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Why Energy Taxes Face Opposition: Household Vulnerability and Price-Shock Stress Pathways

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ABSTRACT

Purpose – To explain public support for energy taxes through behavioral, institutional, and psychological mechanisms beyond cost-based accounts.

Design/methodology/approach – ASurvey-based structural equation modeling tests direct, mediated, and moderated pathways linking perceptions, household responses, and policy support.

Findings – Perceived tax burdens reduce support mainly through sequential increases in household vulnerability and price-shock stress, while fairness and institutional trust directly enhance support and indirectly buffer insecurity. Climate concern and energy literacy raise acceptance largely by reducing vulnerability and stress rather than operating solely as normative justifications. Proposed moderation by household responsibility roles is not supported, indicating that stress-related mechanisms operate broadly across households rather than being strongly conditional on role-based exposure.

Originality/value – This study advances a behavioral–institutional model that reframes the political cost of energy taxation as a psychological process in which insecurity and stress transmit burdens into opposition. By empirically establishing vulnerability and price-shock stress as central serial mediators, it moves the literature beyond direct-effect explanations and clarifies how institutional and cognitive resources function as resilience-building channels that sustain policy legitimacy.

Research implications – Acceptance-oriented tax design should combine targeted compensation, credible governance, and communication strategies that reduce perceived insecurity and stress, thereby improving legitimacy and feasibility of energy taxes.

1. Introduction

Energy taxes have emerged as an increasingly important policy instrument serving climate mitigation, fiscal stabilization, and energy transition objectives. Governments have widely adopted energy taxes to internalize environmental externalities and, in some cases, to generate public revenues for infrastructure investment and social compensation mechanisms (Allcott et al., 2014; Owen, 2006; Xin et al., 2026). Despite their strong economic rationale, energy taxes frequently encounter popular resistance, raising concerns regarding their political legitimacy and long-term sustainability (Jacome et al., 2026). Recent policy debates emphasize that effective price signals alone are insufficient for ensuring public acceptance; instead, citizens' perceptions of fairness, trust in public institutions, and the credibility of redistribution mechanisms play a decisive role in shaping support for energy taxation (World Bank, 2024; OECD, 2024). Consequently, understanding the behavioral foundations of public support for energy taxes has become a critical issue for both policymakers and academics.

Household sensitivity to energy-related costs has intensified in recent years due to heightened volatility in energy prices, supply disruptions in emerging markets, and post-pandemic inflationary pressures. Rising electricity, fuel, and household energy prices have amplified distributional impacts and generated psychological stress, particularly among vulnerable households. Empirical evidence suggests that the effects of energy price shocks are heterogeneous and depend on household roles, consumption patterns, and the availability of substitution options such as public transportation or energy-efficient appliances (Abbass et al., 2026; Foo et al., 2026; Li et al., 2026). As a result, energy tax reforms are more likely to provoke debates concerning social justice, household resilience, and political feasibility in economies undergoing structural transformation or recovering from economic shocks.

The existing literature on energy taxation has predominantly relied on models grounded in economic efficiency or microsimulation approaches that estimate distributional impacts using household expenditure data. While these approaches provide valuable insights, they often understate the importance of behavioral and institutional processes in shaping policy support. The Slippery Slope Framework posits that compliance and cooperation emerge when trust in authorities and perceived legitimacy outweigh coercive enforcement mechanisms (Kirchler et al., 2008). Similarly, theories of procedural and distributive justice emphasize that perceptions of fairness are central to public support for redistributive policies (Maurya, 2026; Scholz and Lilliestam, 2026). More recent behavioral research highlights that climate concern and energy literacy may reduce resistance to energy taxes by reframing them not merely as financial burdens but as collective risk management tools (Annicchiarico et al., 2021; Carattini, 2022; Douenne and Fabre, 2022; Drews and van den Bergh, 2016a).

Empirical findings on public attitudes toward energy taxes

remain mixed and, at times, contradictory. Numerous studies document negative responses to perceived cost burdens, particularly among low-income or energy-dependent households (Douenne and Fabre, 2022; Jaeger-Erben et al., 2025). In contrast, other research identifies positive effects of institutional trust, transparent revenue recycling, and climate concern on policy acceptance (Bianchi et al., 2024; Carattini, 2022; Rhodes and Jaccard, 2013; Maestre-Andrés et al., 2021). A smaller body of work reports contingent or ambiguous effects, suggesting that household vulnerability, stress responses, and gendered divisions of domestic and mobility-related responsibilities may help explain divergent reactions to similar policies (OECD, 2024; Drews and van den Bergh, 2016a). These inconsistencies point to a significant gap in the literature: the absence of comprehensive models that jointly account for perceived fairness, trust, household-level stress, vulnerability, and role-based exposure to energy costs.

This study addresses this gap by developing and empirically testing a holistic behavioral framework for public support of energy taxation. The framework integrates perceived economic burdens, fairness, trust, climate concern, and energy literacy, alongside household vulnerability and price-shock-induced stress. By introducing domestic energy responsibility and mobility responsibility as moderating variables, the study moves beyond conventional proxies such as gender or household headship, offering a more nuanced explanation for heterogeneous policy responses. The findings contribute to the literature on environmental taxation, behavioral public finance, and energy policy by explaining why households exposed to similar price changes may exhibit different levels of policy support. From a policy perspective, the results provide actionable insights for designing compensation mechanisms, communication strategies, and governance arrangements that enhance the legitimacy and acceptability of energy taxes, particularly in developing countries and post-crisis economies.

The remainder of the paper is structured as follows. Section 2 reviews the theoretical and empirical literature on energy taxation, policy acceptance, fairness, trust, and household-level behavioral responses and develops the research hypotheses and conceptual framework. Section 3 describes the research methodology, including survey design, measurement of constructs, sampling strategy, and the analytical approach based on partial least squares structural equation modeling. Section 4 presents the empirical results, including measurement model assessment, structural relationships, mediation and moderation analyses, and robustness checks. Section 5 discusses the findings in relation to prior research, outlines theoretical and policy implications, and concludes with limitations and directions for future research. All procedures involving human participants complied with ethical research standards; participation was voluntary, informed consent was obtained, and all data were collected anonymously for academic research purposes only.

2. Literature Review

2.1 Theoretical foundations of energy tax acceptance

The public acceptability of energy taxes is mainly determined by notions of legitimacy, fairness, and institutional trust rather than price signals alone. According to the Slippery Slope Framework, trust in authorities combined with regulatory power enhances voluntary compliance and support for policymaking; thus, perceived legitimacy is a key predictor of acceptance (Kirchler et al., 2008).

Supplementing this perspective, procedural and distributive justice theories posit that individuals evaluate energy taxes based on the transparency of policymaking processes and the fairness of cost distribution among social groups (Tyler, 1990). Behavioural public finance further argues that risk perceptions and moral judgments such as climate concern and environmental responsibility drive individual support for fiscal instruments aimed at ecological protection (Carattini, 2022; OECD, 2024).

Taken together, these perspectives provide a rationale for a behavioral institutional approach to energy tax acceptance that emphasizes trust, fairness, and perceived societal benefits beyond narrow economic reasoning.

2.2 Perceived energy tax drivers and public policy support

A major constraint on public support for energy taxation is the perceived relative burden associated with energy taxes. Since households evaluate energy taxes in relation to everyday activities such as commuting and domestic energy consumption, transport fuel and household energy prices are particularly salient. Prior studies indicate that perceived cost burdens related to energy and carbon taxes increase public opposition, as such taxes are expected to negatively affect household budgets, work-related mobility, and general living conditions (Douenne and Fabre, 2022; Bursens et al., 2026).

Transport-related taxes are often perceived as difficult to avoid due to limited substitutes, while household energy taxes are frequently associated with concerns about energy insecurity. Consequently, higher perceived transport-related and household energy tax burdens are expected to reduce policy support.

- **H1:** Perceived transport-related energy tax burden (BUR_T) is negatively associated with policy support for energy taxes (SUP).
- **H2:** Perceived household energy tax burden (BUR_H) is negatively associated with policy support for energy taxes (SUP).
- **H3:** Perceived fairness of energy taxation (FAIR) is positively associated with policy support for energy taxes (SUP).
- **H4:** Trust in government and tax authorities (TRUST) is positively associated with policy support for energy taxes (SUP).
- **H5:** Climate concern (CLIM) is positively associated with policy support for energy taxes (SUP).
- **H6:** Energy literacy (LIT) is positively associated with policy support for energy taxes (SUP).

2.3 Household vulnerability and psychological stress under energy taxation

Households experience subjective energy tax burdens that form a central basis for opposition to energy taxation. The linkage between energy taxes and household expenditures on transport and domestic energy reduces policy support, particularly in contexts characterized by limited substitution options and low price elasticities. Empirical evidence consistently shows that fuel and household energy taxes are politically sensitive due to their immediate impact on daily mobility and basic living standards, thereby generating perceptions of personal loss and unfairness (Polanco Vásquez et al., 2025; Jaeger-Erben et al., 2025; Kirchler et al., 2008).

Conversely, institutional and normative drivers reinforce support for energy taxes. Trust in government and perceived fairness in policy design strengthen legitimacy, while climate concern and energy literacy enhance individuals' willingness and capacity to adapt to policy impacts (Tyler, 1990; Carattini, 2022; OECD, 2024). These mechanisms underpin the following hypotheses:

- **H7:** Perceived transport-related energy tax burden (BUR_T) is positively associated with household vulnerability (VULN).

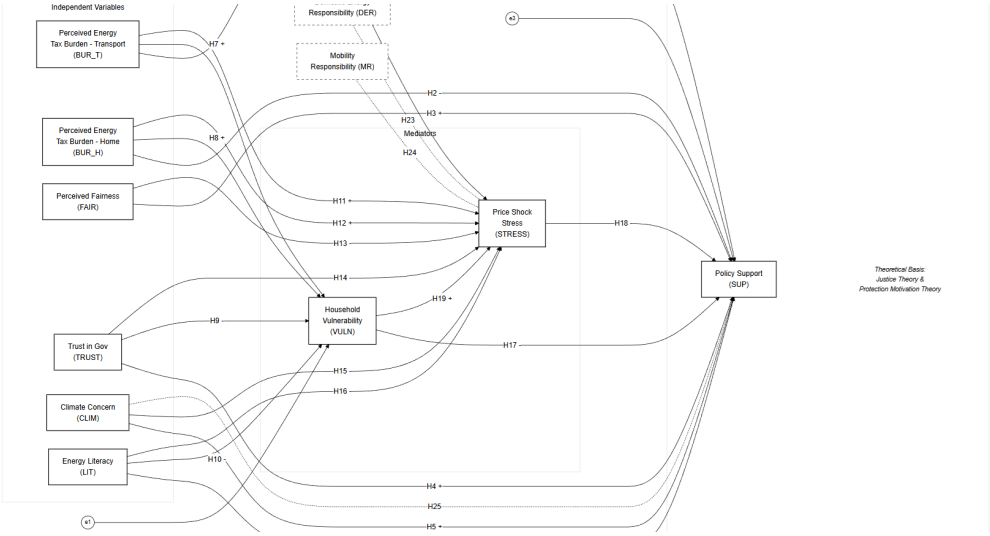

Figure 1: Structural Model Evaluation (Research Framework)

- **H8:** Perceived household energy tax burden (BUR_H) is positively associated with household vulnerability(VULN).
- **H9:** Trust in government and tax authorities (TRUST) is negatively associated with household
- (VULN).
- **H10:** Energy literacy (LIT) is negatively associated with household vulnerability (VULN).

The psychological and financial stress arising from energy price increases further shapes perceptions of energy taxation. Taxes on transport fuels and household energy directly affect everyday mobility and essential activities, thereby increasing vulnerability to price shocks. Prior studies show that energy price shocks elevate anxiety, budgetary constraints, and perceived economic insecurity, especially where short-term adaptation options are limited (Hossain et al., 2026; Oo et al., 2026; World Bank, 2024).

- **H11:** Perceived transport-related energy tax burden (BUR_T) is positively associated with price shock stress (STRESS).
- **H12:** Perceived household energy tax burden (BUR_H) is positively associated with price shock stress (STRESS).
- **H13:** Perceived fairness of energy taxation (FAIR) is negatively associated with price shock stress (STRESS).
- **H14:** Trust in government and tax authorities (TRUST) is negatively associated with price shock stress (STRESS).
- **H15:** Climate concern (CLIM) is negatively associated with price shock stress (STRESS).
- **H16:** Energy literacy (LIT) is negatively associated with price shock stress (STRESS).

2.4 Household vulnerability, stress, and policy support

Household vulnerability represents a central determinant of public attitudes toward energy taxation. Vulnerable households characterized by limited income buffers, high exposure to energy prices, and constrained access to alternatives—are more likely to perceive energy tax increases as threats to basic well-being. Empirical evidence suggests that such vulnerability reduces policy acceptance, as short-term economic security tends to outweigh long-term environmental objectives (Nikou, 2025; Allcott et al., 2014; Li et al., 2026).

- **H17:** Household vulnerability (VULN) is negatively associated with policy support for energy taxes (SUP).
- **H18:** Price shock stress (STRESS) is negatively associated with policy support for energy taxes (SUP).
- **H19:** Household vulnerability (VULN) is positively associated with price shock stress (STRESS).

2.5 Sequential pathways between energy tax perceptions and policy support

Beyond direct effects, perceived energy tax burdens influence policy support through sequential psychological and socioeconomic pathways. Rising energy prices heighten feelings of vulnerability by revealing income constraints and dependence on energy for basic needs, which in turn amplifies stress associated with price shocks and undermines policy acceptance (Babić and Mertens, 2025; Waldron et al., 2025).

- **H20:** Household vulnerability (VULN) mediates the relationship between perceived energy tax burdens and policy support for energy taxes (SUP).
- **H21:** Price shock stress (STRESS) mediates the relationship between perceived energy tax burdens and policy support for energy taxes (SUP).
- **H22:** Household vulnerability (VULN) and price shock stress (STRESS) jointly transmit the relationship between perceived energy tax burdens and policy support for energy taxes (SUP).

2.6 Gendered household roles and conditional policy responses

Gendered roles and responsibilities shape household responses to energy taxes. Women are often more responsible for domestic energy management, making them more sensitive to increases in household energy costs. In contrast, men are typically more exposed to transport-related energy taxes due to commuting responsibilities (**??**). Climate concern further moderates these relationships by reframing energy taxes as necessary tools for climate action.

- **H23:** Domestic energy responsibility (DER) moderates the relationship between household energy
- **H24:** Mobility responsibility (MR) moderates the relationship between transport-related energy tax burden (BUR_T) and price shock stress (STRESS).

- **H25:** Climate concern (CLIM) moderates the relationship between price shock stress (STRESS) and policy support for energy taxes (SUP).

2.7 Conceptual research framework

Figure 1 presents the conceptual framework, integrating behavioural tax compliance theory, procedural and distributive justice perspectives, and gendered household roles to explain public acceptance of energy taxation.

3. Methodology

3.1 Research Design

This study adopts a quantitative cross-sectional survey design to examine household support for energy taxes through behavioral, psychological, and institutional mechanisms. Perceived energy tax burden, fairness, trust, climate concern, energy literacy, household vulnerability, and price shock stress were captured using a structured questionnaire, alongside gendered household roles. This research design is appropriate for testing complex mediation and moderation relationships and is consistent with prior studies on public acceptance of climate and energy policies that rely on perceptual data and behavioral models (Carattini, 2022; Drews and van den Bergh, 2016a,b).

3.2 Research Object and Sample

The research focuses on Indonesian households, represented by respondents aged 18 years and above who participate in household decision-making related to energy use or transport expenditures. Data were collected through an online questionnaire distributed via academic networks, professional mailing lists, and targeted social media platforms, including Facebook community groups. A stratified multi-region sampling approach was employed across 12 provinces in Sumatra, Java, Kalimantan, Sulawesi, Bali-Nusa Tenggara, and Papua to ensure representation of both urban and rural households.

A total of 720 valid responses were obtained, exceeding the recommended minimum sample size for Partial Least Squares Structural Equation Modeling (PLS-SEM) involving mediation and moderation analyses. Detailed demographic characteristics and sampling distribution are reported in Appendix A, based on the validated CSV dataset used in this study (Hair and Alamer, 2022; Hlioui et al., 2025).

3.3 Variable Instruments

All constructs were measured using multiple-item indicators on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Measurement items were adapted from established instruments in the fields of energy policy, tax compliance, and environmental psychology to ensure content and theoretical validity. Constructs including policy support, perceived energy tax burden, fairness, trust, climate concern, and energy literacy represent key cognitive and institutional drivers, while household vulnerability and price shock stress operationalize the proposed transmission mechanisms.

Gendered household roles were operationalized through measures of domestic energy responsibility and mobility responsibility. Each construct was represented by six reflective indicators. The full list of constructs, indicator wording, and source references is provided in Appendix B, while the overall dataset structure is documented in Appendix A.

3.4 Data Analysis

Data analysis was conducted using SmartPLS 4 following the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. PLS-SEM is well-suited for predictive research designs involving complex models with multiple mediators and moderators, as well as non-normal data distributions. The analytical procedure followed a two-stage approach: first, assessment of the measurement model, including indicator reliability, internal consistency, convergent validity, and discriminant validity; second, evaluation of the structural model, including path coefficients, mediation and moderation effects, and explanatory power.

Hypothesis testing was performed using a bootstrapping procedure with 5,000 resamples to assess the statistical significance of the estimated relationships. This analytical strategy follows best practices in PLS-SEM applications within sustainability and public policy research (Hair et al., 2025; Hair and Alamer, 2022; Hair et al., 2025).

4. Results

4.1 Descriptive statistics and sample characteristics

Table 1 The descriptive statistics indicate that the sample is dominated by respondents in their productive age, with an average age of 40.36 years, suggesting that most participants are actively involved in household and economic decision-making. The relatively large age dispersion reflects heterogeneous life stages and socioeconomic experiences, which enhances the representativeness of the sample. Gender composition is nearly balanced, minimizing potential gender bias in the analysis. The predominance of secondary and tertiary education levels indicates moderate human capital, implying adequate capacity to comprehend policy-related information. Average household size (4.21 persons) is consistent with typical household structures in developing economies, while variation in monthly household income highlights existing economic disparities. Furthermore, the higher proportion of urban respondents suggests greater exposure to public services, market access, and policy instruments, which may shape perceptions and behavioral responses. Overall, the descriptive profile demonstrates sufficient demographic and socioeconomic diversity, providing a solid foundation for subsequent empirical analysis and strengthening the external validity of the study.

Table 1: Descriptive statistics of respondents and household characteristics

Variable	Category / Statistic	Value
Age (years)	Mean	40.36
	Standard deviation	11.69
Gender (%)	Male	49.9
	Female	50.1
Education level (%)	Primary or below	21.4
	Secondary	46.8
	Tertiary	31.8
Employment status (%)	Employed	72.5
	Self-employed	18.6
	Unemployed	8.9
Household size	Mean	4.21
	Standard deviation	1.37
Income (million IDR)	Mean	3.20
	Standard deviation	1.69
Residence (%)	Urban	68.8
	Rural	31.2

Table 2 presents the outer loadings for all reflective measurement items. Most indicators exceed the recommended threshold of 0.708, indicating adequate indicator reliability. Two items, DER2 (0.607) and MR2 (0.607), load below 0.70 but remain above the commonly accepted 0.60 cut-off for exploratory research, suggesting a marginal yet acceptable contribution to their respective constructs. CLIM4 (0.766) remains above the 0.708 threshold. Given the early stage of research in this context and to preserve content validity, DER2 and MR2 were retained. Overall, the remaining indicators show strong loadings (0.736–0.921),

confirming that the items reliably represent their intended latent constructs.

Table 3 reports internal consistency reliability. Cronbach's alpha (α) and composite reliability (ρ_c) for all constructs exceed the 0.70 benchmark, indicating strong reliability. The values range from 0.875 (DER) to 0.941 (SUP). The ρ_a values are satisfactory for most constructs (> 0.70). However, DER shows a relatively low ρ_a (0.528), while MR slightly exceeds the upper bound (1.058), which may suggest indicator redundancy. Nevertheless, because the primary composite reliability measure (ρ_c) remains acceptable for both constructs and validity criteria are met, the scales are considered reliable for subsequent analysis.

Convergent validity was assessed using the Average Variance Extracted (AVE) (Table 3). All constructs exceed the 0.50 threshold, indicating that each construct explains more than half of the variance of its indicators. SUP shows the highest AVE (0.726), followed by TRUST (0.683). DER records the lowest AVE (0.544), which is marginally above the cut-off and likely influenced by the comparatively lower loading of DER2. Overall, the results confirm adequate convergent validity across constructs.

Discriminant validity was first examined using the Fornell–Larcker criterion (Table 4). For each construct, the square root of the AVE (diagonal) is greater than its correlations with other constructs (off-diagonal), satisfying the criterion. For example, BUR_H (0.813) exceeds its correlations with VULN (0.575) and STRESS (0.528), while STRESS (0.788) is higher than its correlations with BUR_H (0.528) and VULN (0.556). This indicates that each construct is empirically distinct and shares more variance with its own indicators than with other constructs.

Table 5 presents the Heterotrait–Monotrait ratio (HTMT) as a more stringent test of discriminant validity. All HTMT values are below the conservative threshold of 0.85. The largest value is 0.641 (BUR_H–VULN), followed by 0.627 (STRESS–VULN), both well below 0.85. These findings provide robust evidence that the constructs are distinct. Taken together, the Fornell–Larcker and HTMT results confirm adequate discriminant validity for the measurement model.

Table 2: Indicator loadings

Construct	Item	Loading	Dec.
BUR_H	BUR_H1–H6	0.790–0.840	Keep
BUR_T	BUR_T1–T6	0.776–0.856	Keep
CLIM	CLIM1–CLIM6	0.766–0.830	Keep
DER	DER1	0.739	Keep
	DER2	0.607	Keep*
	DER3–DER6	0.654–0.921	Keep
MR	MR1	0.919	Keep
	MR2	0.607	Keep*
	MR3–MR6	0.736–0.837	Keep

Note: Full item details omitted for brevity. *Retained for content validity.

Table 3: Reliability and Convergent Validity

Cons.	α	ρ_a	ρ_c	AVE
BUR_H	0.898	0.899	0.921	0.662
BUR_T	0.898	0.899	0.922	0.663
CLIM	0.894	0.901	0.919	0.653
DER	0.897	0.528	0.875	0.544
FAIR	0.889	0.891	0.916	0.644
LIT	0.882	0.885	0.910	0.629
MR	0.897	1.058	0.899	0.601
STRESS	0.878	0.879	0.908	0.621
SUP	0.925	0.925	0.941	0.726
TRUST	0.907	0.913	0.928	0.683
VULN	0.892	0.893	0.917	0.649

Table 7 reports collinearity diagnostics and global model fit indices. The maximum inner VIF (1.961) and outer VIF (2.766)

Table 4: Fornell–Larcker criterion

	BUR_H	BUR_T	CLIM	DER	FAIR	LIT	MR	STRESS	SUP	TRUST	VULN
BUR_H	**0.813**										
BUR_T	0.205	**0.814**									
CLIM	-0.109	-0.077	**0.808**								
DER	-0.049	0.043	-0.014	**0.737**							
FAIR	-0.109	-0.098	0.170	-0.081	**0.803**						
LIT	-0.191	-0.107	0.234	-0.079	0.208	**0.793**					
MR	-0.062	0.013	0.039	-0.277	-0.018	0.056	**0.775**				
STRESS	0.528	0.396	-0.222	0.053	-0.311	-0.253	-0.059	**0.788**			
SUP	-0.388	-0.285	0.313	-0.074	0.330	0.270	0.051	-0.474	**0.852**		
TRUST	-0.146	-0.091	0.141	-0.112	0.142	0.145	0.150	-0.233	0.241	**0.827**	
VULN	0.575	0.434	-0.099	0.045	-0.203	-0.236	-0.111	0.556	-0.490	-0.187	**0.806**

Table 5: Heterotrait-Monotrait ratio (HTMT)

	BUR_H	BUR_T	CLIM	DER	FAIR	LIT	MR	STRESS	SUP	TRUST
BUR_T	0.226									
CLIM	0.121	0.089								
DER	0.072	0.054	0.057							
FAIR	0.122	0.110	0.191	0.089						
LIT	0.217	0.127	0.262	0.072	0.235					
MR	0.057	0.062	0.070	0.347	0.059	0.058				
STRESS	0.593	0.446	0.250	0.056	0.350	0.286	0.064			
SUP	0.425	0.312	0.339	0.068	0.362	0.296	0.067	0.525		
TRUST	0.159	0.103	0.156	0.098	0.159	0.160	0.158	0.258	0.258	
VULN	0.641	0.484	0.111	0.048	0.227	0.266	0.117	0.627	0.538	0.206

are well below the conservative cut-off of 5.0. In terms of model fit, the SRMR value of 0.044 falls below the recommended threshold of 0.08, suggesting a good overall correspondence between the model-implied and observed correlations. The NFI of 0.843 also exceeds the commonly used benchmark of 0.80.

Table 6 summarizes the direct determinants of policy support (SUP). Perceived climatic risk (CLIM) and procedural fairness (FAIR) emerge as significant positive drivers of support. Institutional trust (TRUST) has a smaller but significant positive effect. Conversely, household burden (BUR_H), stress (STRESS), and vulnerability (VULN) significantly reduce support, with VULN showing the largest negative effect. The direct effects of tax burden (BUR_T) and literacy (LIT) are not statistically significant.

Table 8 presents the structural paths explaining vulnerability (VULN) and stress (STRESS). For vulnerability, both household burden (BUR_H) and tax burden (BUR_T) are strong positive predictors ($R^2 = 0.452$). Literacy (LIT) and trust (TRUST) significantly reduce vulnerability. For stress, burdens again show strong positive effects, while perceived fairness (FAIR) significantly reduces stress ($R^2 = 0.422$).

4.2 Mediation and moderation analysis

Table 9 reports the specific indirect effects. The findings provide strong support for the hypothesized mediation mechanisms (H20–H22). For both household and transport tax burdens, the direct effects on policy support (SUP) are weak, whereas the total effects are negative and statistically significant. This indicates that tax burdens erode policy support primarily through increased perceived vulnerability and psychological stress (full mediation).

4.3 Discussion

This study develops a behavioral-institutional perspective on public support for energy taxation by extending conventional economic models to incorporate perceptions of equity, institutional trust, psychological stress, and household vulnerability. The findings provide strong evidence that acceptance of energy taxes is shaped not only by perceived economic costs but also by institutional legitimacy and cognitive-emotional evaluations. In doing so, the study contributes to the literature by identifying the mechanisms through which objective policy burdens are translated into public support or opposition.

First, the results are broadly consistent with the theoretical foundations of procedural justice and behavioral public finance (Tyler, 1990; Carattini, 2022). Perceived procedural fairness and institutional trust emerge as significant and positive determinants of policy support, underscoring the importance of transparent decision-making processes and credible governance. These findings suggest that citizens evaluate energy taxes within a social contract framework, where legitimacy is derived not solely from policy effectiveness but also from the perceived fairness of institutions.

However, the results also indicate that the effects of trust and fairness, while statistically significant, are smaller in magnitude than those associated with perceived economic burdens and psychological responses. This contrasts with studies that identify institutional trust as the dominant driver of acceptance Maestre-Andrés et al. (2021) and points to a hierarchy of determinants in which material security and emotional well-being play a more immediate role.

The principal theoretical contribution of this study lies in elucidating the mediating pathways linking tax burdens to policy support. Consistent with stress-coping frameworks and distributive justice perspectives Douenne and Fabre (2022); Li et al. (2026); Scholz and Lilliestam (2026), the results show that both household and transport-related tax burdens exert their strongest effects indirectly through increased perceptions of household vulnerability and stress associated with price shocks. While the direct effects of burdens on support are relatively modest, the total transmitted impacts through these mediators are substantial and negative. This finding highlights that opposition to energy taxation is driven less by the absolute financial cost and more by the insecurity and psychological strain induced by such policies (UatBSolakivi et al., 2026; Waldron et al., 2025; Ajlan, 2026). Vulnerability and stress thus function as central transmission mechanisms explaining heterogeneous public reactions to similar price increases.

The findings further contribute to the literature by clarifying the role of resilience-enhancing factors. Climate concern and energy literacy are positively associated with policy support, but their effects operate largely through reductions in vulnerability and stress. Climate concern exhibits partial mediation, whereas the effect of literacy is fully mediated, suggesting that these cognitive factors enhance support by strengthening perceived adaptive capacity and reducing uncertainty related to energy price fluctuations. This insight positions literacy and environmental awareness not only as informational assets but also as psychological resources that mitigate the adverse mental and emotional impacts of fiscal climate policies.

Finally, the absence of significant moderating effects related to domestic and mobility responsibilities provides an informative null result. Contrary to expectations derived from gendered role theory Jacome et al. (2026); Oo et al. (2026), household roles do not significantly condition the relationship between tax burdens, stress, and policy support. This suggests that, within the present sample, broader economic and psychological vulnerabilities outweigh role-specific responsibilities in shaping stress responses. Future research may examine whether these roles influence policy acceptance through alternative mechanisms, such as the initial framing of perceived burdens rather than the moderation of stress pathways.

Beyond its substantive theoretical contributions, this study also advances the methodological and conceptual understanding of public acceptance of environmental taxation by explicitly integrating psychological stress mechanisms into a structural behavioral-institutional framework. While previous studies have acknowledged distributional impacts and fairness perceptions as important determinants of tax acceptance, few have systematically modeled how these factors interact with subjective experiences of insecurity and stress. By empirically validating household vulnerability and price shock stress as serial mediators, this research provides a more granular explanation for why similar tax designs may provoke divergent public reactions across households. This approach helps reconcile inconsistencies in the existing literature, where comparable energy tax policies have yielded widely varying levels of public support across contexts. The findings suggest that opposition to energy taxes cannot be adequately understood without accounting for the cumulative psychological strain imposed by rising living costs, particularly in settings characterized by income volatility, limited energy alternatives, and weak social safety nets. Consequently, the study contributes to a growing body of work that positions emotional and cognitive responses as integral components of fiscal policy evaluation, rather than peripheral attitudinal factors.

Several directions for future research arise from these findings. First, the central role of vulnerability and stress as mediating mechanisms underscores the importance of more interdisciplinary approaches that integrate public finance, behavioral economics, and social psychology. Longitudinal research designs would be especially useful for examining how sustained exposure to energy price fluctuations influences stress adaptation, household resilience, and policy attitudes over time. Second, although this study finds limited empirical support for moderating effects related to household roles and responsibilities, this null finding should

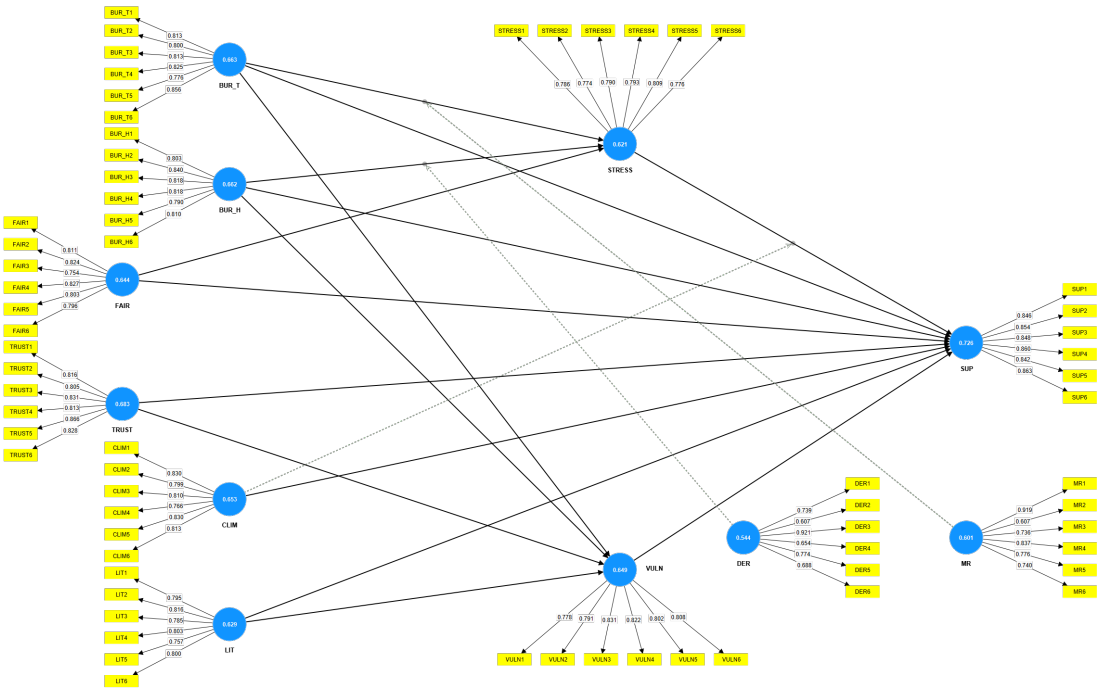

Figure 2: Measurement model with standardized outer loadings

Note: The diagram displays standardized outer loadings for reflective indicators. Values on the paths represent the strength of the relationship between latent constructs and their indicators.

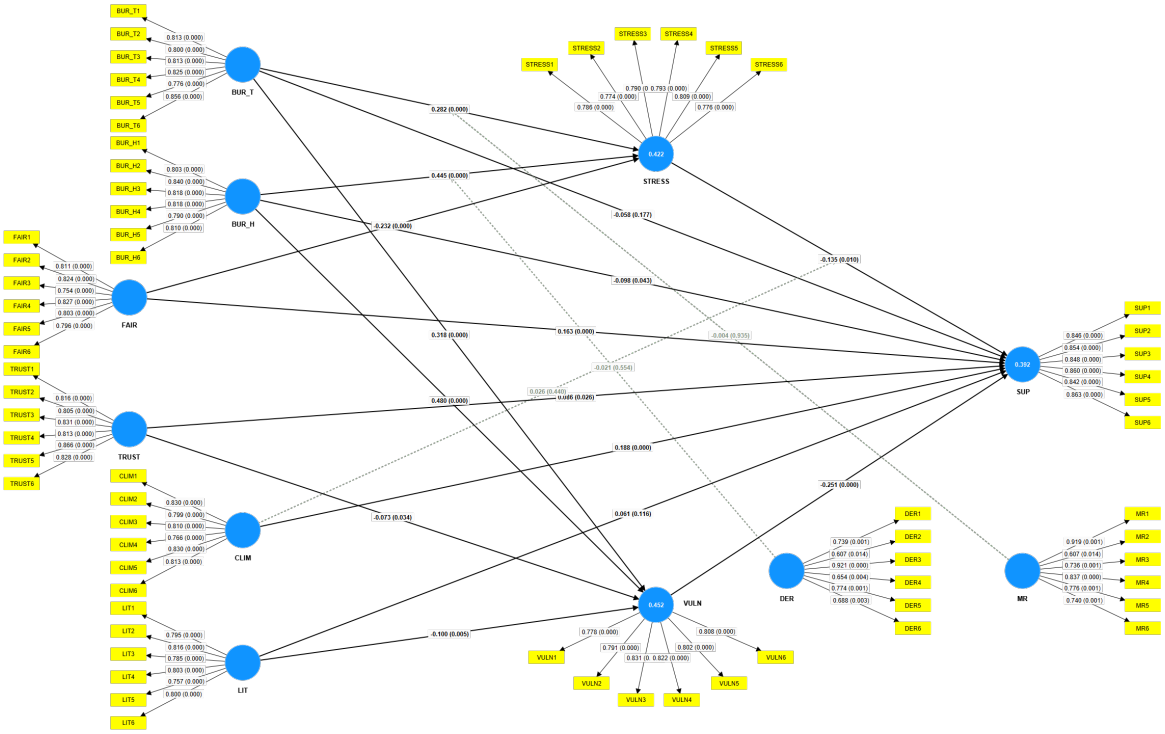

Figure 3: Structural model with standardized path coefficients

Note: Values on paths represent standardized coefficients (β). Values inside constructs represent the coefficient of determination (R^2). The model demonstrates strong predictive power for Vulnerability (R^2 = 0.452), Stress (R^2 = 0.422), and Policy Support (R^2 = 0.392).

not be interpreted as a lack of relevance. Instead, it suggests that such roles may function earlier in the causal process, shaping initial perceptions of burden and vulnerability rather than directly moderating stress responses.

Table 6: Direct effects on policy support (SUP)

Path	β	SD	t	p	Sig.
BUR_H → SUP	-0.098	0.049	2.02	0.043	Yes*
BUR_T → SUP	-0.058	0.043	1.35	0.177	No
CLIM → SUP	0.188	0.037	5.03	0.000	Yes***
FAIR → SUP	0.163	0.038	4.23	0.000	Yes***
LIT → SUP	0.061	0.039	1.57	0.116	No
STRESS → SUP	-0.135	0.053	2.56	0.010	Yes**
TRUST → SUP	0.086	0.038	2.22	0.026	Yes**
VULN → SUP	-0.251	0.051	4.88	0.000	Yes***
CLIM×STR → SUP	0.026	0.034	0.77	0.440	No

Table 7: Collinearity diagnostics and model fit

Criterion	Value	Assessment / Threshold
Collinearity (VIF)		
Inner VIFs (Maximum)	1.961	No collinearity (< 5.0)
Outer VIFs (Maximum)	2.766	No collinearity (< 5.0)
Model fit		
SRMR	0.044	Good fit (≤ 0.08)
NFI	0.843	Acceptable fit (> 0.80)

Table 8: Structural paths predicting household vulnerability (VULN) and stress (STRESS)

DV	Predictor	β	SD	t	p	Sig.
VULN	BUR_H	0.480	0.033	14.78	0.000	***
(R^2 = 0.45)	BUR_T	0.318	0.035	9.03	0.000	***
	LIT	-0.100	0.036	2.80	0.005	**
	TRUST	-0.073	0.035	2.11	0.034	*
STRESS	BUR_H	0.445	0.035	12.88	0.000	***
(R^2 = 0.42)	BUR_T	0.282	0.035	8.07	0.000	***
	FAIR	-0.232	0.036	6.50	0.000	***
	DER	0.035	0.060	0.59	0.555	ns
	MR	-0.030	0.063	0.47	0.636	ns

Table 9: Indirect and total effects on policy support (SUP)

Path	Spec. Ind.	Total Ind.	Direct	Total Eff.	Supp.
BUR_T → SUP	–	-0.058^{ns}	-0.058^{ns}	-0.175***	Yes
→ VULN → SUP	-0.080***				
→ STRESS → SUP	-0.038*				
BUR_H → SUP	–	-0.181***	-0.098*	-0.279***	Yes
→ VULN → SUP	-0.121***				
→ STRESS → SUP	-0.060*				
FAIR → SUP	0.031*	0.031*	0.163***	0.194***	Yes
LIT → SUP	0.025*	0.025*	0.061^{ns}	0.086*	Yes
TRUST → SUP	0.018*	0.018*	0.086**	0.104**	Yes

Table 10: Moderating effects

Hyp.	Interaction path	β	t	p	Result
H23	DER × BUR_H → STRESS	-0.021	0.59	0.554	Not supp.
H24	MR × BUR_T → STRESS	-0.004	0.08	0.935	Not supp.
H25	CLIM × STRESS → SUP	0.026	0.77	0.440	Not supp.

5. Conclusion

This research develops a comprehensive behavioral-institutional model that makes a substantive contribution to the literature on public support for energy taxation. Its central contribution lies in empirically demonstrating that household vulnerability and price shock-related stress function as key serial mediators through which perceived tax burdens translate into opposition to energy tax policies. By identifying these psychological pathways, the study shifts the analytical focus away from conventional direct-effect models of political costs toward an interpretation in which the political cost of energy taxation is fundamentally psychological, rooted in perceived threats to economic security and mental well-being.

The findings further reframe institutional trust, procedural fairness, climate concern, and energy literacy as more than independent sources of policy legitimacy. Instead, these factors operate as critical buffering mechanisms that mitigate vulnerability and anxiety, thereby fostering policy acceptance. This integrated perspective highlights how cognitive and institutional resources can attenuate the adverse psychological impacts of fiscal climate instruments.

From a policy standpoint, the results provide a robust evidence base for the design of socially acceptable energy taxes. Effective policy design should combine taxation with targeted social compensation, clear and credible communication that reduces perceived insecurity, and governance arrangements that strengthen institutional trust. By addressing the psychological mechanisms underlying opposition, governments can enhance both the legitimacy and the political feasibility of energy taxation as a key instrument for climate mitigation.

Limitations and Directions for Future Research

Despite its contributions, this study has several limitations that should be acknowledged and provide opportunities for future research. First, the analysis relies on cross-sectional survey data, which restricts the ability to capture dynamic adjustments in household perceptions, stress responses, and policy attitudes over time. Future studies would benefit from longitudinal or panel designs that track how repeated exposure to energy price changes influences vulnerability, psychological adaptation, and long-term support for energy taxation. Such approaches would allow researchers to distinguish between short-term stress reactions and more durable shifts in acceptance driven by learning, adaptation, or institutional credibility.

Second, while this study finds limited evidence for moderating effects related to domestic and mobility responsibilities, this should not be interpreted as evidence that household roles are unimportant. Rather, these roles may operate at earlier stages of perception formation, shaping how individuals initially interpret tax burdens and economic risk rather than moderating stress responses directly. Future research could explore these mechanisms using qualitative methods, experimental designs, or mixed-method approaches that examine how gendered and household responsibilities influence cognitive framing, perceived fairness, and vulnerability prior to stress activation. Additionally, extending the model to different national and institutional contexts would enhance external validity and allow comparative insights into how welfare systems, compensation schemes, and governance quality condition the psychological pathways identified in this study.

Declarations

CRediT authorship contribution statement

Tasya Nayada: Conceptualization; Methodology; Writing – original draft.
Daryono, : Data analysis; Writing – review & editing.

Informed consent statement

Not applicable. This study does not involve human participants or identifiable personal data.

Ethics approval

This study does not require ethical approval, as it does not involve human subjects, animals, or sensitive personal data.

Permission to reproduce material from other sources

No material from other sources requiring permission was used in this manuscript.

Clinical trial registration

Not applicable.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Artificial intelligence (AI) ethics statement

Artificial intelligence tools were used solely for language refinement and formatting assistance. No AI system was used for data generation, data analysis, or decision-making processes. All interpretations, conclusions, and scientific judgments remain the sole responsibility of the authors.

Appendix A. Demographic Characteristics

Table A1: Demographic and household characteristics of respondents (N = 477)

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	238	49.9
	Female	239	50.1
Age group	22–29	83	17.4
	30–39	149	31.2
	40–49	123	25.8
	≥ 50	122	25.6
Education	High school	112	23.5
	Diploma	104	21.8
	Bachelor's degree	201	42.1
	Master's degree	60	12.6
Monthly income	< 3 million IDR	78	16.4
	3–5 million IDR	131	27.5
	5–10 million IDR	172	36.1
	> 10 million IDR	96	20.1
Residence	Urban	317	66.5
	Rural	160	33.5

Appendix B. Measurement Items

Table A2: Measurement Constructs, Indicators, and Sources

Code	Construct	Indicator Item	Source
SUP	Policy Support	1. I support energy taxes if their goal is to reduce pollution. 2. I accept higher energy taxes if compensation is provided for vulnerable households. 3. I am willing to comply with higher energy taxes to support the energy transition. 4. I support energy taxes if policy outcomes are transparent and measurable. 5. Energy tax revenues should be used for public transport and clean energy. 6. I would still support energy taxes even if household energy costs increase slightly.	Lachapelle et al. (2021); Carattini et al. (2018)
BUR_T	Transport Tax Burden	1. Energy taxes will mainly burden my household's transport and fuel expenses. 2. Higher transport costs would disrupt work or education activities. 3. It is difficult for me to reduce fuel use even if prices rise. 4. Viable public or alternative transport options are limited where I live. 5. Transport-related energy taxes feel disproportionate to their benefits. 6. Energy taxes would worsen my routine transport expenditures.	Carattini et al. (2018); Kallbekken et al. (2011)
BUR_H	Household Tax Burden	1. Energy taxes will mainly burden electricity/LPG household expenses. 2. Higher household energy costs would reduce my ability to meet other needs. 3. Saving energy at home is difficult without reducing comfort. 4. My household energy bills are already high relative to income. 5. Energy taxes increase the risk of bill arrears or extreme cutbacks. 6. Household energy costs are more sensitive to price increases than transport.	Heindl & Löschel (2015); Deller (2018)

Continued on next page...

Table A2 – continued from previous page

Code	Construct	Indicator Item	Source
FAIR	Perceived Fairness	1. Energy taxes should mainly burden those who pollute the most. 2. Energy tax policies should protect low-income households. 3. Energy taxes are fair if applied consistently without special treatment. 4. Governments should clearly explain how energy tax rates are set. 5. Energy taxes are fair if revenues return to the public. 6. Citizens should have accessible complaint and review mechanisms.	Tyler (2006); Wenzel (2002)
TRUST	Institutional Trust	1. I trust the government to manage energy tax revenues responsibly. 2. I trust authorities to distribute compensation fairly. 3. Energy tax policies are not manipulated for special interests. 4. Government reports on energy tax use are credible. 5. Energy tax enforcement is fair and impartial. 6. The government is serious about using energy taxes for energy transition.	Kirchler et al. (2008); Levi & Stoker (2000)
CLIM	Climate Concern	1. I am concerned that climate change will affect quality of life. 2. Emission reduction is necessary despite short-term economic costs. 3. I feel personally responsible for reducing pollution. 4. I support policies that promote energy efficiency. 5. I prefer environmentally friendly policies over cheaper but harmful ones. 6. Climate issues are relevant for tax and fiscal policy.	O'Connor et al. (1999); Stern (2016)
LIT	Energy Literacy	1. I understand why electricity or LPG bills increase. 2. I know realistic ways to save energy at home. 3. I understand low-energy transport alternatives. 4. I am aware of government or utility energy-saving programs. 5. I can estimate how energy price increases affect my budget. 6. I understand that energy taxes aim to change consumption behavior.	DeWaters & Powers (2011)
STRESS	Price Shock Stress	1. Rising energy prices make me anxious about household finances. 2. Energy expenses complicate my monthly budget planning. 3. I feel stressed choosing between energy and basic needs. 4. Higher energy prices may cause household conflict. 5. I frequently think about how to reduce energy costs. 6. Energy price increases weaken my household's financial resilience.	Heo et al. (2020); Pearlin et al. (1981)
VULN	Household Vulnerability	1. My household is quickly affected by energy price increases. 2. We cannot easily replace appliances with efficient technologies. 3. Access to public transport or alternative energy is limited. 4. We risk reducing basic comfort due to energy costs. 5. We lack financial buffers to absorb energy price shocks. 6. Energy cost increases threaten basic needs.	Bouzarovski & Petrova (2015); Hills (2012)
DER	Domestic Responsibility	1. I usually manage household electricity or LPG use. 2. I decide when and how energy is used at home. 3. I handle household energy bill payments. 4. I ensure household energy needs are met. 5. I actively practice energy-saving behaviors at home. 6. Domestic energy responsibility mainly rests with me.	Shelton & John (1996)
MR	Mobility Responsibility	1. I am mainly responsible for work-related travel. 2. I usually transport family members for daily activities. 3. I decide which transport modes the household uses. 4. I bear most household transport expenses. 5. My daily activities depend heavily on transport. 6. Mobility responsibility mainly rests with me.	Best & Lanzendorf (2005)

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