The 66th Meeting of the APEC Expert Group on Energy Efficiency and Conservation (EGEEC 67)

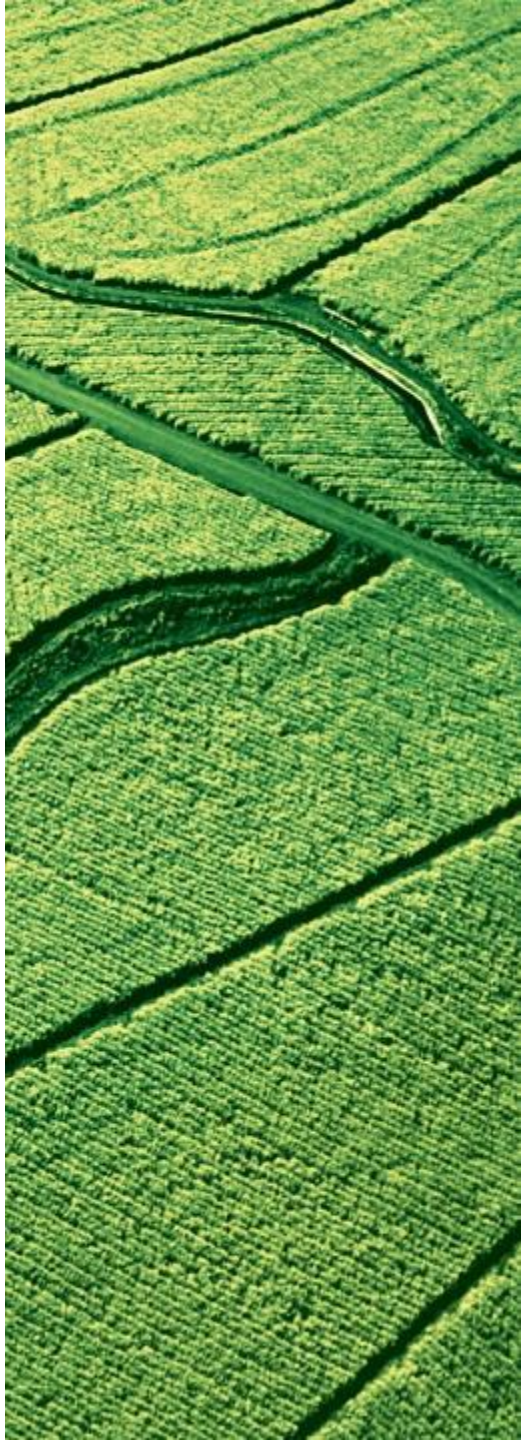
Economy Update in Chinese Taipei

(Advancing System-Level Energy Efficiency: Policy Harmonization and Innovative District Energy Services in APEC)

30 July 2026

Directed: 經濟部能源署 Energy Administration, Ministry of Economic Affairs

Administrated: ITRI Industrial Technology Research Institute



Outline

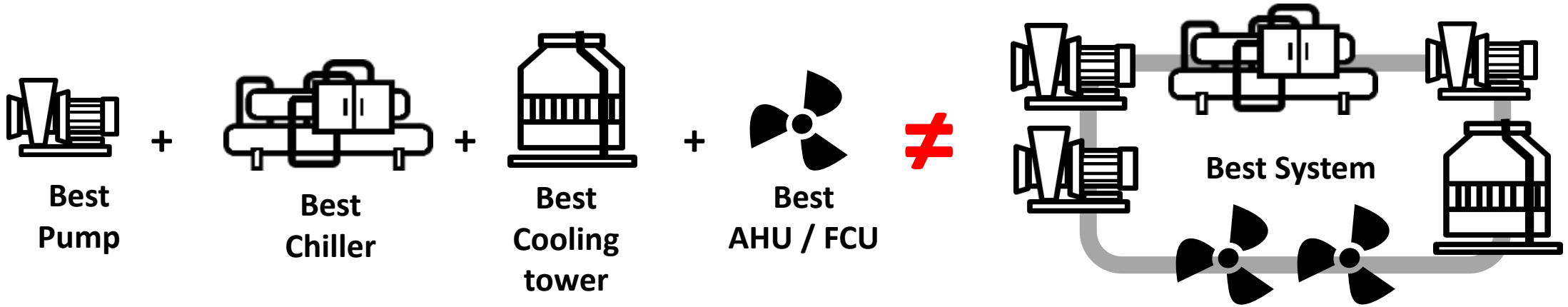
- Why System Efficiency
- Policy Tools for System Efficiency in CT
- Case Studies in System Efficiency
- Challenges & Future Work

2

Why System Efficiency?

Highest **Equipment** Efficiency ≠ Highest **System** Efficiency

- Equipment efficiency is governed by different technical test standards, and hardware specifications must be properly matched.
- The highest overall system efficiency stems from site-tailored hardware integration paired with advanced control strategies



Policy Tools for System Efficiency in CT

DEU Requirement

Contract demand ≥ 800 kW

- **Annual requirement:**
  - Energy data report
  - Energy Manager
  - 1% saving target
- **System performance reporting**
  - **HVAC:** ≥ 1,000 RT (EnPI: KW/RT)
  - **Air compressor ≥** 500 hp (EnPI: KW/CMM)

EPC subsidy

20–40% of project costs

- **Eligible applicants**
  - Registered legal entities
  - Contract demand > 100kW
  - Savings must be above 10%
- **System efficiency provides an additional 10% subsidy**
  - **HVAC (Chilled water system <0.75 KW/RT)**
  - **Air compressor (<6.8 kW/CMM)**
  - BEMS/AI-enabled optimization

ESCO Incentive

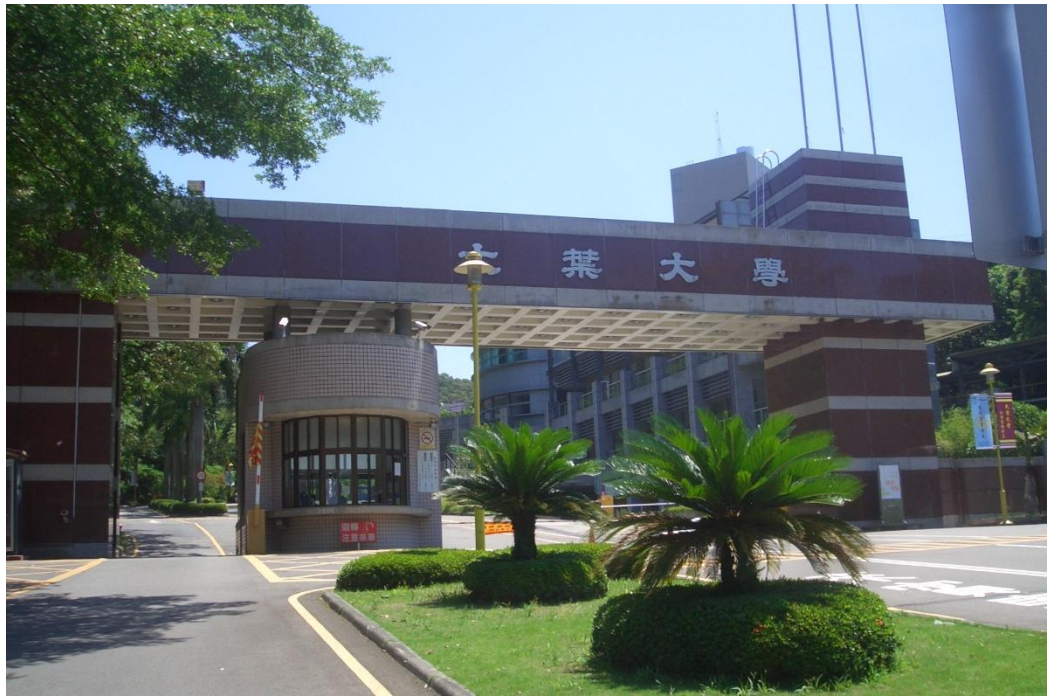
based on verified savings

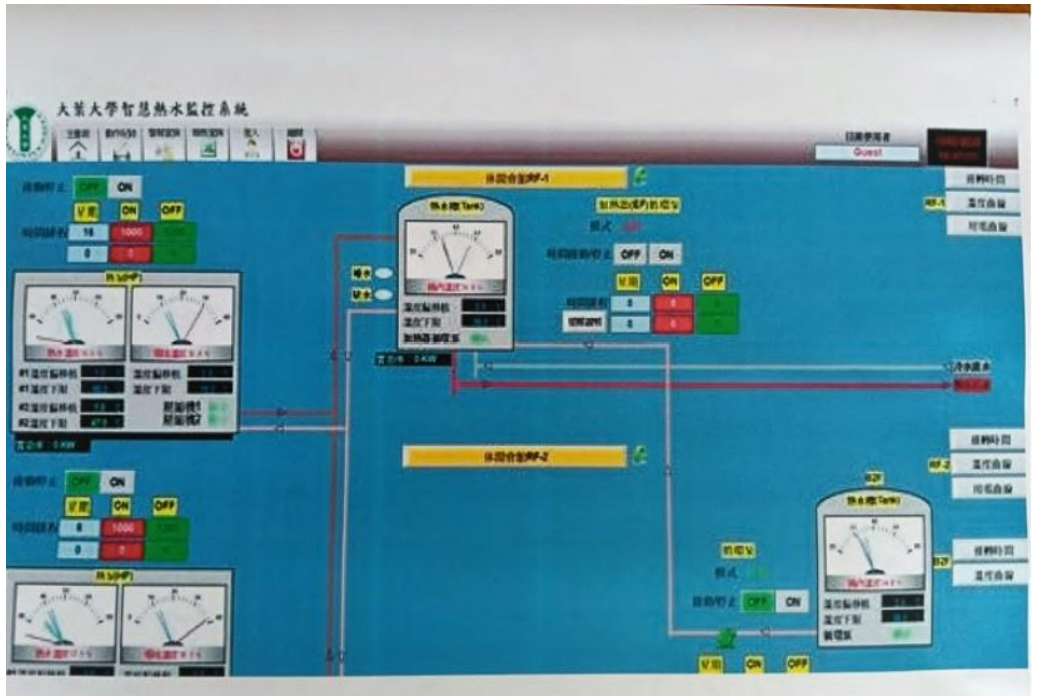
- **Eligible applicants**
  - Hire at least **2 Certified M&V Professionals**
- **Incentives**
  - Rewards based on savings
  - Higher incentives for greater savings
  - Additional NT$1/kWh for projects including EMIS

Note: DEU (Designated Energy User); EPC (Energy Performance Contract); Energy Service Company (ESCO); EnPI (Energy Performance Indicator)

Case Studies in System Efficiency: Da-Yeh University

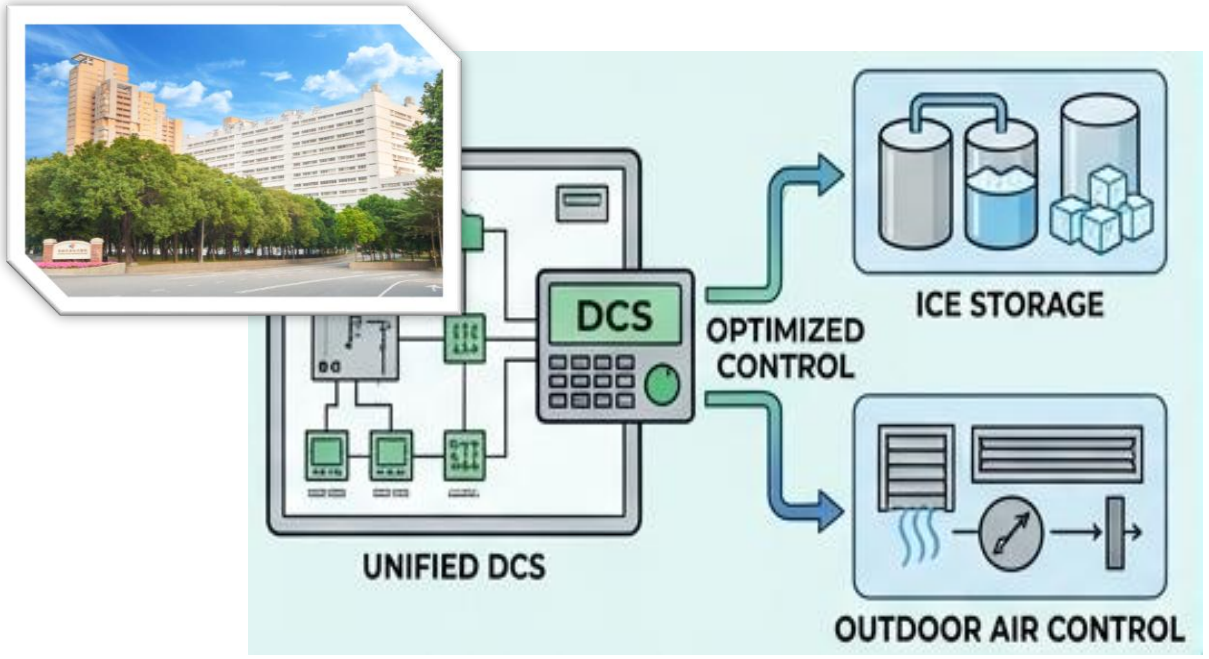
- **System-Level Energy Efficiency:** Transitioning from isolated retrofits to **district-level system optimization**: Combining 2nd-gen heat pumps (COP 3.8), thermal storage, and smart lighting for dynamic load regulation.
  - Dynamic hot water temp control (50°C→45°C saving >25% power)
- **Remote Smart Management:** Integrates system status monitoring, multi-stage scheduling, and instant fault alerts for automated operations.

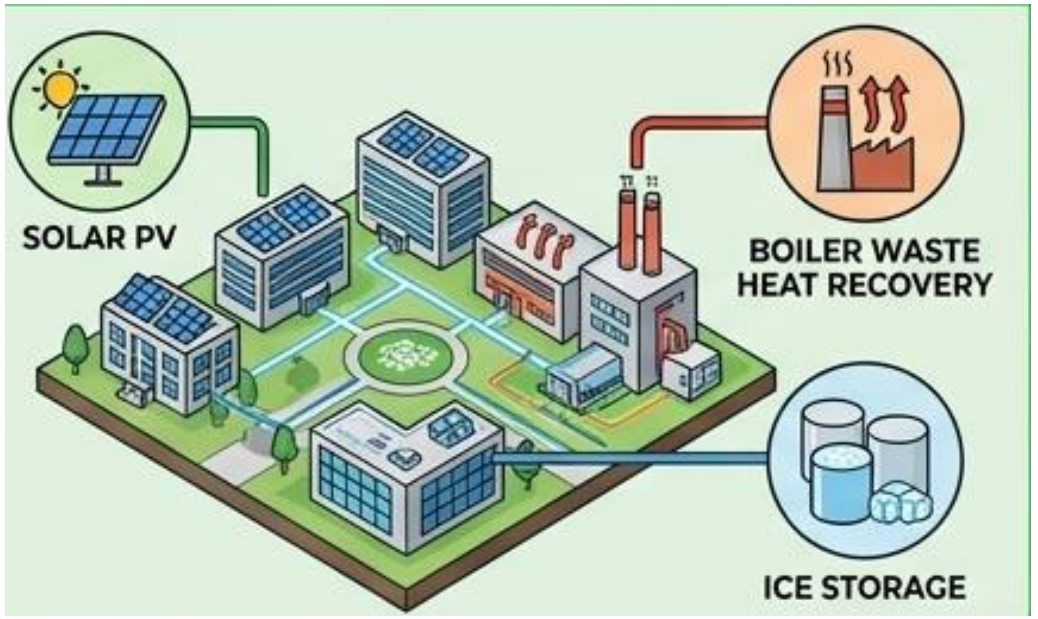




Case Studies in System Efficiency: Chang Gung Memorial Hospital

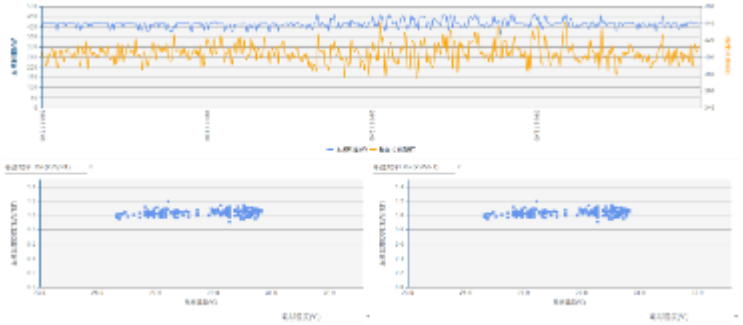
- **Cross-System Integration**: Unified DCS, ice storage & outdoor air intake control beyond single equipment limits.
- **Data-Driven Operations:** Leveraged analytics and dynamic forecasting for optimization.
- **Campus Microgrid Synergy:** Integrated solar PV, boiler waste heat recovery, and ice storage.
- **Grid Resilience Contribution:** Delivered campus-level peak shaving and load shifting to support grid stability.



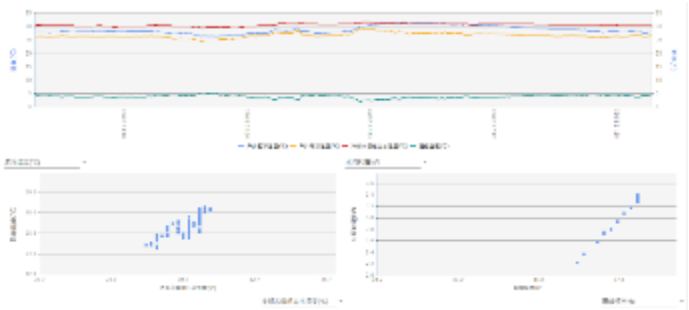


Energy Tracking & Automated Reporting

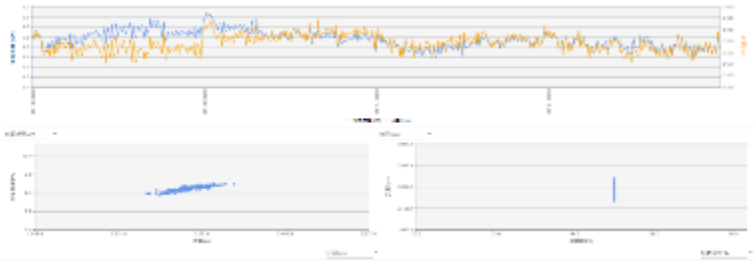
- An AI-enabled EMS automatically analyzes system-level energy consumption and optimizes operational efficiency.
- By leveraging historical data, the system automatically generates reports to meet regulatory reporting requirements and supports continuous, long-term performance tracking.



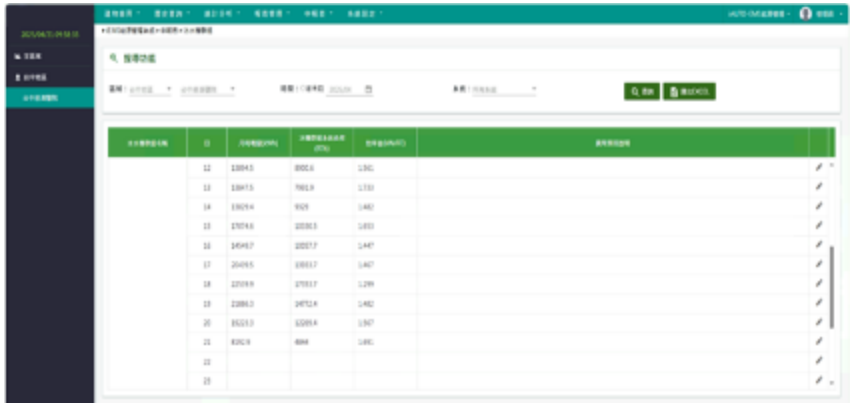
Chiller Analysis



Cooling Tower Analysis

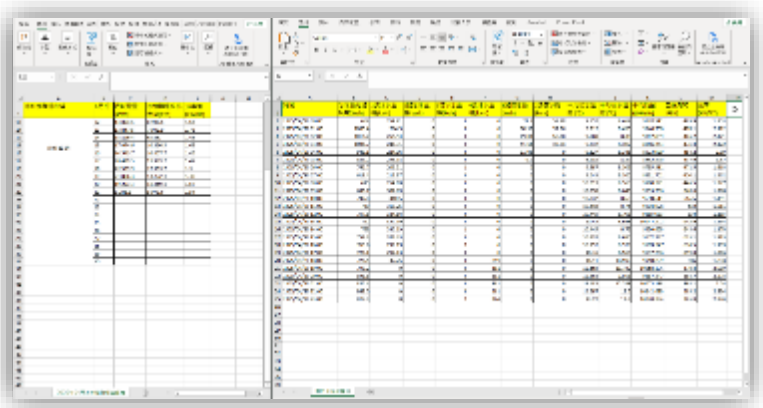


Pump Analysis



System Energy Performance Logs

automatically generating



Declaration report

Challenges & Future Work

Challenges

- High **metering costs** and **ongoing maintenance** requirements can limit **continuous system-performance monitoring**.
- Building operators often prioritize **reliability** and **production** over **energy performance**, making sustained **data quality difficult**.
- System model for AI training for now is still **not very portable** from on to another district.

Future work

- Establish **common requirements** for meter **accuracy**, **calibration**, and **data validation**.
- Standardize **system boundaries, operating conditions,** and **reporting** methods to ensure **comparable kW/RT and kW/CMM results**.