台灣電力公司
綜合研究所

TAIWAN POWER
RESEARCH
INSTITUE

目錄(Contents)

經營者
Management Profile

所長

鍾年勉

General Manager

Chung, Nien-Mien

副所長蒲冠志

Deputy General Manager

Pu, Guan-Chih

副所長張志聲

Deputy General Manager

Chen, Chih-Sheng

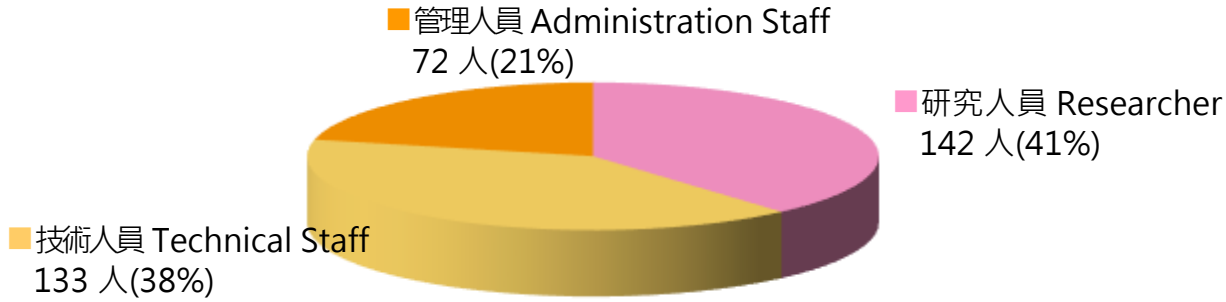
副所長王金墩

Deputy General Manager

Wang, Chin-Tun

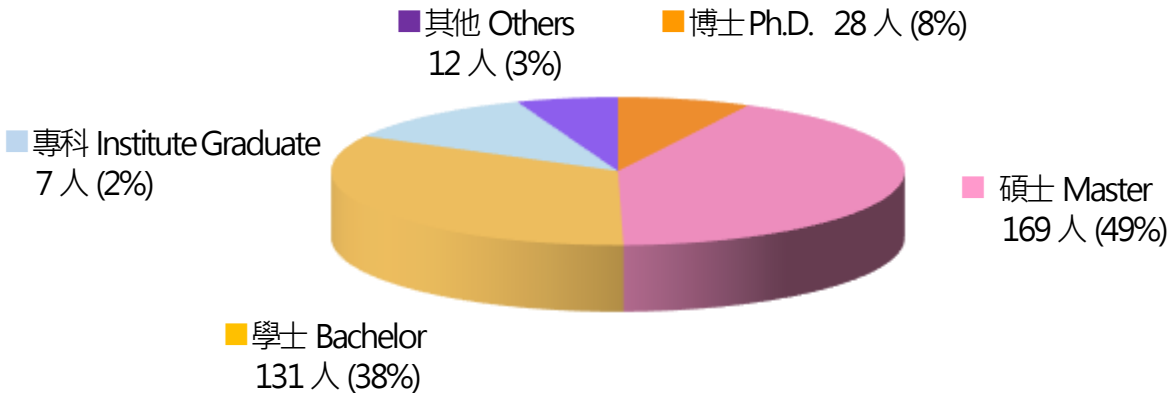
人力 Human Resources

● 人員 Staff Members

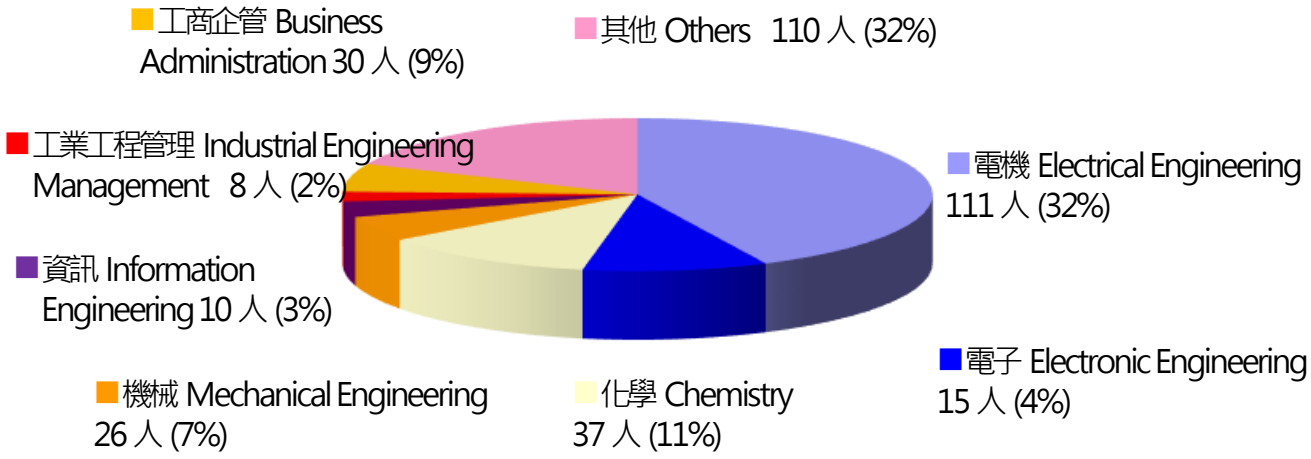


合計 347 人

● 學歷 Educational Background



● 專長 Specialty



組織 Organization

經營策略

具核心技術與專業技能之研究單位，在遵循公司總體發展目標與策略方向之前提下，致力於建構公司短中長程研究規劃與試驗技術之創新應用，並藉由核心技術之建立、國際交流及新科技之引進，提升公司經營績效及降低營運成本，使台電成為電力產業之領導者。

為因應政府能源轉型、淨零排放等政策，支援政府「5+2 產業創新計畫」等經濟發展政策所需電力，除了確保穩定供電，本公司亦須積極開發再生能源，從事電網之擴充與升級，以及透過 5G、AI、大數據等技術，擴大智慧電網之應用範疇，推動數位轉型與科技創新。

為加速淨零挑戰下對前瞻技術發展需求，規劃自 114 年開始，研究發展資源規劃以「50%-50%研發投資組合」策略，50%滿足公司營運需求、50%發展前瞻技術，俾達成零碳永續目標。

Business Strategy

As a research unit with core technology and professional skills, TPRI by following the company's overall development goals and strategic directions, is committed to building the company's short-, medium-, and long-term research planning and innovative application of experimental technology, and through the establishment of core technologies, international exchanges and the introduction of new technologies, improving the company's operating performance and reducing operating costs, to enable Taipower to become a leader of electric industry.

To respond to the government's energy transition, net zero emissions and other policies, to support the power required by the government's economic development policies such as the "5+2 Industrial Innovation Plan", in addition to ensuring stable power supply, Taipower has to actively develop renewable energy, engage in the expansion and upgrading of the power grid, and expand the application scope of the smart grid through 5G, AI, big data and other technologies, and promote digital transformation and technological innovation.

To accelerate the development of future technologies related to achieving net-zero emissions, the research and development resource allocation strategy will adopt a 50%-50% R&D investment portfolio starting from the year 2025. This strategy allocates 50% of resources to meet company operational needs and 50% for foresight technology research and application, aiming to achieve the goal of zero-carbon sustainability.

研究發展 Research & Development

研究發展企劃室 R&D Planning Office

- **前瞻策略規劃 創新研發治理**
  Technology foresight strategy, Innovative R&D governance

擔任所長室幕僚，推動本所研發試驗相關活動，實踐研發管理價值鏈，精準研發策略布局，俾支持台電公司達成能源轉型及創新成長目標。

Serve as a Staff Department member of the General Manager, promote the R&D and test-related activities of TPRI ,implement the R&D management value chain, make precise R&D strategy layout, and support Taiwan Power Company to achieve energy transformation and innovation growth.

- **四大核心任務4 Missions**

1. 推動創新治理及前瞻電力技術預測
   Apply innovative governance and technology foresight of forward-looking technologies in power business
2. 綜理台電公司研發管理流程
   Control the R&D management process of Taiwan Power Company
3. 促進國際電業交流與合作
   Promote international exchanges and cooperation between major power companies
4. 內外部利害關係人溝通與研發成果推廣
   Stakeholder management and promotion of R&D results

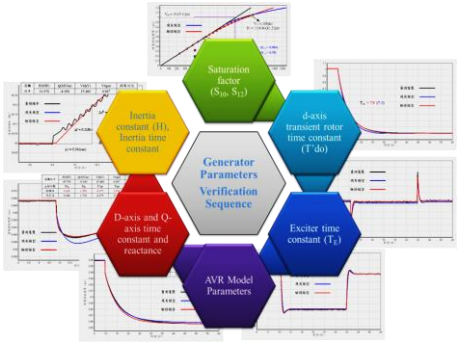
研發企劃架構

R&D Planning Framework

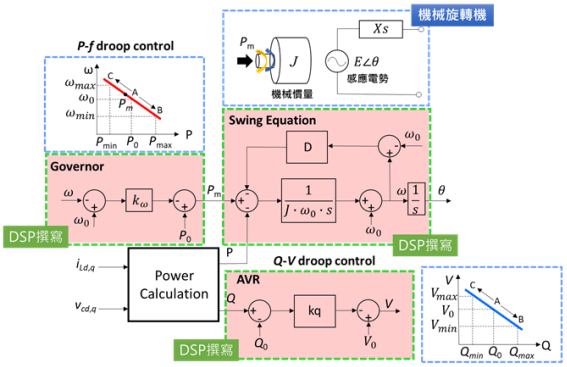
電力研究室 Electric Power Research Lab

• 電力系統分析及改善技術 Technology of Power System Analysis and Improvement

1. 再生能源及儲能設備之虛擬慣量提供 (Provision of virtual inertia through renewable energy and energy storage devices)
2. 飛輪及同步調相機實現慣量調節 (Implementation of inertia regulation using flywheels and synchronous phase adjusters)
3. 智慧型電網規劃與推動 (Planning and Development of Smart Grid)
4. 電力系統有關電力潮流、故障電流、電壓穩定度、動態穩定度、暫態穩定度、保護協調、虛擬慣量等分析技術 (Power System Analysis - Power Flow, Fault Current, Voltage Stability, Dynamic Stability, Transient Stability, Virtual inertia, and Protection Coordination)
5. 電力系統特性監測分析及監測系統之網路應用技術 (Power System Monitoring and Internet Applications)
6. 電力系統調度運轉技術 (Power System Operation Techniques)
7. 電力系統驗證與測試模擬 (Power System Simulation Center-Large Network System Study, Control System Validation, and System Protection Scheme Study)
8. 彈性交流輸電系統之輸電容量彈性調度應用技術(Application of Flexible AC Transmission System Techniques to Increase Transmission Capacity)
9. 極低頻電磁場相關議題資料蒐集、量測技術建立及訓練、智庫之提供 (Extremely Low Frequency Electromagnetic Field Related Issues, Data Collection, and Technology Service Providing)
10. 能源管理系統與系統分析 (Energy Management System and System Analysis)
11. 再生能源高滲透率之電力系統穩定度分析 (Stability Analysis of Power System with High Renewable Energy Permeability)
12. 發電機組模型參數定期量測與確認 (Technology Platforms for Power System Testing and Reviewing Plans for the Parameters of Generator Models)
13. 虛擬同步機模型開發與參數研究 (Development and Parameter Research of Virtual Synchronous Generator Model)



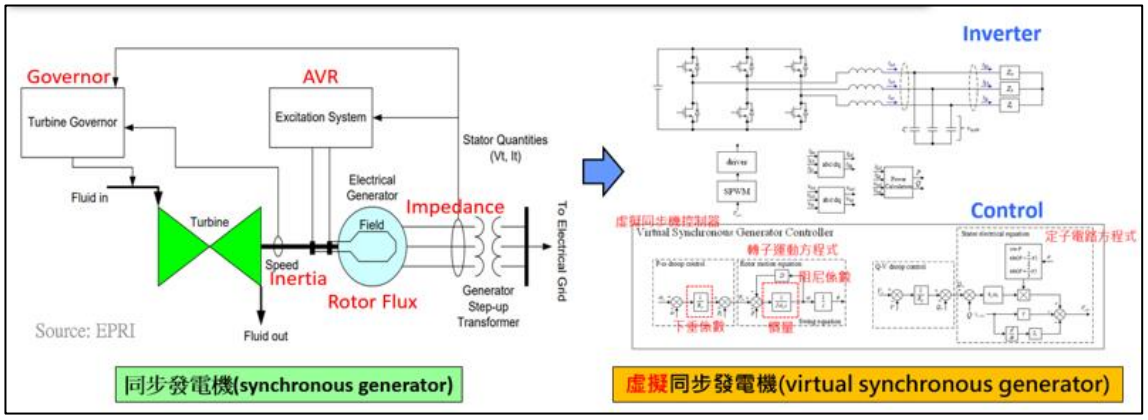
發電機參數測試驗證
Testing and Verification for the Parameter of Generator Models



基礎虛擬同步機控制模型
Basic Virtual Synchronous Generator Control Model

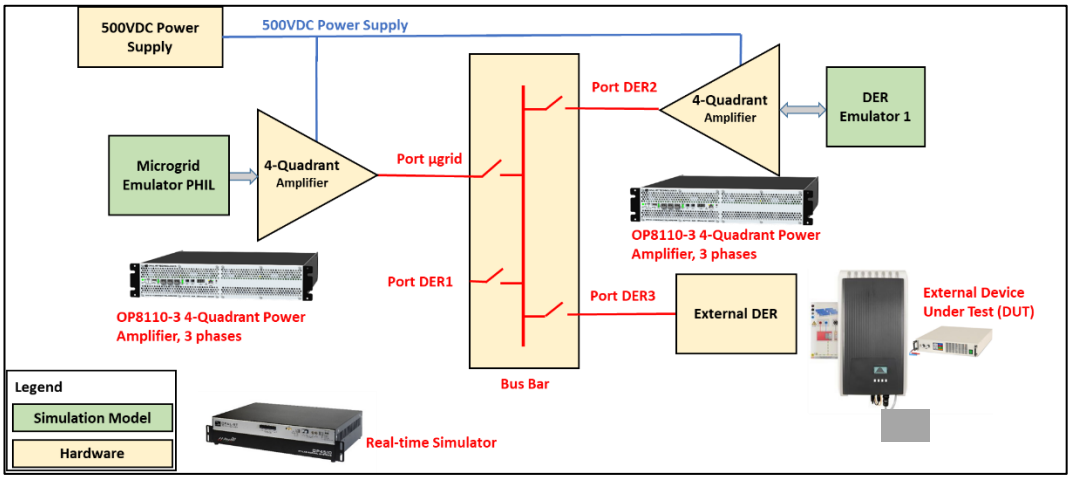
- **電力電子應用分析**
  Power Electronics Applications and Analysis

1. 電力電子控制技術於電力系統慣量改善之應用 (Application of power electronic control technology in improving power system inertia)
2. 大型光電案場變流器之應用(Application of converter in large photovoltaic field)
3. 電力諧波、電壓閃爍及不平衡現象等之監測、分析及改善技術 (Monitoring, Analysis and Mitigation of Power System Harmonic, Voltage Flicker, and System Unbalance Problems)
4. 電力電子模擬驗證平台建置 (Power electronics simulation verification platform construction)
5. 高空電磁脈衝對台灣電網設備影響(Impact of high-altitude electromagnetic pulse on Taiwan power grid equipment)
6. 未來電網之固態變壓器開發與實用化研究 (Development and practical application of solid-state transformers for future power grids)
7. 電力電子設備超諧波干擾及改善研究 (Research on super-harmonic interference and improvement of power electronic equipment)



電力電子控制技術對於電網慣量改善之研究

Research on Power Electronic Control Technology to Improve Grid Inertia



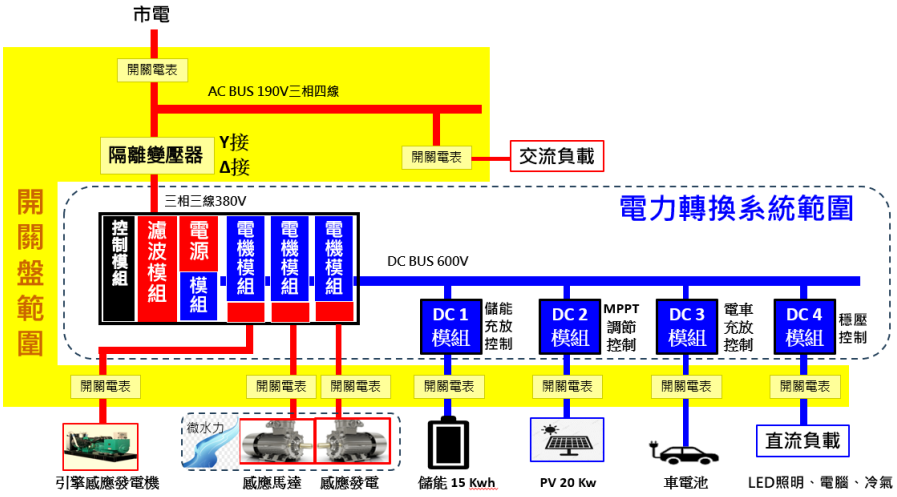
基於OPAL-RT平台之多模態Inverter控制策略之開發與驗證

Development an Verification of Multi-modal Inverter Control Strategy based on OPAL-RT Platform

- **分散式電源應用分析**
  Distributed Power Application and Analysis Technology
  - **微電網應用分析技術**
    Microgrid Application and Analysis Technology

1. 微電網驗證場域各式測試情境之參數調校研析 (Parameter Tuning Analysis for Various Test Scenarios in Microgrid Validation Sites)

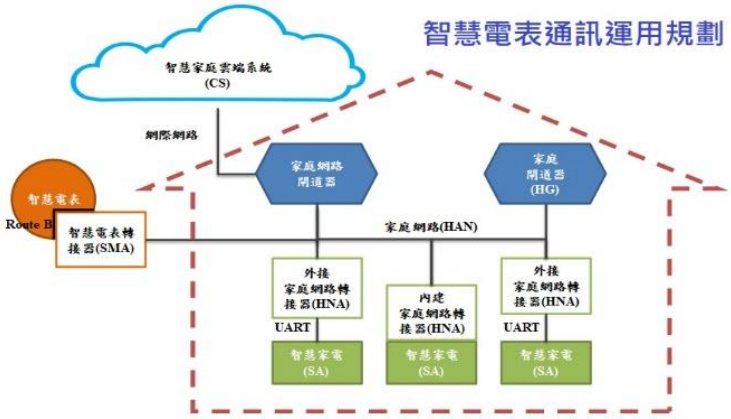
2. 交直流複合微電網系統開發設計 (Development and Design of AC-DC Composite Microgrid System)



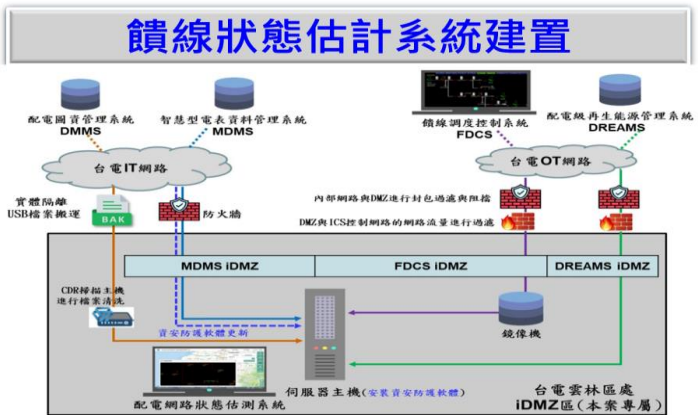
3. 直流微電網應用之關鍵技術探討 (Discussion on the key technologies of DC Micro-grid application)
4. 微電網不斷電與黑啟動技術分析與應用 (Analysis and application of microgrid uninterruptible power supply and black start technology)
5. 微電網儲能設備自主調控技術 (Microgrid energy storage equipment self-regulation technology)
6. 分散式電源最大功率追蹤控制技術 (Distributed power supply maximum power tracking control technology)
7. 交流家電負載改以直流供電之技術探討 (Technical discussion on converting AC household electrical loads to DC power supply)
8. 功率轉換系統(PCS)虛擬同步機功能分析與應用 (Function Analysis and Application of Power Conversion System (PCS) Virtual Synchronizer)

- **饋線韌性技術開發**
  Development of Feeder Resilience Technology

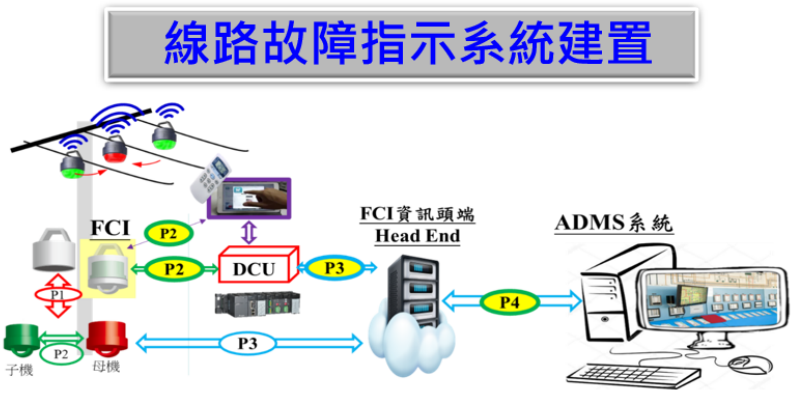
1. 智慧電表基礎建設(AMI)精進改善與推廣 (Advanced improvement and promotion of Advanced Metering Infrastructure)



2. 針對智慧電網皆進行各種系統及功能開發，利用API介面提供整合應用 (Development and Application of the smart grid a variety of systems and functional, which use of API interface to provide integrated applications)



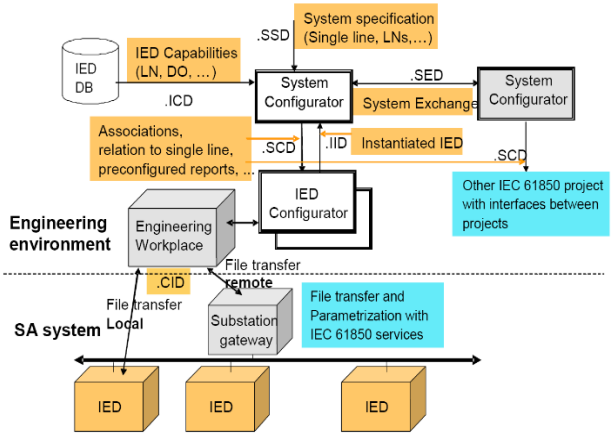
3. 配電系統運轉資料管理平台開發建置 (Development and construction of distribution system operation data management platform)



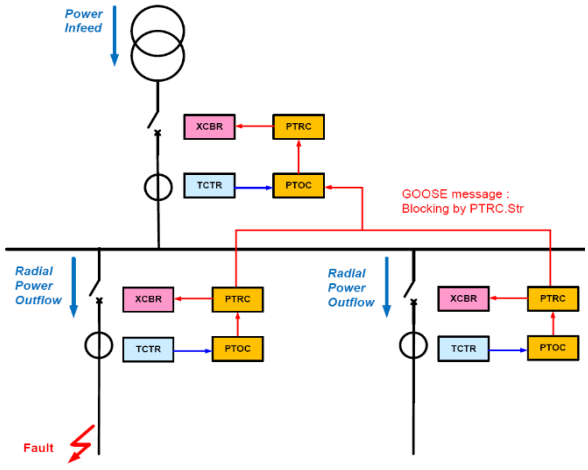
資訊與通信研究室
Information & Communication Technology Research Lab

- **智網標準推動研究組**
  Smart Grid Standards Promotion and Research Group

1. 智慧電網國際資通訊標準研究評估及策略規劃
   Smart Grid International Information and Communication Standards Study, Evaluation, and Strategic Planning.
2. 智慧電網導入國際標準之推動
   Promoting the implementation of international standards for smart grid.
3. IEC 61850 互操作性測試、功能性測試、效能測試研究
   Research for IEC 61850 Interoperability testing, Functional testing, and Performance testing.
4. IEC 61850 標準技術開發與實作
   Technological development and implementation based on IEC 61850 standards.



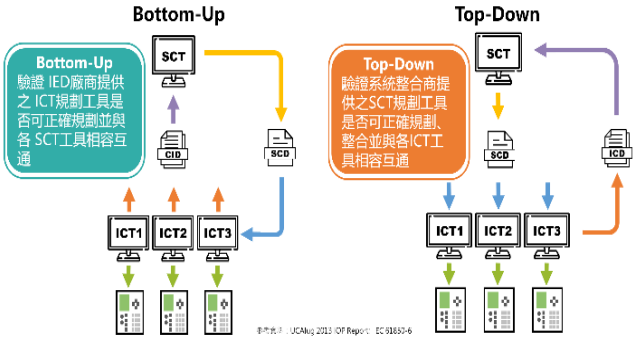
IEC 61850 資料交換研究
資料來源：IEC 61850-6



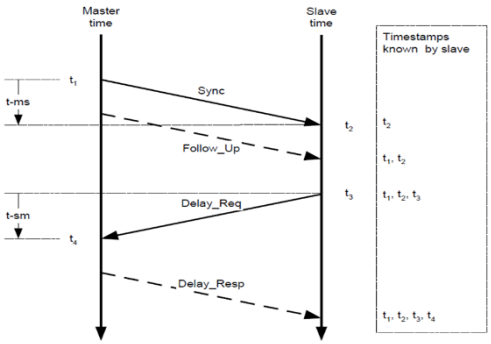
IEC 61850 於變電所應用情境研析
資料來源：IEC TR 61850-7-500

台電公司 IEC 61850 互操作性試驗
資料來源：綜研所資通室

台電公司 IEC 61850 互操作性試驗
資料來源：綜研所資通室



ICT 與 SCT 整合技術研究
資料來源:UCAIug 2013 IOP Report; IEC 61850-6



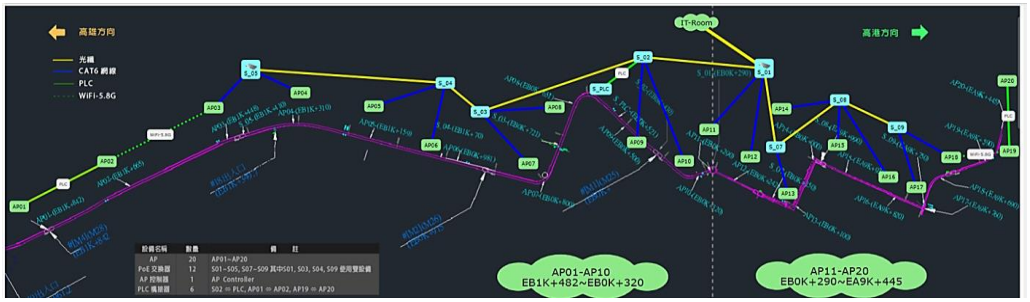
PTP 精度測試
資料來源:IEEE Std. 1588, Rev. 2, 2008

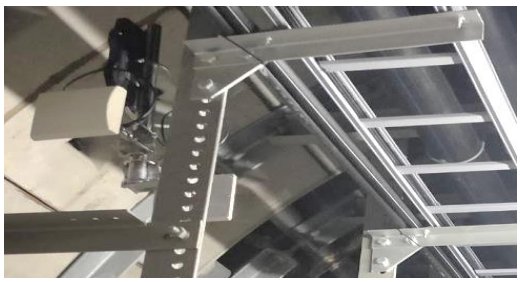
- **資通訊技術組**
  ICT Techniques Group

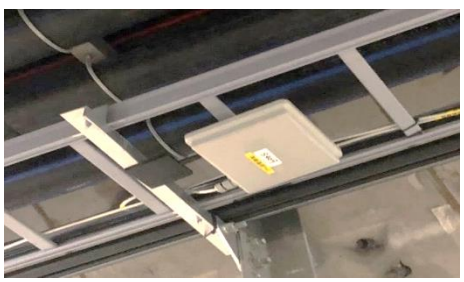
1. Beyond 5G 前期智慧工安 XR 導入研究
   Apply Beyond 5G Network on Smart Industrial Safety with Extended Reality.

資料來源:綜研所資通室

2. 洞道專網物聯暨智慧巡檢應用導入研究
   Introduce the Private Enterprise Network for Smart Sensing and Automotive Inspection in Extra High Voltage Underground Power Transmission System

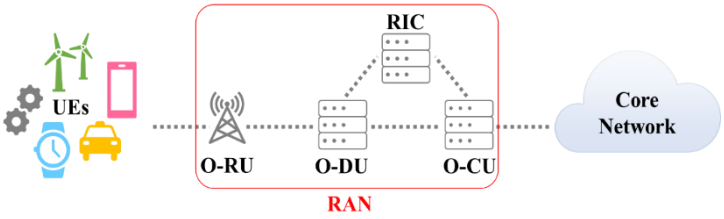






資料來源:綜研所資通室

3. 開放式核網架構研究
   Research on O-RAN Core Network Architecture



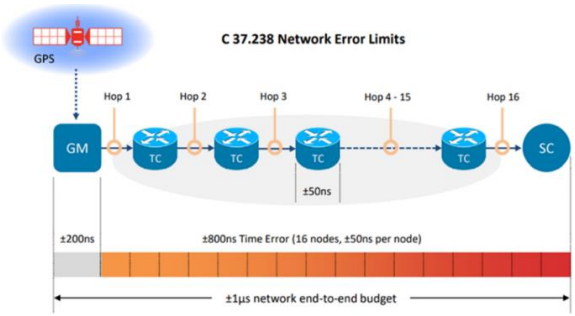
4. 使用衛星拍攝之影像，瞭解每週工程施工進度及記錄工區水下棲地變化
   Use satellite images to understand the weekly construction progress and record changes in the underwater habitat in the work area.

5. 時間同步於智慧電網應用研究:

   Time synchronization in smart grid application research:

   精確的時間同步以實現對電力系統的監測、控制和調度，提高電網的穩定性和可靠性藉由各種運作中設備持續數據採集的資料同步，有助於實現對系統運行狀態、負載情況的準確監測和分析並記錄異常情況，及時識別可能的故障或問題，提供診斷和預測，以利及時採取措施防止故障發生。

   Precise time synchronization enables monitoring, controlling and dispatching of the power system and improves the stability and reliability of the power grid. Through the data synchronization of continuous data collection of various operating equipment, it helps to achieve accurate monitoring and analysis of system operating status and load conditions and record abnormal conditions. Possible faults can be identified in time, and diagnosis and prediction can be provided to prevent malfunctions.



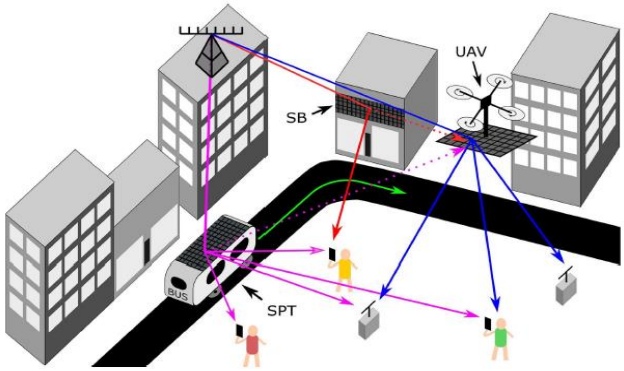
測試每個區塊時間差已確認網路是否可以滿足時間同步要求
Test Each Block And Network Can Be Constructed To Meet Requirements
資料來源: Calnex

6. 可調式智慧平面於 5G 企業專網應用:

Reconfigurable Intelligent Surfaces(RIS) applied in 5G enterprise private network

通過調整表面的反射特性可控制電磁波的傳播路徑以調節無線通信的信號強度和方向，增強信號覆蓋範圍，減少能量損失，提高通信品質和範圍。

By adjusting the reflection characteristics of the surfaces, the propagation path of electromagnetic waves can be controlled to adjust the signal strength and direction of wireless communication, enhance signal coverage, reduce energy loss, and improve communication quality and range.



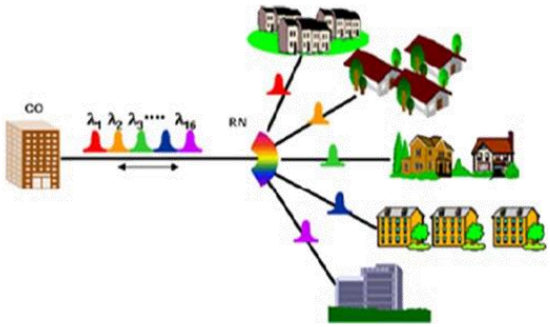
智慧城市中 RIS 輔助訊號傳播的範例

Example of RIS-assisted Signal Propagation in Smart Cities

資料來源: Kisseleff et al.: Reconfigurable Intelligent Surfaces for Smart Cities: Research Challenges and Opportunities

7. 光通訊傳輸研究

Research of Optical Communication Transmission



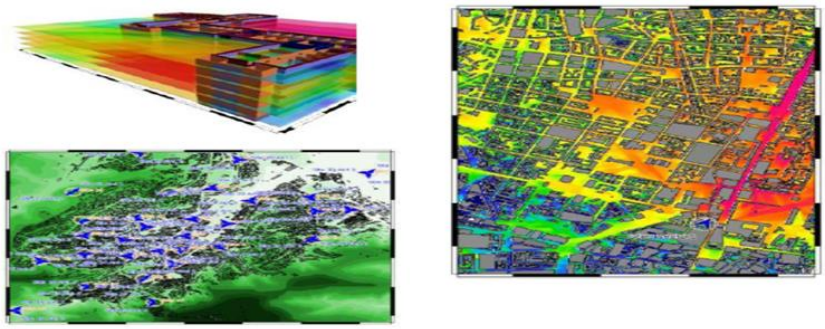
WDM 網路架構圖

Architecture of a WDM Network

資料來源：S. Ghoniemy, "Enhanced Time and Wavelength Division Multiplexed Passive Optical Network (TWDM-PON) for Triple-Play Broadband Service Delivery in FTTx Networks," 2018 International Conference on Computer and Applications (ICCA), 2018, pp. 419-426

8. 電波場域模擬、量測、接取設備規劃

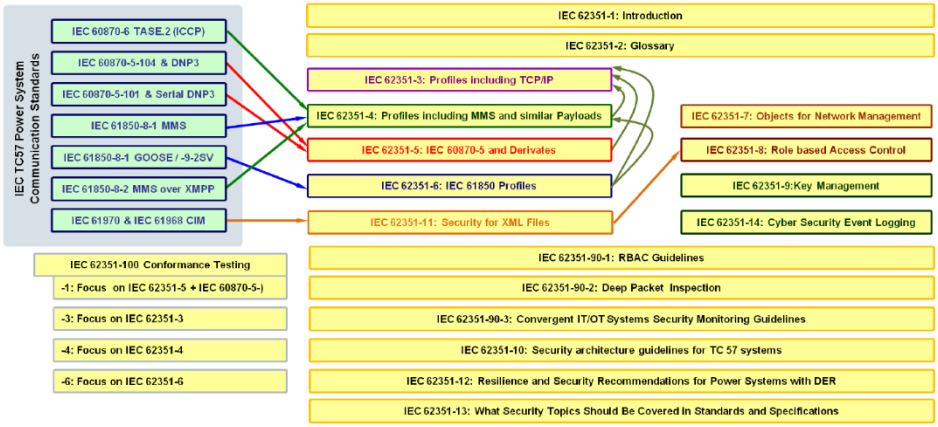
Wave field simulation, measurement, and access equipment planning



室內外無線通道場域模擬
Indoor and Outdoor Wireless Channel Field Simulation
資料來源:Altair-Winprop

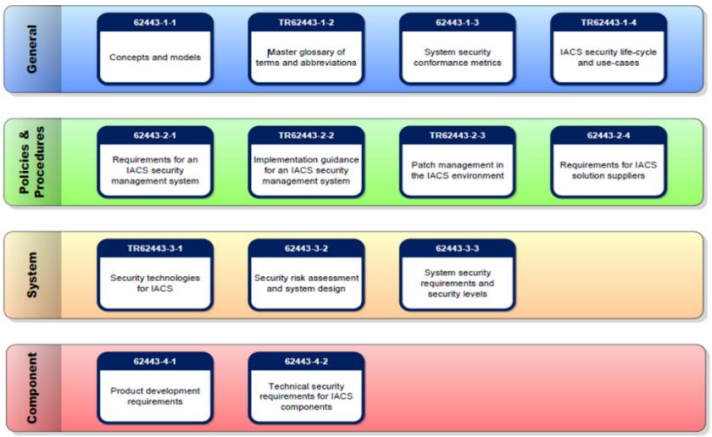
- **資通訊資安研究組**
  ICT Cybersecurity Research Group

1. IEC 62351 智慧電網資通訊安全標準及相關法規研究與導入。
   Research and import the IEC 62351 power system security standards and related regulations.



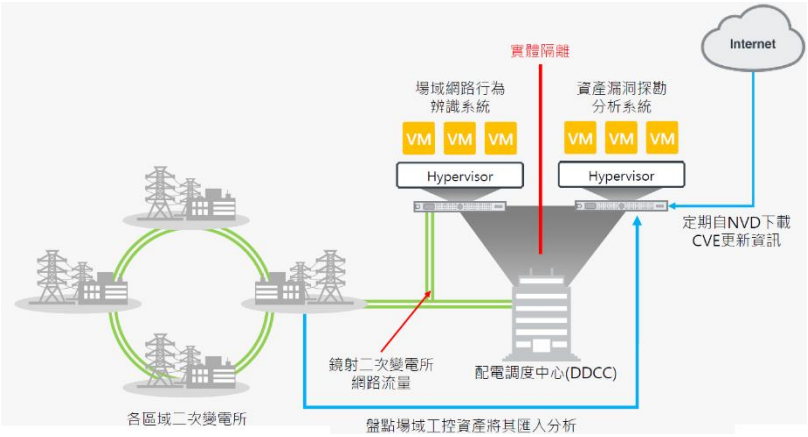
IEC 62351 電力系統安全標準
IEC 62351 Power System Security Standards

2. IEC 62443 工控系統資安標準研究與導入。
   Research and import the IEC 62443 industrial control system security standards.



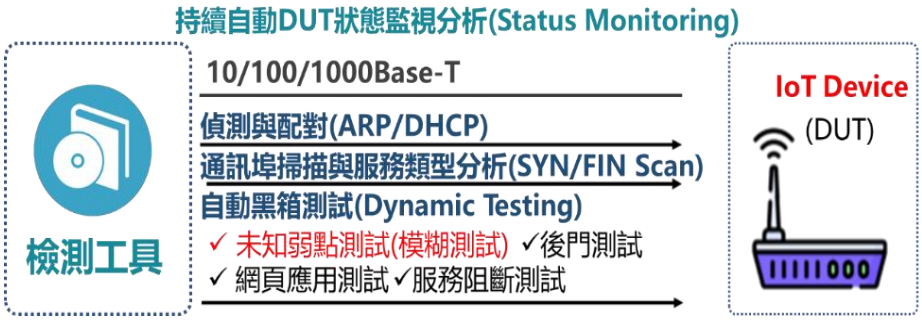
IEC 62443 工控系統安全標準
IEC 62443 Industrial Control System Security Standards

3. IEC 61850 二次變電所資安風險評估與防護對策研究。
Research on IEC 61850 secondary substation security risk assessment and protection countermeasures.



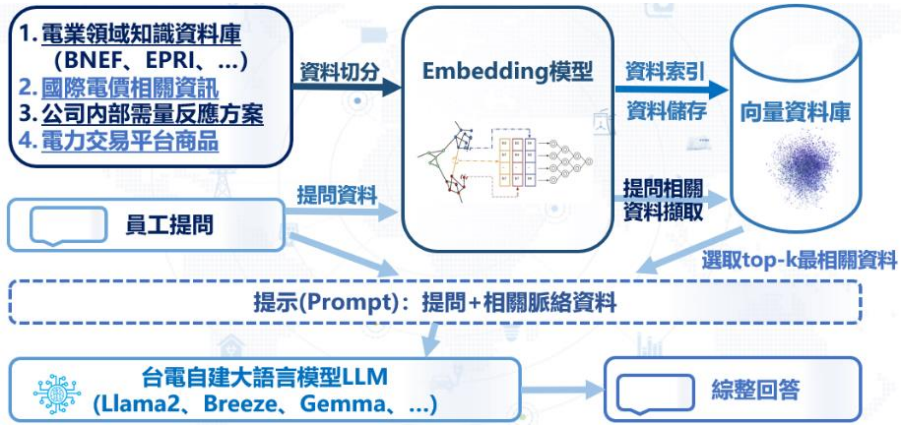
資產漏洞探勘分析平台與入侵偵測系統
Asset Vulnerability Exploration Analysis Platform and IDS

4. 電力物聯網資安檢測技術導入與建置。
Introduction and Establishment of Cybersecurity Detection Technologies for EIoT.

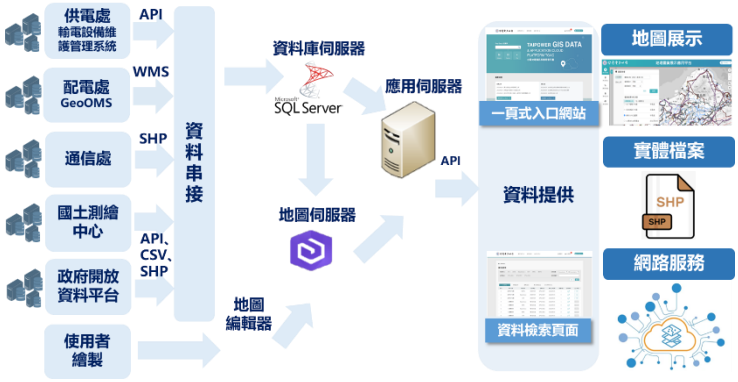


EIoT 資安檢測平台
EIoT Cybersecurity Detection Platform

5. 大語言模型 LLM 於電業領域之應用。
Applications of Large Language Models (LLMs) in the electric power industry.



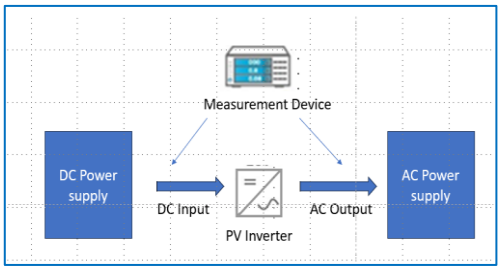
6. 建置台電地理圖資應用雲平台。
   Establishing a geographical information application cloud platform for TPC.



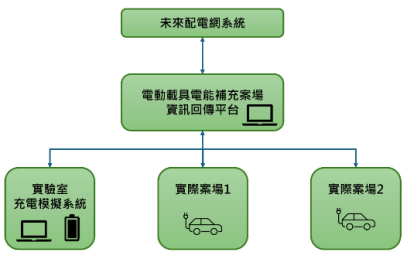
- **資通訊分析與應用研究組**
  Cybernetic Analysis and Integration Application Group

1. 太陽光電變流器資通訊分析與應用研究
   Research on PV Inverter ICT analysis and application
2. 儲能系統資通訊分析與應用研究
   ICT Analysis and Application Research of Energy Storage Systems
3. 電動載具資通訊分析與應用研究
   Research on Analysis and Application of ICT of Electric Vehicle
4. XMPP 資通訊檢測與應用研究
   Research on XMPP ICT examination and application
5. 分散式能源資通訊分析與整合應用研究
   Research on DER ICT analysis and integrated application

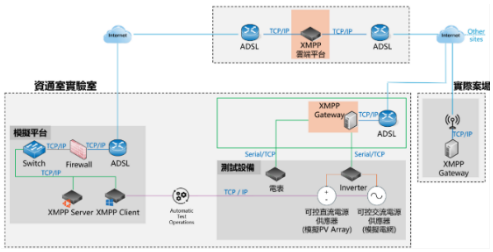
PV 資通訊分析測試平台
PV ICT Analysis and Test Platform



儲能系統平台
Energy Storage System Platform



EV 架構示意圖
EV System Architecture Diagram



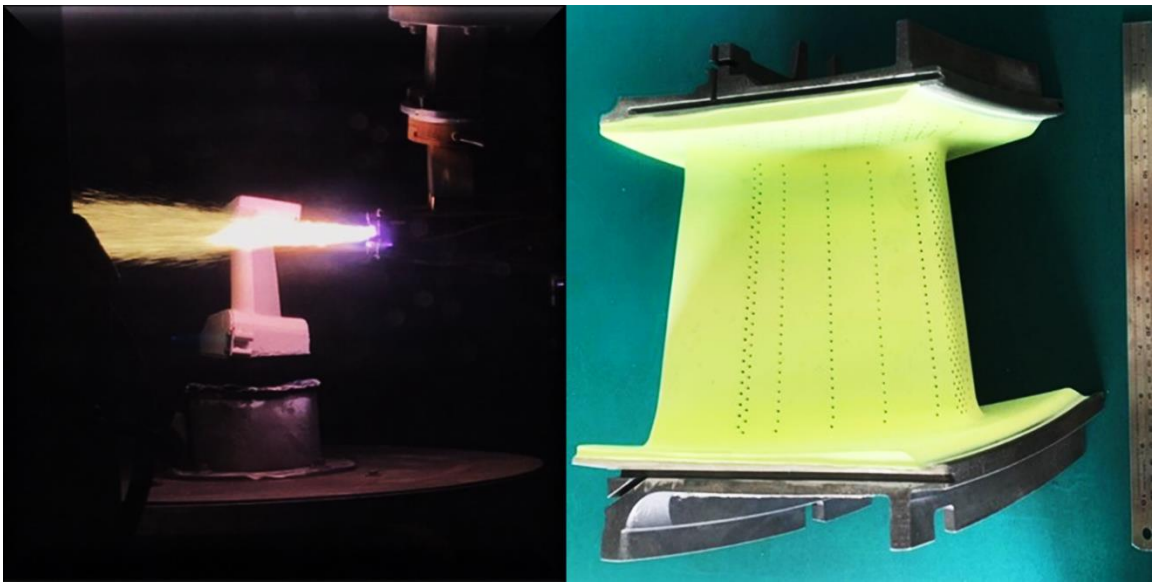
IEC 61850 XMPP 雲端平台
IEC 61850 XMPP Cloud Platform

能源研究室 Energy Research Lab

- **發電渦輪機材料工程與壽命管理技術**

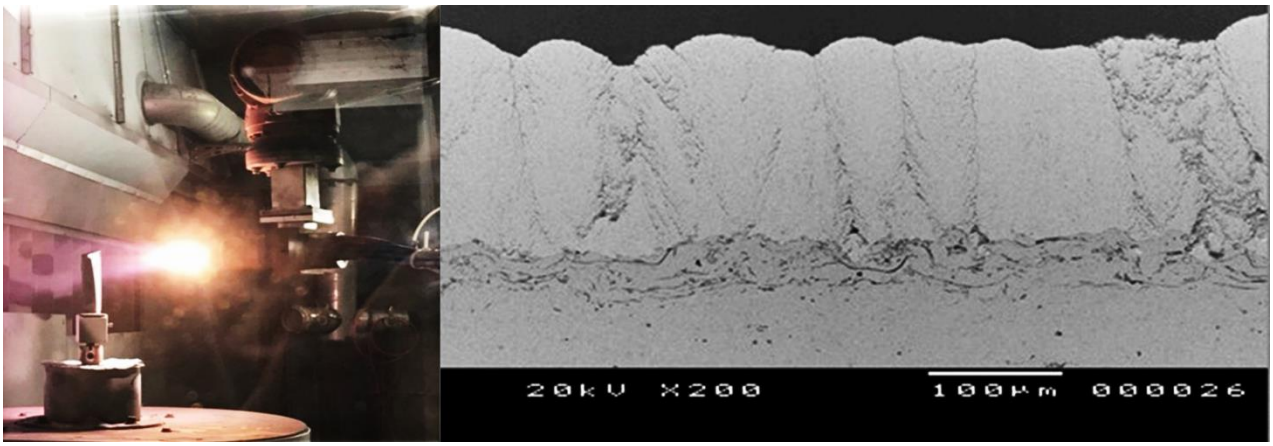
  Material Engineering and Life Management Technologies for Power Turbine

1. 渦輪機材料壽命評估技術(Technologies in Evaluating the Remaining Life for the Critical Turbine Components)
2. 氣渦輪機熱段組件再生處理及新製技術(Technologies in Refurbishment and Renew Manufacture Process for The Hot-section Components of Gas Turbine)
3. 渦輪機組件之破損肇因評估技術(Technology in Evaluating the Root Cause for The Fracture of Turbine Components)
4. 渦輪機組件之雷射銲修技術(Technologies in Laser Welding Repairs of the Turbine Components)



Si3D/501G 葉片絕熱塗層高能量及高效率噴塗製程

High-energy and efficiency spraying process for Si3D/501G blade insulation coatings



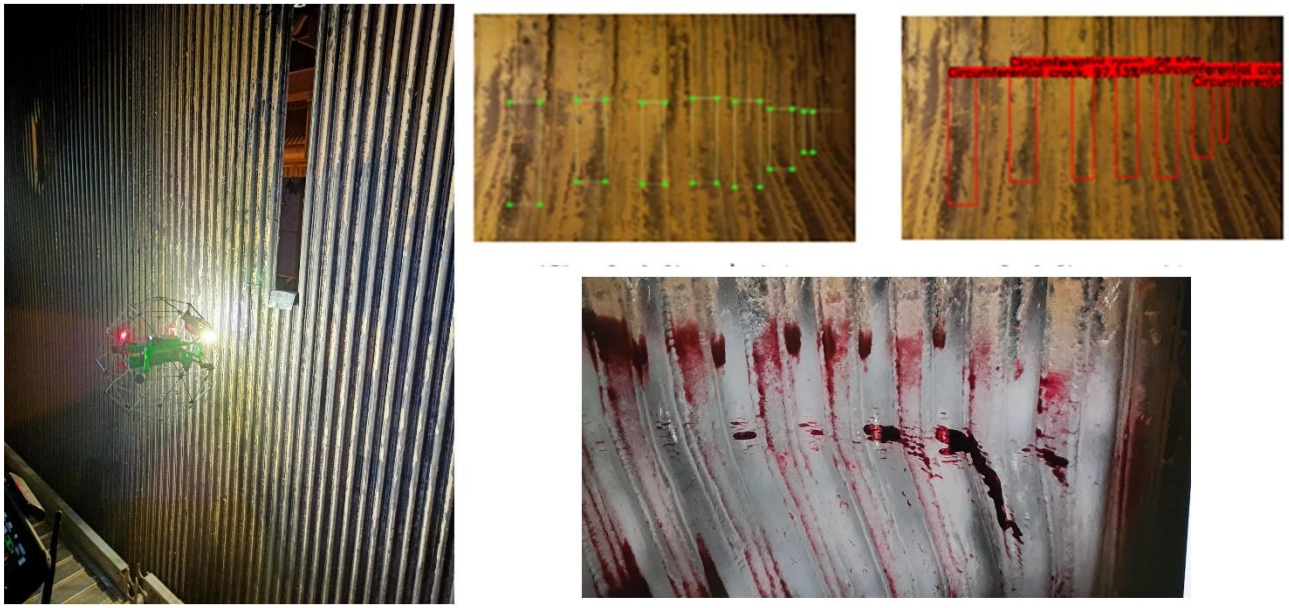
奈米結構絕熱塗層開發

Nanostructured Insulation Coating Development

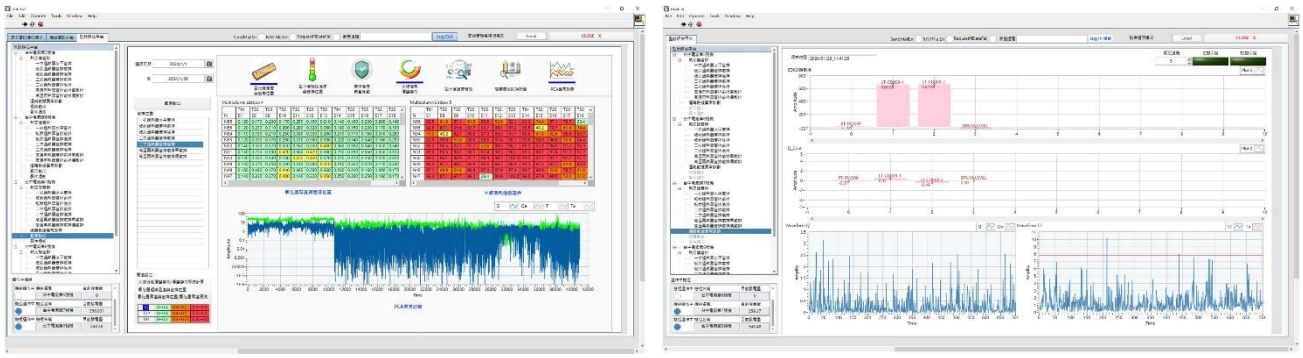
- **發電鍋爐材料壽命評估技術**

  Life Management Technologies for Utilities Boiler

1. 鍋爐組件材料壽命評估技術(Technologies in Evaluating Remaining Life for the Major Components of Utility Boilers)
2. 鍋爐爐管破損肇因分析與改善對策(The Root Cause Analysis of the Failure Parts and Countermeasures for Improvement of Boiler Components)
3. 超超臨界鍋爐材料高溫性質研究與老化評估技術(Study of High Temperature Properties and Degradation Evaluation of Ultra-supercritical Materials)
4. 鍋爐監診系統開發與應用(Development and Application of Boiler Diagnosis System)
5. 室內無人機進行鍋爐內部巡檢，開發瑕疵爐管影像辨識技術(Using Indoor Drones for Internal Boiler Inspection and Developing Image Recognition Technology for Detecting Surface Defects in Boiler Tubes)



鍋爐無人機巡檢、影像辨識與破損分析
Drone inspection, image recognition and failure analysis



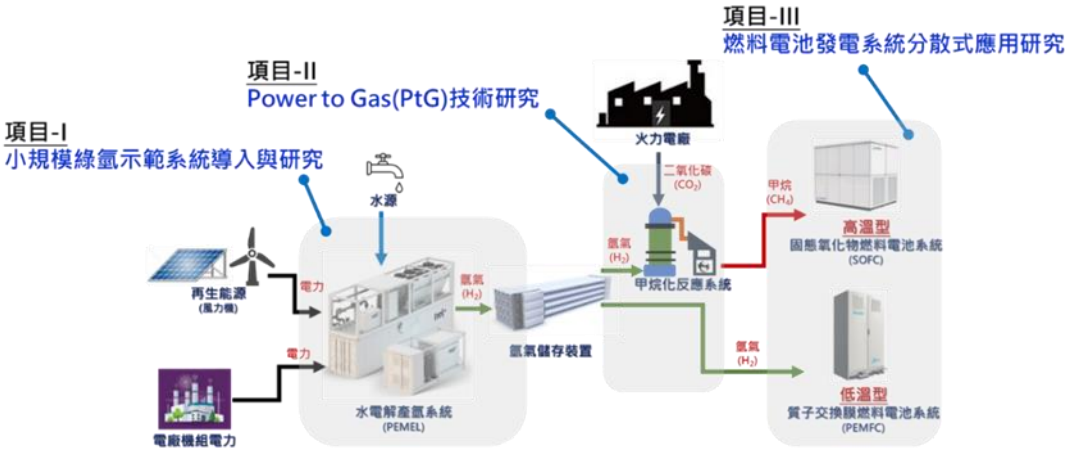
鍋爐監診系統
Boiler Diagnosis System

- **分散式發電系統應用技術**

Technologies for the application of distributed generation system

1. 再生能源發電預測技術(Renewable Energy Forecasting Technology)
2. 再生能源機組運維監控及診斷技術(Renewable Energy Units Intelligent Maintenance Technology)
3. 氣象觀測及預報資料整合應用(Integrated Application of Meteorological Observation and Forecast data)
4. 電解產氫技術(Water Electrolysis Hydrogen Production Technologies)
5. 燃料電池及氫能發電相關技術(Fuel Cell and Hydrogen Power Generation Technologies)
6. 分散式電源管理技術(Integration Research of Distributed Power System)

綠能氣象預測平台
Green Energy Power Forecasting Platform



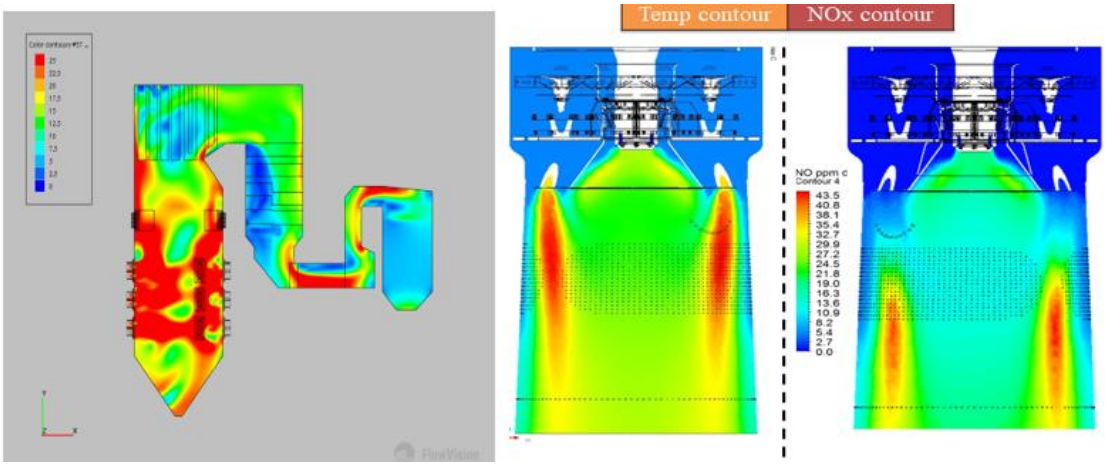
分散式氫能與碳捕捉再利用整合發電應用示範架構
Integrated power generation demonstration framework using distributed hydrogen energy and carbon capture and utilization

- **火力機組效能評估與氫能混燒發電應用研究**

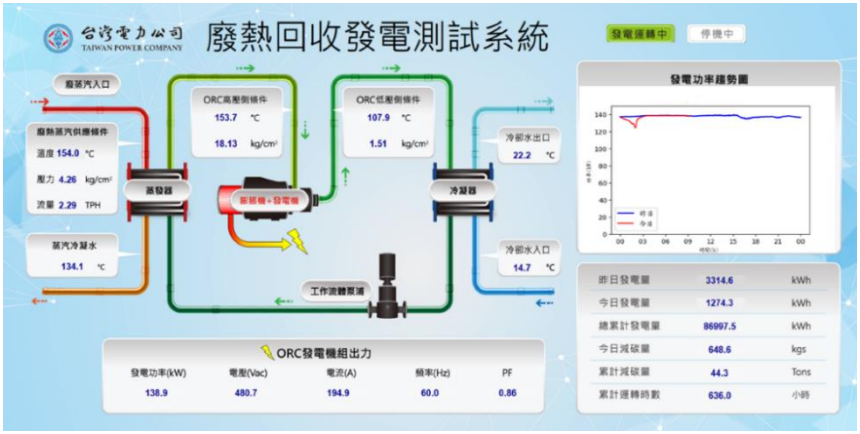
  Research on Thermal Power Unit Performance Evaluation and Hydrogen Co-firing Power Generation Applications

1. 火力機組運轉性能即時監測系統技術(Technologies for Real-time Performance Monitoring and Evaluation of Thermal Power Units)
2. 火力機組燃燒熱流場模擬技術(Combustion and Heat Flow Field Simulation Technologies for Thermal Power Units)
3. 火力機組低碳燃料混燒技術(Technologies for Low-Carbon Fuels Co-firing in Thermal Power Units)
4. 電廠輔機設備流況模擬分析技術(Flow Simulation Analysis Technologies for Power Plant Auxiliary Systems)
5. 發電設備廢熱回收技術(Technologies in Recovering Waste Heat of Power Generation Facilities)
6. 產氫系統與混氫發電機組之整合評估技術(Integrated Assessment Technologies for Hydrogen Production Systems and Hydrogen-blended Power Generation Units)

燃煤鍋爐過熱器線上結渣檢測
Online Slagging Monitoring of Superheaters in Coal-Fired Boilers



火力機組燃燒熱流場模擬分析技術
Combustion and Heat Flow Field Simulation Technologies for Thermal Power Units

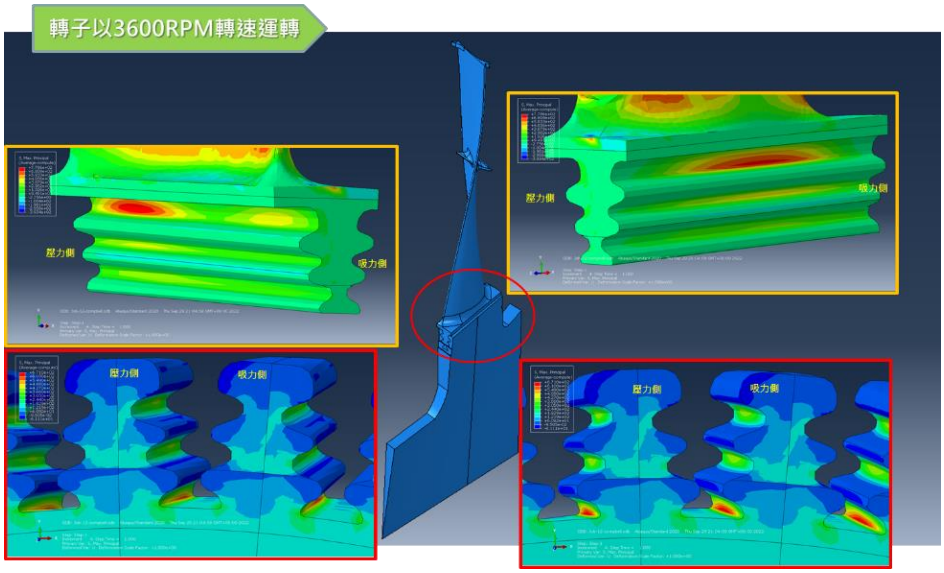


廢熱回收發電測試系統
Waste Heat Recovery Power Generation Test System

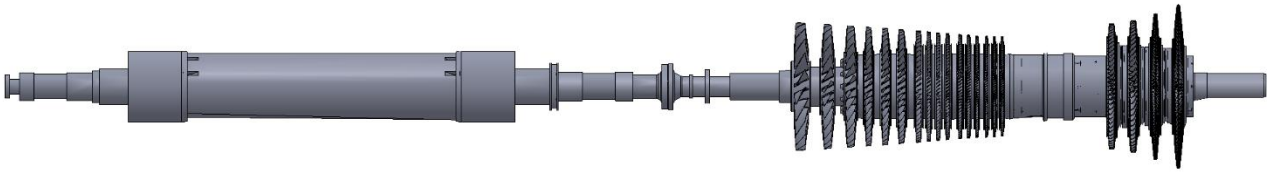
- **發電設備結構力學之評估、模擬與監測技術**

Structural Mechanics Analysis & Monitoring of Power Generation Equipment

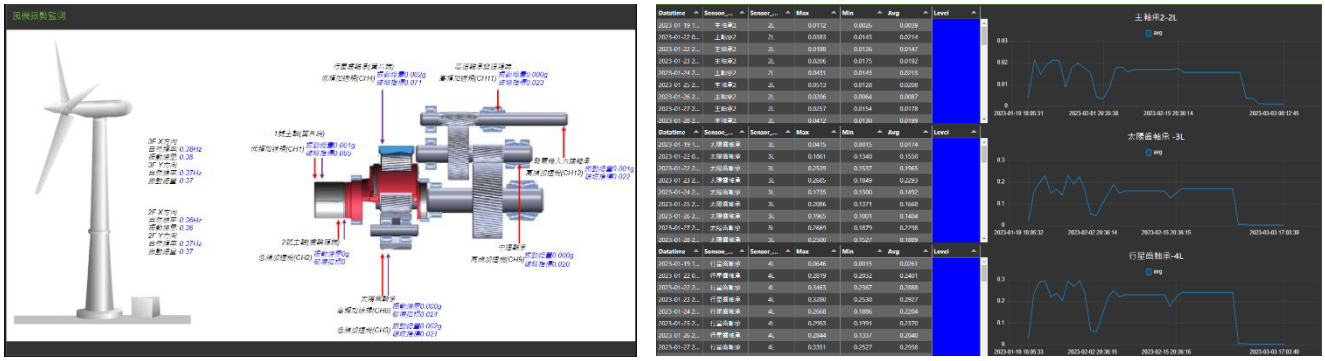
1. 發電設備振動分析與應力評估技術(Technologies in Vibration Diagnosis and Stress Evaluation for Power Generation Equipment)
2. 電廠迴轉機振動肇因與改善對策分析技術(Technologies in Evaluating the Root Cause for Rotary Machines Vibration and the Countermeasures for Improvement)
3. 發電設備運轉狀態監測與健康診斷技術(Technologies in Condition Monitoring System and Structural Health Monitoring of Power Generation Equipment)
4. 設備組件破損肇因與改善對策分析技術(Technologies in Evaluating the Root Cause for the Fracture of Facility Component and the Countermeasures for Improvement)
5. 設備組件有限元素分析及模態試驗(Finite Element Analysis and Modal Testing of Facility Component)



汽機葉片及轉子鳩尾槽應力分析
Stress Analysis of the Turbine Blade and Disk Dovetail Groove



氣渦輪機及發電機轉子動力分析
Dynamics Analysis of the Gas Turbine and Generator Rotor

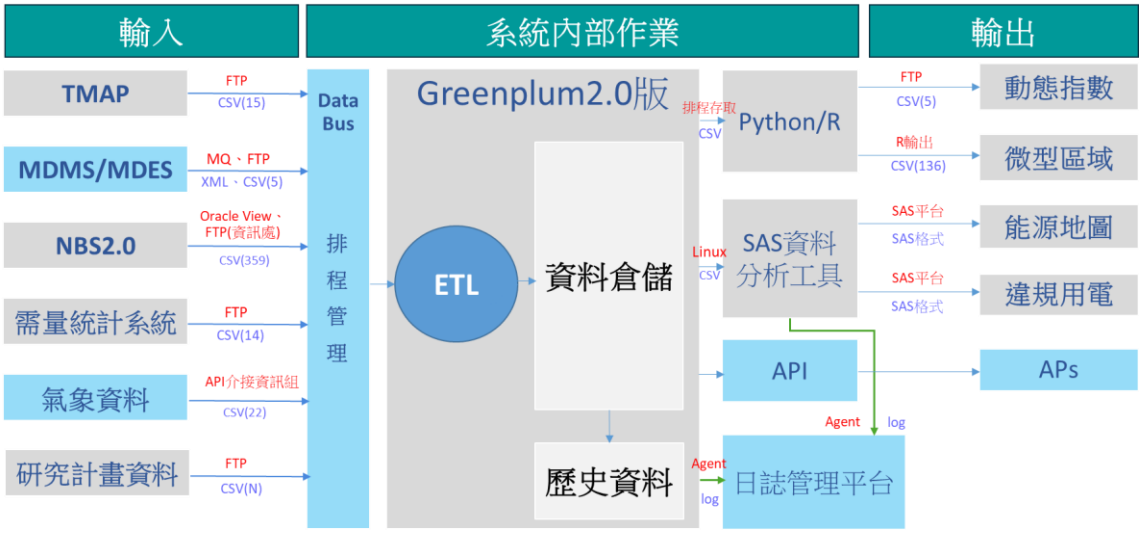


風機運轉狀態監測與健康診斷技術
Technologies in Condition Monitoring System and Structural Health Monitoring of Wind-turbines

負載管理研究室 Load Management Research Lab

- **需求面電能分析與運用技術**
  Demand Side Electric Energy Analysis and Application Technology

1. 智慧電網結合AMI數據分析違規用電行為可行性研究(Feasibility study in Illegal Electronic Activity with AMI Data Analysis and Smart Grid)
2. 整合新興分散式資源應用於電力調度之技術規範研析(Research and Analysis on Technical Specifications of Integrating Emerging Distributed Resources for Power Dispatching)
3. 儲能需量反應試驗與效益分析(A Study on Storing Energy Demand Response Trial and Analysis.)
4. 暫態特徵之非侵入式家電負載解析平台開發與商業化試驗(The Study on Development of Non-Intrusive Appliance Load Monitoring Solution Platform and Business Application Trial)
5. 高壓用戶需量反應特性查詢系統研究(Study on the Inquiry System of Demand Response Characteristics of High Voltage Customers)
6. 再生能源電源高占比時段之負載提升需量反應機制研究(Research on demand response of load increase during periods of high proportion renewable energy)
7. 應用於虛擬電廠之短期負載預測研究(Research on short-term load forecasting applied to virtual power plants)
8. 區域用電量預測與尖離峰趨勢差異分析研究(Regional Electricity Demand Prediction and Analysis of Peak-Off-Peak Discrepancies)
9. 需求面管理措施精進策略及關鍵要素設計研析(Research and analysis on the improvement strategy and key element design of demand side management measures)
10. 太陽光電結合儲能計量及再生能源數據應用精進之研究(Research on enhance study of solar power combined with PV energy storage and application regrading renewable energy meter data)



負載資料研究平台

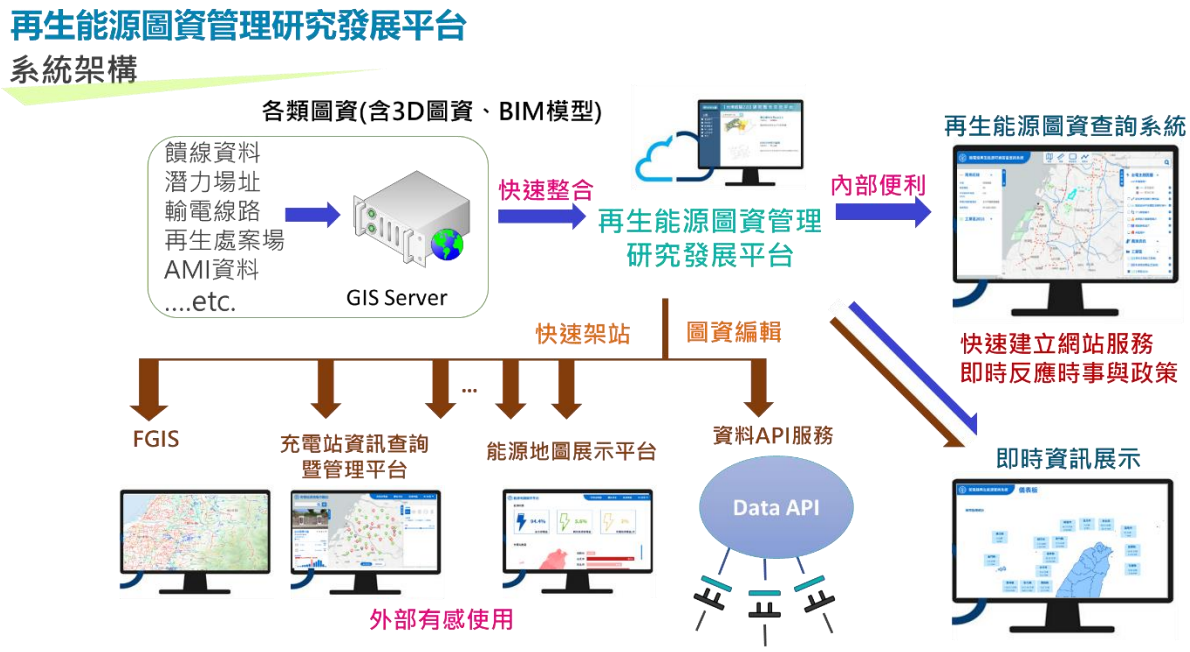
Load Data Research Platform

Esgator 平台架構

Integrated Development Mapping Platform Structure of Esgator

- **智慧配電維護技術研究**
  A Study on Maintenance Techniques of Smart Distribution System

1. 用戶用電設備設計資料審查及審驗圖文管理系統開發(To Develop the Management System for the Customer Equipment's Design Review and Map Information Verification)
2. 配電工程設計輔助圖面電腦化研究(Computerized Research on Auxiliary Design of Power Distribution Engineering Design)
3. 封印鎖管理機制探討與管理系統建置之研究(Study of Discussing Seal Management Policy and Disposing Management System)
4. 結合用戶群代表服務提升需量反應執行成效之可行性研究(Feasibility Study on Improving the Effectiveness of Demand Response Execution in Combination with Aggregator Services)
5. 再生能源管理資訊系統精進研究(A Integration Research of Renewable Energy Management System and Feeder Hosting Capacity Visualization System)
6. 饋線可併網容量視覺化系統精進研究(A Study of Improving Feeder Hosting Capacity Visualization System)
7. 配電規劃資訊系統結合配電級再生能源可併容量查詢系統暨網頁化(To make the web page of Distribution planning information system combined with Feeder GIS)
8. 電度表、變比器資訊數位化管理之研究
   A Study on Digital Information Management of Power Meter and Transducer
9. 用戶用電設備設計資料應用 BIM 技術增進圖資交付與電腦輔助法規檢核之研究
   Research on the application of BIM technology to the design data of consumer electrical equipment to enhance the delivery of graphics and data and computer-aided regulatory review



再生能源與配電設備圖資整合發展平台架構

Integrated Development Mapping Platform Structure of Renewable Energy and Power Distribution Equipment

- **用戶智慧用電體驗與節能應用技術**
  User Smart Electricity Experience and Energy-saving Application Technology

1. 家庭、建置與社區型微電網與能源管理系統資通訊標準研究 (Research on information and communication standards for household, residential and community microgrids and energy management systems)
2. 家庭、建置與社區型微電網與能源管理系統節能技術研究 (Research on energy-saving technologies for household, residential and community microgrids and energy management systems)
3. 用戶端能源管理應用與推動策略研究 (The study on the application and roadmap of customer-side energy management system)

4. 自動需量反應通訊協定技術開發研究 (Research and development of automatic demand response communication protocol technology)
5. 自動需量反應與能源管系統整合應用研究 (Research on the integration and application of automatic demand response and energy management system)

家庭能源管理系統架構

Home Energy Management System Architecture

化學與環境研究室
Chemistry and Environmental Research Lab

- **環境與水資源管理技術**
  Environment and Water Resource Management

1. 超臨界機組水處理技術(Water Treatment for Supercritical Power Plant)
2. 超臨界機組線上水質分析技術(On-line Water Analysis For Supercritical Power Plant)
3. 電廠廢水處理回收減量(Waste Water Recovery and Reduction)
4. 廢水零排放規劃評估(Evaluation of Zero Wastewater Discharge Planning)
5. 微藻固碳與廢水回收整合技術(Integration of Microalgae-based Carbon Fixation and Waste Water Recycling)

薄膜試驗設備

Membrane Treatment Equipment

微藻固碳養殖

Microalgae Carbon Fixation

蒸發試驗設備

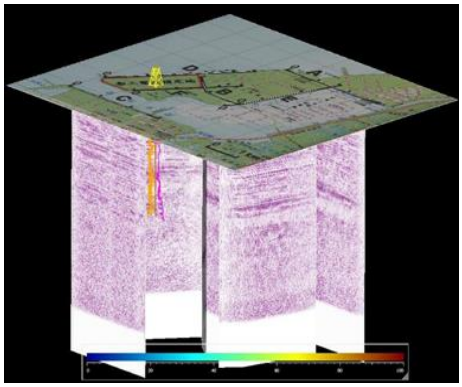
Evaporation Treatment Equipment

氨氮廢水試驗設備

Ammonia Nitrogen Test Equipment

- **二氧化碳減量及再利用技術**
  Carbon Dioxide Reduction and Utilization for Fossil Fuel Power Plants

1. 主流碳捕捉技術分析評估(Analysis and Evaluation of Commercial Scale of Carbon Capture Technology)
2. 化學吸收法於二氧化碳吸脫附技術開發與效益評估(Development and Evaluation of Chemical Absorption Method in CO_2 Absorption and Desorption Process.)
3. 先導物理固態吸附二氧化碳捕捉程序研究(Research on Performance of CO_2 Capture Process by Solid Adsorbent.)
4. 碳捕捉前處理技術開發(Development of Pretreatment Process before Main Carbon Capture Process.)
5. 碳捕捉、封存與運輸技術經濟分析研究(Research of technical economic analysis on Carbon Capture, Storage and Transportation)
6. 二氧化碳地質封存之地質安全與風險評估(Geological Safety and Risk Assessment of CO_2 Geological Storage)
7. 二氧化碳再利用技術評估與開發(Development and Evaluation of CO_2 Utilization Technology.)



彰濱場址三維地球物理資料展示
3D Geophysical Model of ChangBin Site

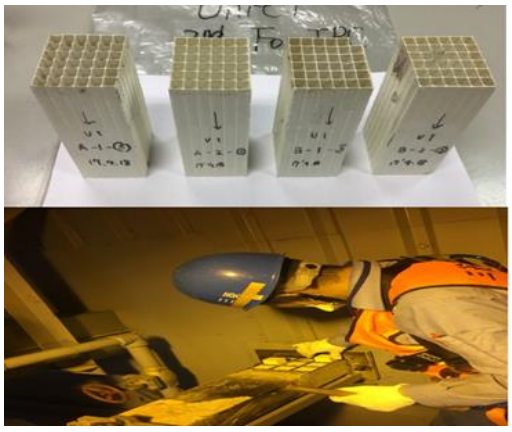
液態吸收程序整合熱管理技術 Chemistry Absorption Process by Heat Integration

固態吸附法二氧化碳捕捉技術
Solid Adsorption Technology for Capture CO_2

減碳技術園區-微型測試區
Carbon Reduction Technology Campus - Mini-Testers Region

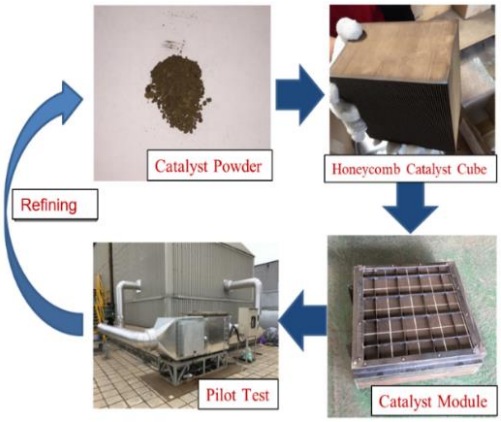
- **電廠煙氣淨化與固體副產物處理技術研究**
  Study on Flue Gas Cleaning and Solid Biproduct Utilization Techniques of Coal-Fired Power Plant

1. SCR 觸媒性能分析及活性管理 (SCR de-NOx Catalyst Quality Performance Analysis and Activity Management)
2. 低溫 SCR 脫硝觸媒技術開發 (Low Temperature SCR de-NOx Catalyst Technology)
3. 煤灰資源化利用技術(Coal Ash Resource Utilization Technology)
4. 巨積混凝土溫控技術發展 (Development of Temperature Control Technology for Massive Concrete)
5. 低碳循環營建技術發展(Development of Low Carbon Circular Construction Technology)
6. 工程減碳技術與策略規劃(Engineering Carbon Reduction Technology and Strategic Planning)



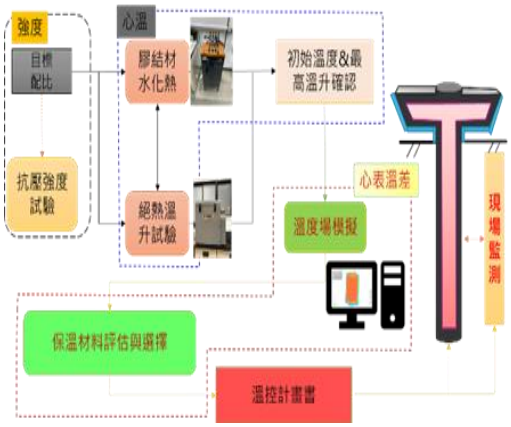
觸媒取樣及分析

Catalyst Sampling and Analysis



觸媒開發及模廠測試

Catalyst Development and Pilot Test



巨積混凝土溫控技術發展流程

Development Process of Temperature Control Technology for Mass Concrete

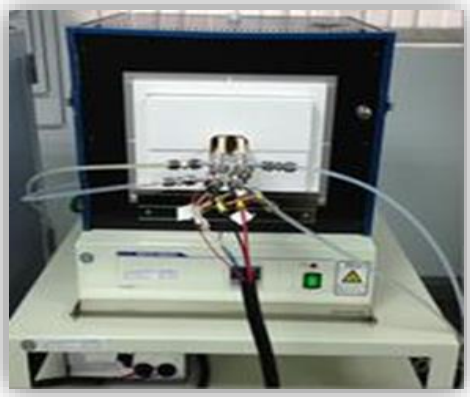
低碳建築技術發展

Development of Low Carbon Circular Construction Technology

- **電化學與儲能關鍵材料技術**
  Key Technology for Electrochemistry and Energy Storage Materials

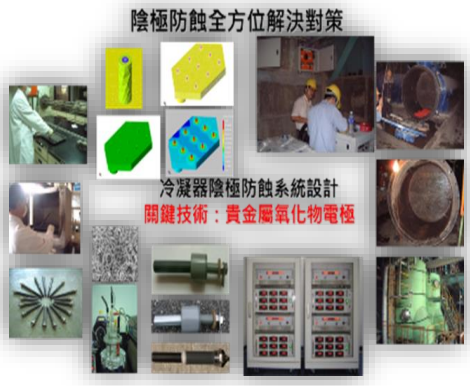
1. 二次電池在再生能源電力儲存之評估研究(Evaluation of Secondary Battery For Renewable Energy Storage Application)
2. 固態氧化物燃料電池關鍵技術(Key Technology On Solid Oxide Fuel Cell(SOFC))
3. 電廠腐蝕監測與陰極防護(Technologies on Corrosion Monitoring And Cathodic Protection For Power Plant)
4. 電池線上監測、容量測試及壽命評估(On-line Monitoring, Capacity Measurement and Life Assessment on Battery used in Power Plant)
5. 陸上及海上風塔與基樁腐蝕防治系統設計與劣化評估(Design and Deterioration Assessment of Onshore and Offshore Wind Tower, and Foundation Corrosion Prevention System)
6. 電化學水處理技術研究(Research on Electrochemical Water Treatment Technology)

釩液流電池儲能系統
Vanadium Redox Flow Battery Energy Storage System (125kW-750 kWh)



SOFC 單電池測試平台
SOFC Single Cell Test System

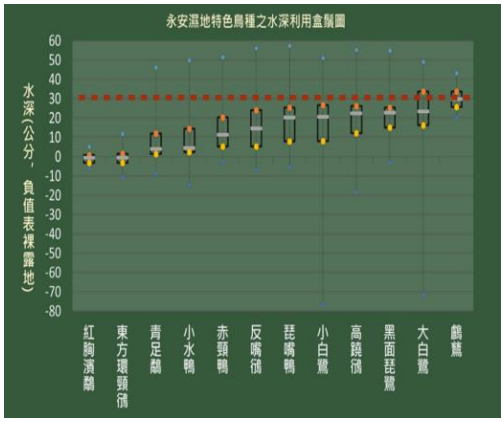
電化學水處理模廠試驗設備
Electrochemical Water Treatment Pilot Test Equipment



電廠陰極防蝕系統設計
Cathodic Protection System Design for Power Plan

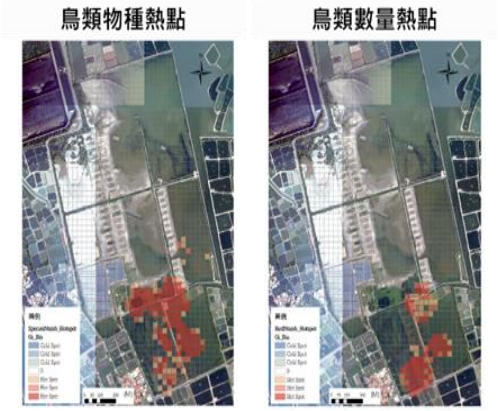
- **電力設施周邊生態保育與海洋牧場技術研究**
  Studies on the Ecological Conservation and Marine Ranch Around Power Facilities

1. 電業生態保育研究(Ecological Conservation Around Power Facilities)
2. 海洋牧場技術研發(Research and Development of Marine Ranch Technology)
3. 能源轉型之生態議題研究(Studies on Ecological Issues of Energy Transition)
4. 生態檢核專業服務及保育研究(Ecological Check Professional Services and Conservation Research)
5. 棲地經營管理專業服務及保育研究(Habitat Management Professional Services and Conservation Research)
6. 水產養殖、海洋生態專業服務及研究(Aquaculture, Marine Ecology Professional Services and Research)



永安濕地棲地保育及水位調控技術

Yongan wetland habitat conservation and water level regulation technology

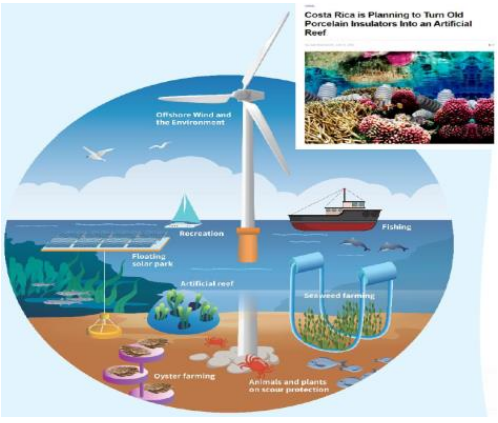


生態調查及生物資源空間分析，環境衝擊決策依據

Ecological investigation and spatial analysis of biological resources, providing the basis for environmental impact decision-making

海洋牧場箱網養殖設備

Marine Farm Facility



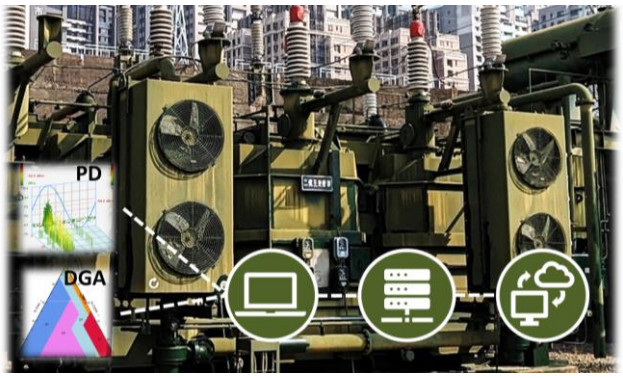
電業生態保育研究

Ecological Conservation Around Power Facilities

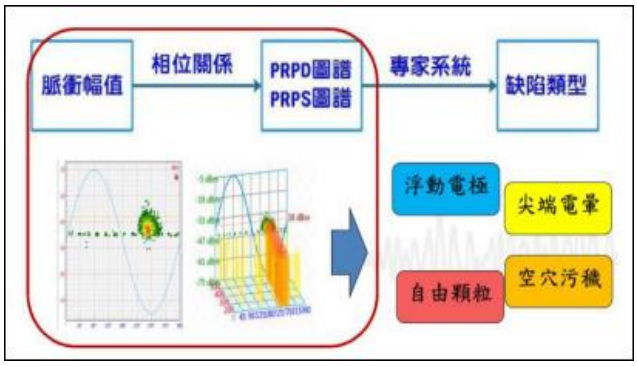
高壓研究室 High Voltage Research Lab

- **電力設備智慧診斷與災害防制技術平台**
  Power Equipment Intelligent Diagnosis and Disaster Prevention Technology
  - **電力設備狀態監測與診斷**
    Power Equipment Condition Monitoring and Diagnostics

1. 變壓器狀態監測與 AI 智慧診斷技術 (Transformer Condition Monitoring and Artificial Intelligent Diagnosis Technology)
2. 輸電級地下電纜預防性維護與故障診斷技術研究 (Research on Preventive Maintenance and Fault Diagnosis Technology for Transmission-Level Underground Cables)



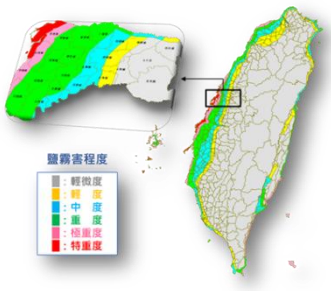
線上 PD 與 DGA 監測系統加值應用
Enhanced Applications for Online PD and DGA Monitoring Systems



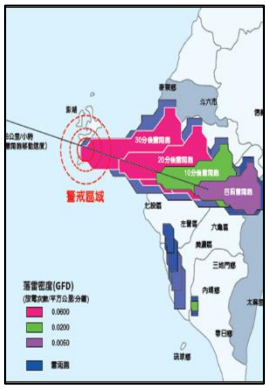
PD 檢測設備之 AI 專家診斷系統
AI Expert System for PD Detection Devices

- **閃電偵測與雷害防制**
  Detection and Countermeasures for Lightning Hazard

1. 閃電偵測 (Lightning Detection)
   (1) 閃電現象偵測與資料庫建立 (Lightning Detection and Up-dating the Lightning Database)
   (2) 即時閃電資訊傳送服務 (Real Time Transmission Service of the Lightning Data)
   (3) 提供歷史閃電資訊服務 (Historical Lightning Information Inquiring Service)



台灣地區鹽害程度分佈圖
Salt Contamination and Distribution Map of Taiwan



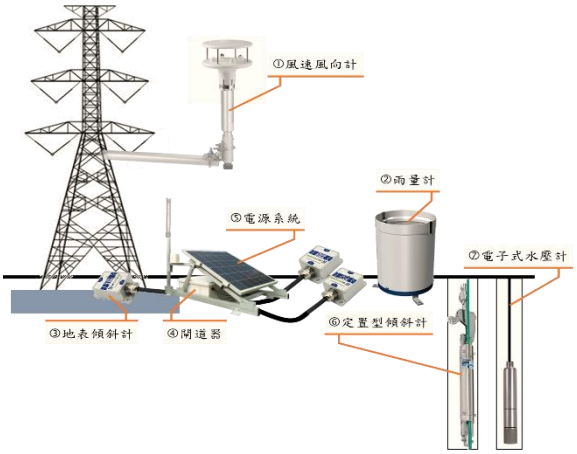
落雷追蹤預警軟體
Lightning Tracking and Alert System

◦ **輸電鐵塔塔基安全監測**
Transmission Tower Foundation Safety Monitoring

1. 塔基監測系統 (Tower Foundation Monitoring System)
2. 邊坡穩定分析及人工監測 (Analysis and Manual Monitoring of Slope Stability)
3. 塔基顏色維護模式精進 (Enhancement of Tower Foundation Color Maintenance Pattern)

◦ **鹽害防制與礙子特性**
The Characteristics of Insulators and Countermeasures for Salt contamination

1. 台灣地區鹽害程度調查 (Investigation of Salt Contamination in Taiwan)
2. 評估礙子絕緣性能與特性試驗分析(Evaluation of Insulator Insulation Performance and Characteristic Test)
3. 深度學習應用於礙子洩漏電流推估之研究 (Research on Insulator Leakage Current Estimation Using Deep Learning)



鐵塔安全監測系統
Tower Foundation Monitoring System

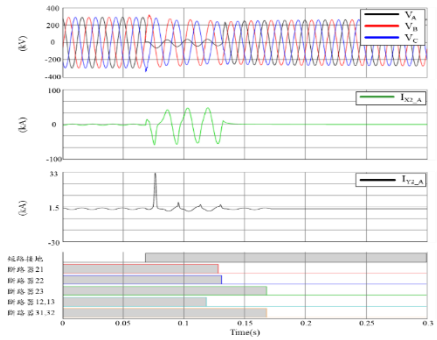
聚合礙子劣化、損壞、失效案例
Case Studies of Polymer Insulator Degradation, Damage, and Failure

- **電力設備即時動態模擬技術發展應用**
Application of Real-Time Simulation for Power System Equipment

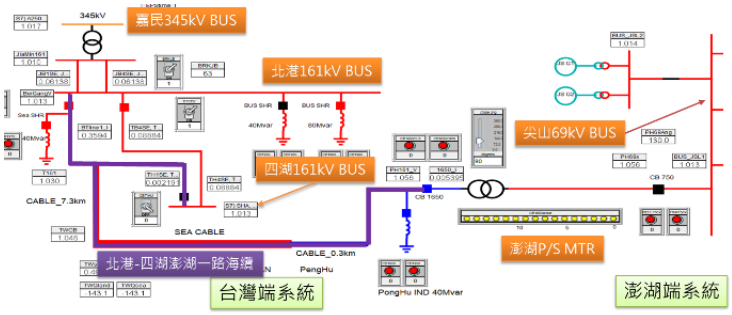
◦ **電力系統即時電磁暫態模擬分析技術**
Power System Real-Time Electromagnetic Transient (RT-EMT) Simulation and Analysis

1. 即時電磁暫態模型建立 (RT-EMT Based Modeling)
   (1) 台灣 345/161kV 電力系統模型(Taiwan 345/161kV Power System Model)
   (2) 變流器電源模型(Inverter-based Resources Model)

2. 即時電磁暫態模擬與分析(RT-EMT Simulation and Analysis)
(1) 系統保護與控制 (System Protection and Control)
(2) 停電事故肇因 (Root Cause of Outage)
(3) 操作程序驗證 (System Operating Procedure Verification)



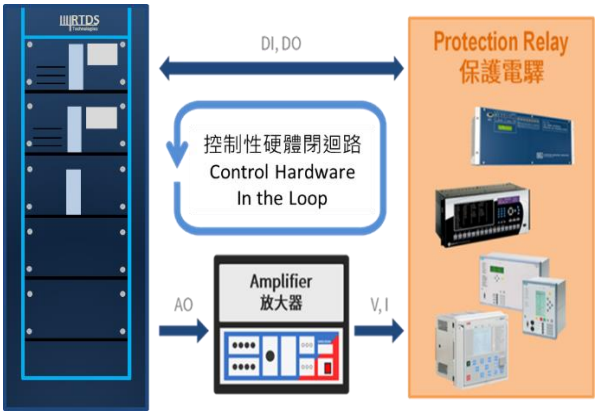
停電事故肇因分析
Analysis of Outage Root Cause



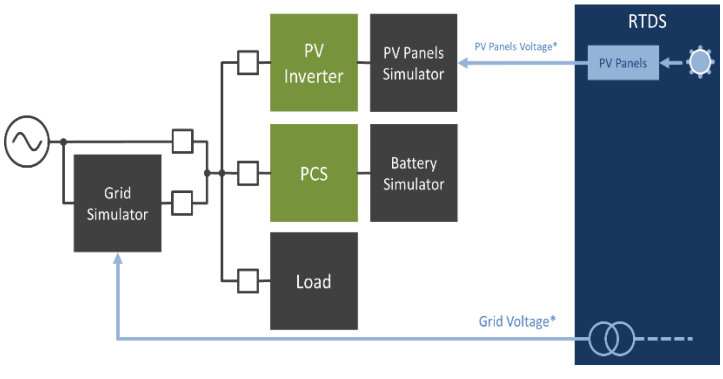
台澎海纜系統 RT-EMT 模型
RT-EMT Model for Taiwan-Penghu Submarine Cable

◦ 電力設備硬體迴路測試技術
The Hardware-in-the-Loop Based Testing for Power System Equipment

1. 控制級硬體迴路測試(Control Hardware-in-the-Loop Testing)
(1) 保護電驛測試(Testing for Protection Relay)
(2) 饋線末端裝置測試(Testing for Feeder-Terminal- Unit)
(3) 微電網控制器測試(Testing for Microgrid Controller)
2. 功率級硬體迴路測試(Power Hardware-in-the-Loop Testing)
(1) 太陽光電變流器併網測試 (Testing for Interconnection of PV Inverter with Power Systems)
(2) 儲能系統 PCS 併網測試 (Testing for Interconnection of ESS PCS with Power Systems)



控制級硬體迴路測試架構圖
Control Hardware-in-Loop Testing Structure



功率級硬體迴路測試架構圖
Power Hardware-in-Loop Testing Structure

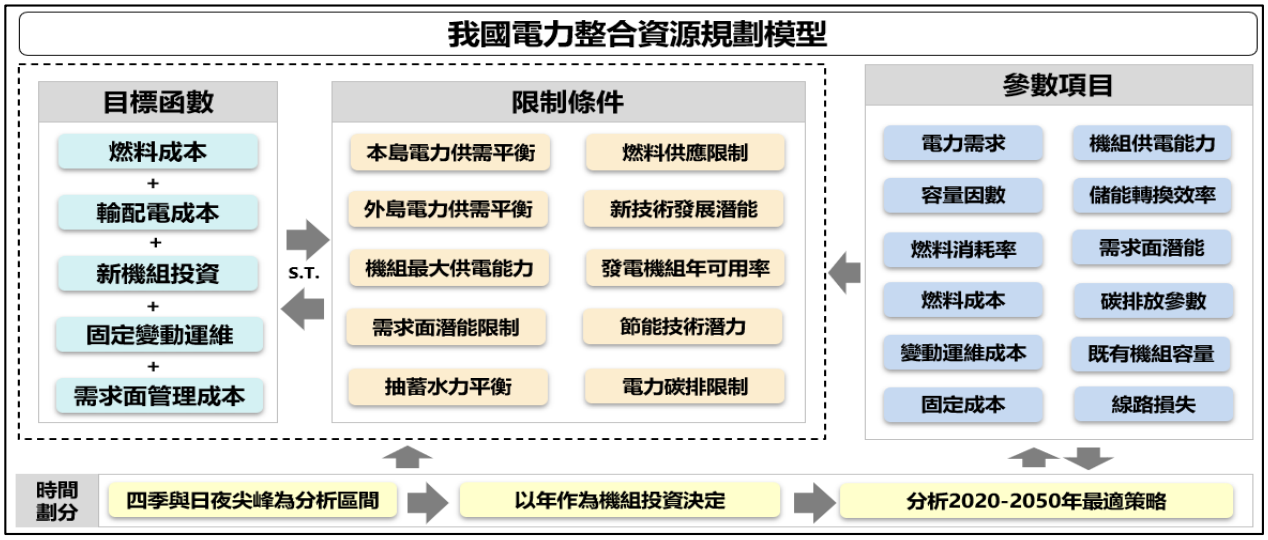
電力經濟與社會研究室

Electricity Economics & Social Research Office

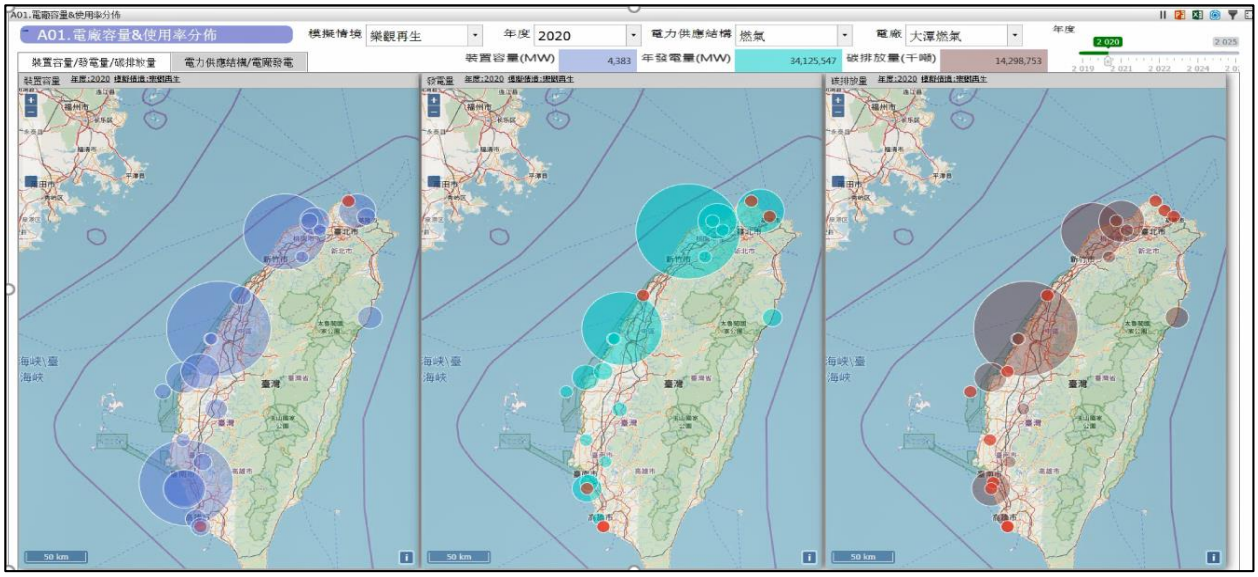
- ## 電力經濟資源整合平台

  ## Integrated Platform for Electricity Economics Resource

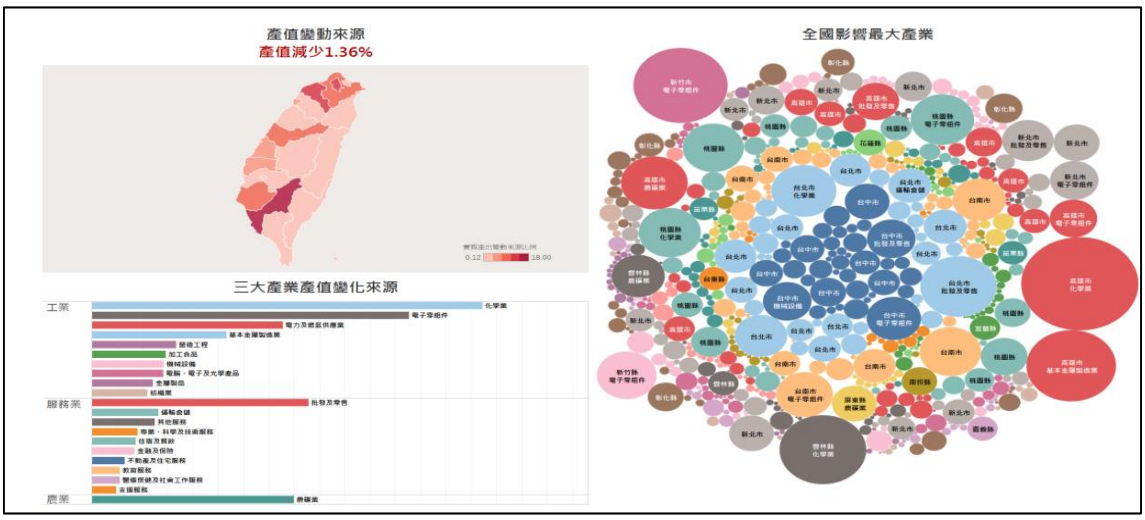
  1. 我國電力資源整合模組 (Resource Integration Planning Module)
  2. 產業經濟預測模組 (Industrial Economic Forecasting Module)
  3. 縣市投入產出分析模組 (Inter-Counties Input-Output Analysis Module)



電力資源整合模組架構
Framework of Resource Integration Planning Module



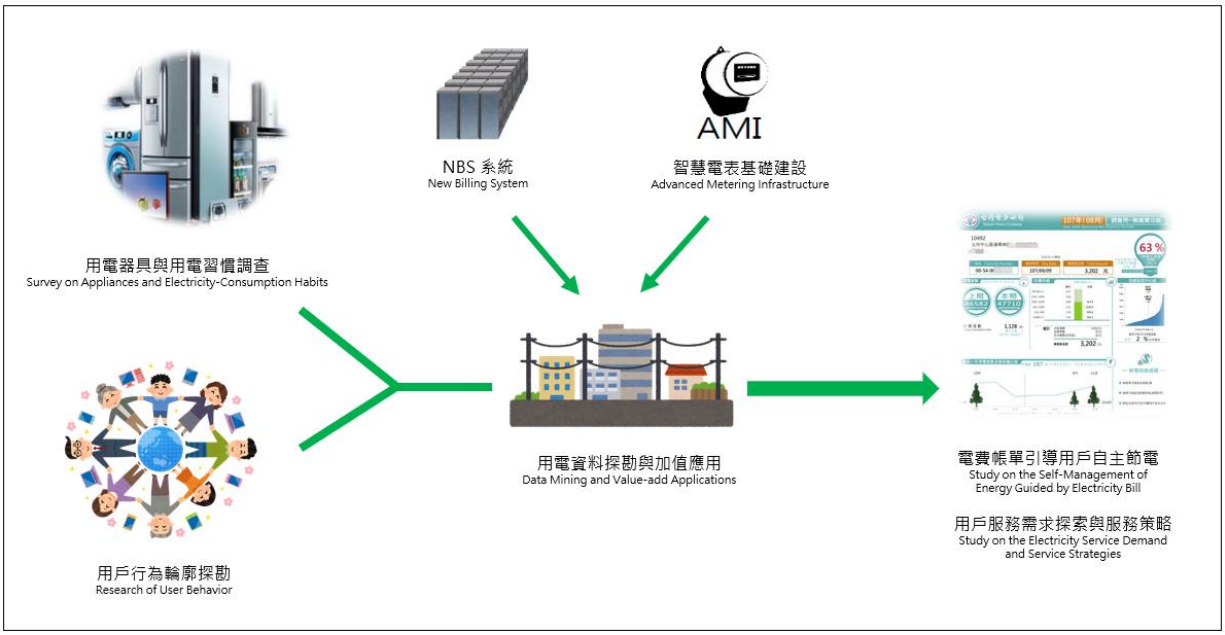
電力資源整合評估結果
Results of Resource Integration Planning Module



電價對縣市產值衝擊
The Impact of Electricity Cost on Inter-Counties Output

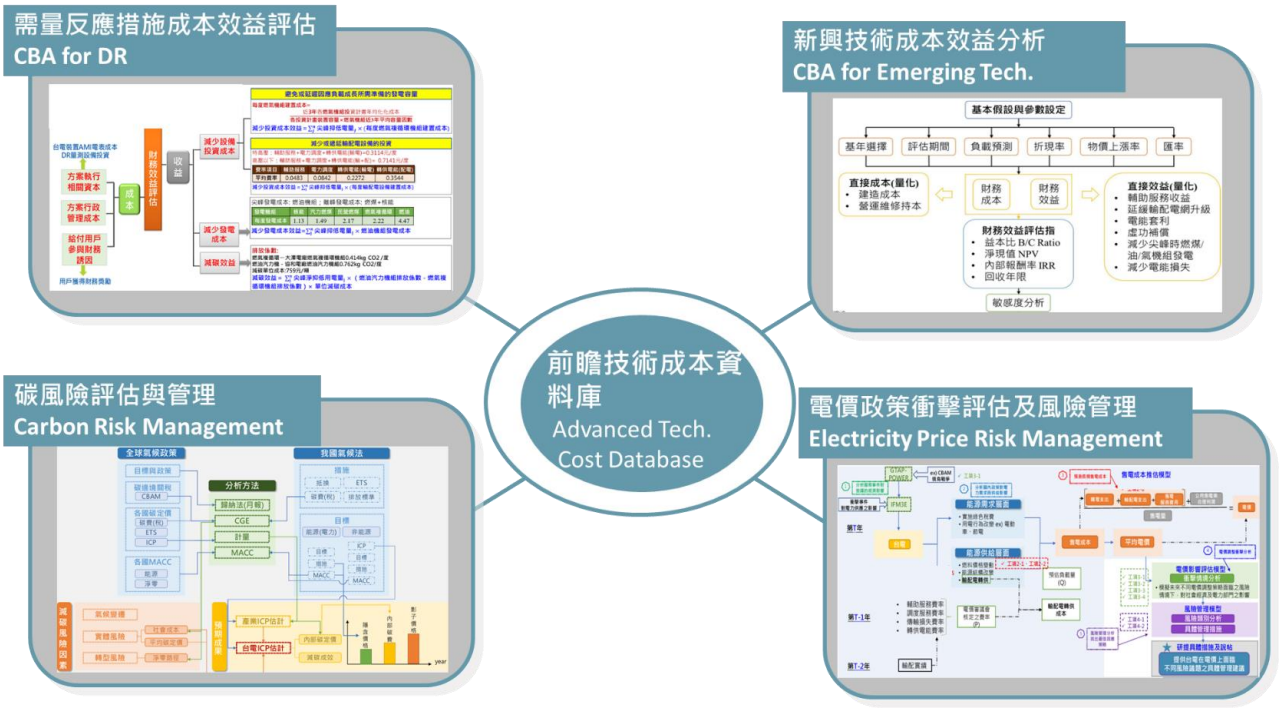
- **用戶經營與管理-用電行為調查分析與策略規劃**
  Customers Relationship Management Analysis on Electricity-Using Behavior and Strategic Planning

1. 用戶用電習慣調查 (Survey on Users' Electricity Usage Patterns)
2. 用戶用電模式分析 (Analysis on Users' Electricity-Using Pattern)
3. 用戶行為輪廓探勘 (Research of Behavior)
4. 用戶服務策略分析 (Analysis of Service Strategies for Users)



用電行為調查分析與策略規劃架構
Structure of the Analysis on Electricity-Using Behavior and Strategic Planning

- **技術經濟分析平台**
  Techno-Economic Analysis Platform
  1. 需量反應措施成本效益評估模組(Cost and Benefit Assessment Module for Demand Response Measures)
  2. 新興技術成本效益分析模組 (Cost and Benefit Analysis Module for Emerging Technology)
  3. 碳風險評估與管理模組 (Carbon Risk Evaluation and Management Module)
  4. 電價政策衝擊影響及風險管理模組(Electricity Pricing Policy Impact Assessment And Risk Management Module)

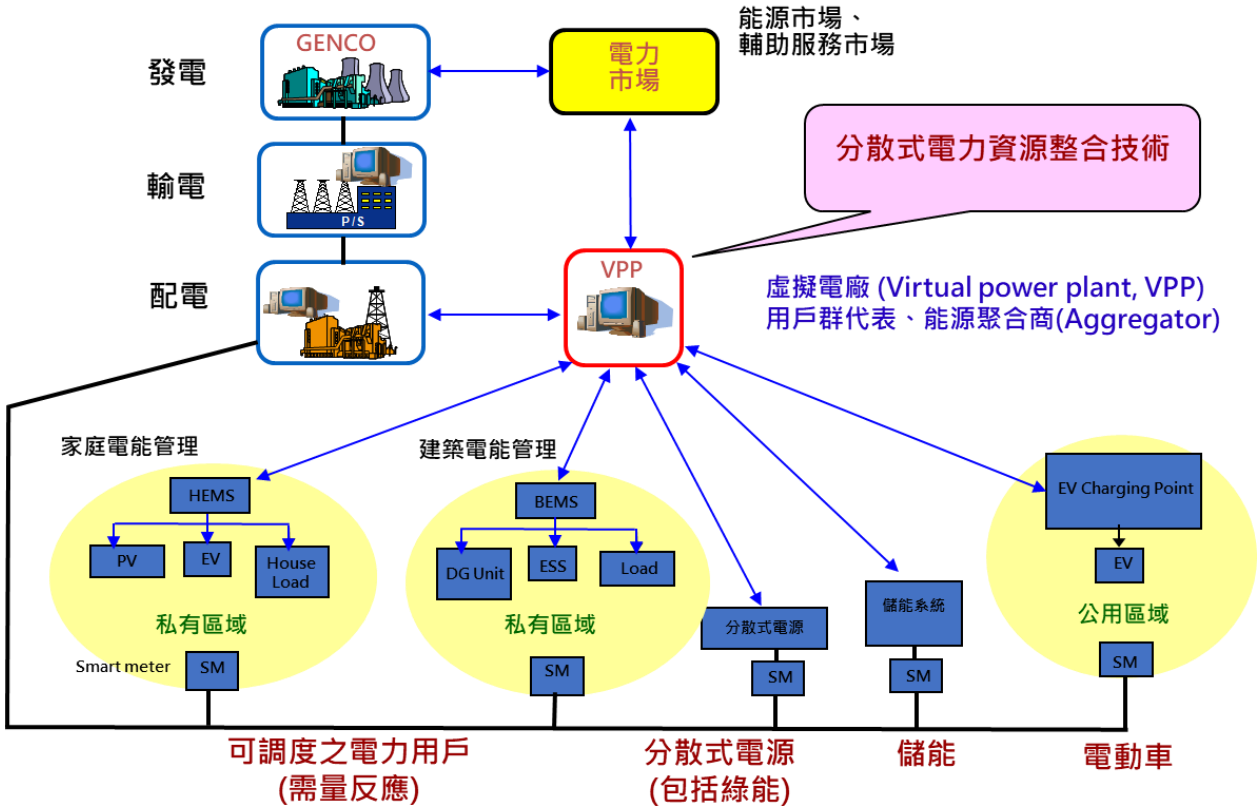


技術經濟分析平台核心資料庫與功能模組
Core Database and Functional Modules of TAE Platform

- **前瞻技術應用**

  New Technology Applications

1. 虛擬電廠(Virtual Power Plant, VPP)
   (1) 分散式能源應用 (Decentralized Energy’ s Applications)
   (2) 用戶智慧能源管理系統應用 (User Smart Energy Management System’ s Applications)
   (3) 電力交易應用 (Electricity Trading’ s Applications)
   (4) 虛擬電廠發展策略 (VPP’ s Development Strategy)



虛擬電廠之運作模式
VPP’ s Operation Mode

2. 分散式知識管理智能助理系統(Distributed KM Smart Work System)
   (1) 知識管理系統應用 (KM’ s Applications)
   (2) 知識管理行動化 (KM’ s Activation)
   (3) 知識管理整合人工智慧加值應用 (KM and AI’ s Value-Added Applications)

知識管理智能助理系統 KM
Smart Work System

試驗業務 Testing Services

⚡ 電力設備試驗組

Power Apparatus Testing Section

- 發、變電工程電力設備完工試驗
  Power plant & Substation Apparatus Test
  - 變壓器、氣體斷路器等特性試驗
    Transformer＆Switchgear Characteristic Test
  - 接地電阻、線路常數等量測
    Grounding Mesh Resistance & Transmission line Constant Test
  - 故障調查、分析、判斷
    Fault Investigation & Diagnostics Test
  - 驗收試驗
    Commissioning & Witness Test
- 交流遞升加壓、短路電流及加入系統對相試驗
  Applied AC Voltage And Short Circuit Test On Power Transformers
  - 提供短路電流、電驛設定試驗
    Applied AC current for Protective Relay Setting
  - 加入系統試驗
    Synchronize & In-phase Test
- 發電機組效率、卸載及性能參數試驗
  Generator Efficiency、Dumping、Governor Characteristic Test
  - 水力發電機組調速機性能參數
    Hydro-generator Units Governor Test
  - 水輪機效率試驗
    Hydro-power Station Turbine Efficiency Test
- 電力設備絕緣監測及維護試驗
  Electrical equipment performance Insulation Test & Predictive maintenance On-Line Monitoring
  - 發電機及變壓器部份放電試驗
    On line & off line partial discharge measurement on Large transformers and generators
  - 變壓器繞組變形試驗
    Power transformers winding deformation diagnostics
  - 紅、紫外線熱影像檢測技術服務
    Infrared & ultraviolet image inspection

變壓器絕緣試驗
Transformer Insulation Test

電廠變壓器遞升加壓試驗
Applied AC Voltage Test

水輪機組調速機性能試驗
Hydro-generator Units Governor Test

發電機部分放電試驗
Generator Partial Discharge Test

儀器組 Measuring Instrument Section

• 主要試驗內容 Major Test Items

- 電量標準之建立與維持
  Establishment and Maintenance of Electricity Standards.
- 新購儀器之特性試驗及品管用儀器之定期校驗
  Characteristic Testing of Newly Purchased Instruments and Regular Calibration of Quality Control Instruments.
- 各發變電所配電盤儀表定期現場校驗
  Regular On-Site Calibration of Switchboard Instruments In Various Power Substations.
- 儀控(IEC61850)及電力監控系統試驗
  Instrument Control (IEC61850) and Power Monitoring System Test.
- 各種儀器及保護電驛之檢修
  Overhaul of Various Instruments and Protective Relays.
- 智慧型保護電驛及系統試驗
  Intelligent Electronic Device (IED) Relay and System Test.
- 保護電驛及儀控系統事故分析
  Fault Analysis of Protection Relay and Instrument Control System.

精密儀器測試
Precision Instrument Testing

發電廠變電所監控儀表定期校驗
Regular calibration of monitoring instruments in power plant substations

• 電量實驗室校驗能量 Calibration Capability

- 直流電壓DC VOLTAGE 10 nV ~ 100 kV；±0.1% ~ 5 ppm
- 直流電流DC CURRENT 0.5 pA ~ 1000 A；±0.4% ~ 130 ppm
- 交流電壓AC VOLTAGE 2 mV ~ 1200 V；5 Hz ~ 30 MHz　±0.1% ~ 70 ppm
- 交流電流AC CURRENT 0.1 A ~ 2000 A；±0.5% ~ 0.03%
- 電 功 率ELECTRIC POWER 0 ~ 240 V · 0 ~ 6 A · 0 ~ 1 PF ·　±0.05% ~ 100 ppm
- 電 阻RESISTANCE 10^{-4} ~ 10^{12} Ω；±0.1% ~ 10 ppm
- 電 容CAPACITANCE 1 pF ~ 1 F；±0.1% ~ 50 ppm
- 電 感INDCUTANCE 100 μH ~ 10 H；±0.1 ~ 0.02%
- 相 位PHASE 0 ~ ±360,000^{o}；±0.01% ~ 0.005^{o}
- 頻率 / 時間 FREQUENCY/TIME 0 ~ 1.3 GHz；±10^{-9} ~ 10^{-13}

電表組 Electricity Metering Section

• 主要試驗內容 Major Test Items

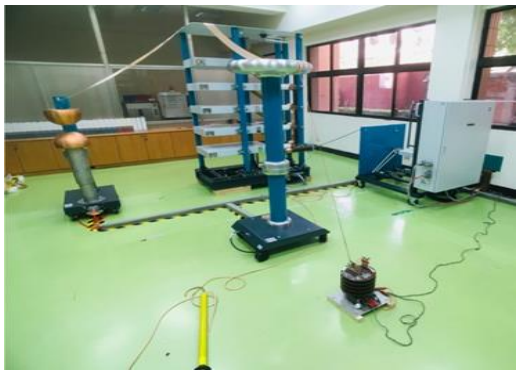
- 電力用戶及發變電所電度表與變比器之校修
  In-service Performance Tests of Electricity Meters and Instrument Transformers
- 新購電度表與變比器之驗收試驗、特性試驗及新型式之定型試驗
  Acceptable Performance of New Type of Electricity Meters and Instrument Transformers
- 瓦時、交流高壓、交流大電流標準之建立與維持
  To Maintain the Primary Standard and to Carry out the Entire Chain of Sequential Measurements between National Standard and Working Standards on Electricity Meter and Instrument Transformer Field
- 電力用戶事故鑑定與分析
  Analysis and Inspection of Power Measurement Diagnostics on End Users
- 新測試設備研發
  Development of New Testing Equipment
- 高低壓智慧型電表 AMI 性能測試平台之建立
  To Establish The Platform on Performance Test of the Advance Metering Infrastructure
- 電表與通訊模組交互可用性測試
  Operability Testing between Electric Meters and Communication Modules

• 主要試驗能力 The Major Facilities of Testing and Capability

- 單 / 三相電度表試驗設備
  Test system for Electricity Metering
  110 / 220 / 380V；0.25 ~ 200A；±0.3%
- 標準瓦時計校正設備
  Watt-hour Standard Calibration System
  110 / $\sqrt{3}$ ~ 240V；0.25 ~ 20A；±0.07%
- 精密比壓器試驗設備
  Precision Potential Transformer Test System
  110 / $\sqrt{3}$ ~ 12,000V；±0.001%
- 精密比流器試驗設備
  Precision Current Transformer Test System
  5 ~ 5,000A；±0.001%
- 感應耐電壓試驗設備
  Induce Voltage Withstand Test System
  0 ~ 150 kV；60 ~ 400Hz

電表與通訊模組交互可用性測試
Operability Testing between Electric Meters and Communication Modules

電度表修校自動化設備
Watthour Meter Repair Automation Equipment



衝擊電壓試驗設備
Impulse Voltage Testing

高壓試驗組 High Voltage Testing Section

• 主要試驗內容 Major Tests Items

- 345kV 電力電纜/GIS 現場交流耐電壓試驗
  On-site AC Withstand Voltage Test up to 345 kV Power Cables/GIS
- 電力電纜部分放電量測(線上)
  Partial Discharge Measurement on Power Cable (Online)
- 高壓熔絲試驗
  Fuse Test
- 變壓器驗收試驗
  Acceptance Test on Taipower Transformer
- 配電級與輸電級避雷器試驗
  Distribution and Transmission Lightning Arrester Test
- 短路試驗
  Short Circuit Test
- 電力品質量測
  Measurement of Power Quality

• 獲得的認證與資格 Accreditation and Qualification

- **ISO 17025 高壓測試實驗室(證書號 L0160-231023)：6 種電力器材試驗認可**
  ISO 17025 High Voltage Testing Lab(Certificate number : L0160-231023)：6 Electric Equipment
- **ISO 17020 檢驗機構(證書號 I0018-221206)**
  ISO 17020 Inspection Body(Certificate number : I0018-221206)
- **經濟部能源署認可高壓用電設備檢驗機構(證書號：1043007690-4)**
  “Inspection Body for High Voltage Equipment” Approved by Energy Administration, Ministry of Economic Affairs (Certificate number :1043007690-4)

• 新試驗項目 New Calibration Items

- 依 IEC 60060-2(2010)執行的交流高電壓校正
  AC high voltage calibration according to IEC 60060-2(2010)

電力電纜交流耐電壓試驗
AC Withstand Voltage Test on Power Cables

大容量短路試驗室
Large Capacity Short Circuit Lab

高電壓校正實驗室
High-volt Calibration Lab

化檢組 Chemical Testing Section

主要試驗內容 Major Test Items

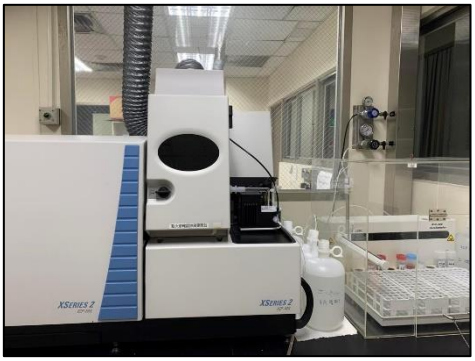
- 電力系統各類物料 - 金屬、木材、塑膠及橡膠之製品等之化學成分與物理特性試驗
  Chemical and Physical Test for Materials of Electrical Power System - Metal, Wood, Plastic and Rubber
- 各類水質及水處理材料特性分析
  Water and Water Treatment Materials Properties Analysis
- 事業廢棄物溶出毒性試驗
  TCLP Testing for Industrial Waste
- 固體廢棄物、毒性化學物質及相關之環境污染物分析檢驗
  Analysis of Solid Wastes、Toxic Chemicals and Related Environmental Pollutants
- 金屬及工程材料機械特性檢驗
  Mechanical Property Test for Metal and Engineering Material
- 電力器材金相及破損分析
  Metallographic and Fracture Analysis of Boiler and Related Steam-power-plant Equipment

獲得的認證與資格 Accreditation and Qualification that We Got

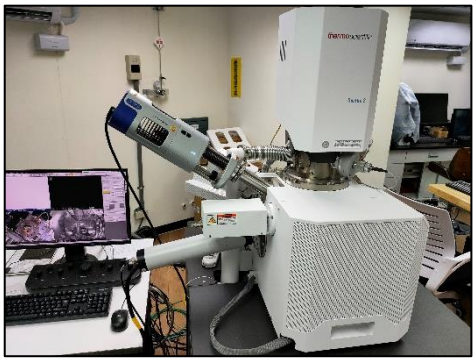
- ISO/IEC 17025：2017；CNS 17025：2018
  - 材料實驗室(TAF 證書編號：L1883-221223)
    Material Laboratory(TAF Accreditation Number：L1883-221223)
- 環境檢驗測定機構檢驗室品質系統基本規範
  - 環境檢驗室(環保署許可字號：環署環檢字第零四三號)
    Environmental Analysis Laboratory(NIEA Accreditation Number：043)

主要試驗設備 Major Facility

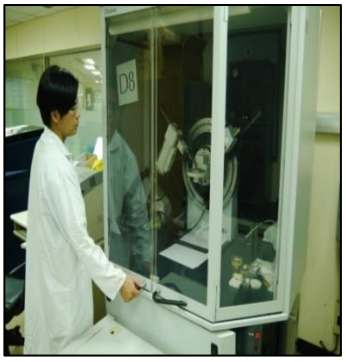
- 光譜分析儀 - 材料、環境樣品成分分析
  Spectroscopy - for Analysis of Chemical Composition of Material and Environmental Samples
- 感應耦合電漿質譜儀-微量元素分析
  Inductively Coupled Plasma Mass Spectrometry - for Trace Elements Analysis
- 氣相層析儀 - 物質定性定量分析
  Gas Chromatograph - for Qualitative and Quantitative Analysis of Material
- X 光繞射光譜儀 - 物質內部結構與組成分析
  X-ray Diffractometer - for Analyzing the Structure and Composition of a Material
- 掃描式電子顯微鏡-金屬與非金屬材料微區顯微組織觀察，適用於電力器材之破損分析
  Scanning Electron Microscopy –Microstructure Observation of Metal and non-Metal Materials for Failure Analysis of Electrical Equipment



感應耦合電漿質譜儀
ICP-MS



掃描式電子顯微鏡
Scanning Electron Microscopy



X 光繞射光譜儀
X-ray Diffractometer

油煤試驗組 Oil & Coal Testing Section

- **主要試驗內容 Major Test Items**
  - 煤、重油、柴油、天然氣等燃料之檢驗分析
    Analysis of Coal, Fuel Oil, Natural Gas, etc.
  - 絕緣油、潤滑油、液壓油、油膏等油品之檢驗分析
    Analysis of Insulating Oil, Lubricants, Hydraulic Fluid, Grease, etc.
  - 電力設備用氣體試驗、氣體偵測設備校驗與絕緣油中氣體分析
    Analysis of Gas and Dissolved Gas-in-oil and Calibration of Gas Detectors for Electrical Power Equipment
- **應用技術 Applications**
  - 新製電力變壓器內部製造瑕疵診斷
    Manufacturing Defect Diagnosis for New Power Transformer by DGA during Factory Tests
  - 運轉中電力變壓器故障預防診斷
    Fault Prevention Diagnosis for In-Service Power Transformer
  - 事故變壓器故障位置預測
    Fault Location Prediction for Failure Transformer
  - 充油電纜接續匣故障預防診斷
    Fault Prevention Diagnosis for Oil-filled Cable Joint
  - 變壓器老化趨勢評估
    Aging Tendency Evaluation of Power Transformer
  - 氣體斷路器故障預防診斷
    Fault Prevention Diagnosis for In-service Gas Insolating Switchgear
- **試驗應用技術 Testing Applications**
  - 燃料、油料與氣體試驗與採樣諮商服務
    Consulting Services for Testing and Sampling of Fuel, Oil and Gas
  - 機械設備潤滑油監測分析與磨潤故障偵測
    Lubricating Oil Monitoring and Tribological Failure Detection
  - 微量水分(0.3ppmv~1%)標準氣體之生產與氣體水分儀校驗
    Calibration of Hygrometer and Production of Standard Gas from - 80℃ to 10℃ Dew Point
  - 電力設備中受污染 SF_6 再生純化處理
    Contaminated SF_6 Gas Recycling and Reclamation for Power Facilities

煤炭工業分析
Proximate Analysis of Coal

變壓器油中氣體分析
Dissolved Gas Analysis of Transformer Oil

絕緣油中糠醛分析
Furanic Compound Analysis of Transformer Oil

展望

因應再生能源大量併網、全球淨零碳排趨勢、用電型態轉變等因素影響下，本所將以「淨零轉型，研發先行」為核心，厚實公司低碳及零碳轉型所需之核心知識與策略基礎。

在前述各項挑戰下，未來本所除針對各項前瞻技術及重點研發領域，除持續進行研發與創新外，亦將針對確保穩定供電、智慧電網佈建、再生能源最大化、低碳及零碳轉型(燃料轉換、負碳排等議題)所需之技術，與國外科研機構進行技術交流與合作，以確保能源轉型及淨零排放目標之達成。

Future Outlook

In response to the influence of high percentage renewable energy, global net zero carbon emission consensus, and changes in electricity consumption patterns, TPRI needs to take "R&D first" as the core in the future to thicken the foundational knowledge and strategic framework required for Taipower’ s low-carbon and zero-carbon transformation.

Under the aforementioned challenges, in the coming year, in addition to continuing R&D and innovation for various foresight technologies and key R&D areas, TPRI will also conduct technical exchanges and cooperation with foreign scientific research institutions to ensure stable power supply, smart grid deployment, renewable energy maximization, low-carbon and zero-carbon transformation (fuel conversion, negative carbon emissions, among others) to ensure the achievement of energy transition and net zero emission targets.

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