

# 自主式分散型區域電力控管技術發展與應用

執行單位

原能會核研所

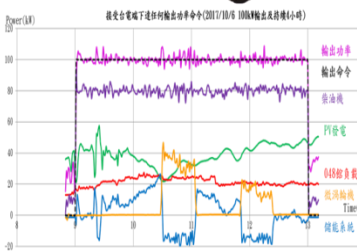
計畫主持人

張永瑞副組長

- 本計畫配合行政院核定「智慧電網總體規劃」方案C10工作項目，發展自主式區域電網關鍵技術，推動建置龍潭微電網實證示範場域與台電龍潭OQ38高壓饋線實際併接運轉，未來可應用於區域需量控制及接受台電電力調度之輔助服務。

## 專利：

1. 具備智慧型調度管理之電網系統 (中華民國、第I456857號)
2. 微電網獨立運轉下負載管理裝置 (中華民國、第I455440號)
3. 分散式頻率偵測及防止微電網全黑控制器 (中華民國、發明第I550999號)
4. 串接式儲能系統 (中華民國、發明第I560970號)
5. 可快速提供分散式電源於配電饋線轉供之配電自動化系統 (中華民國、發明第I591933號)



接受台電調度穩定輸出  
功率100kW連續4小時



核研所龍潭微電  
網實證試驗場域



串接式儲能系統

- 本計畫開發自主式區域電網關鍵技術，包含：分散型電力系統及智慧控制技術、分散型能源電子技術、多代理人分散型控制系統之智慧備援技術、以及區域電網數據管理分析技術發展與應用。
- 已完成國內首座具再生能源供電之微電網系統，與台電OQ38高壓饋線併接，並已實測達成可接受台電調度命令進行(1)需量控制卸載達50kW、(2)解聯孤島運轉、(3)併聯市電穩定輸出功率達100kW等輔助服務，相關研發技術移轉至中興電工、大同、台達電、裕隆電能等公司。
- 本計畫開發之「允許電池單元提供最大化的系統利用率之再生能源儲能系統」以及「核研所能源管理系統」，分別入圍2017與2015年全球百大技術貢獻獎(R&D 100 Awards)之決選名單。

# Development and Application of Autonomous Distributed Power Control Technique

Execution Unit

Institute of Nuclear Energy Research, Atomic Energy Council

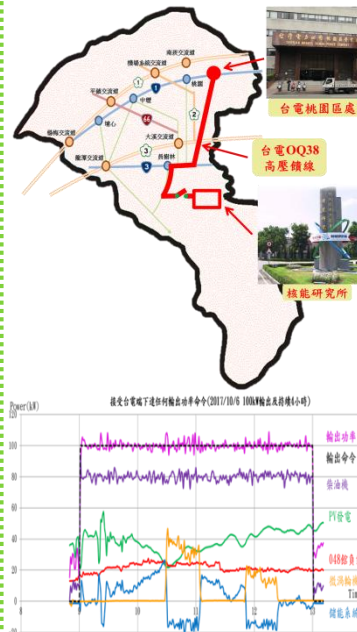
Project Director

Dr. Chang, Yung-Ruei

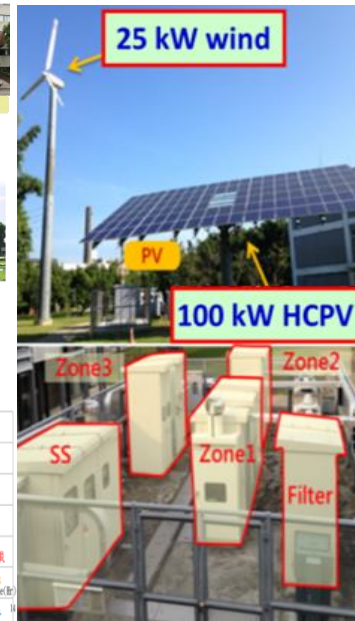
- Content: Based on the C10 work item of "Smart Grid Master Plan" approved by the Executive Yuan, the goal of project is to develop key control techniques for an autonomous regional grid or microgrid. The Longtan microgrid demo site has been built, operated, and connected with the OQ38 distribution feeder line of TPC. In the future, the developed techniques can be applied in the fields of electricity dispatch for demand control and power ancillary services.

## Patents:

1. Supply network having sophisticated energy management (ROC, I456857)
2. Load management strategy under microgrid standalone mode (ROC, I455440)
3. An active frequency detecting controller to prevent blackout of microgrid (ROC, I550999)
4. Apparatus of tandem-type energy storage (ROC, I560970)
5. Apparatus for fast and automatic electric power distribution of distributed generation with feeder load transfer (ROC, I591933)



Dispatched by TPC to stably output 100kW power for 4 hrs



INER-Taiwan's First Outdoor Microgrid Demo Site



Apparatus of tandem-type energy storage

- The project develops key control techniques for an autonomous regional grid or microgrid, which includes the distributed power system and intelligent control technique, the power electronics technique for distributed energy resources, the smart controller redundancy technique for multi-agent distributed control system, as well as the regional grid data management and analysis technique.
- The up-to-date achievement includes: building Taiwan's first outdoor microgrid powered by renewable energy, connecting the microgrid with OQ38 distribution feeder line of TPC, and accepting the dispatch demands from TPC to perform (1) demand response of 50 kW load shedding, (2) islanding operation as disconnecting with the feeder line, and (3) stably providing 100 kW power to the feeder line. Through technical transfers, the associated outcomes were adopted by several domestic companies, such as Chung-Hsin, Tatung, Delta, and Yulon.
- The techniques of “Apparatus of tandem-type energy storage” and “INER energy management system” were nominated into the finalists of R&D 100 Awards in 2017 and 2015 respectively.