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Article

Solar Resource Utilization in Public Institutions Through Energy Performance Contracting: A Multi-Dimensional Assessment of Photovoltaic Efficiency, Governance, and Policy Accountability

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Abstract

This study conducts a multi-dimensional evaluation of Energy Performance Contracts (EPCs) applied to solar photovoltaic (PV) systems in public institutions, emphasizing their technical efficiency, governance structure, and policy accountability. Within the broader context of solar resource utilization and sustainable energy transition, EPCs are increasingly recognized as strategic mechanisms to enhance energy efficiency and reduce emissions without imposing immediate fiscal burdens on public budgets. Using a mixed-methods approach, the research integrates quantitative assessments of photovoltaic system performance—based on SCADA-verified production data and CO₂ mitigation outcomes—with qualitative evaluations of contract design, stakeholder coordination, and institutional transparency. The case of a 1710.72 kWp university-based PV installation in Türkiye demonstrates that EPCs can effectively deliver high operational reliability (performance ratio: 83%) and substantial environmental benefits (1168.64 tons of CO₂ avoided annually). However, the study also reveals that EPC success is critically shaped by the coherence of regulatory frameworks, administrative capacity, and accountability mechanisms. Institutional fragmentation, limited data integration, and insufficient governance oversight remain significant barriers to scaling EPC adoption in the public sector. The research concludes by proposing an integrated policy framework that aligns technical performance monitoring with transparent governance and policy coherence. This approach supports real-time performance tracking, multi-level coordination, and enhanced institutional accountability—key enablers for accelerating the solar energy transition through scalable and financially sustainable EPC models in public infrastructure.

Keywords: energy performance contracting; solar resource utilization; public institutions; photovoltaic efficiency; sustainable energy governance; renewable energy financing; institutional accountability; off-balance-sheet financing; policy coherence; digital monitoring; energy transition

1. Introduction

Global environmental imperatives and fiscal constraints have increasingly pressured public institutions to reconcile energy efficiency with governance accountability. As climate change intensifies, governments worldwide are compelled to reduce their carbon footprint, modernize public infrastructure, and achieve energy efficiency without exacerbating fiscal burdens [1–3]. In this context, Energy Performance Contracts (EPCs) have emerged as a strategic vehicle that enables public entities to implement energy-saving measures through third-party financing, reducing upfront capital expenditure while achieving measurable efficiency outcomes [4,5]. Yet, despite the theoretical promise, the implementation of EPCs remains fragmented and uneven across countries, sectors, and institutional contexts [6,7].

The public sector, as a major energy consumer, plays a crucial role in achieving national sustainability goals. Nevertheless, bureaucratic inertia, accountability gaps, and policy fragmentation frequently hinder effective EPC deployment [8,9]. While countries such as Italy, Malaysia, and Poland have introduced EPC frameworks tailored to their administrative structures [10,11], studies reveal persisting inefficiencies, notably in regulatory enforcement, baseline evaluation, and risk-sharing mechanisms [12,13]. These challenges highlight the necessity of a multidimensional evaluation framework that integrates technical, economic, and governance dimensions in EPC design and implementation.

Recent literature underscores the importance of digital transformation in enhancing EPC governance [14]. AlNuaimi et al. [15] and Arantes & Ferreira [16] argue that smart technologies, digital leadership, and organizational agility can significantly improve energy governance in public institutions. Blockchain, AI, and IoT-based solutions are enabling transparent monitoring and performance verification, thereby mitigating moral hazard in shared-savings EPC models [7,17]. Yet, the integration of digital tools remains patchy, and public sector digitalization is often constrained by skill deficits, cybersecurity risks, and institutional rigidity [18].

In parallel, researchers have pointed to the economic underpinnings of EPCs, emphasizing the importance of performance-based incentive structures and risk-sharing models in aligning contractor incentives with public objectives [19,20]. The role of off-balance-sheet equity mechanisms is increasingly recognized as a viable tool for capital mobilization, especially in contexts where public debt ceilings constrain direct investment [12]. Despite this, risk aversion among public managers and political resistance often delay or dilute innovative financing arrangements [21,22].

The institutional dimension of energy governance has also received growing scholarly attention. Building on institutional theory, several studies have shown how policy path dependence, regulatory traditions, and administrative cultures shape EPC uptake and effectiveness [23–25]. Public procurement frameworks, often designed for conventional infrastructure, may not be suited to performance-based energy contracting, necessitating regulatory redesign and capacity-building interventions [26,27]. Moreover, governance failures—ranging from limited inter-agency coordination to opaque reporting standards—undermine the long-term sustainability of EPCs [28,29].

In developing economies, the challenge is more pronounced. Energy inefficiency in public institutions is compounded by fiscal fragility, limited institutional capacity, and inadequate monitoring systems [30,31]. The absence of robust data infrastructure often results in inaccurate baselining, overestimation of savings, and ultimately, contract failure [32]. While models from Europe and North America offer useful lessons, they cannot be transplanted without contextual adaptation [33,34]. Tailored approaches that account for local governance structures, energy markets, and institutional maturity are imperative.

In higher education institutions (HEIs), which are often microcosms of public infrastructure, the potential of EPCs remains underexploited. Studies by Munaro & John [35], Nair et al. [27], and Segbenu & Olanipekun [36] reveal that HEIs in both developing and developed countries face multiple barriers to energy efficiency, including funding limitations, organizational silos, and fragmented accountability chains. Moreover, university administrators often lack technical expertise or incentives to engage with complex contracting models. Yet, HEIs present unique opportunities for integrated EPC frameworks, particularly when aligned with sustainability agendas and research missions [37].

Furthermore, there is growing recognition of the social and equity implications of EPC deployment. Decentralized energy systems—such as solar microgrids or building-level retrofits—can address both environmental and social equity concerns when designed inclusively [25,38]. In this context, EPCs can be powerful instruments of just transition if embedded within community governance structures and supported by participatory planning processes [39–41]. However, standard EPC models often overlook equity metrics, focusing instead on purely technical or financial KPIs, thereby limiting their transformative potential.

Interdisciplinary scholarship has called for a rethinking of EPCs as part of a broader public management reform. From the perspective of public administration, issues such as accountability, transparency, and institutional learning are central to EPC success [17,42]. Economic analyses, meanwhile, focus on incentive design, transaction costs, and return-on-investment metrics [2,43]. Engineering studies emphasize technical baselining, monitoring, and verification methodologies [44,45]. Despite their insights, these disciplinary silos have impeded the development of an integrated, multi-dimensional EPC framework that bridges governance, economics, and technology.

In response to these challenges, this study proposes a comprehensive, multi-criteria framework for evaluating EPCs in public institutions. Drawing on mixed-methods analysis—including econometric modeling, regulatory analysis, and institutional diagnostics—we examine the interplay between technical efficiency, governance structures, and policy accountability in shaping EPC outcomes. The study builds on the foundational insights of Li [5], who conducted a bibliometric review of EPCs in the public sector, and extends the literature by incorporating interdisciplinary metrics and cross-national case comparisons.

Moreover, this paper responds to calls for evidence-based policymaking in the context of climate governance and fiscal sustainability. As Sachs et al. [3] argue, achieving the Sustainable Development Goals (SDGs) by 2030 requires innovative financing mechanisms that go beyond traditional budgetary channels. EPCs, when properly designed and governed, can serve as catalytic tools for mobilizing private capital toward public infrastructure decarbonization [20,29]. However, their potential remains largely untapped due to conceptual fragmentation and policy inertia.

Accordingly, the objectives of this study are threefold. First, we map the global landscape of EPC implementation across varied institutional contexts, identifying key trends, innovations, and barriers. Second, we develop an integrated evaluative framework that encompasses technical efficiency (e.g., energy savings, cost-effectiveness), governance (e.g., transparency, accountability), and policy alignment (e.g., regulatory fit, institutional coherence). Third, we formulate actionable recommendations for policymakers, energy managers, and public procurement officers seeking to scale up EPC adoption within a sustainable development framework.

This research makes several contributions. Theoretically, it advances the understanding of EPCs through a systems-thinking lens, emphasizing feedback loops and interdependencies across governance, economics, and engineering. Empirically, it draws on a wide range of cross-national data sources, case studies, and secondary literature to build a nuanced typology of EPC effectiveness. Methodologically, it combines quantitative regression analyses [43] with qualitative institutional diagnostics [25,30], offering a replicable model for future research.

The remainder of this paper is organized as follows. Section 2 reviews the existing literature on EPCs, highlighting gaps and theoretical divergences. Section 3 outlines the research methodology, including data sources, variable definitions, and analytical strategies. Section 4 presents the results of

our empirical analysis. Section 5 discusses key findings in relation to policy and governance theory. Section 6 concludes with recommendations for practice, policy, and future research.

2. Literature Review

2.1. Conceptual Foundations of Energy Performance Contracting (EPC)

Energy Performance Contracting (EPC) has emerged as a pivotal financial and operational model designed to address energy inefficiencies in public and private sectors alike. The conceptual core of EPC lies in a performance-based remuneration framework wherein an Energy Service Company (ESCO) implements energy efficiency measures and recovers its investment through the resulting cost savings [10,46]. EPCs have been acknowledged by global institutions, including the World Bank [47], as critical instruments for overcoming the upfront capital barriers traditionally associated with energy efficiency upgrades.

While the EPC mechanism originated in Western economies, its adoption has become increasingly global, particularly in emerging economies where fiscal constraints and energy supply vulnerabilities coalesce. In countries like Türkiye, EPCs have become strategic instruments aligned with both energy policy and fiscal discipline mandates [43]. The flexibility of the EPC model—ranging from guaranteed savings to shared savings agreements—has allowed for tailored applications across a spectrum of building types, from universities and hospitals to municipal facilities [8,27].

Despite the conceptual appeal of EPCs, their real-world deployment is often hindered by technical, institutional, and financial limitations [5]. These barriers necessitate a comprehensive, interdisciplinary approach that integrates technical modeling with economic feasibility analyses—an aspect where our study directly contributes by offering a regression-based evaluation of an EPC-backed photovoltaic (PV) installation.

2.2. EPCs in the Public Sector: Opportunities and Challenges

Public sector institutions have long been recognized as high-potential targets for EPC implementation due to their often inefficient building stock and budgetary limitations [28]. Universities, in particular, offer unique advantages for EPC deployment as they combine high energy consumption profiles with academic capacity for technical oversight and data collection [35].

Nevertheless, multiple empirical studies point to a systemic underutilization of EPCs in public infrastructure [25,45]. These challenges are often rooted in bureaucratic inertia, risk-averse institutional cultures, and fragmented governance structures [22]. Moreover, EPCs require long-term political and financial commitments, which can be difficult to secure in environments characterized by administrative turnover or fluctuating regulatory landscapes [21].

Financially, EPC projects face high transaction costs, lack of access to low-cost financing, and extended payback periods [12]. Technically, the absence of standardized measurement and verification (M&V) frameworks reduces trust in projected savings and complicates contract enforcement [20,33]. Furthermore, issues related to data availability, quality, and granularity undermine predictive accuracy—an area this study addresses through rigorous regression modeling validated with real production data.

2.3. Methodological Advances in EPC Evaluation

A recurring limitation in the EPC literature is the paucity of robust, empirical assessments grounded in operational data. Much of the prior work remains theoretical or anecdotal, often failing to integrate quantitative methods capable of isolating the causal determinants of EPC performance [2,5]. Some notable exceptions include predictive modeling using simulation tools or machine learning algorithms for energy audits [26,37], yet few studies have validated such models against real-world production figures.

A growing body of literature advocates for mixed-method approaches combining technical performance monitoring with econometric modeling to improve reliability and transferability of findings [16,24]. For instance, Momete [19] highlights the utility of integrating financial indicators such as Net Present Value (NPV) and Internal Rate of Return (IRR) with environmental metrics like CO₂ mitigation to holistically assess project success.

This paper builds on these methodological trends by employing a multiple linear regression framework to estimate the unit production cost (in TL/kWh) of a public sector PV system. By using independent variables such as solar radiation, investment cost, and electricity sales price, our model generates a robust estimation of cost efficiency, which is then validated against actual field data—a rarely attempted triangulation in the EPC literature.

2.4. Digitalization, Governance, and Sustainability Nexus

Recent scholarship has emphasized the interlinkages between digital transformation, institutional agility, and energy sustainability [15,18,48]. In public EPC contexts, digital platforms for real-time monitoring and M&V can substantially reduce transaction costs, increase trust between stakeholders, and enhance contractual compliance [44]. However, digitalization requires complementary investments in capacity building, data infrastructure, and cybersecurity—areas often underfunded in public sector EPC projects [17].

Moreover, the success of EPCs is highly contingent on governance quality. As Cowell et al. [23] and Kimuli & Kirabira [31] note, decentralization of energy governance structures, when paired with robust regulatory frameworks, can enhance innovation uptake and stakeholder coordination. This governance angle is especially salient in Türkiye, where EPC adoption remains uneven across institutions due to administrative fragmentation and lack of performance-based accountability.

Thus, our study not only evaluates the technical and economic feasibility of an EPC-backed PV installation but also touches on governance considerations relevant to public energy transitions. By doing so, we aim to fill a gap in the literature that often treats technical modeling and institutional analysis as siloed domains.

2.5. Environmental and Policy Implications

As global efforts to mitigate climate change intensify, EPCs are increasingly positioned as instruments of environmental policy. By linking financial returns to energy savings and emissions reductions, EPCs offer an avenue to internalize environmental externalities into institutional budgets [29,42]. This alignment is particularly critical in countries like Türkiye, which is navigating its obligations under the Paris Agreement while grappling with macroeconomic volatility.

International experience suggests that EPCs can also serve as incubators for broader sustainability reforms. In China, for example, EPCs have been embedded within national carbon neutrality strategies [32], while the European Union has integrated them into its Green Deal framework through programs like ELENA [46]. However, such outcomes require consistent policy support, robust legal infrastructure, and tailored financial instruments—elements that remain partially developed in many emerging economies [11].

The environmental benefits of our case study—particularly the 1168.64 tons of CO₂ avoided and nearly 950 tons of coal saved—underscore the potential for EPCs to contribute tangibly to national and institutional decarbonization efforts. Furthermore, our methodology for quantifying environmental impacts can inform performance verification standards in future EPC contracts.

3. Materials and Methods

This study adopts a qualitative-dominant mixed-method approach to evaluate the multi-dimensional performance of Energy Performance Contracts (EPCs) in public institutions. In line with the objectives outlined in the introduction and abstract, the methodology is designed to investigate three interrelated dimensions of EPC implementation: technical efficiency, institutional governance,

and policy accountability. Rather than focusing exclusively on quantitative output measures, the study emphasizes the interplay between regulatory structures, stakeholder practices, and performance verification mechanisms within the EPC framework.

3.1. Research Strategy

The research is designed as a case-informed institutional analysis, using a university-based solar photovoltaic (PV) project implemented under an EPC model in Türkiye as an empirical anchor. The selected case (a 1710.72 kWp solar power plant commissioned on a public university campus) serves not only as a source of technical and administrative data, but also as a contextualized example through which broader governance and policy issues are examined. The project was selected due to its formal documentation, third-party monitoring system, and alignment with public energy policy goals.

3.2. Data Sources:

The analysis draws on multiple data sources, triangulated to ensure reliability and contextual depth:

- Official project documents including the EPC contract, technical feasibility reports, and implementation plans.
- Institutional data from university administrative units on budgetary processes, energy procurement, and maintenance procedures.
- Regulatory and policy documents at the national and local level, including EPC guidelines, public procurement laws, and climate policy frameworks.
- Semi-structured expert interviews with stakeholders including public officials, project managers, technical consultants, and university administrators (n = 12).
- Academic and grey literature on EPC implementation, governance in public institutions, and energy transition policies in Türkiye and comparable settings.

3.3. Analytical Framework:

To analyze the collected data, the study employs a multi-dimensional content analysis framework guided by three thematic pillars:

Technical and Operational Efficiency

Evaluation of the system's operational output (e.g., annual generation vs. projected capacity), maintenance procedures, and real-time monitoring practices. This includes a critical reading of SCADA reports and EPC performance clauses, but avoids engineering-based regression modeling. Instead, the focus is on whether the technical performance metrics are transparently tracked, verified, and used for contractual decision-making.

1. Institutional Governance Assessment

Analysis of organizational processes surrounding EPC planning, procurement, oversight, and interdepartmental coordination. Interview transcripts and institutional records are coded using governance indicators adapted from previous studies [23,25], such as:

- Role clarity among stakeholders
- Contractual risk allocation
- Monitoring responsibility distribution
- Feedback and grievance mechanisms

2. Policy Accountability and Compliance

Assessment of alignment between EPC implementation and overarching policy commitments, such as national energy efficiency strategies, climate action plans, and budgetary transparency standards. Publicly available performance reports and compliance audits are reviewed to evaluate whether the EPC is being used as an instrument of broader public policy or merely as an isolated infrastructure investment.

3.4. Methodological Rigor

To ensure methodological robustness:

- Triangulation is used to cross-validate interview data with documentary and technical evidence.
- Thematic coding is conducted using NVivo software, allowing for consistent categorization of qualitative data.
- Peer debriefing was carried out with two external energy policy experts to reduce interpretation bias.
- Audit trail documentation was maintained throughout to enhance transparency and replicability.

3.5. Ethical Considerations

The study was conducted in accordance with the principles of ethical research. All interviewees were informed of the purpose of the study and signed consent forms. Institutional approval was obtained from the university's ethics board, and all data were anonymized. No confidential business information was disclosed or used beyond agreed parameters.

3.6. Scope and Limitations

While the case-based methodology offers rich contextual insights, findings are not statistically generalizable. However, the study's conceptual and policy frameworks are transferable to other public sector EPC settings, particularly in emerging economies. The absence of quantitative economic modeling is a deliberate methodological choice to maintain alignment with the study's governance and policy focus.

4. Results and Discussion

This section presents a multi-dimensional analysis of Energy Performance Contracts (EPCs) within a public university setting, interpreted through the lenses of technical performance, governance dynamics, and policy alignment. Drawing on empirical evidence from a university-based solar photovoltaic (PV) installation in Türkiye, the results illustrate how institutional capabilities and policy coherence critically shape the outcomes of EPC implementation.

4.1. Technical Performance and Operational Findings

The installed solar power plant, with a total capacity of 1710.72 kWp, demonstrated an annual estimated energy production of approximately 2,464,069.60 kWh, based on pre-commissioning simulations and performance audits. The expected performance ratio was calculated at 83%, with a specific production figure of 1434.9 kWh/kWp/year. These values are consistent with benchmark findings in similar climatic zones [43], and represent a technically robust configuration for institutional-scale EPC deployments.

Post-implementation monitoring data collected via SCADA systems revealed a stable and predictable generation profile, with minimal seasonal volatility due to optimal orientation (187° south) and fixed 0° tilt design. Notably, performance deviations remained within the expected margin of ±5%, indicating high fidelity between modeled projections and operational data. These findings confirm the technical feasibility and reliability of EPC-supported renewable installations in public universities, even under fixed-tilt constraints.

In environmental terms, the project resulted in an estimated annual avoidance of 1168.64 tons of CO₂ emissions and a displacement of nearly 950 tons of coal, aligning with national decarbonization objectives and providing quantifiable contributions to Türkiye's climate commitments [3,29].

4.2. Governance Dynamics and Institutional Challenges

Despite robust technical performance, the governance architecture surrounding the EPC deployment exhibited several fragilities. Semi-structured interviews and document analysis revealed deficiencies in contract monitoring, intra-institutional communication, and performance-based accountability. Although the project adhered to national procurement laws, ambiguity in risk allocation and role clarity among administrative departments created bottlenecks in implementation.

For instance, while the Facilities Directorate was formally responsible for maintenance oversight, energy performance tracking was fragmented between IT services and finance offices, reflecting a lack of integrated institutional design—a challenge also noted in comparative literature [22,23]. Additionally, grievance mechanisms for stakeholders—such as project staff and students affected by disruptions—were largely absent, weakening transparency and institutional learning.

This aligns with findings from international studies that identify contractual opacity, institutional silos, and inconsistent oversight as recurrent barriers in EPC deployment in the public sector [8,11].

4.3. Policy Coherence and Accountability Evaluation

The project's alignment with national and regional energy policies was partially successful. While the EPC contract directly contributed to energy efficiency targets in higher education and served as a compliance instrument under Türkiye's Energy Efficiency Law (No. 5627), the integration with broader climate strategies, such as the National Climate Change Action Plan, remained superficial.

In terms of budgetary accountability, the project employed an off-balance-sheet financing model—consistent with global EPC norms [12]—but lacked structured public disclosure mechanisms, limiting external scrutiny. These gaps reflect broader systemic challenges in policy enforcement and administrative coherence, especially in developing economy contexts [30,31].

To assess these dimensions in an integrated way, a Policy Impact Matrix was developed (Table 1), synthesizing key dimensions of EPC effectiveness across technical, governance, and policy vectors.

Table 1. Policy Impact Matrix for EPC Implementation in Public Universities.

Dimension	Observed Impact	Assessment	Key References
Technical Efficiency	High generation accuracy; strong performance ratio (83%); consistent SCADA output	Effective	[37,43]
CO₂ Mitigation	1168.64 tons CO ₂ avoided annually; aligns with national NDCs	Substantive	[3,29]
Contract Transparency	Limited clarity in M&V responsibilities and risk-sharing clauses	Needs Improvement	[8,22]
Institutional Capacity	Fragmented monitoring roles; limited technical literacy among non-engineering staff	Weak	[23,25]

Policy Alignment	Partial integration with national energy efficiency strategies; missing links with climate policies	Partially Aligned	[33,44]
Digitalization	Real-time SCADA exists, but not fully integrated with institutional reporting and dashboards	Limited Utilization	[15,17]
Public Accountability	No structured public disclosures or third-party audits of savings	Lacking	[6,24]
Sustainability Legacy	Long-term savings likely; but institutional learning and replication plans not formalized	Incomplete	[35,42]

The findings resonate with broader international experience, where the success of EPCs hinges not merely on technical design but on governance coherence and institutional maturity [7,19]. While advanced economies have integrated EPCs into Green Deal mechanisms [46], emerging economies like Türkiye face structural impediments such as fragmented procurement processes, political turnover, and underdeveloped audit institutions [21,25].

One notable insight from this study is that EPCs function not only as technical instruments but also as policy laboratories for testing new models of public-private cooperation. However, realizing this potential demands a deliberate shift from project-based success metrics to systemic governance reforms [5,42]. Such reforms may include:

- Embedding real-time reporting into national dashboards.
- Mandating independent third-party audits.
- Linking EPC outcomes to broader performance-based budgeting models.

In future research, comparative analysis across multiple public institutions—possibly using institutional theory or public choice frameworks—may reveal structural patterns in EPC success or failure, advancing both policy and academic discourse.

5. Conclusions

This study has explored the complexities of implementing Energy Performance Contracts (EPCs) in public institutions by examining a university-based solar photovoltaic project through an integrated lens of technical efficiency, institutional governance, and policy accountability. Rather than approaching EPCs solely as engineering or financial instruments, the research has illuminated their role as dynamic governance tools that intersect with regulatory coherence, administrative capacity, and participatory oversight.

The findings reveal that while EPCs offer tangible benefits in reducing emissions and improving energy efficiency without direct fiscal burden, their success hinges critically on the enabling institutional environment. The case study underscores that technical excellence is insufficient in the absence of robust monitoring, stakeholder clarity, and policy alignment. Weak interdepartmental coordination, inadequate feedback systems, and fragmented oversight mechanisms were shown to limit long-term impact, even in technically well-executed projects.

In particular, the study highlights that EPCs often struggle to transition from isolated contractual instruments to embedded components of sustainability governance. Their potential to contribute to

national and institutional decarbonization goals remains underleveraged unless accompanied by comprehensive policy frameworks, digital transparency tools, and adaptive governance mechanisms. Moreover, the absence of equity considerations in standard EPC metrics may constrain their broader transformative impact, particularly in public sectors serving vulnerable or marginalized populations.

This research offers a replicable, interdisciplinary framework for evaluating EPCs, integrating both qualitative and contextual dimensions that are often neglected in conventional assessments. It contributes to emerging scholarship that positions EPCs not just as performance-based financial models but as institutional innovations with far-reaching implications for public sector reform, environmental accountability, and the sustainable development agenda.

Going forward, it is essential that EPC frameworks are not only technically sound but also politically credible and socially inclusive. Embedding them within multi-level governance strategies and equipping institutions with the necessary administrative, legal, and digital tools is imperative for scaling up their use effectively. Future research should further interrogate the role of institutional culture, public procurement regimes, and digital governance in mediating EPC outcomes, particularly in Global South contexts where capacity constraints and governance asymmetries are more pronounced.

By reframing EPCs as vehicles for integrated sustainability governance, this study advocates for a paradigm shift in how energy efficiency investments are conceptualized, implemented, and evaluated in public infrastructure. Only through such a reconceptualization can EPCs realize their full potential as engines of just, transparent, and future-ready public service delivery.

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