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# Mitigating Vulnerability to High and Volatile Oil Prices in the Caribbean

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Authors: This material has been prepared by Rigoberto Arel Yépez- García and Sara Giannozzi. The content is based on the 2012 World Bank report “Mitigating Vulnerability to High and Volatile Oil Prices: Power Sector Experiences in Latin America and the Caribbean” by Rigoberto Ariel Yépez-García and Julie Dana; which can be accessed at: <https://openknowledge.worldbank.org/handle/10986/9341>

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# Mitigating Vulnerability to High and Volatile Oil Prices in the Caribbean

## Oil Price Evolution and Risk Exposure

The past decade has witnessed an unprecedented rise in world oil prices and oil price volatility. Since 2002, the spot price for West Texas Intermediate (WTI) has increased more than fivefold, and this upward price trend has featured significant volatility. At peak oil prices in 2008, the standard deviation in daily price changes was nearly twice that observed six years earlier.

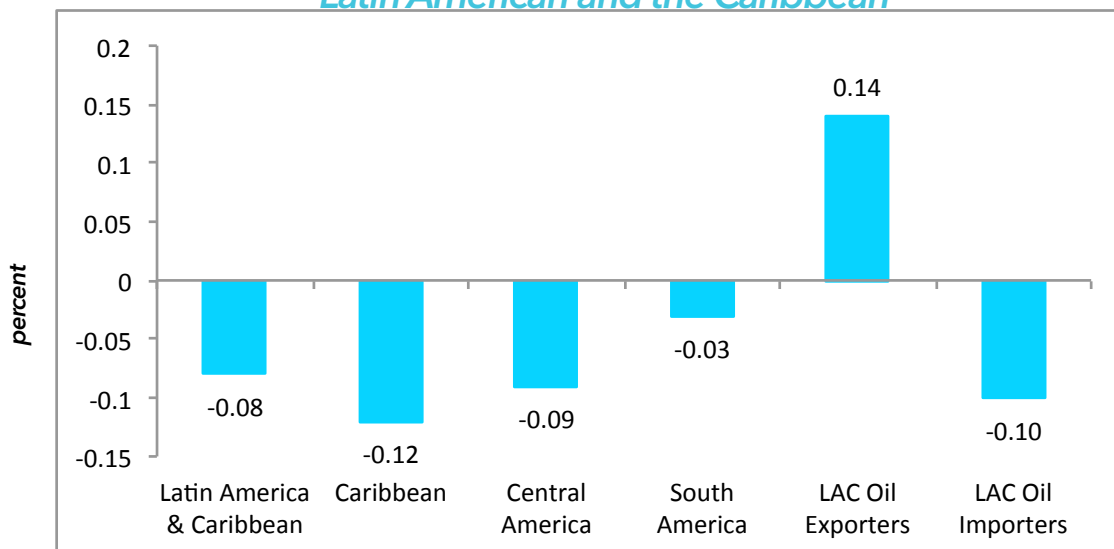
The greater economic uncertainty and higher risk introduced by oil price volatility adversely affect oil importing and exporting nations alike. Countries with a high proportion of oil in their primary energy supply are especially vulnerable to higher and more volatile prices.

Caribbean countries, where oil imports constitute a large share as percentage of GDP (11 percent in 2006), are especially vulnerable to high and volatile oil prices. The World Bank (2006) estimates that in Latin America a 16 percent increase annually in oil prices over a five-year period would increase growth in oil-exporting countries by 0.14 percentage points, compared to a loss of 0.10 percentage points for oil-importing countries. The greatest growth losses, 0.12 percentage points, would be experienced in the Caribbean.

## What is the Economic Impact?

Economies are affected by high and volatile oil prices at both macroeconomic and microeconomic levels. The major direct effects at the macro level are a deteriorating trade balance, through a higher import bill, reflecting a worsening in terms of trade; and a weakening fiscal balance, due to greater government transfers and subsidies to insulate movements in international energy markets. At the micro level, the major direct effect is investment uncertainty, resulting from the higher risk of engaging in new projects. The major indirect effects are inflation; loss of consumer confidence and purchasing power, due to greater economic uncertainty and higher inflation; loss of competitiveness from higher power generation and transport costs; and institutional weakening, as firms and households pressure the government to bypass market mechanisms, which, in turn, affects the credibility and functioning of the regulatory environment.

**Figure 1 Growth Effect Comparisons from Higher Oil Prices in Latin American and the Caribbean**



Source: *Assessing the Impact of Higher Oil Prices in Latin America*, World Bank (2006)

## Who Bears the Risk Burden?

In net oil-importing countries worldwide, high and volatile oil prices ripple through the power sector to numerous segments of the economy. In Central America and the Caribbean, the two sub-regions identified as the most vulnerable to oil price risk in Latin America, oil supplies 51 percent of primary energy needs, compared to 42 percent for the LAC region, and 35 percent for the world overall. Countries heavily dependent on imported oil to power a significant portion of their electricity generation are especially vulnerable to high and volatile oil prices. How is the risk burden of price volatility distributed? In a controlled energy-pricing environment with fixed consumer prices, the utility tends to absorb variations in price inputs. Conversely, in a free-market pricing environment, with a full pass-through mechanism, price shocks are passed along to consumer households and businesses.

Most countries exhibit varying degrees of risk-sharing between consumers, the utility, and government. For example, the government might cap the electricity price for final consumers, making the utility company bear the cost of price increases. But this situation may not be sustainable, as the company may eventually face bankruptcy. If that should occur, the government might have to bail out the utility or otherwise risk power-supply shortages.

When general subsidies—especially those representing a significant share of government outlay—are used to eliminate the impact of price volatility, the result may be a deterioration of the fiscal balance. Even if the government manages to maintain a fiscal balance, the larger share of subsidies in government expenditure means less capacity for capital investment, as well as social programs.

For most of the countries analyzed in this study, consumers are shielded to varying degrees by tariffs with embedded generalized subsidies. Because tariff increases are often insufficient to

cover rising generation costs, the financial position of the utilities may deteriorate. This has been the case for the Dominican Republic, Haiti, and Honduras. A full pass-through power-pricing policy is in effect in The Bahamas and St. Vincent and the Grenadines—where the government is the majority owner of the power utility—and in Barbados, Dominica, Grenada, Jamaica, and St. Lucia—where the private sector is the majority owner. This policy is sustainable in the long run as it forces consumers to eliminate waste and then seek pathways to improve consumption efficiency. Guyana's move from a partial to a full pass-through regime in 2008 highlights the trade-offs of such decisions on final users and the regulatory implications for managing volatility.

## Reducing Short-Term Price Uncertainty: Price Risk Management

One option for managing oil price volatility in the short term is using price risk management instruments. Such tools can reduce the uncertainty associated with commodity-price volatility, particularly its impact on national budgets in a given year. The aim of such approaches is to manage existing price exposure, which is generally a function of current structural conditions. Risk management, or hedging, instruments are designed to cope with volatility—price spikes or shifting prices with no unidirectional trend—which has a financial impact because the existing price exposure results from a direct interest in use of the physical commodity.

A critical first step for any country considering a commodity hedging strategy is careful risk assessment, which needs to take into consideration commercial relationships in the power sector and interactions with public sector actors and policy mechanisms.

Additionally, power-sector actors considering price risk management should focus on establishing an institutional framework that adequately supports implementation of the strategy.

Setting up a commodity hedging strategy includes the following key steps:

- Documenting risk management objectives;
- Establishing roles and responsibilities of the actors and agencies;
- Verifying adequate legal and regulatory infrastructure;
- Setting up procedures for selecting counterparties and brokers;
- Providing careful oversight, supervision, and reporting

## Reducing Dependency: Alternatives to Oil Consumption over the Long Run

However, price risk management instruments cannot substitute for basic structural measures designed to reduce oil consumption over the longer term. To reduce vulnerability in the long-run, countries can think about structural instruments such as: (i) energy portfolio diversification from oil-fired power generation, (ii) investing in energy efficiency, and (iii) increased regional integration with countries endowed with more diversified supply.

## Diversifying from Oil-Fired Power Generation

By diversifying the power generation matrix, countries become less vulnerable to oil prices and reduce the risk attributed to oil price volatility. Today, oil-importing countries have a wide array of choices—both renewables and non-oil conventional energy—for diversifying their energy generation portfolios away from oil. In particular, the sub-regions of Central America and the Caribbean could pursue three groups of alternatives: (i) hydropower, (ii) non-hydro renewable power

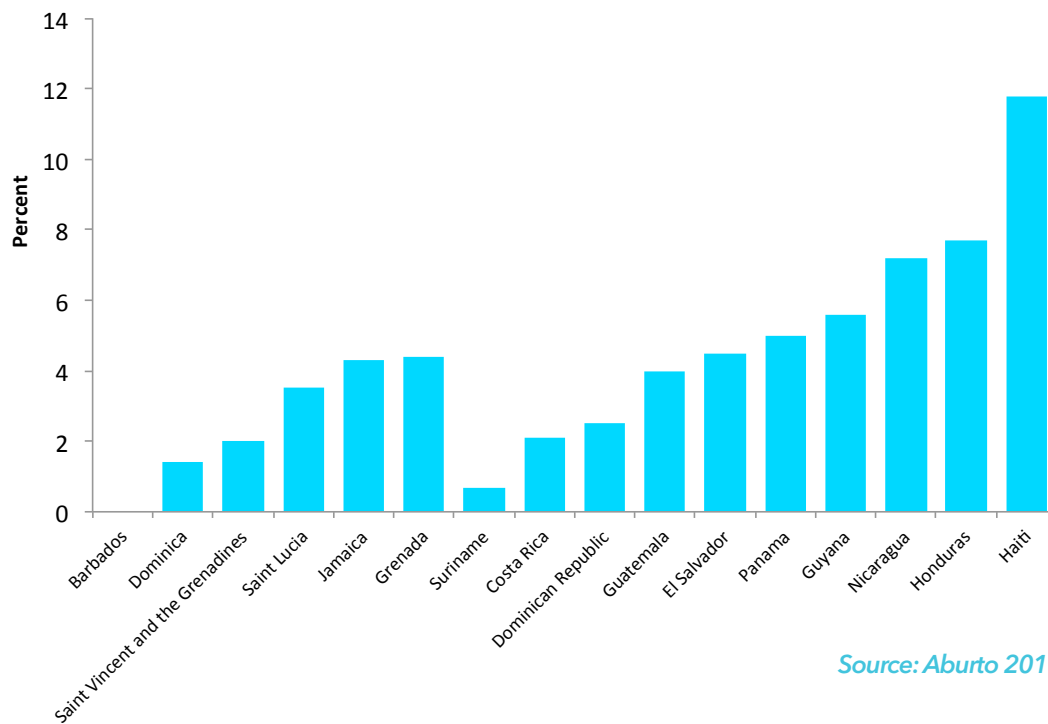
(geothermal, biomass, wind, and solar), and (iii) non-oil conventional thermal power (natural gas). In general, hydropower resources are the best understood, having been the most widely used for decades.

However, in most Caribbean island nations (with the partial exception of the Dominican Republic), existing hydropower output is quite small and the remaining potential either insignificant or non-existent. On the other hand, the potential for non-hydro renewables to comprise a greater share of power generation is significant. Biomass, in the form of sugarcane bagasse, could offer immediate output gains as long as appropriate retrofitting is put in place. From a policy perspective, geothermal has a large potential to diversify the power system, though exploration costs remain a barrier to resource exploitation. Other non-hydro options include wind and solar energy. In addition, non-oil conventional thermal power, particularly natural gas (and coal to a lesser extent), could help to reduce oil dependency, given their low price correlation with oil. The countries with the greatest potential to initiate LNG consumption are Haiti, Jamaica, and Barbados. Given its existing LNG import facility, the Dominican Republic is well-positioned to expand consumption.

## Improving Energy Efficiency

Investing in energy efficiency of both production (supply side) and end use (demand side) is one of the most cost-effective ways to reduce the need for oil and oil-derived products. On the supply side, reducing technical losses contributes to improving overall system efficiency and conserving fuel; thus, it is considered an instrument that directly mitigates exposure to oil price volatility. It is difficult to assess technical losses and thus the potential to reduce them since only aggregate-loss data are available for most countries in the region, and existing information on energy end uses and subsectors in the Caribbean is also spotty.

Figure 2 Energy Savings Potential in Selected Countries of Central America and the Caribbean



Source: Aburto 2010

Supply-side technical losses can be reduced by modifying system characteristics and configurations. These losses can also be reduced by carefully choosing transformer technology, eliminating transformation levels, switching off transformers, improving low-power factors, and distributing generation. On the demand side, reducing peak and non-peak use helps to reduce the generation capacity and transmission and distribution assets required to supply the system. Demand-side efficiency can be improved by adopting policies and programs that encourage efficient electricity consumption by end users. Measures that could be expanded in the countries analyzed in this study include standards for widely-used industrial equipment and residential appliances; building codes; consumer education and demonstration programs; and energy management programs for industry, the buildings sector, and public utilities.

## Promoting Regional Integration

Regional energy integration can also help countries to reduce oil dependence by optimizing electricity supplies across the region, which improves efficiency and, owing to economies of scale, lowers generation costs. In addition, when the consumption profiles of participants are not perfectly correlated, the smoother load pattern that arises means less investment in reserve requirements. If these conditions are met, use of fossil fuels, along with countries' vulnerability to high and volatile oil prices, declines. Furthermore, from a market perspective, regional integration promotes competition, helping to realize the trade gains associated with specialization of the most efficient producers. Moreover, all such benefits imply a reduction in greenhouse gas (GHG) emissions.

Although the potential for interconnection in the Caribbean is more limited than in Central America—owing to the high cost of needed submarine cables and small market size, which reduces economic viability—electricity integration could significantly reduce dependence on oil-fired generation.

**Promoting Energy Integration in the Caribbean** - a 2011 study by Gerner and Hansen evaluated potential opportunities for energy integration in the Caribbean:

- **Renewable energy.** Resources found to have the greatest interconnection potential are natural gas (pipeline and liquefied natural gas [LNG]), geothermal, wind, small hydropower, and biomass. All are highly competitive with technologies currently in use. A key challenge is to identify sites with good resources that are economically feasible.
- **Electricity interconnections using submarine cables.** Interconnecting the various islands using submarine cables would improve efficiency and increase electricity sector security. Also, it would enable more large-scale energy generation using renewables. The level of interconnection could be sub-regional, continental (e.g., with Mexico, Colombia, or República Bolivariana de Venezuela), or bilateral (e.g., Montserrat-Antigua and Barbuda or Puerto Rico-the Dominican Republic).
- **Gas pipeline interconnections.** The study finds that supplying natural gas through the proposed Eastern Caribbean Gas Pipeline might be cheaper than current diesel-based generation. Natural gas from Trinidad and Tobago would supply Barbados, Guadeloupe, Martinique, and St. Lucia. If the islands are interconnected, the pipeline could take advantage of economies of scale owing to the large volumes of gas transported. To be implemented, however, the project must first win consensus among diverse stakeholders, ranging from gas suppliers, utilities, and regulators to financial institutions and governments.

Based on "Caribbean Regional Electricity Supply Options: Toward Greater Security, Renewables and Resilience, World Bank (2011)"

Interconnections between two or more countries could be economically feasible, and these would take advantage of economies of scale and development of indigenous resources. The geothermal and natural-gas potential of some islands could serve as the basis for a more diversified power market that is less vulnerable to oil prices. The most significant resources are in Nevis and Dominica, while Guadeloupe and Martinique also have possibilities. The Dominican Republic and Haiti, in particular, could benefit from stronger integration on both the power and natural-gas fronts.

While the economic benefits of integrated markets are generally accepted, institutional obstacles often prevent their establishment. The most common problems are use of multiple technology standards; variations in regulatory regimes, legal frameworks, and pricing policies; and environmental concerns. Additional hurdles that can limit or delay market integration are conflicting perspectives on the sharing of investment costs and uncertainties about political decision-making.

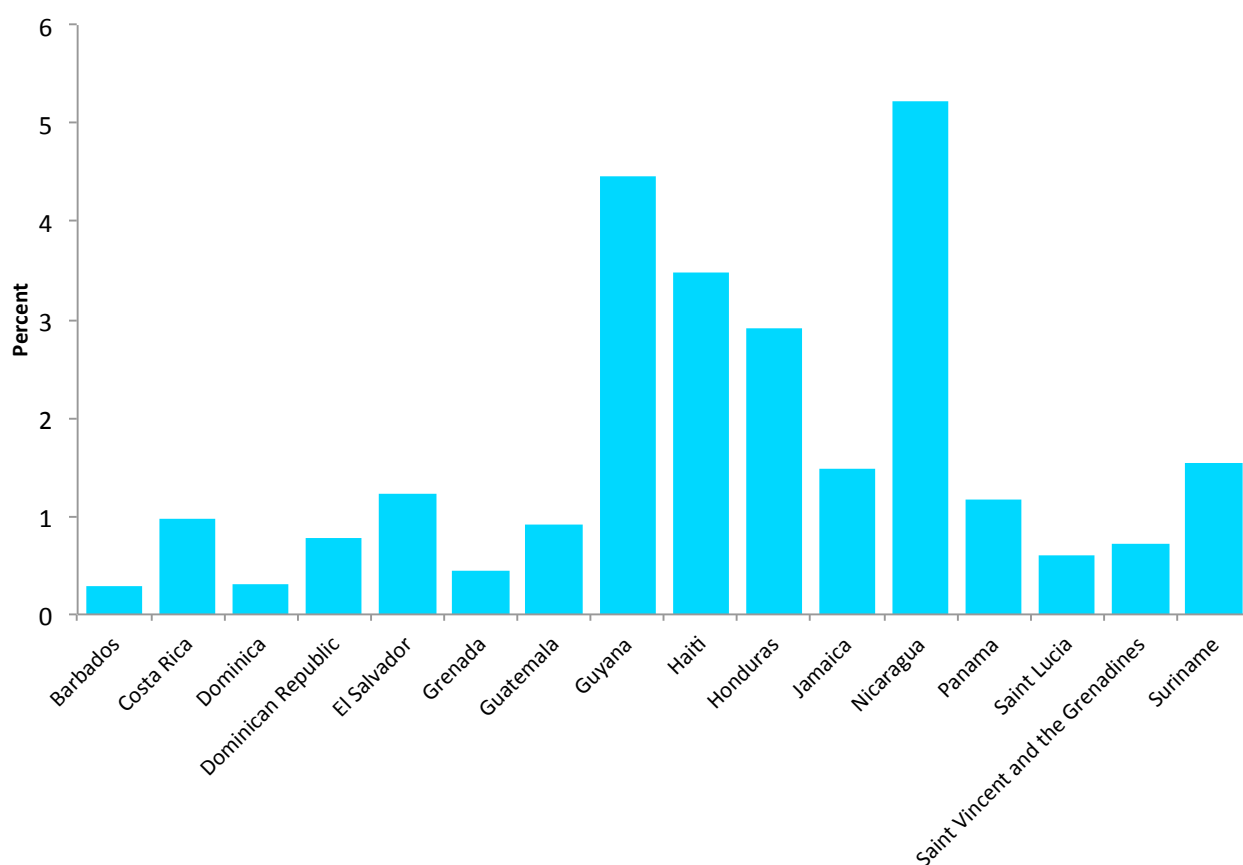


## How Much Can It Help?

The components of this three-pronged strategy – a more diversified energy supply system, including greater utilization of available renewable sources; improved efficiency in electricity production and use; and regional integration, which promotes energy diversification – can work together over the long term to effectively reduce a country's oil generation and consumption and thus mitigate its vulnerability to high and volatile oil prices. Implementing these several structural measures in a combined strategy would mean significant

savings for heavily oil-dependent countries. At the country level, Guyana and Nicaragua could witness a reduction of up to 5 percent of GDP in their current account deficit; while the reductions for Haiti and Honduras would be 3.5 and 2.9 percent of GDP, respectively.

**Figure 3 Potential Fuel Savings from Implementing Structural Measures as percent of GDP, 2009**



Source: Authors

# Conclusions

At a macro level, less oil consumption can directly improve a country's aggregate economy and directly and indirectly benefit government finances and balance of payments. At a micro level, less vulnerability to oil price risk can facilitate investment planning and consumer decision-making. Complementary to these structural measures, price risk management instruments may mitigate exposure to the shorter-term economic uncertainty created by oil price volatility, which also affects investment and planning decisions by households and firms.

This optimistic outlook is not without its challenges. Making such a structural transition would entail considerable upfront costs to utilities, firms, and households; thus, supportive policies and regulations for renewable energy and energy efficiency would be required. In the case of the LAC region, regulatory, contracting, and licensing processes would need to be reformed to allow countries to implement their plans.

Enabling financial instruments that make these investments possible would be helpful. Pricing reforms and technology standards would be needed to ensure that resources are not wasted. In addition, an appropriate regulatory framework and institutional strengthening would be required to facilitate regional integration between countries with differing regulatory policies and power-sector institutions. But the potential benefits from implementing these measures far outweigh the costs. Given the far-reaching, adverse effects of high and volatile oil prices on oil-importing economies, the potential savings from implementing the measures suggested in this report could offer substantial benefits at the macro and micro level, ranging from long-term financial viability of the national economy to a higher living standard for households.



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