Barbados Photovoltaic Module Assembly Plant

Five-Year Business Plan (FY2002-2006)

Prepared for CBET by 4P Group, Inc. in cooperation with Professor Oliver Headley University of West Indies 30 November, 2001
1.0 Executive Summary

1.1 Description of Hypergrowth Business Opportunity
This business plan assesses the feasibility of initially establishing and operating a 1-3 MW/year crystalline silicon photovoltaic (PV) module assembly plant in Barbados. This facility would be the PV module supplier to Barbados, the Caribbean region, and select South American countries.

The capital cost of translating the solar cell into a laminated solar module is relatively low, so the economics of smaller capacity plants can be justified. The main economies of scale can be captured in module assembly plants with an annual capacity of 3-5 MW or greater. The capital cost for equipment is around US$0.9M for this scale of plant, but the full start-up cost will be up to US$3.125M. The number of jobs created in such a plant is very dependent on the level of automation utilized, but typically would be in the 30-50 range. From the point that the decision is made to proceed, and the site location has been acquired, module assembly plants can be operational within six to nine months. If a new building structure is required, these plants can be operational in twelve to eighteen months.

1.2 Market Needs
Although PV supplied electricity continues to inch closer and closer to the price of traditional grid-supplied sources, installed system costs need to decline further to eliminate the need for government grants and incentives. To reduce costs, manufacturing, distribution and installations need to be close to the end-user. The market also needs quality, easy-to-install solar panel designs that enable PV panels to be quickly interconnected, mounted and integrated with current and future building designs. Until PV manufacturing and installation costs can be lowered by another 50 percent, government grants and subsidies will be required to stimulate demand.

1.3 Financial Summary
A financial model was used to identify relevant investment needs and capital expenditures in conjunction with sales and expense projections to generate pro-forma financial statements. Those financial details are included in the Appendix (Sections A-2 through A-9). The following provides the reader with a summary of pertinent financial data.
1.3.1 Funding requirements
To start operation of the Barbados PV Module assembly plant will require US$3.125 million in funding. US$2.275 million in start-up costs is predominantly associated with US$1.0 million for plant and equipment and US$1.275 million for a six month supply of manufacturing inventory.

An additional US$850,000 is required to fund six months of single shift operation, and an additional three months supply of manufacturing inventory.

1.3.2 Five-Year Revenue Forecast
The following five-year revenue forecast assumes that a nine-month backlog of PV panel production has been pre-sold prior to start of manufacturing and that the plant’s full three-shift production capacity can be sold to Caribbean customers and/or international clients. The decline in sales revenues is a result of cost savings passed on to consumers and manufacturing capacity limitations of a single plant. Hypergrowth can be achieved with the introduction of additional plants either on Barbados or some of the other Caribbean nations.

1.3.3 Five-Year Profit & Loss Projections
The following five-year profit and loss forecast assumes that the initial PV plant will start operation in December 2002 with a single shift. Three months later, in March 2003, a second shift will be started and in June of 2003 a third shift will come on line to meet some of the regional market demand for PV solar panels. The reason for this phased implementation is to first get the production facility running efficiently with a single shift and secondly allow additional shifts to be trained properly before launching into full production. This approach minimizes downside risks and enhances the success of this venture. “Start small, do it right, make a profit and then expand”. Although revenues are projected to decline in years 3-5 due to plant capacity limitations and cost savings being passed along to customers, it should be noted that net profit contributions remain relatively constant.
1.3.4 Break-even point

Break-even occurs at a point where sales revenue equals fixed costs plus variable costs. The model demonstrated that the break-even point occurs at approximately US$1.220 million in sales or approximately 6,100 PV panels. With a single shift operation capacity of 20,000 panels per year the break-even point occurs during the fourth month of production.

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1.3.5 Sensitivity Analysis

Sensitivity analysis demonstrates below that the plant will operate profitably even if sales projections are 20% less than forecast. Additional sensitivity analysis is included in the Appendix.
1.4 Economic and Environmental Benefits

In addition to creating jobs in Barbados it is estimated that foreign exchange savings would amount to US$17,436,000 over the five-year study period. Furthermore, reduced dependence on foreign oil and replacing greenhouse gas-emitting electricity generation with clean, reliable solar generated supplies has both economic and environmental benefits.

1.5 Formal Relationships

1.5.1 Funding

The following investors have expressed an interest in making investments in this venture:

- **British American Insurance Company**
  - Contact Person: Mr. A. Claude Musaib-Ali – Executive Chairman; Phone (868 675 5094); E-mail acma@tstt.net

- **Insurance Corporation of Barbados**
  - Contact Person: Mr. Wismar Greaves – CEO; Phone (246 429 7084); E-mail icb@icb.com.bb

1.5.2 Installation and Distribution

A formal relationship has been developed with Sustainable Systems International (SSI) on Barbados to provide Sales, Engineering, Mechanical Integration, Electrical Integration, and Maintenance of PV systems.

SSI has just been formed and will be concerned with the installation and maintenance of renewable energy systems and energy conservation. SSI has close links with Caribbean InfraTech that has already installed PV systems in remote areas of Belize, Guyana and other Caribbean territories.

Discussions are also under way with Barbados Light and Power Company on grid-interconnected PV systems.

1.5.3 Pre-Sales

Memorandums of Understanding are scheduled to be signed with a number companies for PV panels. Negotiations are being conducted with the Barbados Olympic Association, the University of West Indies and the Government of Barbados on the installation of solar PV systems in sizes from 80kWp to 500kWp.

Details associated with this plan are presented in the following sections: