# The Illusion of Fiscal Space: How Implicit Fossil Fuel Subsidies Quietly Undermine the Clean Energy Transition

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**Abstract:** The 2021–2023 global energy price shock forced middle-income governments into a critical trilemma: pass costs to consumers, provide explicit subsidies, or freeze domestic fuel prices. Egypt, Nigeria, and Indonesia chose the latter, widening the gap between domestic prices and the true social cost of fossil fuels. These "implicit subsidies" escape official budget documentation, masking their fiscal impact. This study quantifies the implicit subsidy increment attributable to these policy choices and evaluates whether they crowded out public renewable energy investment. Utilizing the IMF's post-tax subsidy framework, a two-way fixed effects panel regression, and IRENA cost benchmarks demonstrates that the fiscal resources silently consumed by the post-shock subsidy increment represent a significant share of each country's stated renewable energy investment targets.

## Introduction

Between 2021 and 2023, global crude oil prices surged from \$40 to over \$100 per barrel, presenting middle income nations with a critical "political trilemma." To avoid social unrest, Egypt, Nigeria, and Indonesia froze domestic fuel prices, absorbing costs through state-owned enterprises (IMF, 2023).

This approach significantly widened "implicit subsidies"- the gap between consumer prices and the true social cost of fossil fuels. This includes environmental damage and foregone government revenue from state-owned oil companies operating at a loss. Unlike explicit subsidies, which appear in budget documents, these implicit costs remain largely unmeasured in fiscal analyses, with the IMF estimating global implicit subsidies reaching \$7 trillion in 2022 (Black et al., 2023).

This study investigates **the extent to which the 2021–2023 energy price shock inflated implicit fossil fuel subsidies in Egypt, Nigeria, and Indonesia**. While these nations have ambitious renewable energy targets–such as 42% by 2035 for Egypt, 30 GW by 2030 for Nigeria, and 23% by 2025 for Indonesia– public investment consistently falls short (Arab Republic of Egypt, n.d.; Federal Government of Nigeria, 2022; Government of Indonesia, 2014). We argue that these "hidden" implicit subsidies act like a "locked door," silently consuming the fiscal capacity intended for the clean energy transition. By quantifying these invisible costs, this research reveals how current policy choices understate fossil fuel dependency and distort fiscal sustainability analyses, directly linking implicit subsidization to the shortfall in renewable energy investment.

## Literature Review

Literature on fossil fuel subsidies has transitioned from tracking direct fiscal transfers to capturing broader socio-environmental costs. The foundational framework by Coady et al. (2019) distinguishes between explicit (pre-tax) subsidies, direct budgetary support, and implicit (post-tax) subsidies, which account for unpriced externalities like pollution and climate damage. This study utilizes this methodology to estimate the "true" economic cost of consumption within a recent inflationary context.

While the IEA's World Energy Outlook (2022, 2023) notes that protective measures against the 2021–2023 price shock led to record-high subsidies, its national-level data focuses primarily on explicit costs. Similarly, the OECD-IISD Fossil Fuel Subsidy Tracker aggregates IMF, IEA, and OECD subsidy estimates across 195 economies, but lacks granular analysis of implicit subsidy evolution post-inflation (OECD-IISD, 2024).

Despite robust global tracking, research specifically analyzing the inflated cost of implicit subsidies in middle-income economies during the recent energy shock remains scarce. This study addresses this gap by connecting this "hidden" fiscal burden to foregone renewable energy investment capacity, utilizing IRENA technology cost benchmarks to quantify the trade-off.

**Methodology**

This study adopts a 3-step quantitative approach to measuring and estimating the opportunity costs of implicit fuel subsidy. Egypt, Nigeria, Indonesia were selected on four criteria: middle-income status, adoption of domestic fuel price freezes during 2021-23, data availability, and structural diversity across oil importers, exporters and regions. All data are drawn from publicly available sources - IMF, IEA, IRENA, World Bank, and OECD-IISD.

**Step 1**: **Subsidy Estimation**. Following Coady et al. (2019), we calculate annual post-tax implicit subsidies for Egypt, Nigeria, and Indonesia across a pre-shock baseline (2018-2019) and the shock period (2021-2023). The pre-tax subsidy measures the gap between domestic prices (IEA Energy Prices database; national regulator publications) and import-parity reference prices, covering gasoline, diesel, kerosene, LPG, and natural gas. The post-tax subsidy adds a revenue-neutral tax benchmark and three environmental externalities: $CO_2$ climate damage valued at across the Social Cost of Carbon scenarios ($51, $100, and $185/tonne), local air pollution health costs (WHO Global Burden of Disease) and urban congestion costs. The **subsidy increment** (2021-2023 average less the 2018-2019 baseline) isolates the hidden fiscal cost directly attributable to the price freeze, expressed in USD millions and as a % of GDP across 3-country x 3-scenario x 6-year dataset.

**Step 2: Panel Regression**. To test fiscal crowding-out, we estimate a two-way fixed effects model (N=30):

$$\text{Renewable\_Energy\_Investment}_{it} = \alpha + \beta_1 \cdot \text{Subsidy\_Increment}_{it} + \beta_2 \cdot \text{GDP\_Growth}_{it} + \beta_3 \cdot \text{External\_Debt}_{it} + \beta_4 \cdot \text{Fiscal\_Balance}_{it} + \beta_5 \cdot \text{Oil\_Price}_{t} + \gamma_i + \delta_t + \varepsilon_{it}$$

Public renewable energy investment (% of GDP) is regressed on the post-tax subsidy increment, controlling for GDP growth, external debt, fiscal balance, and global oil prices. Country fixed effects absorb time-invariant structural differences; year fixed effects absorb simultaneous global shocks such as COVID and the Ukraine war energy spike. Given the small sample, we report wild cluster bootstrap p-values (Cameron & Miller, 2015) and conduct randomisation inference, treating results as exploratory evidence of displacement. We will also check for robustness via pre-tax-only re-estimation, COVID-year baseline exclusion, absolute USD specification, and a placebo treatment date test.

**Step 3: Opportunity Cost Estimation**. For each country and SCC scenario, we calculate Subsidy Increment (USD) ÷ IRENA LCOE-weighted investment required to meet each country's renewable target. This yields the headline finding: the share of each government's announced renewable target that could have been financed by the fiscal resources silently consumed by the post-shock subsidy increment. This translates the econometric result into a legible, actionable estimate to policymakers and climate finance institutions alike.

To conclude, this proposal provides a systematic measurement of the implicit subsidy increment resulting from the 2021–2023 price freezes in Egypt, Nigeria, and Indonesia. By linking specific, dateable policy interventions to impacts on renewable energy investment, the study addresses a critical gap in fiscal accountability. The methodology is feasible using public data, while the focused three-country scope ensures the research is both rigorous and achievable within the designated timeline, offering a scalable model for broader emerging market analysis.

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