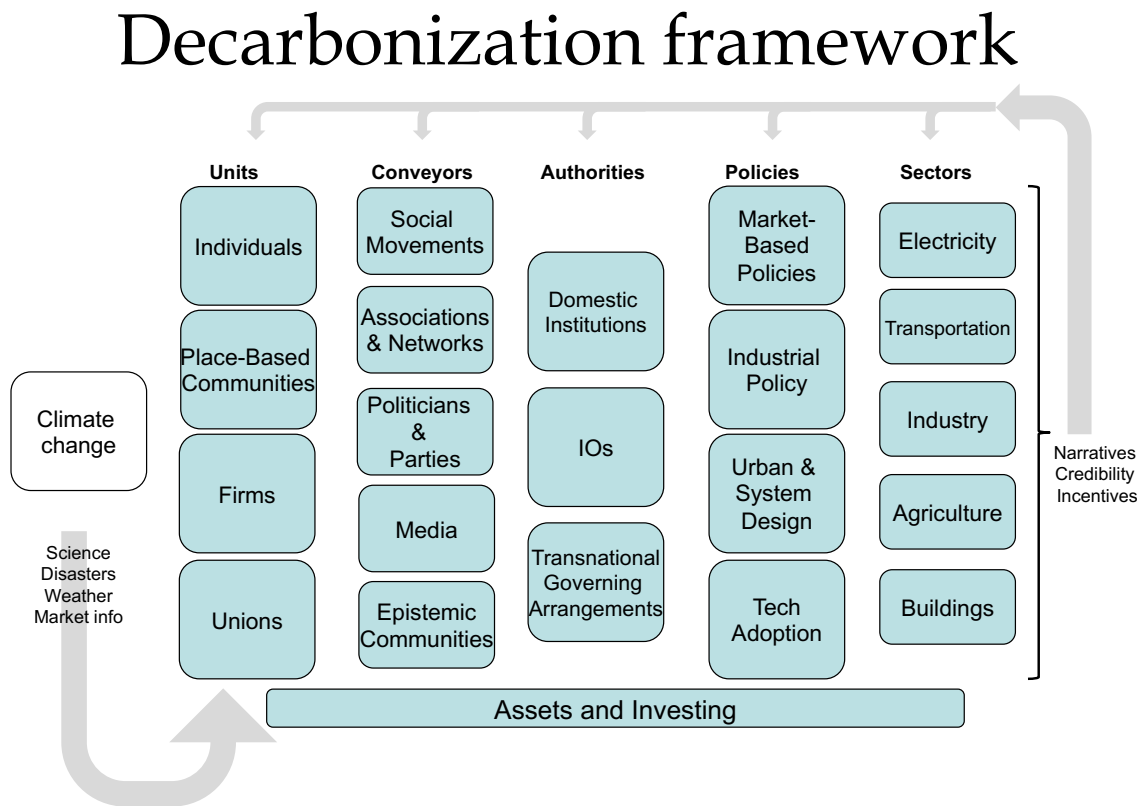
this step, instructors might find it useful to consult how other syllabi are structured. The [Climate Syllabus Bank](#) hosted at Brown University could prove useful for this step, and other resources are available.

The third step is crafting the syllabus itself, drawing on the results from the previous two steps. An instructor must decide what content and questions the students will be exposed to (step one should help), and what teaching methods to use (step two should help). The content and methods are the raw ingredients for a syllabus that is tailored to the circumstances of an intended course, adjusting for things like class size, frequency of class meetings, length of the course, and dozens of other variables. We imagine that instructors are likely to have multiple objectives for their course, only some of which are covered by our analysis here. For instance, instructors might wish to use climate change as a way of introducing students, especially those who are not students of political science, to see politics as an integral part of a topic that might look to them strictly technical or economic. Other instructors might be focused primarily on providing a history of international collaboration and attempts to deal with climate change. Our focus here, by contrast, is to help the *analysis* of climate politics using theory and evidence. These various objectives are mutually compatible and could be combined in a single course.

## Theoretical Framework

Our framework, pictured in Figure 1, focuses on twenty-two elements that are structured in five categories. Our objective is to identify influential political science research associated with each element.

Figure 1: Framework for the Politics of Decarbonization



Our semi-structured method for identifying the relevant research involved four steps. First, we conceptualized the elements in the framework and revised it iteratively after conducting the other three steps. Second, we mined a set of significant literature reviews on climate politics conducted since 2023.<sup>4</sup> Third, we reviewed a set of top political science journals for important published works since about 2017, including *International Organization*, *American Political Science Review*, *International Studies Quarterly*, *British Journal of Political Science*, *Global Environmental Politics*, *American Journal of Political Science*, *World Politics*, *Comparative Political Studies*, and *Journal of Politics*. We also considered, albeit less systematically, publications outside of these journals, including *Nature Climate Change*, *Nature Energy*, *Energy Research and Social Science*, *Environmental Politics*, and *PNAS*. In doing so, we drew upon our own expertise and the advice of those in our personal networks. While this step is unsystematic and necessarily subject to various personal biases, it also takes advantage of our expertise as practicing scholars in this area. Fourth, we selected the research to highlight for each element, prioritizing prominent studies that offered important and novel top-line messages.

<sup>4</sup> Colgan and Hinthorn 2023; Ross 2025; Hadden and Prakash 2023; Gazmararian and Tingley, unpublished

## State of the Art

We describe what political science has to offer on each of the elements in Figure 1. We begin with units, the foundational political actors in our theory of decarbonization. These units – including individuals, communities, firms, and unions – are directly affected by both climate change and decarbonization. Political science shows us how these units not only respond to decarbonization policies but also actively shape such efforts. As a result, these units have strong preferences regarding policy change.

### Units

Surveys of public opinion across all major emitting countries worldwide have concluded that the majority of individuals both believe climate change is real and that 'something' should be done to address it.<sup>5</sup> However, this global consensus has not translated into policies that adequately address the challenge posed by decarbonization. This has spurred scholars to more closely examine the determinants of public support for both international climate agreements<sup>6</sup> and domestic decarbonization policies.<sup>7</sup> Some highlight the role of various socio-demographic factors, such as education<sup>8</sup> and gender,<sup>9</sup> while others emphasize the importance of political ideology in predicting individual-level preferences.<sup>10</sup> Perhaps more importantly, researchers have documented the various tradeoffs individuals face, such as the desire for both better climate outcomes and cheap and reliable energy.<sup>11</sup> Such tradeoffs may be reconciled when individuals perceive the benefits of renewable energy projects,<sup>12</sup> which may translate into an electoral payoff for left-wing parties,<sup>13</sup> but could also generate political backlash.<sup>14</sup> This seemingly contradictory evidence points to arguably the most crucial determinant of individuals' decarbonization policy preferences: whether they stand to benefit or bear the costs.<sup>15</sup> A key finding is that those who stand to bear the economic costs – i.e., those who face threats to their job or higher energy bills – oppose decarbonization policies and support parties who advocate for

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<sup>5</sup> Dechezleprêtre et al. 2022; Andre et al 2024

<sup>6</sup> Bechtel, Genovese, and Scheve 2019; Tingley and Tomz 2022

<sup>7</sup> Stokes 2016; Urpelainen and Zhang 2022; Voeten 2024

<sup>8</sup> Bergquist et al 2022

<sup>9</sup> Bush and Clayton 2023

<sup>10</sup> Driscoll 2019

<sup>11</sup> Ansolabehere and Konisky 2016

<sup>12</sup> Carley et al 2020

<sup>13</sup> Urpelainen and Zhang 2022

<sup>14</sup> Stokes 2016; Stokes et al 2023

<sup>15</sup> Colgan, Green, and Hale 2021

a 'status quo' approach to energy production.<sup>16</sup> Encouragingly, this opposition can be offset by compensatory mechanisms, investments and retraining, and coordinated 'Just Transition' approaches.<sup>17</sup> The success of such strategies is contingent on the credibility of implementing authorities, among other factors.<sup>18</sup> In contrast, we know little about how economic benefits from an energy transition (e.g., via feed-in-tariff subsidies) shifts individuals' preferences and political behavior.<sup>19</sup> Furthermore, while the direct effects of decarbonization policies on individuals are often material in nature, such effects are likely mediated by a variety of social dynamics. A key challenge for researchers now is to incorporate theories of intergroup conflict, social identity, and social norms into future work on the politics of decarbonization.<sup>20</sup>

Local communities, another type of unit, are an important mediator of the effect of decarbonization policies on citizens' preferences. As Stokes (2016, 960) highlights: "a small group of spatially concentrated citizens with intensely held preferences are able to create incentives for politicians to abandon policy, bucking the preferences of 90% of the public". This is in line with work from political behavior highlighting the 'political relevance' of communities due to factors such as place-based attachment<sup>21</sup> and sectors clustered by geography.<sup>22</sup> Political science focuses on two types of 'energy' communities: those with fossil fuels and those with potential for renewable energy. First, in 'fossil fuel communities', there is general opposition to decarbonization. It differs between older coal communities, where much of the industry has already disappeared in some places due to market conditions,<sup>23</sup> and newer shale gas communities, where the fossil fuel sector is still profitable, leading to more politically combative behavior.<sup>24</sup> The former prioritizes adjustment to decarbonization via local economic opportunities<sup>25</sup> and community investments,<sup>26</sup> while the latter utilizes their newly created wealth to oppose decarbonization via political donations to anti-decarbonization candidates.<sup>27</sup> Second, 'renewable energy communities' communities vary considerably in their support for the green transition, possibly due to the way the benefits or costs accrue to a community.<sup>28</sup> While political

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<sup>16</sup> Bechtel, Genovese, and Scheve 2019; Voeten 2024; Bradley 2025; Heddesheimer, Hilbig, and Voeten 2025

<sup>17</sup> Oei, Brauers and Herpich 2020; Gaikwad, Genovese, and Tingley 2022; Bolet, Green and Gonzalez-Eguino 2024

<sup>18</sup> Gazmararian and Tingley 2024; Stutzmann 2025

<sup>19</sup> See Alberdi 2025 for a promising example of such research

<sup>20</sup> See Zucker 2024 for a notable exception

<sup>21</sup> Johnston et al 2000; Wiedemann 2024

<sup>22</sup> Porter 2000; Lim, Aklin, and Frank 2023

<sup>23</sup> Egli, Schmid, & Schmidt 2022; Gaikwad, Genovese, & Tingley 2022

<sup>24</sup> Cooper and Urpelainen 2018

<sup>25</sup> Gazmararian and Tingley 2023

<sup>26</sup> Bolet, Green, and Gonzalez-Eguino 2024; Stutzmann 2025

<sup>27</sup> Sances and You 2022

<sup>28</sup> Stokes 2016; Carley et al. 2020; Urpelainen and Zhang 2022

science tells us a lot about the politics of decarbonization in energy communities, more work is needed to understand the politics of communities with alternative constellations of firms/sectors facing decarbonization policies (e.g., agriculture, industry). For instance, scholars should test the effect of the Inflation Reduction Act in the US, which was explicitly designed to promote ‘green’ sectors in poorer communities.<sup>29</sup>

Private sector firms are a third key type of unit.<sup>30</sup> Political scientists have primarily been concerned with explaining firms’ preferences and behaviour. First, research shows that while a firm’s climate policy preferences depend partly on their own carbon emissions,<sup>31</sup> this relationship is also conditional on a range of factors including firm adjustment costs<sup>32</sup>, exposure to international trade<sup>33</sup>, the stringency of policy<sup>34</sup>, and positioning within supply chains<sup>35</sup>. Such dynamics can propel high emitting firms to lobby governments and regulatory authorities against decarbonization policies, often successfully.<sup>36</sup> Occasionally, however, competitiveness between firms can produce lobbies in favor of decarbonization, even among high emitting firms.<sup>37</sup> Second, regarding firm behaviour, scholars emphasize the role of transnational governance in encouraging the adoption of more stringent environmental standards.<sup>38</sup> In line with the ‘California effect’ outlined by Vogel (1995), environmental regulations can proliferate from country to country via trans-governmental networks.<sup>39</sup> Firms, however, are not always reactive to regulation, but also display a degree of entrepreneurship by engaging in voluntary private regulations.<sup>40</sup> Such voluntary action have been particularly effective for firms in consumer-facing industries, such as those for luxury goods.<sup>41</sup> These findings are in line with a broader understanding of firms as rational actors who aim to preserve, and preferably increase, profits. There is less evidence to date of pro-climate behavior from firms which may benefit from decarbonization policies (e.g., renewable energy firms) or those which face physical risks from climate change (e.g., agribusiness or insurance firms). Additionally, the logic of the new industrial policy-turn in climate politics is being articulated by scholars like Allan and Nahm (2024).

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<sup>29</sup> [cite new Finnegan et al. paper, unpublished]

<sup>30</sup> Prakash 2000

<sup>31</sup> Genovesi and Tvinnereim 2019

<sup>32</sup> Kennard 2020

<sup>33</sup> Genovesi 2019

<sup>34</sup> Green, Hadden, Hale, and Mahdavi 2022

<sup>35</sup> Cory, Lerner, and Osgood 2021

<sup>36</sup> Brulle 2018; Stokes 2020; Hall, Culhane, and Roberts 2024

<sup>37</sup> Kennard 2020; Vormedal and Meckling 2023

<sup>38</sup> Hale 2020

<sup>39</sup> Raustiala 2002

<sup>40</sup> Prakash and Potoski 2006; Vogel 2008; Green 2013

<sup>41</sup> Cao and Prakash 2011; Schleifer and Sun 2018; Hale 2020



Of all the unit types we consider in this review piece, unions have received perhaps the least attention from political scientists interested in decarbonization. From the limited research we do have, we know that unions often act in a similar way to firms: lobbying against policies that economically threaten their members and in favor of policies that compensate or reward them.<sup>42</sup> Unions have even partnered with ideologically opposed firms, in a strategy of ‘double representation’, to lobby against climate policies which threaten both.<sup>43</sup> Yet, unions are not uniform, and our understanding of the implications of this heterogeneity remains limited. In more ‘corporatist’ political systems, where compensating policy losers is easier, unions seem to lobby less strongly against decarbonization policies.<sup>44</sup> While some unions’ policy positions follow straightforwardly from their economic interests (well-paying and secure jobs), others may be cross-pressured economically or ideologically, creating disagreements within their membership. The relative inattention to such factors by scholars is an oversight given that many jobs at risk from decarbonization are clustered in sectors which are relatively highly unionized.<sup>45</sup>

### Conveyors

The four types of units just described typically only have political impact when they are primed, organized, and mobilized by various conveyors. Conveyors connect the preferences of the governed to those who are providing the governance. Here we highlight five conveyor types: social movements; associations and networks; parties and politicians; the media; and epistemic communities.

Political scientists have studied social movements advocating for decarbonization as well as the counter-movements which arise in reaction to oppose decarbonization efforts. In terms of the former, for many years, these movements were ineffectual at a) generating policy change, and b) engaging larger portions of the population.<sup>46</sup> A key finding is that the 2015 Paris agreement marked a shift in both strategy and success for the decarbonization movement<sup>47</sup>. At the international-level, climate NGOs shifted to a more potent ‘justice’ framing<sup>48</sup>, while a series of broad-based movements began advocating for more radical action at the domestic/local level.<sup>49</sup> These newer movements, such as Fridays for Future or Extinction Rebellion, have engaged record numbers of people with direct

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<sup>42</sup> Hall, Culhane, and Roberts 2024; Zucker 2022; Gazmararian and Krashinsky 2024

<sup>43</sup> Mildemberger 2020

<sup>44</sup> Finnegan 2022; Bolet, Green and González-Eguino 2023

<sup>45</sup> For instance, according to [Bureau of Labor Statistics](#), the Manufacturing, Construction, and the Utilities sectors are still among the most unionized sectors in the United States, albeit at much lower levels than in the past.

<sup>46</sup> Caniglia, Brulle, and Szasz 2015; Mc Adam 2017

<sup>47</sup> De Moor and Wahlström 2019

<sup>48</sup> Allan and Hadden 2017

<sup>49</sup> De Moor et al 2021

effects on citizens' attitudes and voting behavior,<sup>50</sup> while also increasing the amount of time politicians discuss climate issues.<sup>51</sup> This recent success has been met with a series of counter-movements,<sup>52</sup> such as the 'yellow vest' movement in France which strongly opposed 'top-down' government action (i.e., a carbon tax),<sup>53</sup> which in turn negatively influenced attitudes towards such policies among the wider public.<sup>54</sup> Similarly, we see counter-climate movements garnering more public support than pro-climate movements in the Netherlands, with this effect driven by favorable media coverage for counter-movements.<sup>55</sup> Researchers implicitly argue and show that these counter-climate movements stem from opposing the exact policies supported by pro-climate social movements. This contested 'see-saw' dynamic stymies progress on decarbonization. Further research is needed to understand what scope conditions are necessary for this dynamic to break, i.e., when does a pro-decarbonization social movement avoid or overcome a counter-movement?

Networks of actors can act as conveyors by engaging with, and shaping, the politics of decarbonization. We distinguish networks (like industry associations, NGO constellations, or the C40 alliance of cities) from social movements on the basis that networks tend to consist of more durable nodes and relationships, whereas the links between actors in social movements tend to form and dissipate based on specific political goals and outcomes.<sup>56</sup> Moreover, while social movements are more visible in the public sphere, networks primarily operate in less publicly visible channels. Political scientists have focused primarily on those networks which are pro-climate. For instance, influential research has documented the evolution of the transnational advocacy networks<sup>57</sup>, convincingly demonstrating that the degree of 'network embeddedness' explains much of the variation in which actions (i.e., contentious or conventional) are taken by climate advocacy organizations.<sup>58</sup> Another important contribution demonstrates how the adoption of pro-climate behaviors by firms is influenced by the choices of other firms.<sup>59</sup> The mechanism here is the presence of common board members across different firms, highlighting the importance of certain key individuals within pro-climate networks. We know less about networks which are anti-climate, but some key research in interdisciplinary

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<sup>50</sup> Valentim 2023

<sup>51</sup> Barrie, Fleming, and Rowan 2023

<sup>52</sup> For information about opposition to wind energy projects in developing countries, see CSL White Paper by [Biygautane et al.](#)

<sup>53</sup> Driscoll 2023

<sup>54</sup> Douenne and Fabre 2022

<sup>55</sup> de Kleer, van Teutem, and De Vries 2024

<sup>56</sup> Slaughter 2004

<sup>57</sup> Hadden 2015

<sup>58</sup> Hadden and Jasny 2019

<sup>59</sup> Lerner and Osgood 2022; Brulle 2018; Hall, Culhane, and Roberts 2024

sociology shows how trans-national networks of conservative think-tanks and research institutes both fund and disseminate anti-climate research and misinformation.<sup>60</sup> Such networks have gained in power and importance in both the U.S. and Europe in recent years.<sup>61</sup>

The third conveyor is politicians and political parties, which is the one to which political scientists have paid most attention. This work can be broadly categorized into two themes – i) political elites’ perceptions and ii) the role of political parties’ ideological positions. First, an important central finding is that politicians underestimate citizens’ support for pro-climate policies.<sup>62</sup> When their beliefs are updated, elites shift their policy positions more in line with their constituents.<sup>63</sup> That said, when forming their policy positions politicians are also mindful of indirect factors, such as labor market protections, which may condition the impact of decarbonization policies on their constituents.<sup>64</sup> There is a two-way relationship between voters preferences and elites’ behavior: cues and support from political elites often influence the attitudes of citizens’ toward decarbonization policies<sup>65</sup>. Establishing the specifics of that two-way relationship should be a central aim of future work.

Second, much research examines the role of ‘niche’ parties, or ‘issue entrepreneurs’, in structuring the political discourse and policy outcomes related to decarbonization<sup>66</sup>. Centrist social-democratic or conservative parties often adopt pro-climate positions in reaction to electoral threats from green parties<sup>67</sup>, although they may face backlash during economic downturns.<sup>68</sup> We know less about the conditions under which green parties themselves are electorally successful, although both the general economic condition of society and institutional factors appear important.<sup>69</sup> Additionally, it seems clear that populist radical-right parties are increasingly politicizing decarbonization,<sup>70</sup> often with electoral payoffs.<sup>71</sup> When such parties hold important political positions, we see worse environmental outcomes<sup>72</sup> and less climate policy implementation.<sup>73</sup>

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<sup>60</sup> For example, see Gibson and Brulle (2024) on the climate obstructionist activities of Koch, Inc.

<sup>61</sup> This call for further research echoes [Brulle and Roberts 2017](#)

<sup>62</sup> Mildemberger and Tingley 2019

<sup>63</sup> Pereira et al. 2023

<sup>64</sup> Kono 2020

<sup>65</sup> Stokes and Warshaw 2017; Merkley and Stecula 2021

<sup>66</sup> Spoon, Hobolt, and De Vries 2014; Abou-Chadi 2016

<sup>67</sup> Spoon, Hobolt, and De Vries 2014

<sup>68</sup> Abou-Chadi and Kayser 2016

<sup>69</sup> Grant and Tilley 2019; Garside and Zhai 2022

<sup>70</sup> MacNeil 2016; Dickson and Hobolt 2024

<sup>71</sup> Heddesheimer, Hilbig, and Voeten 2024; Voeten 2024

<sup>72</sup> Lockwood and Lockwood 2022; Carnegie, Clark and Zucker 2024

<sup>73</sup> Böhmelt 2021

The fourth conveyor we consider is the media, which has received the least attention from political science of any conveyor. The media acts by selecting, framing, and directing attention to the climate-related activities of various units, networks, and social movements.<sup>74</sup> While media coverage does shape public opinion, its influence is mediated by elite cues and economic context.<sup>75</sup> Moreover, the influence of online mass media tends to be restricted to audiences who are already concerned about climate change.<sup>76</sup> There are two key findings from the limited research literature we have. First, the media frames decarbonization differently across countries: in China and India, newspapers frame climate in terms of national political interests, while in the US and the UK newspapers frame the issue along partisan lines.<sup>77</sup> Second, among the Western press, there is evidence that adherence to ‘balanced reporting’ has actually led to biased coverage of both the causes of, and solutions to, climate change.<sup>78</sup> These findings leave two glaring knowledge gaps. First, in the face of ever-increasing extreme weather and climate related disasters we know little about the conditions under which the media covers and frames such events in relation to climate change. Second, most of the research we have examines legacy print media. This is problematic given the major changes in news/media consumption patterns since about 2015, particularly amongst young people. Political scientists can take inspiration from Media studies, which has examined how ‘greenfluencers’ exert influence on social media platforms.<sup>79</sup>

Finally, the fifth conveyor we consider is epistemic communities, often consisting of experts like scientists, diplomats, and think tanks.<sup>80</sup> We consider such networks of experts as conveyors instead of units as they have played a fundamental role in communicating and identifying the physical realities of climate change,<sup>81</sup> with 97% of climate scientists being in broad agreement on the causes of anthropogenic climate change.<sup>82</sup> Other experts, like social scientists and diplomats, have identified, shaped, and communicated the potential policy and institutional responses to climate change, and the consequences of failing to respond. Following the causal logic of Haas 1992, the inherent uncertainty presented by a challenge such as decarbonization stimulates experts to produce detailed information via original research, which is then packaged and conveyed to relevant political actors who

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<sup>74</sup> Allan and Hadden 2017; Caniglia, Brulle and Szasz 2015; de Kleer, van Teutem, and DeVries 2024

<sup>75</sup> Carmichael and Brulle 2016

<sup>76</sup> Damsbo-Svendsen 2022

<sup>77</sup> Pandey and Kurian 2017

<sup>78</sup> Boykoff and Boykoff 2004; Young and Fitz 2022

<sup>79</sup> Dekoninck and Schmuck 2024; Olbermann, Mayer and Schramm 2024

<sup>80</sup> Haas 1992 offers a foundational definition of epistemic communities as “a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area.”

<sup>81</sup> Haas 2015; Allan 2017; For a concrete example, see [IPCC 2023](#)

<sup>82</sup> Young and Fritz 2022

seek policy solutions. Through a process of ‘social learning’ – whereby a trans-national networks of experts learn from each other – epistemic communities have become highly influential in international efforts to address climate change.<sup>83</sup> This is evident across different institutions such as the IMF,<sup>84</sup> the World Bank,<sup>85</sup> and elsewhere.<sup>86</sup> However, the influential role of epistemic communities in climate policymaking may also provoke public backlash from citizens with strong populist attitudes, who may view expert-driven policymaking as elitist and democratically unaccountable.<sup>87</sup>

### Authorities

Units and conveyors work to affect outcomes, in part, by contesting policies set by authorities. Here we highlight three types of authorities: national and sub-national institutions; international organizations (IOs); and transnational governing arrangements.<sup>88</sup> This third type can include intergovernmental agreements like the 2015 Paris Agreement or the unwritten arrangement between Europe and the United States for selecting the World Bank’s leader, but also private governance and other forms of governance that do not depend directly on state authority, such as the United Nation’s Principles on Responsible Investment or the Task Force on Climate-Related Financial Disclosures. By contrast, formal organizations like the UNFCCC Secretariat or International Energy Agency fit in the second category (IOs).

Political scientists treat climate change (and decarbonization) as a domestic-level issue for national and sub-national governments as much as a global collective action problem to be addressed via international institutions.<sup>89</sup> Loosely, one can distinguish between three types of domestic-level institutions. First, there are political institutions such as elected bodies and officials, and these are structured at various national and sub-national levels, such as federal, state, county, and city governments. Second, there are the more technocratic, often unelected, institutions that can affect climate politics, such as courts, central banks, public utility commissions, and electricity regulators. And third, there are climate-specific institutions, some of which were purpose-built, such as the UK’s Climate Change Committee, or have been largely repurposed, like the Ministry of the Environment in many countries. As Navroz Dubash and others have shown, the institutional

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<sup>83</sup> Haas 2015

<sup>84</sup> Clark and Zucker 2024

<sup>85</sup> Bayer, Marcoux, and Urpelainen 2014

<sup>86</sup> Rowan 2021

<sup>87</sup> Bertsou and Caramani 2020

<sup>88</sup> For foundations and an overview, see Mitchell 1994; Keohane and Victor 2011; Biermann et al. 2012; and Axelrod and VanDeveer 2014

<sup>89</sup> Harrison and Sundstrom 2007; Aklin and Mildemberger 2020; Colgan, Green, and Hale 2021

context<sup>90</sup> and electoral rules<sup>91</sup> are crucial for understanding the how and when climate policies are enacted. Promising work is emerging on the role of important institutions within-democracies<sup>92</sup>, such as courts,<sup>93</sup> government funding agencies, and central banks.<sup>94</sup>

One important finding from this literature is that the details of policy design can make the difference between a politically acceptable pro-climate policy and its rejection. When implementing decarbonization policies, governments face choices on whether to include compensatory packages<sup>95</sup>, engage with affected stakeholders,<sup>96</sup> and focus on market-based solutions or more interventionist industrial policies.<sup>97</sup> Making the right choices can strengthen credibility<sup>98</sup> and foster certainty,<sup>99</sup> which in turn builds policy buy-in from those most affected, engages new actors in decarbonization efforts<sup>100</sup>, and ultimately enhances both policy outcomes<sup>101</sup> and public responsiveness.<sup>102</sup> However, government choices are not made in a vacuum, they face a variety of constraints including the underlying national assets,<sup>103</sup> degree of state-capacity,<sup>104</sup> and interest-group strength.<sup>105</sup> The spectrum of possible approaches varies significantly across democracies and autocracies, with democracies possibly facing tougher political choices.<sup>106</sup>

International organizations (IOs) also act as authorities on climate policy, albeit as agents that are ultimately responsible to their member states. Political scientists have identified constellations of IOs working on climate change, variously conceptualized as a regime complex, multi-level governance, or a subsystem.<sup>107</sup> The negotiating process and design of climate agreements and initiatives has received much scholarly attention.<sup>108</sup> Considerably less is known about the environmental effectiveness of those international institutions and efforts, which is a crucial gap in terms of policy-applicable knowledge.<sup>109</sup>

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<sup>90</sup> Levi, Flachsland, and Jakob 2020; Dubash 2021; Meckling, Lipsky, and Finnegan 2022; Allan and Nahm 2024

<sup>91</sup> Schulze 2021; DiLorenzo and Stone 2022; Finnegan 2022; Finnegan 2023

<sup>92</sup> Zwar et al 2023

<sup>93</sup> Vanhala 2018; Setzer and Vanhala 2019; Voeten 2024

<sup>94</sup> Gupta, Cheng and Rajan 2023; Shears, Meckling, and Finnegan 2025

<sup>95</sup> Colantone et al 2024

<sup>96</sup> Bolet, Green, and González-Eguino 2023; Stutzmann 2025

<sup>97</sup> Mikler and Harrison 2012; Meckling et al. 2015; Cullenward and Victor 2020; Allan and Nahm 2024

<sup>98</sup> Gazmararian and Tingley 2023; Zucker 2024

<sup>99</sup> Noailly, Nowozohour, and Van Den Heuvel 2022

<sup>100</sup> Noailly, Nowozohour, and Van Den Heuvel 2022

<sup>101</sup> Fernández-i-Marín, Knill, and Steinebach 2021;

<sup>102</sup> Schaffer, Oehl, and Bernauer 2022

<sup>103</sup> Colgan, Green, and Hale 2021

<sup>104</sup> Meckling and Nahm 2022

<sup>105</sup> Mildemberger 2020; Finnegan 2022

<sup>106</sup> Bayer and Urpelainen 2016; von Stein 2022

<sup>107</sup> Keohane and Victor 2011; Gupta 2007; Schreurs 2010; Chelminski et al. 2020; Colgan 2021

<sup>108</sup> Falkner 2016; Graham and Serdaru 2020; Rowan 2021; Clark and Zucker 2024

<sup>109</sup> Victor et al. 1998

From studies of domestic climate institutions,<sup>110</sup> and studies of IOs effectiveness in non-climate governance,<sup>111</sup> it seems plausible that IOs working on climate change are more effective if they are able to obtain a certain amount of autonomy from the intrusive influence of their member states. Given the high economic costs of decarbonization, however, states seem unlikely to want to delegate such authority to IOs.<sup>112</sup> The one major exception is the European Union, which has significant climate policies, including the Emissions Trading System, the Carbon Border Adjustment Mechanism, the European Green Deal, among others.<sup>113</sup> A understudied mechanism here is the use of EU directives, i.e., legally binding goals set for members states. Such an approach is useful in the context of decarbonization as it both mandates member states to act while providing flexibility in how they undertake such action. Future work should examine the different approaches of member states to adopting policies which both satisfy EU requirements and domestic political coalitions.

Transnational governing arrangements can broadly be categorized along two dimensions – the primary participation of state vs non-state actors; and hard vs. soft commitments.<sup>114</sup> Some political scientists have privileged agreements involving state actors, e.g., the Kyoto Protocol and the Paris Agreement. The governance of these agreements has shifted from a binding approach towards softer commitments over time.<sup>115</sup> States adopt various strategies for engaging with such agreements due to their status within the agreement<sup>116</sup> or their cooperation preferences.<sup>117</sup> State engagement may also be influenced by domestic public opinion towards an agreement, which is structured by a country's current emissions and its degree of compliance.<sup>118</sup> Other scholars have paid more attention to transnational governance where national governments are not the lead actors, though they are sometimes involved.<sup>119</sup> These agreements sometimes lead to the implementation of additional domestic decarbonization policies, conditional on the ideology of domestic political leadership.<sup>120</sup> Research on transnational governance highlights the important role of networks and transnational movements, such as the fossil

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<sup>110</sup> Meckling and Nahm 2022

<sup>111</sup> Lall 2023

<sup>112</sup> Green and Colgan 2013

<sup>113</sup> Bayer and Shaffer 2024

<sup>114</sup> On soft vs. hard law, see Abbott and Snidal 2000; on transnational climate governance, see Betsill and Bulkeley 2004; Prakash and Potoski 2006; Andonova and Mitchell 2010; Bulkeley et al. 2014; Andonova et al 2017. Relatedly, see polycentric governance, which refers to arrangements where there are multiple governing authorities operating at different levels (Ostrom 2010).

<sup>115</sup> Castro Kammerer, and Michaelowa 2024

<sup>116</sup> Castro and Kammerer 2021

<sup>117</sup> Rowan 2021; McAllister and Schnakenberg 2022; Falzon et al 2023; Vanhala and Hestbaek 2016

<sup>118</sup> Tingley and Tomz 2022

<sup>119</sup> Betsill and Bulkeley 2004; Prakash and Potoski 2006; Ostrom 2010; Andonova and Mitchell 2010; Bulkeley et al. 2014; Andonova, Hale, and Roger 2017

<sup>120</sup> Brandi, Blümer, and Morin 2019; Carnegie, Clark, and Zucker 2024

fuel divestment campaign <sup>121</sup> and the Task Force on Climate-Related Financial Disclosures, <sup>122</sup> which continue to proliferate. One important question which political scientists have not answered is how environmentally effective different transnational governing arrangements actually are. Understanding the scope conditions (e.g., buy-in from units or conveyors) under which such arrangements are (not) effective is an important future step.

## Policies

Many governments and transnational authorities have proposed or implemented policies as part of their decarbonization efforts. A vast number of policies touch on climate change in some way. Here, we focus only on those that substantially affect climate mitigation, even if they are not directly aimed at mitigation, like the 2022 Inflation Reduction Act in the United States, China's air pollution policies, or public transportation and building codes in various countries. We disaggregate policies into four categories that we intend as distinct ideal types which are collectively comprehensive of the main decarbonization policy domains: market-based policies; industrial policies; urban and system design policies; and policies for technological adoption.

Market-based policies are perhaps the most prominent category within climate policy. <sup>123</sup> This category includes policies for carbon pricing, carbon offsets or credit markets, and emissions accounting and disclosure practices. <sup>124</sup> The most widely studied market-based policies are Pigouvian-style carbon taxes and cap-and-trade systems, which economists contend are the most efficient mechanisms for reducing the production and consumption of fossil fuels. <sup>125</sup> However, economists' notions of efficiency do not necessarily translate into political support. Instead, individuals generally oppose carbon taxes, primarily due to distributional concerns related to their own income <sup>126</sup> and the regressive nature of such taxes. <sup>127</sup> Even when including redistributive mechanisms and/or revenue recycling, support for carbon taxes remains muted. <sup>128</sup> This overall lack of broad-based support means that carbon pricing policies, while spreading globally, tend to operate at levels too low to be environmentally effective. <sup>129</sup> This pattern is reflected in

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<sup>121</sup> Blondeel, Colgan, and Van de Graaf 2019; Neville 2020

<sup>122</sup> Lin 2024

<sup>123</sup> Meckling 2021; Cullenward and Victor 2020

<sup>124</sup> Chelminski, Colgan, and Larsen 2025

<sup>125</sup> See Stavins 2011 for a discussion on the differences between carbon taxes and cap-and-trade systems. For a useful recent analysis of how economists view the problem of climate change see Ross 2025.

<sup>126</sup> Douenne and Fabre 2022; Beiser-McGrath and Bernauer 2024

<sup>127</sup> Jagers et al 2021

<sup>128</sup> Beiser-McGrath and Bernauer 2019; Mildemberger et al 2022; Douenne and Fabre 2022; but see also Levi, Flachslund, and Jakob 2020; Finnegan 2022; Finnegan 2023

<sup>129</sup> Cullenward and Victor 2020



studies examining recent changes in fuel taxes<sup>130</sup> and carbon subsidies.<sup>131</sup> The key takeaway here is that even when carbon pricing is successfully implemented, there is mixed evidence as to the actual effectiveness of such policies.<sup>132</sup> The question then becomes which market-based policies, if any, are politically feasible while also effective. To date, political science has paid comparatively little attention to green finance and investment policies (e.g., EU Green Bonds), renewable portfolio standards<sup>133</sup>, and market-based industrial policies such as Feed-in-Tariffs and Contracts-for-Difference.<sup>134</sup> Such policies may prove more effective for decarbonization than carbon pricing.

Given the difficulties with implementing effective market-based decarbonization policies, some political scientists have called for governments to embrace green industrial policy.<sup>135</sup> This call is consistent with an observable increase in industrial policy implementation across OECD countries in recent years,<sup>136</sup> including in liberal economies. China, of course, has long pursued green industrial policy.<sup>137</sup> This more interventionist approach has a different distributional logic at its core: in the short-term, it allows governments to create winners<sup>138</sup> (i.e., via sectoral-level investments and subsidies) while compensating longer-term losers<sup>139</sup> (i.e., via investments and retraining programs for firms and workers in high emitting sectors). Political scientists suggest adoption of green industrial policy depends on national-level political institutions, the degree of state centralization, and sectoral-level industrial development challenges.<sup>140</sup> Green industrial policy can be effective at stimulating innovation.<sup>141</sup> Political backlash, however, is a perennial concern.<sup>142</sup> Moreover, the politics may become harder as the focus of green industrial policy turns towards sectors that are more difficult to decarbonize. Early legislation aimed at promoting renewable energy was met by strong organized resistance

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<sup>130</sup> Mahdavi, Martinez-Alvarez, and Ross 2022

<sup>131</sup> Ross, Hazlett, and Mahdavi 2017; Coady et al 2019

<sup>132</sup> Bayer and Aklin (2022) show that the EU-ETS (i.e., cap-and-trade) has had significant, albeit somewhat limited, effect of reducing carbon emissions. In a meta-analysis, Green (2021) similarly shows that the aggregate reduction in emissions from carbon pricing is limited, with carbon taxes performing better than cap-and-trade systems.

<sup>133</sup> See Stokes and Warshaw 2017 for an exception

<sup>134</sup> See Alberdi 2025 for an exception

<sup>135</sup> Meckling et al 2015; Cullenward and Victor 2020

<sup>136</sup> Allan and Nahm 2024; Chelmski et al. unpublished

<sup>137</sup> Lewis and Wiser 2007

<sup>138</sup> Meckling 2021

<sup>139</sup> Bolet, Green and González-Eguino 2023

<sup>140</sup> Allan and Nahm 2024

<sup>141</sup> Barwick et al 2024

<sup>142</sup> Meckling 2015; Nahm 2017; Kennard 2020; Gazmararian and Krashinsky 2024; Bolet, Green and González-Eguino 2023; Patashnik 2023

from the fossil fuel lobby.<sup>143</sup> Researchers must be mindful to such dynamics as the rollout of green industrial policy continues.

The development and adoption of new technologies is crucial for climate solutions, and that process is heavily political.<sup>144</sup> A crucial insight from the research in this area is that the politics and policies needed to support new technologies differs depending on the maturity of the technology, loosely following an idealized “S-curve.”<sup>145</sup> This finding is an important corrective to the technological optimism sometimes found among engineers, as it suggests that technologies are sometimes unlikely to succeed without the right mix of supportive policies.<sup>146</sup> Stimulating clean-tech manufacturing is an especially important challenge.<sup>147</sup> Other research maps the policy process of technology innovation,<sup>148</sup> and the governance of safe geoengineering has attracted particular attention and debate.<sup>149</sup> One important factor which has not been investigated by political scientists to date is how the pre-existing research and development capacity within countries predicts the adoption of new green technologies.

Political science on climate change has, to date, understudied the crucial topics of system and urban design for decarbonization. Systems like food, waste, insurance, and finance all have significant impacts on climate change, as do urban systems – especially housing, transportation, and heating. The politics of changing them are complex and generally they can be modified only gradually over decades. One crucial insight about system complexity coming from biology is the importance of the “adjacent possible.”<sup>150</sup> The idea is, roughly, that while moving a system from State X to State Y in a single step is impossible, it could be possible to accomplish the same goals step-by-step via States A, B, and C. Related concepts are path dependence, policy sequencing, and the notion that today’s policy shapes the politics of the future.<sup>151</sup> Political scientists have yet, however, to grapple seriously with how to identify adjacent possible policies from the state of a system, and equally, how to identify those that are not adjacent possible. High carbon taxes appear to be examples of policies that are not adjacent possible, at least in many circumstances, because even if the end state of the world would be desirable after people’s behavior, expectations, and assets had adjusted over time, the first step (imposing the tax) is unattractive at present. By contrast, the concept of a “15-minute city model”, where all the

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<sup>143</sup> Stokes 2020; Green et al 2022

<sup>144</sup> Sabel and Victor 2024; Sovacool 2016

<sup>145</sup> Geels and Schot 2007; Breetz et al. 2018

<sup>146</sup> Colgan and Hinthorn 2023

<sup>147</sup> For a primer on how Industrial Finance Corporations can help with clean tech manufacturing, see the CSL White Paper by [Nahm](#).

<sup>148</sup> Aklın and Urpeläinen 2018

<sup>149</sup> Jinnah et al. 2018; Biermann et al. 2022

<sup>150</sup> Kaufmann 2000; Raworth 2017

<sup>151</sup> Pierson 2004; Meckling 2015; Colgan et al. 2021

major needs of residents within a 15-minute public transportation journey, is often seen as an adjacent possible. The politics of urban restrictions on cars are fraught, however, and deserve wider scholarly attention.<sup>152</sup> So, too, do the urban co-benefits of decarbonization.

‘Just Transition’ is an important concept that cuts across all four elements in our policies category. This is an encompassing concept with many definitions,<sup>153</sup> which emerged from North American labour unions in the 1970s,<sup>154</sup> and now appears in foundational international climate governance documents such as the 2015 Paris Agreement<sup>155</sup> and the IPCC 6<sup>th</sup> Assessment Report.<sup>156</sup> While varying in scope, these definitions share a common aim: to center the interests of those that are, and will be, most affected by decarbonization policies.<sup>157</sup> Policies are designed to ensure equity and fairness for those who stand to bear the costs, thus alleviating concerns around poverty and inequality<sup>158</sup> and ultimately generating broad public support.<sup>159</sup> Prominent examples include carbon taxes with re-distributive mechanisms<sup>160</sup> and industrial policy which includes compensation and retraining for displaced workers.<sup>161</sup> More broadly, Just Transitions are central to contemporary political movements that seek to align decarbonization with wider goals of social justice – perhaps best exemplified by the Green New Deal.<sup>162</sup> One tradeoff for ‘Just Transition’ policies, however, is that addressing distributive demands might satisfy some groups but will never satisfy everyone and might even generate new opponents.

## Sectors

Most GHG emissions come from five economic sectors: electricity generation; transportation; industry; agriculture; and buildings. Of these, the electricity sector has received by far the most attention from political scientists. Part of the reason for this has been the remarkable increase in the affordability of renewable electricity over the past 25-years.<sup>163</sup> Scholars have pointed to the role of ‘shocks’ (e.g., abrupt rise in oil price or

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<sup>152</sup> Colantone et al 2024; Huber, Wicki, and Bernauer 2020; For new articles on the politicization of the London ULEZ expansion during the recent Mayoral Election see [here](#) and [here](#)

<sup>153</sup> Wang and Lo 2021

<sup>154</sup> Newell and Mulvaney 2013

<sup>155</sup> UN 2015

<sup>156</sup> IPCC 2023

<sup>157</sup> For broad and all-encompassing reviews of the concept of a Just Transition see Newell and Mulvaney (2013) and Wang and Lo 2021

<sup>158</sup> Shang 2023

<sup>159</sup> Bergquist, Mildenberger, and Stokes 2020

<sup>160</sup> Beiser-McGrath and Bernauer 2019; Mildenberger et al 2022; Douenne and Fabre 2022

<sup>161</sup> Bolet, Green, Gonzalez-Eguino 2024; Stutzmann 2025; Mares, Scheve, and Toenshoff 2025

<sup>162</sup> Aronoff et al. 2019

<sup>163</sup> Nemet 2019; Christophers 2022; but also see Christophers 2024. For a visualization and discussion of the data see [here](#)

nuclear disasters) as key propellants of the growth in renewables.<sup>164</sup> Still, while renewables have grown rapidly, the rate at which they replaced fossil fuels (as opposed to satisfying demand growth) has been low for two reasons. First, due to uncertainty of electricity prices and actions by public utility commissions, the profitability of renewables has been low despite their cost competitiveness.<sup>165</sup> Second, fossil fuel firms have fought against them politically, often replacing their earlier climate denialism with a new “climate realism” that generates a similar level of opposition and delay to system change.<sup>166</sup> Indeed, despite the increasing affordability and broad public support of renewables,<sup>167</sup> not a single oil and gas firm has shifted away from fossil fuels, given its ongoing profitability.<sup>168</sup> Future work should build on these findings to explain why governments have not sufficiently intervened to ensure that renewables are more profitable vis-à-vis fossil fuels.

In the transportation sector, the two most prominent decarbonization priorities are vehicle electrification and investment in public transportation. In relation to the former, research suggests that firms engaged in the production of electric vehicles have benefitted from industrial policies focused on innovation.<sup>169</sup> Despite these benefits, we have also seen strong anti-climate lobbying from firms in the automobile sector,<sup>170</sup> as well as electoral backlash from workers.<sup>171</sup> The Paris Agreement appears to have had little impact on the global vehicle manufacturing sector.<sup>172</sup> Generally, citizens seem to prefer policies which provide financial support for new eco-friendly cars, as opposed to those which levy a ban or direct cost, such as congestion and/or road pricing.<sup>173</sup> Most of this literature has focused on nationally endogenous processes (i.e., domestic level industrial policy, public opinion of local regulations). What is less well understood is how foreign threats to the automobile production industry will impact domestic politics. This is an important task for political scientists given China’s increasing dominance of the EV market.<sup>174</sup> Finally, political science research has comparatively little to say about public transportation,

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<sup>164</sup> Aklin and Urpelainen 2018

<sup>165</sup> Christophers 2022

<sup>166</sup> Stokes 2020; Brulle 2018; Hall, Culhane, and Roberts 2024; Egli, Schmid, and Schmid 2022; Gazmararian 2024

<sup>167</sup> Ansolabehere and Konisky 2016; Stokes and Warshaw 2017; Gaikwad, Genovese, and Tingley 2023

<sup>168</sup> Vormedal et al. 2020; Green et al 2022

<sup>169</sup> Barwick et al 2024

<sup>170</sup> Brulle 2018

<sup>171</sup> Gazmararian and Krashinsky 2024

<sup>172</sup> Bare et al. unpublished

<sup>173</sup> Huber, Wicki, and Bernauer 2020; Colantone et al. 2024

<sup>174</sup> Wang 2024; For more on China's dominance of the EV market see [here](#). For more on the decline of employment in German automobile production see [here](#).

shipping,<sup>175</sup> and airline travel, despite their importance for emissions.<sup>176</sup> More effort should be made to understand the political dimensions of these essential public goods.

Heavy industries – i.e., steel production, cement production, and chemical manufacturing – rely on carbon-intensive processes. To decarbonize they must ‘green’ their production processes; shifting to low-carbon electricity is not sufficient. Progress has been slow because engineers have mostly failed to identify low-cost alternative processes. Conceptually, a promising way to achieve industrial decarbonization is via ‘green hydrogen’.<sup>177</sup> Indeed, as part of its ‘Fit for 55 package’, the EU has implemented a hydrogen strategy with the aim of decarbonizing industrial processes.<sup>178</sup> However, it is as yet unclear how viable this strategy is.<sup>179</sup> Political scientists have mostly stayed out of the debate on green hydrogen. However, given hydrogen’s purportedly central role in the future of decarbonization, it is important to understand a) how such policies differ across states depending on their industrial make-up, b) the politics of ‘who pays’ for the necessary R&D, and c) how information and resources relating to green hydrogen are spreading across networks (both pro- and anti-climate).

The agricultural sector is resisting decarbonization in many countries, but political scientists have paid relatively little attention to it. As a sector, climate change creates both physical and transition risks: agricultural yields are expected to decline from physical climate-related threats in most countries (Russia and Canada might be exceptions), but sectoral emissions and decarbonization costs are high. Simply put, climate change threatens the material future of the agricultural sector from all angles. The European Union has emerged as an important actor both in terms of mandating policy implementation and as a target of political backlash amongst farmers. Research from the Netherlands indicates that there is increasing dissatisfaction among farmers towards EU mandated emissions targets,<sup>180</sup> while other work points to increasing radical-right support among farmers exposed to the EU’s environmental policies.<sup>181</sup> In 2024 Europe witnessed a highly coordinated and disruptive series of protests by farmers.<sup>182</sup> These farmers were successful in convincing EU policymakers to scale back their decarbonization plans. Yet, farmers are

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<sup>175</sup> For a primer on shipping, the International Maritime Organization, and GHG emissions, see the CSL White Paper by [Stockbruegger](#).

<sup>176</sup> For a sample of media discussions of US public transportation see the following links to the [Guardian](#), [Financial Times](#), and [Wall Street Journal](#)

<sup>177</sup> Green Hydrogen is hydrogen gas produced using renewable energy sources (e.g., wind, solar, and oxygen) through electrolysis. For more on this process see [here](#). For a discussion on hydrogens potential for decarbonizing industry see [here](#).

<sup>178</sup> See the policy framework [here](#)

<sup>179</sup> Van de Graaf et al. 2020

<sup>180</sup> de Kleer, van Teutem, and De Vries 2024; Siegmann 2024

<sup>181</sup> Bolet and Malet [Unpublished]

<sup>182</sup> For more on this see [here](#)

not purely obstructionist and can provide innovative responses to the challenges presented by decarbonization.<sup>183</sup> Political scientists should do more to understand a) how networks of farmers coordinate anti-climate protests across jurisdictions, b) how these efforts influence policy implementation at both the national and supra-national levels, and c) how farmers exert such outsized political influence relative to their size as a group.

Decarbonizing buildings requires the adoption of new technologies, including the replacement of gas boilers with heat pumps, insulation and window retrofitting, and new low-carbon construction materials. Policies to encourage this adoption are in their infancy and as a result the political science research in this area is limited. The evidence from interdisciplinary researchers indicates considerable variation in the uptake of heat pumps, for instance, but political scientists have yet to explain such variation.<sup>184</sup> Government policies, like the Inflation Reduction Act in the US, have provided direct subsidies to households for the installation of heat pumps.<sup>185</sup> While the IRA employs a purely subsidy-based approach, the German Buildings Energy Act combined subsidies with a regulatory element aimed at phasing out fossil fuel heating systems. This policy implied high upfront costs for homeowners and there is some evidence that this caused an electoral backlash which favored the far-right AfD.<sup>186</sup> Overall, political scientist should pay increased attention to both the political reaction to, and effectiveness of, similar policies as they are rolled out.

### Other elements and themes

The last of the twenty-two elements of decarbonization politics we identify in Figure 1 is about assets and investment. We see this element as running throughout our five categories. Decarbonizing an economy is not an instantaneous process and is only feasible by way of redirecting investments over time. That shift creates economic winners and losers. Thus, scholars have characterized the politics of decarbonization as a political battle between owners of different types of “assets” (including capital, labor, and natural endowments).<sup>187</sup> Key asset types are climate vulnerable assets (such as coastal real estate and many types of agriculture), climate forcing assets (such as fossil fuels and related industries), and climate positive assets (such as renewable energy). The crucial political insight is that asset type becomes a key political cleavage, with people and other units who hold climate forcing assets more likely to oppose pro-climate policy, while those with climate vulnerable assets or climate positive assets more likely to support it. The investment process crosses all five categories outlined above, because it affects units and sectors;

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<sup>183</sup> Sabel and Victor 2022

<sup>184</sup> Rosenow et al 2025

<sup>185</sup> Bang 2025

<sup>186</sup> Kitsinger et al 2025

<sup>187</sup> Colgan et al. 2021; Aklin and Mildenberger 2020

requires new policies; and will only occur with action from conveyors and authorities. Divestment campaigns, normative shifts, and efforts to reduce fossil fuel subsidies are also salient.<sup>188</sup>

Insurance is an important sub-component of the assets and investments element. Given the increasing incidence of extreme weather events resulting from climate change it seems likely, according to Jerome Powell, Chairman of the US Federal Reserve, that in the coming years many private insurance companies will either substantially increase premiums or stop providing insurance for assets located in vulnerable areas.<sup>189</sup> For many asset holders (e.g., homeowners) this means incurring substantial economic costs,<sup>190</sup> as well as devaluations of their asset.<sup>191</sup> Political scientists predicted precisely this kind of economic problem associated with climate risk.<sup>192</sup> There is also evidence that, due to informational asymmetries, some private insurance firms may not be accurately pricing climate risk,<sup>193</sup> while efforts to reform the U.S. National Flood Insurance program to better reflect actual risk were met with strong opposition from a diverse range of vulnerable homeowners.<sup>194</sup> These dynamics raise two important questions. First, in the absence of insurance, who will bear the economic costs of these extreme weather events? And second, what actions should be taken to minimize future investments of physical assets in high-risk locations? Governing authorities will play a pivotal role here, and yet political science has so far had little to say in these debates.

Outside the major elements identified in Figure 1, there are additional dimensions to the political dynamics of decarbonization. Between climate change and our elements, for instance, there are intervening factors like the science of climate change,<sup>195</sup> natural disasters,<sup>196</sup> weather,<sup>197</sup> and various types of available market information,<sup>198</sup> all of which are subject to political contestation and bias. And in the feedback loop from decarbonization activities back to the beliefs and actions of the major elements in Figure 1, there are crucial intervening factors like narratives (especially of environmental justice),<sup>199</sup> credibility

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<sup>188</sup> Blondeel et al. 2019; Ross et al. 2017; Sikkink 2023

<sup>189</sup> For the full video of Powell's comments see [here](#)

<sup>190</sup> See NCEI data from 2024 [here](#)

<sup>191</sup> Keys and Mulder 2024; For projections on how climate change will affect the price of property in the US see this [report](#) from First Street

<sup>192</sup> Colgan 2018; Colgan et al. 2021

<sup>193</sup> Keenan and Bradt 2020

<sup>194</sup> Elliot 2021

<sup>195</sup> Mongkolnchaiarunya unpublished; Brysse et al. 2013

<sup>196</sup> Javeline et al. 2019; Hazlett and Mildenberger 2020; Garside and Zhai 2022

<sup>197</sup> Rowan 2023

<sup>198</sup> Barta 2024

<sup>199</sup> Okereke 2008; Klinsky et al. 2017; Guenther 2024



(especially of market-based policies and implementing authorities),<sup>200</sup> metaphors,<sup>201</sup> and structuring incentives (especially of individuals' social positionality as it affects the uptake of climate policy benefits).<sup>202</sup> Ideas like “degrowth” and “circular economy” belong in this set of intervening factors.

### A Heatmap of Political Science Knowledge

Identifying knowledge strengths and gaps for each element in our framework from Figure 1 generates a heatmap. Such a heatmap can serve as a tool for instructors in crafting courses on climate politics and for students in identifying research questions. The aim is not to prompt instructors to only teach where political science knowledge is strongest. Rather, we feel it is just as important for instructors to identify areas where we know comparatively little, as well as those areas where we know a lot. For those elements where political science knowledge is weakest, instructors may turn to other fields (e.g., economics, history, media studies etc.) or other sources (e.g., documentaries, institutional reports) when crafting their climate politics syllabi.

There is no perfect way to assess the strength of the political science research offered for each element in Figure 1. We provide our own subjective assessment based on four criteria: the number of publications related to a particular topic area, the clarity of the key finding(s) or concepts in that area, the evidence supporting that finding, and the importance of the finding relative to the end goal of decarbonization. Figure 2 shows the result. For each category (units, conveyors, authorities, policies, and sectors, pictured vertically), we sought to identify which element (if any) had the most and least knowledge generated by existing political science literature. We hasten to add that we are not casting judgments on individual publications, and we see areas of relative weakness in Figure 2 are opportunities for future research.

The resulting Figure 2 illustrates that while political science has built strong knowledge for some elements (i.e., individuals, politicians and parties, market-based policies, and the electricity sector), there are other elements where knowledge is much weaker. For instance, some sectors – agriculture, buildings, and industry – have received little attention from political scientists. Moreover, researchers have tended to focus on units (individuals) and conveyors (politicians and parties) which are more easily quantifiable with existing data resources (i.e., public opinion surveys, election results, and party manifestos). We note here that, in the Authorities category, political science offers roughly the same level of attention to all three elements, so we did not code any as stronger or weaker.

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<sup>200</sup> Gazmararian and Tingley 2023

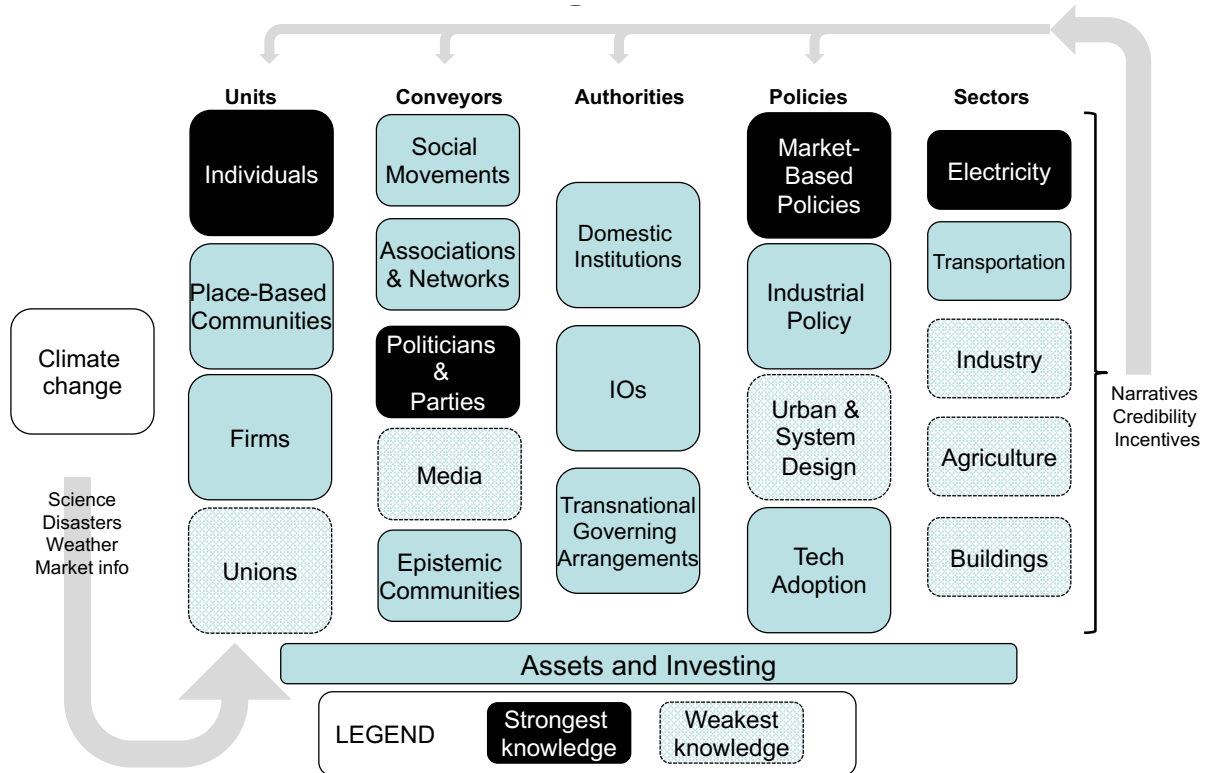
<sup>201</sup> Bernstein and Hoffmann 2019

<sup>202</sup> Sovacool et al. 2022; Memmott et al. 2024



Overall, Figure 2 presents a mixed picture of knowledge generation. This further underlines the importance of crafting climate politics courses which are grounded in a broad framework about how climate change relates generates political forces for decarbonization. Such a framework allows instructors and students alike to identify, understand, and construct theories of change based on existing research, while also recognizing areas where such theories are less well understood.

**Figure 2: Political Science Heatmap on the Politics of Decarbonization**



### Teaching Application: Pathways of Change

Our framework of decarbonization politics is necessarily broad, capturing twenty-two elements in total. Conceptually, each of these elements may be linked via a multitude of pathways which illustrate different theories of change. Past and present policy approaches can be understood in light of one or more of these pathways. Our broad framework, then, offers opportunities to incorporate a practical teaching application into climate politics courses.

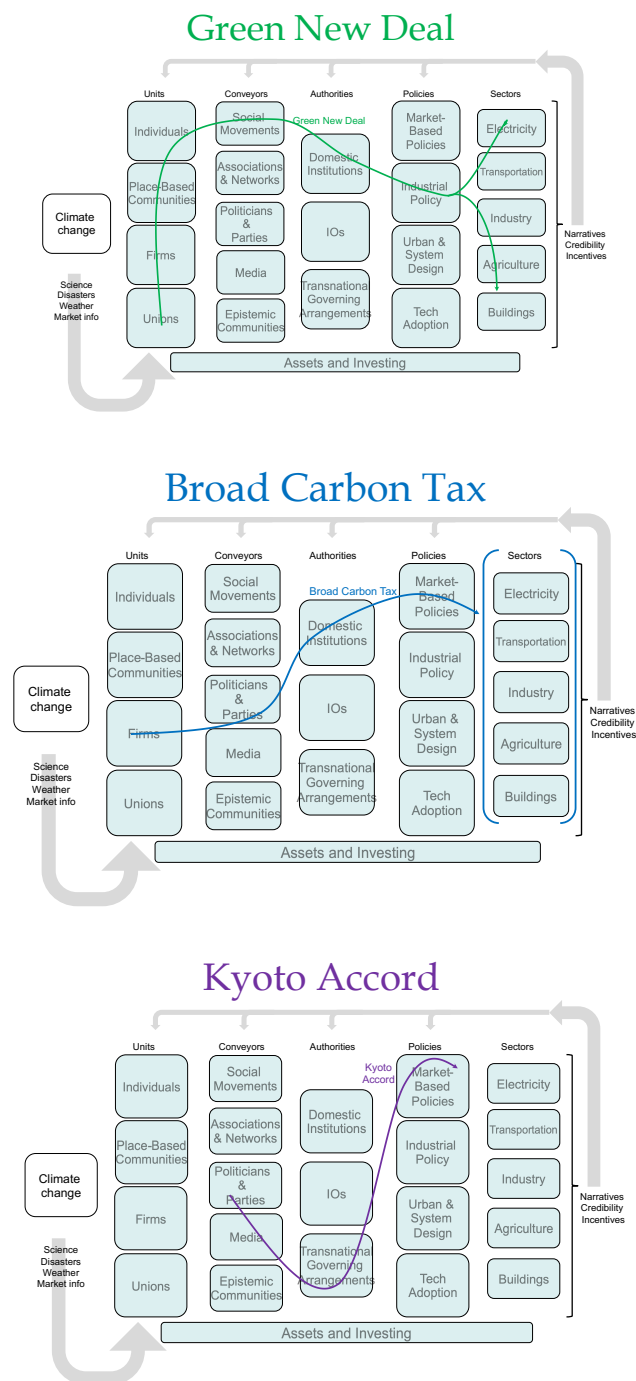
One opportunity is for instructors to use our framework to explore different policy approaches and the implicit theories of change they embody. For instance, they could illustrate how the green new deal relies on a theory of change that is powered by unions, communities, and social movements, while emphasizing industrial policy as means of achieving a fair and just transition across all sectors of the economy (Panel A, Figure 3).

Conversely, many political elites and parties favour market-based policies to decarbonize the economy, such as carbon pricing. Often carbon pricing targets firms, though this depends on the design of the policy (Panel B, Figure 3). A third example is the 1998 Kyoto Protocol, which was a transnational governance agreement which was policy-neutral about how the participating states achieved its goal. As such, the underlying theory of change for the Kyoto Protocol was rather truncated, which may have contributed to its failure (Panel C, Figure 3). These are just three examples among many which instructors could use to elucidate how different theories of decarbonization are enacted in the real work.

A second opportunity is for students to draw on the knowledge gained throughout a climate politics course to develop and illustrate their own ideal-type theory of change. For example, in the first week of a course instructors could ask students to briefly sketch the theory of change they believe would be most effective and/or political feasible. A follow-up session towards the end of course would then invite students to present an updated version of this theory, where they may reflect on how their thinking has evolved — if at all — regarding the most effective strategies for decarbonization.

The main point is that our framework provides a flexible tool which can both provide guidance on how to construct a graduate or advanced undergraduate course on climate politics and be used as a practical application within such courses or for more introductory undergraduate courses. While we point to some examples of the latter here, we hope instructors will take up our mantle and put the framework to more creative uses.

Figure 3: Mapping Theories of Change



Theories of change for (a) the Green New Deal, (b) an economy-wide carbon tax, (c) the Kyoto Protocol.

## Conclusion

Our aim here has been twofold. First, we sought to provide prospective instructors with the substantive building blocks for designing a first-rate syllabus on climate politics at the graduate or advanced undergraduate level. The overarching framework could even be used as a teaching tool in more introductory undergraduate courses. Second, we hoped to inspire students who are searching for a research question to answer in an essay, thesis, or research article.

In doing so we emphasized the importance of explicit or implicit theories of change. We suggest that when students are provided a theory of change, regardless of how simple, it enables them to get more out of their climate politics course. Relatedly, encouraging students to formulate their own theories of change based on course material can be a useful teaching experience. Instructors could introduce a dynamic element to a course by asking students to illustrate their ex-ante theory at the beginning of the course which would then be followed by a session in the final weeks of the course where students present their ex-post theory. Additionally, real-world climate policies (e.g., Green New Deal, Kyoto Protocol) can be explained in terms of their implicit theories of change, helping students ground their knowledge of climate politics in real-world policy debates.

Instead of offering one or two specified theories of change, we provide a broad framework that captures many of the constituent elements of decarbonization. Our framework disaggregates the politics of decarbonization into twenty-two sub-topics. For each we assessed the state of political science knowledge, pointing throughout to areas of strength and weakness. This allowed us to create a “heatmap” assessment of what political science knows and what it does not, which we hope can serve as a tool for instructors in crafting courses of climate politics and for students searching for research questions. Elements which are currently less well understood include many important sectors (i.e., agriculture, buildings, and industry), systems design, the media, and the role of unions.

We also hope that this article will prove useful for researchers beyond political science. There is arguably no other contemporary issue that demands more of an interdisciplinary approach than climate change. Just as we encourage political scientists to rely on research from other fields, we hope that this article will serve as a resource for instructors of other courses. In the spirit of our broad framework approach, addressing climate change requires instructors, students, and researchers of all types to cast the net wide and embrace a wide variety of material.

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