The Financiers' Guide to Sustainable Energy Lending in the Caribbean

Organization of American States

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Contents

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Acronyms

AC	Air Conditioning
AID Bank	Dominica Agricultural Industrial and Development Bank
APS	Alternative Power Source
BBD	Barbados Dollar
CFL	Compact Fluorescent Light
CREDP	Caribbean Renewable Energy Development Programme
CSEP	Caribbean Sustainable Energy Program
CSR	Corporate Social Responsibility
DSD	Department of Sustainable Development
ECCU	Eastern Caribbean Currency Union
EE	Energy Efficiency
EIB	European Investment Bank
EU	European Union
EU-ACP	European Union's African, Caribbean and Pacific Energy Facility
FI	Financial Institution
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit – German Agency for International Cooperation
IDB	Inter-American Development Bank
IPP	Independent Power Producer
kWh	Kilowatt Hour
MW	Megawatt
NHT	National Housing Trust of Jamaica
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
PACE	Property Assessed Clean Energy
PV	Photovoltaic
RE	Renewable Energy
SET	Sustainable Energy Technology
SWS	Solar Water System
VAT	Value Added Tax
W	Watt

1. Introduction

The Caribbean region is highly reliant on imported fossil fuels to generate electricity. Volatile electricity prices create economic development challenges which can be mitigated to some extent through affordable, locally produced energy. The region has abundant renewable energy resources such as solar, wind, geothermal, biomass, and biogas, as well as an increasing availability of modern energy efficient appliances. Reducing reliance on high-cost, imported energy sources enables individuals, businesses and governments to redirect financial resources to other needs, thus promoting economic growth. The promotion of renewable energy (RE) and energy efficiency (EE)—collectively referred to here as sustainable energy technologies (SETs)—create opportunities for countries to reduce their exposure to imported energy costs, and to transition to a more sustainable energy future.

Despite their strong potential, RE and EE remain underdeveloped in the Caribbean region. This is due to barriers such as higher upfront costs; a lack of workforce experience with sustainable energy technology; low consumer awareness; and a lack of policy and financial instruments to drive the uptake in RE technologies and EE products. Together, these barriers constrain both the supply of and the demand for investment in sustainable energy in the Caribbean. As a result, Caribbean banks and investors have not established a track record of financing sustainable energy in the region.

The intent of this guide is to serve as a primer for Caribbean financial institutions (FIs) that may be interested in providing capital for sustainable energy projects. Additionally, the guide provides policymakers and other market participants with an overview of current Caribbean SET market barriers.

This guide focuses on seven Caribbean countries: Antigua and Barbuda, The Bahamas, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines.[1] This guide was developed through consultations with regional financial, policy, and industry stakeholders and addresses topics that were identified as high priorities. These consultations included:

An online survey focusing on regional lending practices was distributed to Caribbean credit union lending officers and to the managing directors of commercial and international development banks active in the region.

In-depth interviews were conducted with more than 30 key stakeholders, including lending and underwriting representatives, development agencies, and representatives of the regional RE and EE industries.

A financiers' workshop titled 'Financing Sustainable Energy in the Caribbean: A Consultation and Workshop for Financiers' was held in Saint Lucia in November 2012. The forum brought together financiers from across the Caribbean to 1) deepen their understanding of sustainable energy technology (SETs) options; 2) give financiers the opportunity to express their perception of the barriers to the uptake of SETs; 3) gather feedback for this Financiers' Guide; 4) build bridges for cooperation among financiers; and 5) develop a way forward for promoting sustainable energy financing in the region.

[1] These countries will be referred to as either the "Eastern Caribbean and the Bahamas" or "target countries" throughout this document.

A credit Union breakfast meeting titled 'Sustainable Energy Finance in the Caribbean' was held in Jamaica in June 2012. The meeting brought together CEO's and Directors of the Caribbean Confederation of Credit Unions (CCCU) to discuss the economic and non-economic barriers, and encourage frank discussion among the regarding practical, affordable financial mechanisms and innovative ways with the goal to overcome the current hurdles that limit investments in renewable energy and energy efficiency projects in the Caribbean.

This guide is structured in sections which can be read sequentially or as standalone chapters. Each chapter provides short overviews of the content for readers.

What is the purpose of this guide?

To date, sustainable energy financing guides have focused primarily on the medium- and large-scale commercial markets rather than on household and small business markets.[2] This report addresses this knowledge gap by focusing on consumer and small business sustainable energy investment opportunities. After reading this guide, local FIs will better understand the market and policy environment for sustainable energy in the Caribbean. Additionally, this guide will help financiers develop sustainable energy lending products and enable them to explain the benefits of SET investments to their customers. This guide provides insights on the barriers to investing in SETs, how other FIs structure their lending, and provides suggestions for possible lending products. The approaches outlined in this guide are relevant to lending to both small and micro businesses, since many of them seek out loans with similar characteristics to consumers.

Who should use this guide?

Financiers. Local banks and credit unions play a vital role in providing capital, particularly to consumers and small business ventures. Such financial institutions are interested both in determining how to lend to sustainable energy and how to use sustainable energy to diversify their portfolios. This guide targets general managers, loan officers, and underwriters, and provides practical insights on sustainable energy financing barriers, options, and approaches to help them to prudently expand their lending portfolios.

Households and Small Businesses. Faced with increasing energy prices in the Caribbean, households want to learn how to lower their energy costs. Sustainable energy technologies have high upfront costs and longer payback periods which requires customers to carefully weigh the value of investing. This guide provides basic information about relevant residential technologies and insights on the different types of lending options provided by credit unions and commercial banks.

Policymakers and international organizations. Policymakers from local and national governments as well as representatives from international organizations are seeking to increase the use of renewable energy and energy efficiency in the Caribbean to reduce the region's reliance on high-cost, imported fossil fuels for electricity generation. This guide provides insights on barriers to investment which can inform the development of policy instruments and programs to support sustainable energy.

Which technologies are targeted?

While a wide range of SETs are applicable for the Caribbean region[3], only certain technologies are relevant to the residential context. This guide focuses on financing for SETs that can be readily

[2] NEXANT, 2010 and World Bank, 2011

[3] Such technologies include wind, biogas and biomass installations, geothermal, wave, and solar technologies NEXANT, 2010 and IFOK Analysis 2012.

integrated into residential or small business infrastructure, including solar photovoltaics (PV), solar water heaters and energy efficient appliances. In contrast to utility-scale projects, a key characteristic of residential SETs is that they are physically located at the host site and can be configured to generate electricity bill savings for residential utility customers.[4] The focus on residential SETs creates opportunities for lenders to create new financing programs which can have positive impacts on individual households and communities. However, the focus on small, on-site systems also places project finance strategies outside the scope of this study since project finance requires larger transactions. This focus was confirmed by regional stakeholders during the outreach process, which identified investments in small scale SETs as viable, shelf-ready solutions to the region's energy constraints. Although a full discussion of RE project finance is beyond the scope of this guide, many of the issues addressed herein will also apply to larger commercial projects.

2. The Case for Sustainable Energy

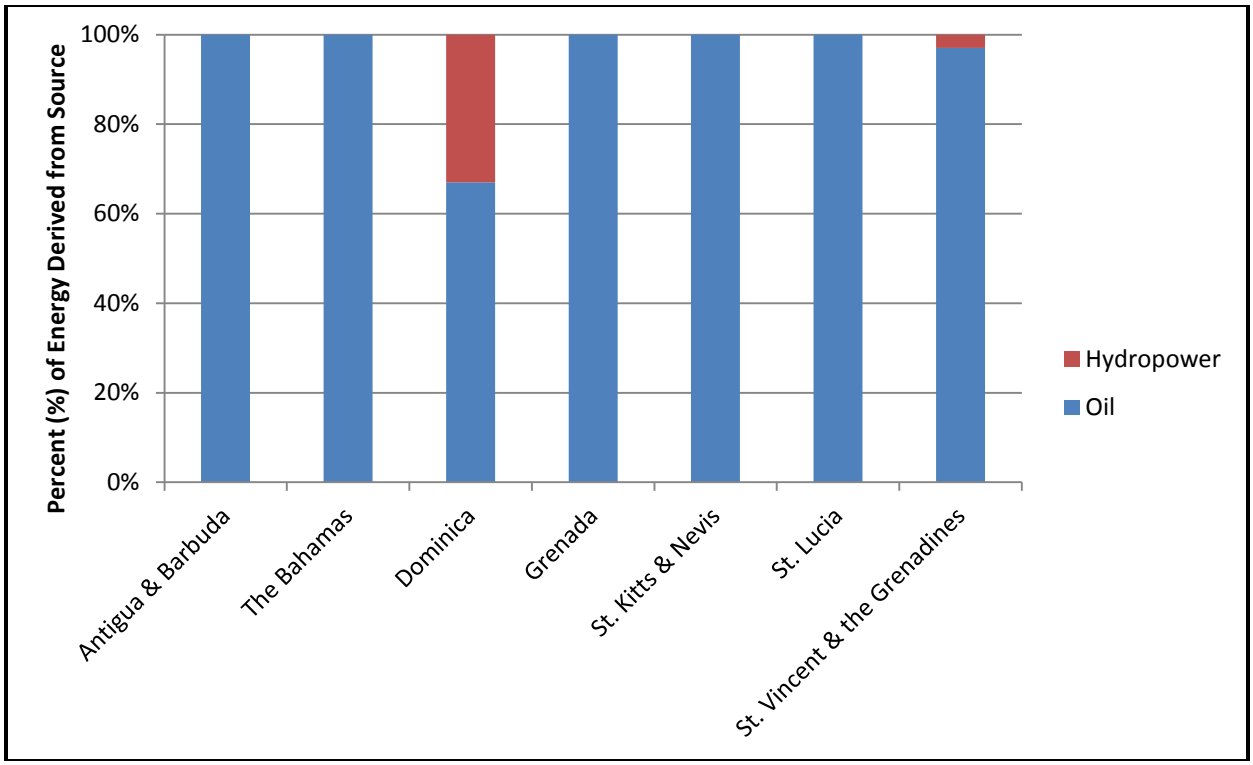
This chapter is intended to provide background information to financiers less familiar with SETs. Financiers can also direct customers seeking to learn more about SETs to this chapter. Section 2.1 summarizes the benefits of diversifying away from oil dependence. Section 2.2 presents the broader resource potential of RE and EE in the target countries. Section 2.3 gives an overview of residential SETs.

2.1 The case for sustainable energy technologies

The Caribbean region has limited conventional fuel sources and is highly reliant on imported energy to generate its electricity. The majority of the countries studied in this report are 100 percent reliant on imported oil for energy[5] (see Figure 1). Oil prices are volatile and are projected to continue to trend upward in the future. In general, projecting future oil prices has been difficult. The International Energy Agency's World Energy Outlook, for example, projects that oil prices will increase to $119/barrel in 2015, $180/barrel by 2025, and $247/barrel by 2035.[6] The current cost of oil, however, is already trading at over US$108/barrel.[7] The increasing cost of fuel sources can be highly disruptive to national budgeting and economic development strategies and underlines the need for fuel source diversity.

[4] Solar water systems can save residential customers gas bill savings if they do not use an electric water heater.
[5] Oil includes heavy fuel oil (HFO), light fuel oil (LFO), jet fuel, and other derivatives.
[6] IEA, 2011
[7] Bloomberg Energy and Oil Prices, 2012

Figure 1. Electricity Mix of Target Countries



Source: REEGLE, 2007-2011

Currently, retail electricity prices rise in accordance with increases in fuel import prices. Oil price increases are passed onto the consumer via the fuel surcharge, leaving consumers in the Caribbean with some of the highest electricity prices in the world, at US$0.35/kWh on average in 2010.[8] In fact, over the last ten years, the nominal electricity price has increased by nearly 60 percent.[9] Recent estimates indicate a doubling of demand by 2028, which will place additional pressure on electricity prices.[10] Energy prices in the Caribbean are projected to continue to rise, consistent with projections of future increases in international oil prices. These higher electricity prices increasingly make sustainable energy solutions more cost competitive for consumer and communities.

Implementing strategies that reduce oil demand can create multiple benefits in the region, as described below. Benefits include energy cost savings, protection against price shocks, improved grid resilience, fuel supply diversity, meeting or offsetting growing electricity demand, local employment and environmental protection.

Energy cost savings

Both renewable energy technologies and energy efficient appliances reduce a consumer's electricity bill—EE products consume less electricity and on-site RE generation can reduce or eliminate the need to purchase energy from a utility (See Annex D for Case Studies that demonstrate potential cost-savings). Depending on the regulatory framework in place (Annex A), households can also generate income by

[8] CARILEC, 2011 and UNDP, 2012
[9] CARILEC, 2002 - 2011
[10] NEXANT, 2010

generating more electricity than they consume and supplying the excess to the grid. While investing in SETs has upfront costs, in the medium- to long-term, they provide consumers with larger disposable incomes which make it easier for them to service their debt.

Resilient energy infrastructure

The Caribbean region is often affected by tropical storms and hurricanes. These natural disasters can damage the national electricity grids and prevent utilities from providing electricity to consumers and businesses. The lost productivity due to power outages can have severe impacts on the economy. While it is true that RE systems could be equally affected by such storms, renewable energy can also be configured to provide energy resiliency (e.g. back-up power or back-up heat), to provide deployable emergency response and disaster recovery services (e.g. mobile generators and portable power sources), and to reduce the time and expense of recovery.[11] At larger scale deployments, it is also possible that distributed renewable energy systems can better ensure grid resilience than centralized power stations can (depending on the scope and nature of the disruption).[12] However, ensuring grid resilience through the use of decentralized architecture would likely require a significant scale-up of renewable resources, as well as the introduction of smart grid control and management strategies.

Fuel supply diversity

Expanding renewable energy generation diversifies a country's energy mix, which provides two key benefits: reduction of fuel import costs and hedges against future energy price shocks.

- **Reduce fuel import costs.** Recent fuel price volatility has caused Caribbean utility companies to reassess their ability to provide reliable, consistent electricity at the same affordable price. High reliance on imported energy not only makes the region susceptible to the economic risks associated with high fuel costs, but in turn keeps the region from moving toward a low-carbon growth trajectory. Installing a greater amount of electricity generation capacity derived from renewable energy sources will diversify the energy mix of countries in the Eastern Caribbean and the Bahamas. This, in combination with energy efficiency measures, will achieve both a reduction in spending on fuel imports and less volatile electricity prices for the consumer.
- **Hedge against future energy price shocks.** Since the fuel for wind and solar systems is free, customer-sited systems can provide an effective hedge against future price shocks by stabilizing a portion of the resident's electricity bills. Growth in renewable energy uptake can improve community resilience against volatile fossil fuel prices.

Meeting/off-setting growing electricity demand

Sustainable energy technologies could also serve as the key technology in meeting growing electricity demand. Electricity demand throughout the region is expected to double by 2028.[13] Given this, governments and some utilities alike are faced with the challenge increasing generation capacity under severe budget constraints following the economic downturn of 2008. Distributed RE systems combined with energy efficiency measures could reduce—if not fully solve—the problem since they can potentially attract new sources of private sector capital to the market if the policies are in place to enable them to be deployed.[14]

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[11] Young, W. R., 2006. HILL, 2009. Young, W., 2006.

[12] Perez, R. et al., 2004.

[13] NEXANT, 2010

[14] Utility companies have a disincentive to encourage energy conservation because it reduces their revenue. In some instances, regulatory frameworks can allow utilities to recoup revenue from lower sales volume. Energy conservation can allow utilities to supply a wider consumer base using the same electricity production capacity, therefore reducing their needs to invest in electricity capacity expansion.

Strengthen the local economy

Expanding SET investments can provide a range of benefits to the local economy. In particular, it can provide local employment opportunities which can result in an overall more robust economy and community.

- **Local employment opportunities.** The majority of sustainable energy technologies that are sold in the Caribbean are manufactured outside of the region. Many technologies, such as solar PV and solar hot water systems, require local engineers and installers for the equipment to become operational. An increase in demand also creates a greater need for technically skilled individuals who can maintain and repair the systems, thus further supporting local employment opportunities. In some instances, there may be opportunities for local manufacturing or assembly as has been the case for solar hot water manufacturers in Barbados (See case study "Barbados SWS Leadership"). With an acute shortage of such skills in the Eastern Caribbean and the Bahamas today, local entrepreneurs have begun to develop local workforce training programs. The Alternative Power Sources (APS) program in the Bahamas, for example, has developed a training course to simultaneously educate individuals in renewable energy and renewable energy technologies and recruit qualified talent into the market.[15]
- **More robust local economy.** Financial institutions prefer a robust economy and community to serve. Reliance on more costly, imported conventional fuel not only results in less disposable income available to consumers, but also to businesses, and the government. This has several long-term economic consequences, such as reduced consumer consumption; inhibited new business creation; and tighter governmental budget constraints that may preclude the provision of key social services. Supporting energy diversification and economic development can directly support the community responsibility strategies of financial institutions.[16]

Barbados SWS Leadership

Barbados has the largest number of installed solar water heaters in the Caribbean (45,000 SWS for private, public, and commercial buildings), saving the country some US$6.5 million annually on oil imports. SETs contribute approximately 15% to the country's total energy supply, particularly due to the extensive use of solar water systems.

A key to Barbados' success in SWS deployment has been its localized marketing and manufacturing. When the industry started on the island in the 1970s, system manufacturers utilized a door-to-door approach to inform potential customers of the cost-savings achieved with SWS. After an initial 4,600 BBD investment, a typical household can achieve a net return on investment in less than two years. As business thrived, Barbadian manufacturer capitalized on the market—exporting locally produced systems to the Eastern Caribbean. Approximately 80 percent of SWS in the English-speaking Caribbean originate from Barbados-owned factories.

[15] Stakeholder interview, Damien Lyn, Alternative Power Sources. http://www.apsja.com/main/bahamas-renewable-energy-writeup.php

[16] For example, credit unions often have community responsibility strategies given their unique customer-owner membership structure. The charters of many credit unions make customers 'owners' in the financial institution, so credit unions can be mandated to pursue policies and programs that better the community.

Environmental protection

The target countries rely heavily on their tourism sectors for economic growth, which makes maintaining environmental quality of the upmost importance. Reducing energy consumption and transitioning toward renewable energy reduces environmental pollution. While the target countries have among the world's lowest carbon footprints, renewable energy generation and energy efficiency measures both help to reduce greenhouse gas emissions, by a relatively small amount, but the symbolic affect may be quite significant.[17]

2.2 Renewable energy resource potential

Figure 2 below highlights the strong potential for renewable energy resources in the target countries, which have been evaluated through multiple feasibility studies.[18] As the table depicts, many of the target countries have a strong resource potential in commercial-scale renewable energies—such as geothermal and wind. However, as stated in the objectives, this guide limits its focus to residential-scale SETs. For this reason, the renewable energy resources most relevant to financiers are solar PV and solar hot water systems—which have a strong resource potential in all the target countries.

Figure 2. Resource Potential by Target Country

	Solar Photovoltaic & SHWS	Hydro	Wind	Geothermal	Biomass/ Biogas
Antigua & Barbuda	●	●	★	●	●
The Bahamas	●	●	●	●	●
Dominica	●	●	●	●	●
Grenada	●	●	●	★	●
St. Kitts & Nevis	●	●	●	★	●
St. Lucia	●	●	●	●	●
St. Vincent & the Grenadines	●	●	●	●	●

★ = Greater than 100 MW potential capacity
● = 10MW - 100 MW potential capacity
● = Less than 10 MW potential capacity
● = None indicated or Unknown

Source: IFOK Analysis, 2012 (Adapted from Nexant, 2010; NREL, 2012)

Adding to this renewable energy picture is the significant potential for countries throughout the region to invest in energy efficiency. Energy efficient equipment can be a significant first step for residents and businesses to control their energy expenditures. Investment in energy efficiency equipment[19] represents an immediately viable solution to consumer preferences, regulatory, and commercial barriers that

[17] Daly, 2010
[18] NEXANT, 2010, World Bank, 2011 and NREL, OAS, 2012
[19] Such as solar hot water systems (SWS), air conditioning units, washing machines, refrigerators, energy-saving light bulbs, or insulation.

prevent the introduction of small-scale renewable energy systems for households. Recent studies have identified energy efficiency as having the greatest scope for reducing emissions and dependence on imported energy. For example, in neighboring Jamaica, a demand-side management program that distributed 100,000 energy efficient light bulbs to 30,000 households was able to save the country approximately 5,350 MWh per year and reduce the electric load by almost 1.7 MW. It is also notable that partly due to energy efficiency measures introduced in the Jamaican market, average monthly electricity consumption decreased by 18% during 2003 and 2008.[20]

2.3 Residential sustainable energy technologies

Despite its excellent potential, renewable energy and energy efficiency technologies remain underdeveloped in the Caribbean region. There are several technologies that are relevant to the consumer household context, namely solar photovoltaic (PV), solar hot water systems, and energy efficient appliances such as air conditioning units, washing machines, refrigerators, televisions, and light bulbs. Key characteristics of these technologies are described below. This section defines the SETs that are the focus of this guide, gives a general overview of how the technologies work, and presents high level insights on potential paybacks.

Solar photovoltaic electricity

The sun's energy is free but requires photovoltaic (PV) panels to absorb the sun light and convert it into electricity. PV systems are usually roof-mounted in a household context although the smallest systems can be portable. A solar PV system consists of a single or collection of panels, and can include batteries (for nighttime and days without sun), a charge controller, and an inverter that converts the direct current into alternating current. All of the target countries surveyed in this report have a high potential for solar PV—defined as between 10 MW and 100 MW of potential generation (See Figure 2. Resource Potential by Target Country). Dominica, for example, has 45 MW of potential solar PV generation and Saint Lucia has 36 MW of potential solar PV generation.[21] Most relevant, is that each country targeted by this guide could generate more electricity from PV than they currently use.

[20] Average monthly electricity consumption for Jamaican households decreased from 200 kWh per month in 2003 to 164 kWh per month in 2008 (Binger, 2011).
[21] NEXANT, 2010

Table 1. Solar Photovoltaic Electricity Summary

Energy Source	Sun
Energy Displaced	Fuel oil or electricity purchased from the power grid
Requirements	Access to sun; if roof-mounted roof facing south (preferable), east or west; a sturdy roof that can carry added weight of installation
Generating Capacity	Small systems typically start at 100 W (to power at least 5 compact fluorescent light bulbs (CFLs)) and larger residential systems have capacities of up to 3.5 kW (to power higher energy appliances such as televisions, refrigerators, and air conditioning units)
Cost Per Unit	Varies depending on installation size, quality, manufacturer, installation costs; US$3,000 - US$15,000 for entire system
Useful Life	20 – 30 years

Solar water systems (SWS)

Solar water systems use the warmth of the sun to heat either water or another fluid in collectors. Typically roof-mounted, a solar collector consists of a storage tank and a solar collector. Solar hot water systems have a lower cost compared to various other renewable energy equipment types and have a shorter payback period. This makes solar water heaters attractive for a broader audience, including low and middle income households, as well as large households and businesses.

Permission to use photo and courtesy of Solar Dynamics Ltd.

Solar water systems are becoming more common in the Caribbean, and have a long history of deployment in countries such as Barbados, Grenada, and Saint Lucia. Barbados has the largest number of installed solar water heaters in the Caribbean. The market growth in Barbados has allowed the costs of SWS to decrease compared to the rest of the region, and thus households in Barbados have a lower payback period than households in other countries.[22]

[22] A Barbadian household can purchase a SWS for US$2,400 and achieve a net return on investment in less than two years. By comparison, the SWS market in this guide's target countries is under-developed. This causes installers and vendors to import equipment—which can include a lengthy customs process and increases the cost of the equipment to the consumer. The additional time and costs mean consumers in the target countries have a longer payback period compared to Barbados.

Table 2. Solar Water Systems Summary

Energy Source	Sun
Energy Displaced	Fuel oil or electricity purchased from the power grid
Requirements	Access to sun; if roof-mounted roof facing south (preferable), east or west; a sturdy roof that can carry added weight of installation
Generating Capacity	A solar water system has the capacity to supply an entire household with hot water, approximately 200 liters per day
Cost Per Unit	Varies depending on installation size, quality, manufacturer, installation costs; US$1,000 – US$3,000 per system installed
Useful Life	15-40 years (depending on maintenance)

Energy efficient appliances

Medium and large appliances such as air conditioning units, refrigerators, washing machines, televisions, fans, computers, and lighting make up the majority of household electricity consumption. Given the upward trajectory of electricity prices, consumers are increasingly interested in finding ways to reduce electricity consumption.

There is a wide range of energy efficient technologies available to consumers and small business in the Caribbean region. Energy efficient product models exist for almost every type of appliance—from washing machines to light bulbs to televisions. Since they consume less electricity to function, they result in a lower electricity cost for the consumer. Energy efficient appliances may be more expensive than the standard model, which might deter individuals from purchasing them even if consumers will save in the long-run. EE appliances can provide high energy savings as shown below in Table 3.

Table 3. Potential Energy Savings for Energy Efficient Appliances

Category	Potential energy savings of best available technologies vs. low-efficiency products
Air Conditioning Units	70%
Lighting	70% - 80%
Washing Machines	30%
Refrigerator/Freezers	>50%
Televisions	80%

Source: TopTen International Group, 2012

These savings can result in quick paybacks if the units are somewhat competitively priced compared to standard (non-EE) appliances. Example paybacks are difficult to calculate and vary by country, technology, model and how the appliance is used. Most appliances and energy efficient and standard models are imported from markets in the United States, Europe, and Asia. These markets each have national rating and labeling systems such as Energy Star and the European Ecodesign Label, which they apply to their exported goods. This results in a range of available products on the market. Given that these products can each have different ratings, it can be confusing to the consumer when selecting products and further complicates investment payback calculations.

Overwhelmingly, however, the energy savings from EE provides consumers with more disposable income, making it easier for them to service their debt. This could enable financiers to provide larger loans to consumers than would be possible otherwise (See Annex D**Error! Reference source not found.** for Case Studies that demonstrate potential savings and see Case Study "Electricity Savings from a High Efficiency Refrigerator" for an energy efficiency example below).

Electricity Savings from a High Efficiency Refrigerator

A customer looking to purchase a new refrigerator-freezer combination unit will have a range of models and brands from which to choose. If a customer selects 400 liter (14 cubic feet) unit, two products are available. Each product has different energy efficiencies according to their respective labels:

- Product A costs EC$ 3,200. It consumes on average 350 kWh a year.
- Product B is less expensive: it costs EC$ 2,500. For this model the average energy consumption is 490 kWh a year.

Assuming a refrigerator lifespan of ten years and an electricity rate of XCD 1.14 per kWh consumed, the fridges will incur the following costs:

Refrigerator A		
Investment	**Operation**	**Total Costs**
EC$ 3,200	10 years * 350 kWh/yr * XCD 1.14/kWh = EC$ 3,990	EC$ 7,190
Refrigerator B		
Investment	**Operation**	**Total Costs**
EC$ 2,500	10 years * 490 kWh/yr * XCD 1.14/kWh = EC$ 5,586	EC$ 8,086

Refrigerator A will save the customer around EC$ 896 the entire lifetime of the product or about EC$ 90 per year of operation, even though the initial investment is higher. Savings could be greater depending on electricity price increases within the ten year product life.

Source: ECELP Analysis and Data Collection, November 2012

3. The Current Financing Landscape

A range of investment opportunities exists for consumers and small businesses seeking to invest in sustainable energy technologies. These projects are, however, capital intensive and many consumers rely on financing in order to purchase systems.

The Caribbean has a robust financing community that could support RE/EE market development and which is particularly well suited to finance small-scale, residential projects. Regional and local financial institutions, including credit unions and commercial banks, provide the majority of household lending. National and regional development banks are also involved in consumer lending but indirectly—they typically provide lines of credit[23] for financiers that lend directly to consumers. Together, these

[23] In the Caribbean, lines of credit are also known as funding windows.

institutions have been a source for providing capital, lending advice, and developing new lending instruments to adjust to the emerging need of sustainable energy financing.

This chapter has four sections: activities of key financial players, how financial institutions evaluate consumer creditworthiness, typical loan terms for sustainable energy finance, and how sustainable energy finance fits within a lender's portfolios.

3.1 Activities of key financial players

Credit unions

Credit unions serve a high percentage of the market in the Caribbean: ranging from a low of 18% in the Bahamas, to a high of 152% in Dominica, indicating that consumers oftentimes have multiple credit union memberships.[24] The average penetration rate for the target countries is approximately 55%.[25] Credit unions have been vital debt lenders to households throughout the Caribbean and their role has consistently grown. From 2010 to 2011 alone, membership increased 5% from approximately 2.25 million to 2.36 million.[26] From 2005-2010, the total asset size of the credit union sector in the Eastern Caribbean Currency Union (ECCU) almost doubled from US$390 million (9% of the regional GDP) to US$700 million (13% of the regional GDP).[27] Credit unions are an engine of local economic development—90 cents of every dollar of savings is invested back into the local economy through loans.[28]

A typical credit union lending portfolio will offer products for home mortgages, vehicle loans, computer and education loans, micro-business loans, and small equipment. Although credit union loans can be as small as US$100, the average loan from a credit union is around US$5,000 and typically ranges from approximately US$1,800 to US$18,000.

Local and International Commercial banks

Along with credit unions, local and international commercial banks are the main source of debt financing in the region. Compared with the near doubling of assets among credit unions in the ECCU, the commercial banking sector in the ECCU only saw its total assets increase by 30% from 2005-2010 (from US$6.4 billion to US$9.2 billion).[29]

Bank lending can be distinguished between large international commercial banks operating in the region (namely Scotia Bank, First Caribbean International Bank, and Royal Bank of Canada) and smaller locally-owned commercial banks. The former tend to be more conservative restrictive in their lending policies, particularly to low and middle income households, leaving the space for creativity and the invention of new financial products to the smaller domestic players—local commercial banks, credit unions and

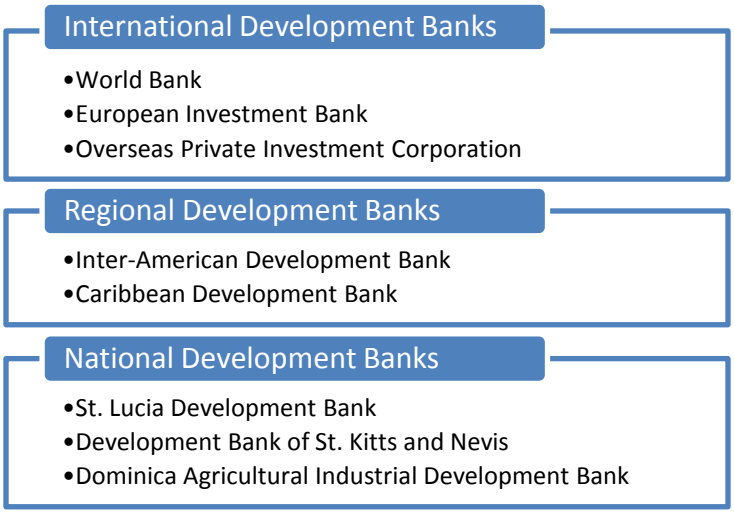
[24] World Council of Credit Unions, 2012
[25] Penetration rate is calculated by dividing the total number of reported credit union members by the economically active population age 15-64 yrs old. Penetration rates are as follows: Antigua and Barbuda- 43.74%; The Bahamas- 18.01%; Dominica- 152%; Grenada- 61.58%; St. Kitts and Nevis- 52.87%; St. Lucia- 74.31%; St. Vincent and the Grenadines- 81.03%. (World Council of Credit Unions, 2012). The mean calculation stated above excludes Dominica because it is an outlier.
[26] World Council of Credit Unions, 2012
[27] Wong, et al., November 14, 2011
[28] IFOK Analysis, 2012
[29] Wong, et al., November 14, 2011

national development banks. While both international and local banks primarily target their lending to commercial entities and higher net worth households, lending to micro-businesses and households is typically a larger share of the lending portfolio for local banks.

National and regional development banks

There is a range of national, regional and international development banks that are active in the Eastern Caribbean and Bahamas region.

Figure 3. Select Development Banks Active in the Target Countries



Generally, these banks offer lines of credit which they make available to participating regional and local banks and sometimes to credit unions.[30] Such lines of credit provide financiers with needed capital, enabling banks and credit unions to lend directly to consumers and small businesses. According to interviews, small businesses will often seek financing from a national development bank and then migrate their loans to commercial banks or credit unions after consolidating their debt since local commercial banks are often able to offer more favorable rates.

Some lines of credit have requirements that prioritize lending to businesses interested in sustainable energy investments. For example, the European Investment Bank extended a US$10 million line of credit to the Dominica Agricultural Industrial and Development Bank (AID Bank), of which US$1.3 million is dedicated for renewable energy and energy efficiency project financing. This line of credit provides subsidized interest rates,[31] thus enabling AID Bank to provide lower interest rates than it otherwise would offer. Similarly, the EIB has opened a line of credit of up to US$8 million to the Development Bank of Saint Kitts and Nevis, enabling the bank to offer a line of credit to support small and medium sized enterprises wishing to install RE/EE technology.[32] These lines of credit have had limited activity to date, the reasons for which were under exploration during time of publication. In principal, development banks could offer similar lines of credit to credit unions or commercial banks to provide funding for loans.

3.2 How Financial Institutions Evaluate Consumer Creditworthiness

Financial institutions need to assess customer credit before they provide loans. As expected, financiers apply the same criteria used to assess customers' creditworthiness to all lending, including sustainable energy loans. These criteria include:

[30] Some development banks have been unable to provide financing windows to credit unions in the target countries in the past because of differences in reporting standards.
[31] European Investment Bank, 2012
[32] European Investment Bank, 2010

Ability to Pay. The present and projected disposable income available for debt service.

Willingness to Pay. While a consumer may be able to pay, the consumer may prioritize other payments. The risks of late or defaulted payments are more difficult to predict than ability to pay because it relies on perception of character and unexpected events.

Down Payment. The amount that a consumer is able to pay upfront helps a financier evaluate the consumer's ability to pay as well as set favorable loan terms.

Collateral Available. Collateral is used to secure repayment of a loan and can be cash, property, or the asset itself. The collateral serves as protection for the financier in the event of the customer defaulting on the loan and incentivizes the customer to repay—if the customer defaults, the financier assumes ownership of the collateral.

3.3 Typical Loan Terms for Sustainable Energy Finance

Financial institutions across the spectrum apply the loan terms associated with their traditional products—consumer loans, commercial loans, and mortgages—to their financing of SETs. As Table below demonstrates, however, there is a wide variation between the loan terms offered by the various financial institutions.[33]

Table 4 was constructed through the Saint Lucia workshop and consultation as well as targeted interviews with credit unions, local banks, and commercial banks in the target countries. It provides the reader with a more thorough understanding of the lending practices of the different financial institutions active in the target countries. Furthermore, a careful examination of typical loan terms in the target countries begins to reveal some of the main barriers to expanded SET financing (as explained in Section 4).

As can be seen in the table, local banks and commercial banks tend to offer the most competitive interest rates, compared to credit unions. However, local banks and commercial banks can also have more stringent collateral requirements that make access to finance difficult for typical households. For this reason, credit unions occupy a unique space within the banking sector in the Caribbean and are often able to offer more flexible, adaptive financing products that are responsive to their members' needs. In this way, credit unions are able to overcome their higher interest rates through customer service and customer loyalty.

Financial institutions in the target countries prefer to offer SET financing as part of a mortgage or new construction loan. This not only allows the bank to receive higher-value loans, but allows the loan tenor to be more appropriately tied to the lifetime of the SET. When financial institutions offer SET financing as part of a personal or equipment loan, the loan terms typically offered are not competitive or affordable for the customer (as outlined in Table 4 below). Where financial institutions locate SET financing within their corporate lending portfolios can have implications on financiers' abilities to offer competitive and attractive loan terms to their customers. Carving out a unique SET financing product within each category can not only provide financial institutions a way to diversify their portfolios, but also allow financiers to design tailored loan terms for their customers. Each component of typical loan

[33] The information was primarily collected at the Saint Lucia financiers' workshop, interviews and the questionnaire. It is a limited sample but gives a sense of financiers' views.

terms in the Caribbean is explained in further detail below, as well as the implications for financiers in SET financing.

Tenor. For consumer loans, the tenor, or sometimes called "tenure" in the Caribbean region, offered by the various financial institutions range from 2-6 years. For commercial loans, the average tenor ranges from just 5-10 years for credit unions to 10-15 years for local banks and commercial banks. Across the various financial institutions, the loan tenor for mortgages ranges from 20-30 years. Consultations for this guide revealed that individuals requesting SET financing outside of a mortgage or new construction loan were most likely to take out a consumer loan. Given the long lifetimes of SET assets, the short tenor of the consumer loan can prevent the customer from receiving an appropriate return on investment. By contrast, customers who are able to tie their SET financing into their mortgage or a loan for new construction can receive a loan tenor that more closely matches SET system life (e.g. 25-30 years)—allowing the customer to realize an appropriate return on investment. An easy remedy is for financiers to consider promoting and including SET financing in all mortgages, new construction, and refinancing loans to customers. Financial institutions can also consider strategic considerations in offering SET financing products for consumer loans—being careful to tie the loan tenor to the lifetime of the asset.

Down payment. Financiers have a range of minimum requirements for loan down payments. These vary by lender and loan type. For consumer loans, credit unions tend to require a payment that is at least 10% of the loan value and commercial banks tend to require 25% cash. Local banks require a down payment of 10% to 20% cash but up to 50% if the equipment itself is the security. Down payment requirements for commercial loans are similar for credit unions and local banks—10% to 20%. Commercial banks tend to have higher requirements, 25% to 35% cash. Home mortgage down payment amounts tend to be consistent across financiers—in the 15% to 20% range. Commercial banks indicated greater flexibility with their mortgage down payment requirements—10% to 25% cash.

Collateral. While those surveyed for this guide generally agreed on appropriate down payment minimums, there was wide disparity regarding collateral requirements and resulting loan to value (LTV) ratios. Therefore, the collateral listed in Table 4 below is broad. Generally, financiers, both domestic and international, have some discretion and can provide unsecured loans. However, these are usually at a much higher interest rate.

For consumer loans, the asset type used as collateral varies depending on the type of financier. The assets the financier lends against can be related or unrelated—the equipment itself, property, car, real estate, funds on deposit, or another asset. One local bank cited that property equity can be used for 100% financing in some consumer loan instances. Similar to consumer loans, commercial loan collateral requirements for financiers can be generalized as including property or other assets (related or unrelated). For equipment financing on commercial loans, one commercial bank stated that they accept up to 50% of the value of the equipment in vacant land or up to 65% of the value of the equipment in property as collateral. As to be expected, credit unions, local banks and commercial banks secure their mortgages with property. Interviews with financiers highlighted that they prefer to use property to as collateral, regardless of the type of loan. Property is preferable because it is easy to assess and there is a well-established resale market.

In many of the target countries, however, financial institutions are wary to accept a sustainable energy technology as a form of collateral because 1) it is hard to assess the value, 2) repossession in the event of default can be difficult, and 3) second hand markets for SETs are not established. Hire purchase schemes, such as those offered by retailers (e.g. Courts) have generated resale markets which banks

could utilize in reselling collected products. As financiers consider ways to promote SET financing products, an evaluation of collateral policies may assist financial institutions in offering more competitive and attractive loan products to their customers.

Interest Rates. Consumer loans have a higher interest rate because of their lower loan values (typically between US$100 – US$5,000) and shorter tenors. Local banks offer the lowest interest rates for consumer loans, ranging from 9-10%. Credit unions typically offer 12% for consumer loans and the rate is often standardized through credit union associations. Commercial banks offer 11-15% interest rates on consumer loans. For commercial loans, commercial banks offer the lowest interest rate at 9% and local banks offer 9-13%. Credit unions have a high interest rate at 15% for commercial loans. Credit unions, local banks, and commercial banks offer similar interest rates on mortgages—local and commercial banks offer 7-8% and credit unions offer 8-10%. Mortgages are the preferred loan product offered by all the financial institutions because of their high value (US$50,000+) and securitization. While financial institutions offer competitive mortgage interest rates and prefer to include SET financing in a mortgage, new construction loans, or refinancing, in some cases it may not be feasible or reasonable for the customer. For example, a customer may not want to refinance their mortgage just to receive financing on a US$700 solar hot water heater or an US$1,800 solar panel. As financiers consider ways to promote SET financing products, an evaluation of consumer loan interest rates may assist financial institutions in offering more competitive and attractive loan products to their customers.

Origination Fees. Origination fees are typically between 0 and 2 percent of the value of the loan. Most financial institutions will cap the origination fee at approximately US$370 (EC$1000) regardless of the size of the loan.

Recovery Rate. Most financiers expect SET lending to be incorporated in a home mortgage. In instances where loans are classified as an equipment loan, questions regarding the seizure and resale of collateral remain open. Financiers in the workshop highlighted that those risks are incorporated when setting the loan terms.

Table 4. Typical Loan Terms Offered in Target Countries

	Loan Type	Credit Unions	Local Banks	Commercial Banks
Tenor	*Consumer (Personal or equipment loan)*	Up to 5 yrs (avg. 3 yrs)	24 - 36 months	Up to 5 yrs (Avg. 3 yrs) 7 yrs for a vehicle
	Commercial	5 - 10 yrs	10 - 15 yrs	15 yrs
	Mortgage	20 - 25 yrs	25 - 30 yrs	25 yrs
Down Payment	*Consumer*	10% cash	10% - 20% cash; 50% cash if the equipment is the security	25% cash
	Commercial	10% - 20% cash	10% - 20% cash	25% - 35% cash
	Mortgage	20% cash	20% cash	10% - 25% cash
Collateral	*Consumer*	Asset type varies	Asset type varies; can use property as collateral for 100% financing	Asset type varies
	Commercial	Property or other asset	Property or other asset	Property or other asset; for equipment financing, up to 50% value of vacant land or up to 65% value of a property
	Mortgage	Property	Property	Property
Interest Rate	*Consumer*	12%	9% - 10.5%	11% - 15%
	Commercial	15%	9% - 13%	9%
	Mortgage	8% - 10%	7% - 8%	7 - 8%
Origination Fees	*Consumer*	0 - 2%	0 - 2%	0 - 2%
	Commercial	0 - 2%	0 - 2%	0 - 2%
	Mortgage	0 - 2%	0 - 2%	0 - 2%
Notes	1. The interest rates on loans from commercial banks are technically floating, but they have not changed in recent years. 2. Origination fees are defined as any fee separate from the interest and the principal. Most lenders stated that they cap origination fees at approximately US$370 (EC$1000).			

Source: IFOK Analysis, 2012

3.4 How Sustainable Energy Finance Fits into a Lender's Portfolio

When deciding whether to issue a loan, financiers also evaluate the loan within the context of their respective financial institution's lending portfolio. Financiers locate SET financing within various parts of their corporate lending portfolio and typically consider their loan diversification, whether to run it as a formalized product line or loan promotion, and the target default rate.

Loan Diversification. Financiers seek to strike the right balance between aspects such as the loan type, value, and default risk. Most importantly, a lender will evaluate how a SET lending product affects their loan diversification.

Formalized Product Line. There are few financial institutions in the target countries that offer SET financing as its own formalized loan product. The Development Bank of Saint Kitts and Nevis is one example of a target country financial institution with a formalized product line for SET financing. Under the European Investment Bank's US$1 million line of credit, the Development Bank of Saint Kitts and Nevis is able to provide small- and medium-sized enterprises with low-interest financing for SET investments.

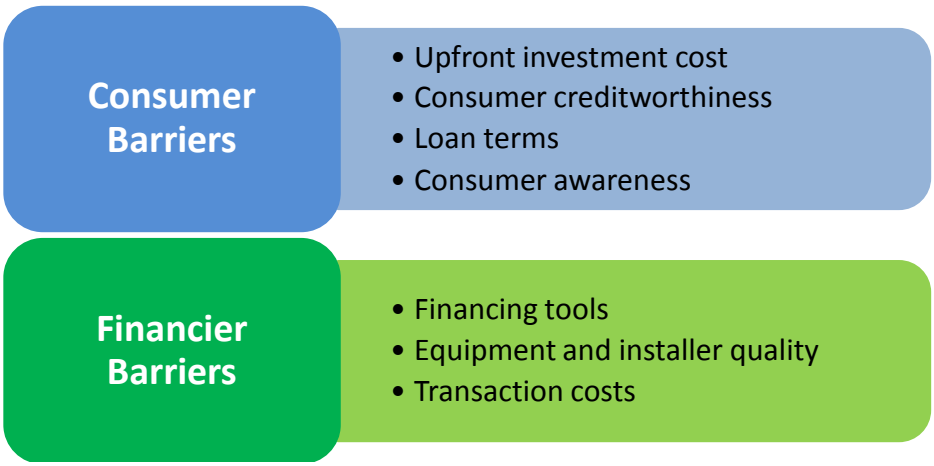
Loan Promotions. Loan promotions are limited-time engagements that promote a certain loan product to customers by offering competitive loan terms or other incentives and are commonplace in the target countries. For example, a financial institution in Grenada utilized a vendor-finance agreement to partner with a certified computer vendor. Customers were able to get a computer loan from the credit union at a reduced rate if they bought their computer from the specific vendor. As explained in further detail below (Section 5), vendor-finance agreements can provide financial institutions with quality assurance and protect customers from financing low-quality equipment. Loan promotions could be used to increase consumer demand for SET financing and consultations for this guide revealed that many financial institutions in the target countries have offered loan promotions for SETs. For example, one financial institution in Saint Lucia partnered with a solar panel installer to increase RE installations on new construction homes. The installer offered a discount on the cost of solar panel installation and the financial institution chose to finance 100% of the installation costs by including the costs into the value of a new construction loan.

Target Default Rate. Consultations for this guide reveal that as a result of the financial crisis, many financial institutions are implementing conservative lending policies in order to bring their average default rates within the pre-financial crisis range. For example, financiers stated that they are reducing lending to the tourism sector and large commercial sector—two sectors adversely impacted by the financial crisis. A typical financier in the region will have a default rate of 5% - 8%, but a target of 6% or below. By contrast, financial institutions in the region had an average default rate of approximately 12% after the financial crisis—adversely impacted by tourism and other large commercial lending.

4. Barriers to Financing Sustainable Energy

While the target countries have developed a portfolio of policy and financial instruments to encourage energy efficiency and renewable energy investment, market development has been slow to date because of a range of barriers that are specific to consumers and financiers, as presented below in Figure 4. This section describes the respective barriers and provides suggested mitigation strategies.

Figure 4. Key Consumer and Financier Barriers to Sustainable Energy Financing



When considering mitigation strategies, it is important to remember that the intent is *not* to provide financing to borrowers who will not be able or willing to repay, but rather, to ensure access to financing for creditworthy borrowers who are not currently being served by financial institutions. Armed with a solid understanding of the costs and lifespan of viable SETs, most financial institutions will be able to offer soundly underwritten, profitable loans to consumers that convey benefits to their own institutions, the members or customers they serve, and ultimately the community.

4.1 Barriers Consumers Face

Conversations with financiers and consumers emphasized four barriers that affect the ability of consumers to invest in sustainable energy technologies: upfront investment costs, creditworthiness, loan terms, and consumer awareness.

Upfront investment costs

Renewable energy and energy efficient technologies typically cost more than their conventional product counterparts. The cost is prohibitively high for many consumers, and so poses a barrier to investment. When evaluating the upfront investment costs, consumers also factor that SET investments take months to years for investment recovery and there can be a lag time between when the product is purchased and when it begins to generate savings.[34]

[34] If consumers choose to buy through a retailer, and especially though an importer, there may be a significant time gap between the first down payment and the operation of the energy efficient appliance or renewable energy technology.

Ways to Reduce Upfront Investment Cost Barrier

- **Loans.** Financiers offer loans to eliminate or reduce the upfront investments costs.
- **Grace period.** Financiers could grant a grace period on the loan payment start date until the SET is functional. This would reduce initial financial burden that consumers face, however, could result in additional work for the lender to monitor and enforce installation within a reasonable time period.

Consumer Creditworthiness

Consumers and project developers may lack the necessary creditworthiness and collateral to access financing. Workshop participants indicated that they would apply existing techniques for evaluation of consumer creditworthiness and evaluation of debt capacity.

Loan terms

One of the main benefits of SETs is that the energy savings produce a long-term savings or income stream that directly improves free cash flow for the consumer, enabling them to more easily service debt. The fact that RE/EE equipment has a break-even point is a necessary benefit in overcoming the high first-cost considerations associated with the investment. In particular, two loan term aspects that prevent households from investing in SETs are tenors and high interest rates.

SET loans tend to be tied to either a home mortgage (new build) or an equipment loan. Home mortgages often match the lifetime of many SETs (20-30 years), whereas equipment loans tend to be 12-36 months in duration. Consumers who already own a home are effectively discouraged from investing in renewable energy or energy efficiency products because they are typically bound to the short equipment loan tenors, no matter the product. High interest rates lead many consumers to decide that a loan is not worthwhile, particularly if they are bound to a short tenor.

Ways to Reduce Loan Terms Barrier

- **Adjust loan tenor.** Financiers can consider tying the tenor of personal or equipment loans to be just short of the technology life (instead of a fixed 24- or 36-month tenor) to reduce high upfront costs. This can lead to greater affordability for the customer and greater security for the lending institution.

Consumer awareness

The typical consumer in the Eastern Caribbean and the Bahamas region is not aware of the possible positive benefits, both economically and to the environment, of investing in sustainable energy technologies. Despite a recent growth in information sharing on sustainable energy topics, consumers have cited that they lack an understanding of the different renewable energy and energy efficiency technologies available. Questions include:

- What types of technologies are suitable for homes?
- How do the technologies work?
- What are the risks of the technologies?
- What are the energy savings for a given EE appliance?
- Which EE appliances will have the greatest effect on a household electricity bill?
- What is the payback time for a given SET investment?
- Who provides financing for sustainable energy technologies?
- What are fair terms for a SET loan?

- What are after-sale maintenance and repair costs? Does a service contract typically cover these costs?

Ways to Reduce Consumer Awareness Barrier

- **Awareness building and training.** Investing in SETs is different from providing financing for a home or car because, in the latter, the case for such an investment is clearer for the average person. Awareness building and training on the characteristics and long-term benefits of RE/EE projects can help alleviate many of the hesitations that consumers have about investing. For example, when evaluating the cost/benefit of a SET investment, it is important to consider the total "lifecycle" costs[35] of the equipment. Tools and educational materials that can serve as quick reference guides to consumers and financiers would help answer many of the typical questions around SETs in further depth than is possible in this guide. A knowledge network or information clearing house on different SET options, products, and financial incentives could also prove to be a useful resource.
- **Government-led communication campaigns.** Governments have a role in shaping public awareness of the benefits and risks of investing in sustainable energy technologies. Communication campaigns, such as the *My Energy My Responsibility* campaign led by the government of Trinidad and Tobago, for example has created a space for dialogue and awareness raising. Led in three stages, the program provides the public information on three subjects, starting with where energy comes from, then energy conservation options, and finally renewable energy. The communication campaign is supported by what will soon become a single stop online resource targeting a range of audiences (www.myenergytt.com).

4.2 Barriers Financiers Face

Conversations with financiers emphasized three barriers that affect the ability of financiers to offer SET financing products: lack of financing tools, uncertainty around equipment and installer quality, and transaction costs.

Lack of financing tools

Developing new loan products and assessing the risks for an unfamiliar technology requires time and information in order for a financial institution to make the best possible decisions. Financiers interviewed indicated the need for practical tools and resources tailored to topics affecting their decision making processes.

In particular, two areas of support were emphasized: risk evaluation and payback calculation. Financial institutions with no or limited experience evaluating the real and perceived risks of sustainable energy investments tended to offer a higher interest rate than lenders with experience in the sector. This creates the need for a tool to explain these risks, as they vary by country and by technology. Financiers also expressed strong interest in a payback calculation tool, to develop an understanding of potential paybacks so that they can project the estimated consumer savings generated through a SET loan.

[35] Lifecycle costs include initial capital costs, future fuel costs, future operation and maintenance costs, decommissioning costs, and equipment lifetime.

Ways to Reduce Lack of Financing Tools Barrier

- **Lending and assessment tools.** As governments seek to promote consumer investments in sustainable energy technologies, they should seek to make lending easier. One way would be to further develop lending and assessment tools, such as those found in Section 5 of this guide. Such tools and guides could prove to be particularly useful if tailored to the country context, technology type, or loan type. Additional resources that would be beneficial include:
    - Technology-specific template contracts
    - Step-by-step options for structuring a loan (technology and country specific)
    - Tools for assessing the costs, benefits, and payback of a given SET investment
    - Market research on the typical homeowner seeking to buy SETs (e.g. income, investment size)
    - Ways to reflect environmental considerations in lending pricing and products
- **Capacity building.** Developing educational materials and leading training sessions (such as RETSCREEN) on how to evaluate the risks of sustainable energy technologies could reduce financiers' wariness to lend. Additionally, collecting and sharing lessons learned and best practices could support capacity building for risk evaluation and assessments. Helping financial institutions to develop a better understanding of SET financing will enable them to hold more productive dialogues with their customers.

Equipment and Installer Quality

Financial institutions need to understand how SET reliability considerations can affect their lending decisions. The absence of a system to assess and understand the quality of equipment providers and installers poses a challenge to lenders.

Equipment quality

Lenders seek to better understand the reliability of a given product and whether it will meet its expected performance level. The high levels of information uncertainty and distrust (in terms of collecting, tracking, and publicizing the SET energy cost-savings) leads some financiers to classify technologies in higher risk categories.[36] Financiers require a high degree of confidence that the financed SET will achieve the projected energy cost-savings and deliver a reasonable return before issuing a loan. Lenders are at risk if they base the loan terms off of a consumer's projected savings or revenue stream which becomes non-existent because of an underperforming product.

The lack of common SET standards, labels, and certification systems in the Eastern Caribbean and Bahamas pose challenges to financiers in several ways:

- Evaluating the paybacks of technologies and assessing their reliability;
- Determining which products are actually energy efficient;[37]
- Understanding and comparing labels from foreign imports (e.g. US EPA Energy Star labels); and
- Knowing which labels to trust.

[36] Some local manufacturers and FIs stated in interviews that distrust of SET equipment providers has grown in the region and is hindering experienced, reputable installers from being able to close deals.

[37] One interviewee mentioned that some retail and distribution companies remove any type of energy efficiency labeling because it is confusing to consumers.

Additionally, interviews with financiers highlighted that there has been growth in "pop-up" suppliers which provide technologies that are not suitable for the region (e.g. solar PV that is not resistant to salty, oceanic climates) or that lack product warranties.[38]

Installer quality

Similar to equipment quality, the absence of national and regional installer vetting, warranties or certification programs are barriers for financial institutions. Having a reliable system in place would provide FIs with needed information to assess the quality of the installation—including whether the financed equipment will be installed by a qualified provider, whether it will work as forecasted, and protection should the installer damage the equipment during installation.

Ways to Reduce Equipment and Installer Quality Barrier

- **Equipment warranties.** Financial institutions could require purchased equipment to have a manufacturer or retailer warranty in order for customers to receive a loan. Equipment technology risks could be further reduced by providing preferred loan terms for the purchase of specified reputable brands. Even though distributors and retailers sometimes remove eco-labels (e.g. Energy Star) from energy efficient product packaging, FIs could keep a list of the associated model numbers and require that SET equipment loans be on the approved list.
- **Installer warranty.** Financiers could also use installer warranties to serve as a threshold requirement for lending. Such a warranty would cover the quality of the installer's work.
- **Request for Qualifications.** Financial institutions could issue a request for qualifications from equipment providers or installers. This would enable FIs to vet the equipment and installer quality and determine which providers could be listed as "pre-approved". Competition could also encourage the businesses to provide better services than otherwise.

Transaction costs

The cost of participating in the SET market for financiers is higher compared to other, more conventional markets. Financial institutions will not develop products for non-existent markets, and consumers may not install RE/EE equipment at scale if financing tools for those are absent. This "chicken and egg" scenario has inhibited investment in sustainable energy technologies to date, particularly with regards to financiers' costs of customer acquisition and project evaluation.

Customer acquisition costs

The lack of customer awareness of and demand for sustainable energy financing creates a time cost barrier for financiers seeking to grow sustainable energy portfolios. Additionally, consumer level renewable energy and energy efficient loans are typically small.[39] The smaller size and lower cost relative to commercial scale projects creates a disincentive for some lenders, particularly larger, international commercial banks. Credit unions and local banks, however, tend to provide smaller value loans. A financial institution may face challenges in providing finance due to the high transaction costs per project.

[38] This can result in the installation of equipment that will not last as long as expected, has defects, or operates at reduced efficiency.

[39] Solar PV on homes and small businesses usually are less than 100 kW in size and consumer investments in EE tend to be in appliances such as a high-efficiency air conditioning unit.

Portfolio size

Sustainable energy portfolios are currently a small portion of financiers' overall portfolios. When a branch manager and a local or commercial bank compares a SET portfolio to an auto loan portfolio, the SET portfolio is typically much smaller. The transaction costs of developing a new loan product may not be worthwhile for a financial institution because of the small demand.

Ways to Reduce Transaction Cost Barrier

- **Streamline processes.** The lending institution can reduce transaction costs by standardizing and streamlining its application, underwriting, and approval processes. Costs might be further reduced by implementing a marketing campaign to increase the number of SET loans, thereby spreading fixed costs associated with the initiative across a larger number of loans.
- **Offer community funding packages.** Community funding packages have been successful in the United States and are significantly increasing the rate of adoption of SETs. Under such a program, the lead organizer selects a single SET developer to procure and install SETs within the community at a pre-negotiated price—creating economies of scale that allow the installer to offer the group discounted costs of installation. (See this model applied to solar in 'Solarize' in Section 0)

5. Possible SET Product Offerings for the Caribbean Region

There are several possible loan product offerings that financiers in the Eastern Caribbean and Bahamas region could offer. As highlighted in Section 3, FIs tend to develop lending promotions, which if successful, can be scaled up to become a regular offering. This section offers financiers a range of possible SET product offerings. These products were developed through consultation with interview partners and the workshop held in Saint Lucia, and build upon the best practices of FIs in the Caribbean and internationally.

The loan products are organized under three sub-headings: **Core**, **Extended**, and **Advanced**. These headings represent:

- Whether the loan product falls under the FI's core business model
- The level of effort required to develop and implement the loan product
- Whether the loan product requires additional policy support and/or technical assistance.

	CORE	Can be implemented immediately using current skills and knowledge.
	EXTENDED	Requires more effort to develop and implement. Some technical assistance may be needed.
	ADVANCED	Requires the most effort to develop and implement. Most likely requires technical assistance from outside organization(s) and policy support from the government.

5.1 Loan Products within a Financial Institution's Core Business

Loan products identified in this section represent the 'bread and butter' of a financial institution's business. These loan products build off of products and services currently being offered by most FIs and are tailored to meet the needs and requirements for SET financing. Most FIs will find that the loan products described below can be implemented almost immediately and require little to no external technical assistance or capacity support.

Sustainable Energy Technology Mortgage Product

Mortgages are a fundamental lending product offered by financial institutions. Under this product, financiers would roll renewable energy and energy efficiency investments (including new appliances) into a home mortgage loan. If the homeowner is looking to make retrofits, then the SET investment could be financed through a modification of an existing mortgage or a second mortgage.

Financiers would partner with a couple (3-4) vetted vendors and installers to determine the best products on the market. Financiers would incentivize customers to participate in this product offering by supplying a mortgage interest rate that is between 0.5% - 2% below the existing average rate. The key elements, needs addressed, and steps that could be taken to develop this product are described below.

CORE	Can be implemented immediately using current skills and knowledge.
Objective	To provide competitively priced mortgages for investments in energy efficiency and/or renewable energy compared to a traditional home mortgage.
Needs Addressed	Consumers building or purchasing a new home will need to purchase new appliances and evaluate whether to invest in renewable energy. They are faced with the choice of purchasing less expensive appliances that consume more energy or appliances that cost more upfront but can yield energy savings over time. This lending product reduces investment barriers by offering bank-sponsored vendor vetting. Additionally, it reduces high upfront costs by offering a lower interest rate and a loan tenor that matches or exceeds the life span of SET products.
Steps for Financiers	a) Work with experts (e.g. universities, consultants, government) to determine qualifying sustainable energy technologies for a new build or a home improvement (product type and required funds). • Develop a list of possible products offered by several equipment vendors and installers or • Form a partnership with a single equipment provider and/or installer who sells/installs qualified products b) Determine baseline rates for SET mortgage terms that are slightly lower than the baseline for standard home mortgages (~0.5%-2%). The SET terms[40] would be adjusted as need depending on customer creditworthiness. c) Determine what percentage of the mortgage value would go toward the SET investment.[41] Determine terms if the home is sold or owner defaults on loan.

[40] Financiers from the Saint Lucia workshop stated that it would be appropriate for property to be the collateral with 20% down payment and 80% financing.

[41] Financiers from the Saint Lucia workshop felt that it would be appropriate for 10-15% of the mortgage value to go toward the SET investment.

	d) Promote offering in partnership with approved installers or associated partners.	
Opportunity	• Increase mortgage size (SETs are more expensive) • Expand customer base • Expand product line offering • Market differentiation	• Can test concept as a promotion and scale up into a product line if successful • Reduce transaction costs through installer partnerships
Risks	• Time investment to procure and evaluate equipment vendors/installers • Time investment/technical capacity to evaluate eligible RE/EE products	• Technologies may not be as efficient/productive as anticipated, thus leaving borrower with less disposable income than envisioned
Possible Partners	• Energy efficiency vendors and installers • Local or national government • RE/EE experts (e.g. consultants, NGOs, academia)	

Participants from the Saint Lucia workshop unanimously agreed that this type of a SET mortgage product could be a realistic product offering for their respective financial institution. The group identified a few considerations when developing the product, such as:

- Rewriting an entire, existing loan under a refinance at a concessionary rate may not be an option for some banks. In such instances, FIs could consider providing a lower interest rate just for the SET value within the mortgage.
- FIs will need to strike the right rate for the concessionary interest rate. It should provide savings to the customer but savings do not necessarily need to match the total value of the SET investment.
- FIs could use a graduated payment structure for the first few (e.g. 5) years of a mortgage while the borrower repays the equipment installation cost.[42]
- Participants agreed that a SET investment would increase the value of the home, although not necessarily proportionally to the investment amount.

Payroll Deduction Scheme

Payroll deduction schemes are common throughout the target countries and are often used to finance durable consumer goods. There are three forms of the payroll deduction scheme. Under option one, the consumer agrees to surrender the entirety of their monthly salary to the financial institution. The FI then deducts the mandatory minimum payment and assigns it towards the loan payment. The balance of the salary is available on deposit for the consumer to withdraw. Under option two, the consumer already has a checking account with the FI or the FI requires the consumer to open a checking account to participate in the program—known as a 'payroll assignment'. The consumer deposits their monthly paychecks into the checking account and the mandatory minimum payment is deducted and assigned to the loan payment. The balance is then available to the consumer in their checking account. Under the third option, a FI establishes an arrangement with the customer's employer in order to ensure access to

[42] Graduated payment structures allow for lower monthly payments at the beginning of a long-term loan, which then increase over time to reflect expected increases in salaries.

payroll deduction. Once the program is set up, the authorizing lender deducts regular loan payments directly from the employee's payroll. Options one and two are most common in the target countries.

Typically, consumers must have had their job for a minimum of two to four years and a strong employment record in order to qualify for the program. The loan tenor tends to be two to four years, although it could be extended to more closely match the lifetime of the SET asset. The FI may require a contractual obligation that the full amount of the loan is due immediately if the borrower changes jobs. The consumer may have to pay a small origination fee and the FI incurs minimal transaction costs as loan payments are collected on an aggregated basis.

CORE	Can be implemented immediately using current skills and knowledge.
Objective	To implement a simple mechanism for FIs to offer finance for durable consumer goods. The authorizing lender deducts regular loan payments directly from the employee's payroll or bank account.
Needs Addressed	Many consumers in the target countries do not have the necessary financial capital to invest in SETs. A FI can mitigate the risks of default and reduce transaction costs by tying loan payments with the borrowers scheduled paycheck.
Steps for Financiers	a) Engage local credible and established employers to determine the financial and logistical feasibility of developing a payroll deduction scheme. b) Depending on the agreement option: Determine the payment collection schedule and other agreement terms between the FI, employee and the employer (if relevant). c) Determine which employees are creditworthy and who is eligible for the payroll deduction scheme option. d) Determine administrative costs and implement necessary fees—such as creating a checking account for eligible customers. e) Promote offering in partnership with employer to the consumers.
Opportunity	• Expand customer base • Reduce transaction costs • Mitigate risks of default
Risks	• Requires credible employee and employer • SETs may underperform, leaving borrower with less disposable income
Possible Partners	• Local credible, established employers

The Saint Lucia financiers' workshop highlighted that payroll deduction schemes are common practice among FIs in the Caribbean target countries. Participants unanimously agreed that their institution could offer payroll deduction schemes for SETs almost immediately at their institution. This loan model highlights how financiers want to approach SETs in ways consistent with current lending standards and practices. Key considerations for developing a SET payroll deduction scheme include:

- Consumers have several jobs in their lifetime and so short loan tenors are preferable because the agreement is typically not held between the FI and the employer. The loan would need a low down payment and a low interest rate given the short tenor.
- Determining an appropriate security is difficult, particularly since payroll is not a security. Scotia Bank and other FIs offer "payroll assignment" so that the paycheck needs to be deposited with the bank, thus reducing risk.
- Participants also noted that such agreements tend not to be specifically between the FI and the employer, although there are some non-binding ties. Therefore, a successful payroll deduction scheme must include a contractual provision so that the full amount of the loan is due immediately if the borrower changes jobs.

5.2 Loan Products that Extend Beyond Current Financial Institution Practices

Loan products identified in this section extend beyond the current practices of most FIs in the region. However, the loan products discussed have been successfully implemented outside of the target countries with notable success. The loan products described below require additional effort from the FI to develop and implement and may also require varying levels of additional technical assistance.

Vendor Service Agreements

Vendor Service Agreements provide quality assurance and help the financial institution preserve the value of the equipment and the savings stream. In vendor service agreements, financial institutions typically open a request for qualifications (RFQ) to solicit proposals from possible vendors who could provide SET products or installation. This creates competition among vendors to provide competitive product and installation packages to prospective clients. It also enables FIs to vet vendors. The financial institution would enter an agreement with the vendor after identifying one or multiple vendors. The FI could offer preferred or more competitive loans to customers purchasing from the vetted vendor. Under this structure, the equipment vendor/installer would assure the financial institution that the SETs have a minimum warranty and will be regularly serviced and maintained for an agreed upon amount of time (usually the loan tenor). The costs of this maintenance and upkeep can either be paid by the consumer or the vendor/installer, depending on the agreement.

This model allows financial institutions to expand their customer base, mitigate the risks of default, and reduce the transaction costs associated with regular maintenance of a loan. It also allows the financial institution to partner with trusted and qualified equipment vendors/installers—ensuring their customers get the best product and protecting the financial institution. The warranty and regular maintenance also incentivizes the customer to continue paying their debt obligations in order to ensure the continued productivity of their SETs.

EXTENDED	Requires more effort to develop and implement. Some technical assistance may be needed.
Objective	To provide quality assurance to the FI and the consumer by offering a minimum warranty and regular service and maintenance agreement.
Needs Addressed	Many financial institutions need further training and knowledge in order to assess quality SETs. A vendor service agreement addresses equipment and installer quality issues by allowing a FI to partner with a credible, established vendor who guarantees a minimum warranty on the SET and provides regular service and maintenance of the equipment. The agreement includes important terms on liability and recourse in the event of consumer default, such as remarketing or buyback of SETs, or holdbacks and partial financing.
Steps for Financiers	a) Engage local credible and established product vendors and installers to determine the financial and logistical feasibility of developing a vendor service agreement. b) Determine the procedures to market and originate the loans, including marketing literature, loan applications, credit underwriting guidelines, and credit analysis procedures. c) Determine financing terms, including rates, terms, documentation, and security requirements. d) Determine the equipment, service, and credit support to be provided by the technology vendor/installer, including minimum warranties and regular maintenance services. e) Determine technology vendor/installer liability, remarketing or buyback agreements, full or partial recourse on the loans, fees for extra FI loss reserves, and holdback or partial financing. f) Determine administrative costs and implement necessary fees. g) Promote offering in partnership with vendor/installer to the consumers.
Opportunity	• Expand customer base • Reduce transaction costs • Mitigate risks of default • Increase willingness to pay
Risks	• Time investment to evaluate vendors and installers • Time investment to evaluate eligible SET products
Possible Partners	• SET vendors and installers • Local large-scale retailers, such as Courts • Other FIs to create a larger cooperative agreement

The majority of the Saint Lucia workshop participants believed that they would support such a product because the bulk buying power of financial institutions would enable them to make loans available to their members at a low cost. Additionally, participants agreed that such an agreement would save their customers time in vetting suitable vendors/installers. Some participants, however, were not entirely convinced by the concept, citing the administrative burden to develop and service the product as barriers.

The group identified additional considerations that are important for structuring such a product, such as:

- Financial institutions should avoid limiting customers to a single product vendor/installer because it could increase the financial institution's liability. Instead, financial institutions should provide customers with a list of certified product vendors/installers and give the customer the option of choosing the provider.
- Financial institutions would offer concessional financing under this deal. This product could be complementary to a payroll deduction scheme or solarize scheme (see below) and would seek to leverage added benefits from the SET technology vendor/installer.
- SET vendors/installers would need to offer a service agreement to protect the buyer from product failure or poor performance.
- SET vendors/installers should not assume default risk because they would provide reduced prices or an improved service packet under the agreement.
- FIs should not allow the product vendor/installer to charge an administration fee for their participation.
- FIs could also structure a leasing agreement with a product vendor/installer which would manage the relationship with the customer. This would work for portable equipment so that the SET vendor/installer can repossess the equipment in case of default or delinquency. Some financiers believed this would be a lower risk option for their institutions.

On-Bill Financing Model

On-bill financing programs, often administered by a utility company, provide loans for energy improvements and structure the repayment of those loans through a charge on the customer's monthly utility bill. Loan terms are prepared such that the repayment costs are lower than the cost savings realized by the energy improvement, ensuring that the customer sees a lower utility bill after the completion of the project. On-bill financing benefits from an existing billing relationship with the customer, providing lower administrative costs than a traditional loan program.

The debt obligation of the on-bill financing program can either be tied to the customer or to the meter. If the loan is tied to the customer, through a program commonly referred to as an on-bill loan, the customer is required to repay the full loan if they sell the property. If the loan is tied to the meter, known as an on-bill tariff program, the debt obligation would stay with the meter in the case of a change in ownership. The on-bill tariff program can also be used to address the split incentive issue for rental properties, ensuring the renter directly pays for the energy improvements made to the facility.[43]
While on-bill financing programs are traditionally used for commercial facilities, there are a few instances of utilities offering on-bill financing for residential customers.[44]

[43] DOE, 2011
[44] The How$mart program in Kansas, USA is structured as an on-bill tariff program, and is available for Midwest Energy electric and gas customers installing insulation, sealing, and energy efficient heating and cooling systems. The program offers an interest rate of 3% over 15 years for residential customers. The repayment surcharge is capped at 90% of the projected savings, meaning that the customer will be saving money on each bill (Midwest Energy, 2009).

EXTENDED	Requires more effort to develop and implement. Some technical assistance may be needed.
Objective	To expand the lending market for energy improvements to residential rental units in partnership with the utility.
Needs Addressed	Traditionally, landlords of residential rental units have little incentive to invest in energy improvements, as they do not pay the monthly utility bills. This issue, known commonly as the split incentive problem, makes it difficult to incentivize energy improvements in the renters market. On-bill tariffs address this problem by tying an energy efficiency loan to the unit's electric meter and integrating the repayment mechanism into the monthly utility bill. The renter will see a monthly charge on their utility bill, and as the unit changes tenants, the charge will be applied to the new tenants. The monthly charge is structured such that it is valued less than the monthly savings realized by the investment, meaning the renter will always be saving money. This can open up a potentially large market for a financier that was previously not accessible.
Steps for Financiers	a) Engage the utility to determine the political and logistical feasibility of instituting an on-bill financing program. b) Identify energy improvements that are eligible for an on-bill financing loan. Explore a partnership with a vetted vendor that can offer audits for interested customers. c) Determine loan interest rates and terms based on the credit rating and utility payment history for eligible customers. Ensure that the interest rates are favorable enough to provide a reasonable return on investment for the customer. d) Agree to terms of partnership with utility. e) Determine administrative costs and implement necessary fees. f) Promote offering in partnership with utility to the utility customers.
Opportunity	• Expand customer base, specifically tenants • Expand product line offering • Reduce administrative costs • Market differentiation
Risks	• Less control of program administration due to partnership with utility • Technologies may not be as efficient or productive as anticipated, thus leaving borrower with less disposable income than envisioned
Possible Partners	• Local utility • Local energy auditor

Workshop participants viewed on-bill financing as a less attractive option and expressed concern that creating a partnership with a utility could be both time and administratively intensive. Utilities would likely need a government incentive or regulation in order for them to want to encourage energy efficiency. For these reasons, this product option was not discussed at length at the Saint Lucia workshop.

5.3 Advanced Loan Products

Loan products identified in this section require the most level of effort from the FI to develop and implement. However, the loan products discussed have been either successfully implemented outside of the target countries with notable success or are currently in existence but for other sectors.[45] The loan products below require technical assistance and policy/government support.

Develop a Second Hand Market for Equipment

Large retailers, such as Courts, have an established history in the target countries of selling repossessed equipment and appliances—such as dishwashers, air conditioners, washing machines, etc. Creating a second hand market for repossessed sustainable energy equipment would allow financial institutions to use the equipment as collateral in the loan—as they will still be able to recoup their costs in the event of default. Under such a scheme, FIs would partner with an established vendor, such as Courts, or another large scale-retailer or installer. The FI then offers financing to customers who purchase their SETs through the established product vendor or installer. In the event of the customer defaulting, the established vendor or installer agrees to buyback the RE or EE equipment or guarantees to re-sell the equipment. This will allow the financial institution to recoup their costs in the event of default.

ADVANCED	Requires the most effort to develop and implement. Most likely requires technical assistance from outside organization(s) and policy support from the government.
Objective	To establish a re-sale market for repossessed SETs to enable FIs to recoup their costs in cases of borrower default. Partner with companies that offer hire-purchase schemes.
Needs Addressed	One way to increase the accessibility of SET financing is to use the SET itself to secure the loan as collateral. This product would create a partnership that supports the development of a second hand market so the SET can be re-sold or re-financed. This allows the FI to recoup their costs in the event of consumer default.
Steps for Financiers	a) Engage a local large-scale retailer, such as Courts, or other established vendor or SET installer to determine the financial and logistical feasibility of developing a second hand market. b) Identify which products can easily be removed from a home. c) Determine buy-back, re-sell, and other agreement terms between the FI and the vendor/installer, in the event of consumer default. d) Determine administrative costs and implement necessary fees. e) Promote offering in partnership with vendor/installer to the consumers—through special financing, loan promotions, discounts, etc.
Opportunity	• Expand customer base • Recoup costs during default • Mitigate risks of default • Reduce transaction costs
Risks	• Time and cost to establish market • Costly diligence and valuation of second-hand SET
Possible Partners	• Local large-scale retailers (such as Courts) • Local SET vendor and/or installer

[45] For example, a second hand market for furniture and cars is widespread throughout the Caribbean region.

Of the loan product offerings presented to workshop participants, developing a second hand market for equipment had the lowest interest level and buy in for several reasons:

- Currently a second hand market for SETs does not exist. It is not the core business of financiers to create second hand markets and it is not in their best interest to lend to consumers who are at risk of default.
- Establishing a second hand market is both time and cost intensive.
- This lending product relies on the technical capacity and reputation of the established installer to determine quality, certified RE and EE equipment. It also relies on the market share and presence of established vendors and installers to ensure that SETs can be sold second hand, in the event of default. Since the market for SETs remains small in all target countries, creating a second hand market may be premature. Not all SETs are easy to remove from a home. Solar PV panels and solar hot water systems are difficult to remove from a home, making it therefore more realistic to focus the market on energy efficient appliances. In such an instance, partnerships with major supplies (e.g. Courts) could be relevant.
- Depending on the age and type of the appliance, products that were initially purchased because of their lower electricity consumption high efficiency compared to the newest products on the market. This could reduce or eliminate any type of premium on the EE sale value in the second hand market.

Solarize / Consumer Purchasing Aggregation Model

Solarize programs, a group purchasing program of solar equipment traditionally organized by a local government or community group, have been successful at driving the adoption of residential solar in the US.[46] Through a Solarize program, the lead organizer would select a single solar developer to offer the procurement and installation of solar equipment to residents within the community at a pre-negotiated price. Taking advantage of economies of scale associated with purchasing large volumes of equipment, the installer can offer the group of residents a price discounted from the cost of a single installation. Once the price is set, community members have a limited time that they are able to lock in that discounted price before the offer expires.

In addition to the cost benefits associated with the group purchase model, Solarize programs have been shown to significantly increase the rate of adoption of residential solar projects. Customer inertia poses a major barrier for installers and financiers as the unfamiliarity with the technology and the complexity of the process can extend the sales cycle to over two years. By engaging an entire community at once with a limited time offer, Solarize programs offer a “safety in numbers” to community members and can reduce the sales cycle to 3-6 months.[47] Some Solarize programs even implement tiered pricing depending on how many people sign up, meaning that those who have committed are incentivized to engage their neighbors to participate so they will see a lower installed cost.

[46] These programs have become increasingly popular in the US since the first Solarize program in Portland, Oregon in 2010.
[47] Irvine, Sawyer, & Grove, May 2012

ADVANCED	Requires the most effort to develop and implement. Most likely requires technical assistance from outside organization(s) and policy support from the government.
Objective	To expand the market of residential solar loans by increasing the financial feasibility through group purchasing and by mitigating the customer inertia problem through community organizing.
Needs Addressed	Residential solar is still a nascent market due to high upfront costs, unfamiliarity with the technology, and a complex decision process. Through the implementation of a Solarize program, a local lending institution can increase the market for solar loans by offering a better financial return and overcoming the customer inertia problem that can lead to a two year sales cycle.
Steps for Financiers	a) Select a qualified installer through a Request for Proposal process. b) Negotiate an installed price for a residential solar installation through the program. Some programs will offer a tiered pricing structure based on how many people sign up. c) Establish a sign up deadline for interested customers. d) Engage the local community through a marketing campaign focusing on the limited time offer and financing options. e) Once the deadline is reached, work with the installer to review the houses that have signed up to ensure that they are technically feasible for a solar installation. f) Contract with the residents that have roofs feasible for solar.
Opportunity	• Expand customer base • Expand product line offering • Market differentiation • Enable group purchasing at reduced rates • Overcome customer inertia problem
Risks	• Solar may not be financially feasible even with the discount • Technical issues may prevent potential customers from installing solar • Technologies may not be as efficient/productive as anticipated, thus leaving borrower with less disposable income than envisioned
Possible Partners	• Local government • Installer • Technical assistance to support program implementation

The majority of the Saint Lucia workshop participants were excited about this concept, but expressed that they would not participate in such a program without technical assistance. Participants believe the program has high administrative costs to establish and run, and requires significant expertise in sustainable energy technologies, compared with the other lending products described in this chapter. However, the majority of participants expressed that they would participate or consider participation if adequate technical support were provided.

The group identified additional considerations that are important for structuring such a product, such as:

- Similar to the vendor service agreement, participants' cautioned that FIs should not limit their customers to a single vendor and that an extensive vetting process would be required to

determine 'certified' vendors and installers. FIs believed that it was important to demonstrate that they do not have any inside deals with vendors.

- The product offering would be a time-bounded offering, perhaps a window of six months.
- The buyer should be responsible for maintenance. The FI could collect maintenance fees as part of the loan payments to ensure that the vendor is paid for required maintenance and to reduce the financier's risk.
- Workshop participants believed that it could be possible to provide customers with a short-term loan option (5-7 years) and an option to tie the loan to a new or existing mortgage.[48]
- Participants highlighted that the government or a government agency could assist FIs with identifying vendors and offering technical assistance. The group discussed how there could be opportunities to manage a Solarize program across several Caribbean countries to maximize efficiency, scale, and technical assistance support. A centralized approach could include multiple SET vendors.

Property Assessed Clean Energy Model

The Property Assessed Clean Energy (PACE) financing model enables individual property owners to borrow money from their local government and repay the loan through an assessment or special tax on their property tax bill. Typically the loan program is funded through the sale of bonds, and each loan is secured with a lien on the property. The PACE model is advantageous to the property owner as the debt obligation passes with the ownership of property, eliminating administrative hurdles associated with traditional loan or third party ownership programs. The PACE model also benefits the investor, as the repayment mechanism through the property tax bill means that, like other taxes, the loan must be paid before other claims on the property in the event of foreclosure.[49] [50] [51] This model, however, requires clear support from policymakers in order to create an environment where PACE is allowed, as well as technical assistance to support financiers with lending in a PACE environment.

[48] The workshop group that focused on this product believed that if the product were to be offered as a new mortgage or equipment loan, it would be fair for the financial institution to offer a 1% interest rate reduction. If the customer wanted to add the purchase to an existing loan, the financier could offer an interest rate reduction of 0.5%.

[49] DOE, 2011

[50] Fuller, Kunkel, & Kammen, 2009

[51] The ClimateSmart program in Boulder County, Colorado offered between US$3,000 to US$50,000 in loans for EE and RE improvements and installations to residential property owners. The program offered estimated rates of 6.75% - 7.75% for standard applicants, and estimated rates of 3% - 4.5% for households with an income at or below 115% of the area median income. Applicants were required to pay a US$75 application fee, and up to 4% of the loan amount to cover closing costs. Applicants were expected to pay 5% of the loan amount into a Debt Service Reserve Fund that would help the county achieve a better bond rating and therefore offer better interest rates (ClimateSmart, 2010).

ADVANCED	Requires the most effort to develop and implement. Most likely requires technical assistance from outside organization(s) and policy support from the government.
Objective	To implement a mechanism for institutions to offer low interest loans for residential energy improvements without the higher administrative costs and risks associated with a traditional loan program.
Needs Addressed	Consumers often lack the financial capital available to invest in energy improvements to their home. While traditional loan programs can help to finance the upfront capital expenses, they are often expensive to administer and can carry higher risks for the investor, costs that are ultimately passed onto the consumer. A government-supported Property Assessed Clean Energy (PACE) program can mitigate these issues by integrating the repayment mechanism into the property tax bill. This structure piggybacks onto an existing payment system so that a new system does not need to be developed, reducing administrative costs. Furthermore, the investor can use the customer's tax payment history as another variable to determine the potential risk of default during the loan term.
Steps for Financiers	a) Engage the national or local government to determine the political and logistical feasibility of instituting a PACE program. b) Identify energy improvements that are eligible for a PACE loan. Explore a partnership with a vendor that can offer audits for interested customers. c) Determine loan interest rates and terms based on the credit rating and tax payment history for eligible customers. Ensure that the interest rates are favourable enough to provide a reasonable return on investment for the customer. d) Determine administrative costs and implement necessary fees. e) Promote offering in partnership with local government.
Opportunity	• Expand customer base • Expand product line offering • Market differentiation • Test concept as a promotion and scale up into a product line if successful • Reduce investment risk • Demonstrate commitment to working with the public sector to expand investments in SETs
Risks	• Less control of the administration of the program due to partnership with local government • Technologies may not be as efficient/productive as anticipated, thus leaving borrower with less disposable income than envisioned
Possible Partners	• National and/or local government • Local energy auditors

This concept requires support from policymakers in order to modify the tax code. It was not discussed at length at the Saint Lucia workshop because it is not a solution that financial institutions can implement today in the Caribbean region. As the market grows and as FIs gain experience with financing SETs, this could be a way for lenders to cooperate with their national governments to further expand the SET market.

6. Conclusion

The recommendations range from long-term, external actions that can facilitate greater investments in SETs, to more immediate, actionable steps that financiers can take today to increase residential-scale SET deployment.

This guide demonstrates that there are clear benefits and opportunities for both financial institutions and consumers to invest in sustainable energy technologies. SETs provide the opportunity for households to generate an additional savings or income stream, thereby providing borrowers with larger disposable incomes. This makes borrowers more creditworthy and reduces the likelihood of default. For this reason, participants in the development of this guide indicated strong interest in formulating and implementing lending products to expand investments in sustainable energy technologies. Many participants indicated that the time they spent learning about SET financing helped them understand the field much better, making them more confident and willing to pursue lending opportunities for these technologies.

Expanding lending for SETs also supports the goals of many financial institutions on individual, regional and societal levels. Investments in SETs yield positive outcomes in terms of energy savings to the individual, increasing fuel supply diversity, promoting local employment, and supporting environmental protection goals.

Each target country in this guide has many opportunities to promote investment in energy efficiency as well as a strong resource potential in solar PV and solar hot water systems. Therefore, the target countries are ideally situated to implement and promote programs that will increase residential-scale SET deployment.

As highlighted throughout the guide, there are a number of consumer and financier barriers that have prevented greater SET investment and deployment. Most important, it is essential for financiers to accurately assess the expected savings or revenue stream that will result from a SET investment. Strategies to protect the value of the collateral and reduce barriers include:

- Utilizing financial analysis tools and other lending assessment tools to calculate energy savings and returns.
- Offering a grace period on the loan payment until the SET begins generating savings or revenue.
- Adjusting the loan tenor to more closely match the technology life such as by tying the loan to a home mortgage.
- Requiring the equipment provider and/or installer to provide warranties and qualifications before offering SET financing to customers.

Successfully growing the SET market also requires creating an enabling environment for SETs. Implementing regulations, providing financial incentives, and establishing country-specific targets and institutions will further the deployment of SETs and facilitate greater SET financing by financial institutions. Accompanying this enabling environment should be national and regional campaigns to increase awareness around renewable energy, energy conservation, and SETs. Nearly every participant felt that a major barrier to financing household SETs was a lack of understanding of the costs and benefits of suitable technologies; all agreed that awareness campaigns would be essential for a large scale transition to sustainable energy to occur.

Financial institutions stand to gain from the developments occurring in the target countries. By offering their customers affordable loan products and financing options for SET investments, financiers can yield positive financial returns for their institutions and create long-term savings for their customers. Financing SETs is not wildly different from any other type of lending. Financiers can apply consistent evaluation metrics and some lending products that are currently widely used today can be adjusted for SET financing. These products include:

- Developing a SET mortgage product offering to provide competitively priced mortgages for investments in energy efficiency and/or renewable energy compared to a traditional home mortgage.
- Adjusting current payroll deduction schemes to be compatible with SET financing, utilizing existing institutional knowledge, skills, and expertise on the financing mechanism, supplemented with the loan structure recommendations highlighted in this guide.

There are also a series of long-term actions that will require greater investment from financiers to implement. These actions will further develop an enabling environment for SETs and better position financial institutions to assist their customers in SET financing. These long terms actions include:

- Developing a vendor service agreement with certified SET vendors to provide quality assurance to the financial institution and the consumer.
- Creating a 'Solarize' program to expand the market of residential solar loans through group purchasing and community ownership models.

Finally, there is space for additional support and technical assistance from international development organizations. International development and technical assistance organizations looking to offer further support and technical assistance should prioritize:

- Creating a financial modeling tool that will allow FIs to calculate energy savings, payback periods, and revenue generated from a SET investment.
- Formulating a financiers' tool kit that includes template loan contracts, lists of reputable vendors, criteria for evaluating service contracts, and template communication materials to provide to customers.
- Expanding market research on the typical homeowner seeking to buy SETs (e.g. income, investment size)
- Developing a centralized, online platform that shares information and resources relevant to FIs on SET investments and financing—including a list of funding windows, grant opportunities, soft loans, and technical assistance FIs can access.
- Providing in-depth SET lending training to financiers, including training in financial analysis renewable energy tools, such as RETScreen.

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Annex: Sustainable Energy Finance Resources

A. Definition of Renewable Energy and Energy Efficiency Policies and Incentives

In recent years, policymakers in the Eastern Caribbean and the Bahamas have implemented a series of policies and incentive programs to create an enabling environment for investment in sustainable energy technologies. This Annex provides general, high-level definitions of these types of policies and incentive programs which are clustered into the following categories: targets and institutions, financial, and regulations. Note that the definitions can vary widely by jurisdiction and may not align perfectly with the definition provided by a given country in the Eastern Caribbean region.

Targets and Institutions

Energy Efficiency Targets are an official commitment, plan, or goal set by the government to achieve an increase in energy efficiency or reach target energy consumption rates by a future date.

Renewable Energy Targets are an official commitment, plan, or goal set by the government to achieve a certain amount of RE by a future date.

National Sustainable Energy Policies typically include goals, milestones or a roadmap envisioning the country's energy future. National sustainable energy policies can be a supporting framework for RE or EE targets.

Energy Units are present in many countries. Their roles vary depending on their mandate but typically, they are government bodies that implement and enforce energy standards or goals. Such bodies often design and implement RE/EE programs and financial incentives to promote greater uptake of SETs, and can help streamline the sustainable energy project development process.

Financial Incentives

Capital Subsidies, Grants, and Rebates are typically payments by a utility, government agency, or government-owned bank to cover a percentage of the capital cost of an investment in a sustainable energy technology.

Tax Incentives typically provide exemptions from, or a refund of, tax associated with the purchase of sustainable energy technologies or energy efficiency equipment. They can include personal tax credits, which reduce personal income tax by an amount tied to the amount spent on purchasing and installing SETs; property tax incentives, which provide that the added value of a RE system is excluded from the valuation of the property for taxation purposes; import duty waivers; or sales/VAT tax incentives, which provide an exemption from, or refund of, a sales/VAT tax for the purchase of a RE system or EE equipment.

Regulations

Interconnection Standards clearly specify the technical and administrative procedures by which a customer connects their sustainable energy technology to the utility's electricity grid. Standard

interconnection procedures for small-scale generators can often be simplified and streamlined, compared to procedures utilized for larger-scale generators.[52]

Net Metering and **Net Billing** policies are regulations that allow for the two-way flow of electricity between the customer and the utility company and allow customers to be credited for the excess electricity generation that they do not use. The intent of net metering and net billing is to provide an incentive for customers to install onsite generation, although the effectiveness of net metering in supporting market growth depends on design details such as the rate at which the electricity is credited.[53]

Feed-in Tariff is a set of government policies that guarantee a power producer a fixed, long-term payment for renewable electricity generation. A feed-in tariff typically includes supporting policies regarding interconnection, purchase and dispatch, as well as contracting.[54] Feed-in tariffs are different from net metering in that 100% of the system's output is purchased by the utility, instead of the power being used onsite to reduce demand.

Energy Codes typically require new buildings or buildings that are undergoing renovations to adhere to certain energy standards, such as energy efficiency and/or green building standards.

Energy Efficiency Appliance Standards are government mandated minimum efficiency standards for certain appliances and equipment. Depending on the policy, they can also prohibit the retail sale of appliances and equipment that do not meet the standards.

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[52] Varnado, L., & Sheehan, M. (2009). Connecting to the Grid: A Guide to Distributed Generation Interconnection Issues (6th ed.). North Carolina: North Carolina Solar Center.

[53] Wiedman, J., Culley, T., Varnado, L., & Jackson, R. (November 2012). "Freeing the Grid 2012: Best Practices in State Net Metering Policies and Interconnection Procedures." Latham, New York: Interstate Renewable Energy Council.

[54] Rickerson, Laurent, Jacobs, Dietrich, and Hanley. "Feed-in Tariffs as a Policy Instrument for Promoting Renewable Energies and Green Economies in Developing Countries: Law Drafters' Guide." United Nations Environment Programme (2012).

B. Renewable Energy and Energy Efficiency Policies and Incentives by Target Country

In recent years, policymakers in the Eastern Caribbean and the Bahamas have implemented a series of policies and incentive programs to create an enabling environment for investment in sustainable energy technologies (See Figure 5 below). This section uses a stop light table to present a high-level overview of the environment that exists in the guide's target countries. Policies and incentive programs can be clustered into the following categories: targets and institutions, financial, and regulations (For general definitions see Annex A). For each key policy and incentive, this Annex presents a snapshot as it exists in the country and discusses current country activities.

Figure 5 below summarizes the evolving regulatory environment in the Eastern Caribbean and the Bahamas. A key question for financiers is whether they will be able to help current and future clients capture new sustainable energy opportunities. The existence of established policies and regulations, and the fact that new regulations are under development, could create opportunities for financial institutions to craft programs around specific policies. At the same time, however, these new sustainable energy policies will require bank staff to build internal knowledge and capacity about how their customers can take advantage of them. The analysis as to whether a given regulatory environment is sufficient to support the development of new financial products will need to be made on a bank by bank and country by country basis. Policymakers can accelerate SET investments by addressing the legal barriers to lending—such as providing government-supported grants and other incentive programs, ensuring interconnection and net metering, and providing FIs with a clear overview of the legal environment in their home country.

Figure 5. Policies and Incentives in Target Countries

		Antigua & Barbuda	The Bahamas	Dominica	Grenada	St. Kitts & Nevis	St. Lucia	St. Vincent & the Grenadines
Targets & Institutions	RE Targets	Yellow	Yellow	Yellow	Green	Green	Green	Green
	EE Targets	Yellow	Yellow	Yellow	Green	Green	Green	Green
	National Sustainable Energy Policy	Yellow	Yellow	Yellow	Green	Green	Green	Green
	Energy Unit	Green	Red	Green	Green	Green	Green	Green
Financial	Capital Subsidies, Grants, Rebates	Orange	Orange	Orange	Orange	Red	Red	Orange
	Tax Reductions (VAT, Sales, Excise, Energy)	Green	Orange	Green	Green	Green	Green	Yellow
Regulations	IPPs Eligible for Interconnection	Yellow	Red	Green	Green	Yellow	Yellow	Yellow
	Net Metering & Net Billing	Green	Red	Green	Green	Yellow	Green	Yellow
	Feed-in Tariff	Orange	Red	Red	Green	Red	Orange	Orange
	Energy Code	Green	Red	Red	Red	Orange	Orange	Green
	EE Appliance Standards	Red	Red	Red	Red	Red	Red	Red

= The policy structure exists
= The policy structure is being drafted or requires negotiations for implementation
= Existing government documentation cites the policy as an option
= The policy structure does not exist

Sources: REEEGLE, 2012; IFOK Analysis, 2012

Antigua and Barbuda is currently drafting its National Sustainable Energy Policy, which will include RE and EE targets.[55] The Energy Unit is situated under the Office of the Prime Minister and was formed in 2010. It is responsible for developing the country's energy policy and associated action plan.[56] There are no capital subsidies or rebates available however, the 2011 National Energy Policy[57] recognizes the need for greater RE/EE uptake through financial incentives, such as grants.[58] Antigua and Barbuda offers a VAT-tax reduction on 28 eligible items, such as solar panels, solar water heaters, and heat pumps.[59] Independent power producers are eligible to feed into the grid with permission from the Antigua Public

[55] Government of Antigua and Barbuda. (December 2010). DRAFT: National Energy Policy St. John's, Antigua.
[56] UN DESA. (2012). "Stock Taking Report, Rio+20: Antigua and Barbuda." New York, NY: UN DESA.
[57] NREL, & OAS. (2012). Energy Policy and Sector Analysis in the Caribbean (2010-2011): Assessing Antigua and Barbuda; the Bahamas; Dominica; Grenada; St. Lucia; St. Kitts and Nevis; and St. Vincent and the Grenadines. Golden, CO.
[58] Government of Antigua and Barbuda. (2011). "DRAFT National Energy Policy: Antigua and Barbuda." St. John's, Antigua and Barbuda Energy Desk, Office of the Prime Minister.
[59] Government Continues to Promote the Use of Renewable Energy Solutions. (June 5, 2011). Caribarena. Retrieved from www.caribarena.com/antigua/environment/environment/97597-government-continues-to-promote-the-use-of-renewable-energy-solutions.html

Utilities Authority (APUA)—which includes meeting APUA's interconnection standards.[60] APUA also recently approved net metering for households,[61] and the National Energy Policy mentions that feed-in tariffs or a mandated quota system could be possible policy options.[62] Antigua and Barbuda utilizes a building code that includes best practices against natural disasters and climate mitigation.[63] There are no energy efficiency appliance standards specified in legislation or policy.

The Bahamas is finalizing its National Sustainable Energy Policy, which is expected to include RE and EE targets.[64] There is no specified Energy Unit or National Energy Agency in the Bahamas. The latest version of the 2010 Energy Action Plan recognizes the need for greater RE/EE uptake through financial incentives, such as grants.[65] The Bahamas is exploring a rebate program, the 50-50 project, which would allow 50% of annual energy savings achieved through implementing energy efficiency or SET technologies to be given back to eligible public and private schools, while the remaining 50% would go to the utility to offset for school energy bills.[66] The government is also exploring exempting certain energy-savings goods from import duties.[67] There are no interconnection standards for independent power producers, energy codes for buildings, net metering/net billing options, or feed-in tariff in the Bahamas. There are no energy efficiency appliance standards specified in legislation or policy.

Dominica is currently drafting its National Sustainable Energy Policy, which will include RE and EE targets.[68] The Energy Unit in Dominica is located within the Ministry of Public Utilities and is responsible for coordinating the development and expansion of electricity production and distribution, including renewable energy sources.[69] There are no capital subsidies available in Dominica, however, the National Sustainable Energy Policy recognizes the need for greater RE/EE uptake through financial incentives, such as grants and rebates.[70] Dominica offers a VAT-tax and import duty waiver on eligible SET equipment listed on the Customs and Excise Division website.[71]The public utility in Dominica, Dominica Electricity Services Ltd (DOMLEC), allows for independent power producers to feed into the grid under its interconnection standard and allows for net metering.[72] There is no feed-in tariff policy or legislation in Dominica. There is no formalized energy code in policy or legislation in Dominica and there are no energy efficiency appliance standards specified in legislation or policy.

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[60] APUA. (2012). APUA Interconnection Policy, from www.apua.ag/interconnection-policy/
[61] Caribbean360. (November 12, 2012). Antigua Must Find Alternatives to High Costs of Imported Fuels says PM. Caribbean360.com. Retrieved from http://www.caribbean360.com/index.php/news/antigua_news/633444.html#axzz2Fexo7tkg
[62] Government of Antigua and Barbuda. (December 2010). DRAFT: National Energy Policy St. John's, Antigua.
[63] Wason, A. (August 2001). Status of Building Codes in the Caribbean, from http://www.oas.org/pgdm/document/codemtrx.htm
[64] National Energy Policy Committee. (September 2010). "Second Report of the National Energy Policy Committee: Final." Nassau, Bahamas: Government of the Bahamas.
[65] Ibid.
[66] Ibid.
[67] Ibid.
[68] Fadelle, M. (2012). "Final Draft: National Energy Policy of the Commonwealth of Dominica." Roseau: Energy Unit, Ministry of Public Utilities.
[69] REEGLE. (2012). Dominica Energy Profile, from www.reegle.info/countries/dominica-energy-profile/DM
[70] Fadelle, M. (2012). "Final Draft: National Energy Policy of the Commonwealth of Dominica." Roseau: Energy Unit, Ministry of Public Utilities.
[71] REEGLE. (2012). Dominica Energy Profile, from www.reegle.info/countries/dominica-energy-profile/DM
[72] Dominica Electricity Services (2010). Distributed Renewable Energy Generation Interconnection Policy. Roseau: DOMLEC.

Grenada adopted its National Sustainable Energy Policy in 2011, which includes RE and EE targets.[73] The Energy Unit in Grenada is located within the Ministry of Finance and is responsible for promoting RE, EE, and energy conservation at all levels of the economy.[74] Grenada does not offer capital subsidies, grants, or rebates, however the National Sustainable Energy Policy recognizes the need for greater RE/EE uptake through financial incentives, such as grants, subsidies, and rebates.[75] However, Grenada does offer a VAT-tax reduction and import duty waiver on eligible energy savings devices.[76] The public utility in Grenada, Grenada Electricity Services Ltd (GRENLEC), has an interconnection standard for independent power producers and offers net billing.[77] There is no specified energy code in policy or legislation in Grenada. There are no energy efficiency equipment standards specified in policy or legislation, however, the proposed Energy Efficiency Act will mandate fuel efficiency standards for imported vehicles.[78]

Saint Kitts and Nevis adopted its National Sustainable Energy Policy in 2012, which includes RE and EE targets.[79] The Energy Unit in Saint Kitts and Nevis is located within the Ministry of Housing, Public Works, Energy and Public Utilities and is responsible for promoting energy development—including pilot projects such as solar panel installation on Government headquarters.[80] There are no capital subsidies, grants, or rebates available in Saint Kitts and Nevis. However, the government does offer VAT-tax reductions and import duty waivers on a range of alternative energy equipment—such as solar PV panels, hydrogen fuel cells, wind-turbines, energy saving light bulbs, and solar water heaters.[81] Saint Kitts and Nevis is currently in conversation with its public utility, the Saint Kitts Electricity Company Ltd. (SKELEC) to explore interconnection standard policies for independent power producers and net metering/net billing.[82] The government is exploring establishing building energy codes, as outlined in its National Energy Policy.[83] Saint Kitts and Nevis does not have a feed-in tariff or energy efficiency appliance standards specified in policy or legislation.

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[73]Government of Grenada. (November 2011). The National Energy Policy of Grenada: A Low Carbon Development Strategy for Grenada, Carriacou and Petite Martinique. St. George's, Grenada: Office of the Prime Minister

[74] Government of Grenada. (2010). Department of Energy & Sustainable Development, from www.gov.gd/ministries/finance.html

[75] Government of Grenada. (November 2011). The National Energy Policy of Grenada: A Low Carbon Development Strategy for Grenada, Carriacou and Petite Martinique. St. George's, Grenada: Office of the Prime Minister

[76] Government of Grenada. (2012). Tax Exemptions, from customs.gov.gd/exemptions.php

[77] Forsyth, D. (2009). Small Island Grid Renewable Interconnection Policy. St. George's, Grenada: Grenada Electricity Services Ltd.

[78] REEGLE. (2012). Energy Profile: Grenada, from www.reegle.info/countries/grenada-energy-profile/GD

[79] Caribbean360. (June 21, 2012). Tax Waiver to cut St. Kitts and Nevis Energy Bill. *Caribbean360*. Retrieved from www.caribbean360.com/index.php/business/591039.html#axzz2FWGSiA4w

[80] Samuel, T. (December 30, 2011). St. Kitts-Nevis Moves Closer to Green Energy Goals. *The St. Kitts & Nevis Observer*. Retrieved from www.thestkittsnevisobserver.com/2011/12/30/energy-goals.html

[81] Caribbean360. (June 21, 2012). Tax Waiver to cut St. Kitts and Nevis Energy Bill. *Caribbean360*. Retrieved from www.caribbean360.com/index.php/business/591039.html#axzz2FWGSiA4w

[82] Caribseek News. (May 18, 2012). Public Utilities Ministry Praises SKELEC for Improved Service. *Caribseek News*. Retrieved from http://news.caribseek.com/index.php/caribbean-islands-news/saint-kitts-and-nevis-news/item/13326-public-utilities-ministry-praises-skelec-for-improved-service

[83] Ministry of Public Works, Utilities, Energy, and Housing. (2011). DRAFT: National Energy Policy, St. Kitts and Nevis. Basseterre, St. Kitts.

Saint Lucia adopted its National Sustainable Energy Plan in 2006,[84] and more recently adopted its National Energy Plan in 2010, which includes RE and EE targets.[85] The Energy Unit in Saint Lucia is located within the Ministry for Public Service, Sustainable Development, Energy, Science and Technology and is responsible for pursuing the aims of the National Energy Plan and the Sustainable Energy Plan.[86] Currently, there are no capital subsidies, grants, or rebates available in Saint Lucia. In the past, Saint Lucia offered an "Efficient Lighting for Saint Lucia" program that provided compact fluorescent light bulbs (CFLs) to low-income households.[87] The government also offered financing for first time solar water heater buyers through a GSEII-supported program from 2005-2009.[88] Currently, Saint Lucia offers import duty waivers on renewable energy technologies and has adopted a VAT-tax reduction policy, but is still developing its list of product exemptions.[89] The government is updating its Electricity Supply Act of 1994 and soliciting comments.[90] One of the issues being explored is whether to enable independent power producers to connect to the grid, which would require permission from the public utility (St. Lucia Electricity Services Ltd. - LUCELEC) or removing LUCELEC's monopoly on generation, transmission, and distribution.[91] The government also states in its National Energy Policy that it will develop an energy efficiency building code.[92] From 2009-2010, the government and LUCELEC piloted net metering for solar projects.[93] Since then, LUCELEC has allowed limited net metering for PV systems up to 5 kW.[94] LUCELEC has also expressed interest in exploring the feasibility of a feed-in tariff.[95] In Saint Lucia, there are no energy efficiency appliance standards specified in policy or legislation.

Saint Vincent and the Grenadines adopted its National Sustainable Energy Plan in 2010, which includes RE and EE targets.[96] The Energy Unit in Saint Vincent and the Grenadines is located within the Ministry of National Security, Air & Sea Port Development and is responsible for overseeing the Energy Conservation Fund and assisting in the formulation and implementation of the government's energy policies.[97] Saint Vincent and the Grenadines does not offer capital subsidies for SETs, but its National

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[84] NREL, & OAS. (2012). Energy Policy and Sector Analysis in the Caribbean (2010-2011): Assessing Antigua and Barbuda; the Bahamas; Dominica; Grenada; St. Lucia; St. Kitts and Nevis; and St. Vincent and the Grenadines. Golden, CO.

[85] Government of Saint Lucia. (January 2010). Saint Lucia National Energy Policy. Castries, St. Lucia: Ministry of Physical Development and the Environment.

[86] REEGLE. (2012). Energy Profile: Saint Lucia, from www.reegle.info/countries/st-lucia-energy-profile/LC

[87] Global Sustainable Energy Islands Initiative. (2012). GSEII Case Study: Energy Efficient Lighting. St. Lucia: Global Sustainable Energy Islands Initiative.

[88] Global Sustainable Energy Islands Initiative. (2012). GSEII Case Study: Solar Hot Water Systems in the Caribbean. St. Lucia: Global Sustainable Energy Islands Initiative.

[89] REEGLE. (2012). Energy Profile: Saint Lucia, from www.reegle.info/countries/st-lucia-energy-profile/LC

[90] SEPA-Americas. (2010). Project Documents- Saint Lucia, from http://www.sepa-americas.net/estadisticas_detalle.php?ID=12

[91] LUCELEC. Comments on Electricity Supply Act- Chapter 16. Castries, St. Lucia: LUCELEC.

[92] Government of Saint Lucia. (January 2010). Saint Lucia National Energy Policy. Castries, St. Lucia: Ministry of Physical Development and the Environment.

[93] LUCELEC. (September 2011). LUCELEC's Experiences in Small PV Systems. Castries, St. Lucia.

[94] Louisy, T. (September 2012). LUCELEC's Sustainable Energy Experience, from http://irena.org/documentdownloads/events/BermudaSeptember2012/10_Trevor_Louisy.pdf

[95] LUCELEC. (September 2011). LUCELEC's Experiences in Small PV Systems. Castries, St. Lucia.

[96] NREL, & OAS. (2012). Energy Policy and Sector Analysis in the Caribbean (2010-2011): Assessing Antigua and Barbuda; the Bahamas; Dominica; Grenada; St. Lucia; St. Kitts and Nevis; and St. Vincent and the Grenadines. Golden, CO.

[97] Government of St. Vincent and the Grenadines. (2012). About the Energy Unit, from www.security.gov.vc/index.php?option=com_content&view=article&id=87&Itemid=139

Sustainable Energy Plan recommends evaluating the use of grants or concessional financing to increase RE and EE uptake.[98] The government offers an import duty waiver on a case-by-case basis for renewable energy systems.[99] In 2011, Saint Vincent and the Grenadines became the first OECS country to adopt an Energy Code, which includes provisions for disaster and climate change mitigation.[100] There is no national interconnection standard, but individuals are allowed to net meter and feed into the grid with permission from the public utility, St. Vincent Electricity Services Ltd (VINLEC).[101] The National Sustainable Energy Plan states that the government will explore amending its current electricity legislation or use mandates to encourage independent power producer generation and interconnection to the grid.[102] Saint Vincent and the Grenadines does not have energy efficiency appliance standards formalized in current policy or legislation.

[98] Government of St. Vincent and the Grenadines. (January 2010). Energy Action Plan for St. Vincent and the Grenadines: First Edition. Kingstown, St. Vincent and the Grenadines.
[99] Ibid.
[100] Caribbean News Now. (October 5, 2011). National Building Code and Guidelines Implemented in St. Vincent. *Caribbean News NOW!* Retrieved from www.caribbeannewsnow.com/headline-National-building-code-and-guidelines-implemented-in-St-Vincent-8162.html
[101] Burke, K. (September 2011). A Strategic Approach Towards Managing Fossil Fuel Cost through the Application of Renewable Energy Technologies. St. Thomas: CARILEC Renewable Energy Forum
[102] Government of St. Vincent and the Grenadines. (January 2010). Energy Action Plan for St. Vincent and the Grenadines: First Edition. Kingstown, St. Vincent and the Grenadines.

C. Evaluating Sustainable Energy Technology Project Risks

Risk Type	Key Question	Mitigation Strategy
Performance Risk	Is there an adequate renewable resource at the proposed project site?	Ensure that a proper feasibility study has been conducted for the specific site
	Will the renewable resource continue to be available at the proposed project site?	To the extent possible, ensure that future changes to site conditions will not affect renewable energy resource access
	Do the installation and technology installers provide proper warranties?	Check to ensure that appropriate warranties are provided
	Will the project be properly maintained during the tenor of the loan? Does the project contract include a service contract?	
Technology Risk	Is the proposed renewable energy technology established and viable?	Check to ensure that the proposed technology is appropriate for the local conditions
	Is the proposed renewable energy technology installer's proposed product established and viable?	Check technology installer history and references
	Is the technology installer's proposed product suitable for the Caribbean region? (e.g. resistant to salt corrosion)	Check technology installer history and references
Contractor Risk	Does the proposed installation installer have the ability to install the proposed technology?	Check installation installer history and references
	Can the proposed installation installer deliver the project on time?	Check installation installer history and references
Counter Party Risk	Can the borrower's balance sheet support the increased debt obligation?	Conduct a credit check on the project proponent
	Does the borrower have sufficient collateral?	Investigate proposed borrower collateral
	Does the borrower have significant equity in the project?	Review project financing structure
Economic Risk	What are the potential impacts of changes to fossil energy prices on the borrower's ability to service project debt?	Ensure that project pro forma include reasonable assumptions about future energy prices
	Can cash flow from the project support debt service?	Review project cash flow model to ensure adequate debt service coverage ratios
Legal/Policy Risk	Are project economics reliant on government policy support going forward? (I.e. feed-in tariffs, production tax credits, etc.) If so, is there risk of these subsidies ending?	Understand local energy policy landscape and impacts of potential policy changes to project economics
	Is the project reliant on government support such as grants or rebates? If so, has the project sponsor secured these resources?	Ensure that project sponsors have secured all proposed grants or rebates in advance of making lending commitments

D. Saint Lucia Workshop Case Studies

During the Financiers' Workshop and Consultation in Saint Lucia, the IFOK and MCG consultants presented three SET-related case studies to the participants. The case studies, which are presented below, were based on real data and described three different scenarios lenders might potentially encounter. The participants were split into three teams and each team received one case study to work on. The teams analyzed the cases to better understand how a SET loan would work and what information financiers need before granting a SET loan. The three teams presented the cases to the entire forum to gain feedback and better insights. The case studies can be found in Annex Section E of this report.

The group exercise helped workshop participants identify a few areas where information was lacking—in both the case studies and in their business context. Financiers indicated a need for more information on the equipment and installer quality (e.g. service contracts, warranties and certificates). Additionally, they expressed concerns about the ability to seize collateral and the lack of secondary market to support liquidation of seized collateral (when not secured by the property itself). Participants noted that larger loans would be linked to mortgages, making it essential to have an accurate valuation of the home.

In each of the case studies IFOK and MCG employed assumptions based on regional observations or estimates in order calculate costs and savings. The annual rate of increase in electricity rates is estimated at a constant 2% per year. The proportion of monthly electrical consumption related to hot water was estimated at 44% of the total household consumption. While cost per kWh is fairly volatile and differs widely among the islands, the workshop participants agreed that a price of EC$1.14 was a reasonable proxy. VAT, import duties and other fees also vary significantly among the target countries with combined costs ranging from 13 to 24% depending upon the domicile, cost of installation relative to equipment, and whether the goods are subject to additional taxes or fees. Each of these variables impacts the analysis.

Case Study 1: Non-pressured Solar Hot Water System (SHW)

A simple and inexpensive gravity-fed solar water system that is 150 liters in size can provide approximately half of the hot water required for a family of four in the Caribbean region. Financiers considered a prototype system based on the following characteristics:

Capacity	150 liter
% Household Energy Produced	22%
% Electricity bill related to household hot water consumption	44%
Expected equipment life	20 years
Avg. monthly electric bill (EC$)	513
Avg. monthly consumption (kWh)	450
Base cost kWh (EC$)	1.14

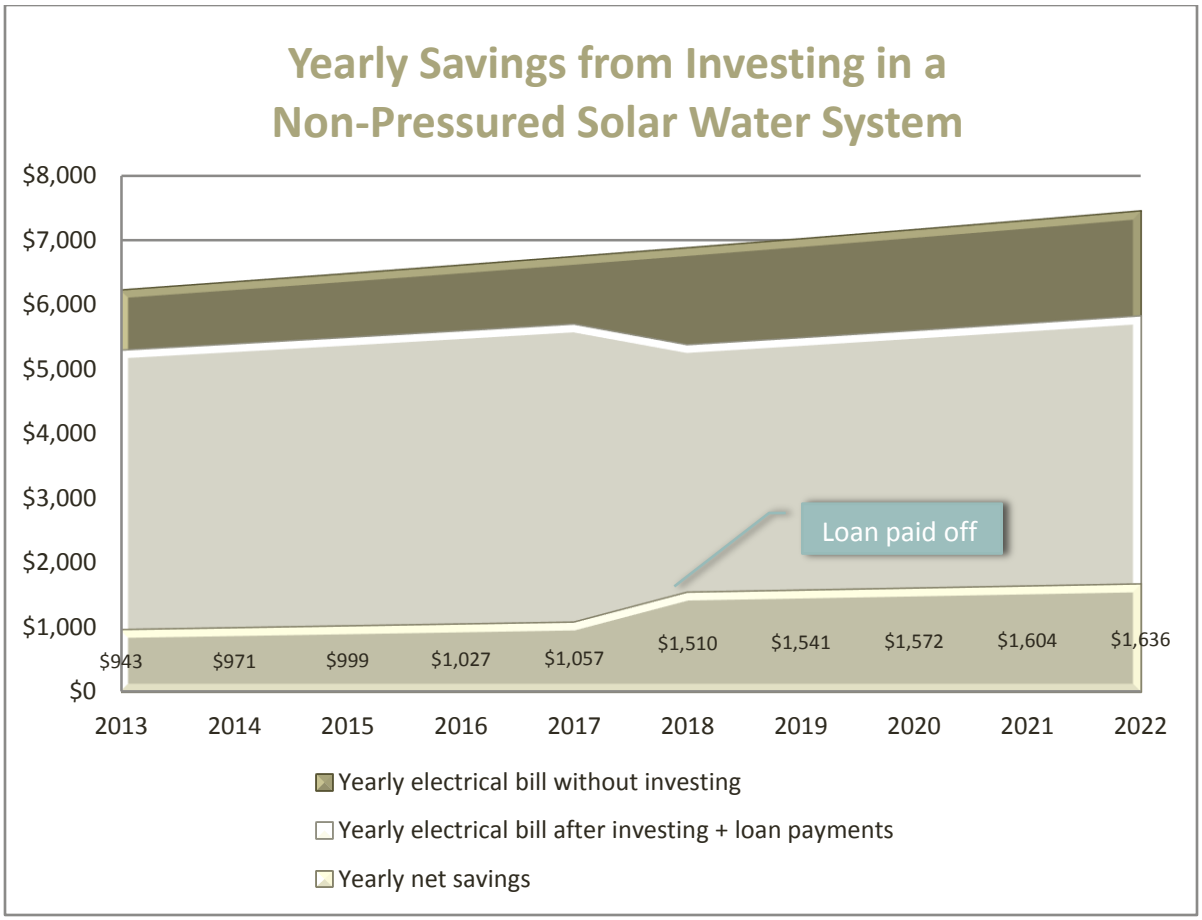
Equipment Price (EC$)	1,026
Installation (EC$)	525
VAT + duties + fees	199
Total Installed Cost (EC$)	1,750

After reviewing asset features, the financiers in the workshop determined lending parameters as follows:

Installed Cost (EC$)	1,750
Down Payment (%)	5%
Amount Financed (EC$)	1,663
Financing Term (Years)	5
Interest Rate	10.00%
Payment (monthly, EC$)	35.32

To calculate potential savings and impact on household monthly debt capacity, lenders employed a government-supplied estimate of 2% annual increase in the cost of electric power. These data produced substantial estimated net savings to homeowners as presented in the figures below:

Year	Savings by Year	Cumulative
1	$943	$943
2	$971	$1,913
3	$999	$2,912
4	$1,027	$3,939
5	$1,057	$4,996
6	$1,510	$6,507
7	$1,541	$8,047
8	$1,572	$9,619
9	$1,604	$11,223
10	$1,636	$12,859



Lenders felt that a system of this size could be easily repossessed where allowed by law and felt the low purchase price mitigated the risk to the bank arising from a lack of secondary market in which to sell seized hot water systems. Financiers in the workshop indicated that they would encourage or require a long-term service agreement to protect both the consumer and the bank collateral.

Workshop participants agreed that they would lend to customers or members using the terms above and supported their decisions by noting the substantial net savings beginning in the first year.

Since the cases were designed to benefit the financiers, the value of the down payment was excluded from the expected monthly savings. Participants used this approach because all down payments were required in cash, and therefore were prerequisites for the loan and not part of the loans themselves. When the required minimum down payment for this system (EC$88) is incorporated in the analysis the overall savings declines to EC$855 during the first year.

Case Study 2: Pressured Solar Hot Water System (SHW)

A moderately priced pressurized solar hot water system that is 300 liters in size can provide approximately 100% of the hot water required for a family of four in the Caribbean region. Financiers considered a prototype system based on the following characteristics:

Capacity	300 liter
% Household Energy Produced	44%
% Electricity bill related to household hot water consumption	44%
Expected equipment life	20 years
Avg. monthly electric bill (EC$)	513
Avg. monthly consumption (kWh)	450
Base cost kWh (EC$)	1.14

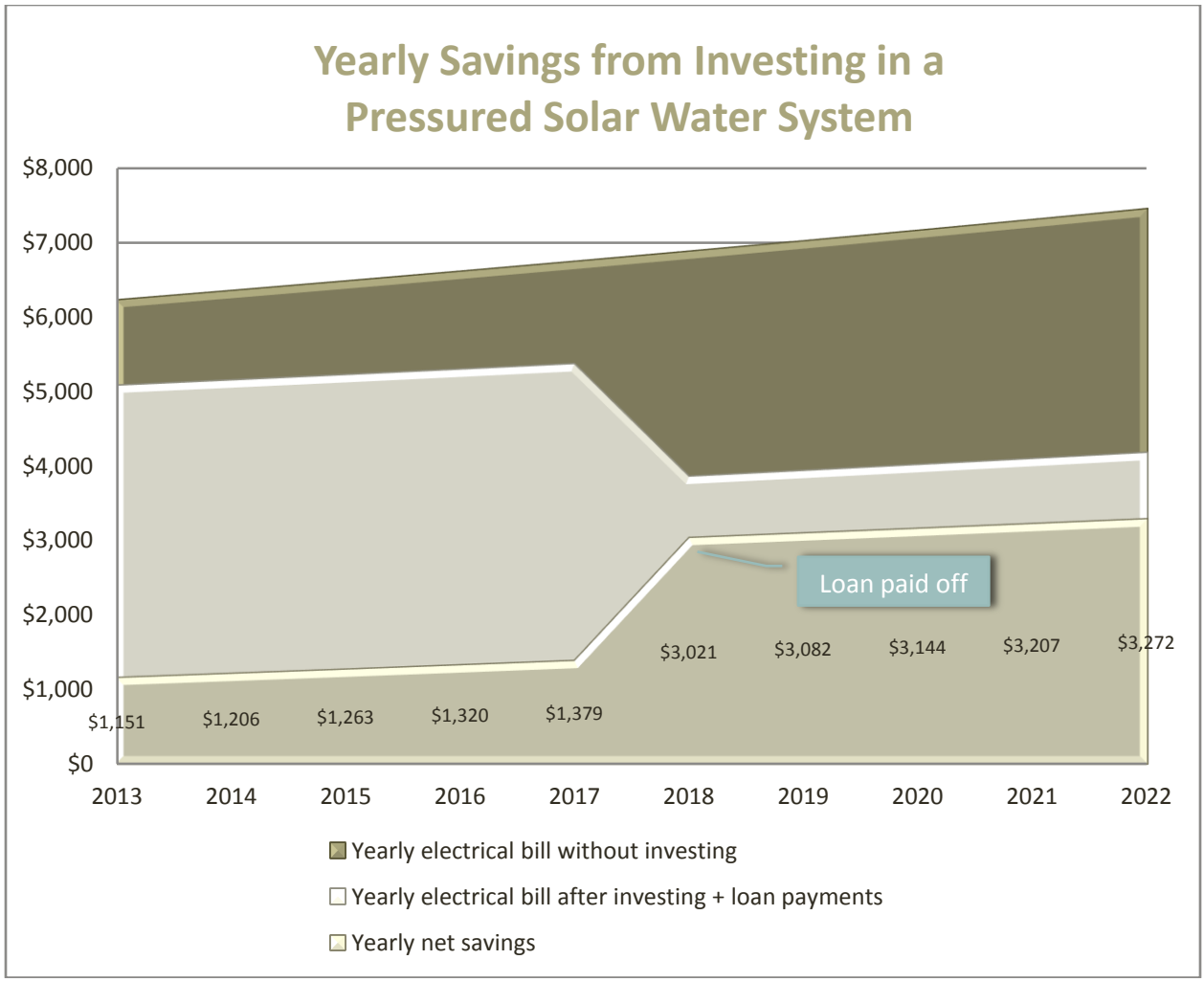
Equipment Price (EC$)	5,101
Installation (EC$)	491
VAT + duties + fees	995
Total Installed Cost (EC$)	6,587

After reviewing asset features, the lenders determined lending parameters as follow:

Installed Cost (EC$)	6,587
Down Payment (%)	10%
Amount Financed (EC$)	5,928
Financing Term (Years)	5
Interest Rate	12.00%
Payment (monthly, EC$)	131.87

To calculate potential savings and impact on household monthly debt capacity, lenders employed a government-supplied estimate of 2% annual increase in the cost of electric power. These data produced substantial estimated net savings to homeowners as detailed in the figures below:

Year	Savings by Year	Cumulative
1	$1,151	$1,151
2	$1,206	$2,357
3	$1,263	$3,620
4	$1,320	$4,940
5	$1,379	$6,319
6	$3,021	$9,340
7	$3,082	$12,421
8	$3,144	$15,565
9	$3,207	$18,773
10	$3,272	$22,045



Lenders expressed some concern about the ability to repossess the system in the event of borrower default and adjusted loan parameters to reflect the increased risk. They indicated that they would encourage or require a long-term service agreement to protect both the consumer and the bank collateral.

Workshop participants agreed that the substantial savings a homeowner could expect to realize over the life of the asset, along with any increased relative savings in the event of a greater surge in power prices and in conjunction with the system features represent a prudent investment for both customers and financiers.

Since the cases were designed to benefit the financiers, the value of the down payment was excluded from the expected monthly savings. Participants used this approach because all down payments were required in cash, and therefore were prerequisites for the loan and not part of the loans themselves. When the required minimum down payment for this system (EC$ 659) is incorporated in the analysis, the first year savings declines to EC$ 530.

Case Study 3: Solar Photovoltaic Installation

The Caribbean climate is generally conducive to significant power generation through solar photovoltaic (PV) panels. While substantially more expensive than solar hot water systems, solar systems have the potential to generate enough electricity to provide the average household in the region with most of the required electrical consumption.[103] Financiers considered a prototype system composed of five roof-top panels (5kW peak) and all requisite wiring and components based on the following characteristics:

Annual electricity yield	7,300 kWh per year
% Household Energy Produced	81%
% Electricity bill related to household hot water consumption	44%
Expected equipment life	2 years
Avg. monthly electric bill (EC$)	855
Avg. monthly consumption (kWh)	750
Base cost (EC$)	1.14

Equipment Price (EC$)	40,468
Installation (EC$)	2,680
VAT + duties + fees (EC$)	10,452
Total Installed Cost (EC$)	53,601

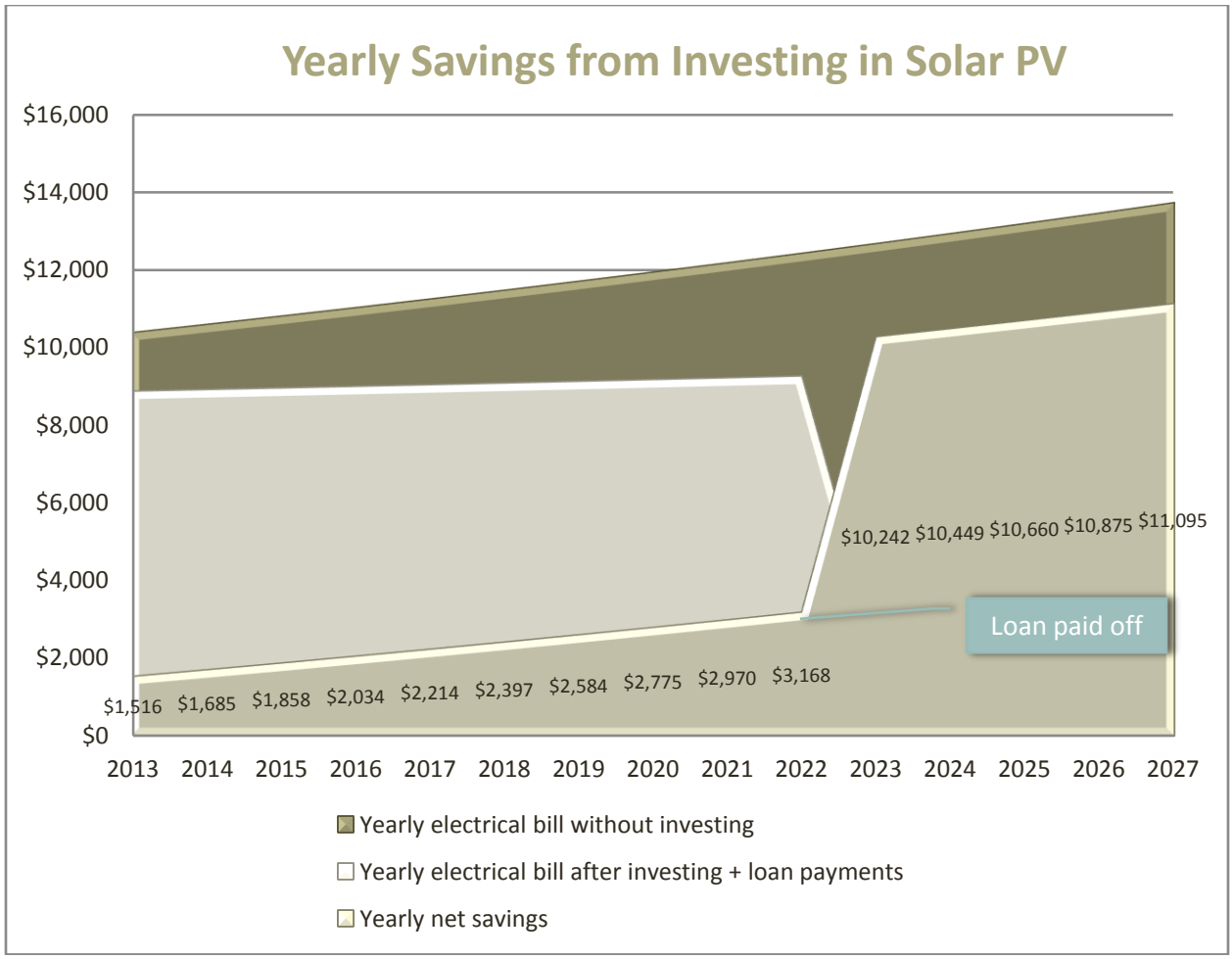
After reviewing asset features, the lenders determined lending parameters as follow:

Installed Cost (EC$)	53,601
Down Payment (%)	10%
Amount Financed (EC$)	48,241
Financing Term (Years)	10
Interest Rate	7.50%
Payment (monthly) (EC$)	572

To calculate potential savings and impact on household monthly debt capacity, lenders employed a government-supplied estimate of 2% annual increase in the cost of electric power. These data produced substantial estimated net savings to homeowners as illustrated in the figures below:

Year	Savings by Year	Cumulative
1	$1,516	$1,516
2	$1,685	$3,201
3	$1,858	$5,058
4	$2,034	$7,092
5	$2,214	$9,306
6	$2,397	$11,703
7	$2,584	$14,287
8	$2,775	$17,062
9	$2,970	$20,031
10	$3,168	$23,200

[103] This would require a regulatory framework to support feeding excess electricity into the grid and measures to balance the power load on the grid.



Lenders expressed some concern about the ability to repossess the system in the event of borrower default and adjusted loan parameters to reflect the increased risk, but also felt that the property value would be significantly increased by the solar installation. They indicated that they would encourage or require a long-term service agreement to protect both the consumer and the bank collateral.

Participants agreed that the substantial savings a homeowner could expect to realize over the life of the solar PV asset, along with any increased relative savings in the event of a greater surge in power prices and in conjunction with the system features represent a prudent investment for both customers and financiers.

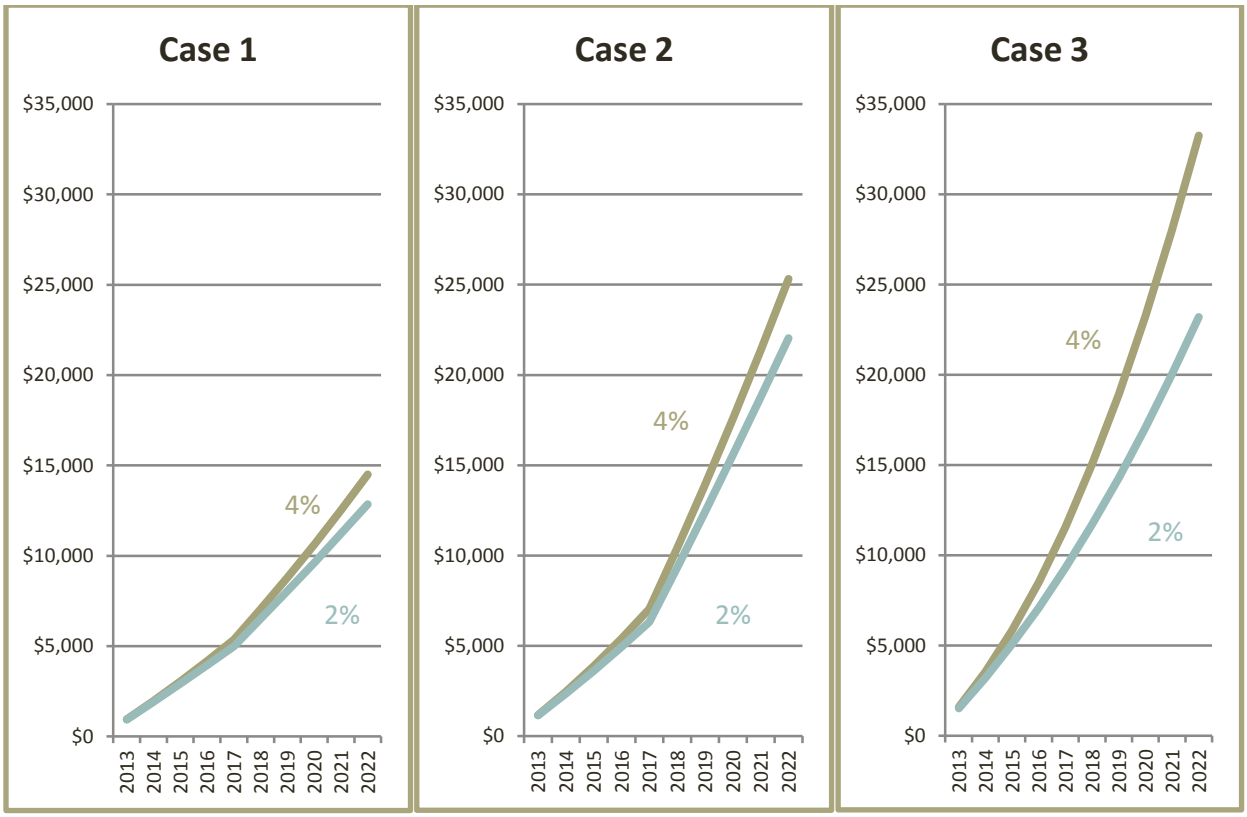
Since the cases were designed to benefit the financiers, the value of the down payment was excluded from the expected monthly savings. Participants used this approach because all down payments were required in cash, and therefore were prerequisites for the loan and not part of the loans themselves. When the down payment of EC$ 5,360 is incorporated in the analysis the breakeven point is extended to year 3.

Summary of the Three Cases

In each case, the participants agreed they would offer SET loans to customers or members of average creditworthiness under the terms set forth for each case. While a number of questions remain regarding the ability to actually repossess the equipment itself, the risks were incorporated in some combination of down payment, term and interest rate. Many of the participants found that the ability to calculate cashflow and break-even points for the SETs was helpful to them, as financiers, and would be important to inform and educate the borrowers.

While IFOK and MCG used a 2% annual increase in the cost of electricity across the three case studies, outcomes could be quite different in the event of a spike in costs or a sustained increase in prices. Figure 6 below shows the difference in expected savings when rates consistently increase 2% and 4% over the next ten years. As the rate of increase rises, cumulative savings increase and break-even periods decrease. This occurs because the household has "locked in" the ability to generate sustainable energy by installing the respective solar water or PV system. The magnitude of savings increases with the rise of electricity costs and the proportion of household consumption generated through SETs. It is also true, however, that lower or falling electricity prices would produce adverse outcomes for the households, although the magnitude is limited by the cost of the SETS.

Figure 6. Cumulative Savings over a Ten Year Period in the Three Case Studies



E. Saint Lucia Financiers' Workshop - Participant List

Name	Title	Institution
Antigua & Barbuda		
Jennifer Whyte	General Manager	St Johns Co-op Credit Union
Dominica		
Emaline Harris Collymore	Corporate Affairs Manager	Dominica Agricultural Industrial and Development Bank
Aylmer Irish	General Manager/CEO	National Co-op Credit Union
Kingsley Thomas	General Manager	Dominica Agricultural Industrial and Development Bank
Grenada		
Samuel Britton	General Manager	Teacher's Credit Union
St. Kitts & Nevis		
Jasmine Eddy	General Manager	Development Bank of Saint Kitts & Nevis
G. Sydney Newton	General Manager	Nevis Co-op Credit Union, Pres. of CU, Board member of utility
James Webbe	Manager	FND. Co-op Credit Union
Ralph Wharton	General Manager	Caribbean Confederation of Credit Unions
Saint Lucia		
Serge L' Africain	Senior Account Manager	Scotia Bank
Johanna Carstens	Technical Advisor	GIZ/CREDP
Herma Charles	Operations Supervisor	Mabouya Valley Co-operative Credit Union
Biens Charlemagne	Officer in Charge	Saint Lucia Co-operative League
Nakita Edwards	Development Co-operators Inc	Development Co-operators Inc
Brian John	General Manager	Teachers' Co-operative Credit Union
Ivo Joslyn	Senior Loans Officer	Government Employees Co-operative Credit Union
Peter Kublank	Consultant	CREDP-GIZ
Peter A. Murray	Programme Officer Social & Sustainable Development Division	OECS Secretariat PO Box 1383 Castries
Glenda Nathan	Loans Officer	Elks Co-operative Credit Union
Vanesta Nervais	Corporate Accounts Executive	Bank of Saint Lucia
Maxine Nestor	Programme Manager ECERA	OECS Secretariat
Other Countries		
Orlando Alleyne	Chairman, Credit Committee	UWI Co-op Credit Union Ltd
Christina Becker-Birck	Senior Consultant	IFOK / Meister Consultants Group
Yves Ferreira	Head of the Regional Representation in the Caribbean	European Investment Bank
Sean Flannery	COO and Director Sustainable Investment Strategies	IFOK / Meister Consultants Group
Edgar von Knebel	Consultant	CREDP-GIZ
Detlef Loy	GIZ Consultant	CREDP-GIZ

F. Jamaica Credit Union Breakfast Meeting - Participant List

Name	Title	Institution
Antigua & Barbuda		
Carol Spencer-Browne	President	St Johns Co-op Credit Union
Jennifer Whyte	General Manager	St Johns Co-op Credit Union
The Bahamas		
Philip Greenslade		Public Workers Cooperative
Sonia Hamilton	President	National Workers Co-Operative Credit Union Ltd.
Francina Horton		Public Worker Co-operative
Barbados		
Judith Baynes	General Manager	UWI (Cave Hill) Co-operative Credit Union Ltd
Anderson Henry		The Light & Power Employees Co-op Credit Union Ltd.
Lucas Hudson	Operations Manager	Barbados Teachers Credit Union
Andrew Lovell		Public Transport Coop
James Paul		City of Bridgetown Credit Union
Kelvin Whittaker	President, Board of Directors	The Light & Power Employees Co-op Credit Union Ltd.
Trevor Williams		The Light & Power Employees Co-op Credit Union Ltd.
Belize		
David Friessen		Blue Creek CU
Carlos Fuller	International & Regional Liaison Officer	Caribbean Community Climate Change Centre
Corine Robinson Fuller	Executive Director	Belize Credit Union League
Juana Terry		St Francis Xavier Credit Union
Curacao		
Ethlyn Hanley	President	Fehosleam Curacao League
Carlos de la Paz		UCU Curacao
Dominica		
Dexter Ducreay	President	National Co-op Credit Union
Cletus Joseph		National Co-op Credit Union
Grenada		
Samuel Britton	General Manager	Teacher's Credit Union
Lucia Livingston-Andall	General Manager	Grenada Public-Service Co-operative Credit Union Limited
Melissa Telesford		Communal Co-op Credit Union
Kathy Thompson		Communal Co-op Credit Union
Jamaica		
Glenworth Francis	General Manager	Jamaica Coop Credit Union League

Name	Title	Institution
Gerlyn Gray		JPST Partners Co-op Credit Union
Courtney Lodge	Chief Executive Officer	GSB/FHC Credit Union
Fitzgerald Rowe	Manager	St Elizabeth Coop Credit Union
Jennifer Taylor-Wilson		Hanover Co-operative Credit Union Limited
Leroy Williams		First Regional Co-operative Credit Union
Saint Kitts and Nevis		
Peter Etienne	Chief-Executive Officer	Caribbean Confederation of Credit Unions
Ralph Wharton	General Manager	Caribbean Confederation of Credit Unions
Saint Lucia		
Johanna Carstens	Technical Advisor	Caribbean Renewable Energy Programme (CREDP/GIZ)
Sylvester Dickson	President	Saint Lucia Civil Service Co-op Credit Union
Melvin Edwards	Managing Director	Development Co-Operators Inc
Alexander Joseph	Chief Executive Officer	Saint Lucia Co-operative League
Carolina Peña	Program Manager	Organization of American States
Linus Robinson	Director	Saint Lucia Co-operative League
Saint Vincent and the Grenadines		
Junior Bacchus	President	St Vincent and the Grenadines Co-op League Ltd
Alric Caesar		Marriaqua Co-op Credit Union
Michael John		St Vincent Co-op League
Trinidad and Tobago		
Kent Byer	Vice-President	TECU Credit Union Co-operative Society Limited
Gail Rajkumar		TATECO Credit Union
United States of America and Germany		
Christina Becker-Birck	Senior Consultant	IFOK - Meister Consultants Group
Sean Flannery	Director of Investable Sustainable Strategies	IFOK - Meister Consultants Group

G. List of Survey Participants and Interviewees

Name	Title	Institution
Antigua		
Jennifer Whyte	General Manager	St Johns Co-op Credit Union
The Bahamas		
Flossmae Curling		HDC Development Corp
Barbados		
Paul Mondesir	Project Officer (Infrastructure)	European Union
Belize		
Rafael Dominguez	General Manager	St. Francis Xavier Credit Union
Corine Robinson Fuller	Executive Director	Belize Credit Union League
Dominica		
Emaline Harris Collymore	Corporate Affairs Manager	Dominca Agricultural Industrial and Development Bank
Hervé Nizard	Managing Director	Sustainable Earth Inc
Kingsley Thomas	General Manager	Dominca Agricultural Industrial and Development Bank
Grenada		
Samuel Britton	General Manager	Teacher's Credit Union
Dirk Burkhardt	Managing Director	Grenada Solar Power Ltd.
Jamaica		
Damian Lyn	Director	Alternative Power Sources
Chinyere Nwaogwugwu	Project Director	Eco Tec
Suzanne Shaw	Project Coordinator	Mobilizing Renewable Energy in the Caribbean - EU Energy Facility II project
Luxembourg		
Monica Arevalo	Loans Officer	European Investment Bank
Peter Blackman	Portfolio Manager, Private Sector Development Division	Caribbean Development Bank
Saint Kitts and Nevis		
Lenworth Harris	General Manager	Development Bank of St. Kitts & Nevis
Ralph Wharton	General Manager	Caribbean Confederation of Credit Unions
Saint Lucia		
Serge L' Africain	Senior Account Manager	Scotia Bank
Esther Brown	General Manager	Eastern Caribbean Financial Holding Company
Joanna Charles	Assistant General Manager	Bank of St. Lucia

Name	Title	Institution
Leonard Deane	Consultant	OECS Secretariat
Beverly Henry	Senior Manager- Credit Risk Department	Eastern Caribbean Financial Holding Company
Anderson (Andy) Lake	Senior Manager- Corporate Banking	Bank of St. Lucia
Thomas Scheutzlich	Principal Advisor	Caribbean Renewable Energy Programme (CREDP/GIZ)
Saint Vincent and the Grenadines		
Herbert Samuel	President/Founder	Green Island, Inc. Welectricity
Derry Williams	Managing Director	Bank of St. Vincent & the Grenadines (ECFH)
Trinidad and Tobago		
Catherine Gourdin		International Finance Corporation
Ian Smart		Smart Energy Limited
Washington, DC		
Christiaan Gischler	Senior Energy Specialist	Inter-American Development Bank