



ZCR Success Story I:

reduction of energy consumption and cost

for Daluyon Beach and Mountain Resort, Puerto Princesa, Palawan



Project funded by:



European Union's SWITCH-Asia Program

Project implemented by:



GrAT, PhilGBC, PCSD, CIEMAT-PSA, ASSIST



Daluyon Beach & Mountain Resort is located on Palawan's Sabang Beach, close to the famous Underground River National Park. The resort has 8 modern Asian beach villas (2 rooms per villa), a conference pavilion which can accommodate 150 people, and a swimming pool (18m x 12m). A restaurant and bars are also available.

The rooms are equipped with air-conditioner and ceiling fan, solar hot water, mini-bars, and other multimedia elements such as wi-fi, satellite cable TV, and DVD player. Daluyon Beach and Mountain Resort provides 24-hour generated power.

Implemented Energy and Resource-Saving Measures

The people behind the Daluyon Beach & Mountain Resort were already aware of the importance of natural conservation and keen on utilization of renewable energy.

In fact, the resort has already adopted the solar hot water supply system – an innovation that addresses the energy-intensive design of conventional water-heating systems.

Yet, a number of further improvement potential was recognized through the detailed energy audit by the ZCR project team.

The next pages outline the changes that the resort has adopted in response to the ZCR project team's recommendations.



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Water meters

By installing water meters, the resort has now better understanding of its water consumption used per area. Installation of energy monitoring device and the awareness of the current cost enabled the resort to manage the resort's energy use behavior, and use the data as a better basis for peak load manage-



Before:

Main water line had no water meter.



After:

Water meters were installed at overhead storage tank, main water line, kitchen and restaurant in order to measure resort water

Louver ventilation



Before: No louver ventilation at the roof

Installed louver ventilation at the roof allows better cross-ventilation and prevents proliferation of mold, fungi, and bacteria caused by trapped air in the ceiling. The natural ventilation improves the air quality significantly.



After: All guest rooms, the staff house, and the diesel generator power house now have louver ventilation in the roof.

Through the louver ventilation, there is no need to turn on electric light during day-time anymore. It is much more comfortable for staff to work with the improved air quality and at lower temperature with

Roof ventilation



Before: No roof ventilation and insulation at maintenance department, stock room, and staff cafeteria



After: Installed roof ventilation allows hot air to escape, and natural light to come in.

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Waterless urinals



Waterless urinals have been installed in all public areas. Through this measure, over 150,000 liters of water are saved per urinal.

Daylight solar tubes

The front desk and the kitchen were equipped with solar tubes, which lead the daylight directly into the room. Now, indoor areas offer natural light, which increases the comfort.



During daytime, 8 units of 50 watts, 4 units of 14 watts and 1 unit of 25 watts light bulbs are turned off (6 hrs approx.) at the front desk. This saves 2800 W every day. In the kitchen, 8 units of 18 watts fluorescent lamps and 3 units of 9 watts fluorescent lamps are now turned off during daytime (8 hrs approx.). Also, inefficient light bulbs have been replaced with energy efficient ones which consume only 20 % electricity.

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Cooling



Before: No shading over the water pump

After: Installed roof shade to protect the motor from direct sunshine



Before the ZCR project, the conference pavilion did not have any cooling facilities. Thus, the solar heat directly penetrates the roof of the tent. This increased the inside temperature up to 55 °C. It was incredibly hot!



Before: No cooling system at the roof. The heat of the sun directly hits the tent (conference pavilion) roof and radiant heat reaches 53.9 °C inside.

Instead of covering the entire structure and providing four units of air-conditioner which was quoted at PhP 680,000 and could consume 12.0 Tons of Refrigeration (TR) every time the tent is used, the CEO and owner of Daluyon Beach & Mountain Resort, Mr. Butch Tan, opted for a simpler solutions recommended by the ZCR team, to place insulation on the roof



After: Installed water sprinkler and insulation at the roof



After: Placed decorative cloth for better aesthetic effect and as an added insulation

of the tent skillfully and to utilise a water sprinkler to cool down the intense radiant heat. The temperature inside the tent is remarkably lower by an average of 8 °C on a hot sunny day. This makes it much more comfortable to be inside the tent. The sprinkler operates on a closed loop system: it uses rainwater collected from the roof, which goes back to the cistern and re-circulated. The water pump consumes 350W only when in use.

The refurbishment of the conference pavilion is a good example showing the feasibility of saving energy consumption at lower cost, and increasing the comfort of users at the same time.

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Key Success Factor

What makes the Daluyon Beach & Mountain Resort so successful both in business and in its environmental performance? The first success factor is the environmental consciousness and devotion of the owner and staff members. Mr. Butch Tan quickly implements measures that improve energy efficiency when he is aware of their benefit, and uses new green technologies such as the solar tube for natural lighting.

The second success factor is the skilled engineers that the resort has. To support the local engineers in obtaining basic and advanced knowledge and handy skills, the ZCR project also conducted a series of trainings wherein the resort engineers were able to participate. More information on training opportunities can be found at the ZCR website:

www.ZeroCarbonResorts.eu.

The last unique success factor is the prompt and frequent feedback of the owner to the ZCR team. By sharing its achievements and findings, the resort has received further technical advices and regular monitoring from the international and local experts..



CEO Butch Tan (right) and engineering staff

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30 March 2011

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Project Funded By:



European Union's SWITCH-Asia Program

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