

ECOWAS Solar Thermal Energy
Capacity Building and
Demonstration Programme
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SOLAR THERMAL ENERGY IN CAPE VERDE - STATE OF DEVELOPMENT -

António Barbosa

BACKGROUND CAPE VERDE

- Population of about 500,000 inhabitants
- Land area of 4,033 km²
- The average solar radiation is about 6.0 kWh/m²/day
- Insolation is above 3000 hours per year, therefore excellent condition to harness solar thermal energy.
- Lately, tourism has become one of the main economic activity
- Contributing to 20% of GDP and providing many jobs.
- Tourism activity is concentrated on the of islands of Sal and Boavista and accounts for about 80% of the market and where most the investment are located.
- Despite the benefits of tourism, it leaves a huge trail of carbon footprint and contributes to high level of imports of fossil fuel.

Foreseeing the need of solar thermal energy in the context of tourism

Tourism statistics in Cape Verde

Trend of guests and stay time from 2009 to 2013

	2009	2010	2011	2012	2013	Change 12/13 (%)
Guests	330,319	381,831	475,294	533,877	552,144	3.4
Stay night	2,021,752	2,342,282	2,827,562	3,334,275	3,436,111	3.1

Remark: Table above does not include tens of thousands of cape-verdians who come every year for vacation with an average period of stay of one month but stay with relatives and not in hotels.

Energy statistics 2013

- In 2013 CV produced 390 GWh of electrical energy of which 21.26% was from renewable source (Solar PV & Wind). Of this total, 91 GWh (23.28%) was generated in Sal & Boavista the main destination of tourism with only 8.0% of population.
- In 2013, CV imported 304,000 toe of energy (butane gas, motor gasoline, diesel, HFO, JET Fuel) totaling 230 millions USD or appr. 13% of GDP.

Solar thermal energy Situation in Cape Verde

- Up to now, the use of solar thermal energy is limited to water heating of low temperature (60-70 C) for domestic purposes. But the need for solar thermal energy is huge since most of applications of heating water or generating steam in industrial plants consume fossil fuel (Diesel and IFO or HFO), and, in some instances electricity.
- Regrettably no public institutions, namely hospitals, schools, public companies, use solar thermal energy to satisfy their hot water requirement. The same can be said with regard to private enterprises, such as, big hotels, industries – fish processing plants, paint mixing factory, soap factory, soft drinks plants, etc. However, in the last few years (2 to 3) or so an uptake has started.
- On the contrary, we assist that several small hotels or boarding rooms, in fact, do use electricity for heating water despite the huge cost of electricity, and large hotels based in Sal and in Boavista use boiler fed by Diesel oil and/or butane gas for their heating needs (hot water, kitchen and laundry).

Experiences of your institution concerning solar thermal energy

- Solar thermal energy in Cape Verde is recent and have been in use since early 80's but in small application limited to water heating for private houses.
- At UNICV some initiatives regarding professional training in renewable energy has taken place but up to now they haven't been concluded and therefore results could not be assessed. There is a private university that offer education & training program in renewable energy but it started last year and will be under way for the next years. In Praia a vocational school offers some short courses programs on renewable energy but it is not regular
- Training programs are essentially addressed for young men and women coming from high school or drop off from the school system, however, some refreshment courses are offered to existing personnel in the labor market.
- It is **recommended that learning objectives** and outcomes be rigorously verified and measures taken to overcome the shortcomings identified.

Education and Training

The newly built Training Center for Renewable Energy and Industrial Maintenance is expected to delivery good professionals in renewable energy field capable of attending the requirements of installation and maintenance of such systems. Therefore, **it is strongly recommended** that the training program be designed and implemented with high component of practical classes (lab hours) and on-the-job training properly monitored.



Experiences of your institution concerning solar thermal energy

There is no production of solar collectors or solar thermal systems in CV. Sales of solar collector or solar thermal systems are by imports and frequently they come in small lots because of inventory costs. Only a few stores deal with the import solar systems. However, in many instances private people may bring them directly to the country.

The statistics available from the Customs Authority indicate the overall costs of solar heater imported and the overall weight. From that data and considering the import price of one unit of solar system, say, 1.000 € and import price of electric water heater of 30 liters capacity, say, 100 €, the table below shows the number of units extrapolated for 10 years period (2003 to 2012). It must be said that statistics of solar systems from private shipments are not recorded since they don't fall under the category of imports (those sent by cape-verdians living abroad);

Statistics of solar systems vs electric heater 2003/2012

	SOLAR HEATERS IMPORTS									
YEAR	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1000 x ECV	3848	867	4197	13198	4507	6855	10298	4399	7280	10714
EURO	34898	7863	38064	119691	40873	62173	93395	39893	66024	97162
Nr. Units	35	8	38	120	41	62	93	40	66	97
								Total units		600
	ELECTRIC HEATERS IMPORTS									
YEAR	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1000 x ECV	19869	20361	21700	23875	54167	43020	32256	17296	34949	24745
EURO	180195	184653	196800	216528	491245	390150	292527	156860	316959	224412
Nr. Units	1802	1847	1968	2165	4912	3901	2925	1569	3170	2244
								Total units		26,500

Modes of heating water

- From an inquiry carried out on the islands of Sal, Boavista, S. Vicente and in the city of Praia only a few hotels use solar thermal energy for heating water (about 20% of total). On the contrary, there is a wide use electrical heaters and boilers fed either by butane gas or diesel oil. Recently, because of high prices of electricity some switching from electricity to solar are taking place.

Fuel consumption for hotels

- Hotels of more than 500 rooms or 1,000 beds (in Sal and Boavista) spend about 100,000 Euros per year in butane gas for cooking and laundry and huge some on Diesel Oil for heating water purposes. These fuels are burnt in boilers;
- Medium size hotels spend on average 60,000 Euros per year on fuel for heating water purposes, cooking and laundry;
- Small hotels that use electricity for heating water purposes spend between 24,000 to 30,000 Euros per year, though costs are not segregated. **Recommendation: Mandatory usage of solar thermal system**



Clube Hotel Riu Garopa – Santa Maria, Sal Island

Cost of heating water from butane gas

For example, this Hotel, Praia-Mar, spends up to 80,000 Euros per year in butane gas to feed the boiler to satisfy his need in of hot water for laundry, cooking and sanitary hot water. Apparently there is under way a project to implement solar panels to cater for those needs. Investment with **payback time: 2 years**



Existing key barriers for solar thermal energy

- For domestic application high cost of solar system is an impending factor (a system of 150 liters can cost up to 1,600.00 Euros). On the other hand, an electric heater of 30 liters and rated 1,500 W is sold for 120.00 Euros
- For industrial application the cost should not be considered as an impediment since most of the investments are so large when compared to what might cost a solar system. Hence, one possible explanation for lack of usage of solar thermal energy in industry, particularly with regard to tourism industry, namely hotels, could be lack of legislation and regulation to enforce usage of such systems;
- An important aspect related to low usage of solar thermal energy in industry in general, could be attributed to lack of information and knowledge of potential savings in using solar thermal energy for water heating purposes. Probably, lack of motivation since frequently decision makers are not held accountable for their decisions;
- Poor awareness and information among stakeholders.

Challenges on maintenance of solar thermal energy

- **Water quality - Solar water heaters require clean, non-hard water for long term operation. Hard or dirty water leads to blockage and corrosion of pipes and storage tanks. A couple troublesome experience was identified in Praia (Tourism school Hospital) which result from poor maintenance. Situations like these may cause bad reputation and lead people to create myths; **Mistrust!****
- **Improper installation and commissioning and maintenance of SWHs are the leading causes of system failures. **Education and Training!****

Needs and expectations

- **ECOWAS solar thermal program:** Provide means to exchanges experiences, legislation, regulation, codes and sharing ongoing research program;
- **Ministry of Energy:** Approve legislation and specific regulation that promotes usage of solar thermal energy , for example, by levying heavy duty taxes in imports of electric water heaters and providing fiscal incentives for those who contributes in lowering the carbon foot print of their activities and make mandatory for foreign investment;
- **Ministry of Housing, Urban planning and Environment :** Enact building codes in line with sustainable practice, particularly having in mind the question of thermal load during the hot and humid months, natural lighting and green areas to provide shading to façades. Aim to have in the future near zero energy balance buildings by adopting best practices in civil construction in line to green/sustainable construction in partnership with municipal authorities
- **Chamber of Architects:** Be more persuasive to their clients in leading them to embrace sustainable design for long term benefit.

END NOTE

Regrettably, those who should use solar system to set the example and be a role model, simply, do exactly the contrary - use electric heater. Therefore, probably, electric heaters and boilers are here to stay for long time!

**THANK YOU & MIND THE
DEGRADATION OF ENERGY**

