# Preliminary Research on Optimization of R&D Key Performance Indicators

R&D Planning Office: Chen, Hsiao-Wei; Huang, Chung; Lin, Wen-Wen; Li, Yi-Tien

### 1. Project Background and Objectives

Against the backdrop of increasingly severe global climate change, net-zero carbon emissions have become an international consensus. Our government has actively responded to this trend by establishing the goal of netzero emissions by 2050. As Taiwan's primary electricity provider, Taiwan Power Company (TPC) plays a crucial role in the energy transition. To achieve the net-zero target, we must increase research and development (R&D) resources, develop and introduce the latest technologies, improve energy efficiency, and strengthen grid resilience.

However, the previous R&D performance evaluation system cannot fully reflect research outcomes under new circumstances. To ensure effective utilization of R&D resources, accelerate the implementation of R&D results, and align R&D direction with policy objectives, we have initiated this study as a preliminary effort for subsequent optimization of R&D key performance indicators (KPI).

The objectives of this research include:

(1) Optimizing TPC's R&D KPI system: Establish scientific. reasonable. and effective а performance indicator system based on the causal relationship chain model (Input-Project-Output-Outcome-Impact, IPOOI). This systematically defines the research project's inputs (I), activities (P), outputs (O), outcomes (O), and impacts (I), along with their associated contexts and key performance elements, to better reflect the actual value of R&D results and their contribution to company development (Fig. 1).

(2) Conducting preliminary operations for implementing the R&D KPI system: Examine the feasibility of implementing the optimized indicator system to establish a foundation for subsequent full-scale implementation.

## 2. Research Content and Main Tasks

To achieve these objectives, this research encompasses the following tasks:

- Reference R&D KPI from benchmark international power groups to propose improvement directions and principles for R&D KPI.
- (2) Construct an R&D KPI system, indicator items, and measurement principles.
- (3) Conduct pilot operations for R&D key performance evaluation.
- (4) Develop enhancement strategies and implementation methods for subsequent R&D KPI.

## 3. Preliminary Results

This project has achieved the following preliminary results:

 Establishment of Improvement Directions and Principles for the R&D KPI System: Completed analysis of R&D performance indicator systems from international power organizations, including Korea Electric Power Corporation, Tokyo Electric Power Company, Southern Company (USA), and RWE (Germany), and incorporated applicable elements from these organizations into this study.

- (2) Completion of TPC's R&D Indicator Restructuring:
  - Since the quantitative data presented by A. the original indicators could not fully represent the uniqueness and importance of results (such as cost reduction amounts, number of reports, product development counts, etc.), indicators such as "Number of Quality Papers" and "Number of Patent Applications" have been added to enable stakeholders to understand the highlights of each research project's results directly.
  - B. This study has also introduced research characteristic indicators to emphasize the unique contributions of the results. For example, in the "Power Plant Resource Sustainability and Flue Gas Research" Purification Technology project, indicators such as "Assistance in Reducing Greenhouse Gas Emissions" and "Assistance in Reducing Coal Ash Generation" were added after restructuring, clearly presenting the uniqueness of the research project's results. The purpose of establishing characteristic indicators is to facilitate the company's explanation of each research project's contribution to specific development directions. helping stakeholders better understand the company's R&D characteristics.

(3) Completion of R&D Key Performance

Evaluation Pilot Operations: Verified the feasibility of the preliminarily improved indicator system through company directors and internal/external experts, establishing a foundation for subsequent full-scale implementation, with the following completed items:

- A. Internal Consensus Seminars: Through seminars and other formats, extensively collected opinions from colleagues implementing research projects, built consensus, and ensured that the established indicator system meets practical needs (Fig. 2).
- B. Completion of Internal and External Expert Evaluations: Invited internal and external experts to provide suggestions, ensuring the professionalism and forward-looking nature of the indicator system, and completed objective and impartial evaluation of R&D results by these experts. Finally, the evaluation results were analyzed to provide references for subsequent improvement of the indicator system.
- (4) Proposed Recommendations for Future R&DPerformance Evaluation MechanismImplementation:
  - A. Enhancement of the Indicator System:
    Adjusted based on pilot results to improve operability and practicality.
  - B. Implementation Recommendations:
    Provided specific recommendations for future implementation of the R&D performance evaluation mechanism to

ensure effective implementation of the indicator system.

### 4. Conclusion and Outlook

Implementing the R&D KPI system optimization project will help enhance the effectiveness of our company's R&D investments, ensure alignment between R&D direction and policy objectives, and establish a solid foundation for achieving sustainable development under the challenge of the net-zero transition.

In the future, our company will continue to optimize R&D management mechanisms, increase R&D investments, and develop more forward-looking power technologies to contribute more to energy transition, stable power supply, and sustainable development.



Source: Compiled by this research.

Figure 1 Causal Chain Relationship Model (IPOOI) for TPC's R&D Projects



Source: Research documentation

Figure 2 Workshop Discussion Groups on "Energy and Power Economic Integration Model Applications and Small Area Power Supply-Demand Balance" and "Smart User Power Technology Development and Promotion Research" to Validate Performance Indicator Content