

Repairable Authority in Renewable Energy Deployment Under Long Lifecycles of Contestation, Evidence Change, and Operating Conditions

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ABSTRACT In contested siting environments, approval is rarely the end of governance; it is the beginning of a prolonged period in which commitments are tested, evidence is contested, and operating conditions evolve. This paper develops a social science theory of repairable authority in renewable deployment. The central claim is that durable deployment depends on revision rights, defined as institutionally recognized pathways for reopening, adjusting, and enforcing commitments in response to new evidence and changing conditions, without collapsing either investor predictability or democratic legitimacy. The paper contributes a conceptual model that distinguishes between closure as an administrative event and holding as a lifecycle property of decisions. It shows how decisions fail to hold when authority is fragmented across arenas, when evidence is produced through contested intermediary arrangements, and when narratives of urgency displace accountable commitments. The analysis advances an interpretive-institutional approach that treats revision not as a procedural exception but as a normal governance function in pluralist societies under nonstationary ecological and infrastructural baselines. The paper then derives implications for institutional design centered on standing after approval, bounded but contestable transparency, and routine review rhythms that make enforcement visible while limiting discretionary drift.

KEYWORDS

1. Introduction

Public controversies over renewable energy projects often appear, on the surface, to be disputes about landscapes, wildlife, or local disruption [1]. Beneath these substantive disagreements lies a recurrent governance question: whether institutions can make commitments that remain credible after approval, when projects are built, operated, monitored, and occasionally modified. In many settings, what is contested is not only a project's immediate footprint, but the reliability of the governance chain that is supposed to translate assurances into enforceable practice over decades. Communities may accept that a low-carbon transition is necessary yet still oppose specific projects when they believe that promised mitigations will be weakly enforced, that monitoring will be opaque, or that revision will be unavailable once closure

occurs [2]. Developers and system planners, conversely, may accept that environmental constraints are legitimate yet still resist governance arrangements that appear to permit open-ended renegotiation, shifting interpretations, or discretionary enforcement that undermines predictability.

This paper proposes that the decisive institutional problem in many renewable deployments is not deciding, but holding. Deciding refers to completing formal steps that culminate in authorization. Holding refers to the capacity of that authorization to remain governable across time as evidence accumulates, cumulative effects become visible, and conditions change [3]. Holding is neither automatic nor reducible to legal defensibility at the moment of approval. It depends on whether stakeholders view post-approval accountability as real, whether regulators can act on evidence without appearing arbitrary, and whether revision can occur through legitimate pathways rather than through crisis

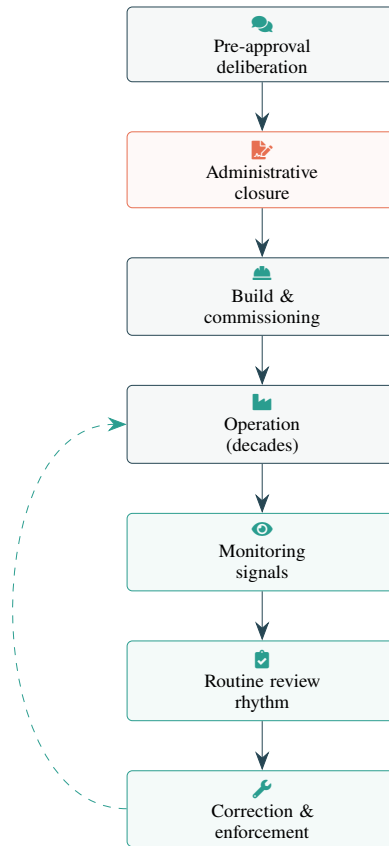


Figure 1 Lifecycle distinction between an administrative closure event and the longer property of holding: authorization remains governable when monitoring and routine review can trigger bounded correction and enforcement without collapsing predictability.

politics. When decisions do not hold, conflict tends to recur and migrate across arenas, and governance becomes trapped in cycles of tightening, backlash, litigation, and ad hoc exceptions. When decisions do hold, disagreement may persist but is more likely to be routed through routine review and enforcement rather than through escalation [4].

A central empirical motivation for this paper is the gap between policy narratives and implementation pathways. For example, national policy documents may frame renewable deployment as supporting resilience and adaptation, yet implementation may remain oriented primarily toward mitigation targets, leaving diversification and other adaptation-relevant concerns under-specified in practice [5]. This gap matters for governance because it expands what is promised while leaving unclear how competing objectives will be managed under stress, such as during extreme events or grid disruptions [6]. When narratives are broad but commitments are narrow, stakeholders interpret governance as rhetorical, which undermines trust and intensifies the perceived need to secure leverage before closure.

The argument developed here is that renewable transitions require repairable authority, meaning institutional authority that can preserve closure while enabling legitimate correction. Repairable authority rests on revision rights. Revision rights are not a single legal doctrine; they are an ensemble of institutional arrangements that specify who can trigger review, what evidence counts, what actions follow, and how reasons are documented

[7]. They also specify what is not revisable without reopening core authorizations, protecting predictability. Revision rights differ from general participation rights because they are oriented toward lifecycle governance rather than front-loaded consultation. They also differ from discretionary adaptive management rhetoric because they require enforceable triggers and visible response.

The paper is non-technical and contributes a conceptual framework rather than a technology-specific optimization [8]. It treats renewable deployment as a pluralist governance problem: multiple actors with legitimate but competing values must coexist under uncertainty and nonstationary baselines. In this setting, insisting on complete consensus is unrealistic, and insisting on irreversible closure is politically brittle. Revision rights provide a middle path: they allow decisions to be made and implemented while preserving structured contestability and correction [9].

The analysis proceeds in five sections. The first section formulates the problem of holding and defines revision rights as a governance capacity. The second section analyzes dispute movement across governance arenas and explains why fragmented authority produces recurrent contestation. The third section focuses on evidence politics and delegated expertise, showing how intermediary arrangements shape whether revision is credible [10]. The fourth section examines influence work in regulatory settings, emphasizing how confidence and uncertainty are managed through ongoing interaction. The fifth

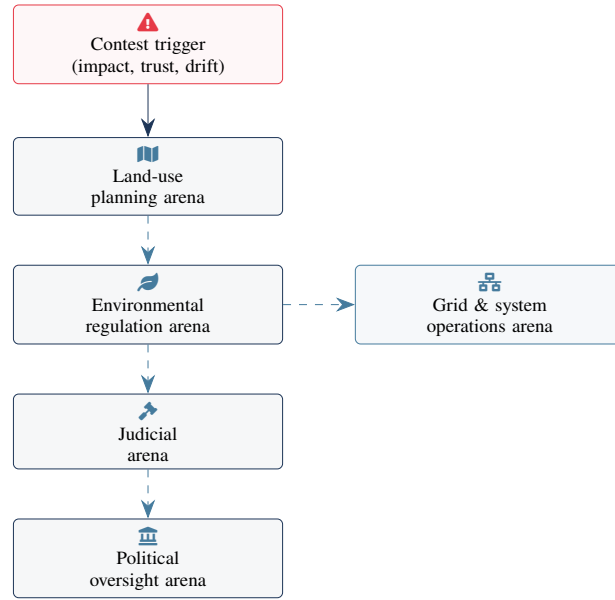


Figure 2 Dispute routing under fragmented authority: when holding is weak in one arena, contestation migrates through adjacent arenas (planning, regulation, courts, political oversight), with system-operation constraints becoming an additional route for leverage and reframing.

Concept	Focus	Typical question
Deciding	Pre-approval procedure	Has authorization been granted?
Holding	Lifecycle governability	Does the decision remain workable?
Revision rights	Structured reopening	How can commitments be adjusted?
Closure	Administrative endpoint	When do formal steps end?
Repairable authority	Adaptive legitimacy	Can authority correct without breaking?

Table 1 Core concepts in the argument

section analyzes institutional reversals and boundary defense as responses to legitimacy pressures, connecting these dynamics to the design requirements of repairable authority. The conclusion summarizes implications for building transitions that are both faster and more socially durable.

2. Problem Formulation: From Closure to Holding

The administrative imagination of infrastructure governance often treats approval as the moment at which legitimacy is secured and the governance task shifts from deciding to implementing [11]. This imagination is strained in renewable deployment because many of the most salient uncertainties are not fully resolvable *ex ante*. Impacts may depend on operating regimes, on cumulative build-out, on shifting ecological baselines, and on evolving grid conditions. Even when extensive assessments are conducted, stakeholders may disagree about thresholds, baselines, and the credibility of mitigations. The result is that approval does not end dispute; it reorganizes dispute around

post-approval accountability [12]. Whether that reorganization becomes manageable depends on the existence of revision rights.

Holding can be conceptualized as the durability of authorization. An authorization holds when it remains intelligible, enforceable, and revisable in legitimate ways across time [13]. Intelligibility means stakeholders can identify what is promised, what is required, and what constitutes deviation. Enforceability means regulators have capacity and willingness to act on deviations. Revisability means changes can occur through predictable and legitimate pathways, protecting both public accountability and investment certainty. Holding is therefore an institutional property, not merely a social attitude [14]. It is produced through routines, documentation practices, monitoring systems, and standing rules.

The concept of revision rights foregrounds an asymmetry in many deployment processes. Participation is typically concentrated before approval, when communities are asked to comment on plans and assessments. After approval, standing often weakens, and the governance system relies on administrative enforcement that may be under-resourced or politically

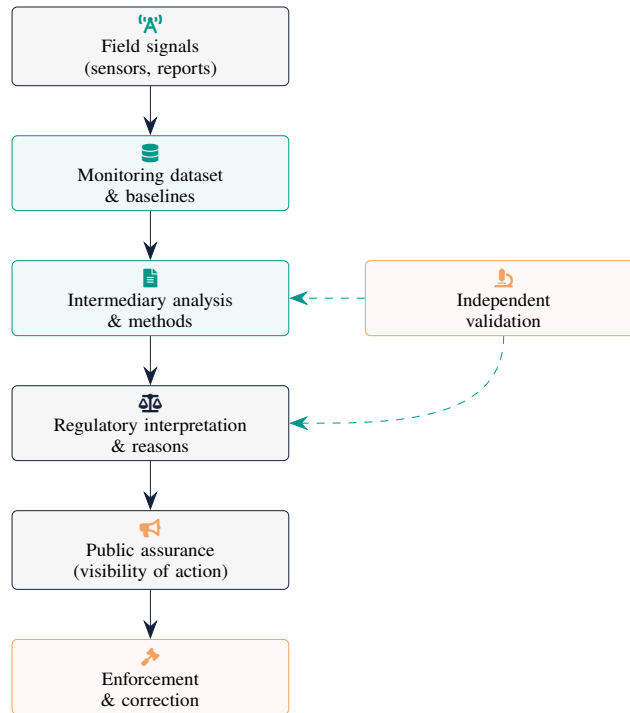


Figure 3 Evidence assurance chain for holding: field signals become actionable only when datasets, methods, and interpretation are auditable, and when validation and public-facing reporting make the observation-to-response link legible.

constrained [15]. This arrangement creates a strategic incentive for affected publics to resist closure because they anticipate diminished leverage later. It also creates an incentive for developers to push for the strongest possible closure at approval because they anticipate that any post-approval reopening would be destabilizing. The resulting conflict is not merely attitudinal; it is structurally produced by a governance architecture that separates decision from durable accountability [16].

Revision rights reorganize these incentives. When standing after approval is credible and bounded, publics can accept closure under uncertainty because they retain pathways to trigger review and require reasoned responses. When revision rules are explicit and limited to defined triggers and action sets, developers can accept review without fearing indefinite renegotiation. When monitoring is linked to visible response ladders, regulators can act without appearing arbitrary because actions follow predefined logic [17]. Revision rights therefore reduce both front-loaded resistance and post-approval cynicism.

However, revision rights are difficult to institutionalize because they confront a common tension: the legitimacy of closure versus the legitimacy of correction. Closure is legitimate when decisions are made through fair process and justified reasons. Correction is legitimate when new evidence or changed conditions require adjustment [18]. In brittle systems, correction is interpreted as moving goalposts and closure is interpreted as coercion. Repairable authority requires a settlement between these interpretations, achieved not by rhetorical balance but by institutional design: the explicit specification of triggers, standing, transparency, and response.

Revision rights also clarify that the speed-versus-diligence

debate is frequently misframed [19]. Efforts to accelerate deployment by compressing procedure can reduce short-term delay but can increase conflict if they weaken trust that correction is possible. Efforts to increase diligence by expanding studies and consultation can increase perceived fairness but can also increase uncertainty if they fail to establish closure norms and if they do not strengthen enforcement and revision. Holding, as the dependent variable, suggests that both speed and diligence are secondary to the quality of post-approval governability. A process can be relatively fast and still produce holding if revision rights are credible [20]. A process can be slow and still fail to produce holding if post-approval accountability is weak.

The remainder of the paper operationalizes this argument by examining how holding fails and how revision rights are contested. The next section focuses on the movement of disputes across arenas, which is a common symptom of weak holding: when a decision does not hold in one arena, actors seek leverage in another.

3. Mechanisms: Dispute Routing Across Arenas and the Production of Recurrence

Renewable deployment rarely unfolds within a single decision arena [21]. Land-use planning, environmental regulation, grid integration, market design, and political oversight are often institutionally distinct, even when they are functionally interdependent. Each arena carries its own standards of proof, temporal rhythms, and legitimacy expectations. As a result, when conflict emerges, actors often route disputes across arenas rather than resolving them within one procedure. This routing is not merely opportunistic; it reflects the rational pursuit of standing and

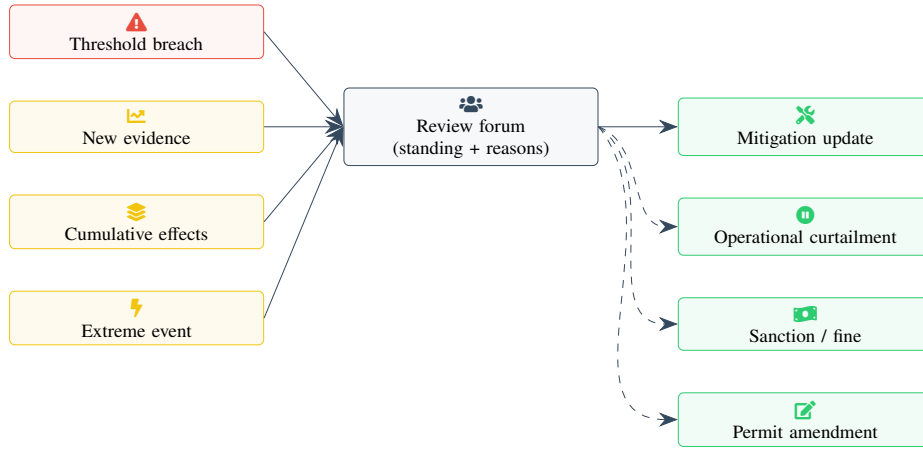


Figure 4 Revision-rights architecture as a bounded trigger–review–response system: defined triggers route into a reason-giving review forum that can select a limited action set (updates, curtailment, sanctions, amendments) to preserve closure while enabling correction.

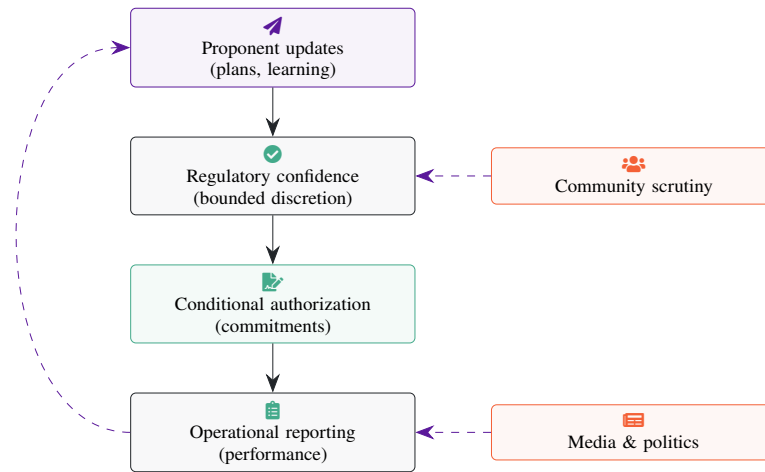


Figure 5 Confidence is produced through repeated interaction: updates and reporting can sustain regulatory confidence, but scrutiny and political attention shape whether confidence is perceived as legitimate unless it is anchored in visible commitments and rule-based review.

leverage within fragmented governance [22].

Dispute routing is one mechanism through which weak holding becomes visible. When affected publics perceive that local planning produces closure without enforceable commitments, they may route disputes to environmental regulators or courts. When developers perceive that environmental conditions are inconsistent or unpredictable, they may route disputes to political arenas or higher-level policy bodies [23]. When regulators face legitimacy pressures and limited enforcement capacity, they may route disputes into procedural domains by demanding more studies or by narrowing scope. Each routing changes the meaning of the dispute because arenas recognize different registers: legal defensibility, ecological protection, system reliability, or political urgency. The dispute therefore mutates as it moves, often increasing polarization because each arena reconstitutes what counts as legitimate evidence.

A dynamic governance perspective helps explain why routing produces recurrence rather than resolution [24]. One empirical illustration is a qualitative study of solar deployment governance that traces how outcomes are shaped through multi-actor negotia-

tion across interconnected arenas, emphasizing that governance evolves through iterative bargaining among ministries, regulators, utilities, developers, environmental organizations, and communities, while navigating trade-offs among grid stability, environmental protection, cost efficiency, and deployment speed [25]. The relevance here is not the sectoral specifics of solar, but the structural insight: in fragmented settings, governance is not a static architecture that implements a policy, but a process that is continually renegotiated as actor relations and constraints shift. In such settings, dispute routing is normal, and holding requires cross-arena translation mechanisms that maintain the interpretability of commitments.

Routing is intensified by cumulative portfolios [26]. As multiple projects are proposed, stakeholders interpret each decision as precedent-setting. Communities may resist early projects because they anticipate cumulative burdens and fear that later correction will be impossible. Developers may push for standardization and predictability to reduce transaction costs across portfolios [27]. Regulators may seek to tighten standards to prevent reputational damage from cumulative controversy.

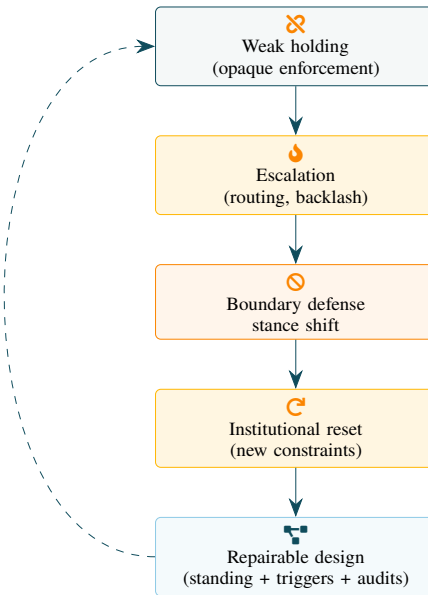


Figure 6 Failure cascade when routine repair is absent: weak holding increases escalation and pushes regulators toward stance-level boundary defense and resets; institutional design for repairable authority aims to replace crisis cycles with predictable review and correction.

Actor	Main concern	Governance fear
Local communities	Long-term impacts, trust	No leverage after approval
Developers	Investment certainty	Endless renegotiation
Regulators	Legitimacy, capacity	Being seen as arbitrary or weak
Grid / system operators	Reliability, integration	Fragmented decisions across arenas
Environmental NGOs	Cumulative ecological harm	Symbolic mitigation and monitoring
Policy makers	Transition pace	Backlash and institutional drift

Table 2 Stakeholder concerns around renewable projects

These dynamics make disputes less about individual projects and more about the perceived reliability of the governance regime. Holding therefore becomes a regime-level property: do actors believe that the system as a whole can correct and enforce, or do they believe that closure is irreversible and enforcement is symbolic?

The interaction of routing and cumulative portfolios also creates feedback loops [28]. If one project produces post-approval disputes due to weak enforcement, communities interpret promises in subsequent projects as unreliable and intensify pre-approval resistance. If one project is delayed by routing through multiple arenas, developers and policy advocates may seek procedural compression to prevent recurrence, which can further undermine trust. Regulators may respond to controversy by tightening interpretations, which can increase uncertainty and provoke more political routing. These feedback loops generate the appearance that renewables are uniquely conflict-prone, when in fact the conflict is produced by governance architectures that are weak at maintaining holding across arenas [29].

Revision rights address routing by providing recognized pathways for contestation and correction within the lifecycle of authorization. When publics believe that monitoring and review can trigger real response, they have less incentive to route disputes into courts as a substitute for standing. When developers believe that revision is bounded and rule-based, they have less incentive to route disputes into political arenas seeking exemptions or central overrides [30]. When regulators can rely on predefined triggers and response ladders, they have less incentive to route disputes into procedural inflation as self-protection. Routing does not disappear, but it becomes less escalatory and less destabilizing.

The next section turns to a central determinant of whether revision rights are credible: how evidence is produced, validated, and contested. Evidence is the medium through which disputes are adjudicated, and evidence systems are increasingly mediated by intermediaries and delegated expertise [31].

Dimension	Operational focus	Example questions
Intelligibility	Clarity of commitments	Who owes what, to whom, and when?
Enforceability	Capacity to act	Can deviations be detected and sanctioned?
Revisability	Structured correction	When can rules be adjusted?
Cross-arena consistency	Translation across forums	Do arenas read the decision the same way?
Perceived fairness	Distributive and procedural	Do affected actors accept the rules?

Table 3 Dimensions of holding in authorization

Arena	Typical trigger	Legitimacy register
Local planning	Land-use conflicts	Local control, place-based claims
Environmental regulation	Impact disputes	Ecological thresholds, precaution
Grid / market design	System effects	Reliability, efficiency, cost
Courts	Procedural or rights claims	Legal defensibility, due process
High-level politics	Salient controversies	National goals, urgency narratives
Media / public debate	Visible conflicts	Reputation, blame, framing

Table 4 Dispute routing across governance arenas

4. Evidence Politics: Delegation, Intermediation, and the Assurance Problem

Holding depends on whether stakeholders trust the observation and response capacity of governance systems. Monitoring data, assessment reports, and compliance audits are the infrastructural basis for post-approval accountability. Yet in contemporary environmental governance, these functions are frequently delegated to private intermediaries. Consultants supervise environmental impact assessments, develop policy-related materials, and conduct compliance monitoring, often under contractual arrangements that are not fully legible to publics [32]. Delegation can expand capacity, but it can also weaken perceived independence and blur responsibility, undermining the credibility of revision rights.

A key issue is that delegated evidence production can create an assurance gap. An assurance gap exists when the governance system produces information but cannot credibly demonstrate that information is independent, contestable, and connected to action. Communities may interpret developer-funded monitoring as biased or filtered [33]. Developers may interpret community-generated claims as strategic and unvalidated. Regulators may lack internal expertise to adjudicate method disputes, relying on intermediary outputs that they cannot fully verify. In such settings, disagreements about impacts become disagreements about the credibility of the system that measures impacts, which is more difficult to settle because it is a dispute about authority itself [34].

An empirical anchor for this mechanism is a qualitative case study of environmental governance privatization that examines how an environmental regulator increasingly delegates key responsibilities, including supervision of impact assessments, policy development, and compliance monitoring, and finds that while privatization can expand regulatory capacity and leverage specialized expertise, it also risks diminishing autonomy, reducing transparency, and creating dependence on private firms, motivating the need for stronger oversight and safeguards [35]. The relevance for renewable deployment is direct: when revision rights rely on monitoring and expert judgment, but the credibility of those expert systems is contested, revision rights become politically fragile. They can be dismissed as symbolic or as captured, increasing incentives for pre-approval resistance and post-approval escalation.

Delegation affects holding through multiple pathways [36]. First, it shapes method choices and baseline definitions, which are central to interpretive closure. Professional templates can stabilize interpretation across cases, but they can also embed assumptions that publics contest, particularly around cumulative effects and nonstationary baselines. Second, it shapes transparency. Private firms may treat certain data and methods as proprietary, limiting contestability [37]. Third, it shapes response. When deviations are detected, responsibility may be diffused across developers, contractors, and regulators, delaying action and reinforcing cynicism. Fourth, it shapes institutional capacity over time [38]. As agencies rely more heavily on

Arrangement	Potential gain	Assurance risk
Developer-funded monitoring	More data, lower cost	Perceived bias in reporting
Consultant-led assessments	Specialized expertise	Method opacity, dependence
Third-party audits	Independent checks	Narrow scope, episodic scrutiny
Citizen science	Local knowledge, trust	Variable methods, uneven coverage
Centralized modelling	System-wide view	Distance from local effects

Table 5 Delegated evidence and assurance gaps

Strategy	Typical user	Effect on holding
Continuous pitching	Developers, innovators	Builds regulator confidence, may sideline others
Framing uncertainty as manageable	Developers, policy makers	Supports approval under change
Promising adaptive management	Multiple actors	Legitimate if linked to real triggers
Relationship building	Developers, agencies	Smooths interaction, can look closed
Selective case comparison	All sides	Shapes baselines and expectations

Table 6 Influence work in regulatory interaction

external expertise, internal capacity to challenge and interpret evidence may decline, increasing dependence and weakening authority.

These dynamics do not imply that delegation is inherently illegitimate. Rather, they indicate that delegation must be governed as a public assurance function rather than as a private service procurement. Public assurance requires clear independence tiers, conflict-of-interest rules, and validation procedures that are visible to affected publics [39]. It also requires that public agencies retain interpretive capacity. Even when measurement is delegated, meaning-making cannot be fully outsourced without undermining authority, because the legitimacy of enforcement depends on the regulator's capacity to justify and defend decisions.

Revision rights are particularly sensitive to the assurance gap because they rely on evidence-triggered review. If stakeholders distrust evidence systems, they will not accept that review triggers are fairly applied [40]. They will suspect selective enforcement or strategic delay. If developers distrust evidence adjudication, they will fear arbitrary tightening. In both cases, the result is decreased holding and increased routing: actors seek arenas where they can contest legitimacy rather than methods [41].

Repairable authority therefore requires institutional investments in assurance. These investments can take multiple forms while remaining compatible with minimal disclosure requirements. They can include independent audits commissioned

through public or pooled mechanisms, standardized disclosure of key assumptions, accessible summaries that connect indicators to commitments, and routine publication of compliance status and response actions. The key is to make the link between observation and response publicly legible, reducing the space for suspicion [42].

The next section moves from evidence production to the political dynamics of regulatory interaction. Even when evidence systems exist, holding depends on how regulators manage uncertainty and confidence, and how actors seek to influence interpretations over time. This influence work is a normal feature of governance, but it can destabilize holding when revision rights are weak or discretionary.

5. Influence Work: Managing Regulatory Confidence Under Uncertainty

Renewable deployment involves sustained interaction between project proponents and regulators, not only at the point of application but throughout planning, approval, and sometimes operation [43]. In these interactions, actors do not merely present facts; they frame feasibility, risk, and acceptability in ways intended to shape regulatory interpretation. Influence work includes persuasion, reassurance, and the strategic demonstration of learning and adaptability. This is not necessarily improper; in uncertain environments, regulators must make judgments, and proponents must show that commitments are credible. However, when influence work substitutes for rule-based revision rights,

Trigger type	Example	Possible responses
Monitoring threshold	Noise or wildlife limits exceeded	Adjust operations, tighten conditions
New evidence	Revised impact science	Update standards, revise permits
Cumulative exceedance	Corridor or basin limits reached	Cap new projects, redesign portfolios
Operational change	Repowering, new turbine layout	Partial reopening, new safeguards
Extreme event	Failure, accident, outage	Incident review, retrofits, sanctions
Legal / policy shift	New climate or biodiversity law	Harmonize existing authorizations

Table 7 Illustrative triggers for revision rights

Symptom	Underlying mechanism	Outcome
Litigation waves	Weak post-approval standing	Conflict shifts to courts
Arena shopping	Fragmented authority	Repeated reopening in new forums
Symbolic monitoring	Delegated but unlinked data	Cynicism about enforcement
Sudden moratoria	Boundary defense by regulators	Uncertainty, portfolio disruption
Discretionary exceptions	Ad hoc political fixes	Perceived unfairness, drift

Table 8 Failure modes when revision rights are weak

governance becomes vulnerable to perceptions of unequal access and narrative dominance [44].

A concrete illustration comes from research on pitching to regulators in the context of wind energy innovation, which describes how entrepreneurs engage in repeated, ongoing pitching to address regulatory uncertainties, provide updates, demonstrate adaptability, and build confidence in long-term viability, thereby sustaining regulatory support in a shifting environment [45]. The relevance for a social theory of holding is that confidence is not a static attribute; it is produced through repeated interaction. When regulators accept that projects can adapt and comply over time, they may be more willing to authorize under uncertainty [46]. Yet if the mechanisms that maintain confidence are primarily relational and discretionary rather than institutionalized as review triggers and response ladders, confidence becomes fragile and contested, especially by actors who lack comparable access to influence channels.

Influence work affects interpretive closure because it shapes how regulators interpret sufficiency. A proponent may frame a mitigation plan as robust by emphasizing adaptability and future improvements. Opponents may frame the same plan as deferral by emphasizing that future improvements are unenforceable [47]. Regulators may be sympathetic to adaptability narratives when institutional mandates emphasize innovation and urgency. However, adaptability narratives strengthen holding only when

they are translated into enforceable commitments with defined review conditions. Otherwise, adaptability becomes a promise without a pathway, increasing cynicism.

Influence work also affects procedural dynamics [48]. Regulators who feel reassured by ongoing engagement may be more willing to permit staged decisions, deferring some details to post-approval periods. This can accelerate procedural closure, but it heightens the importance of revision rights because deferred details will later become sites of dispute. If standing after approval is weak, deferral can provoke resistance because stakeholders anticipate that decisions are effectively being made outside public scrutiny [49]. Conversely, if standing after approval is credible, deferral can be legitimate because stakeholders have pathways to contest and correct.

A central equity concern is that influence capacity is uneven. Well-resourced developers can attend repeated meetings, produce polished materials, and sustain continuous engagement. Communities and smaller organizations may lack the capacity to participate similarly, particularly when participation is unpaid and time-intensive [50]. If regulatory confidence is built primarily through sustained pitching by proponents, the governance system risks privileging those with greater resources, undermining relational legitimacy. Revision rights can mitigate this by reducing the dependence of confidence on private access and by making confidence conditional on observable compliance and

Design element	Brief description	Expected effect
Standing after approval	Defined rights to trigger review	Less front-loaded resistance
Routine review cycles	Scheduled check-ins on conditions	Visible correction without crisis
Response ladders	Predefined action steps	Less arbitrariness, clearer signals
Independent assurance	Oversight of delegated evidence	Higher trust in monitoring
Portfolio-level oversight	Cumulative and corridor tools	Better management of aggregate harm
Bounded revision scope	Clear limits on what can change	Maintains predictability for investors

Table 9 Design features of repairable authority

enforceable triggers rather than on relationship maintenance.

Influence work also reshapes institutional learning. In some cases, regulators learn from proponents about new mitigation techniques, and proponents learn from regulators about emerging expectations [51]. This mutual learning can be productive and can support adaptation under nonstationary conditions. Yet learning becomes politically contentious when it occurs through opaque channels and results in shifting interpretations that publics experience as inconsistency. Repairable authority requires that learning be formalized into public guidance and reason-giving, so that interpretive change is traceable rather than arbitrary [52].

Finally, influence work interacts with the politics of urgency. Under pressure to accelerate deployment, regulators may become more receptive to narratives of adaptability and future correction. This can be a rational stance, but it depends on the existence of credible correction mechanisms. Without revision rights, urgency-driven authorization can become brittle, provoking backlash when communities perceive that uncertainty is being offloaded onto them without recourse [53]. With revision rights, urgency-driven authorization can be more durable because correction is governable.

The next section examines what happens when repairable authority fails and regulators respond through boundary defense and institutional reversals. Such reversals provide insight into the conditions under which holding breaks down and the forms of repair that become politically available.

6. Institutional Reversals and Boundary Defense: When Repair Becomes a Stance

When governance systems struggle to maintain holding, regulators may shift from attempting to manage projects through conditions and monitoring to adopting stronger stances, including categorical opposition, moratoria, or calls for cessation in certain domains [54]. Such stances can be interpreted as principled ecological protection, as strategic boundary defense, or as both. For a theory of revision rights, these reversals are significant because they illustrate what happens when routine

repair mechanisms are insufficient to restore legitimacy and enforceability.

An empirical illustration is a qualitative case study of an environmental regulator's stance on wind energy that traces how the regulator's position evolved through interactions with other ministries, developers, environmental organizations, and local communities, culminating in an unprecedented stance advocating cessation of wind projects due to significant environmental harm, while also functioning as a strategic maneuver to reinforce regulatory authority under constrained influence, with wind promotion continuing under heightened scrutiny and assessment demands

Boundary defense occurs when an institution acts to protect its authority and mission in the face of perceived encroachment or erosion. In renewable deployment, boundary defense can be triggered by repeated enforcement challenges, by public accusations of capture, or by cumulative ecological controversies that make incremental conditioning appear inadequate. When an environmental regulator perceives that its ability to enforce is limited and that its credibility is at risk, it may adopt a stronger interpretive position to regain leverage [55]. This can include demanding more stringent assessments, narrowing acceptable siting conditions, or opposing project categories.

From the perspective of repairable authority, boundary defense is a form of repair, but it is a repair at the level of stance rather than at the level of routine procedure. It attempts to repair legitimacy by shifting the acceptable balance between clean-energy benefits and ecological protection. However, stance repair can have destabilizing effects on holding because it increases uncertainty for developers and may provoke political backlash [56]. It can also shift disputes into higher-level arenas, intensifying routing and potentially leading to central overrides. In other words, stance repair can restore legitimacy in one domain while destabilizing it in another.

Revision rights provide an alternative to stance repair by making correction routine and enforceable before legitimacy collapses. When monitoring and enforcement are visible, when standing after approval is credible, and when revision triggers are defined, regulators can act decisively on deviations without

needing to adopt categorical stances [57]. Communities can see that the system corrects, reducing the demand for total prohibition. Developers can see that correction is rule-bound, reducing the fear of abrupt reversals. Regulators can maintain authority through consistent enforcement rather than through episodic hardening [58].

Institutional reversals also clarify the relationship between cumulative harm and governability. In portfolios where cumulative ecological impacts are salient, project-by-project conditions may not address corridor-level effects. Regulators may then perceive that the system lacks tools to govern cumulative outcomes and respond by tightening or opposing. Repairable authority therefore requires portfolio-level revision rights, not only project-level ones [59]. Portfolio-level rights can include corridor monitoring, cumulative thresholds, and coordinated review forums that allocate responsibility for aggregate outcomes. Without these, regulators may be forced into stance repair because incremental conditioning cannot credibly manage cumulative effects.

Finally, stance repair interacts with narratives of urgency and adaptation. When renewable projects are justified through broad societal claims, such as resilience and security, categorical opposition can be framed as irresponsibility or obstruction, intensifying political conflict [60]. This dynamic underscores the need for governance designs that translate broad narratives into accountable commitments. When commitments are clear and enforceable, disputes can be about whether commitments are met rather than about whether an entire technology category is acceptable. In this way, revision rights reduce the probability that debates become existential and polarized [61].

7. Conclusion

This paper has argued that the central governance challenge in many renewable deployments is not simply reaching approval, but ensuring that decisions hold across long lifecycles under uncertainty, cumulative effects, and nonstationary baselines. It developed a social science theory of repairable authority, centered on revision rights as the institutional pathways through which commitments can be reopened, adjusted, and enforced without undermining either democratic legitimacy or investment predictability. The analysis distinguished closure as an administrative event from holding as a lifecycle property of authorization, and it explained why weak post-approval standing and weak evidence assurance systems intensify front-loaded conflict and post-approval recurrence.

The implications are not that participation should be eliminated or that regulators should avoid precaution [62]. Rather, the implication is that durable acceleration requires governance capacities that make correction routine and enforceable. Revision rights require standing after approval, monitoring linked to response ladders, bounded but contestable transparency, independent validation of delegated evidence systems, and portfolio-level mechanisms for cumulative governance. Such capacities also help align broad policy narratives with operational commitments, reducing the gap between mitigation-centered implementation and wider claims about resilience and adaptation that can otherwise undermine trust [5]. By building repairable

authority, institutions can reduce crisis cycles and enable renewable transitions that proceed under uncertainty while remaining accountable, contestable, and socially durable [63].

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References

- [1] B. Kong, "Governing china's energy in the context of global governance," *Global Policy*, vol. 2, pp. 51–65, 9 2011.
- [2] D. Wu, C.-C. Lu, P.-Y. Tang, M.-L. Wang, and A.-C. Yang, "A resampling slack-based energy efficiency analysis: Application in the g20 economies," *Energies*, vol. 15, pp. 67–67, 12 2021.
- [3] M. M. Naseer, A. I. Hunjra, A. Palma, and tanveer bagh, "Sustainable development goals and environmental performance: Exploring the contribution of energy, governance, and growth," 1 2024.
- [4] Q. Xiang, "The influence of the russia-ukraine conflict on international energy trade and its enlightenment on china," *BCP Business & Management*, vol. 29, pp. 37–41, 10 2022.
- [5] A. Eitan, "Climate change adaptation through renewable energy: The cases of australia, canada, and the united kingdom," *Environments*, vol. 11, no. 9, p. 199, 2024.
- [6] A. N. Stulberg, *Triangular Diplomacy and Europe's Changing Gas Network: From "Trying-Angles" to Stable Marriage*, pp. 189–216. Springer International Publishing, 9 2017.
- [7] A. Acharya and L. A. Cave, "Feed-in-tariff removal in uk's community energy: Analysis and recommendations for business practices," *Journal of Sustainable Development*, vol. 13, pp. 1–, 7 2020.
- [8] M. A. Heldeweg, M. Sanders, and M. Harmsen, "Public-private or private-private energy partnerships? toward good energy governance in regional and local green gas projects," *Energy, Sustainability and Society*, vol. 5, pp. 9–, 3 2015.
- [9] A. N. Asthana and N. Charan, "Curricular infusion in technology management education programmes," *Journal of Data Acquisition and Processing*, vol. 38, no. 3, p. 3522, 2023.
- [10] F. Hualupmomi, "An analysis of how political governance of liquid fuels contributes to energy security in papua new guinea," 1 2019.
- [11] D. Grinlinton, "Energy, governance and sustainability," *Journal of Energy & Natural Resources Law*, vol. 35, pp. 349–354, 12 2016.

- [12] A. B. Stambouli, Z. Khat, S. Flazi, H. Tanemoto, M. Nakajima, H. Isoda, F. Yokoyama, S. Hannachi, K. Kurokawa, M. Shimizu, and H. Koinuma, "Trends and challenges of sustainable energy and water research in north africa: Sahara solar breeder concerns at the intersection of energy/water," *RE&PQJ*, vol. 12, pp. 1–8, 1 2024.
- [13] M. Mason, *Conclusion: Towards a Renewable Energy Transition in the Middle East and North Africa?*, pp. 219–235. United States: Springer Netherlands, 7 2009.
- [14] N. Pamuk, "Vulnerability analysis of multiple critical fault outages and adaptive under voltage load shedding scenarios in marmara region electrical power grid," *International Journal of Intelligent Systems and Applications in Engineering*, vol. 1, pp. 29–38, 3 2017.
- [15] A. Prontera and R. Quitzow, "The eu as catalytic state? rethinking european climate and energy governance," *New Political Economy*, vol. 27, pp. 517–531, 10 2021.
- [16] M. G. Gebreslassie, *The Role of Community Energy and the Challenges in a State-Led Model of Service Provision in Ethiopia*, pp. 147–169. Springer Nature Switzerland, 5 2024.
- [17] F. Rotondo, F. Abastante, G. Cotella, and I. M. Lami, "Questioning low-carbon transition governance: A comparative analysis of european case studies," *Sustainability*, vol. 12, pp. 10460–, 12 2020.
- [18] M. L. Bassani, "Global energy governance through inter-governmental organizations: Analysis of the feasibility of implementation," *PANORAMA OF BRAZILIAN LAW*, vol. 5, pp. 258–278, 6 2018.
- [19] R. C. Austral, "EdiÇão completa (v. 7 | n. 8 | out.nov 2016)," *Conjuntura Austral*, vol. 7, 12 2016.
- [20] J. Chilvers and H. Pallett, "Energy democracies and publics in the making: A relational agenda for research and practice," *Frontiers in Communication*, vol. 3, pp. 14–, 4 2018.
- [21] I. Budiman, "The complexity of barriers to biogas digester dissemination in indonesia: challenges for agriculture waste management," *Journal of Material Cycles and Waste Management*, vol. 23, pp. 1918–1929, 7 2021.
- [22] E. J. M. Sahid, T. C. Sin, and G. C. Hock, "Energy security in asean region: Its challenges," *IOP Conference Series: Earth and Environmental Science*, vol. 268, pp. 012168–, 6 2019.
- [23] D. A. Permatasari and N. Lazuardy, "Indonesia multilateral cooperation in enhancing energy sustainability through g20 forum," *SSRN Electronic Journal*, 1 2019.
- [24] T. Forsyth, "Energy, governance and security in thailand and myanmar (burma): a critical approach to environmental politics in the south," *Environmental Politics*, vol. 24, pp. 169–171, 11 2014.
- [25] A. Eitan, "Negotiating the energy transition: Governance trade-offs in solar deployment," *Energy Strategy Reviews*, vol. 61, p. 101854, 2025.
- [26] S. Roehrkasten, *Global Governance on Renewable Energy - Global Governance on Renewable Energy*. Springer Fachmedien Wiesbaden, 6 2015.
- [27] M. Wolfram, "Learning urban energy governance for system innovation: an assessment of transformative capacity development in three south korean cities," *Journal of Environmental Policy & Planning*, vol. 21, pp. 30–45, 8 2018.
- [28] A. Ayyoob and A. Sajeev, *Decentralized Energy Systems and Just Transition*, pp. 97–122. IGI Global Scientific Publishing, 9 2025.
- [29] S. G. Pueppke, "Ancient wef: Water–energy–food nexus in the distant past," *Water*, vol. 13, pp. 925–, 3 2021.
- [30] A. Fronteddu, "From extractivism to community resilience: the promise and perils of sardinia's energy transition," 7 2023.
- [31] A. Jabbar, J. Yuan, S. Idris, M. Inshal, W. Wang, and T. Mahmood, "Causal sentiment-driven reinforcement learning framework for adaptive solar energy policy design," 7 2025.
- [32] M. K. Pasupuleti, "Energy innovations: Sustainable power solutions," *International Journal of Academic and Industrial Research Innovations(IJAIRI)*, vol. 4, pp. 1–14, 4 2024.
- [33] K. Bouw, C. J. Wiekens, C. Tigchelaar, and A. Faaij, "Involving citizens in heat planning: A participatory process design for informed decision-making," *Sustainability*, vol. 15, pp. 1937–1937, 1 2023.
- [34] A. H. Syadzily, "Closing remarks of the governor of the national resilience institute of the republic of indonesia at the jakarta geopolitical forum ix 2025:," *Proceeding Jakarta Geopolitical Forum*, vol. 9, pp. 136–137, 6 2025.
- [35] A. Eitan, "Privatizing environmental governance: the evolving relationship between regulators and private entities," *Journal of Environmental Policy & Planning*, pp. 1–27, 2025.
- [36] M. Alam, "Can fiscal decentralization degrade the urbanized environment?," in *International Conference on Topical Issues of International Political Geography*, pp. 527–546, Springer, 2022.
- [37] A. Sabban, *Innovation in Global Green Technologies 2020*. IntechOpen, 6 2020.
- [38] J. Pitt and C. Nolden, "Post-subsidy solar pv business models to tackle fuel poverty in multi-occupancy social housing," *Energies*, vol. 13, pp. 4852–, 9 2020.

- [39] T. Grobelski, "Changing the coal status quo through scalar practices: The anti-smog movement's contributions to polish energy transition," *Environment and Planning C: Politics and Space*, vol. 43, pp. 1369–1390, 3 2025.
- [40] H. J. Wiseman, *Energy Governance Models*, pp. 41–64. De Gruyter, 5 2023.
- [41] G. C.-F. Chen and C. Lees, "Growing china's renewables sector: a developmental state approach," *New Political Economy*, vol. 21, pp. 574–586, 5 2016.
- [42] J. Nyangon, *Handbook of Smart Cities - Smart Energy Frameworks for Smart Cities: The Need for Polycentrism*, pp. 1–32. Springer International Publishing, 2 2020.
- [43] V. Shebanin, O. Shebanina, I. Kormyshkina, G. Reshetilov, and I. Kormyshkin, "Development of monitoring and evaluation mechanisms for the efficiency of the management system for the comprehensive recovery of territorial communities," *Scientific Bulletin of Mukachevo State University. Series "Economics"*, vol. 11, pp. 147–159, 11 2024.
- [44] S. Hameiri and L. W. Jones, "Probing the links between political economy and non-traditional security: Themes, approaches and instruments," *International Politics*, vol. 52, pp. 371–388, 3 2015.
- [45] A. Eitan and I. Fischhendler, "Shaping niche innovations in energy transitions: The role of pitching to regulators," *Energy Research & Social Science*, vol. 126, p. 104170, 2025.
- [46] T. Moss, *Historicising Accountability: Berlin's Energy Transitions*, pp. 41–52. Springer International Publishing, 10 2019.
- [47] M. F. Rabbi, J. Popp, D. Máté, and S. Kovács, "Energy security and energy transition to achieve carbon neutrality," *Energies*, vol. 15, pp. 8126–8126, 10 2022.
- [48] S. Ziaja, "Role of knowledge networks and boundary organizations in coproduction: A short history of a decision-support tool and model for adapting multiuse reservoir and water-energy governance to climate change in california," *Weather, Climate, and Society*, vol. 11, pp. 823–849, 9 2019.
- [49] M. Alam, "Environmental activists' hysteresis as a driving force for establishing environmental actions against urban forest privatization in bandung, indonesia," *International Sociology*, vol. 36, no. 6, pp. 801–818, 2021.
- [50] F. Ghalebzade, H. Molatefi, R. Zahedi, and S. Daneshgar, "Analyzing operational dynamics: Centralized load distribution and suspended wagons in self-propelled trains," *Advanced Control for Applications*, vol. 6, 10 2024.
- [51] D. Gritsenko, *Energy development in the Arctic: resource colonialism revisited*, pp. 172–184. Edward Elgar Publishing, 1 2018.
- [52] A. Melin, R. Day, and K. Jenkins, "Energy justice and the capability approach—introduction to the special issue," *Journal of Human Development and Capabilities*, vol. 22, pp. 185–196, 4 2021.
- [53] H. Koga, S. Bouzarovski, and S. Petrova, "Energy democratisation through agrivoltaics? the territorialisation dynamics of community-based energy governance in japan," *Sustainability Science*, vol. 20, pp. 1361–1377, 3 2025.
- [54] M. P. Devi, M. D. Choudhry, G. B. Raja, and T. Sathya, *A Roadmap Towards Robust IoT-Enabled Cyber-Physical Systems in Cyber Industrial 4.0*, pp. 293–313. Apple Academic Press, 3 2022.
- [55] A. Benz, *Transformation of a policy regime: energy and climate policy*. Edward Elgar Publishing, 11 2021.
- [56] L. Irajifar, H. Chen, A. Lak, A. Sharifi, and A. Cheshmehzangi, "The nexus between digitalization and sustainability: A scientometrics analysis.," *Heliyon*, vol. 9, pp. e15172–e15172, 4 2023.
- [57] V. Ferreros, F. O. Vescovi, S. E. Baer, and A. M. Mai, *Climate Self-Governance*, pp. 399–422. Emerald Publishing Limited, 5 2024.
- [58] A. U. o'g'li Nishonov, "Nuclear governance assessing effectiveness and enhancing international cooperation," *Indonesian Journal of Innovation Studies*, vol. 25, 4 2024.
- [59] A. Ciarreta and E. Ahmadov, "Sustainability on energy governance: Recent trends of the electricity sector in azerbaijan," *Economics World*, vol. 7, 2 2019.
- [60] *Preface*, pp. vii–xii. Columbia University Press, 12 2018.
- [61] A. Asthana, "Water: Perspectives, issues, concerns.," 2003.
- [62] J. Bain and N. Chaban, "An emerging eu strategic narrative? twitter communication during the eu's sustainable energy week," *Comparative European Politics*, vol. 15, pp. 135–155, 2 2017.
- [63] Y. yu Lu, B. Cao, Y. Hua, and L. Ding, "Efficiency measurement of green regional development and its influencing factors: An improved data envelopment analysis framework," *Sustainability*, vol. 12, pp. 4361–, 5 2020.