

開發無量光—萬佛聖城將全面採用太陽能

Tapping into Infinite Light

—CTTB Switching to Solar Power



The purifying boundaries ceremony for the solar farm at CTTB / 萬佛聖城太陽能發電系統用地灑淨儀式

本刊編輯部整理 | Compiled by Editorial Staff
英譯：張簡嘉乃 | English Translation by Amy Chang-Chien



DHARMA REALM NEWS | 法界音

(續封面內頁)

自5月份起，將陸續安裝1,800餘片太陽能板，每片發電量為280瓦。今年底之前，即可供應全城用電。萬佛聖城太陽能計劃小組成員張簡嘉乃，曾於一家製造太陽能板無人飛機的公司任職七年，對太陽能產業相當熟悉。本刊特別進行專訪，請她介紹萬佛聖城的太陽能發電計劃。

問：這項太陽能計劃如何開始？

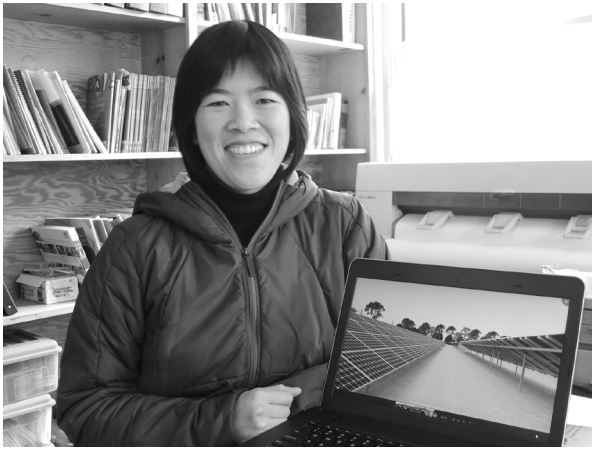
答：萬佛聖城於2011年，在五觀齋堂屋頂安裝了可發電五萬瓦的太陽能板，前期準備工作自2008年即已展開，但當時太陽能板的價格仍然居高不下。我聽上人的老

(Continued from the front inner cover)

CTTB received the necessary permits in late April from the County of Mendocino. After over a year of planning, this solar project finally launched. Starting in May, over 1800 solar panels will be installed over the next several months, with each panel producing 280 watts of electricity. It will cover the current electricity usage at CTTB. One member of the solar project team, Amy Chang-Chien, worked seven years for a company that produced solar-powered unmanned aerial vehicles before she came to CTTB and is familiar with the solar energy industry. We interviewed her to learn more about CTTB's solar project.

Q: How did the project start?

A: In 2011, the City of Ten Thousand Buddhas installed a 50 kW solar photovoltaic system on the roof of the Five Contemplations Hall. Preparations for the 2011 project began in 2008, when solar panel prices were still high.



張簡嘉乃的手提電腦展示萬佛聖城太陽能系統的立體模型圖。

Amy Chang-chien showing the 3D model of CTTB's solar energy system on her laptop.

弟子說，上人住世時，即已對太陽能感到興趣。過去兩年間，太陽能板的價格下跌大約一半，這是我們興建太陽能發電系統的決定因素之一，另一大因素就是我們奉行採用再生能源的原則。

問：齋堂屋頂安裝的太陽能板，至今為萬佛聖城節省了多少能源？

答：齋堂屋頂安裝的太陽能發電系統，不僅供電給廚房與齋堂，也供應萬佛聖城其餘地方。2011年供應全城七分之一的用電量；如今供應全城用電量將近十分之一，因為這幾年聖城在成長中。四年來，因為齋堂屋頂這套發電系統而減少排放的二氧化硫約達2,700磅，一氧化氮排放減少1,700磅，二氧化碳排放量更減少236噸。

問：新的太陽能發電計劃規模有多大？當初如何展開？

答：這套新系統的發電量為五十萬瓦，將可涵蓋聖城目前全部用電需求。數年前萬佛聖城的建築維修部門曾邀請工程專家，針對聖城擁有的發電資源進行永續性評估。從大家熟悉的太陽光伏發電、太陽熱能、風力發電、水力發電，乃至大家較不熟悉的地熱發電、小型渦輪發電、燃料電池、生質能源等，都作了可行性評估。當時評估的因素包括萬佛聖城所擁有這些發電能源的質量，分析過去與未來用電需求、長期使用成本，以及運作與維修的複雜程度等。最後太陽光伏發電與太陽熱能兩個項目

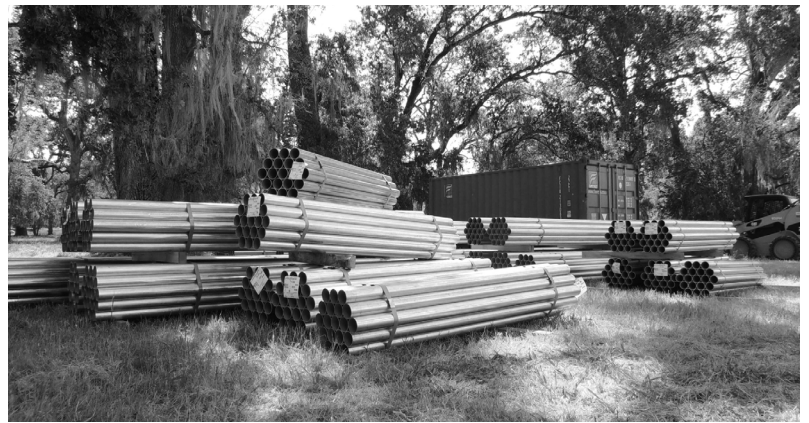
Actually, older disciples have told me that the Venerable Master had long been interested in solar energy. Within two years, the price of solar panels dropped by about one-half. The price drop was a definite motivator in addition to the principle of running on renewable energy.

Q: How much energy does the solar system save in the kitchen and dining hall?

A: The way that the solar system is set up, the energy generated is used throughout the whole campus, not just at the kitchen and the dining hall. It covers about one-seventh of the energy used in 2011. It is closer to one-tenth today due to recent growth. CTTB's 50kW system, to date, has offset emissions by 2,700 pounds of sulfur dioxide, 1,700 pounds of nitrogen oxides, and more than 236 tons of carbon dioxide.

Q: How big is the new project and how did it get started?

A: It is a 500kW system, designed to completely offset the current electricity usage at CTTB. A couple of years ago, the Buildings & Grounds Department at CTTB commissioned an engineering firm to do a sustainability study for the CTTB area, which besides the main campus, also includes Wonderful Enlightenment Mountain, meadows on the east



太陽能系統的部分建材堆積在工地現場。
Solar energy system parts on site at CTTB.

side, hills to the north and creeks merging on the south. The engineers evaluated potential onsite energy sources, from commonly-known technologies such as solar PV (photovoltaic), solar thermal, wind and hydroelectric power, to lesser-known ones like geothermal, micro-turbine, fuel cell, and biomass. Feasibility was assessed for each based on the quantity and quality of the power resource on-site, CTTB's physical site characteristics, historical and planned future energy usage, life-cycle costs, and operational and maintenance complexity. The two front-runners were solar PV and solar thermal. That's when we realized that we had to move forward with the next phase of the solar project, which is a much bigger project than the first.

Q: What is your role in this project?

脫穎而出，那時我們開始意識到，聖城的太陽能發電計劃必須進入下一階段，也就是比第一套（齋堂屋頂）大得多的發電系統。

問：妳在這項計劃中扮演什麼角色？

答：萬佛聖城的建築維修部門有個水電瓦斯計劃小組，主要負責這項新太陽能發電系統的構想、評估、詳細計劃與整合。小組成員有四人，包括近恭師、果露居士、親悟居士，還有我。我主要負責聯絡、溝通與宣導。除了建築維修部門的人員之外，我還要感恩上人遍佈世界各地的弟子支持，以及大家同心協力讓這項計劃順利成就。

問：這套太陽能發電系統安裝在什麼地方？

答：在萬佛聖城西北角的空地。我們當初評估了很多座屋頂，最後發現在地面安裝發電系統的好處更多。我們找了四個地點，從中挑選了現在的用地。開始發電後，電力將供應全城各建築物使用。北美的太陽能板在安裝時，都會朝南傾斜，以便吸收最多的太陽能。我們挑選地點的最主要考慮因素，是希望太陽能板的反光不致影響鄰居以及我們自己。現在的用地，不但不會干擾鄰居，而且從萬佛聖城內部也看不到。

問：這塊用地有多大？安裝太陽能發電系統後的環保效益如何？

答：佔地大約兩英畝。開始發電後，頭一年減少的二氧化碳排放量，等於美國423英畝面積的森林全年可吸收的二氧化碳；也相當於耗用五萬八千加侖汽油後，所排放的二氧化碳數量。

問：這套太陽能發電系統可使用多久？

答：使用年限為30年到50年之間。不過廠商保固期是25年，由於發電功率會逐年下降，因此屆時可能要更換零件來維持發電功率。☸

A: There are four people from the utilities planning group in the Buildings & Grounds (B&G) department mainly responsible for the conception, evaluation, specification and integration of the new system—Dharma Master Jin Gong, John Scroggs, Murrah Boswell and myself. My role is in coordination, communication, and outreach. Besides the folks from B&G, I am grateful for the support of disciples from all over the world and the way everybody worked together to make this project possible.

Q: Where will the new system be located?

A: In the northwest corner of CTTB. We evaluated various roof-top locations and determined that a ground-mount system has more advantages. Four different locations were then evaluated and one was selected. In North America, the panels are tilted facing south to maximize the amount of energy captured. A key consideration was not to reflect glare onto our neighbors nor ourselves. The location chosen will not bother our neighbors and we will not see it from the main areas inside CTTB.

Q: How big is this solar farm? What are the benefits of the system for the environment?

A: The solar farm will cover about 2 acres. In its first year of operation, the carbon dioxide reduced by the new solar system is equivalent to the carbon sequestered by 423 acres of U.S. forests in one year; or equivalent to 58,000 gallons of gasoline being consumed.

Q: How long will this solar system last?

A: This solar system will last around 30 to 50 years. However, the manufacturer's warranty is 25 years. The performance of this solar system will degrade every year and we will need to replace parts of the system to maintain its performance.☸



工頭（中）率領工人測量萬佛聖城太陽能系統的用地 The foreman (middle) and workers measuring the site.