Skills for Green Jobs in Barbados
Skills for Green Jobs in Barbados
# Table of Contents

Abbreviations and Acronyms .................................................................................................................. 4
Abstract ....................................................................................................................................................... 5

1. Introduction ........................................................................................................................................ 6
   1.1 Background ........................................................................................................................................ 6
   1.2 Methodology .................................................................................................................................... 8

2. Major changes in the economy and employment ............................................................................. 9

3. Key policies and regulations ............................................................................................................. 17

4. Skills development measures for the green economy ................................................................... 21
   4.1. Skills needs identification / anticipation ....................................................................................... 21
   4.2. Education and training ................................................................................................................... 21
   4.3. Active Labour Market Policies and retraining measures ............................................................... 24
   4.4. The role of the private sector in skills training .............................................................................. 24
   4.5. The role of institutional set-up ...................................................................................................... 25

5. Analysis of case studies ....................................................................................................................... 27

6. Conclusion and recommendations .................................................................................................. 30

Annex - UWI-ILO Skills for Green Jobs Government ............................................................................ 36

## List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>GDP and Employment Share by Industry</td>
<td>10</td>
</tr>
<tr>
<td>Table 2</td>
<td>List of Green Jobs and SITC Codes</td>
<td>12</td>
</tr>
<tr>
<td>Table 3</td>
<td>Renewable Energy Transition Targets</td>
<td>14</td>
</tr>
<tr>
<td>Table 4</td>
<td>Occupations and skill sets in demand (existing and future)</td>
<td>22</td>
</tr>
<tr>
<td>Table 5</td>
<td>Barbados Stakeholder List</td>
<td>37</td>
</tr>
</tbody>
</table>

## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Real GDP Growth</td>
<td>9</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Proportion Persons Working in Green Industries (2004 – 2014)</td>
<td>13</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Proportion Employed Individuals working in Green Industries (2004 – 2014)</td>
<td>13</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Proportion of Females Working in Green Industries (2010 – 2014)</td>
<td>15</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Education Level of Individuals in Green Industries (2004 – 2014)</td>
<td>15</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Proportion Head of Households in Green Industries (2004 – 2014)</td>
<td>16</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Fuel imports (% of merchandise imports)</td>
<td>16</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Schematic Diagram of Stakeholders and their relationships for Green Job Training in Barbados</td>
<td>26</td>
</tr>
</tbody>
</table>
### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALMP</td>
<td>Active labour Market Policies</td>
</tr>
<tr>
<td>BCCI</td>
<td>Barbados Chamber of Commerce and Industry</td>
</tr>
<tr>
<td>BHSD</td>
<td>Barbados Human Resource Development Strategy</td>
</tr>
<tr>
<td>BREA</td>
<td>Barbados Renewable Energy Association</td>
</tr>
<tr>
<td>BVTB</td>
<td>Barbados Vocational Training Board</td>
</tr>
<tr>
<td>CC</td>
<td>Climate Change</td>
</tr>
<tr>
<td>CVQ</td>
<td>Caribbean Vocational Qualification</td>
</tr>
<tr>
<td>CDB</td>
<td>Caribbean Development Bank</td>
</tr>
<tr>
<td>ECLAC</td>
<td>Economic Commission for Latin America and the Caribbean</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>GOB</td>
<td>Government of Barbados</td>
</tr>
<tr>
<td>METI</td>
<td>Ministry of Education, Science, Technology and Innovation</td>
</tr>
<tr>
<td>MLSD</td>
<td>Ministry of Labor, Social Security and Human Resource Development</td>
</tr>
<tr>
<td>NVQ</td>
<td>National Vocational Qualification</td>
</tr>
<tr>
<td>PAGE</td>
<td>Partnership for Action on Green Economy</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>RE</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>SIDS</td>
<td>Small Island Developing States</td>
</tr>
<tr>
<td>SJPP</td>
<td>Samuel Jackman Prescod Polytechnic</td>
</tr>
<tr>
<td>SWHT</td>
<td>Solar Water Heater Technician</td>
</tr>
<tr>
<td>TVET</td>
<td>Technical Vocational and Educational Training</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Programme</td>
</tr>
<tr>
<td>NIS</td>
<td>National Insurance Scheme</td>
</tr>
<tr>
<td>NEB</td>
<td>National Employment Bureau</td>
</tr>
</tbody>
</table>
Abstract

Small island developing states are likely to be significantly impacted by climate change. These effects will challenge the sustainability of households, firms, governments and the overall economy. One approach to adapting to climate change is through greening the economy. Such an approach would enhance the efficiency of resource use, enhance competitiveness and stimulate investment in existing and new industries. Such investment is likely to give rise to the emergence of so-called ‘green jobs’. These green jobs are likely to provide decent work opportunities and help address one of the key challenges that most small States face, namely unemployment. This report provides an initial assessment of the status of green jobs in the small island developing State of Barbados. The country is an ideal place to examine this issue, as policymakers have set the island the ambitious target of being the greenest economy in Latin America and the Caribbean. Using secondary data sources, stakeholder interviews and desk research, the study provides the first comprehensive attempt to map the status of green jobs in the island. Stakeholders identified individuals capable of undertaking solar PV design and installation, as well as energy auditors - among others - as being currently in demand, while knowledge of energy storage systems and smart grid modelling were highlighted as important skills for the future. It appears that green jobs will very likely increase their profile in the future on the island, and to support this growth policymakers will need to continue support for educational institutions, helping them to stay up-to-date and in touch with the demands of industry.

Acknowledgment

This study was conducted by the Centre for Resource Management and Environmental Studies & Department of Economics, University of the West Indies, Cave Hill Campus, Barbados, as a part of set of national studies on skills for green jobs conducted in some thirty countries globally. The set of studies is the result of collaboration between the ILO and the European Centre for the Development of Vocational Training (Cedefop). Overall methodological guidance was provided by Olga Strietska-Iilina (ILO Employment Policy Department, Skills and Employability Branch). Coordination of country studies and technical backstopping was provided by a team led by Catherine Saget (ILO Research Department), Tahmina Mahmud (ILO Skills and Employability Branch) and Takaaki Kizu (ILO Research Department). Moustapha Kamal Gueye and Marek Harsdorff (ILO Enterprises Department, Green Jobs Programme) contributed to the studies’ implementation on behalf of the ILO Green Jobs Programme. Alena Zukersteinova and Stelina Chatzichristou from Cedefop’s Department for Skills and Labour Market coordinated studies among the participating EU countries. Valuable inputs were provided by the ILO colleagues: Christine Hoffmann, Laura Brewer, Maria Ilca Lima Webster, Alvaro Ramirez Bogantes, Hassan Ndahi, Fernando Vargas Zuñiga, Patrick Daru, Akiko Sakamoto, Mikhail Pouchkin, Gabriel Bordado, Julien Magnat, Kanae Tada, Tendy Gunawan, Bolotbek Orokov, Gwyneth Anne Palmos, Georginia Pascual, Badiane Cheickh and Kishore Kumar Singh. Solveig Boyer (ILO Green Jobs Programme), Massimiliano Leone, Ana Buzdugan (International Training Centre ILO Turin) and Manuela Flamini (Edizioni Retrò s.r.l.) were responsible for editing and design.
1. Introduction

1.1 Background

Climate change (CC) projections of increased global temperatures due to global Greenhouse Gas Emissions (GHG) are expected to result in warmer and expanding ocean waters, melting glaciers and ice sheets, and a consequent sea level rise. Small island developing states (SIDS) such as those in the Caribbean will, due to CC, experience negative impacts such as salt water intrusions into freshwater aquifers, coastal erosion, and stronger, more frequent hurricanes which are already a major challenge to infrastructural development and environmental preservation and more notably, event-associated deaths (Bueno, Herzfeld, Stanton, & Ackerman, 2008). In addition to these climatic and environmental threats, inherent vulnerabilities such as small size, limited capacity (resources and human) and high national debts constrain Caribbean SIDS’ ability to adapt to global climate change (ECLAC, 2011; Briguglio, 1995). Despite the negative impacts associated with CC, changing climate presents an opportunity for all countries to work towards greening their economies in order to curb the quantities of GHG emitted into the atmosphere while also building more sustainable societies.

Internationally and regionally there are various definitions of the terms “green economy” and “green jobs”. UNEP (2001) defines a green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”. In so doing, new areas such as renewable energy and green technology and products provide the basis for meeting economic and social needs while curbing or eliminating the use of fossil fuels. Moreover, a sustainable perspective of a green economy is that of an economy that does not generate pollution or waste, and is hyper-efficient in its use of water, energy and materials (UNEP, 2008). In the Caribbean a green economy is understood to be many things. It would be impracticable to try to capture the vast range of green economy concepts into a single definition of Caribbean green economy, as they all consist of coherent, mutually-reinforcing concepts in an effort to build a more resilient, productive and environmentally sustainable future (CDB, 2014). As an alternative view, six key characteristics of a green economy in the Caribbean have been identified: (i) equity in the distribution of economic benefits and costs, (ii) productivity in the management of ecological resources, (iii) investment in resilience to climate change and other external shocks, (iv) pro-poor generation of decent jobs and working conditions for local people, (v) creation of a regional economy that is self-directed, self-reliant and resistant to foreign control, and (vi) specific rooting in the rich local culture of the Caribbean (Geoghegan, Leotaud, & Bass, 2014). To understand the complexities associated with the economic shift and structural transformation associated with green economies, a major component must be highlighted; green jobs. One definition of green jobs is any occupation in agriculture, manufacturing, construction, installation and maintenance, as well as scientific and technical, administrative and service-related activities, that contribute substantially to preserving or restoring environmental quality (UNEP, 2008). An updated description of green jobs is given by the International Labour Organization in which green jobs are those that reduce the environmental impact of enterprises and economic sectors to levels that are considered sustainable. Green jobs must satisfy the criteria of preserving or restoring the quality of the environment while meeting the requirements of decent work (adequate wages, safe conditions, workers’ rights and social dialogue and protection). Green jobs also include work associated with mitigation and adaptation to climate change.

Across the Caribbean region efforts have been made to initiate and enhance a transition
Skills for Green Jobs in Barbados

1. Introduction

towards green economies. In Jamaica the concept of green economy and green jobs is summed up in a central strategy:

“By basing new jobs and industries on sustainable use of natural resources and unique environmental assets (renewable energy sources, promoting organic agriculture, genetic potential of local endemic species) will help build a green economy” (UNEP, 2016).

St. Lucia, in framing its transition to a green economy, adopted the Caribbean Natural Resources Institute definition:

“A green economy in the Caribbean context aims for long term prosperity through equitable distribution of economic benefits and effective management of ecological resources; it is economically viable and resilient, self-directed, self-reliant, and pro poor” (UNEP, 2016).

Barbados has committed itself to a national vision of becoming “the most environmentally-advanced green country in Latin America and the Caribbean.” The Government of Barbados (COB) has described the concept of a green economy as “an integrated production, distribution, consumption and waste assimilation system that at its core reflects the fragility of our small island ecosystems” (UNEP, 2017). To this end the country has drafted policies that assist in the effort of becoming a fully-fledged green economy. Barbados already has some longstanding green economy industries such as production of solar panel water heaters. Also, research by Moore (2013), aimed at identifying the export opportunities for Barbados’ green goods and services, has contributed to a mapping of how the country achieves its green economy agenda. In 2012 a Green Economy Scoping Study (Moore W., et al., 2014) was undertaken, which has since been discussed and adopted by Parliament as a national reference document, confirming broad-based support. Moreover, the best practice framework for social dialogue, the Barbados Social Partnership, also has ‘greening’ as part of its Agenda. Through a coordinated effort by Ministers the country joined the Partnership for Action on Green Economy (PAGE) in 2016.

In the literature there are two main definitions guiding the discussion on green jobs. The first definition is static in nature, associated with clearly identifiable jobs such as solar panel installers and recyclers, whereas the second is a more dynamic definition in which it is argued that once there is a push to greening an economy, this will impose occupational requirements on most jobs that were not required prior to greening. The second definition therefore allows a job to be partially green (Georgetown University, 2015). Taking these definitions into consideration it is important to understand and achieve clarity on what a green economy means for an island such as Barbados. In so doing, one of the indicators of a green economy would be the number of existing and emerging green jobs. Therefore the ability to define and measure green jobs contributes to the country’s vision of being the leading green economy in Latin America and the Caribbean.

This study aims to create a baseline to support further policy dialogue with stakeholders on the green economy and, more specifically, green jobs and their related skills in relation to education and labour market adaptation, and concrete action to facilitate the economic and social transition for sustainability. The main objectives of the study are:

- identify the priorities and challenges of CC, and the sectors with greening potential;
- assess and analyse the current skills needs (gap) for green jobs and the incorporation of such skills into policies, programmes and the institutional framework at regional, national, sectoral and enterprise levels;
- analyse the coordination of initial and continuing training programmes with respect to systemic provision, delivery channels, ad hoc versus anticipated skills responses, and skills response by different actors and providers;
- conclude and propose policy actions and recommendations on skills policies and strategies, skills at all levels and further research needs to meet the demand for greening the economy of Barbados.
1.2 Methodology

Since the terms “green economy” and “green jobs” are relatively new despite their popularity, there is still some ambiguity in their meaning. In order to meet the aforementioned objectives, qualitative research was undertaken. At the core of the study is a search for understanding the meaning of green jobs and their associated skills and competences and how various identified stakeholders view the concept of a green job. To do this it is necessary to engage in methods that seek to uncover trends, thoughts and opinions within a culture-specific context (Mack, Woodsong, MacQueen, Guest, & Namey, 2005). Therefore the following methods were undertaken:

1. Literature Review
2. Semi-structured Interviews
3. Case Studies

Literature Review

To establish a preliminary framework for the green economy and skills for green jobs in Barbados, a literature review was conducted. Data and information was collected and analysed regarding greening policies and strategies at both international and regional scales. In addition, reports and other documentation relating to current and potential greening sectors, labour programmes, and institutional capacity at national, sectoral, local and enterprise levels in Barbados were analyzed. This background information formed the basis for the questions developed for the semi-structured interviews and, in some instances, for validation of primary information.

Semi-Structured Interviews

To obtain primary data, particularly trends, views, facts and description of processes of skills for green jobs within the Barbadian context, key stakeholders in the public and private sectors and in civil society were identified and semi-structured interviews were conducted. Semi-structured interviews were chosen as it was acknowledged there may be key information unknown to the research team that may need further investigation once the information is disclosed (RAND Corporation, 2009). Questionnaires were specifically tailored to each stakeholder to enhance the quality and relevance of the information gathered to meet the objectives of the study. The initial list of stakeholders was expanded via “snowball sampling” to determine the key players in the network of training provision for green skills and competences. Each interview was on average an hour in length and, while discussions were allowed to flow freely, the questionnaire was the key instrument guiding the dialogue (See Annex).

Case Studies

To buttress the information collected from the semi-structured interviews, in-depth case studies were compiled to identify (i) (re)training needs deriving from structural changes in the labour market and major employment shifts within and across sectors due to climate change and demands for greening the economy; (ii) new green occupations which emerge in the context of adaptation to climate change and mitigation of negative impacts in Barbados; and (iii) new types of skills, competences and skills gaps which need to be incorporated into existing occupational profiles (greening of existing occupations). Case studies were identified based on the stakeholder groupings; private sector companies, public sector programmes and educational and training institutions.
Barbados has a relatively high level of economic development. In 2016 the total nominal value of goods and services produced was $4.8 billion (at current international $ rates), while GDP per capita (on a purchasing power parity basis, PPP) was $16,096. Indeed, GDP per capita in Barbados was almost 46% higher than the average for a group of comparator countries. Within the Caribbean, only the Bahamas ($23,124) and St. Kitts and Nevis ($16,725) had a higher level of per capita GDP.

After seven consecutive years of positive growth, economic activity declined by 4% in 2009 as a result of the widespread recession. Economic activity has been modest only, growth in most years being less than 1% per annum or virtually zero. In fact real GDP growth between 2010 and 2015 was just 0.4% per annum, significantly lower than the average rate of growth (2.3%) experienced between 2002 and 2008. The anaemic rate of GDP growth between 2010 and 2015 can be attributed to a 6.6% average annual decline in construction over the period, as well as declines in the hotel and restaurant trade, transport, storage and communications, finance and business services, and manufacturing which together more than offset a pickup in personal and other services as well as in public administration of government services.

Like most small open economies Barbados is characterized by a narrow domestic production base, that is to say production is concentrated on a few goods and services. Since the 1950s Barbados has largely been a service-driven economy. Within the last 25 years this dependence has deepened even further. The services industry is largely driven by tourism,

---

1 Comparator countries include the 15 beneficiary countries of Compete Caribbean – Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominican Republic, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Lucia, St. Kitts and Nevis, St Vincent and the Grenadines, Suriname and Trinidad and Tobago – and Palau, Mauritius, Seychelles and Malta as comparator countries. The latter four were chosen because their GDP per capita (current PPP US$) and population size do not differ from those of Barbados by more than 25%.
2. Major Changes in the Economy and Employment

Skills for Green Jobs in Barbados

The single largest industry is finance and business services, which account for almost one-third of total value added (Table 1) or US$1.3 billion. In addition to finance and business services, which support the local tourism industry, makes a direct contribution to GDP of 13% or US$518 billion and an indirect contribution of 40% to the overall economy. Such a large indirect contribution obviously means that the industry has significant spillover effects on virtually all the major industries in the economy. In addition, any threat to the tourism industry has the potential to impact on the entire economy. Cashman, Cumberbatch and Moore (2001) report that as tourists become more cautious of their carbon footprint, the demand for travel from major metropoles in the west could decline, while on the supply side the damage caused to the hotel infrastructure by sea level rise could increase operating costs.

The shares of employment in the various industries largely match those reported for GDP. Hotels and restaurants again emerge as one of the single largest industries in terms of employment generation. In addition to this category, wholesale and retail activities, as well as personal and other services, also emerge as major areas of employment.

These major service industries have significant potential for greening and supporting greening activities in other industries. Moore et al. (2012) noted that there exists tremendous potential for greening the tourism industry. Efforts at greening could reduce the industry’s dependence on imported inputs, fossil fuels, and the external environment. Addressing these issues could help the industry adapt to the likely effects of climate change and can be supported through such tools as certification schemes, triple bottom-line reporting, indicators of sustainable tourism and utilization of environmental codes of conduct.

While not as large as tourism in terms of their contribution to GDP, there also exists other potential opportunities for greening including transport, construction and agriculture (Moore et al., 2012). Options for greening transport include greater utilization of public transport systems, standards for fuel mixes, and more fuel-efficient vehicles. It is therefore likely that green jobs

---

**Table 1: GDP and Employment Share by Industry**

<table>
<thead>
<tr>
<th>Industry</th>
<th>2015 GDP (US MILLION)</th>
<th>2015 GDP (% SHARE)</th>
<th>EMPLOYMENT 2015 (THOUSANDS)</th>
<th>EMPLOYMENT 2015 (% SHARE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>62.8</td>
<td>1.581</td>
<td>3.7</td>
<td>2.887</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>158.75</td>
<td>3.998</td>
<td>9.8</td>
<td>7.645</td>
</tr>
<tr>
<td>Electricity, Gas &amp; Water</td>
<td>105.8</td>
<td>2.664</td>
<td>2.9</td>
<td>2.262</td>
</tr>
<tr>
<td>Construction, Mining and Quarrying</td>
<td>137.2</td>
<td>3.455</td>
<td>12.1</td>
<td>9.440</td>
</tr>
<tr>
<td>Wholesale &amp; Retail Trade</td>
<td>388.85</td>
<td>9.792</td>
<td>20.2</td>
<td>15.759</td>
</tr>
<tr>
<td>Hotels &amp; Restaurants</td>
<td>518.5</td>
<td>13.057</td>
<td>15.8</td>
<td>12.326</td>
</tr>
<tr>
<td>Transport, Storage &amp; Communications</td>
<td>460.4</td>
<td>11.594</td>
<td>6.3</td>
<td>4.915</td>
</tr>
<tr>
<td>Finance &amp; Business Services</td>
<td>1,260.35</td>
<td>31.738</td>
<td>5.5</td>
<td>4.291</td>
</tr>
<tr>
<td>Personal &amp; Other Services (Incl. Private Education &amp; Health)</td>
<td>347.15</td>
<td>8.742</td>
<td>42.3</td>
<td>32.985</td>
</tr>
<tr>
<td>Government Services</td>
<td>432.35</td>
<td>10.887</td>
<td>9.6</td>
<td>7.489</td>
</tr>
<tr>
<td>Gross Domestic Product at Factor Cost</td>
<td>3,971.1</td>
<td>100.000</td>
<td>128.2</td>
<td>100.000</td>
</tr>
</tbody>
</table>

![image of Table 1](https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/barbados2017.pdf)
could emerge around the maintenance of fuel-efficient vehicles, as well as the management of an integrated public transportation system. Construction, a major source of employment, also has opportunities for generating jobs in relation to the construction of green buildings and the retrofitting of existing buildings. In relation to agriculture, the revitalization of the sugarcane industry by pairing it with energy generation, and greater production of local fertilizers, soil conditions and animals, all seem to offer significant potential.

In addition to greening of particular industries, the finance industry, one of the largest industries on the island, has the potential to play a supporting role in relation to hastening the transition to a green economy. This can take the form of providing green finance for fuel-efficient or electric vehicles, loans for alternative energy projects, eco-savings deposits and other initiatives. These new financial products can not only generate jobs within the finance company offering such new loan products, but also as a result of the new or existing companies that would experience additional business as a result of the new initiatives.

Using data from the quarterly labour force survey, this section of the study attempts to identify key trends in green jobs in recent years. Following Stoevska and Hunter (2012), green jobs were defined as jobs in environmental areas that result in the output of environmental goods and services or activities that help establishments reduce or eliminate their impact on the environment. Using this definition, the authors identified persons working in the following areas as possessing green jobs in some cases (Table 2).

The data used in this study are the quarterly labour force surveys conducted by the Barbados Statistical Service between 2004 and 2014 to estimate various labour market indicators such as unemployment, employment in various industries, and the average hours worked in those industries. The data is then annualized for each survey year and merged in STATA using the “append” command, thereby creating a database of 161,152 observations.

Using the definitions of green industries highlighted earlier it is estimated that, on average, between 2004 and 2015 15% of the employed labour force can be classified as holding some type of job working in one of the areas identified in the previous paragraph (Figure 2). These jobs can vary from skilled to unskilled and from the production line to the back-office. Prior to the downturn in economic activity, the proportion of jobs attributed to the green industries highlighted was even larger in 2005, as an estimated 21% of the employed labour force held a job in a green industry. By 2010 this ratio had shrunk to just 9.7% and remained around this level for the remainder of the period under consideration.

Of those individuals working in green industries, the top seven green areas were libraries and cultural activities (6.5%), services to buildings and landscape activities (1.9%), human health services (0.8%), scientific research and development (0.8%), forestry and logging (0.8%), business support activities (0.7%), and crop and animal production (0.6%).

Prior to the beginning of the 2008 economic recession, there was a roughly 50-50 split in relation to gender in employment in green industries in Barbados. In 2008 almost 56% of the green jobs on the island were held by women. By 2011 this ratio had fallen to 42%, but had recovered somewhat to 44% by 2014 (Figure 4). Most of the job losses that occurred in the post-2008 period were in relation to back-office operations as well as health services.

One of the reasons for the declining employment in green industries during the recession is that many of these employees and business owners only have primary or secondary education (Figure 5). During the period under review more than half (57%) of employees and self-employed in green industries indicated that their highest level of education was at either primary or secondary level. This finding was confirmed during the stakeholder interviews conducted during the process of putting together this report. The manager of one manufacturing firm of green products indicated that most of the workers on the production line were normally educated up to secondary school level. Any other training required was provided by the company. These production line workers also constituted the bulk of employees in the company.
### Table 2: List of Green Jobs and SITC Codes

<table>
<thead>
<tr>
<th>SITC CODES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crop and animal production, hunting and related service ac</td>
</tr>
<tr>
<td>2</td>
<td>Forestry and logging</td>
</tr>
<tr>
<td>3</td>
<td>Fishing and aquaculture</td>
</tr>
<tr>
<td>36</td>
<td>Water collection, treatment and supply</td>
</tr>
<tr>
<td>37</td>
<td>Sewage</td>
</tr>
<tr>
<td>38</td>
<td>Waste collection, treatment and disposal activities</td>
</tr>
<tr>
<td>39</td>
<td>Remediation activities and other waste management services</td>
</tr>
<tr>
<td>42</td>
<td>Civil engineering</td>
</tr>
<tr>
<td>50</td>
<td>Water transport</td>
</tr>
<tr>
<td>52</td>
<td>Warehousing and support activities for transport</td>
</tr>
<tr>
<td>53</td>
<td>Postal and courier activities</td>
</tr>
<tr>
<td>70</td>
<td>Activities of head offices; management consultancy activity</td>
</tr>
<tr>
<td>71</td>
<td>Architectural and engineering activities</td>
</tr>
<tr>
<td>72</td>
<td>Scientific research and development</td>
</tr>
<tr>
<td>74</td>
<td>Other profession, scientific and technical activities</td>
</tr>
<tr>
<td>75</td>
<td>Veterinary activities</td>
</tr>
<tr>
<td>81</td>
<td>Services to buildings and landscape activities</td>
</tr>
<tr>
<td>82</td>
<td>Office administrative, office support and business support</td>
</tr>
<tr>
<td>86</td>
<td>Human health activities</td>
</tr>
<tr>
<td>90</td>
<td>Creative, arts and entertainment activities</td>
</tr>
<tr>
<td>91</td>
<td>Libraries, archives, museums and other cultural activities</td>
</tr>
<tr>
<td>93</td>
<td>Sports activities and amusement and recreation activities</td>
</tr>
<tr>
<td>95</td>
<td>Repair of computers and personal and other household goods</td>
</tr>
</tbody>
</table>
**Skills for Green Jobs in Barbados**

### Figure 2: Proportion Persons Working in Green Industries (2004 – 2014)

- **Green industries**: 15%
- **Other industries**: 85%

*Source: Barbados Statistical Service*

### Figure 3: Proportion Employed Individuals working in Green Industries (2004 – 2014)

*Source: Barbados Statistical Service*
In addition to the educational characteristics of individuals, two interviewees also noted that most of the workers in the plant were women and heads of their households. This is an observation that is also supported by the national statistics for the island. Based on data from the national labour force survey, approximately 48% of individuals in green industries were classified as the heads of their households (Figure 6). Given the ambitions of the island to enhance its green credentials, this could provide a degree of household income stability, as new jobs would be emerging in the industry and providing income-earning opportunities for these individuals. However, this also suggests that a downturn in domestic green industries could have a significant and negative impact on households and household poverty on the island.

The Barbados energy sector is also a vital factor in greening the economy. In 2013 the country imported BDS$376 million for the generation of electricity, and fuel costs per kilowatt-hour (kWh) made up almost 75% of total power generation costs in the same year (Hohmeyer, 2015), representing around 7% of the country’s GDP. Fossil fuels largely dominate the island’s energy mix. Heavy fuel oil, largely used for electricity power generation, accounted for 37% of total energy used. The other major categories included diesel (18%), gasoline (17%) and kerosene (7%). Most of the other categories accounted for less than 10% of total energy use. Since 2012 fuel imports as a percentage of total imports have been steadily decreasing to 15% in 2016, representing a reduction of approximately half of fuel imports in 2012 (Figure 7). This reduction may be due to the decrease in world oil prices, reflecting the high vulnerability of the island to external shocks from international oil prices.

To reduce the high vulnerability and dependence of the country on fossil fuel, the country in its draft National Energy Policy 2017-2037 has indicated the following targets (Table 3).

The transition to 75% RE by 2037 indicates a movement towards new and redefined occupations within the energy sector. This is acknowledged in the policy underpinning the objective, that is increasing the number of persons locally with qualifications and skills relating to energy production and management of renewable sources (Ince, 2017).

<table>
<thead>
<tr>
<th>FOSSIL FUEL REDUCTION</th>
<th>RE PRODUCTION FOR ELECTRICITY GENERATION</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>34%</td>
<td>2022</td>
</tr>
<tr>
<td>38%</td>
<td>50%</td>
<td>2027</td>
</tr>
<tr>
<td>56%</td>
<td>56%</td>
<td>2032</td>
</tr>
<tr>
<td>75%</td>
<td>75%</td>
<td>2037</td>
</tr>
</tbody>
</table>

Source: (Ince, 2017)
2. MAJOR CHANGES IN THE ECONOMY AND EMPLOYMENT

**Skills for Green Jobs in Barbados**

**Figure 4:** Proportion of Females Working in Green Industries (2010 – 2014)

![Bar Graph showing the proportion of females working in green industries from 2010 to 2014.](image)

*Source: Barbados Statistical Service*

**Figure 5:** Education Level of Individuals in Green Industries (2004 – 2014)

![Pie Chart showing the education levels of individuals in green industries.](image)

*Source: Barbados Statistical Service*
Figure 6: Proportion Head of Households in Green Industries (2004 – 2014)

Source: Barbados Statistical Service

Figure 7: Fuel imports (% of merchandise imports)

Source: World Bank Databank
3. Key policies and regulations

There are no specific policies aimed at creation of green jobs in Barbados. This section will therefore provide a general overview of labour market regulations on the island, key fiscal incentives for greening, and other policies related to green occupations and skills development.

Labour market regulations in Barbados cover a myriad of areas. There exist regulations on the following: freedom of association, collective bargaining and industrial relations; elimination of child labour, protection of children and young persons; equality of opportunity and treatment; labour administration; employment policy, promotion of employment and employment services; education, vocational guidance and training; employment security and termination of employment; cooperatives; conditions of employment; conditions of work; occupational safety and health; social security; migrant protection; migrant workers; specific categories or workers; and international agreements.

Actual implementation of these regulations, however, is a “mixture of legislation, common law doctrines, custom and policy”. There are two main pieces of legislation governing terms and conditions of employment in Barbados. The Employment (Miscellaneous Provisions) Act attempts to avoid exploitation of particularly vulnerable groups. The Act prohibits the employment of children (persons under the age of 16), and the employment of persons during the night (between 9 pm and 7am), unless the enterprise satisfies the authorities that adequate arrangements have been made for the transportation of employees to and from their place of work. There is also an Employment Rights Act that covers employee rights in six key areas:

1. the right to a written statement of the details of employment;
2. the right to a written statement of remuneration paid;
3. the right to be consulted before changes to the regular hours of work are made;
4. the right to priority rehiring of workers previously made redundant;
5. the right to a certificate of employment details when made redundant; and
6. the right not to be unfairly dismissed.

In addition to the rights laid out above, the Act also established an Employment Rights Tribunal as a form of arbitrator of any disputes relating to these rights.

Industrial relations in the country have also been regularized through the Social Partnership and the articulation of a social compact, namely the Social Protocols. These protocols outline the norms expected from all three groups (government, unions, and the private sector) in relation to employment and industrial relations. The Protocol also contains specific commitments from all three groups in relation to best practice in industrial relations.

Freedom of association and collective bargaining is regularized through the Trade Unions Act. This legislation provides for registration of trade unions and rules for peaceful picketing. Through the Holidays with Pay Act workers are also provided with at 3 weeks of paid holiday if they have been employed for less than 5 years and at least 4 weeks if the period of employment exceeds 5 years. When an employee is made redundant the Severance Payments Act covers payments from the employer to the employee. Once an employee who has been employed by the company continuously for 104 weeks, working at least 21 hours per week, is made redundant, the Act requires 2.5 weeks’ basic pay for between 1 and 10 years, 3 weeks’ basic pay for service of between 10 and 20 years’ duration and 3.5 weeks’ basic pay for any period of employment exceeding 20 years.

Most of the green tax incentives available through the Customs and Excise Department take the form of duty-free imports or reduced import duties on selected items. In relation to home energy efficiency, materials which keep houses cooler, such as thermal barriers, roof insulation, window tints and ceramic roofing coatings by treating them as “energy efficient
systems/components”, are subject to an import duty of 5% rather than the present 20%. In relation to energy-saving fluorescent light bulbs, the rate of import duty was reduced from 20% to 5%.

Materials or equipment to be used exclusively for the purpose of generating renewable energy and conservation are exempt from import duty of 20% (e.g. wind turbine systems; solar photovoltaic systems; any apparatus or machinery designed to produce motive power, heat, light or electricity through the utilization of renewable sources of energy). Similarly, electric and other hybrid vehicles also benefit from a lower rate of import duty. For example, for hybrid vehicles powered by either electricity or gasoline or by electricity and diesel where the engine capacity does not exceed 1,600cc, the rate of duty is 20% instead of the otherwise lowest rate of 46.95%.

The income tax incentives generally (1) allow individuals or businesses to access income tax rebates to fully or partially recover the cost of investing in energy-efficient and renewable energy items; (2) allow businesses to enjoy tax holidays when installing renewable energy systems; (3) allow businesses to pay lower taxes through tax deductions. For example, an individual can deduct from assessable income 150% of actual expenditure not exceeding $10,000, and a person carrying on a registered business can deduct 150% of actual expenditure not exceeding $25,000 for each year over a five-year period in respect of the conduct of the following: energy audits; and 50% of the cost of retrofitting premises or installing systems to produce electricity from sources other than fossil fuels. Similarly, businesses that have incurred expenditure on an energy audit and the retrofitting of a building, or the installation of a system to provide electricity from sources other than fossil fuels, can claim an initial allowance of 20% of this capital expenditure. In addition, an annual allowance of 150% of the amount expended can also be deducted over a period of five years on such depreciable property as is in use in the business at the end of the year.

**Value Added Tax (VAT) Incentives**

Building materials and supplies for construction of a facility dedicated to the generation and sale of electricity from a renewable source are duty-free and VAT-free. Zero-rate VAT is applied to all RE and EE systems and products produced in Barbados. The administrations responsible for the execution of VAT and import duties are the Customs Department and the Barbados Revenue Authority. Persons eligible for the ten-year tax holiday are developers, manufacturers and installers of renewable energy systems and products5 (Income Tax (Amendment) Act, 2013, Section 37 I. (1) and (2)). Eligible businesses can deduct up to 150% of the amount of interest paid on a loan in respect of:

a. construction of a new facility to sell off electricity from a renewable source;

b. construction of a new facility for the installation or supply of renewable energy and energy-efficient products;

c. upgrading of an existing property so as to generate and sell off electricity from a renewable source. (Income Tax (Amendment) Act, 2013, Section 37 J (1) (a) and (b)).

Individuals can claim the funds spent on RE and EE training provided by Educational and Vocational Institutions that are approved by the Barbados Accreditation Council when computing their taxable income. Parents of minors and adult students (up to the age of 25 years), can deduct the funds spent on RE or EE training provided by Educational and Vocational Institutions that are approved by the Barbados

---

5 “Developer” means a person who has performed applied research to acquire new knowledge directed towards a specific practical aim or objective and has done experimental development by way of systematic work directed at producing new material, products, devices and improving those that have already been produced. (Income Tax (Amendment) Act, 2013, Section 37 I. (3))

6 “Eligible business” means a business engaged in the installation, manufacturing or supply of renewable energy and energy efficient products and the generation and selling of electricity from a renewable source. (Income Tax (Amendment) Act, 2013, Section 37 J, Subsections (4) and (5)

---

4 “Energy audit” means “an evaluation by an authorized energy auditor of the energy consumption in a residential or non-residential property to determine the way in which energy can be conserved.”

---

3. Key Policies and Regulations
Accreditation Council. The student must not be employed and must be studying in the area of RE and EE (Income Tax (Amendment) Act, 2013, Section 4(2) (a) and (b)).

A person carrying on an eligible business is allowed to deduct against assessable income, with effect from Income Year 2012, 150% of the amount actually expended on (a) the marketing of products for the generation and sale of electricity from a renewable energy source, or (b) the marketing of products related to the installation and servicing of renewable energy electricity generation systems or energy-efficient products. A person operating an eligible business is allowed to deduct against assessable income, with effect from Income Year 2012, 150% of the amount expended in respect of product development and the conduct of research related directly to (a) the generation and sale of electricity from a renewable source; or (b) the installation and servicing of renewable energy electricity systems or energy-efficient products (Income Tax (Amendment) Act, 2013, Section 37M. (1)(a)(B)). Where venture capital funds are invested in eligible businesses the funds are exempt from the payment of corporation tax with effect from Income Year 2012 for a period of ten years. Contributions made by persons to venture capital funds are allowed as deductions in calculating assessable income with effect from Income Year 2012, where the investments are made in the renewable energy and energy-efficient sectors for a period of ten years. Dividends received by shareholders investing in entrepreneurial businesses described as eligible businesses are exempt from withholding tax with effect from Income Year 2012 for a period of ten years (Income Tax (Amendment) Act, 2013, Section 37(O)). Income earned from the sale of electricity produced from the utilization of renewable energy equipment by an individual who owns and wholly occupies residential property is not included in calculating assessable income (Income Tax (Amendment) Act, 2013, Section 3 (aa)).

Other policies that directly or indirectly address skills development for green jobs are analysed next.

Barbados National Energy Policy 2017-2037 (Final Draft)

Under the Barbados National Energy Policy draft provisions have been made for human resource capacity and development. Overall Objective 11 of the new policy states “Increasing the number of persons locally with qualifications and skills relating to energy production and management of renewable sources”.

The policy outlines the development of skills and knowledge in the energy sector that will result in a sector that:

- has a skilled workforce able to fulfil the requirements of the new renewable energy sectors;
- has standards of qualification for all aspects of the energy sector, especially in renewable energy;
- maximizes information-sharing between educational institutions and the energy sector in establishing degree programmes, vocational programmes and school curricula;
- incorporates new skills relevant to emerging conventional and renewable energy sectors in syllabuses in tertiary institutions such as Barbados Community College (BCC), Samuel Jackman Prescod Polytechnic (SJPP), University of West Indies (UWI), and others;
- has an increased number of scholarships available for persons interested in studying new areas related to energy and aspects of sustainability in the oil and gas sector;
- has an increased number of qualified persons for conducting energy audits;
- emphasizes the concept of ‘innovation’ throughout curricula related to energy at various levels of education.

The new energy policy from the above objectives will clearly target the development of green skills in the energy sector of Barbados.

---

7 “Venture Capital Funds” means a fund from which equity financing is provided to business ventures specified by the Minister and on such conditions as the Minister approves, and “venture capital” shall be construed accordingly. (Income Tax (Amendment) Act, 2013, Section 37 N. (1), (2) and (3)).

In the BHDS the National Qualification Framework provides the foundation for the integration of green skills for jobs in the training system of Barbados. The integration of skills for green jobs would aid in updating and improving the standards of many jobs as the global job market progresses to more sustainable practices. Implications for the integration of skills for green jobs have been noted indirectly throughout the document, in which there is consideration of general openness towards integrating current and developing training programmes for RE. Therefore, this is an indication of the need for ‘requisite’ skills across the island to be as dynamic and advanced when compared to those in the global market (Ministry of Education and Human Resource Development & Ministry of Labour, 2010).

The Barbados Educational Policy - National Education for All 2015

This policy mainly addresses a broad spectrum of topics concerned with current issues, goals achieved and gaps in the educational system up to 2014. The realization that there is a need for diversity and enhancement of skills paves the way for green skills to be included in a new or revised educational policy. The need for green skills could be highlighted in future policy since it has not been emphasized as important in the advancement of the labour force. The Barbados labour force needs to progress as new technology is created and skill sets will also need to advance accordingly. There is also some limitation on how much information is provided on technical and vocational training in the policy, where there is more gender analysis and information on overall ‘life skills’ requirements as a main emphasis of the discussion. The policy provides a futuristic outlook of education, with sustainability, education quality, good governance and accountability being recognized as key factors at work. These are basic requirements for green skills and, by extension, green jobs will be appropriately assimilated into the labour force. The movement towards sustainable development is considered a vital component of the policy but lacks a direct narrative relating to inclusion of green skills in the education system (Ministry of Education, Science, Technology and Innovation, 2014).

CARICOM Regional TVET Strategy

In this policy document, the CARICOM Training System displays the system model (compiled by CARICOM’s Regional Human Resources Development Plan) which shows the progression of the bidirectional relationship between those receiving training and those creating and reinventing programmes. From the model it can be suggested that, at the level of Assessment Services, integration of green skills can be applied, especially as regards the upgrading and retraining aspects. These would first have to be taken to the oversight bodies at national level and up to regional level, through and involving the ministries of the SIDS. National Training Authorities (NTAs), being formed from a “broad representation” of TVET organizational bodies, are in charge of developing and incorporating new techniques into the programmes provided in TVET from the top down. Green skills, both existing and emerging, will have to be recognized at this level in order to ensure the development of the necessary programmes in RE areas.

In order to be implemented, approval for green skills will need to entail coordination, assessment of need, quality assurance, accreditation and monitoring, promotion of workplace development, and certification. This is in conjunction with appropriate training and certification of trainers, and meetings with stakeholders which will provide insight into the labour market information that will be required to adequately assess what will be economically viable for the Barbadian labour market.
4. Skills development measures for the green economy

4.1. Skills needs identification / anticipation

The Ministry of Labour, Social Security and Human Resource Development (MLSD) is the main body responsible for skills identification and anticipation studies in Barbados. The MLSD uses employer surveys which are distributed through sectoral associations such as the Barbados International Business Association. National employer surveys have been undertaken arbitrarily owing to limited resources in 2007, 2010 and 2012. The MLSD is currently undertaking an employer survey which targets four sectors: International Business and Finance, Manufacturing, Cultural and Creative Industries, and Tourism. The survey does not target sectors, for example renewable energy or construction, that would have a high probability of requiring persons with green skills, as the survey is designed to target sectors that contribute significantly to the country’s Gross Domestic Product. Green sectors could be categorized as new and emerging and therefore would not be assessed by the national employer survey. The current employer survey comprises the following: Initial Screening Questions, Profile Information, Employment Practices, Skills Gaps and Demands, Recent School Leavers and Graduates, Future Workforce Needs and Planning, and Investment in Employee Learning and Development. Future employer surveys could include green and or potentially green sectors to assess and anticipate skills needs in those sectors, and other methods could also be employed such as macro-level forecasts and sectoral studies to enhance the reliability and robustness of the results (OECD, 2016).

In addition to the current employer survey a labour market and information study was recently carried out for the renewable energy sector. The following occupations and skills sets were identified by collating information from the Labour Market and Information study carried out in 2014 (Sault College and Samuel Jackman Prescod Polytechnic, 2014) and from stakeholder interviews conducted during this study.

The Barbados Standard Occupational Standard (BARSOC), based on the International Standard Classification of Occupations (ISCO), was established in 2016 and 204 occupations in existing or potential green sectors can be categorized as having tasks which:

- enhance green skills - tasks that are added to existing skills
- increase green demand - increased demand for the occupation
- are new and emerging green tasks - new occupations with new tasks

The BARSOC could be used as a tool in skills assessment and anticipation studies, but limited human capacity constrains the analytical potential of the BARSOC.

4.2. Education and training

The main new occupations emerging from Barbados moving towards a green and sustainable economy are occupations within the renewable energy sector. In response to the demand from employers for renewable energy technicians and system installers, TVET institutions across the island have developed RE programmes within their course offerings.

The main vocational and training institutions on the island are; the Samuel Jackman Prescod Polytechnic (SJPP), the Barbados Vocational Training Board (BVTB), and the Barbados Community College (BCC). At present the incorporation of green skills, as understood by the main TVET institutions, into programme
The Barbados TVET Council and the BVTB do not have a direct mandate for the inclusion of green skills for new and existing occupations within their programmes and curricula. This may be due to a number of challenges such as lack of resources (human, financial and infrastructural) and the absence of policy directly mandated to include green skills in curriculum development.

The SJPP has incorporated three-month-long programmes that incorporate green skills, which include:

1. Solar Panel Installation
2. Photovoltaic (PV) Electrical Installation
3. Energy Advisory Services
4. Wind Energy

Students within the Electrical Engineering programme are encouraged to join the PV electrical installation programme in order to broaden their skills set, and all the above

Table 4: Occupations and skill sets in demand (existing and future)

<table>
<thead>
<tr>
<th>OCCUPATIONS &amp; SKILL SETS IN DEMAND</th>
<th>FUTURE/EMERGING OCCUPATIONS AND SKILL SETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricians (certified), with alternate and direct current knowledge</td>
<td>Non-roof installers (ground/pole/ballast)</td>
</tr>
<tr>
<td>Electrical and Mechanical Engineers</td>
<td>Mechanics with the ability to work on electric batteries and fuel cell technology</td>
</tr>
<tr>
<td>Solar PV Design with the ability to understand electrical code compliance</td>
<td>Knowledge of hybrid systems</td>
</tr>
<tr>
<td>Site Assessors able to use satellite imagery</td>
<td>PV Designers able to design batteries and off grid systems</td>
</tr>
<tr>
<td>PV installers with the ability to read and understand drawings &amp; skills using hand tools</td>
<td>Micro grid knowledge (energy resource, generation, loads and boundaries)</td>
</tr>
<tr>
<td>Energy Auditor able to conduct audits, sound scientific knowledge, familiarity with system dynamics</td>
<td>Knowledge of wind turbine technology, with marine and aquatic skills, vertical wind technology</td>
</tr>
<tr>
<td>Energy Conservation and energy efficiency</td>
<td>Smart grid technology</td>
</tr>
<tr>
<td>Plumbers knowledge of solar heating systems</td>
<td>Knowledge of waste energy systems (science of anaerobic digestion processes and related systems)</td>
</tr>
<tr>
<td>IT Networking Skills</td>
<td>Engineering Designers with retrofit design knowledge for sustainability (RE/EE, air flow and quality, wastewater reuse, etc.)</td>
</tr>
<tr>
<td>Sound knowledge of inverter and converter systems</td>
<td>Electrical and computer skills for energy management systems to automatically manage solar, AC, DC and grid connectivity</td>
</tr>
<tr>
<td>Knowledge of construction standards and practices</td>
<td>Smart metering knowledge and training</td>
</tr>
<tr>
<td>Project management training and experience</td>
<td>Energy storage knowledge with engineering skills for batteries (lithium), compressed air tanks, water, synthetic and alternative fuel</td>
</tr>
<tr>
<td>Health and safety training</td>
<td>Advanced meteorology with application to PV systems</td>
</tr>
<tr>
<td></td>
<td>Agriculture cold storage using PV systems</td>
</tr>
<tr>
<td></td>
<td>Aquaponics and hydroponic knowledge</td>
</tr>
<tr>
<td></td>
<td>Smart and sustainable farming training</td>
</tr>
<tr>
<td></td>
<td>Wind turbine technology for fishing vessels</td>
</tr>
</tbody>
</table>

Source: (Sault College and Samuel Jackman Prescod Polytechnic, 2014) and Author compilation
Skills for Green Jobs in Barbados

Programmes curricula are aligned with National Vocational Qualification (NVQ) and Caribbean Vocational Qualification (CVQ) certifications. The Energy Advisory and Wind Energy programmes are expected to be offered in December 2017-January 2018. The SJPP in the future aims to combine the above four programmes into a two-year renewable energy programme. Also noteworthy is that the SJPP and BCC share technical and infrastructural resources in order to deliver the Solar Panel and Photovoltaic Installation courses.

The BVTB has two apprenticeship scheme programmes associated with green jobs and occupations:

1. Solar Water Heating Technician (SWHT), and
2. Skills Training Course in Horticulture/Landscaping

The SWHT 3-year apprenticeship programme curriculum includes units on the following: safety on site and in workshop; trade tools and practices; pipe fitting and pipe welding; solar heater construction and installation; installation of plumbing fixtures; repair, maintenance and servicing of plumbing systems; maintenance of pipes; and plumbing theory. At the end of the programme a Certification of Apprenticeship is awarded. The horticulture and landscaping course runs for thirty-four weeks accompanied by a four-week job attachment. Students of the course are exposed to vegetative propagation, propagation by seeds, crop production, landscaping of an area, hedge trimming both manually and mechanically, no-dig gardening (that is using trans-planters, compost and sheep manure), composting (done in conjunction with the trainees in the skidsteer/loader class), and leaf and grass mulching. The BVTB has plans to introduce a course designed for developing skills and competences in irrigation and harvesting of rainwater. The SWHT Programme success rate has been very low, as apprentices were unable to complete their courses owing to lack of capacity within private companies. On the other hand, during the last two years nineteen persons out of twenty-one registered candidates in the horticulture and landscaping course successfully completed the course and were certified.

The programmes discussed above clearly include elements of sustainability and “green” skills, but there seems to be lack of direct incorporation of skilled persons into major infrastructural or economic transition projects. Therefore, the delivery of education and training programmes with “green” skills may be considered a piecemeal approach. To attain the national goal of becoming the most environmentally-advanced green country in Latin America and the Caribbean, there needs to be a comprehensive framework for upgrading existing skills and the introduction of new skills for green occupations that complement a national green transition strategy. This approach must ensure a labour market skills match in job opportunities in emerging and growing markets, and can be facilitated through social dialogue under the Barbados Social Partnership framework.

It has been found that almost 41% of the employed Barbadian labour force have no formal certification and many may find themselves marginalized in the near future due to lack of certification. It is expected that, through the Ministry of Labour and Social Development and the Barbados TVET Council, both NVQs and CVQs are further developed and expanded to the fullest extent possible. To achieve this objective workers who may have acquired their skills sets through on-the-job training and other programmes will be given opportunities to demonstrate their competences to a recognized certifying body and will be examined by skilled and experienced assessors. Moreover, to ensure that skills are aligned with real work requirements the MLSD is expected to conduct with its partners curriculum and programmes assessments to determine the use of competence-based education and training (CBET) methodology in training institutions and the provision of any necessary technical assistance. The MLSD has pledged to support implementation of a system of Prior Learning Assessment and Recognition (PLAR), and to acknowledge the skills and competences already acquired by persons outside traditional academic and training settings (Manpower Research and Statistical Unit, Ministry of Labour, 2014).
4.3. Active Labour Market Policies and retraining measures

There are currently no specific ALMPs that targeted towards green skills. However Barbados does have ALMPs such as public employment services which include training schemes provided free of cost to citizens through the BVTB. In addition, through the National Insurance Scheme (NIS) the National Employment Bureau has a retraining fund of BDS$10 million. The purpose of the fund is to provide active job seekers with retraining opportunities to improve the skills and competences of unemployed citizens. Once citizens have applied for unemployment benefits with the NIS they are eligible to access the opportunities associated with the retraining fund offered at the SJPP, BCC and BVTB. Courses in high demand under the retraining fund that could have a green component cover the following: electrical installation, plumbing, masonry, and construction. The retraining fund has encountered operational challenges such as limited physical capacity, and an inability to procure new technology.

4.4. The role of the private sector in skills training

The private sector in Barbados plays a key role in both market-driven skills identification and (re)training and in providing new opportunities through green jobs. The majority of the training takes place at enterprise level where employees are trained either within the organization, sometimes led by internationally-certified experts, or employees are sent abroad (Canada, US and Germany) on training programmes to upgrade their skills. Training at enterprise level is currently mainly being done in companies within the RE and transport sector and to a lesser extent in waste management. All the employers interviewed for this study noted that they in some way provide training for their employees. This finding is also supported by Ashton et al. (2000) who indicate that companies in Barbados engage in a high degree of on-the-job training, especially for technical and vocational workers (Downes, 2009) such as those technicians in the RE sector.

The private sector also engages in dialogue with the TVET institutions on the island on what and how courses which directly fill the gap for specific skills and jobs are delivered. In addition the BVTB in collaboration with companies offer occupational base skills development schemes. An example of this type of arrangement between the private sector and training institutes is Williams Solar, which has worked with the SJPP and BCC in the development of their solar panel installation courses. These programmes provided Williams Solar with some of the skilled labour needed to carry out their day-to-day operations effectively. Moreover there is now the need to enhance the offerings of the Solar Panel Installation course to cover more technical skills such as battery technology, energy storage and engineering and design of systems.

In the near future private employers will be encouraged by government to utilize the National Employment Bureau to register their vacancies and complement traditional methods used in the recruitment of workers. Traditionally there has been heavy emphasis on elementary, low-skilled occupations that has characterized the public sector employment service, and government is committed to increasing the proportion and technical array of professional of jobs available. To this end government is seeking to fully engage the private sector and the student bodies of all major tertiary institutions (Manpower Research and Statistical Unit, Ministry of Labour, 2014). This initiative has the potential to be a key instrument through which the demand for green skills can be matched through a private-public partnership.
4.5. The role of institutional set-up

Owing to the strong and open social dialogue, mainly under the Social Partnership, stakeholders of the tripartite group actively engage in discussion with each other on various issues of national importance. Given the mandate for achieving a green economy, the provision of training in green skills is no exception. Four main stakeholder groups in Barbados engage in the provision of training for green skills; government agencies and training institutions, private sector companies, international institutions (standards, policies and training) and non-governmental organizations. Through various programmes and initiatives at all levels (enterprise, sectoral and national) training and skills development is provided for the national labour force. One of the major strengths of the current stakeholder network is the active involvement of all major stakeholders in the development of curricula and training materials. This active working relationship could be further optimized through implementation of a coherent strategy for green transition.

A best-practice example of institutional strength and capacity at sectoral level for the enhancement of green skills is the Barbados Renewable Energy Association (BREA). BREA has 60 members, with members from across the Caribbean and internationally (Canada). As an NGO BREA is currently improving its capacity by including the following key pillars in addition to its advocacy role for RE on the island:

i. Education and Training - the Association supports a market-driven process of skills anticipation and identification. In doing so, the BREA conducts stakeholder consultative sessions with its membership during which a number of specific training programmes are identified. In the facilitation of these programmes BREA has partnered with key funding agencies such as the Caribbean Development Bank, Barbados Investment and Development Corporation and US AID Caribbean Clean Energy Programme in the roll-out of these interventions.

ii. Capacity-building - the above interventions and training programmes will be led by industry experts and are expected to enhance not only the competences and skills of workers in the RE sector but, more importantly, the international competitiveness of the renewable energy and energy efficiency technicians and engineers to enable them to export their services.

iii. Research and Development - in order to deliver on its new mandate BREA entered into a number of strategic partnerships with leading training institutions. Under its mandate for R&D, BREA is working with the Berkeley University to strengthen the Association’s research and development needs, starting with the transportation sector, more specifically the penetration of electric vehicles within Barbados. A pilot study is being conducted in partnership with the Government of Barbados through the Division of Energy and the Ministry of Transport in the facilitation of a Pilot Electric Vehicle Study. This study should identify the necessary basic and technical skills and overall framework needed to support the transition of the sector from predominantly fossil-fuel-operated vehicles to RE.

The Barbados Chamber of Commerce and Industry (BCCI) aims to strengthen its focus on development of the green economy in Barbados, and more specifically on renewable energy and energy-saving efforts. Owing to the magnitude of this initiative a Green Committee was specifically formed within the BCCI. The Green Committee is comprised of members of the BCCI who work closely with the Division of Energy, BREA and University of the West Indies (UWI) in a number of areas:

- schools initiative – raising awareness and education on renewable energy technology;
- clarity on incentives available for energy efficiency (EE) and renewable energy (RE) in collaboration with the Division of Energy;
- working with BREA to raise awareness in the business community on EE & RE. More specifically we have ensured that we are aligned with BREA so as to maximize our combined efforts;
working with BL&P and UWI to create alignment on “One Plan” for a totally renewable-energy-based Barbados (Barbados Chamber of Commerce and Industry, 2014).

At Ministerial level there is coordination between the Ministry of Labour, the Ministry of Environment (Division of Energy), the Ministry of Agriculture and the Ministry of Education to identify, develop and administer the requisite training programmes aimed at providing decent work through sustainable businesses and occupations. At present there is no formal arrangement that coordinates policies and programmes between ministries, but the ministries work hand-in-hand at operational level, technical officers working together from various ministries to integrate sustainability and green economy concepts into all of the programmes being developed and implemented.
5. Analysis of case studies

Case study 1 - Barbados Community College

The Barbados Community College (BCC) was established in 1968 by an Act of Parliament and provides post-secondary education where it was previously inaccessible to a large proportion of the population. By 1990 the Barbados Community College Act provided the institution with the authority to grant certificates, diplomas, associate degrees, degrees and other awards to students on completion of their studies. The College’s mission statement is as follows:

“The Barbados Community College is a dynamic center of learning which exists to meet the changing education, training and development needs of the societies that it serves, by providing a range of courses and programmes of study in a learning environment conducive to the intellectual, physical and social development of students and staff, so that they can make a meaningful contribution to their country, region and the wider community”.

The College provides an array of courses that prepare students for careers in fields associated with green jobs. These include two-year Associate Degree Programmes in Environmental Health Inspection, Mechanical Engineering, Environmental Sciences, Chemistry, Biology, Physics and Mathematics. BCC also offers training in Electrical Installation and Plumbing, both skills which are necessary for the installation of PV cells within the PV installation programme. At the College there is a Curriculum Development Office that is responsible for developing and reviewing the study programmes and curricula, and this is done through consultations with specialists in the relevant fields. The development of the PV programme was however a joint effort with Samuel Jackman Prescod Polytechnic so as to avoid duplication of effort. On completion of the courses graduates often go on to work in private companies that specialize in PV installation. The exact number of BCC graduates who are currently employed in this occupation is unknown. BCC also has a Memorandum of Understanding with several North American colleges through the USA-CARICOM Programme and the Canada-CARICOM Scholarship Programme, allowing them to build up their technical capacity and improve green skills and training for the Barbadian labour force.

Case study 2 - Samuel Jackman Prescod Polytechnic (SJPP)

Barbados currently leads in the installation of solar water heaters per capita in the western hemisphere with approximately 50% of households using them (UNDP, 2009). This has been largely driven by financial and fiscal incentives from the Government to encourage the use of such heaters (GOB, n.d.). As a result there is a demand for skilled technicians on the island. The institution’s mission is “to be the leader in the preparation of a highly trained workforce by providing qualified persons with quality competency-based technical and vocational training that responds to the future employment and lifelong needs of its students”.

In 1969 the Samuel Jackman Prescod Polytechnic was established and has since developed an Institutional Partnership with Sault College, one of the most highly-recognized training institutions in the field of renewable energy in Canada. Through this partnership with Sault College the SJPP was able in 2015 to develop curricula in Photovoltaic Installation and Solar Photovoltaic Electrical Installation, and have since produced over 200 graduates. In developing the training programme an advisory committee represented by both public and private sector organizations was consulted to identify the most relevant skills students would need to work in green industries following graduation. Four classes are run simultaneously,
5. ANALYSIS OF CASE STUDIES

Skills for Green Jobs in Barbados

Each with their own instructor. The courses run for one semester with a limit of 16 students per class (i.e., 128 students per year). Funding was also made available to enable the institution to obtain equipment for teaching on subjects such as solar panels, inverters, and turbines. SJPP offers two-year courses in Electrical Installation, Plumbing, and Masonry, all skills that are required for the installation of solar panels, along with Mechanical Engineering which provides the foundation for a career in servicing electric vehicles. The institution currently has plans to provide specialized training in the renewable energy field with programmes in Wind Energy and Energy Advisory Services by the end of 2017.

The students who enrol in the PV installation courses are usually certified and employed electricians who wish to acquire additional skills. As such, the courses are usually run after working hours so that they can attend. This enables them to make a smooth transition into the renewable energy field since they would have both certification and experience. There is no record of how many graduates have in practice transitioned into green jobs.

Case study 3 - University of the West Indies, Cave Hill Campus

The University of the West Indies (UWI) is a multi-campus regional university which serves the English-speaking Caribbean. In 1963 The UWI Cave Hill campus in Barbados was opened with a capacity of 500 students. Over the years it has grown significantly to accommodate 7,000–9,000 students a year. It currently offers a range of tertiary level programmes at both undergraduate and postgraduate levels that provide students with qualifications for careers that are transferable to a green economy. Some of these include:

- Bachelor of Science in Biology
- Bachelor of Science in Biochemistry
- Bachelor of Science in Chemistry
- Master of Science in Biosafety
- Master of Science in Renewable Energy Management

With these qualifications, graduates from these programmes can have careers in the research and development of green technology and practices for Barbados, and some have gone on to work as consultants for private green companies in Barbados although the total number is unknown. Persons wishing to pursue higher degrees in electrical and mechanical engineering can attend the St Augustine campus located in Trinidad and Tobago.

Case study 4 - Innogen

Innogen is a locally-based company that focuses on the installation of PV cells for residential and commercial buildings. The company was launched in 2011 and currently employs 12 full-time and 14 part-time workers. Currently, there are approximately 1,100 solar plants connected to the grid, Innogen being responsible for the maintenance of over 600 systems. A wide variety of skills is required for the operation of the company and these include electrical and planning engineers, construction workers, and labourers. The company mainly hires from the local labour force unless those concerned lack the required skills, qualifications, or experience. Innogen works with the Biology and Chemistry in the Department of University of the West Indies on research and development support and these employees are often already certified in renewable energy before being hired. Training institutes on the island such as BCC and SJPP provide the foundation of basic knowledge and certification, particularly in the installation of solar panels, but further applied training is often provided by Innogen so that employees become specialized in the area in which they are working. In the first three months of being hired, technicians undergo practical and classroom training known as the Innogen Solar Energy course and receive certification once the training is successfully completed. Employees also participate in online courses offered by...
various institutions in order to improve their skills in electrical installation and renewable energy efficiency. One of the organizations used most frequently by Innogen for this training is the Schneider Electric Energy University. The courses provided are modular and self-paced and participants can take anywhere between 18 months and two years to complete them, at the end of which they are awarded certificates.

Case study 5 - Electric Vehicles: MegaPower

MegaPower is the largest importer of electric vehicles in Barbados. The company began operation in 2013 and since then over 200 electric vehicles have been sold. They offer various models of electric cars and vans, their most popular being the Nissan LEAF, along with a network of charging ports available throughout the island either free of charge or for a small fee. They also provide personal and commercial charging ports with the option of their being solar-powered. After the first year vehicles require full servicing which is more frequent than is required by fossil-fuel-powered cars. The company employs a team of mechanics who are trained by MegaPower to perform service maintenance. These mechanics are certified by the International Maintenance Institute in Electrically Propelled Vehicle Repair and Placement (Level 3) as well as trained in the use of the CONSULT-III Diagnostic Tool. Chargers and solar or wind equipment do not require regular maintenance, and MegaPower can procure parts and connect customers with engineers or electricians should it become necessary. Currently the majority of vehicles in Barbados still use fossil fuels. The transportation sector accounts for 31% of total fuel consumption and is the second largest contributor to CO$_2$ emissions on the island. Shifting to green vehicles on a larger scale would require further training of mechanics to provide the necessary skills for the upkeep of electric vehicles. This may also involve training of electricians to equip them with the skills for installing residential and commercial charger ports.

Case study 6 - Williams Solar

Barbados currently ranks fourth in the world in the installation and use of solar water heaters. Residents benefit from tax exemptions for solar water heating equipment and it has been made mandatory for new public housing. Williams Solar is a privately-owned and operated company that specializes in the installation of solar equipment for both commercial and residential buildings. Like Innogen, they also employ graduates from Barbados Community College and Samuel Jackman Prescod Polytechnic for PV installation. In recent times the company has found it easier to fill many of its technical positions owing to the training provided by these institutions, and it has developed a strong working relationship with them. Though graduates may have the technical skills required for the job, many of the newly-hired personnel lack experience and therefore must undergo some on-the-job training within the company. This training tends to be ad hoc and unstructured, new employees being mentored by more experienced personnel. Employees are sometimes sent to the USA or Canada to sit the North American Board of Certified Energy Practitioners (NABCEP) exam. These courses are intended to keep employees abreast of best practices in the renewable energy field since these standards are updated every three years. Included in the training are different techniques for installing solar panels and facilitating efficiency in installing inverters. Periodically Williams Solar employees also participate in PV installation training workshops in Barbados which usually run for up to five days, so as to provide training for the trainers. Those who participate in the training of trainers’ courses receive certificates of completion.

Williams Solar plans on branching out into the development of wind energy in the future. A proposal to produce wind energy on barges offshore has been put forward, employees would receive training from SJPP, which is currently the only institution in Barbados with a curriculum on wind energy.
6. Conclusion and recommendations

Conclusions

Barbados has adopted the definition of a green economy as one which at its core reflects the country’s small island ecosystem in all its economic activity. Therefore any job that promotes and enhances this type of economy is considered “green”. Despite its high level of economic and social development Barbados has experienced low or zero growth since the great recession of 2009. The downturn in economic activity and the need to increase resilience to climate change has prompted a drive to green economy in sectors including tourism, transport, construction and agriculture. The energy sector is leading the charge in achieving a green economy and a number of fiscal incentives are available given the market size of the RE sector. It is estimated that, on average, between 2004 and 2015 15% of the employed labour force could be classified as working in a “green” job; however by 2010 the ratio had decreased by 9.7% and had remained at around this level by the end of 2015. These workers consisted of persons whose highest educational level was either primary or secondary and are the heads of their households. Demand for emerging green skills includes those associated with occupations in PV installation systems, wind turbine technology, and engineers and designers with knowledge of “green” application to physical structures and energy systems.

To reduce the high vulnerability and dependence of the country on fossil fuels a new draft National Energy Policy 2017-2037 has specified a target of 75% of energy needs to be produced from renewable sources by 2037. The new policy proposes measures to enhance human resource capacity and development through various programmes that would elevate the skills and competences of those working in the RE sector. This framework supports the existing fiscal incentives for greening and other policies that indirectly address green skills development. The new Energy Policy may act as an interim plan for green jobs given that there is no specific policy mandate targeted on the creation and improvement of green jobs in Barbados.

The main skills assessment and anticipation tool used on the island consists of employer surveys conducted by the MLSD in an arbitrary manner due to limited resources. In addition to the MLSD, the private sector in Barbados plays a key role in both market-driven skills identification and (re) training and in provision of new opportunities through green jobs. Due to the strong and open social dialogue, mainly under the Barbados Social Partnership, stakeholders have the opportunity of actively engaging in discussion with each other on various issues of national importance. Given the mandate for achieving a green economy the provision of training for green skills is no exception.

The case studies provided in the study are best practice examples of the development and facilitation of green jobs and training programmes in Barbados by companies and educational institutions. Despite representing a small percentage of the economy, these microcosm cases can act as a framework for scaling-up activities and expanding training programmes in order to achieve a sustainable economy.
Recommendations

The following recommendations are proposed, based on the information gathered in the study:

1. Creation of a national policy that mainstreams the development of green jobs in the overall economy and the development of a roadmap that outlines the markets, resources, technology and physical infrastructure necessary to achieve the national vision of a green economy.

2. Development and implementation of a labour market policy which is a by-product of the national policy mentioned above, and which specifically addresses the creation and advancement of “green” skills education and training based on labour market demand.

3. Development of a formal arrangement by which government, private companies and educational institutions across the island identify skills gaps and emerging skills to develop curricula and programmes for green or greening sectors.

4. Fiscal incentives to encourage private companies to engage in training activities.

5. Creation of training programmes for women working in green sectors, particularly those working in lower-level occupations, to enhance their skills and thereby increase their flexibility in the jobs market.

6. Updating of occupational health-and-safety-at-work standards and guidelines to include the handling and management of, in particular, “end-of-life” materials used in green activities.

References


6. CONCLUSION AND RECOMMENDATIONS

Boston: Stockholm Environmental Institute, Tufts University.


Skills for Green Jobs in Barbados

6. CONCLUSION AND RECOMMENDATIONS


GOB. (n.d.). *National Sustainable Energy Policy (Revised).*


6. CONCLUSION AND RECOMMENDATIONS


Skills for Green Jobs in Barbados

Commonwealth Secretariat.


Annex

UWI-ILO Skills for Green Jobs
Government Ministry Interview Questionnaire

1. What is the national definition of a green economy and by extension green jobs?
2. Does the Ministry have a specific mandate on “green” job creation?
3. What sectors in Barbados do you think have the greatest potential for greening?
4. What government policies/programmes/incentives are in place for current “greening” sectors (e.g. energy) and for future sectors to create an enabling environment?
5. What has been the success rate of the above policies and what challenges were incurred?
6. How has the Ministry incorporated into its policies, the transition to and need for green jobs to achieve the mandate of Barbados becoming a green economy?
7. Will the Ministry be updating the BHRDS 2011-2016 in the near future? How will that new policy speak to skills development and needs?
8. Does the Ministry have a formal arrangement with the Ministry of Environment and/or education and vocational institutions in promoting skills and competencies in “green” sectors?
9. Do you believe there is a skills gap for technical jobs in “green” business?
10. If yes, describe the gap and how it may be addressed (what role would the Ministry play in filling the gap)
11. If no, what current programmes are available and how are they carried out?
12. Do the policies of the Ministry (climate change, sustainability, scoping study) cohere with those of Ministries (e.g. Barbados Human Resource Development Strategy 2011-2016)?
13. What are the main skills assessment and anticipation tools used by the Ministry?
14. What are the active labour market policies currently being implemented?
15. Is there a current monitoring programme for job skills to meet UN SDGs, particularly renewable energy?

Table 5: Barbados Stakeholder List

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>NAME</th>
<th>TITLE</th>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Labor</td>
<td>Mr. Ricardo Norville</td>
<td>Assistant Chief of Research and Planning</td>
<td><a href="mailto:rnorville@labour.gov.bb">rnorville@labour.gov.bb</a></td>
</tr>
<tr>
<td>Ministry of Environment</td>
<td>Mr. Travis Sinckler</td>
<td>Senior Environmental Officer</td>
<td><a href="mailto:travis.sinckler@barbados.gov.bb">travis.sinckler@barbados.gov.bb</a></td>
</tr>
<tr>
<td>Barbados Renewable Energy Association (BREA)</td>
<td>Ms. Meshia Clarke</td>
<td>Executive Director</td>
<td><a href="mailto:meshia.clarke@brea.bb">meshia.clarke@brea.bb</a></td>
</tr>
<tr>
<td>Samuel Jackman Prescod Polytechnic</td>
<td>Mr. Henderson Cadogan</td>
<td>Deputy Principal-Academic</td>
<td><a href="mailto:hcadogan@sjpp.edu.bb">hcadogan@sjpp.edu.bb</a></td>
</tr>
<tr>
<td>Barbados Vocational Training Board</td>
<td>Ms. Jennifer Michael</td>
<td>Assistant Director of Training</td>
<td><a href="mailto:jmichael@bvtb.gov.bb">jmichael@bvtb.gov.bb</a></td>
</tr>
<tr>
<td>Caribbean LED Lighting</td>
<td>Mr. Jim Reid</td>
<td>Founder &amp; Chairman</td>
<td><a href="mailto:jreid@caribbeanledlighting.com">jreid@caribbeanledlighting.com</a></td>
</tr>
<tr>
<td>Williams Solar</td>
<td>Mr. Stephen Worme</td>
<td>General Manager</td>
<td><a href="mailto:stephen.worme@gmail.com">stephen.worme@gmail.com</a></td>
</tr>
<tr>
<td>Innogen Inc</td>
<td>Mr. Vancourt Rouse</td>
<td>CEO</td>
<td><a href="mailto:vanrouse@caribsurf.com">vanrouse@caribsurf.com</a></td>
</tr>
<tr>
<td>Barbados TVET Council</td>
<td>Ms. Wendy McClean</td>
<td>Manager Technical Services</td>
<td><a href="mailto:wmcclean@tvetcouncil.com.bb">wmcclean@tvetcouncil.com.bb</a></td>
</tr>
</tbody>
</table>