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Taking Responsibility

ENERGY DIVERSIFICATION & THE CARIBBEAN

BACKGROUND BRIEF

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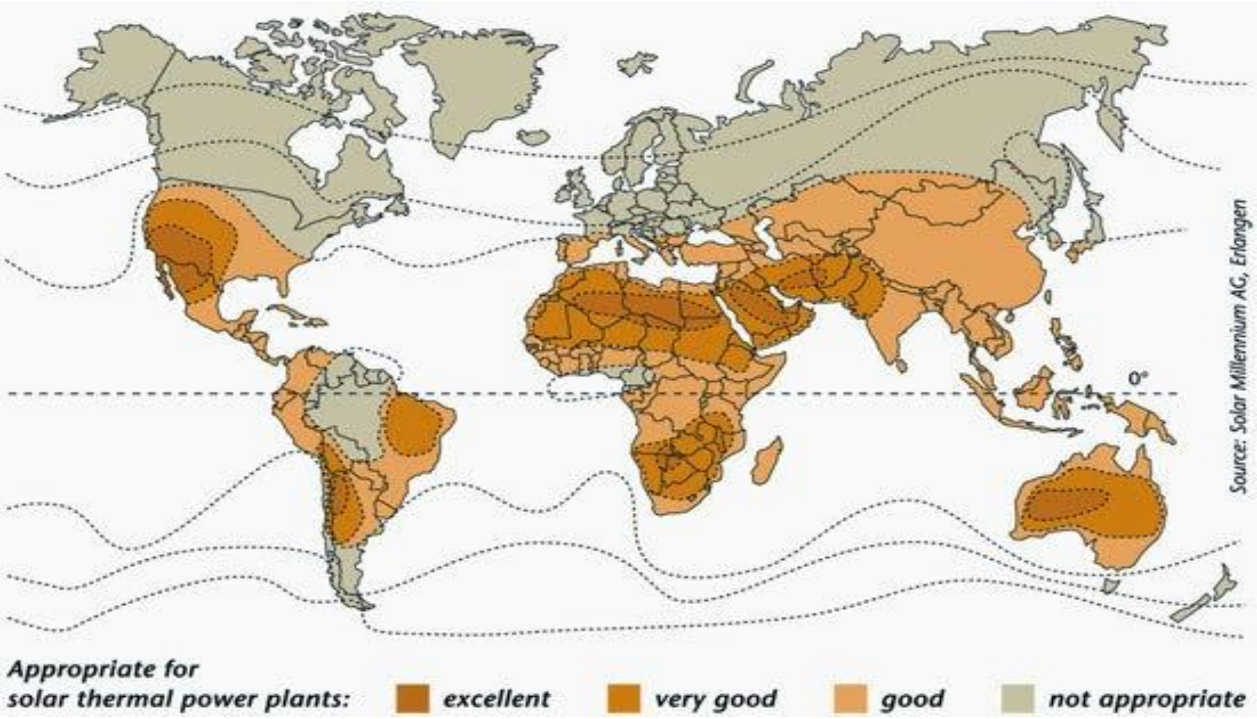

Next week, the world's leaders will assemble in Copenhagen, Denmark, for the United Nations Climate Change Conference. This is an opportune time for Caribbean governments to decide what their own positions on alternative energy and climate change should be.

Within the next decade "technological change will revolutionise the energy sector, undermining current assumptions and conventional wisdom."[1] Simply put, customers will have an economically viable choice to leave the grid. This will mean utility-controlled fossil fuels will no longer be the de facto power source for electricity generation.

Two of the key questions thus facing Caribbean[2] policy makers are:

1. To what extent should they diversify?
2. At what point should they jump onto the renewable energy[3] bandwagon?

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[1] Podesta, John D., Kate Gordon, Bracken Hendricks, and Benjamin Goldstein. *The Clean Energy Investment Agenda: A Comprehensive Approach to Building the Low-Carbon Economy.* Policy Paper, Centre for American Progress, 2009

[2] For the purposes of this proposal, the Caribbean is defined as those states participating in the Caribbean Renewable Energy Development Programme (CREDP): Antigua and Barbuda, the Bahamas, Barbados, Belize, British Virgin Islands, Cuba, Dominica, Grenada, Guyana, Jamaica, Montserrat, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Suriname, Trinidad and Tobago and Turks and Caicos (CARICOM Secretariat 2004).

[3] Renewable Energy is defined as "energy obtained from natural and persistent flows of energy occurring in the immediate environment" (Twidell and Weir 2006)

There is a strong case to be made that the time is now, and that most of the Caribbean territories are well-placed to supply the vast majority of their energy and electricity needs from renewable energy resources. In fact, one can argue that the current renewable energy targets[4] are not ambitious enough.

An immediate policy commitment to a greater adoption of renewables would be a pre-emptive energy security strategy. More broadly, it would represent a strategic diversification of each territory's economic base, which would in effect, lay the foundation for a new economy.

While it would not be easy, the transition from an imported fossil fuel dependent electricity and transportation sector to an indigenous renewable energy based one, is necessary. Like the telecommunications revolution, it would quietly, but completely transform the region's economies. And the potential economic gains are significant.

The following are compelling reasons to justify the use of policy to prioritise such a transformation:

- Renewable energy technology is better suited to Caribbean energy market dynamics.
- Renewable energy will improve the region's energy security.
- Renewable energy could boost economic growth in the region.
- There may be ways to make the shift to renewable energy more affordable.

RENEWABLE ENERGY TECHNOLOGY IS BETTER SUITED TO CARIBBEAN ENERGY MARKET DYNAMICS

There is significant heterogeneity amongst the Caribbean national energy markets and renewable energy potentials. Differences relate to geography, size, peak load, energy consumption, GDP per capita and the type of utility ownership and regulation. While the most promising renewable energy technologies, for any of the Caribbean islands, are likely to be a combination of solar, wind, hydro, geothermal or bio-mass based ones, different territories will have their own unique, optimal combinations. Practical renewable energy systems have to be tailored to the local energy flows, and demand characteristics of the area to be supplied. Thus it is impossible to prescribe a one-fit, regionally replicable, renewable energy plan.

With that said, island systems have a number of common characteristics that make them ill-suited to fossil-fuel based energy generation systems. They tend to be small, isolated systems with no, or minimal potential for interconnection. As a result, the region's systems are capital-intensive; require high reserve-capacity margins in order to guarantee reliability; are unable to benefit from economies of scale; and with the exception of Trinidad, are highly dependent on imported fuel. Particularly due to the

[4] Ministers from Latin America and the Caribbean agreed at the World Summit on Sustainable Development in Johannesburg, South Africa, in September 2002 on a 10% target for Renewable Energy by the end of 2010 (CARILEC 2008).

lack of economies of scale and limited storage capacity, in addition to the other factors, the Caribbean energy market has largely been uncompetitive and volatile.

This is because fossil-fuel based systems are most easily managed centrally as they benefit from significant economies of scale In contrast, some renewable energy technologies are available as small embedded generators that are easily produced in dispersed locations and do not need large economies of scale to function optimally. To the extent that fossil fuel based technology was the only proven system available to the energy sector, the Caribbean had to make the best of an unfavourable situation. However, the world has changed, and new opportunities abound.

RENEWABLE ENERGY WILL IMPROVE THE REGION'S ENERGY SECURITY

Internationally, current energy policy debates are framed with reference to energy security and the need to mitigate climate change. While both ought to be of concern to the region, the former should probably drive regional energy policy[5]. The European Commission defines energy security as "uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial)."

Caribbean countries are highly dependent on the expensive option of imported fossil fuels,[6] which accounts for over 90% of the region's electricity generation. The adverse effect that the 2008 energy price hikes had on the region's balance of payments, foreign exchange markets and domestic inflation are well documented. This occurred within the context of the PetroCaribe initiative, which served to cushion the blow, but in so doing, obscured the true crisis that the region is facing. The uncertainty surrounding future price spikes and volatility has already undermined economic activity and will continue to do so. Diversifying will not only ease the associated balance of payment imbalances that derive from being so heavily reliant on imported fuel, but it will also create long-term price stability. And it is energy price stability that facilitates economic activity, enabling long term planning and investments.

In a world in which oil prices may be moving to a permanently higher plateau, fossil- fuel based electricity and transportation systems are becoming burdensome for the region[7]. Cheap, abundant and reliable energy is fundamental to economic prosperity. Yet, it is the global consensus that the time of low and stable fossil fuel prices has passed. The recently published International Energy Agency (IEA) 2009 *World Energy Outlook* predicts oil prices to remain within the USD$100 region for the foreseeable future (avg. USD$100 pb up to 2020 and avg. USD$115 pb up to 2030). Based on the large

[5] The member states of the Caribbean are amongst the highest emitters of GHGs (Green House Gasses) per capita worldwide. However due to the region's relatively small size, its contribution to global emissions is minimal (CARICOM Secretariat 2004).
[6] The Caribbean is a high energy intensity region (CARICOM Secretariat 2004).
[7] The average cost, per kWh produced, of electricity in the Caribbean is one of the highest in the developing world (CARICOM Secretariat 2004).

projected increase in demand and the comparatively low expected increase in supply[8], oil price is unlikely to fall below these estimates. In addition, the effect of impending global climate change agreements will significantly raise the future cost of fossil fuel based energy sources[9].

Energy security is not only a regional problem, it is a global challenge. Many countries, particularly those that are also dependent on imported fuel, have been actively designing 'Green Energy Policies' to place their economies in the best position to take advantage of the expected changes of the coming decades. In 2008, in the United States and the European Union, additional power capacity from renewables exceeded the power capacity of conventional power sources**.** Germany, Spain, Japan, Brazil, the United States and China have each made a concerted effort to invest not only in clean-energy technologies but in clean-energy manufacturing infrastructure. These countries are happy to provide technical assistance – in fact many already have, to like-minded governments. They should be considered potential partners as the region seeks to transform their energy sectors.

RENEWABLE ENERGY COULD BOOST ECONOMIC GROWTH IN THE REGION

The transition from an imported, fossil fuel dependent electricity and transportation sector to one that is indigenous and based on renewable energy could even be seen as a timely economic catalyst for the region. There is already international precedent for such an approach. China, Japan, the Republic of Korea, the United States and various European states have earmarked large investments in clean energy as part of recent economic stimulus plans, all geared towards creating jobs and reinvigorating economies. And yet, hefty stimulus packages are not needed. With the right policy direction, renewable energy has the ability to generate substantial economic activity, without direct government support.

The adoption of renewables will likely create a new economic sector[10]. It will enable the re-branding of the Caribbean tourism product; innovations in its financial markets and the possibility of energy intensive industries (re-)establishing themselves in the region. On average, renewable energy technologies create more jobs per unit of installed capacity, per unit of power generated and per dollar invested, when compared to fossil-fuel plants. The United Nations Environment Programme (UNEP) funded report "Green Jobs: Towards decent work in a sustainable, low-carbon world" notes that currently 2.3 million workers are employed world-wide in the renewable

[8] World population is projected to increase from 6B today to approximately 9B in 2050 this coupled with the high rates of economic growth and electrification of the developing world (particularly China and India) will raise global demand (Helm 2007). World electricity demand is projected to grow at an annual rate of 2.5% to 2030 (International Energy Agency 2009). All fossil fuels are finite resources.

[9] Goldman Sachs predicts that the carbon price necessary to incentivize emissions reductions will be in the region of USD$150/ tonne (GS Sustain 2009).

[10] In 2008 annual renewable energy investment reached USD$120B (REN21 Secretariat 2009). It is projected that the market providing finance for clean and renewable energy will reach USD$1.9 trillion by 2020 (World Watch Institute and Cornell University Global Labour Institute 2008).

energy technologies sectors. By 2030, UNEP projects 20 million more jobs would have been created in this field. The type of employment that will be created ranges from retrofitting buildings to make them more energy efficient; upgrading existing infrastructure; installing, operating and maintaining renewable energy plants; and there will also be a need for specialised renewable energy lawyers, accountants and consultants. All of these skills will be required in the Caribbean. Yet even if net employment creation were merely neutral, a shift to renewable energy would probably safeguard employment that would be lost as a result of a renewed surge in oil prices.

China has realised the economic development potential of clean energy technology. Through a combination of favourable government procurement guidelines, tax policies and national targets, Chinese government policy has facilitated the development of a world-class solar industry in a relatively short space of time. Although the dynamics of the Chinese and Caribbean economies differ completely, Caribbean policy-makers ought to do like the Chinese and consider what renewable energy technologies have the potential to create the greatest linkages throughout the rest of their economies. For example, bio-fuel based technology has the potential to generate extended backward linkages in Caribbean economies, but is not appropriate for all territories.

It would be an opportunity wasted if dependence on expensive, imported fossil fuels were to be swapped for dependence on imported, high-cost renewable energy capital equipment.

THERE MAY BE WAYS TO MAKE THE SHIFT TO RENEWABLE ENERGY MORE AFFORDABLE

We, however, cannot mislead ourselves: renewable energy is not cheap. Those technologies where advances are cutting fossil fuel cost, such as solar and wind, cannot provide constant load energy; thus for now, they can only provide add-on. Meanwhile, those renewables that do provide load energy either do it on too small a scale to make a difference or, like waste to energy, are expensive compared with fossil fuels. So while the long-term benefits of renewable energy are evident, the short term costs are intimidating. Getting around them is the chief obstacle which faces Caribbean governments.

Because Caribbean governments have very limited fiscal space, ***it is important that policy focuses on creating the right incentives rather than providing funding***. This approach will enable governments to meet their objectives with limited use of public funds. The type of transition being contemplated cannot occur without the utilities being brought to the table. What is necessary is a credible, consistent long-term policy framework that encourages utilities to invest heavily in renewable energy generation capacity. The majority of the region's utilities are privately owned and it is the private owners that will be expected to fund much of this transition.

Caribbean Governments need to be fiscally practical. Only proven and cost-efficient technologies should be encouraged. This is why, in our future research on renewable energy, CaPRI will limit our analysis to solar, wind, hydro, geothermal and bio-mass

technologies. Limited fiscal space, technological expertise and human resource capacity, as well as small energy markets, create a situation in which Caribbean governments would do best to adopt those technologies that have already achieved grid parity. They should also privilege technologies that have already proven to be successful at the scale appropriate to the respective territory's energy needs.

Such a transition will require a suite of complementary policies. These must create new markets for renewable energy based products and services. Governments should devote resources to determining what policy changes are necessary to encourage the desired market shift. However, included among the low-hanging fruit are changes to; national building codes; land policy; legislation; and national energy policies. Government need not seek to subsidise the industry directly. Rather, having created the demand, the government should empower the private sector to meet it. It is not in the interest of Caribbean governments, or the energy market at large, for government to become market players.

In the developed world, for example, many governments have used subsidies, feed-in tariffs and tax rebates to coax investment. In the Caribbean context, tax rebates and feed-in tariffs will probably be necessary.

Feed-in Tariffs:

Overly complex tax codes, as exist in some Caribbean countries, can inhibit growth and cause revenue-loss. Therefore, incentives to adopt renewable energy should be kept as simple as possible. One possible approach is feed-in tariffs. Feed in tariffs (FITs) are legislated mandates that an electric utility purchase at a fixed, favourable tariff power, generated by independent power producers from renewable resources. This tariff is guaranteed for a fixed time period, and varies depending upon the particular generation source (i.e. there would be a different FIT for wind and geothermal generated electricity). FITs are phased out after a target renewable energy generation capacity is met, say fifteen percent of national generation capacity, and generally have a provision whereby the tariff decreases annually, hence encouraging immediate investment. The favourable rate is usually passed on from suppliers to consumers, however as this premium is spread amongst many consumers the impact on individual households has tended to be quite small.

FITs were first introduced in the Unites States in response to the second oil crisis, and today exist in over twenty-five nations. They have been particularly successful at incentivizing the uptake of renewable energy in Germany, Denmark and Spain. As a policy instrument they are effective because they create long-term stability and fair market conditions for renewable energy technology. Effective FITs have had the following characteristics, they:

1. *distinguish between different technologies and precisely stipulate what technologies are to be covered by the legislation;*
2. *make provisions for the tariff to decrease periodically, thereby incentivizing immediate investment;*
3. *set a clear renewable generation capacity target, after which the tariff seizes to be applicable;*
4. *provide a long term, but set time-frame, over which the tariff is guaranteed e.g. 20 years;*
5. *mandate a tariff that is neither too high nor too low; and*
6. *provide a credible method by which the tariff will be financed.*

The adoption of renewables will not result in cheaper electricity to the consumer in the medium term, but rather will result in a stable price. The chief cost argument in favour of renewable energy is thus not that it is a cheap energy source, but that it will hedge against high fossil fuels prices in the future. All the major energy players in the region are aware of this, including the utilities. Apart from anything else, they know that if the oil price shoots up again, they will have particularly irate customers and probably be required to absorb some of the cost themselves. As a result, many utilities are independently exploring the case for renewable energy.

Targeted policies could accelerate this trend. In principle, it might be possible to wait and let market incentives prompt the switch, however, the danger of such an approach would be that an energy price surge might make the eventual adjustment especially painful. Governments should take advantage of the availability of capital at this moment, and the slight fiscal space created by the reduction in energy prices that has

resulted from the global downturn. And while many Caribbean governments are pondering the possibility of switching to liquefied natural gas, this appears to be a long shot for the Caribbean. This is because 1) prices will rise in the future and be just as uncertain as oil, 2) a switch to LNG would require massive infrastructure investments, and 3) it would require economies of scale that are not easily achieved in most territories. If governments and utilities have massive infrastructure investments to make in the future – already, many plants are well beyond their lifespan – why not adopt policies that encourage this investment in the direction of renewable technology?

CONCLUSIONS

The imperatives of augmenting energy security and mitigating climate change will dominate the international energy policy arena for the foreseeable future. In order to take advantage of international expertise and funding, Caribbean governments need to situate their energy and economic policies within these international dialogues. Furthermore, if they are to take advantage of this wave of interest, they need to act quickly. This will enable them to become one of the regions that benefits from the multilateral and bilateral funding, as well as technical expertise, that have been earmarked for this purpose. CaPRI is undertaking research to determine what funding options are available, and how they can be realised; but it is clear that Caribbean governments will need to take the initiative aggressively if these opportunities are not to pass us by.

Such a transition will not be simple. Nonetheless, it has been well researched and tested for the past two decades: in short, it is feasible, and appears to be in the region's interest. The technology exists. The initial, region-specific research has been done[11]. Innovative financing structures exist. All that is needed is a clear pathway away from "business as usual". Depending on the territory, small-hydro, wind, solar photovoltaic, and other technologies are already able to produce electricity more cheaply than utility-provided electricity from fossil fuels. While the barriers erected by the current framework will probably block mass customer adoption in the short term, the fact is that the internet and communications boom of the past two decades has generated technologies that allow customers to exit the grid, as well as means by which utilities can reduce their current system losses by half. There will thus come a point in time at which the price of renewable energy generated electricity will be so compelling that those who are most economically able – large businesses, and high net worth individuals – will leave the grid, preferring to generate their own electricity. This will serve to create extraordinary hardship for the utility companies and those consumers that are left to be served by them.

Thus, if policy-makers are to act, they must do so quickly.

[11] The interested reader is referred to the work of the "Regional Energy Action Plan (REAP)" a 1980s CARICOM project, and the 1998 initiated Caribbean Renewable Energy Development Programme (CREDP). A number of other multilateral and bilateral assistance programmes are ongoing.

BIBLIOGRAPHY

CARICOM Secretariat. *Caribbean Renewable Energy Development Programme.* Project Document, United Nations Development Programme Global Environment Facility, 2004.Caribbean Information Platform on Renewable Energy*:* http://cipore.org/home/ Caribbean Renewable Energy Forum Linkedin Homepage: http://www.linkedin.com/groups gid=2409247&trk=myg_ugrp_ovr

Goldman Sachs. *Change is coming: A framework for climate change – a defining issue of the 21st century*. 2009.

Helm, Dieter. *The New Energy Paradigm.* Oxford: Oxford University Press, 2007.

International Energy Agency. *World Energy Outlook 2009.* Paris: OECD/IEA, 2009.

KEMA. *CARILEC: Position Paper on Energy Policy.* St. Lucia: CARILEC, 2008.

Ministry of Energy and Mining, *Jamaica's National Energy Policy 2009 - 3030.* Kingston: Ministry of Energy and Mining, 2009.

Podesta, John D., Kate Gordon, Bracken Hendricks, and Benjamin Goldstein. *The Clean Energy Investment Agenda: A Comprehensive Approach to Building the Low-Carbon Economy.* Policy Paper, Centre for American Progress, 2009.

REN21 Secretariat. *Renewables Global Status Report: 2009 Update.* Renewable Energy Policy Network for the 21st Century (REN21), 2009.

Scheer, Hermann. *Energy Autonomy: The Economic, Social and Technological Case for Renewable Energy.* London: Earthscan/James & James, 2007.

Twidell, John, and Tony Weir. *Renewable Energy Resources, Second Edition.* Abingdon: Taylor & Francis, 2006.

UNEP, SEFI and New Energy Finance. *Global Trends in Sustainable Energy Investment 2009: Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency.* Geneva: UNEP/ SEFI, 2009.

United Nations Environment Programme Finance Initiative Climate Change Working Group. *CEO Briefing: Renewable Energy.* Geneva: UNEP/ SEFI, 2004.

World Watch Institute and Cornell University Global Labour Institute. *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World* . Nairob: UNEP, 2008.

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