1.7 Project Idea for Technology 6: Solar Assisted Air Conditioning

1.7.1 Introduction and Background

Over 10% of the total electricity generated in Sri Lanka is utilized for air conditioning of buildings. Almost all these air conditioners utilize the electrically operated vapour compression technology. In the proposed technology, solar heat is used to provide a part of the energy needed for this application. This would result a reduction about 20% of the electrical energy used for air conditioning.

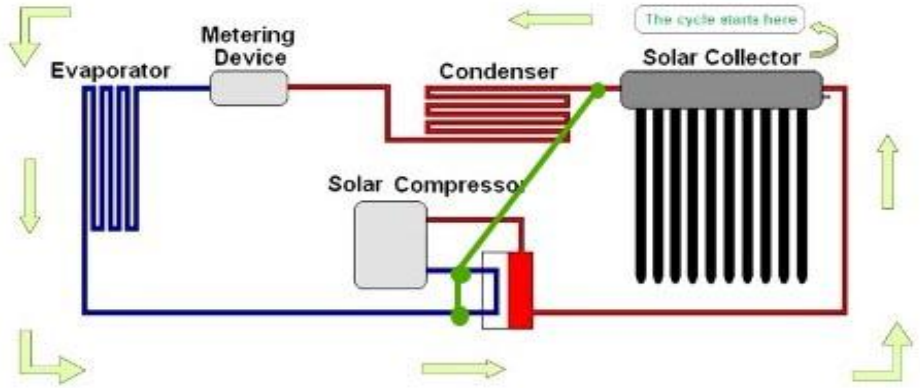

Figure 1.1: Solar Assisted Air Conditioning System

In the proposed technology, the green line part of the convention air conditioning cycle in the diagram shown above, is replaced by a solar collected and heat exchanger.

1.7.2 Objectives

To install a Window Type Solar Assisted Air Conditioner at the office of the Sustainable Energy Authority to monitor and verify its performance and disseminate the merits of this technology to all prospective users of this technology in Sri Lanka.

1.7.3 Outputs of the Proposed Project

- A comprehensive feasibility report on the financial and technical viability of Solar Assisted Air Conditioning Technology.
- Diffusion of Solar Assisted Air Conditioning Technology amongst all users of air conditioning systems in Sri Lanka.

1.7.4 Relationship to the country's sustainable development priorities

Section 2.3 of the National Energy Policies and Strategies of Sri Lanka of October 2006, specifically deals with Promoting Energy Efficiency and Conservation According to this section, Energy supply systems will be efficiently managed and operated while also ensuring efficient utilization and conservation of energy.

The government of Sri Lanka is very keen to reduce the foreign expenditure on energy related matters. Hence the government is promoting indigenous resources based energy development and energy conservation for the following reasons:

- The present share of indigenous resources Vs. imported resources based electricity generation in the country is 40:60. In a decade, as per the present plan, this situation is expected to worsen reaching a value of 20: 80. In respect of transport fuel, the entire requirements of fuel are imported. Such a large share of imported energy is very unhealthy for the energy security of this country. Hence the government wants to reduce the share on import based energy.
- Out of a total of nearly 10 billion US$ worth of annual exports, over 60% goes for the import of fuels. This compounded by the very adverse balance of payments issues experienced in the country, has made the government to encourage all concerned to develop indigenous sources of energy.
- The development and utilization of indigenous resources also lead to increased local value addition thus increase the generation of local wealth. Most of such wealth goes to the poorer segment of rural communities. This will enable the government objectives of achieving better wealth distribution.

1.7.5 Project Deliverables

As a result of this project at least 100 kW of air conditioning load will be reduced every year from 2013 to 2017. As an initial step, this would enable the government to demonstrate this technology so that a significant amount of air-conditioning load is reduced.

1.7.6 Project Scope and Possible Implementation

The scope of this project is to install, operate and monitor and verify the performance of a Solar Assisted Air Conditioning system and to take action to diffuse this technology to all users of air conditioning systems in Sri Lanka.

1.7.7 Project activities

The following are the project activities:

- Preparation and publication of a Feasibility Report on the Financial and Technical viability of Solar Assisted Air Conditioning System. Introduction of a government policy of not subsidizing fossil fuels.
- Eliminating the taxes imposed on energy efficiency projects.
- Donor Agencies to provide funds at low interest rate for energy efficiency project.
- Sustainable Energy Authority to invoke the provision in the Act to impose a levy on fossil fuels and use this revenue to finance energy efficiency projects.
- Technical colleges and universities to include Solar Assisted Air Conditioning System in their curricula.
- Procurement, installation, operation and monitoring of a Solar Assisted Air Conditioning System.
- Diffusion of Solar Assisted Air Conditioning System to all users of air conditioning system in Sri Lanka.

1.7.8 Timelines for the Proposed Activities

Table 1.17: Timelines for the Proposed Activities of Project 6

The time frames of year 1, year 2 and year 3 to 25 are chosen taking into account the project initiation, commissioning and operational phases of the project.

No.	Activity	Year 1	Year 2	Year 3 to Year 25
1.	Preparation and publication of a Feasibility Report on the Financial and Technical viability of Solar Assisted Air Conditioning Technology.			
2.	Eliminating the taxes imposed on local construction in respect of energy efficiency projects.			
3.	Donor Agencies to provide funds at low interest rate for energy efficiency projects.			
4.	Sustainable Energy Authority to invoke the provision in the Act to impose a levy on fossil fuels and use this revenue to finance energy efficiency projects.			

5.	Technical colleges and universities should include Solar Assisted Air Conditioning System technology in their curricula.			
6.	Procurement, installation, operation and monitoring of a Solar Assisted Air Conditioning System.			
7.	Diffusion of Solar Assisted Air Conditioning System to all users of air conditioning system in Sri Lanka			

1.7.9 Budget/Resource requirements

Table 1.18: Budget Estimate for Proposed Activities of Project 6

The budget values assigned for "international" are expected to be raised as grant component from donor agencies without burdening the national consumers. The "local" component of the budget is ultimately expected to be provided by the consumers and citizens of this country.

No.	Activity	Proposed Budget (US$)		Remarks
		International	Local	
1.	Preparation and publication of a Feasibility Report on the Financial and Technical viability of Solar Assisted Air Conditioning Systems	150,000	Nil	Outright Grant
2.	Eliminating the taxes imposed on local construction in respect of energy efficiency projects.	Nil	Nil	Policy
3.	Sustainable Energy Authority to invoke the provision in the Act to impose a levy on fossil fuels and use this revenue to finance energy efficiency projects.	Nil	1,000,000	Guarantee fund
4.	Technical colleges and universities should include Solar Assisted Air Conditioning System in their curricula.	Nil	80,000	Vote of the Ministries of HE/VT
5.	Procurement, installation and monitoring of a Solar Assisted Air Conditioning System	80,000	Nil	Out right grant
6.	Dissemination Programme on Solar Assisted Air Conditioning System	80,000	Nil	Out right grant
	Total	**310,000**	**1,080,000**	

1.7.10 Measurement/Evaluation

Monitoring: The progress of project activities will be monitored periodically by the committee coordinating the project. This committee will be constituted with representatives from the following institutions:

- Ceylon Electricity Board
- Ministry of Power and Energy
- Ministry of Finance
- Sustainable Energy Authority

Evaluation: The Monitoring Committee is expected to nominate a suitable team to evaluate the performance and progress of the project and recommend appropriate corrective measures.

The monitoring and evaluation committee is expected to formulate quantitative and measurable indicators such as the number and capacities of Solar Assisted ACs and their relative energy consumptions, amount of funds generated etc. on a timely and regular basis.

1.7.11 Possible Complications/Challenges

The following complications and challenges need to be met:

- Although it appears that a number of systems utilizing this technology are in operation in some countries, notably in the Philippines, the basic scientific principle of this technology is not very clear. Hence this aspect should be carefully addressed prior to embarking on this project.

1.7.12 Responsibilities and Coordination

Table 1.19: Responsibilities of Project Coordination

Institution/ Stakeholder	Responsibilities
Ceylon Electricity Board/ Ministry of Power & Energy	• Monitoring of the Project
Sustainable Energy Authority	• Primary Implementing Agency • Collection of levy from fossil fuels and creation and operation of a renewable energy/energy efficiency guarantee fund. • Procurement, installation and operation and monitoring of a Solar Assisted Air Condition

	system. • Dissemination of this technology to all users of Air Conditioning Systems.
Ministry of Finance	• Receipt and disbursement of donor contributions
Ministries of Higher Education and Vocational Training	• Introduction of these technologies in the respective curricula.

Implementing Agency:

Sustainable Energy Authority (SEA) has the skill, knowledge and resources required to procure, install and monitor a Solar Assisted Air Conditioning System. SEA is conducting many awareness programmes on different aspects of Renewable Energy and Energy Efficiency. Hence, **Sustainable Energy Authority is the most appropriate primary agency to implement this programme.**

1.7.13 List of References

1. Solar Assisted Air Conditioning, Felix Richard A. Cordova, President & CEO, Edward Marcs Philippines Inc. www.edwardmarcsphil.com ; E-mail: info@edwardmarcsphil.com Tel Nos: +632 9221371; +632 9221658; Mobile: +63917 6288839
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