

智慧能源控制與整合技術開發計畫

執行單位

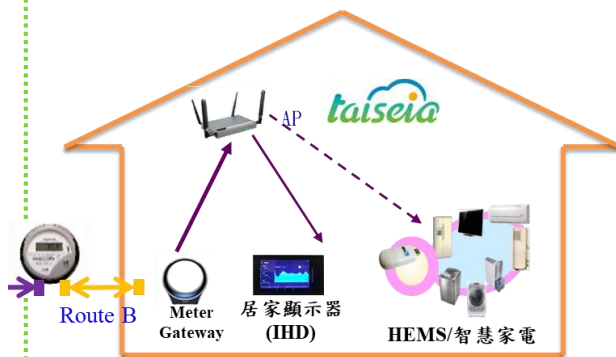
工業技術研究院

計畫主持人

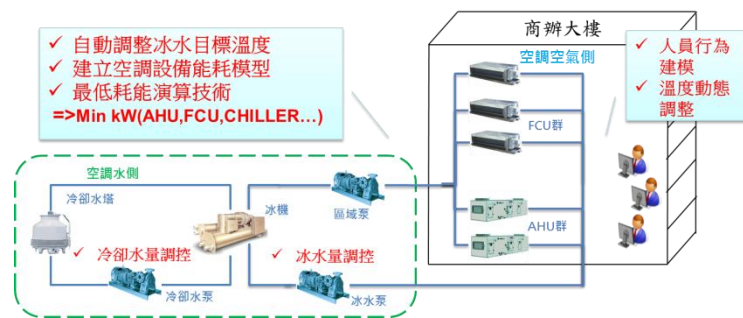
梁佩芳 組長

- 本計畫之技術發展涵蓋智慧電表、工業能源管理以及住商能源管理，並將以計畫成果支持國內之節能減碳行動，推動能源管理系統建置及智慧電表系統布建。

1. 提出應用於工業物聯網、智慧電表系統及能源管理之專利，包括燃燒系統的氧氣濃度修正方法、未知PID控制器之參數調諧方法、擾動源追溯方法、空調系統及其控制方法及先進讀表基礎建設中之韌體更新系統及其方法
2. 推動智慧家電通訊互通協議(TaiSEIA 101)成為國家標準 CNS 16014



- 左圖：智慧家電通訊互通協議(TaiSEIA 101)
- 左下圖：智慧電表系統串接智慧家電示意圖
- 下圖：冰水空調系統全域最適化控制技術



- 建立中央空調系統全域最適化控制技術，可兼顧環境舒適度與系統能耗，預期技術應用後，中央空調水系統運轉能耗指標可降低至0.65-0.9kW/RT。
- 發展工業物聯網節能應用，透過監測能源耗用及其他感測資料之整合分析，協助工業用戶掌握設備與系統狀態，評估製程效率或穩定性，進而改善生產品質與能源效率，並陸續導入石化、橡膠、汽車等產業。
- 智慧家電與通訊模組間共通介面及協議已由經濟部標準檢驗局於106年6月完成審查，並於10月公告為國家標準CNS 16014，建立智慧家電之應用發展基礎。
- 配合低壓AMI推動政策，擬定智慧電表對家庭通訊之介面標準，透過電表閘道器與家庭能源管理系統(HEMS)之整合，建立電表即時資訊應用之環境，並於台北、新北、台南及高雄等處公有建築完成1000戶示範系統建置。

Key Technology Development of Smart Energy Control And System Integration

Execution Unit

Industrial Technology Research Institute

Project Director

Division Director, Pei-Fang Liang

- The project scope covers the development of AMI solution, the development of energy management systems for Industrial, commercial and residential sectors, as well as the promotion of industrial applications.

1. Filed patents include:

- (1) Modification method of oxygen concentration for combustion system,
- (2) Parameter tuning method of unknown PID controller,
- (3) Disturbance source tracing method,
- (4) Air conditioning control device and method thereof,
- (5) System for firmware upgrade in AMI and method thereof

2. Smart appliance comm. protocol (TaiSEIA 101) becomes the national standard (CNS 16014)



Left : TaiSEIA 101 compatible home appliances

Lower Left : The integration of smart meter with HEMS

Below : The optimization of HVAC system control



- The HVAC optimization control takes the environmental comfort level into considerations in addition to the power. The Operating System Efficiency (OSE) of HVAC can be improved to 0.65-0.9kW/RT with the developed system solution.
- The IoT-based energy management platform monitors the energy consumption and performs the integration analysis along with the other sensing data. The results reveal the status of facilities or systems for industrial users, and give evaluations to the efficiency or stability of manufacturing processes. The system solutions have been applied to the petrochemical, rubber and automobile industries.
- The communication interface protocol for smart homes, TaiSEIA 101, has been revised by BSMI, MOEA and becomes the national standard, CNS 16014, in Oct 2017. the penetration of smart appliances will gradually increases under the promotion of appliance industry.
- The communication interface of smart meter and home devices is defined to facilitate the low-voltage AMI applications. The home energy management system(HEMS) will gather near real-time meter data through the newly defined meter gateway, which enables the optimization of smart appliance use and other meter data applications. 1000 new smart meters have been installed in the Taipei, new Taipei, Tainan and Kaohsiung Cities to evaluate the technology readiness and use cases.