

智慧電網示範系統建置

執行單位

義守大學

計畫主持人

陳朝順

- 再生能源管理系統可促進綠能產業推動與增加電網綠能併網容量。離島智慧電網發展綠能儲能整合控制技術，降低離島發電成本及提升綠能應用。變壓器管理系統，執行停電即時回報、需量反應與電動車充放電管理。

中華民國發明專利

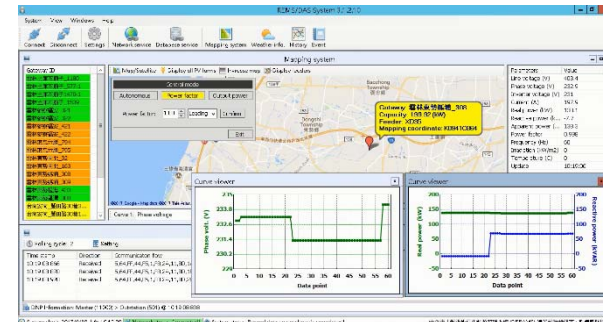
- 再生能源管理系統及再生能源管理方法 (公開號201732719)
- 末端單元及其監控系統 (專利號I596859)
- 混合式再生能源發電系統 (專利號I611646)
- 智能化變壓器管理系統 (申請號102107506)



微型相別量測單元



變壓器末端單元



再生能源管理系統

- 再生能源管理系統與先進配電自動化系統整合控制功能，執行綠能發電智慧變流器之調控，增加電網綠能併網容量30%以上，支援我國綠能產業之發展與綠能推動目標之達成。變壓器末端單元應用光纖、電力線載波及LoRa混合式通訊，即時監測變壓器運轉狀態並作過載或停電回報，偵測饋線末端電壓狀態，配合綠能發電，執行變電所主變壓器OLTC之調控而提升供電品質；執行用戶需量反應與電動車充放電控制，避免變壓器燒損而影響供電品質。本系統完成台電系統功能驗證，亦獲得德國紐倫堡發明展獎牌。相別量測單元(μ PMU)確認變壓器相別，改善配電系統三相不平衡。七美離島智慧電網完成太陽光電系統、儲能系統及能源管理系統建置，可穩定綠能發電，並改善離島供電品質。

Demonstration system of smart grid

Execution Unit

I-Shou University

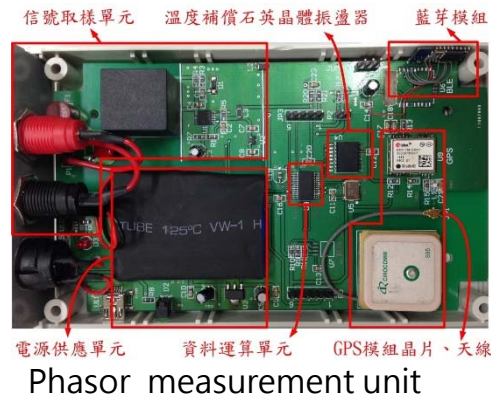
Project Director

Prof. CHAO-SHUN CHEN

- The renewable energy management system performs the control of PV smart inverters to increase the penetration rate of renewable energy and improve service quality of power system. The Cimei smart grid with PV system and wind generators develops the integrated control system to reduce the diesel generation cost by executing the smart charging and discharging of energy storage system. The transformer terminal unit can monitor the operation status of transformers and support the customer demand response and EV smart charging to prevent the overloading problem by using the hybrid communication of optical fiber, power line carrier and RF LoRa.

Patents

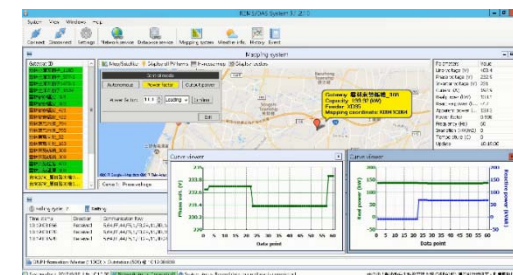
- Renewable energy management system (application #201732719)
- Terminal unit and supervision system (pat #I596859)
- Hybrid renewable energy generation system (pat # I611646)
- Intelligent transformer management system (application # 102107506)



Phasor measurement unit



Transformer terminal unit



Renewable energy management system

● Content

The integrated control system of renewable energy and advanced distribution automation increases the penetration rate of renewable generation in distribution system by 30%, which will provide technical support for the development of green energy in Taiwan. The transformer terminal unit (TTU) performs the real time monitoring of distribution transformers and reports the flag of overloading and power outage using the hybrid communication system of optical fiber, power line carrier and LoRa. It can also be used for measurement of feeder voltage for decision making of main transformer OLTC control considering the renewable energy generation to mitigate the impact of renewable integration. The TTU can also be used for customer demand response and smart charging of electric vehicles. The micro phasor measurement unit (μ PMU) identifies the transformer phase to enhance three phase balancing of distribution system. The smart grid of offshore Cimei Island executes the integrated control of PV system and energy storage system to stabilize the green energy generation and improve the service quality of power system.