



# INSIDE STORIES

## on climate compatible development

Climate & Development  
Knowledge Network

September 2012

### Key messages

- The solar water heater (SWH) industry in Barbados has been very successful. It boasts over 50,000 installations that have saved consumers as much as US\$137 million since the early 1970s.
- Governments must create a framework to support the development of SWHs and ensure long-term fiscal and regulatory certainty for manufacturers and customers.
- Fiscal incentives are good value: government support for the Barbados SWH industry was approximately US\$550,000 in 2002. Estimates suggest SWHs save consumers between US\$11.5 and US\$16 million per year.
- Governments can play a major role in establishing a commercial market by installing SWHs on public buildings and social housing.
- Persuasive champions who are able to speak to communities, together with effective marketing strategies, are vital for consumer acceptance of the technology.
- Public recognition of the personal, financial and quality of life benefits of SWHs provides a springboard to acceptance of other renewable energy technology programmes.
- The Barbados experience could be easily replicated in other countries with high fossil fuel imports and abundant sunshine.

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## Seizing the sunshine: Barbados' thriving solar water heater industry

**For the Small Island Developing States (SIDS) of the Caribbean, renewable energy technologies (RETs) will become increasingly important in the face of high fossil fuel costs. Many countries now recognise the need to move towards low-carbon, climate-resilient economies, as set out in the Caribbean Community (CARICOM) implementation plan for climate change-resilient development.<sup>1</sup> Many nations rely heavily on imported fossil fuels, spending an ever-larger proportion of their GDP on energy imports. Along with air conditioning, refrigeration and transportation, water heating is one of the most energy-intensive domestic activities, using roughly 2 megawatt-hours (MWh) of energy per household per year.<sup>2</sup> Fortunately, the islands have access to one source of energy that is not in short supply, receiving over 3,000 hours of sunshine in a year.<sup>3</sup> Barbados has capitalised on this, replacing gas and electric water heaters with solar water heaters (SWHs) at both domestic and commercial sites.**

By almost any measure Barbados's efforts to encourage the widespread adoption of SWH technology has been a success. The island's 200,000 inhabitants now boast more than 50,000 SWH installations and save over 100,000 MWh of energy per year.<sup>4</sup> However, other countries in the Caribbean region have not achieved the same market penetration, with many still heavily dependent on fossil fuels for water heating. In 2001 Barbados

alone accounted for more than 60% of the SWHs in the Caribbean region and was responsible for about 80% of manufacturing.<sup>5</sup>

This policy brief explores the reasons that have made SWHs a success in Barbados, as well as some of the challenges that have been overcome. It suggests that with regulatory certainty, government intervention and the determination of a small number of

committed companies and individuals, the penetration experienced in Barbados can be replicated elsewhere. Moreover, this policy brief argues that the SWH experience can help lay the foundations for the broader acceptance of other RETs.

## Introducing solar water heaters in Barbados

The SWH industry in Barbados emerged in the early 1970s in response to the major oil shock, where prices increased threefold in the space of one year. Like many SIDS in the Caribbean, Barbados relied heavily on imported fossil fuels, which provided 95% of the country's energy needs.<sup>6</sup> Yet one person decided to make use of the country's abundant sunshine: In 1973 Canon Andrew Hatch of Christian Action for Development made a SWH out of an old oil drum and fixed it to the roof of his church.<sup>7</sup>

Recognising the potential of the technology, James Husbands founded Solar Dynamics, the first SWH company on the island, in 1973 and soon had the opportunity to demonstrate the technology at the highest levels of government. 'The Prime Minister, Tom Adams, wanted a water heater. We installed one of our units at his house and he was very pleased with it.' Having the country's leader see his annual gas consumption drop by 70% was a new business owner's dream.<sup>8</sup>

Government incentives brought competition in the business of manufacturing and supplying SWHs, with SunPower and AquaSol setting up shop. The market grew, with solar installations peaking in 1989 at over

2,800 units. By 2009 there were around 45,000 installed SWH systems, representing two in five households.<sup>9</sup>

## Barriers to developing the SWH industry

Even though a high level of dependence on oil imports and rising fossil fuel prices provided a favourable environment, these factors cannot fully explain why the SWH industry was so successful in Barbados. These conditions were shared by many countries that are still spending significant proportions of their GDP on imported oil. Some significant challenges had to be overcome in order to allow the industry to flourish:

- **Accessing start-up capital** was a problem for the early pioneers of the SWH industry in Barbados. Despite having secured government contracts for SWH installations, banks were unwilling to provide investment to enable them to be fulfilled.
- **Sustaining regulatory support** over many years is important to provide certainty for investors and consumers. Economic restructuring led the 1992 Barbados Government to cut the Homeowner Tax Benefit, which suppressed industry growth until it was reinstated in 1996 (see Box 1).
- **Developing an effective product** was essential to develop consumer confidence in solar technology. Ensuring that the size of the SWH was appropriate for each household was crucial to maintain sufficient water temperature.
- **Building consumer awareness** was a challenge in Barbados,

especially as SWH technology was not well known in the region at the time.

- The **high upfront cost** of SWHs acted as a barrier to market penetration, especially as most households had already invested in other forms of water heating technology such as electricity or gas.

## Factors for success

Overcoming these barriers allowed the SWH industry in Barbados to get a foothold and flourish. The reasons for this success can be broken into three broad categories: i) the early pioneers; ii) financial support and regulatory certainty; and iii) consumer acceptance.

### The early pioneers

The SWH industry in Barbados stemmed from the work of a very small number of individuals. Leonard Nurse, IPCC lead author and Barbados' Special Envoy for the Environment, explained that the early pioneers were vital for the success of the industry: 'What really drove the industry in Barbados was the emergence of a champion ... and at the time, that champion was James Husbands'.<sup>10</sup>

The perseverance and drive of industry champions was translated into the energetic public engagement and marketing strategies employed by Solar Dynamics, whose sales team worked across all sectors of the community.<sup>11</sup> The key to its sales strategy was to continually find new ways of reaching people, buoyed by a genuine passion for the technology itself. Examples of this were Solar Dynamics' initiative of

marketing to people living in wooden houses and to employees of the households while installing the SWHs.<sup>12</sup>

### Financial support and regulatory certainty

Giving sufficient regulatory certainty and financial support in key areas was crucial for investor confidence. Starting in the 1970s, the Barbados Government introduced a series of measures to support the fledgling SWH industry (see Box 1). The Fiscal Incentives Act of 1974 was perfectly timed to coincide with the first oil crisis, and was a clear signal of the Government's intentions to move away from fossil fuels. Creating a tax break on raw materials supported manufacturers who were struggling to find early-stage finance.<sup>13</sup>

The Government introduced further measures to support the industry by mandating SWHs for all new government housing developments. Despite these contracts, Husbands faced typical challenges in getting early-stage funding from the banks.<sup>14</sup> To overcome this problem, the Barbados Institute of Management and Productivity provided a loan that was quickly repaid after the project was completed.

Further government incentives in the 1980s, in the form of the Homeowner Tax Benefit (see Box 1), also had a major

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Leonard Nurse, IPCC lead author and Barbados' Special Envoy for the Environment

### Box 1. Fiscal incentives to stimulate the SWH technology in Barbados

#### 1974 – Fiscal Incentives Act:

Just as the SWH industry was beginning to emerge, the Government introduced a tax exemption for the materials used to produce SWHs, saving 20% of their cost. Importantly they also levied a 30% tax on electric water heaters, significantly increasing their price.

#### 1977 – Government purchase of SWH for state housing:

The Government supported the nascent SWH industry by mandating the installation of SWH for new-build government housing developments.

#### 1980–1992 – Homeowner Tax Benefit:

In 1980 the Government made the full cost of a SWH installation tax-deductible up to a maximum of BD\$3,500 (US\$1,750). This incentive was stopped in 1992 as part of economic restructuring following the economic recession in the late 1980s.

#### 1996 – Amended Homeowner Tax Benefit:

In 1996 the Homeowner Tax was reinstated. In its amended form, Barbadians were allowed an annual tax deduction of BD\$3,500 (US\$1,750) for home improvements including mortgage interest, repairs, renovation, energy- and water-saving measures, and SWHs.

impact on SWH installations, which rose from around 900 per year in 1980 to peak at over 2,800 per year in 1989.<sup>15</sup> Although the benefit was stopped in 1993 following the economic recession in the early 1990s and the restructuring that followed, it was reinstated just 3 years later – a testament to its efficacy.<sup>16</sup>

Nurse considers the Homeowner Tax Benefit to be particularly successful because of the signal it sent to investors: 'It was very important that successive governments were consistent in their support. ... Governments need the fortitude to commit to [financial and regulatory support] for the long term'.<sup>17</sup> Studies have shown that the costs of

these incentives are exceptionally good value.<sup>18</sup> In 2002 the tax incentives offered by the Government cost BD\$1.1 million (US\$550,000), or 0.06% of government revenues; and the cumulative cost of the tax incentives amounts to around BD\$21.5 million (US\$10.75 million).<sup>19</sup> Estimates suggest that currently SWHs save 65–92 million kilowatt-hours (kWh) annually, with a consumer value of BD\$23–32 million (US\$11.5–16 million) per year; cumulatively this totals BD\$274 million (US\$137 million).<sup>20</sup>

### Consumer acceptance

Consumers quickly realised the potential benefits of SWHs. One of the most important aspects of this was ensuring

that the technology was appropriate for the size of household – and worked well. The experience of other countries offers lessons here. Jamaica also had a small-scale SWH industry in the early 1970s, but it failed to reach the levels of growth achieved in Barbados. One of the reasons for this was that customers were dissatisfied with the early SWHs because they were too small. Water was frequently too cold or there was no hot water in the morning.<sup>21</sup> In Barbados, companies removed consumer risk by offering a guarantee on temperature.<sup>22</sup>

Another barrier for consumers was the high upfront cost of the unit itself. To counter this, credit unions and distributors offered financial support, allowing consumers to spread the cost of the units over 3 years. Matching the credit term to the 3-year payback time of the SWH units meant that some consumers spent less than if they had continued heating their water with gas.

Table 1 summarises the factors that helped foster a successful SWH industry in Barbados.

### Replicating the Barbados experience

The above-mentioned factors for success were each individually important. However, as William Hinds, Head of Energy Efficiency and Renewable Energy Unit at the Ministry of Energy and Environment, explains: ‘The challenge for Barbados was combining them in both the public and commercial sectors at the right time’.<sup>23</sup>

Some of the challenges faced by Barbados are likely to be less problematic

for countries developing a SWH industry today. As SWH units have matured as a technology, consumers are more likely to be satisfied with the product. However, there is some evidence of additional barriers to achieving the same market penetration in other countries. For example, in countries where energy prices are low there is less pressure to make the transition to RETs. This can be partially countered by transferring subsidies from fossil fuels to support SWHs and other renewables.

Other challenges have also been exposed when transposing the Barbados SWH industry into other countries. As the SWH industry began to reach maturity in the country, many companies looked to replicate their successes abroad. Solar Dynamics, for example, made inroads into the SWH market in St Lucia.<sup>24</sup> Embarking on a joint venture with a St Lucian company, which acted as a distributor, allowed

Solar Dynamics to gain easier access to the market. But despite St Lucia having high fuel costs and no oil reserves<sup>25</sup> the market was slow to develop. According to Husbands, the reason for this was in part due to Solar Dynamics’ strategy of having Barbadians run the project in St Lucia. The turning point came when the company changed its policy and employed local people. In this case an attempt to share the knowledge and experience gained in Barbados was undermined by a lack of local sensitivity.

Developing a strong SWH industry can play an important role as part of a wider RET programme that includes electricity generation. Technologies such as solar photovoltaic systems, hydropower, geothermal and wind generation are viable in many countries. However, establishing more complex RETs is likely to be easier if consumer confidence has already been created in a lower technology solution like SWHs.

**Table 1. Key elements of the support framework for the SWH industry in Barbados**

Direction of influence	Factors that helped stimulate growth of SWH industry
Private sector to consumers	<ul style="list-style-type: none"> <li>• High-quality products</li> <li>• Consumer guarantee</li> <li>• Finance to spread upfront cost of SWH</li> <li>• Community engagement and job creation</li> <li>• Clear quality of life benefits</li> <li>• Strong marketing and communications</li> </ul>
Private sector to government	<ul style="list-style-type: none"> <li>• Demonstrated the potential of the technology</li> <li>• Cost effective technology that saves millions of dollars</li> </ul>
Government to consumers	<ul style="list-style-type: none"> <li>• Involvement and participation through communications</li> <li>• Fiscal incentives (the Homeowner Tax Benefit)</li> <li>• Increased duty on gas and electric heaters</li> </ul>
Government to private sector	<ul style="list-style-type: none"> <li>• Fiscal Incentives Act 1974</li> <li>• Government purchase of SWH for new-build developments</li> <li>• Created an environment of regulatory certainty and gave continuous support</li> </ul>

## Implications

When Canon Andrew Hatch installed the first SWH on the roof of his church in Barbados, he showed considerable foresight and ingenuity. Since then, the development of the SWH industry in Barbados has largely been due to the commitment of its early pioneers and the support of successive governments. The baseline conditions for SWH to be successful – a favourable climate and high fossil fuel costs – exist for many countries today, just as they did for Barbados in the 1970s.

Barbados has been very successful in developing its SWH industry, overcoming several significant challenges. There are several key lessons for countries wishing to replicate Barbados' achievement:

- **Establish channels of funding** for pioneering companies that are struggling to access credit. In tough economic times this could include the direct provision of government loans.
- **Provide fiscal incentives** that support both the manufacturers and the consumers of SWHs.
- Maintain the **regulatory support framework over the long term** to provide confidence for investors and consumers.
- Ensure that the product is of **high quality**, supported by an **enthusiastic, locally-sensitive marketing strategy** to build consumer awareness of the benefits of SWH technology.
- Offer **performance guarantees** to reduce consumer risk.
- Encourage SWH distributors and manufacturers to **offer consumer credit schemes** to spread the upfront cost of the SWHs and their installation.

In order to stimulate the growth of a SWH industry most effectively, these measures should be seen as interacting elements of a system that creates the optimum conditions for market growth. Ensuring that these are implemented in a coordinated and timely manner is critical.

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The Climate and Development Knowledge Network (CDKN) aims to help decision-makers in developing countries design and deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at the country level.

## About Acclimatise

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Front cover photo: Kate Shifman  
Editing, design and layout: Green Ink ([www.greenink.co.uk](http://www.greenink.co.uk))



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