Public Opinion Foundations of the Clean Energy Transition*

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Abstract

Public attitudes are central to the clean energy transition. There is, however, theoretical ambiguity about how mass publics influence policy and the sources of their policy preferences. This has consequences for understanding decarbonization trajectories and the conditions that enable political reforms. Our review uses the recent turn to green industrial policy to clarify the origins and influence of public opinion in the clean energy transition. The political logic of green industrial policy leverages policy benefits to create allies, a strategy that will hinge on whether the public recognizes these gains and rewards politicians. The conclusion identifies new avenues for public opinion research prompted by the shifting climate policy strategies.

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Climate change solutions depend on ordinary people. Cutting emissions requires policy, but voters must elect politicians who support mitigation and welcome green technologies in their homes and communities. Debates about political barriers to the energy transition acknowledge the public but often reduce its role to amorphous concepts such as "political will."[1] Some question how public opinion could matter when it runs up against organized interest groups, while others view the public as a constraint on policymaking (e.g., Gilens and Page 2014). This article aims to clarify the precise ways in which public opinion might influence the clean energy transition.

The recent turn to green industrial policy in the United States and Europe offers an opportunity to reconsider public opinion's role in the clean energy transition and unpack this ambiguous notion of "political will." Our review focuses on the United States, with insights that we expect to apply in other democratic countries pursuing industrial policies. We examine the landmark 2022 Inflation Reduction Act to explain why the bill sidestepped public opinion barriers that stymied previous reforms. This policymaking episode shows how the public is neither irrelevant nor omniscient.

Public attitudes shape the incentives of policymakers, the types of leaders elected, and the adoption and siting of clean technologies. Politicians anticipate how voters will respond to climate policies, which could be to a leader's benefit or loss. People are unsure about how much a policy will harm or benefit them, which allows interest groups to frame how the public and politicians think about the energy transition. Together, competing interests and values structure public opinion, which conditions how ordinary people mobilize and shape policy debates.

After explaining how public opinion affects policymaking, we focus on how climate policy design and implementation influence public support. We highlight three interrelated factors: visibility, individual prioritization of climate change, and beliefs about distributive effects. Visibility refers to whether people can directly see a policy's effects. Prioritization is how

[1]PBS News (2022), for example, summarized a recent IPCC report by saying that the barrier to stopping climate change is the "lack of political will."

much climate change ranks in importance to other issues. While beliefs about distributive effects are the public's expectations of a policy's benefits and costs. Our goal is to provide an accessible overview of research on responsiveness and policy attitudes while identifying research needs that result from the industrial policy turn.

These concepts help explain the political implications of the turn to green industrial policy in the United States. The IRA's political logic is to hide costs while using economic benefits to create allies in the green transition. The strategy further ties climate change to other high-priority issues, such as reducing inflation and national security. The success of this new approach may hinge on whether the public recognizes the IRA's benefits and rewards politicians.

Our review encourages greater conceptual clarity about climate change public opinion. Scholars, policymakers, and popular commentators should replace amorphous appeals to the public's importance with clear statements about how voters shape the politics of transitioning away from fossil fuels to clean energy.

The public's role takes on new urgency as reformers hope to design policies that endure changing administrations. Researchers have also invested considerable resources to model pathways to decarbonize our economy. How the public influences these trajectories is complex (Beckage, Moore, and Lacasse 2022; Peng et al. 2021). We contribute to these efforts by communicating findings from a mature social science literature on public attitudes and behavior. In turn, the article concludes with a research agenda about the public's role in the new industrial politics of climate change.

Public Opinion's Role in Climate Politics

When pollsters ask Americans whether they believe global warming is real and worrisome, a majority attests that climate change is happening and they're concerned (Leiserowitz, Maibach, Rosenthal, and Kotcher 2022; Krosnick and MacInnis 2020). Partisan gaps persist in these attitudes as with many issues (Egan and Mullin 2017). These climate beliefs

correspond with stated policy preferences: 69 percent of registered voters support transitioning the economy from fossil fuels to clean energy by 2050, the timeline needed to meet international climate goals (Leiserowitz, Maibach, Rosenthal, Kotcher, et al. 2022). Despite this national consensus, politicians have largely failed to respond to public opinion with meaningful climate policy. What explains this apparent disconnect, at least before the IRA, between measured climate policy attitudes and national climate policy?

One view is that citizens are largely irrelevant. From this perspective, public opinion rarely influences the Congressional legislative agenda. Instead, elites and interest groups dominate (Gilens and Page 2014; Bawn et al. 2012). To the extent that the public holds coherent opinions, they follow rather than lead their elected officials (Lenz 2012). Alternatively, public opinion may matter but only in a very generalized fashion, such as by signaling a general mood that reorients politicians to do more or less on an issue, like turning a thermostat up or down, but it is unlikely to shape specific policy designs (Wlezien 1995).[2]

Popular debates often collapse public opinion into the abstract concept of "public will." But the concept of public will typically remains undefined or defined tautologically as the presence of conditions under which action is possible. While these debates highlight the public's importance, they leave unspecified the conditions and pathways through which public opinion matters. There is a rich public opinion literature that explains not only how ordinary people affect policymaking but also the origins of their policy attitudes.[3] Our aim is not a comprehensive review of this literature but to illustrate the primary ways that public opinion could influence politicians' decisions to adopt climate reforms and individual decisions needed to achieve energy transition goals.

[2]Another possibility is that public support stems from poorly designed questions that don't properly frame the costs of action.

[3]There is, for example, considerable scholarship on accountability, which is beyond our scope to review (e.g., Ashworth 2012).

Policymaking Incentives

The public's attitudes about policies are, at a minimum, important inputs into policymakers' incentives to act. V.O. Key, Jr. (1961), introduced the idea of latent opinion, which refers to how the public may respond to decision-makers in the future, causing them political damage. Lawmakers pay attention to what they think the public wants when crafting policy and voting on legislation, with the aim of avoiding future electoral problems (Arnold 1990; Mayhew 2004). Public opinion can shape policymaking through politician perceptions of their constituents' views.

One source of these perceptions is opinion polls. Politicians often conduct "message tests" of policies to see whether they are popular. Quality surveys are expensive, especially for measuring the attitudes of local constituencies. Organizations such as Gallup and Pew also regularly ask the public what they think about today's issues. There is evidence from natural and actual experiments that politicians, when provided with public opinion data, adjust their positions to be more in step with constituents (Hager and Hilbig 2020; Hertel-Fernandez, Mildenberger, and Stokes 2019).

Interest groups recognize the importance of policymaker beliefs and invest considerable sums to distort their perceptions of constituent views (Broockman and Skovron 2018). Legislative staffers in Congress systematically mis-estimate constituent opinions on issues including climate change (Hertel-Fernandez, Mildenberger, and Stokes 2019). These misperceptions aren't unique to the United States and can emerge when policymakers have unequal contact with stakeholders (Pereira 2021; Walgrave et al. 2023). Environmental advocates work to counterbalance business lobbying by providing information about the public's attitudes. It can be challenging, however, to intervene and shift policymakers' views (Kalla and Porter 2021).

Politicians' perceptions of public attitudes are not only constructed by interest groups. A simple fact of politics is that people are sensitive to sacrifice—and lawmakers know this. Voters don't like paying higher prices for groceries, gasoline, and electricity. Whether distorted

or real, public opinion shapes political leaders' incentives when deciding to make long-term investments to address climate change.

One study of state-level support for 39 policies across eight issues found that politicians are highly responsive when citizens have policy-specific opinions on salient issues, though policy may not always be congruent with these opinions due to institutions and interest groups (Lax and Phillips 2012). Studies of climate policy in the American states and high-income countries show signs of responsiveness (Bromley-Trujillo and Poe 2020; Schaffer, Oehl, and Bernauer 2022).

Electoral Selection

We have strong theoretical reasons to believe that the public's climate policy preferences can affect their voting behavior. Over time, election outcomes could shape the types and priorities of politicians. With a few exceptions, much of this research comes from other issue areas, so we need more research focused on climate change. But we expect the logic to apply and it's useful for understanding how the public could affect climate reforms.

We know from American politics research that lawmakers who cast votes out of step with their constituents often lose re-election (Canes-Wrone, Brady, and Cogan 2002). A recent study, for example, linked congressional roll-call votes on 44 bills from 2006 to 2018 to survey data on constituent perceptions and found across various research designs that constituents held their representatives accountable, meaning that they were more likely to vote for a politician with greater perceived issue agreement (Ansolabehere and Kuriwaki 2022).

For many voters, elections aren't about a particular policy, but climate policy can matter for some issue publics. Issue publics refer to groups who are affected by a policy and, therefore, are often well-informed and well-organized (Converse 1964). Young people, for example, appear to increasingly care about climate change and prioritize it when deciding how to vote.

Several conditions must be met for policy preferences to affect vote choice. People must

be informed about whether current policies align with their preferences; the candidates on the ballot must differ in where they stand on climate policy; and climate change must take priority over other issues.

In the United States, there is a clear national partisan divide on climate change, where the Democratic Party has stronger issue ownership of the environment (Egan 2013; Karol 2019). This partisan cleavage could facilitate climate-oriented voting in national elections, though it may become more challenging for the public to identify differences between candidates in more local elections where politician positions can diverge from the national platform.

Most research on climate policy and vote choice highlights electoral risks. Wind farm construction caused incumbent politicians in Canada to lose votes (Stokes 2016). Coal's decline bolstered support for Republican presidential candidates in areas where voters couldn't see market forces at work (Gazmararian 2024b). Heightened energy prices for Dutch renters increased support for far-right parties opposed to climate policy (Voeten 2024). American autoworkers who build internal combustion engines have begun to turn toward the Republican Party as the electric vehicle transition accelerates (Gazmararian and Krashinsky 2023). Owners of polluting cars in Milan supported right-wing populist parties after the city banned their vehicles (Colantone et al. 2024). Groups that face concentrated climate policy costs have incentives to vote for politicians and parties that oppose the clean energy transition.

But we also have evidence that as climate change grows in salience, people directly harmed will vote on it. Californians who suffered wildfires turned out in greater numbers on environmental ballot referenda (Hazlett and Mildenberger 2020). Exposure to extreme weather increased climate concern and Green Party support across Europe (Hoffmann et al. 2022). The relationship between climate-related experiences and opinion is complex and emerging (Howe et al. 2019), but it illustrates one way that global warming can become more salient and affect how people vote.

Primary elections also provide an avenue for public opinion to influence policymaking priorities (Bergquist and Warshaw 2020). In the 2020 Democratic primary election, Gov-

ernor Jay Inslee ran a single-issue climate campaign that pushed the other candidates to incorporate more ambitious climate policies into their platforms. Joe Biden, the eventual Democratic nominee, ended up adopting many of Inslee's proposals in his platform.

We don't want to leave the impression that environmental issues predominate in elections. They don't. American voters care most about the economy. But through issue publics and primary elections, climate change can emerge on the agenda and could, over time, influence the types of politicians elevated into office. These dynamics can advance or halt the energy transition, depending on voter preferences.

Technology Adoption and Energy Development

The energy transition, spurred by climate policies, requires that people adopt new technologies and that communities accept energy projects. First, people will need to make consumption choices aligned with decarbonization goals. These include transitioning from gas furnaces to heat pumps, and gasoline to electric vehicles. Policies can ban products and leave consumers with no choice, but many try to encourage people to make these decisions via nudges and financial incentives.

Second, the energy transition will require the widespread deployment of new clean energy infrastructure ranging from transmission lines to solar panels (Larson et al. 2021). Many local governments exercise discretion over the approval of new infrastructure projects such as wind turbines. When making these siting decisions, local policymakers consider the community's views because they could face electoral risks if they approved unpopular projects. If community members are uncertain about a project's benefits, that could slow the energy transition (Carley et al. 2020; Wüstenhagen, Wolsink, and Bürer 2007). People can have a positive view about renewable energy and climate policy in general but oppose specific projects in their communities (Bell, Gray, and Haggett 2005).

By this point, it should be clear how public opinion influences policymakers and matters for the energy transition. But how do climate reforms such as the IRA arise despite

opposition from incumbent interest groups?

What Public Opinion Research Says about Green Industrial Policy

The turn to green industrial policy, as with the IRA, sidesteps several features of public opinion that frustrated earlier climate policymaking efforts: visible costs, low prioritization, and limited direct benefits.

Before the IRA, when climate reforms in the United States succeeded, they were often low-salience efforts with minimal efforts by opponents to politicize incremental actions (e.g., Rabe 2004).

At the federal level, climate policy focuses on the economist's recommendation of carbon pricing, with limited consideration of politics. American climate policymaking from around 2001 through 2012 fixated on putting a price on carbon pollution. Scholars followed policymakers, and much of our public opinion research examines carbon prices rather than today's industrial policy approach (Fairbrother 2022). Climate policy opponents, and at times proponents, framed policies as involving sacrifices. As we review, policies seen to increase costs are often a losing political proposition, even when coupled with well-intentioned designs to mask those costs. Learning from the pitfalls of attempts like the Waxman-Markey cap-and-trade bill, the IRA focused on creating visible benefits, which likely contributed to its success.[4]

Cost Sensitivity and Policy Support

An accumulation of evidence shows how support falls when people focus on the costs of climate policies (Drews and van den Bergh 2016; Bergquist, Konisky, and Kotcher 2020).[5] Bechtel and Scheve (2013), for example, conducted large-scale survey experiments in France,

[4]Proposals like cap and trade are not impossible, as the 1990 CAA Amendments and regional efforts demonstrate. These successes, however, relied on particular political conditions.

[5]Perceived fairness and effectiveness also affect public support (Bergquist et al. 2022).

Germany, the United Kingdom, and the United States that randomly varied information about how much a global climate agreement would cost households each month. They found that an increase in costs from one to two percent of GDP reduced support for climate action by 20 percentage points.[6] Surveys estimating the willingness of citizens to pay for reductions in GHG emissions find that households would spend around $80 annually (Kotchen, Boyle, and Leiserowitz 2013). These estimates, though old, imply that carbon prices are politically constrained to as low as $2 to $8 per ton of CO2 (Jenkins 2014), a far reach from recent estimates that put the social cost of carbon at $185 per ton (Rennert et al. 2022). Likewise, Beiser-McGrath and Bernauer (2023) show how support falls when people learn about a carbon tax's costs. These public opinion findings correspond with political behavior such as Washington State's failed carbon pricing referendum and the "Yellow Vests" movement in France (Douenne and Fabre 2022; Anderson, Marinescu, and Shor 2023). The public will incur some costs, but support drops as costs rise.

Climate policy inaction also entails costs from future climate damage. These costs, however, are distant, often outside the political time horizons of voters and politicians.[7] As discussed above, experience with climatic extremes could raise support for climate policy (Howe et al. 2019; Borick and Rabe 2014; Borick and Rabe 2010). These effects, however, are often ephemeral (Egan and Mullin 2012, 2017), or are mediated by partisan politics (Hazlett and Mildenberger 2020). As climate change's costs manifest, the salience of inaction's costs has not yet been overtaken.

People don't like costs, but they want clean energy, which the IRA seeks to expand. Ansolabehere and Konisky (2014) amass a wealth of public opinion data on what energy people want to use and why. They show that the attributes of energy, namely its price and environmental harms, are the most important determinants of support, more so than partisanship and social values. People want their electricity to be cheap and clean, which reflects

[6]Borick and Rabe (2010) find that Canadians have a greater willingness to pay costs.

[7]See Jacobs (2016) on time horizons and political reform, and Gazmararian (2024c) for causal evidence of the influence of individual time horizons.

an openness to the clean energy transition but also reiterates the public's cost sensitivity.

Reformers recognize the influence of costs and have sought strategies to reduce the visibility or offset the magnitude of these costs. Carbon pricing proposals often propose to rebate revenue to citizens (Carattini, Kallbekken, and Orlov 2019). Survey experiments show that rebates increase public support for carbon pricing both in the United States and globally (Beiser-McGrath and Bernauer 2019; Jagers et al. 2021). But there is little evidence that these rebates—as implemented in Canada and Switzerland—have reshaped climate policy support in the face of coordinated interest group opposition (Mildenberger et al. 2022). Even simple partisan frames can erase the positive effect of rebates on policy support (Fremstad et al. 2022). There is a gap between objective and subjective policy costs. It matters not only if benefits are flowing to the public but whether politically active constituents perceive these benefits. Opponents often work to distort these perceptions to align the public with their interest group's preferences.

The IRA took a different approach to sidestep the cost-sensitivity challenge. Instead of imposing costs on fossil energy consumers or producers, the law focused on creating benefits. The law makes massive investments to lower clean energy costs and encourage vehicle and building electrification. These investments must be paid for, which could burden the public. But the political reformers behind the IRA raised funds partly by closing tax loopholes. The law could also reduce deficits, so voters are less likely to be saddled with debt that creates pressure for reversal (Gazmararian and Tingley 2023; CBO 2022).

Local Economic Benefits

The IRA also generates local economic benefits such as jobs to construct renewable energy, build batteries, and install energy-efficient products.[8] Many of these new economic opportunities are being created in Republican states, traditional opponents of climate policy. The geography of investment could have implications for the coalitions that support the energy

[8]Energy transmission infrastructure is also crucial for decarbonization, and here local benefits are also important (Bergquist et al. 2020).

transition in the future (Egan and Mullin 2023). What does the public opinion literature say about how these local economic benefits will influence the reception of the IRA?

Framing the clean energy transition in terms of job creation or cost savings can increase support, even among Republicans who are otherwise more skeptical of the clean energy transition (Stokes and Warshaw 2017; Gustafson et al. 2022; Bayulgen and Benegal 2019). One survey experiment finds that highlighting local jobs from electric vehicles can lock in support for the energy transition (Gazmararian and Tingley 2023). In a study of 24 countries, Bain et al. (2016) find that emphasizing the economic and scientific benefits of the clean energy transition can motivate support for actions to combat global warming, even among climate skeptics.[9] In a review of studies on public acceptance of energy projects, positive perceptions of benefits consistently correlate with support (Carley et al. 2020).

These benefits, however, must materialize and appear credible to people on the ground. Gazmararian and Tingley (2023) present evidence from national, regional, and targeted surveys that reveal public concerns about the local benefits of green industries, such as the share of jobs that go to local workers. They also show how policy solutions such as transparency around investment could lessen these worries. In practice, there will also be counter-arguments that try to neutralize arguments emphasizing local economic benefits, so local economic benefits may not automatically translate into greater climate policy support (Bernauer and McGrath 2016).

Prioritization and Policy Bundling

Although many Americans think climate change should be a top priority for Washington, the public consistently ranks global warming on the bottom of the list of priorities for policymakers to address, whereas top priorities include the economy, budget deficit, and tax reform (Egan and Mullin 2017). One aspect of the IRA that may have helped overcome the low weight placed on environmental issues was how the reform contained higher priority

[9]Other benefits from mitigation policy like public health improvement from air pollution reduction can increase support (Myers et al. 2012).

policies, such as those to tackle the high cost of living, hence "inflation reduction" in the name.

This type of policy bundling increases public support. One study used a "conjoint" survey experiment that independently varied the attributes of a climate policy, such as whether it is bundled with social and economic reforms like affordable housing. The study found that bundling climate policy with broader social reforms can build support for climate action, especially among people of color and Democrats, but not Republicans (Bergquist, Mildenberger, and Stokes 2020). These partisan reactions to policy bundling reflect the political coalitions that formed around the IRA, with party-line support from Democrats and opposition from Republicans.

Gaikwad, Genovese, and Tingley (2022) find similarly that the public prefers a bundle of spending across multiple programs. Starting with the presumption that the government had raised money through a price on carbon, the study considered how people allocate spending across adaptation, transition assistance for harmed fossil fuel workers, renewable energy infrastructure, and taxpayers dividends. In geographically targeted polls, allocations reflected priorities that varied with how climate change and the energy transition would affect the respondent's region. This may explain why the IRA also included tax credits targeted at "energy communities," also located in states of key senators like Joe Manchin of West Virginia.[10]

Priorities for Public Opinion Research

Durability and Policy Feedback

Even when climate policy passes, its long-term durability is never guaranteed. Policy losers mobilize to repeal or retrench even modest climate policy efforts (Patashnik 2023). Ontario, Canada, refused to impose its own emissions pricing program in 2018, while Australia axed

[10]Gazmararian (2024a) shows how just transition policies increase public support for the energy transition in coal country.

its carbon tax in 2014. Many fossil-fuel-aligned politicians in the United States have already begun laying the groundwork for the IRA's repeal, with plans to expand fossil fuel production. Whereas IRA proponents have tried to design the law to encourage "feedback effects" that build self-sustaining public and business constituencies (Campbell 2012; Pierson 1993).

What affects the public's beliefs about green industrial policy's durability?

Whether the public perceives the benefits of the IRA, such as new jobs and local tax revenue, as durable will matter for the law's success. The possibility that a new government will reverse the IRA or that economic circumstances might change and hinder investment is not theoretical. Gazmararian and Tingley (2023) show how these credibility challenges are salient in the public's mind: 71 percent of the national public is uncertain that the federal government would keep its promises to invest in their communities. Their polling of local officials across the country reveals even more acute reversibility concerns. If the public does not view the law's benefits as durable, communities might be less willing to embrace battery assembly plants, transmission lines, and wind energy. Local opposition has already emerged to large solar projects in places such as Williamsport, Ohio (Gearino 2022).

There is initial evidence that the national public believes the benefits from the IRA may stick, but we need more research. One opinion poll fielded the month after the IRA passed shows that the public thinks that most companies and politicians are unlikely to try to reverse the law. The one exception is fossil fuel companies and Republicans. Half of the public think they would be likely to try to reverse the IRA. Republican respondents are less likely to think that their party would reverse the law (Gazmararian and Tingley 2023).

This mixed picture suggests that the public is hopeful about the longevity of the law but is not yet convinced that the benefits will last. Other national surveys show that few think the IRA will accomplish its goals. Only 34 percent of the public think the law will reduce global warming or the cost of electricity (Leiserowitz, Maibach, Rosenthal, Kotcher, et al. 2022). This pessimism may reflect concern about the durability of benefits, potentially because interest groups might try to water down the law's implementation (Stokes 2020).

How to build broad support for partisan reforms?

The IRA passed along partisan lines. No Republican voted for it. A partisan climate law may be better than no law at all, but there's evidence that the public perceives partisan laws as less durable (Gazmararian and Tingley 2023). Voters generally prefer bipartisan policies, which also reflects an aversion to extremism (Bergquist, Mildenberger, and Stokes 2020; Westwood 2022).[11] We need more research on whether and how other features of the law's design could counterbalance concerns about the law's partisan passage.

Who gets credit for green industrial policy's benefits, and to what effect?

The IRA's survival may hinge on whether the public recognizes the law's benefits and rewards politicians. There's a well-documented challenge in American politics where the public does not always recognize government benefits. Mettler (2011) calls this the "submerged state" problem. The classic example is the Medicaid recipient who votes for small government. The lack of traceability can lead people to oppose policies of which they are beneficiaries.

For the IRA, politicians have incentives to try to claim credit. Credit allocation, however, is difficult in a federal system where the implementation involves local, state, and federal actors (Arceneaux 2006; Konisky 2011). Democrats who ushered through the law will want to take credit for the local benefits. But they might need to share the credit with Republican governors, for example, to encourage them to accelerate the clean energy transition in their state. Some politicians may even deny the IRA's role despite benefiting because of fear of electoral consequences. Who the public ultimately rewards will shape the incentives of political elites to advance or forestall decarbonization.

Scholars should look to see what lessons climate politics can draw from the established policy feedback literature in other issue areas, such as social security. A useful theoretical exercise for researchers would be to find similarities and differences across these issue spaces. The long-term nature of climate change and the magnitude of climate policy's distributive

[11] But see Harbridge, Malhotra, and Harrison (2014) who show that partisans may have a preference for policies supported by their party.

effects may create unique incentives for leaders and the public.

We also need more research on how the politics of credit-claiming affect whether policy feedbacks take root. Do attempts to make the IRA's investments more visible spark backlash by polarizing energy projects locally? If so, what messages can communicate the federal government's role in these investments that do not risk deepening polarization. Scholars should also take seriously, and evaluate systematically, the trade-off between making policy more durable by claiming credit and the benefit of local community acceptance of energy projects.

Urgent need for high-resolution panel data

A rigorous approach to understanding change in policy preferences due to policy feedbacks would be to establish a survey panel—repeated surveys of the same individual—that could track changes over time at the individual level. Scholars could pair this panel data with high-resolution spatial data on the distribution of benefits from the IRA to study in real-time how the benefits of the law shape public opinion or not.

Consumer Demand for New Technologies

Implementing the IRA and successfully driving a society-wide energy transition will require more than climate-friendly politicians and decision-makers. The public will also be critical since there must be rapid consumer uptake of clean energy technologies in households. The IRA subsidizes many of these technologies through grant programs and uncapped tax credit provisions. The speed of consumer technology adoption will determine the overall size and impact of the legislation.

What are the public's attitudes about new clean energy technologies?

Some research has been done on consumer sentiment towards solar projects and electric vehicles. Boudet (2019) provides a helpful review of common theoretical frameworks and models for understanding public perceptions of and responses to new technologies. Factors that affect these perceptions include perceptions of costs and benefits, values, interaction with

existing landscapes, and processes around adoption. A consistent finding is that the public often knows little about energy technologies. Perceptions abound. People, for instance, don't fully understand facts about the range and capacity of electric vehicles.

With a fast-evolving set of electrification technologies promoted by the IRA, we need more descriptive and theoretical work about public attitudes. We know little systematically about technologies such as heat pumps, induction stoves, and household energy storage (Gromet, Kunreuther, and Larrick 2013; Lesic et al. 2019; van Rijnsoever and Farla 2014). In general, we require a more nuanced understanding of how price, comfort, and health considerations shape consumer sentiment.

What are best practices to counter barriers to clean technology adoption?

What are the optimal ways to engage the public in the clean energy transition and combat misinformation about new technologies that incumbent fossil fuel interests are disseminating? We also need to understand how consumer sentiment toward household electrification will interact with partisan politics. To date, clean energy uptake has often been bipartisan, structured by costs and not ideology (Mildenberger et al. 2022). The dynamics of IRA implementation will depend on whether this trend continues or whether ideological considerations dominate, as we may be seeing with gas stove politics.

Environmental Justice

How do environmental justice provisions affect climate policy support?

The IRA has provisions that begin to address decades of environmental pollution that have disproportionately fallen on Black, Brown, and Indigenous communities.[12] There exists little systematic work on public opinion and environmental justice. Existing polling finds nominal support from most Americans to increase funding for low-income communities and communities of color that are disproportionately harmed by pollution (Carman et al. 2022). We suspect that, as with support for climate mitigation policy, actual support for climate

[12]See Carley and Konisky (2020) on the justice and equity implications of the clean energy transition.

justice policies might be lower if survey-takers had to consider the costs of these initiatives. Indeed, one study shows that Americans do not know much about environmental inequalities and only exhibit marginal support for policy tools that could begin to address environmental racism (Bugden 2022).

Do environmental justice communities perceive the benefits from targeted IRA provisions?

When it comes to the IRA, an obvious starting point is to understand whether individuals whom the IRA hopes to help perceive the law's provisions as having a positive impact over time. Do they see more opportunities for employment in new green sectors? Do they notice improvements in environmental quality in their community? How do objective measures of changes in environmental quality map onto self-reports of daily conditions? What are the next steps that members of environmental justice communities think should be taken?

The IRA also contains provisions that will encourage the expansion of "hydrogen hubs." These are large-scale industrial facilities that could come into tension with environmental justice goals. We are only beginning to understand how the public perceives hydrogen technologies, a topic that the public knows little about (Gordon, Balta-Ozkan, and Nabavi 2022). The environmental impacts of hydrogen depend on the way it's made, with much of it today coming from natural gas. Scholars could explore how communities, where these hydrogen hubs are located, view these new projects.

What approaches can build public support for addressing environmental injustices in the absence of state and federal policies?

Another line of inquiry departs from the IRA and asks about additional approaches to attempt to solve inequities highlighted by environmental justice scholarship. For example, Gazmararian and Tingley (2024) explore how to overcome historical racial and wealth inequities in rooftop solar adoption with a program that leverages ground-up net-metering proceeds. Further research could explain other types of community initiatives that could

complement state-led policies.

Globalization and Green Industrial Policy

Policy designs to win public support for the energy transition at home will also have international ramifications that could spill over to affect public opinion in unforeseen ways. Provisions in the IRA, such as "Buy America" incentives that are popular at home, run up against long-standing commitments abroad to global free trade. Many of the United States' trading partners have pursued similar industrial policies.

How do people weigh trade-offs between free trade and green industrial policy?

We need more research to understand how the public weighs the benefits from the clean energy transition versus the gains from free trade.There is initial evidence for EV subsidies that the public does not support restricts on automaker eligibility for these credits (Lim et al. 2022), which suggests that economic nationalism may not be as effective a messaging strategy as some thought.

There is also a growing move by nations that have taken ambitious actions on climate change to level the playing field at home for domestic businesses. These countries are imposing so-called "carbon border adjustments" and related tools to make foreign businesses pay an equivalent price for the carbon dioxide emissions embedded in their goods. Otherwise, there is a fear that domestic businesses will shift to locations where they would not have to comply with more stringent climate protections. We know relatively little about how the public will respond to these trade policies. They could be supportive because these policies level the playing field for domestic firms. But these policies would increase costs for domestic consumers. These are consequential trade-offs to understand. The large literature on public opinion and trade policy will serve as a helpful launching point.

Conclusion

Public opinion influences the policies that politicians adopt, the types of leaders and their priorities, and the clean energy decisions of consumers and communities. Our review reflects on how scholarship about climate change and public opinion illuminates the turn to green industrial policy. Notably, these efforts, such as the IRA, heeded the public's sensitivity to the costs of policies, focused primarily on creating local benefits, and bundled climate reforms with higher priority policies.

Scholars should be attentive to the ways in which the nascent energy transition itself further transforms climate politics. As people witness the IRA's economic benefits, will support grow for more ambitious climate policy? The law's political strategy is to concentrate clean energy benefits in electorally consequential states, many red and purple.

We focus on the United States, but countries worldwide have turned to green industrial policies. The European Union and its individual countries are pursuing green energy subsidies that mirror aspects of the IRA. Our arguments about public opinion have the greatest applicability in these democratic countries, unlike in more authoritarian contexts such as China, which is also pursuing green industrial policies. The questions we identify for further study in the United States also apply worldwide.

The longevity and success of green industrial policies will depend on whether the public and interest groups embrace their benefits. This may not be automatic in the case of efforts like the IRA due to the bill's partisan nature, credibility challenges faced by all political reforms, and the dynamics of credit claiming. Yet, much remains to be studied, including the law's environmental justice provisions, and the public's preferences when it comes to the tension between green industrial policy and the international trade regime. These mechanisms and conditions offer a more clear statement of the importance of public opinion than amorphous appeals to "political will."

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