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Thinkpiece

Produced by Baringa for the Foreign Commonwealth Office (FCO)

Caribbean renewables investment: creating the right incentive framework



Based on the September 2014 CARILEC Regulatory Forum, held in Tortola, British Virgin Islands

Caribbean renewables investment: creating the right incentive framework

On 24 September 2014, the Caribbean Electric Utility Service Corporation (CARILEC) held its fifth Regulatory Forum in the British Virgin Islands (BVI), with support from the UK Foreign Commonwealth Office (FCO) and the World Bank. The Forum brought together utilities, Governments, regulators, industrial customers, international donors and other experts to discuss regulatory issues for the Caribbean electricity sector, with a common focus on the need to deliver reliability, affordability and sustainability of supply in systems with an increasing penetration of renewable energy. Key themes included tariff design for self-generation, efficient cost-sharing, incentive regulation, and enabling participation of Independent Power Producers (IPPs).

This *Thinkpiece* – prepared by Baringa for the FCO – discusses some of the key challenges raised by stakeholders at the Forum, as well as some potential principles to guide regulatory change. We would like to thank the Forum presenters and participants who allowed us to quote them so as to give a sense of the discussion. The views in this *Thinkpiece* are attributable to Baringa and the FCO alone.

▶ Setting the scene

Electricity prices in island-based Caribbean countries are among the highest in the world, driven by a heavy reliance on imported fossil fuels, particularly oil. High and volatile energy costs hold back economic growth in the region and reduce affordability for

Caribbean consumers (notwithstanding the recent dramatic fall in global oil prices). The rapid deployment of small-scale self-generation observed in many parts of the Caribbean in recent years has started to reduce dependence on fossil fuels, as well

as provide self-generating customers with a more affordable energy supply. This is an exciting development for the region, and there is a strong desire among Caribbean governments, regulators and industry to tap into the region's significant indigenous



Wigton Wind Farm, Jamaica

Angela Francis

Regional Economist – Caribbean,
British High Commission
Port of Spain, Trinidad and Tobago



Towards energy independence

“Dependence on imported fossil fuels represents a major barrier to economic development in the region. Getting commercial incentives for private investors and utilities aligned with government policy to ramp up renewable generation is critical to move the region towards energy independence.”

renewable resources (which include solar, wind, biomass, hydro, marine, and geothermal), to further reduce oil imports and create a more sustainable economy.

At the same time, however, the deployment of renewables poses fundamental challenges to the existing utility business model and to the still-emerging regulatory frameworks. In particular, the vertically integrated business model – based on generation and network provision with a pass through at ‘cost plus’ – starts to break down once there are significant volumes of self-generating customers and Independent Power Producers (IPPs) participating in the market. While it could be argued that utilities have existing strong incentives to avoid fuel costs through renewables deployment, there is a danger that they find themselves in an increasingly defensive position as their existing revenue streams erode before new ones have developed.

Strong and sustainable utilities are essential to guarantee supply and manage increasingly complex grids in systems with the levels of renewables targeted by Caribbean governments. Utilities will need to work with policy makers and regulators to lead and foster innovation in the new services that will be required, including those related to system operation, ancillary services, storage and demand management.

These radical shifts in the sector are happening within a regulatory framework that is at a relatively early stage of development, and designed around stable island-based systems with a single utility and a single generation technology. Regulatory arrangements will, therefore, need to evolve to reflect these changing market dynamics and to ensure that consumers pay no more than necessary for sustainable and secure supplies. Independent and stable regulation will be critical to unlocking new private investment and to ensuring that utilities remain a part of the solution. Provided that the necessary evolution can occur within an agreed framework and a set of balanced principles, **renewables deployment can represent a significant ‘win-win-win’ for customers, utilities and the wider Caribbean economy.**

This *Thinkpiece* will cover some of these key current issues facing the Caribbean electricity sector, including:

- ▶ Tariff principles for self-generation
- ▶ Enabling IPPs and contracting for Power Purchasing Agreements (PPAs)
- ▶ New service offerings for storage demand and network management.

Peter Williams

Managing Director
Emera (Caribbean) Incorporated
St. Michael, Barbados



A new era

"A new era has begun with the rapid deployment of distributed grid-tied solar PV in Barbados and other parts of the Caribbean. Utility leaders are increasingly engaged in finding appropriate technical and regulatory approaches to this new development in the industry."

The development of renewables presents significant opportunities as well as challenges in the Caribbean region, for example:

- ▶ How should consumers be paid for their self-generation, and what incentives does this create?
- ▶ How to ensure that utilities can recover their fixed costs as the penetration of self-generation increases?
- ▶ How to ensure that consumers pay no more than necessary for delivery of shared services, and that these costs are shared fairly between different customers?
- ▶ How to attract new investors and IPPs into these markets, maximise cost-effectiveness of generation and maintain a commercially viable role for utilities?
- ▶ What new business models and services will need to emerge as the penetration of renewables increases, and how will the system reward these services?



Tariff principles for self-generation

The existing business model for electricity utilities in the Caribbean typically comprises single vertically-integrated companies tasked with investing in and maintaining generation, networks and providing supply to end customers. Utilities recover both their fixed and variable costs through a tariff on end customers, set annually or for multiple years based on a 'cost-plus' calculation. While variable costs can be volatile and strongly influenced by movements in fossil fuel prices, fixed costs are generally more stable reflecting previous investment in now 'sunk' assets.

With self-generation enabled, self-generating customers can enjoy lower and more stable electricity bills as well as a degree of 'energy independence', which is clearly a positive development for these customers. Up to a point, this can also represent a win for utilities, as the tariff can be set such that the lost revenue from reduced system demand (when the customer is self-generating) is offset by the avoided fuel cost for serving that demand. In other words, it can make sense for the utility on a variable cost basis. However, depending on the design of the tariff, increased self-generation could lead to an under-recovery of fixed costs, or at least a shifting of the fixed cost burden onto those customers not self-generating. Neither of these scenarios is likely to be sustainable in the medium term, and if left unresolved it could raise barriers to utility support for further renewables deployment in the region.

For self-generating consumers, authorities can set up different types of tariff to pay for the excess power generated (above consumption). Two common forms of tariffs can be distinguished: **Net metering** and **Net billing**.

Net metering relates to an arrangement whereby the utilities purchase the excess power from self-generating customers at the same rate they charge for consumption. This is equivalent to the customer paying for its 'net' consumption only, with their contribution to both variable and fixed costs reduced pro-rata with the volume of electricity exported to the grid.

Net billing, also referred to as a 'buy-all-sell-all approach', is an arrangement in which a self-generating customer pays for its demand at the full retail rate (including fixed costs) and then sells its excess electricity at a pre-defined rate. Export tariffs can be fixed under long-term contracts, with different rates awarded according to the generation technology deployed (commonly referred to as 'feed-in tariffs' or FiTs), or they can be calculated based on some other metric such as generation costs or avoided fuel costs. Using avoided costs as the metric to set export tariffs, for example, the self-generating customer still pays their share of fixed costs to the utility.

Wilson Rickerson

CEO
Meister Consultants Group, Inc
Boston, Massachusetts, USA



New directions in policy making

"The Caribbean is moving beyond traditional FiTs and net metering, introducing 'next generation' regulations that signal new directions in policymaking."

Janine Migden-Ostrander

Principal, The Regulatory Assistance Project, Columbus, Ohio, USA



Balancing multiple objectives

"It is critical that rates be designed that balance the utility's need for sufficient revenues to operate the grid, provide sufficient value to customers to engage in on-site generation and protect customers without solar PV from assuming an unfair share of the cost responsibility, while still structuring rates to encourage conservation."

Different tariffs can provide different incentives to customers and utilities. For example, by minimising costs to self-generating consumers, a net metering arrangement may encourage more renewable deployment. With net metering, however, as the volume of self-generation on the system increases there may be a risk of under-recovery of fixed costs for utilities, which may in turn increase the risk of asset stranding. In this scenario, an approach more akin to net billing – whereby the customer pays a greater share of fixed costs – may be necessary, even if it could somewhat reduce the incentives for self-generation for some customers.

Arguably, the tariff design should also recognise the 'insurance' value of the grid for self-generating customers. For example, a customer close to self-sufficient with rooftop solar would make a limited contribution to fixed costs (based on its net import volumes only), whether under a net metering

or net billing arrangement. This would under-compensate the utility for the backup capacity that it is obliged to provide for the customer (e.g. to provide supply when the sun is not shining). In systems with high levels of self-generation, tariff mechanisms may have to include a 'demand charge' to reflect the backup capacity costs, based on the customer's potential contribution to peak demand.

These examples highlight the importance of tariff design in creating the right incentives for renewables deployment at the customer level, while ensuring that utilities can recover their fixed costs. Further to this, the regulatory framework needs to ensure that customers are only paying for the efficient costs of investing in and operating the system, and thus may need to evolve from the existing 'cost plus' framework (which we discuss later in this *Thinkpiece*).



IPP generation and PPA contracting

While the immediately visible and most debated challenge to the existing utility business model comes from self-generation, the entry of utility-scale renewable IPPs presents many similar challenges. Utilities need to balance the need to provide a fair price for IPP generation in the PPA, with the need to optimise the overall efficiency of the system and ensure efficient cost recovery for shared assets and services.

While there may be some risk of stranded assets resulting from new IPP entry, the overriding issue for the Caribbean has been under-investment in generation. Single utilities may lack the financing capability to invest in

new renewable capacity, which may make the IPP model an attractive option. It enables the utilities to shift risk from their balance sheet on to IPPs prepared to take on this risk. This can, in turn, attract new investment and skills into the sector to meet a growing demand, as well as encourage technological innovation. Further, PPA contracting for utility-scale renewables deployment can create new business opportunities for the utilities, including the provision of network capacity, ancillary and balancing services, and metering and other supply-related activities.



Castries Harbour, Saint Lucia

Peter Sherry

Senior Manager
Baringa Partners
London, UK



Unlocking new private investment

"Enabling participation from IPPs can unlock new private investment and innovation in the sector in the long term, while opening up new business model opportunities that leverage the utilities' continuing central role in the remainder of the value chain."

Allison Jean

Executive Director
Caribbean Electric Utility
Service Corporation (CARILEC)
Castries, Saint Lucia



The need for strong utilities

"It is important that in our quest to achieve lower electricity prices for consumers, there is attention paid to the continued economic viability of the power companies themselves."

The size of many Caribbean markets may provide natural and technical barriers to significant new entry from IPPs (indeed, this was likely a key rationale for the original vertically integrated structure in the region). However, the regulatory

framework should accommodate efficient new entry where IPP generation can reduce costs to consumers overall, while ensuring utilities remain sustainable in the long term.

The evolving role of system operators in Europe

Experience from the UK, Europe and elsewhere increasingly supports the notion that strong centralised management remains essential in systems with high renewables penetration.

In particular, the role of system operation becomes much more complex and specialised in systems with a high penetration of intermittent resources, (e.g. wind, solar). New ancillary services are required to provide flexibility, sourced from a diverse range of technologies including fast-cycling generation, interconnection, storage and demand-side response. Even where many services can be provided at a distribution level, system operators will retain a critical role both in the procurement and dispatch of these flexible services, as well as ensuring that the system remains secure and balanced in real-time.



Power line on Mayreau Island, St Vincent and the Grenadines

New service offerings for storage, network and demand management

While tariff design and an effective PPA framework can help with the efficient and equitable recovery of existing fixed costs for utilities, there remains the challenge of encouraging the new investment and service offerings required in the long term. Given the relatively small size of the Caribbean island systems, the role of utilities may change more rapidly here than in many other markets, and the Caribbean could, therefore, find itself at the forefront of the globally evolving utility business model.

Caribbean utilities will have a critical role to play in managing a more complex renewables-based system with multiple participants. New business models can be developed that leverage the experience and expertise that resides within their organisations, and monetises this in the provision of essential services to the system. For example, utilities could proactively contribute to the development of innovative utility-scale storage solutions that enable greater renewables penetration, while reducing pressure on the running regime of existing fossil fuel based generation assets.

At the same time, the regulatory regime will need to adapt to recognise the different service and revenue profile associated with some of these newer and more innovative business models. The next generation of regulatory approaches include ‘incentive-based regulation’, which not only hold utilities to account but also encourage and reward those that provide efficient and reliable services at the lowest long-run cost to customers. The ‘RIIO’ (Revenue = Incentives + Innovation + Outputs) framework implemented by Ofgem in the UK is one example of a strong incentive-based regime that places the long-term interests of consumers at its core.¹ Such a ‘carrot and stick’ regulatory approach may be more fit-for-purpose than the existing regulatory frameworks in the Caribbean – to enable a better alignment of commercial incentives with the government policy objective to encourage efficient renewables deployment and thus reduce reliance on imported fossil fuels.

¹ <https://www.ofgem.gov.uk/network-regulation-%E2%80%93-riio-model>



Geothermal basin in the Valley of Desolation, Windward Islands, Dominica

Dr Chris Doyle

Principal Teaching Fellow
Warwick University
Warwick, UK



Encouraging innovation

“With the emergence of innovative, efficient and scalable technologies, the Caribbean electricity supply industry stands on the cusp of delivering significant economic benefits. In partnership with the private sector and international agencies, Governments in the region can help accelerate this evolution, as has occurred successfully in the telecoms sector.”

Bartley Higgins

Energy Specialist
World Bank Group
Washington, USA



Modernising the Caribbean energy sector

"The World Bank supports ongoing efforts in the Caribbean to modernise the energy sector and develop regional solutions to regulation and power markets that will unlock new sources of investment, facilitate economies of scale, and create incentives to develop renewable energy and energy efficiency."

The way forward: a framework for regulatory change

The development of renewables represents a 'game-changing' opportunity for the Caribbean. Renewable deployment can reduce dependence on imported fossil fuels as well as encourage new investment and innovation, all of which can be to the benefit of electricity customers and the wider regional economy.

However, as we have discussed in this *Thinkpiece*, the rapid deployment of renewables is challenging the existing utility business model and with it the relatively immature regulatory frameworks in the region. These pressures on the existing utility business model could represent a major threat to further deployment of renewables in the Caribbean, and in turn, a significant lost opportunity for the region to set itself on a more sustainable long term energy path.

The current business models and regulatory frameworks will, therefore, need to adapt to respond to this new reality. While the precise institutions and mechanisms through which change is achieved will inevitably vary across individual Caribbean countries, there are a number of principles that could govern this change process. For example:

- ▶ Tariffs for self-generation should create the right incentives for efficient renewable deployment, while ensuring that utilities can recover their fixed costs.
- ▶ The existing 'cost-plus' regulatory framework may need to evolve into an *ex ante* incentive-based framework to ensure that customers pay no more than necessary for shared services.
- ▶ The regulatory framework governing PPAs should incentivise new entry from IPPs where that generation can reduce costs to consumers overall, while ensuring utilities can recover shared costs and remain sustainable in the long-term.
- ▶ The regulatory regime will need to adapt to recognise the potentially increased risk associated with some of the newer and more innovative business models that utilities should be encouraged to pursue in a system with a high penetration of renewables.
- ▶ Incentive-based regulatory models should place customers at the centre of the framework and provide both 'carrots and sticks' to incentivise proactive and forward looking behaviour from utilities to safeguard customer interests.



Caribbean policy makers, regulators and utilities in the electricity sector are currently faced with both huge opportunities and significant challenges. The speed at which a more fit-for-purpose incentive and regulatory framework can be developed will, in large part, determine the speed of renewables deployment in the region. As a first step, a critical review is required of the incentives that exist around self-generation, participation of IPPs, and the requirement for new and more complex system management products and service offerings. This would then need to evolve into the development of an agreed set of guiding principles, from which individual Caribbean country governments and regulators could implement into their respective regulatory frameworks.

To this end, programme funders and delivery bodies should consider how developing the commercial and regulatory incentive framework for the electricity sector can be supported by their existing and prospective programmes. We welcome CARILEC's commitment to include consideration of these issues in their ongoing programme.

Provided that the regulatory regime can evolve with the inevitable changes in the utility business model, the deployment of renewables can unlock new private investment and deliver a 'win-win-win' for Caribbean consumers, utilities and the wider economy.

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About Baringa

Baringa Partners LLP is an award-winning management consultancy that specialises in the energy, financial services and utilities markets in the UK and continental Europe. It partners with organisations when they are developing and delivering key elements of their business strategy, as well as working extensively with government and regulators to provide policy and advisory services. Baringa works with its clients either to implement new or optimise existing business capabilities that relate to their people, processes and technology.

Baringa is recognised both in the UK and internationally for its unique culture, which has been acknowledged by a number of awards and accolades and continues to reaffirm Baringa's status as a leading people-centred organisation.

