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Powering the Future: Energy Transition Strategies for the ECCU

Peter Nagle, Camilo E. Tovar, and Diego Gutierrez

SIP/2025/066

IMF Selected Issues Papers are prepared by IMF staff as background documentation for periodic consultations with member countries. It is based on the information available at the time it was completed on April 9, 2025. This paper is also published separately as IMF Country Report No 25/105.

2025
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SELECTED ISSUES PAPER

 SIP/2025/066

IMF Selected Issues Paper
Western Hemisphere Department

Powering the Future: Energy Transition Strategies for the ECCU, Eastern Caribbean Currency Union

Prepared by Peter Nagle, Camilo E. Tovar, and Diego Gutierrez

Authorized for distribution by Christoph Duenwald
May 2025

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ABSTRACT: Reducing energy dependence in the ECCU entails improving energy efficiency and shifting from fossil fuels to renewable energy. This energy transition will affect the transmission of and vulnerability to shocks (e.g., from natural disasters or commodity markets) while at the same time helping to reduce economic imbalances and enhance growth potential. Policymakers need to establish frameworks to maximize the benefits of the energy transition, while ensuring it is sustainable and equitable.

RECOMMENDED CITATION: Nagle, P., Tovar, C., and Gutierrez, D. (2025). Powering the Future: Energy Transition Strategies for the ECCU, IMF Selected Issues Paper, Western Hemisphere Department, SIP/2025/066. Washington, D.C.: International Monetary Fund.

JEL Classification Numbers:	F45, O13, Q43
Keywords:	ECCU, Caribbean, Energy Transition, Oil Dependence, Economic Resilience
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Prepared By Peter Nagle and Camilo E. Tovar with research analysis by Diego Gutierrez (all WHD).

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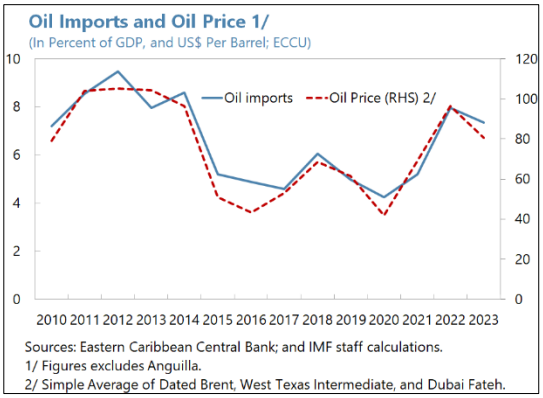
POWERING THE FUTURE: ENERGY TRANSITION STRATEGIES FOR THE ECCU[1]

Reducing energy dependence in the ECCU entails improving energy efficiency and shifting from fossil fuels to renewable energy (RE). This energy transition (ET) will affect the transmission of and vulnerability to shocks (e.g., from natural disasters or commodity markets) while at the same time helping to reduce economic imbalances and enhance growth potential. Policymakers need to establish frameworks to maximize the benefits of the ET, while ensuring it is sustainable and equitable.

A. Introduction

1. The ET is an opportunity for the ECCU to reduce its dependence on imported fossil fuels, enhance macroeconomic stability, and bolster growth prospects. ECCU countries are among the most energy dependent in the world, which is a key macroeconomic vulnerability and source of current account imbalances. Moreover, the use of costly oil imports for electricity generation has led to very high electricity prices, undermining competitiveness—particularly for the tourism industry—at the expense of potential growth that has exhibited a trend decline among ECCU countries in recent decades. Oil price shocks can also have adverse effects on inflation and external and fiscal positions. For example, the 2022 oil price spike led to oil imports rising by nearly 3 percentage points of GDP. Shifting from imported oil to RE could boost long-term growth and support economic convergence and resilience, while insulating economies from global oil price fluctuations.



2. There are major challenges to achieving the ET in the ECCU. Importing RE technology may widen the current account deficit given high up-front costs of renewables. The small size of the islands' electricity markets limits economies of scale, increasing the cost of RE projects, and deterring investment. Limited land availability constrains solar and onshore wind deployment, and the small scale of grids creates challenges in integrating variable RE. Extreme weather threats further jeopardize RE infrastructure.[2] These challenges are compounded by high costs of capital, limited fiscal space, and inadequate and varying regulatory frameworks.

[1] Prepared by Peter Nagle and Camilo E. Tovar with research analysis by Diego Gutierrez.

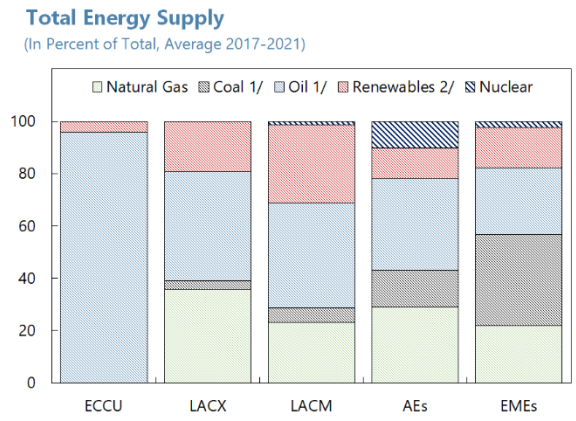
[2] For example, in July 2024 Hurricane Beryl caused significant damage to the Limlair Solar Farm on Carriacou, Grenada, which was built to withstand Category 4 Hurricanes.

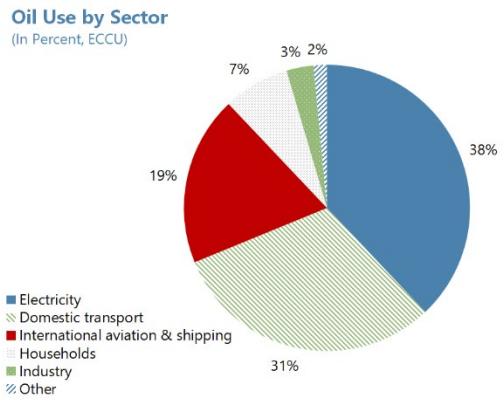
3. This chapter examines the impact of the ET and strategies to achieve it in the ECCU. Section B analyses the energy landscape, Section C discusses strategies for a successful ET, Section D considers the ET as an opportunity to strengthen the ECCU, and Section E discusses policy options.

B. The Energy Landscape

Energy Supply

4. Imported oil products met 96 percent of the ECCU's primary energy needs in 2021. These imports serve three main roles in the energy matrix: about two-fifths are used for electricity generation (diesel), two-fifths are used in final consumption, such as domestic transport and cooking (as liquefied petroleum gas, LPG), and the remaining one-fifth is used to refuel international ships and aircraft.[3] RE accounted for just 1 percent of the energy supply in 2021, although production was higher in Dominica and St. Vincent and the Grenadines due to hydroelectric plants. Traditional biofuels, such as charcoal, account for 7 percent of energy in Grenada and St. Lucia, and 3 percent across the ECCU on average.





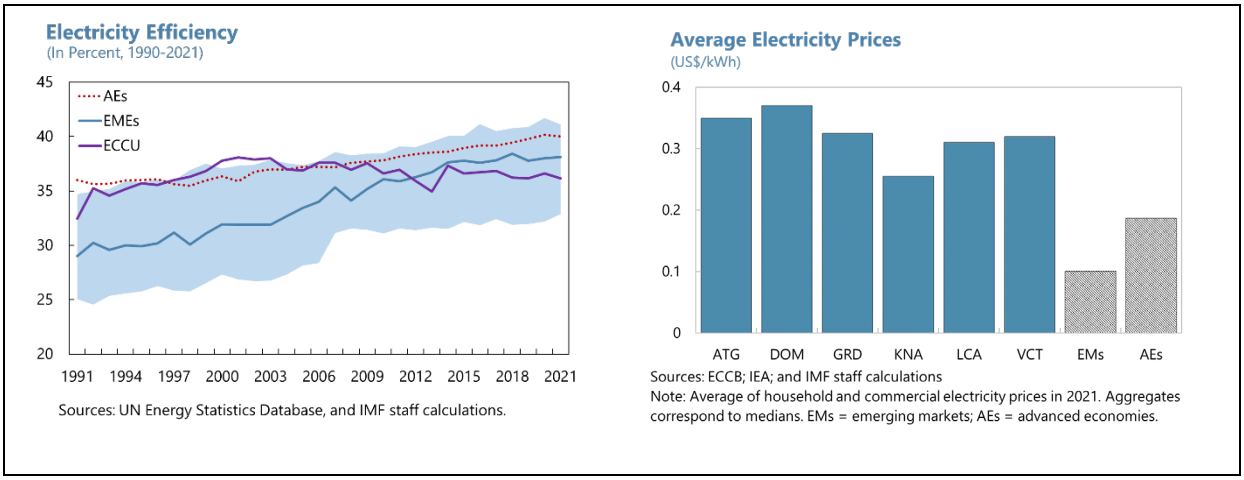
Sources: UN Energy Statistics Database; World Bank; and IMF staff estimates.
1/ Coal is comprised of primary production and related products; oil is comprised of crude oil and oil products.
2/ Renewables include biofuels and waste, electricity, and heat. LACX = Latin American and Caribbean net energy exporters, LACM = Latin American and Caribbean net energy importers.

Electricity Generation and Distribution

5. Electricity costs in the ECCU are among the highest in the world, due to aging and inefficient infrastructure, and the use of costly diesel. Most ECCU countries use old diesel generators that are less efficient than newer models or natural gas plants. While average efficiency of electricity generation in the ECCU gradually declined over the past two decades, it rose in

[3] While this SIP focuses on domestic energy use, countries might also want to examine reducing energy use for international shipping. In the Caribbean, individual countries may wish to take a regional approach to avoid impacting individual tourism competitiveness. See Black et al. 2024 for more details.

advanced economies (AEs) and emerging market economies (EMEs).[4] If ECCU efficiency had kept pace with AEs, oil use in electricity generation would have been 10 percent lower in 2021. Further, aging and poorly maintained grid infrastructure results in transmission and distribution losses of 15-20 percent, well above the 6 percent average in AEs (Yépez-García and Mori, 2024). These factors, together with the use of diesel (which is costlier than coal or natural gas) have led to very high electricity costs. These range from US$0.26/kWh to US$0.37/kWh in the ECCU in 2021, compared to a median price of $0.10/kWh in emerging market economies and US$0.19/kWh in advanced economies. This undermines competitiveness, particularly for the electricity intensive tourism sector. Despite being costly and emissions-intensive, diesel-generated electricity prevails across the ECCU's small-scale power grids due to its reliability and flexibility.

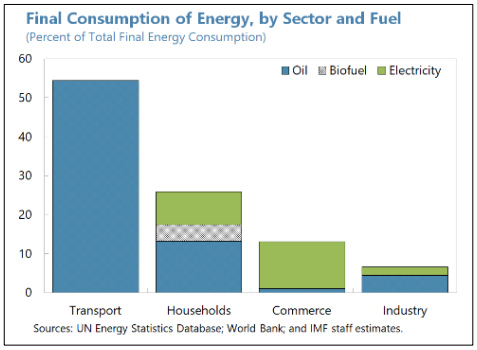


6. Electricity utility companies tend to be vertically integrated monopolies focused on reliability. These companies are a mix of state owned and privately owned, and typically hold monopolies on electricity generation, transmission, and distribution. While this structure may be necessary given the small size of grids, when coupled with inadequate regulatory frameworks (e.g., those governing the licensing of private utility-scale Independent Power Producers), it can stifle innovation and competition, leading to higher consumer costs (Atlantic Council, 2024). Most companies prioritize reliable power supply over RE generation goals. The lack of an independent regulator in many countries is an impediment to new market entrants, given the need to assure them of a level playing field (McIntyre and Ashram, 2017). Despite high costs and challenges, electricity access is near universal in the ECCU, with a significant improvement over the past two decades.

[4] Electricity generation efficiency measures electricity output versus fuel input. A 37 percent efficiency means 37 units of electricity are produced for every 100 units of fuel, with 63 units of energy lost (e.g., as waste heat).

Energy Consumption

7. Final energy consumption patterns in ECCU countries reflect their economic structures. Transport is the largest sector, accounting for over half of final energy consumption in 2021, highlighting its importance for tourism. Households consumed 24 percent, the commercial sector (mainly hotels) about 13 percent, and industry only 7 percent. Each sector exhibits different fuel requirements. The transport sector relies entirely on oil (mainly gasoline) due to the dominance of internal combustion engine (ICE) vehicles. The commercial sector uses electricity for over 90 percent of its total energy needs, driven mainly by air conditioning, which accounts for more than half of electricity consumption by hotels (Coony and Johnson, 2024). Finally, households use oil (as LPG) and biomass for cooking, and electricity for air-conditioning and lighting.



C. Strategies for a Successful Energy Transition

8. A successful ET requires ECCU countries to shift from imported oil to domestically produced RE. The ET has two key components: replacing oil with RE in electricity (about 40 percent of oil use); and replacing oil in end-uses through electrification—e.g., switching to electric vehicles (EVs) for domestic transport, or using electric cookers instead of biofuels. Some uses may need alternative fuels like green hydrogen or methanol (particularly for international transport). The region can deliver this transition by utilizing its substantial solar and wind potential and possible geothermal resources.

9. A successful ET must lower energy costs while ensuring a reliable energy supply. Careful planning, for example, through a National Integrated Resource Plan (IRP), can be vital in this regard. IRPs help ensure countries can meet energy demand, incorporate RE potential, and ensure reliable and cost-effective solutions. ECCU countries could adopt a strategic approach focused on combining energy efficiency and RE generation, with a more gradual electrification of other sectors (Table 1):

- **Energy efficiency can be among the most cost-effective approaches and should be prioritized.** Economically viable measures such as upgrading appliances and installing efficient lighting can directly reduce energy demand and oil imports with far lower investment needs compared to RE or EVs, resulting in significant savings. For example, a US$0.9 billion investment in energy efficiency from 2020-2040 could lower CARICOM's energy consumption by 18 percent, resulting in a net reduction in energy expenditure of US$6.1 billion—5.2 percent of 2023 GDP (Masson and Erhardt 2020).

- **Replacing oil-based electricity generation with RE sources has significant investment needs but can directly reduce oil dependency.** A rapid expansion of RE will reduce oil

dependency in electricity generation, potentially lowering costs. The intermittent nature of solar and wind, however, requires investment in energy storage and grid upgrades.

- **Electrification of other sectors such as transport should be gradual, given high investment needs and limited RE generation.** Moving from ICE vehicles to EVs will require substantial investments in EVs, charging infrastructure, and grid expansion. The effectiveness of this strategy in reducing oil dependence rests on the RE share in the electricity mix. Currently, EV adoption may not lower oil imports, but merely shift oil usage from gas-powered cars to electricity generation.

10. Energy security must be central to the ECCU's ET strategy for resilient economic growth. While solar and wind will play significant roles, challenges arise from their daily and seasonal cycles and weather variations that can lead to unstable supply, with adverse economic impacts. Mitigating risks requires incorporating a mix of RE sources, investing in energy storage and backup generation (such as conventional energy), implementing smart grid solutions (including demand flexibility), and introducing insurance mechanisms. Countries that develop geothermal energy, such as Dominica, Grenada, St. Kitts and Nevis, and St. Vincent and the Grenadines, will be less affected, but must ensure their energy infrastructure is resilient to natural disasters.

D. The Energy Transition as an Opportunity to Strengthen the ECCU

11. The macroeconomic impact of the ET will differ in the short and medium term, depending on its effect on energy costs. Technological developments have sharply reduced the cost of solar, wind, and batteries (IRENA 2024). However, RE entails large upfront capital investment (but lower operating costs), unlike fossil fuels, which have lower initial investment needs (but higher ongoing costs). For example, reducing energy costs in Antigua and Barbuda by about 40 percent could require up-front capital equivalent to 25 percent of GDP (IRENA, 2021). The financing approach will be critical, especially the distribution of funding from the public and private sectors.

12. In the near term, RE projects may boost growth via increased public and private investment. The impact on energy prices will depend on how the upfront costs are initially financed, and targeted measures may be needed to protect vulnerable households from potential cost increases. Beyond transfers, the ET could have significant fiscal implications as governments either invest directly (e.g., in grid infrastructure) or incentivize RE adoption through taxes and subsidies.[5] While these create initial pressures, reduced fossil fuel subsidies and potential green tax revenues could provide offsetting effects, though implementing carbon pricing remains politically challenging given already high energy costs. Current account deficits may temporarily widen due to RE technology imports (e.g., solar panels, EVs), but reduced oil imports and higher foreign direct investment in RE should provide partly compensating effects although potentially with timing lags

[5] Proactive measures such as reducing import duties and VAT on hybrid vehicles and EVs in Grenada and St. Vincent and the Grenadines illustrates the fiscal trade-offs that arise due to foregone revenue.

(Jaumotte et al., 2024). Investments in RE could create new jobs—e.g., solar installation—partly compensating for losses in fossil-fuel related sectors (e.g., ICE mechanics).

13. In the medium term, the ET is a transformative opportunity for the ECCU to boost growth and competitiveness, build resilience to oil price shocks, and enhance macrofinancial stability. The ET could boost sectors such as tourism by lowering energy costs, while also fostering economic diversification into new industries. For instance, a two-thirds reduction in the electricity costs in St. Kitts and Nevis could increase GDP by 1.1 percent (IMF 2024). It will also improve external balances by permanently reducing oil imports, although foreign financing of RE projects will need future repayments, resulting in financial outflows. By reducing vulnerability to oil price shocks, the ET would lower inflation variability and strengthen monetary policy transmission as inflation becomes less sensitive to external shocks. Higher growth would also boost tax revenues and improve long-term debt dynamics, although the overall impact will depend on governments' policy mixes and financing approaches.

E. Policy Options

14. Policies for the ET in the ECCU must balance maximizing opportunities with minimizing adverse effects. High government debt limits the fiscal space for the ET, while potential growth is expected to slow). Crowding in private investment will be critical, requiring sound fiscal frameworks, sustainable incentives, and clear regulatory policies to incentivize private finance, while protecting vulnerable households from rising energy costs or job displacement through targeted interventions.

15. Sound, stable, and credible macroeconomic frameworks are essential for a successful ET. The currency union provides a strong anchor for stability in the region, but high debt levels demand prudent fiscal management to create fiscal space for the ET. This involves mobilizing revenue and rationalizing spending (e.g., better targeting of transfers and subsidies, including on fossil fuels), alongside a rules-based fiscal framework (IMF, 2022). Strong institutions, a stable business environment, and clear and easy permitting processes for RE, can reduce potential risks for investors and foster investment.

16. Well-designed fiscal incentives can help accelerate the ET and attract private investment, but they must be fit for the ECCU. Carbon pricing is often considered an efficient tool to encourage adoption of RE technology and generate revenue; however, the ECCU's already high energy costs call for a cautious approach, involving an assessment of the financial soundness of public utility companies, and targeted household support. Alternative options include feebates and tax credits, import tariff exemptions for energy-efficient appliances, and phasing out explicit fossil fuel subsidies. This can be complemented with energy efficiency standards in building codes or fuel efficiency regulations (Ivanova et al., 2024). Fiscal and other government policies will also need to address key equity issues arising from the ET, for example, managing energy affordability through progressive pricing and targeted support and facilitating workforce transition with retraining programs.

17. Strengthening energy regulatory frameworks with independent energy regulators is also vital to catalyze private sector investment in the ECCU. Regulations should incentivize investment from both large-scale RE producers (e.g., through robust power purchase agreements) and smaller producers, such as households (e.g., net metering for rooftop solar), while avoiding grid cannibalization. Transparent public-private partnership frameworks with strong governance can protect government interests while attracting private investment (Queyranne et al., 2019).

18. Regional cooperation can play a key role in facilitating a successful ET. Coordination across ECCU members can unlock economies of scale through harmonized policies and energy regulations, standardized processes, and consistent incentive structures. Innovative financial instruments (e.g., guarantees and blended finance), supported by Multilateral Development Banks, can derisk energy investments and unlock private finance. Initiatives like the Caribbean Resilient Renewable Energy Infrastructure Investment Facility can help overcome policy, institutional, and technical barriers to improve the access to finance to accelerate RE investments, with first projects taking place in Grenada and St. Lucia (Mukhi, 2022; Antoine, 2022). The Sustainable Energy Facility (SEF) for Eastern Caribbean Countries, can also help reduce financial, technical and institutional barriers to geothermal energy development in five Eastern Caribbean countries, while providing institutional strengthening and capacity building to their governments and partners.

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