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Energy Justice, Sustainability, and Local Climate Action Planning: A Case Study from Türkiye

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Abstract

This study examines the extent to which energy justice principles are incorporated into local climate governance across six Turkish coastal metropolitan municipalities: Istanbul, Bursa, Kocaeli, Izmir, Antalya, and Trabzon. Using a mixed-methods design that combines qualitative policy analysis with a purpose-built Energy Justice Index (EJI), the study evaluates distributive, procedural, and recognition justice provisions within Climate Action Plans (CAPs) and Sustainable Energy and Climate Action Plans (SECAPs). The findings indicate that local climate planning in Türkiye remains predominantly focused on technical and emissions-oriented objectives, offering comparatively limited attention to democratic participation and the needs of vulnerable populations. Quantitatively, the municipalities exhibit a low mean EJI score of 30.2 out of 100 and a mean Technocracy Gap of 15.7 points, alongside a universal absence of monitoring mechanisms for vulnerable groups ($R3 = 0$ across all cases). Procedural justice emerged as the weakest dimension, while recognition justice was frequently limited to identifying vulnerable groups without corresponding monitoring. The study contributes to energy justice scholarship by developing a municipal-level assessment framework and introducing the Technocracy Gap as an exploratory indicator of the balance between technical climate ambition and justice-oriented governance provisions. It further proposes a rights-based governance approach for more just local climate planning.

Keywords: energy justice; sustainability; climate change; local climate action planning; just transition

1. Introduction

The global energy transition is not merely a technical challenge; it is a profoundly political one. Decisions about who bears the costs of decarbonization, who participates in shaping energy futures, and whose identities and vulnerabilities are recognized in policy design are fundamentally questions of justice and power [1,2]. The theoretical field of energy justice has emerged precisely to address these questions, offering a normative and analytical framework that challenges the technocratic assumptions embedded in mainstream climate governance [3].

Energy justice serves as a critical framework for addressing inequities within the global energy system and climate governance. Rooted in three core principles—distributive justice, procedural justice, and recognition justice—energy justice scholarship draws on a rich tradition of political philosophy, from Rawlsian theories of fair distribution to Fraser’s tripartite model of social justice and Young’s critique of the politics of difference [4–6]. This multidisciplinary field insists that energy transitions are sites of political contestation in which questions of rights, power, and democratic accountability are central [7].



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The “just transition” framework expands these theories by ensuring that the shift to a low-carbon economy does not exacerbate existing social inequalities. This requires moving beyond “technocratic monitoring” toward an approach that treats energy as a fundamental human right [8]. Currently, the global system faces dual crises: energy vulnerability exacerbated by geopolitical instability, and environmental injustice, wherein climate change disproportionately impacts those least responsible for its causes.

Local governments occupy a uniquely important position in this landscape. As the primary managers of urban infrastructure that includes transportation networks, building codes, and public spaces, municipalities represent both the front line of climate impact and the most proximate level of democratic governance [9,10]. Yet local climate action planning in many countries, including Türkiye, has frequently emphasized measurable emissions reductions and technical performance indicators, often providing comparatively little attention to questions of equity, participation and recognition [11,12].

The sustainability paradigm, defined by the United Nations Sustainable Development Goals (SDGs) for 2030 [13], provides the overarching framework for these justice considerations. SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) are particularly relevant in the Turkish context. SDG7 explicitly addresses ensuring access to affordable, reliable, and clean energy. Despite global progress—with electricity access reaching almost 92% of the world’s population in 2023—wide disparities remain, leaving over 666 million people without electricity, although around 310 million people have gained access since 2015 [14,15]. In Türkiye, the challenge has evolved; while grid access is nearly universal, the focus has shifted toward *energy poverty* [16]. According to Eurostat data, 19.5% of households in Türkiye were unable to keep their homes adequately warm in 2023, highlighting the ongoing struggle of households to afford basic energy services [17]. Furthermore, the integration of sustainable energy planning in emerging regions often faces severe technical and spatial constraints. The recent literature highlighting renewable energy assessments in developing contexts—such as wind power generation potential in South Asia [18]—demonstrates that the complex technical requirements of energy transitions often force governments to adopt highly centralized, technocratic governance models, inadvertently marginalizing local social contexts. Recent interdisciplinary scholarship on renewable energy governance further emphasizes that the sustainable energy transition is a deeply socio-spatial process requiring democratic oversight; integrating these perspectives into local climate action planning ensures that municipal transitions actively foster local ownership rather than bypassing marginalized communities [19,20].

To ensure these democratic and socio-spatial perspectives are actually implemented, recent scholarship has increasingly sought to operationalize energy justice through quantitative and mixed-methods assessment frameworks [2,21]. However, most existing indices focus on national energy systems, energy poverty, or broad sustainability indicators, providing limited insight into how justice principles are institutionalized within municipal climate planning. This study addresses that gap by developing a localized Energy Justice Index (EJI) capable of assessing distributive, procedural, and recognition justice within municipal Climate Action Plans (CAPs) and Sustainable Energy and Climate Action Plans (SECAPs).

Translating these global goals into national results, Türkiye’s climate policy (Türkiye’s updated Nationally Determined Contribution (NDC) targets a 41% reduction in greenhouse gas emissions by 2030 and supports the country’s long-term net-zero objective for 2053 [22]) is steered by the Climate Change Mitigation Strategy and Action Plan (CCM-SAP) 2024–2030 [23], which targets a 41% reduction in greenhouse gas emissions by 2030. However, the burden of implementation increasingly falls on municipalities, particularly in coastal regions vulnerable to rising sea levels.

This study examines how energy justice principles are integrated into the local Climate Action Plans (CAPs) and Sustainable Energy and Climate Action Plans (SECAPs) of six Turkish coastal metropolitan municipalities: Istanbul, Bursa, Kocaeli, Izmir, Antalya, and Trabzon. Employing a mixed-methods design—qualitative policy analysis combined with a purpose-built Energy Justice Index (EJI) we identify systematic patterns of omission and propose a rights-based framework for more just local climate governance.

This study seeks to advance the discourse on climate governance by achieving three integrated objectives: (1) Theoretical scaling to deepen the application of energy justice theory by scaling it down to the level of local governance, thereby bridging the gap between global normative ideals and municipal realities; (2) Empirical expansion to provide original comparative empirical evidence from an emerging economy context (Türkiye), offering a vital perspective that addresses the underrepresentation of non-Western cases in the energy justice literature; and (3) Institutional reform to examine the implications of technocratic planning cultures through a rights-based framework and identify pathways for more inclusive local climate governance.

2. Energy Justice and Political Theory

2.1. *The Three-Pillar Framework and Its Political Foundations*

The three-pillar framework of energy justice—distributive, procedural, and recognition justice—provides the analytical backbone of this study. While these pillars are well established in the energy justice literature [1–3], their deeper roots in political theory deserve explicit engagement, as this grounding is essential for understanding what a genuinely just energy transition requires at the institutional level.

Distributive justice concerns the fair allocation of climate-related benefits and burdens across society. Drawing on Rawls [4], energy justice scholars emphasize that climate policies should not disproportionately disadvantage already vulnerable populations. Within local climate governance, distributive justice therefore focuses on how mitigation and adaptation measures affect access to energy services, affordability, and climate resilience [2,24].

Procedural justice emphasizes meaningful participation in decision-making processes. Building on deliberative democratic theory [6,25], energy justice scholarship argues that affected communities should have opportunities to influence climate policy design, implementation, and evaluation. Procedural justice therefore extends beyond consultation to include co-production, accountability, and responsiveness [26,27].

Recognition justice focuses on the visibility and inclusion of marginalized populations within governance processes. Drawing primarily on Fraser [5,28], recognition justice requires that climate policies acknowledge the distinct vulnerabilities experienced by different social groups and incorporate mechanisms to address those vulnerabilities. In local climate governance, recognition therefore involves both identifying vulnerable populations [29] and ensuring that their needs are reflected in policy commitments and monitoring systems [15,30].

Together, these three pillars constitute a comprehensive political theory of energy justice that moves beyond technocratic efficiency metrics. They demand that local climate governance be evaluated not only by its emission reduction targets but also by its democratic quality, distributional consequences, and capacity to recognize and respond to social differences.

2.2. *Energy Justice and the Critique of Technocracy*

A central argument of this study is that dominant approaches to local climate action planning in Türkiye frequently exhibit technocratic characteristics that may limit the integration of energy justice principles, particularly procedural and recognition dimensions. Tech-

nocracy, in its classical formulation, displaces political decisions with technical expertise, reframing complex social questions as problems with optimal technical solutions [31,32]. In climate governance, this manifests as a focus on quantifiable targets—greenhouse gas inventories, renewable energy percentages, energy efficiency ratings—at the expense of questions about who benefits, who participates, and whose needs are recognized.

This technocratic bias is not politically neutral. As Swyngedouw [33] argues, the ‘post-political’ framing of climate change as a technical management problem actively depoliticizes the energy transition, foreclosing democratic contestation over the distribution of costs and benefits. Sovacool et al. [7] demonstrate that technocratic approaches systematically undervalue social and political dimensions, producing outcomes that are technically efficient but socially unjust. Newell and Mulvaney [34] show that ‘just transition’ frameworks are frequently co-opted by technocratic actors who strip them of redistributive content, while Pellizzoni [35] reveals that participatory mechanisms in environmental governance are often performative rather than substantive.

In the Turkish context, this technocratic bias is reinforced by institutional structures that concentrate planning authority in central government agencies, limit civil society engagement, and prioritize economic competitiveness over equity [11]. The result is a planning culture in which CAPs are produced as technical documents with limited public engagement, and in which justice considerations are treated as secondary to emission reduction targets.

2.3. Energy Justice, the Just Transition, and Local Governance

The concept of the ‘just transition’ provides a bridge between energy justice theory and local governance practice. Originally developed by labor unions to address the economic displacement of fossil fuel workers, the just transition framework has evolved into a broader political demand for a low-carbon transformation that is equitable, democratic, and rights-based [34,36]. At the local level, a just transition requires municipalities to go beyond emission reduction targets and actively address the distributional, procedural, and recognition dimensions of the energy transition.

The Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy) and SDG 11 (Sustainable Cities and Communities), provide a global normative framework that supports this rights-based approach. However, as Fukuda-Parr and McNeill [37] and Scobie [38] note, the SDG framework is itself vulnerable to technocratic capture, with its quantitative indicator system potentially reducing complex justice questions to measurable metrics. Effective local implementation therefore requires active political engagement with the justice dimensions of sustainability, not merely the tracking of technical indicators.

2.4. Energy Justice and Sustainability in Türkiye

2.4.1. Energy Vulnerabilities and Environmental Injustice

Türkiye presents a compelling case for energy justice analysis. As a rapidly urbanizing upper-middle-income country with significant fossil fuel dependence, growing renewable energy capacity, and deep regional inequalities, it embodies many of the tensions that characterize energy transitions in emerging economies. At the national level, Türkiye’s energy system is characterized by high import dependence—approximately 70% of primary energy is imported—and a coal sector that remains politically and economically significant despite its environmental costs [39]. The country’s Climate Change Mitigation Strategy and Action Plan (CCMSAP 2024–2030) [23] commits to net-zero emissions by 2053 and includes provisions for renewable energy expansion and energy efficiency improvements. However, critics have noted that the plan’s social and equity dimensions remain underdeveloped,

with limited attention to the distributional impacts of the energy transition on low-income households, coal-dependent communities, and other vulnerable groups [11].

At the urban level, air quality represents one of the most visible manifestations of environmental injustice: in 2018, 96.3% of Turkish air quality monitoring stations reported PM10 levels exceeding WHO guidelines [40,41]. Urban residents—particularly those in lower-income neighborhoods near industrial zones or coal-fired heating areas—bear a disproportionate burden of this pollution, illustrating the distributive injustice embedded in current energy and urban planning practices. Energy poverty compounds this picture: approximately 19% of Turkish households report difficulty in adequately heating their homes, with rates significantly higher among low-income, elderly, and rural populations [17]—a recognition injustice, as energy-poor households are rarely visible in municipal planning documents.

2.4.2. Local Climate Governance in Türkiye

Turkish metropolitan municipalities have increasingly engaged with climate action planning over the past decade, driven by international frameworks such as the Covenant of Mayors, the C40 Cities network, and the ICLEI Local Governments for Sustainability program. As of 2025, several major municipalities have adopted CAPs or SECAPs that set emission reduction targets and outline sectoral strategies for mitigation and adaptation.

However, this planning activity has developed largely within the technocratic paradigm described in Section 2.2. Municipal CAPs are typically produced by technical departments—often with support from international consultants—and are structured around quantitative emission inventories, sectoral action tables, and monitoring indicators. Public participation is generally limited to formal consultation events that do not provide meaningful opportunities for community input to shape plan content. Social equity considerations, where present, are typically addressed in brief sections on ‘vulnerable groups’ that lack specific policy commitments or monitoring mechanisms. This pattern reflects broader institutional constraints on local democracy in Türkiye, including the centralization of fiscal and regulatory authority at the national level and the absence of legal requirements for participatory planning in the climate action domain [11].

3. Materials and Methods

3.1. Study Area and Case Selection

This study employs a mixed-methods design combining qualitative policy analysis with a purpose-built quantitative scoring instrument. The empirical base comprises CAPs and SECAPs from six Turkish metropolitan municipalities: Istanbul, Bursa, Kocaeli, Izmir, Antalya, and Trabzon. These cities were selected to represent the diverse socio-economic, climatic, and governance characteristics of Türkiye’s four main coastal regions: the Marmara Sea (Istanbul, Bursa, Kocaeli), the Aegean (Izmir), the Mediterranean (Antalya), and the Black Sea (Trabzon). Together, these cities account for approximately 35% of Türkiye’s total population and a significant share of national GHG emissions, making them critical sites for climate action.

Rather than random sampling, this study employed purposive, criterion-based sampling to select six metropolitan municipalities. Criteria included metropolitan status, coastal vulnerability, and the public availability of an established CAP/SECAP. These six cities capture Türkiye’s diverse regional geographies—from the heavily industrialized Marmara region (Kocaeli, Bursa) to tourism-dependent Mediterranean hubs (Antalya)—allowing for an analysis of how different regional economic pressures intersect with climate planning. While the findings are not statistically generalizable to all Turkish municipalities, they provide a diagnostic assessment of early-adopting, high-capacity urban centers.

Consequently, the study focuses on early-adopting metropolitan municipalities that have established and publicly accessible climate frameworks. The geographical distribution of these regions and the specific cities selected for this climate initiative—representing a diverse cross-section of the Turkish coastline—are illustrated in Figure 1. (Coastal vulnerability was a key case-selection criterion because sea-level rise, storm surges, and coastal flooding are projected to increase climate risks for Turkish coastal settlements ([42], p.6).)



Figure 1. Study area (six selected cities) (Map of Türkiye). Source: Author’s compilation using Google Maps. (Google LLC, Mountain View, CA, USA). Available online: <https://www.google.com/maps> (accessed on 25 December 2025).

3.2. Qualitative Analytical Framework—The Energy Justice Scorecard

The research database was constructed from official municipal CAP and SECAP documents, supplemented by municipal website content and national policy documents including the CCMSAP 2024–2030 [23]. All document analyses and policy scoring were conducted manually by the authors. Data compilation, index calculations, and sensitivity analyses were performed using Microsoft Excel for Mac (Version 16.30, Microsoft Corporation, Redmond, WA, USA), following the methodological guidelines for composite indicator construction established by the OECD Handbook on Constructing Composite Indicators [43].

Documents were analyzed using a purpose-built Energy Justice Scorecard that operationalizes the three-pillar framework across three sustainability dimensions: (i) economic objectives—emission reduction targets, renewable energy adoption, energy efficiency measures, green job creation, and economic resilience strategies; (ii) social objectives—distributive equity provisions, recognition of vulnerable groups, procedural participation mechanisms, public health protections, and community engagement frameworks; and (iii) environmental objectives—waste management strategies, biodiversity provisions, air and water quality measures, and agricultural-forestry integration. Each dimension was assessed against a four-level rubric: Absent (0), Nominal (1), Partial (2), and Substantive (3), drawing on established frameworks for qualitative policy evaluation [12,44].

To ensure transparency, the scoring process was guided by a detailed coding protocol (provided in Appendix A), which includes explicit anchor definitions (0–3) and textual examples to minimize subjectivity. As a limitation of this study, the document analysis was conducted by a single coder; however, to enhance consistency, all documents were independently re-coded by the same researcher after a four-week interval, and discrepancies were reviewed and reconciled. Furthermore, document analysis captures formal institutional discourse rather than enacted governance practices; therefore, the findings

should be interpreted as an assessment of municipal planning frameworks rather than a definitive measure of implementation outcomes.

The complete coding rubric, illustrative coding examples, and sensitivity analysis results are provided in Appendices A–C.

3.3. Quantitative Framework—Development and Justification of the Energy Justice Index

The Energy Justice Index (EJI) was developed deductively from the three-pillar framework established in the energy justice literature, particularly the distributive, procedural, and recognition justice dimensions identified by Jenkins et al. [3], Sovacool and Dworkin [1] and Heffron and McCauley [2]. Rather than deriving indicators statistically, the EJI operationalizes theoretically grounded concepts into observable policy commitments contained within municipal climate action plans—responding directly to calls for more systematic assessments of justice provisions in climate governance documents [24].

3.3.1. Sub-Indicator Design

To construct the index, nine sub-indicators were selected to represent the three justice pillars, chosen based on their repeated appearance in the energy justice literature and their direct relevance to local climate governance. For methodological consistency, each municipal CAP/SECAP was evaluated across these sub-indicators—divided equally among the three pillars—using a standardized four-level rubric (0–3: Absent, Nominal, Partial, Substantive).

1. Distributive Justice evaluates D1 (GHG emission reduction targets with equity weighting), D2 (energy poverty and vulnerable household provisions), and D3 (anti-displacement measures and progressive pricing mechanisms) to assess the allocation of benefits and burdens associated with climate action.
2. Procedural Justice examines P1 (formal public consultation mechanisms), P2 (substantive community co-production processes), and P3 (feedback loops demonstrating that community input directly shaped plan content) to assess meaningful opportunities for participation and co-production.
3. Recognition Justice focuses on R1 (explicit identification of specific vulnerable groups), R2 (dedicated policy commitments for these populations), and R3 (monitoring indicators to track outcomes for vulnerable groups) to examine the visibility of marginalized populations and accountability mechanisms.

3.3.2. Normalization and EJI Equation

Following the OECD Handbook on Constructing Composite Indicators [43], raw scores for each pillar were normalized to a 0–100 scale (sum of three sub-indicators $\div 9 \times 100$) to ensure mathematical comparability across cities. The overall EJI is then calculated as the unweighted mean of the three normalized pillar scores:

$$EJI = \frac{D + P + R}{3} \quad (1)$$

where D represents the normalized Distributive Justice score, P represents the normalized Procedural Justice score, and R represents the normalized Recognition Justice score. Equal weighting (33.3% per pillar) reflects the theoretical consensus that distributive, procedural, and recognition justice constitute mutually irreducible, co-equal dimensions of energy justice [28]. Because no empirical or normative basis exists in the literature to prioritize one justice tenet over another, equal weighting represents the most transparent and theoretically neutral approach for exploratory comparative analysis [9,44].

3.3.3. Robustness and Sensitivity Analysis

To validate the robustness of the EJI, a sensitivity analysis tested three alternative weighting scenarios—Distributive Priority, Procedural Priority, and Recognition Priority—against the equal-weight Baseline, following the OECD Handbook on Constructing Composite Indicators [43]. Full scenario definitions and results are reported in Appendix C (Table A1).

Although absolute scores shifted slightly under alternative scenarios, two structural consistencies confirm robustness. First, municipal performance clusters remained stable across all scenarios, with Istanbul consistently the highest and Kocaeli and Antalya the lowest performers. Second, the universal absence of monitoring indicators ($R3 = 0$), feedback loops ($P3 = 0$), and anti-displacement provisions ($D3 = 0$) remained unchanged, as these represent absolute omissions in the policy texts that no weighting scheme can alter. This quantitative stability confirms that the overall municipal rankings show minimal displacement, remaining entirely consistent at the top and bottom tiers, proving the EJI is structurally resilient to subjective parameter adjustments. Consequently, the principal findings are robust to reasonable changes in weighting assumptions, validating the use of the theoretically neutral, equal-weighting baseline.

3.3.4. Technocracy Gap Equation

A Technocracy Gap score was calculated as an exploratory indicator of the balance between technical climate ambition and justice-oriented governance provisions. It is calculated as the difference between the Distributive score and the mean of the Procedural and Recognition scores:

$$Gap = D - \frac{P + R}{2} \quad (2)$$

where D is the normalized Distributive Justice score, P is the normalized Procedural Justice score, and R is the normalized Recognition Justice score. Higher positive values indicate greater emphasis on technical planning commitments relative to procedural participation and recognition-based measures.

The formulation of the Technocracy Gap ($Gap = D - \frac{P+R}{2}$) theoretically reflects how these justice dimensions are operationalized in Turkish municipal planning. Distributive justice (D) is framed almost exclusively through highly technical, quantifiable metrics (e.g., greenhouse gas reduction targets, renewable capacity), reflecting a technocratic logic that prioritizes measurable outputs over social processes. Conversely, Procedural (P) and Recognition (R) justice requires democratic engagement and social mapping—dimensions that resist quantification and are systematically underrepresented. Aggregating P and R as “social provisions” and subtracting them from the distributive score mathematically isolates this “technocratic bias,” revealing the extent to which technical ambition overshadows social equity. To test the robustness, an alternative measure using only Procedural justice ($Gap_{alt} = D - P$) was calculated. The directional findings remained fully consistent across all six municipalities, confirming the governance imbalance is a structural reality rather than an artifact of aggregating P and R .

4. Results

4.1. Cross-Case Overview

The evaluation of the six municipal CAPs and SECAPs [45–50] reveals a consistent pattern: strong performance on economic and environmental objectives—particularly GHG emission reduction targets and renewable energy strategies—combined with systematic weaknesses on social objectives, especially procedural participation and recognition of vulnerable groups. This pattern is consistent with the theoretical expectations outlined in

Section 2 and suggests that energy justice principles remain only partially integrated into Turkish local climate governance. Table 1 presents the qualitative Energy Justice Scorecard results, and Table 2 reports the corresponding quantitative EJI scores.

Table 1. Energy Justice Scorecard—Qualitative Summary Results (Each justice pillar consists of three indicators scored on a 0–3 scale and normalized to a 0–100 scale. Detailed scoring procedures are provided in Section 3.3 and Appendix A).

Municipality	Distributive Justice	Procedural Justice	Recognition Justice	Overall
Istanbul	Partial	Nominal	Partial	Partial
Kocaeli	Partial	Absent	Absent	Nominal
Bursa	Partial	Nominal	Nominal	Nominal–Partial
Izmir	Partial	Nominal	Partial	Partial
Antalya	Nominal	Absent	Nominal	Nominal
Trabzon	Partial	Absent	Partial	Nominal–Partial

Source: Author’s analysis based on municipal CAP/SECAP documents [45–50].

Table 2. Energy Justice Index—Full Quantitative Results.

Municipality	Distributive Score	Procedural Score	Recognition Score	EJI	Technocracy Gap
Istanbul	55.6	44.4	55.6	51.9	5.6
Kocaeli	33.3	11.1	11.1	18.5	22.2
Bursa	44.4	22.2	22.2	29.6	22.2
Izmir	55.6	22.2	44.4	40.7	22.2
Antalya	22.2	11.1	22.2	18.5	5.6
Trabzon	33.3	0.0	33.3	22.2	16.7
Mean	40.7	18.5	31.5	30.2	15.7

Source: Author’s quantitative analysis of municipal CAP/SECAP documents.

4.2. Distributive Justice—Emission Targets Without Equity Mechanisms

All six municipalities set quantitative GHG emission reduction targets, ranging from 21% (Kocaeli) to 41% (Trabzon) reductions by 2030 relative to baseline years [47,49]. Renewable energy and energy efficiency measures are consistently identified as primary mitigation strategies, reflecting alignment with national CCMSAP targets and international frameworks such as the Covenant of Mayors. Quantitatively, distributive justice scores range from 22.2 (Antalya) to 55.6 (Istanbul and Izmir), with a cross-city mean of 40.7—the highest of the three pillars, yet still well below any threshold of substantive provision (see Table 2 and Figure 2).

However, distributive justice—the equitable allocation of the costs and benefits of these measures—is addressed only partially or nominally across all cases. Istanbul’s CAP [45] is the most advanced, explicitly acknowledging that climate change impacts fall disproportionately on low-income neighborhoods and identifying energy poverty as a policy concern; this is reflected in its distributive score of 55.6. Izmir’s SECAP [46] similarly references equity in the context of public health and transportation access. However, neither plan includes specific policy instruments—such as targeted subsidies, progressive pricing mechanisms, or anti-displacement protections—to operationalize these distributive commitments. Consequently, both plans score ‘Partial’ rather than substantive on sub-indicators D2 and D3 (see Figure 2, Tables 1 and 2).

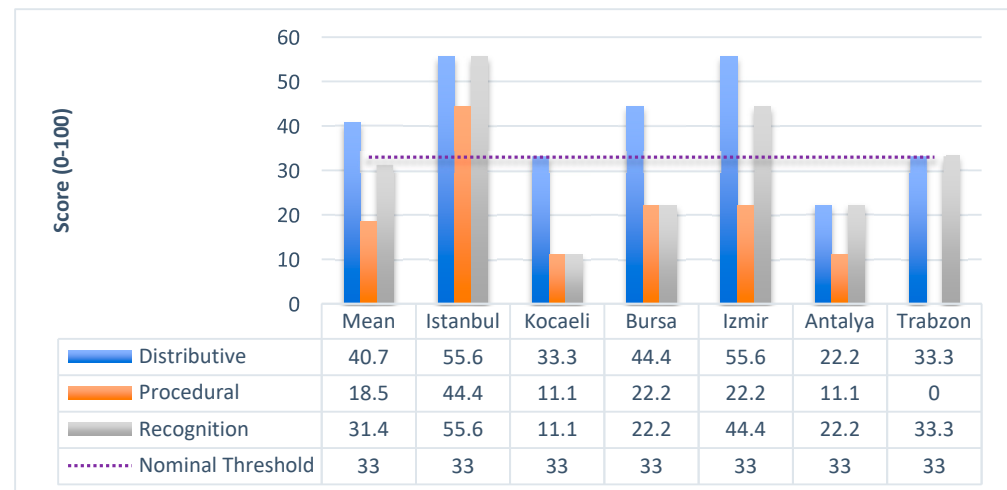


Figure 2. Energy Justice Pillar Scores by Municipality. A “Nominal” score (1 point per sub-indicator) equals 3 raw points per 3-indicator pillar. Normalized to a 0–100 scale, this threshold is calculated as $(3/9) \approx 33.3$. A score of 33 therefore represents a baseline level of justice provisions across all indicators in a pillar.

Despite variation across municipalities, distributive justice provisions remain limited. Istanbul and Izmir provide the strongest evidence of equity-oriented planning, while Antalya records the lowest distributive score (22.2). Across all six municipalities, anti-displacement measures and progressive pricing mechanisms (D3) were absent (Figure 3), suggesting that the most demanding dimension of distributive justice has not yet been incorporated into local climate planning frameworks.

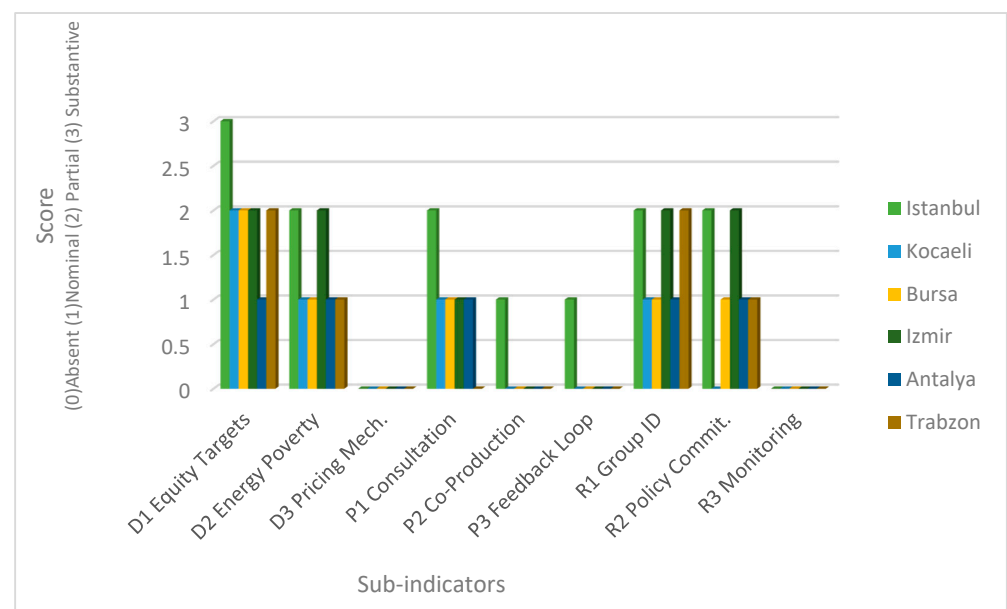


Figure 3. Sub-indicator profiles across all municipalities. The chart displays all nine sub-indicator scores across all six cities, revealing a universal collapse at P2, P3, and R3. Scores are assigned as follows: (0) Absent; (1) Nominal; (2) Partial; (3) Substantive. The maximum raw score for any single pillar is calculated as $\text{Max Score} = 3 \text{ sub-indicators} \times 3 \text{ points} = 9 \text{ points}$. These findings are broadly consistent with Pellizzoni’s [35] argument that participation in environmental governance may remain consultative rather than transformative, and with Swyngedouw’s [33] critique of post-political climate governance. They also reflect broader institutional constraints on local democracy in Türkiye identified by Adaman et al. [11].

4.3. Procedural Justice—Technocratic Planning Without Democratic Participation

Procedural justice emerged as the weakest dimension across the six municipalities, with a mean score of 18.5 out of 100. Although several plans reference consultation activities, none provides evidence of sustained co-production or formal feedback mechanisms demonstrating how public input influenced planning outcomes. Istanbul achieved the highest procedural score (44.4), while Trabzon recorded no procedural provisions. These findings suggest that participation remains largely consultative rather than collaborative within current municipal climate planning processes (Table 2; Figure 2).

Sub-indicator profiles in Figure 3 below across all municipalities reveal pronounced variation in energy justice performance. Distributive sub-indicators—particularly *D1 (Equity Targets)* and *D2 (Energy Poverty)* attract the greatest municipal attention, with *D1* recording the highest scores across the sample, reflecting a nominal commitment to equity-oriented target-setting. Procedural and recognition dimensions, however, exhibit systematic underperformance: *P3 (Feedback Loop)* and *R3 (Monitoring)* register consistently low or absent scores across all six municipalities, signaling a structural deficit in accountability mechanisms and stakeholder engagement. These patterns suggest that while municipalities demonstrate capacity for technical goal setting, the deliberative and recognition-based foundations necessary for substantive energy justice remain largely underdeveloped in current local climate action planning.

4.4. Recognition Justice—Partial Visibility of Vulnerable Groups

Recognition justice—the explicit acknowledgment of the identities and vulnerabilities of specific social groups—is present in some form in four of the six plans but is substantive in none. Recognition scores range from 11.1 (Kocaeli) to 55.6 (Istanbul), with a cross-city mean of 31.5 (Table 2; Figure 2). Istanbul's CAP [45] is the most advanced, explicitly identifying women, refugees, and elderly populations as groups with specific climate vulnerabilities and referencing the need for gender-sensitive adaptation measures. Trabzon's SECAP [49] similarly identifies elderly populations and fishing communities as priority groups for climate adaptation support, yielding a recognition score of 33.3. Kocaeli scores the lowest at 11.1, demonstrating no meaningful recognition of the vulnerable populations—such as migrants and industrial workers—who are most exposed to its heavy industrial pollution burden.

Critically, in no case are recognition justice provisions translated into specific, monitored policy commitments. This reveals a particularly important sub-pattern: *R3* (monitoring indicators for vulnerable group outcomes) scores zero across all six municipalities. Consequently, even where vulnerable groups are identified (*R1*) and nominal policy commitments are made (*R2*), no municipality has established monitoring mechanisms to track whether those commitments are actually improving outcomes for marginalized populations. This disjuncture between nominal recognition and monitored accountability is precisely what Fraser [5] identifies as the difference between affirmative and transformative justice: acknowledging difference without structurally addressing the conditions that produce it [30].

Particularly notable is the near-universal absence of recognition provisions for refugees and migrants. Türkiye hosts one of the world's largest refugee populations, with approximately 2.6 million registered Syrian refugees as of 2025, concentrated in urban areas including Istanbul, Kocaeli, and Bursa [51]. These populations face acute energy poverty and climate vulnerability, yet they are largely invisible in municipal CAPs—a significant recognition gap with serious distributional consequences.

The limited attention given to refugee populations in municipal climate plans should also be understood within Türkiye's legal-administrative framework. Under the Law

on Foreigners and International Protection (No. 6458) and the Temporary Protection Regulation, primary responsibility for refugee governance remains with central government institutions. While municipalities retain important responsibilities for local service provision [52], their authority to develop refugee-specific programs remains constrained. Recognition deficits identified in this study should therefore be understood partly as a consequence of broader governance arrangements.

4.5. Integrated Quantitative and Qualitative Evidence—Technocracy Gap

The Technocracy Gap score—defined as the difference between each municipality's distributive justice score and the mean of its procedural and recognition justice scores—serves as an exploratory indicator of the balance between technical climate ambition and justice-oriented governance provisions. Figure 4 and Table 3 illustrate this relationship across the six municipalities, revealing a consistent pattern in which technical climate commitments receive greater emphasis than procedural participation and recognition-based measures.

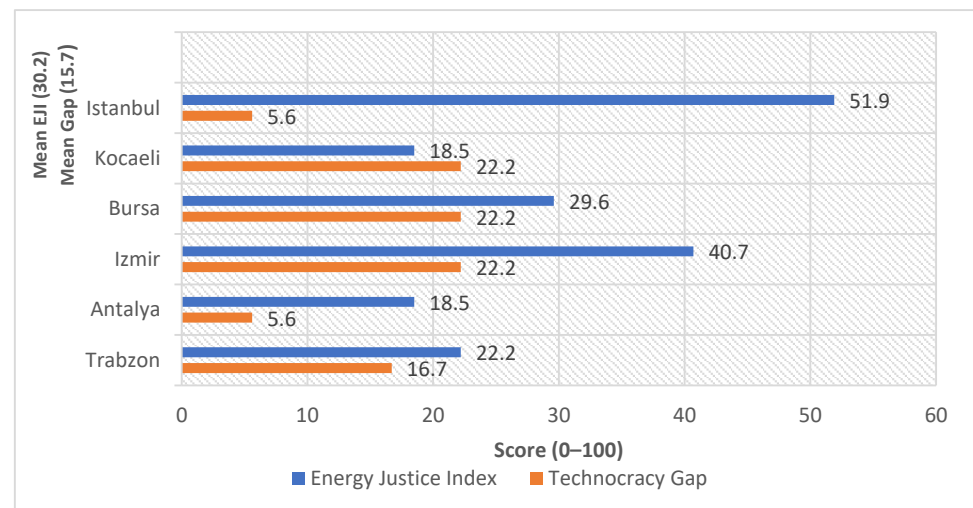


Figure 4. EJI Score vs. Technocracy Gap by Municipality.

Table 3. Comparison of Municipal GHG Ambition and Social Provisions (Technocracy Gap) *.

Municipality	2030 GHG Reduction Target	Social Provisions Score (0–100)	GHG Ambition (Normalized Ambition (0–100))	Gap	Profile
Trabzon	41%	16.7	100	83.3	Extreme Technocracy
Antalya	40%	16.7	98	81.3	Extreme Technocracy
Izmir	40%	33.3	98	64.7	High Technocracy
Istanbul	40%	50.0	98	48.0	Moderate/Approaching Balance
Kocaeli	21%	11.1	51	39.9	Moderate Technocracy
Bursa	22%	22.2	54	31.8	Moderate Technocracy

* Normalized against the highest municipal/national target of 41% (Trabzon) to establish a comparative. 0–100 scale for Figure 5.

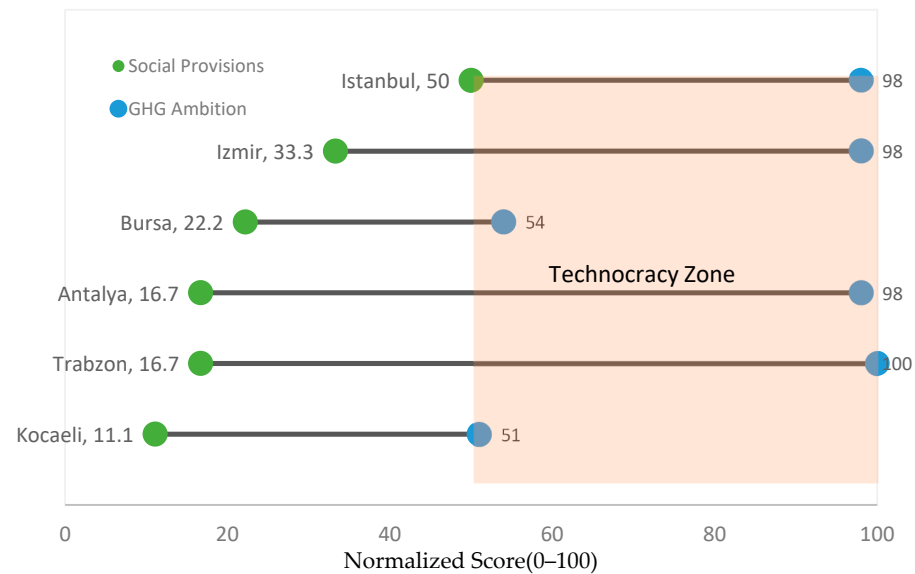


Figure 5. Comparing Municipal GHG Ambition vs. Social Provisions. The chart compares municipal GHG ambition and social provision scores. Green markers represent Social Provision Scores (mean of Procedural and Recognition Justice scores), while blue markers represent normalized GHG reduction ambition. The shaded Technocracy Zone highlights municipalities where climate mitigation ambition substantially exceeds justice-oriented governance provisions. Municipalities positioned within this zone exhibit normalized GHG ambition scores above 50 and social provision scores below 50. Social Provision Scores (SPS) were calculated as the average of normalized Procedural Justice (PJ) and Recognition Justice (RJ) scores for each municipality: $SPS = (PJ + RJ)/2$. These scores were also normalized to a scale of 0–100.

The mean Technocracy Gap across the six municipalities was 15.7 points, with Kocaeli, Bursa, and Izmir recording the highest values (22.2). Kocaeli is particularly illustrative: despite setting the most ambitious greenhouse gas reduction target in the sample (41%), it scored only 11.1 on both procedural and recognition justice. This case provides a clear example of climate planning in which technical targets receive substantially greater emphasis than participation and recognition-based measures. By contrast, Istanbul recorded the smallest gap among high-performing municipalities because its procedural and recognition provisions were comparatively stronger (Figures 4 and 5 (Figure 4 illustrates the relationship between overall EJI performance and Technocracy Gap scores across the six municipalities)).

The cross-case analysis yields four systemic findings that integrate the qualitative and quantitative evidence:

- (1) *The procedural floor*—Procedural justice scores (mean: 18.5) are systematically and consistently lower than both distributive (mean: 40.7) and recognition scores (mean: 31.5), suggesting that democratic participation remains the least developed dimension of energy justice within the plans examined (Table 2 and Figure 2). The qualitative evidence—performative consultation, absent co-production, no feedback loops—maps precisely onto sub-indicators P1–P3 (see Figure 3 above).
- (2) *The Technocracy Gap* provides quantitative evidence of the imbalance between technical planning commitments and justice-oriented governance provisions identified throughout the qualitative analysis, consistent with broader critiques of technocratic climate governance [30,32]. The shaded orange ‘Technocracy Zone’ (in Figure 5) highlights municipalities scoring above 50 in GHG ambition, while social provisions remain underdeveloped, with scores below 25. All metrics are normalized to a 0–100 scale.

- (3) *No municipality achieves substantive justice*—The absence of any ‘Substantive’ (score = 3) rating across all 54 scored sub-indicators suggests that the deficiencies identified may reflect broader characteristics of current municipal climate planning practices rather than isolated weaknesses.
- (4) *Monitoring is the universal missing link*—Zero scores on R3 (monitoring for vulnerable groups) across all cities identify the absence of accountability mechanisms as the single most consistent and consequential gap in current planning practice, consistent with Fraser’s [5] distinction between affirmative and transformative recognition.

Although municipal political affiliation may influence planning priorities, procedural and recognition deficits appear across municipalities governed by different political parties, suggesting that these patterns are not confined to a single partisan context.

The clustering of municipalities such as Kocaeli, Antalya and Trabzon [47–49] within the shaded Technocracy Zone further illustrates the imbalance between technical climate ambition and justice-oriented governance provisions. While these municipalities record relatively strong greenhouse gas (GHG) reduction commitments, their social provision scores remain comparatively low. Trabzon and Antalya exhibit the largest gaps (83.3 and 81.3, respectively), reflecting a strong emphasis on technical climate targets alongside limited procedural and recognition-based measures. By contrast, Istanbul represents a comparatively more balanced case, with a social provision score of 50.0 and a smaller gap (48.0), suggesting stronger integration of justice-oriented governance provisions. These patterns are also reflected in Table 3, particularly in the consistent underperformance of P3 (Feedback Loops) and R3 (Monitoring). Overall, the findings are broadly consistent with critiques of technocratic climate governance, which suggest that measurable climate targets often receive greater emphasis than participatory and recognition-based dimensions of justice [33].

5. Discussion

5.1. Technocracy and the Politics of Local Climate Planning

It is critical to interpret these findings within the epistemological boundaries of document analysis. Municipal climate plans often function as instruments of ‘performative compliance’—formal commitments designed to satisfy the requirements of international networks (e.g., Covenant of Mayors) or national mandates, rather than as binding governance blueprints. Consequently, the procedural participation provisions and recognition commitments documented in these plans may not accurately reflect actual stakeholder engagement processes, informal governance mechanisms, institutional learning dynamics, or real budgetary allocations. The identified justice deficits should therefore be viewed as baseline structural gaps that are likely exacerbated during the actual implementation phase. The EJI captures this pattern quantitatively, with a mean score of 30.2 out of 100 and no municipality achieving a substantive score on any indicator. Together, these findings suggest that justice-oriented governance provisions remain comparatively underdeveloped within the climate plans examined.

The observed emphasis on technical planning provisions may reflect broader institutional characteristics of the Turkish governance system, including administrative structures that prioritize measurable policy outputs and regulatory compliance [53]. As Swynedouw [33] argues, the post-political framing of climate change as a technical management problem can limit opportunities for democratic contestation over the distribution of transition costs and benefits. The mean Technocracy Gap of 15.7 points is broadly consistent with this interpretation.

We acknowledge that technocratic planning offers distinct advantages, such as the rapid mobilization of expertise and alignment with international financial mechanisms.

However, its normative presumption in the Turkish context is problematic. Türkiye operates within a highly centralized administrative system in which local governments possess limited autonomy in several policy domains [11,52,54]. These institutional arrangements may constrain opportunities for participatory governance and locally tailored climate interventions. In this context, technocratic planning approaches may be reinforced by administrative structures that prioritize measurable policy outputs and regulatory compliance. Similar concerns regarding the dominance of technocratic approaches and the limited role of participatory governance have been identified in studies of climate governance across a range of emerging-economy contexts [55,56].

Furthermore, municipal inaction regarding vulnerable groups—particularly refugees—is compounded by legal-administrative constraints. Under the Law on Foreigners and International Protection (Law No. 6458) [57,58], refugee governance is highly centralized under the national Presidency of Migration Management. Municipalities lack formal legal mandates or dedicated budgets for refugee integration [52]. Consequently, the limited recognition of refugees within CAPs is not merely a municipal oversight but a structural barrier created by centralized governance.

The findings are consistent with Fischer’s [31] critique of technocracy, which argues that political questions are frequently reframed as technical problems. In the present study, the universal absence of D3 provisions (anti-displacement and progressive pricing mechanisms) suggests that some of the most politically demanding dimensions of distributive justice receive limited attention within municipal climate plans.

The consequences of this technocratic bias are not merely procedural. The near-universal absence of substantive equity provisions and the consistent lack of monitoring mechanisms for vulnerable populations suggest that current planning approaches may be insufficient to address existing inequalities. This interpretation is broadly consistent with critiques of technocratic transition frameworks, which argue that technical efficiency alone does not guarantee socially equitable outcomes [34,35].

The findings should also be interpreted within Türkiye’s broader institutional context. Local climate governance operates within a highly centralized administrative system in which municipalities possess limited fiscal and regulatory autonomy in several policy domains. These institutional arrangements may constrain opportunities for participatory governance and the development of locally tailored justice-oriented interventions. Consequently, some of the procedural and recognition deficits identified in this study may reflect broader governance structures rather than solely municipal planning choices. Future comparative research could explore how different governance systems shape the integration of energy justice principles into local climate planning.

Additionally, the variation in EJI and Technocracy Gap scores does not correlate cleanly with municipal political party affiliation. Both CHP-led municipalities (e.g., Istanbul, Izmir) and AKP-led municipalities (e.g., Bursa, Kocaeli) exhibit similar structural deficits in procedural and recognition justice. This descriptive pattern suggests that procedural and recognition deficits are not confined to municipalities governed by a particular political party and may reflect broader institutional characteristics of current climate planning practices.

5.2. Toward a Rights-Based Framework for Local Climate Governance

Addressing these deficiencies requires a fundamental reorientation of local climate action planning—from a technocratic model focused on emission reduction targets to a rights-based model that treats energy access, democratic participation, and recognition of vulnerability as non-negotiable governance obligations. Drawing on the energy justice literature and the findings of this study, we propose a Rights-Based Local Climate Governance Framework organized around four principles:

- (1) *Rights-based distributive commitments*: CAPs should include explicit analysis of the distributional impacts of climate policies on different social groups, with targeted instruments—subsidies, progressive pricing, anti-displacement protections—to ensure that transition costs do not fall disproportionately on vulnerable populations [2,23]. The universal zero score on D3 across all six cities identifies this as the most urgent distributive reform.
- (2) *Substantive procedural democracy*: Planning processes should move beyond formal consultation to genuine co-production, involving community organizations, civil society groups, and representatives of marginalized populations in substantive decision-making. This requires dedicated resources, capacity-building support, and feedback mechanisms that demonstrate how community input shapes plan content [25,34]. The procedural floor identified in Finding 1—a mean score of 18.5—makes this the most structurally deficient dimension requiring reform.
- (3) *Transformative recognition*: Plans should explicitly identify and address the specific vulnerabilities of marginalized groups—including refugees, energy-poor households, elderly populations, and informal workers—through dedicated policy commitments, budget allocations, and monitoring indicators. This requires moving from affirmative to transformative recognition, addressing the structural conditions that produce vulnerability rather than merely acknowledging its existence [5,30]. The universal absence of R3 monitoring provisions makes this the most critical accountability gap.
- (4) *Institutional accountability*: Rights-based commitments must be embedded in institutional structures that create accountability for their implementation. This includes independent monitoring bodies with civil society representation, public reporting on equity outcomes, and legal frameworks that recognize the right to participate in climate governance [21,34,59].

When benchmarked internationally, the procedural and recognition justice deficits identified in Türkiye appear consistent with patterns documented in the broader urban climate governance literature. Scholars have noted that institutionalized participatory frameworks—such as the Covenant of Mayors in Europe—tend to strengthen procedural justice provisions in municipal climate planning [60,61]. Conversely, research on climate governance in rapidly urbanizing economies suggests that infrastructural urgency frequently deprioritizes participatory and recognition mechanisms in favor of technical delivery [62]. While a systematic cross-national comparison falls outside the scope of this study, these parallels suggest that the technocracy gap identified here may reflect a broader structural condition in emerging economy climate governance. Consequently, the Energy Justice Index (EJI) framework provides a robust methodological foundation well-positioned to diagnose these imbalances in future comparative research. Indeed, the proposed framework is highly transferable to municipalities in other developing or emerging economies (e.g., in Latin America, South Asia, or Sub-Saharan Africa) that face similar climate governance challenges, characterized by rapid urbanization, informal settlements, and highly centralized administrative systems.

5.3. Implications for Turkish Climate Governance

Implementing this framework in the Turkish context requires addressing the institutional constraints identified in this study. Key reforms include strengthening the legal basis for participatory planning in the climate action domain [56]; building the capacity of civil society organizations to engage in technical planning processes; developing national guidance on equity provisions in municipal CAPs; and creating monitoring frameworks that track distributional and recognition outcomes alongside emission reduction targets.

These reforms are consistent with Türkiye's international commitments under the Paris Agreement, the SDGs, and the Covenant of Mayors, all of which include provisions for participatory governance and social equity. They are also supported by a growing body of evidence that rights-based approaches to climate governance are associated with more durable and socially legitimate outcomes by building the social trust and political legitimacy necessary for sustained action [7,59,63]. The quantitative evidence presented here—particularly the mean EJI of 30.2 and the universal absence of substantive scores—provides a measurable baseline against which future reform progress can be tracked.

5.4. Policy Implications

To translate the findings of this study into actionable guidance, municipalities can utilize the Energy Justice Index (EJI) and the Technocracy Gap as diagnostic instruments embedded within their existing climate planning cycles. Rather than treating justice as an abstract normative aspiration, local governments can operationalize the three-pillar framework through the following structural approaches.

First, municipalities can apply the EJI as a *baseline diagnostic tool* at the outset of each CAP/SECAP drafting or revision cycle. By calculating their own Technocracy Gap prior to plan development, city planners can quantitatively identify where technical climate ambitions have historically outpaced democratic accountability, enabling them to target specific deficits in procedural or recognition justice before commitments are finalized.

Second, closing the Technocracy Gap requires a structural shift from top-down consultation toward genuine *co-production*. Operationally, this means embedding procedural justice into the CAP drafting phase itself—establishing formal, binding feedback mechanisms that integrate community stakeholders into the steering committees responsible for defining the initial scope and priorities of the plan, rather than presenting finished technical documents for passive public comment.

Third, municipalities currently rely predominantly on technical metrics—such as greenhouse gas reduction targets or energy efficiency outputs—to evaluate CAP performance. To operationalize the recognition and procedural dimensions of the EJI, local governments should embed *justice-specific Key Performance Indicators (KPIs)* into their annual climate reporting frameworks. This includes tracking the equitable distribution of infrastructure investments, measuring the demographic representation of community groups in planning processes, and requiring vulnerability-disaggregated data to ensure that marginalized populations remain visible across all stages of climate risk assessment and policy response.

Crucially, addressing these deficits does not require prohibitive administrative overhauls. To ensure practical applicability under existing institutional and budgetary constraints, municipalities do not need to create new, heavily funded departments to operationalize these justice indicators. Instead, implementation can be achieved by leveraging existing administrative structures. For example, the justice-oriented KPIs mentioned above can be integrated directly into the mandatory annual sustainability reports already required by national law. Furthermore, municipalities can utilize existing City Councils (Kent Konseyleri) to facilitate procedural justice and stakeholder engagement, providing a low-cost, legally recognized mechanism to bridge the gap between technical climate planning and community representation.

6. Conclusions

This study examines the extent to which energy justice principles are incorporated into municipal climate action planning in Türkiye. By applying the three-pillar framework of distributive, procedural, and recognition justice to six metropolitan municipalities and

introducing the Energy Justice Index (EJI), the study bridges the gap between normative energy justice theory and local climate governance practice. The analysis also develops the Technocracy Gap as an exploratory indicator of the balance between technical climate ambition and justice-oriented governance provisions. As an exploratory indicator, future studies should systematically compare the Technocracy Gap with alternative, established governance or sustainability metrics—such as institutional capacity measures, participatory budget indices, or citizen satisfaction indicators—to further examine its broader applicability and predictive power across different policy settings.

The findings suggest that municipal climate planning in Türkiye remains predominantly oriented toward technical and emissions-reduction objectives, while procedural participation and recognition-based measures receive comparatively less attention. Across the six municipalities examined, the mean EJI score was 30.2 out of 100, while procedural and recognition dimensions consistently scored lower than distributive measures. This pattern was reflected in a mean Technocracy Gap of 15.7 points and the absence of monitoring mechanisms for vulnerable populations ($R3 = 0$ across all cases). This absence highlights a significant governance gap between formal recognition and institutional accountability.

The study advances three broader theoretical insights. First, recognition without monitoring may result in institutionalized misrecognition, as vulnerable groups remain visible in planning documents but absent from accountability frameworks. Second, the Technocracy Gap provides a useful heuristic for identifying imbalances between technical climate ambition and justice-oriented governance provisions. Third, energy justice at the municipal level depends not only on distributive outcomes but also on institutional arrangements capable of sustaining participation, recognition, and accountability over time.

The findings also suggest that improving energy justice in local climate governance requires more than technical refinement of climate plans. Greater attention to participatory processes, vulnerable populations, and monitoring mechanisms may strengthen both the democratic legitimacy and implementation effectiveness of local climate action. In particular, institutionalizing accountability mechanisms for vulnerable groups would help translate formal recognition into measurable governance outcomes.

Several limitations must be acknowledged. First, it must be noted that the study's findings are bounded by the inherent limitations of formal document analysis; the EJI captures what municipalities formally commit to, rather than what they actually deliver. Because municipal climate plans often function as instruments of performative compliance, they may fail to reflect actual implementation outcomes. Future research should integrate document analysis with interviews and implementation-focused assessments to examine how justice commitments translate into lived experiences for vulnerable populations. Second, the reliance on a single-coder assessment for the EJI carries inherent subjectivity. While internal consistency was improved through a delayed re-coding process, this does not replace independent external validation. Future research applying this framework should utilize multiple independent coders and apply statistical reliability metrics, such as Cohen's Kappa or Krippendorff's Alpha, to establish rigorous inter-coder reliability and ensure methodological robustness. Additionally, inviting domain experts in energy justice and urban governance to serve as external validators would further bolster the credibility of the proposed index. Finally, expanding the sample size to include a broader array of municipalities from diverse national and subnational governance contexts will enhance the framework's external validity and cross-comparative applicability.

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Appendix A. Coding Protocol and Energy Justice Scorecard

This rubric was applied to evaluate all municipal Climate Action Plans (CAPs) and Sustainable Energy and Climate Action Plans (SECAPs) analyzed in this study. Each of the nine sub-indicators was scored on a standardized four-level scale: 0 (Absent), 1 (Nominal), 2 (Partial), and 3 (Substantive).

Appendix A.1. Scoring Procedure

Each municipal Climate Action Plan (CAP) or Sustainable Energy and Climate Action Plan (SECAP) was evaluated using a standardized Energy Justice Scorecard. The assessment followed a four-level rubric:

Score	Category	Operational Definition
0	Absent	No reference to the criterion
1	Nominal	Brief mention without concrete policy commitments
2	Partial	Explicit policy commitment but limited implementation detail
3	Substantive	Detailed policy commitment with implementation, accountability, or monitoring provisions

Each document was reviewed in its entirety and evaluated against nine sub-indicators distributed across the three pillars of energy justice.

Appendix A.2. Distributive Justice Indicators

Code	Indicator	Description
D1	Equity-Oriented Climate Targets	Explicit recognition of unequal climate impacts or vulnerable populations within mitigation/adaptation targets
D2	Energy Poverty Measures	Programs addressing affordability, vulnerable households, or energy access
D3	Anti-Displacement/Progressive Pricing	Measures preventing climate gentrification, displacement, or disproportionate economic burdens

Appendix A.3. Procedural Justice Indicators

Code	Indicator	Description
P1	Public Consultation	Evidence of stakeholder consultation during plan development
P2	Co-Production	Active involvement of citizens, NGOs, or communities in policy design
P3	Feedback Loops	Demonstration that stakeholder input influenced final policy content

Appendix A.4. Recognition Justice Indicators

Code	Indicator	Description
R1	Identification of Vulnerable Groups	Explicit identification of socially vulnerable populations
R2	Dedicated Policy Commitments	Targeted actions addressing specific vulnerable groups
R3	Monitoring of Vulnerable Group Outcomes	Indicators tracking outcomes for vulnerable populations

Appendix A.5. Coding Process

Document analysis was conducted by a single researcher. To improve consistency:

- All documents were coded twice;
- A four-week interval separated coding rounds;
- Discrepancies were reviewed and reconciled;
- Final scores were determined through comparative review of both coding rounds.

Because only one coder was involved, intercoder reliability statistics were not calculated.

Appendix B. Illustrative Coding Examples

The following examples demonstrate how the rubric in Appendix A was applied to representative text passages drawn from the analyzed municipal CAPs and SECAPs. All excerpts have been translated from Turkish and lightly paraphrased to preserve analytical anonymity while retaining the substantive content relevant to scoring.

Example 1—D2 (Energy Poverty), Municipality: Istanbul

Text excerpt

“Climate impacts disproportionately affect low-income households and energy-vulnerable populations.”

Assigned score: 2 (Partial)

Reasoning

The plan explicitly recognizes energy poverty and vulnerable households. However, it does not provide a dedicated subsidy mechanism, affordability program, or measurable implementation framework.

Example 2—P1 (Public Consultation), Municipality: Bursa

Text excerpt

“Stakeholder meetings were conducted during preparation of the climate action plan.”

Assigned score: 1 (Nominal)

Reasoning

Consultation is mentioned, but no evidence is provided regarding participation quality, influence on decision-making, or follow-up mechanisms.

Example 3—P3 (Feedback Loop), Municipality: All Cases

Text excerpt

No evidence identified.

Assigned score: 0 (Absent)

Reasoning

None of the plans demonstrate how public comments altered policy content or influenced final decisions.

Example 4—R1 (Recognition), Municipality: Istanbul

Text excerpt

“Women, refugees, elderly populations, and low-income households may face disproportionate climate risks.”

Assigned score: 3 (Substantive)

Reasoning

The plan explicitly identifies multiple vulnerable groups and discusses differentiated climate impacts.

Example 5—R3 (Monitoring), Municipality: All Cases

Text excerpt

No monitoring indicators identified.

Assigned score: 0 (Absent)

Reasoning

Although some municipalities identify vulnerable populations, none establish indicators for monitoring outcomes among those groups.

Example 6—D3 (Anti-Displacement Measures), Municipality: Antalya

Text excerpt

No reference identified.

Assigned score: 0 (Absent)

Reasoning

No provisions addressing climate gentrification, displacement, or progressive pricing mechanisms.

Appendix C. Sensitivity Analysis of the Energy Justice Index (EJI)

Appendix C.1. Purpose

A sensitivity analysis was conducted to evaluate whether municipal rankings were affected by alternative weighting schemes.

The baseline EJI assigns equal weights to:

- (a) Distributive Justice = 33.3%;
- (b) Procedural Justice = 33.3%;
- (c) Recognition Justice = 33.3%.

Appendix C.2. Alternative Weighting Scenarios

Table A1. Alternative weighting scenarios for the Energy Justice Index (EJI) sensitivity analysis.

Scenario	D	P	R	Meaning
Baseline (EJI)	33.3%	33.3%	33.3%	<i>“All three matter equally”</i>
Procedural Priority	25%	50%	25%	<i>“What if fair process matters most?”</i>
Recognition Priority	25%	25%	50%	<i>“What if recognizing vulnerable groups matters most?”</i>
Distributive Priority	50%	25%	25%	<i>“What if fair outcomes matter most?”</i>

Note that italics in the “Meaning” column are used to visually distinguish the conceptual interpretations of each weighting.

Appendix C.3. Findings

Across all weighting scenarios:

- (a) Istanbul remained the highest-performing municipality.
- (b) Kocaeli and Antalya remained among the lowest-performing municipalities.
- (c) Municipal clustering patterns remained largely unchanged.
- (d) Procedural justice consistently emerged as the weakest pillar.

The universal absence of monitoring mechanisms for vulnerable groups ($R3 = 0$) remained unchanged across all scenarios.

Although absolute EJI scores varied slightly under alternative weighting schemes, the relative ranking of municipalities remained stable. This suggests that the principal findings of the study are robust to reasonable changes in weighting assumptions.

Appendix C.4. Interpretation

The sensitivity analysis indicates that the Energy Justice Index is not driven by a single weighting choice. The persistence of municipal rankings under alternative weighting scenarios provides additional confidence that the findings reflect substantive differences in climate planning content rather than methodological artifacts.

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