

Feasibility Studies with the Aim of Developing a
Joint Crediting Mechanism in FY2017

Sophistication of Efficiency Management at Thermal Power Stations: Implementation of Real-Time Unit Performance Management Using IoT (India)

New Energy and Industrial Technology Development Organization (NEDO)

Tokyo Electric Power Company Holdings and Mitsubishi Research Institute

Sophistication of Efficiency Management at Thermal Power Stations: Implementation of Real-Time Unit Performance Management Using IoT (India)

Conducted by: Tokyo Electric Power Company (TEPCO) Holdings and Mitsubishi Research Institute

This project aims to introduce the TEPCO Group's real-time unit performance management service to two 500 MW subcritical thermal power plant units in India, and also explore the possibility of applying this service to other coal-fired power plants throughout the country. This project will also contribute to global efforts to reduce CO₂ emissions.

Study Outline

With the introduction of large amounts of renewable energy in India, existing coal-fired power plants are required to perform load-following operations and deterioration of thermal efficiency has become a problem. In this study, measures were proposed to identify factors of thermal efficiency deterioration through the analysis of operating data to improve operational methods and maintain and improve thermal efficiency by remodeling facilities. The proposed measures are based on the TEPCO Group's extensive historical knowledge of power plant operation and maintenance.

Study Items

- 1) Current status of energy and environmental policies in India and future issues to be addressed
- 2) Analysis of target power station
- 3) Proposal for a performance management service
- 4) Quantification of greenhouse gas emission reductions
- 5) Evaluation of effects on project related to quantifying amount of contribution to global efforts
- 6) Strategy and issues with regard to commercialization and dissemination of project

Partner/Site

Durgapur Steel Thermal Power Station

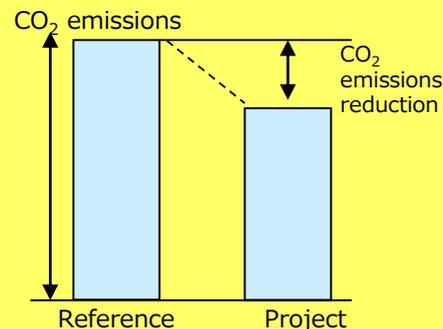
- Owned by Damodar Valley Corporation
- Located in West Bengal
- Two 500 MW subcritical units
- Operation started in 2011

Estimated Emission Reductions: 56,800 tCO₂/y per unit

Estimated Reduction of Greenhouse Gas Emissions

Reference Emissions

- Emissions at current O&M levels
- Determined by estimation of decrease in efficiency at power station based on load efficiency curve derived from collected data and TEPCO's experience in area



Project Emissions

- Emissions when performance management service is implemented
- Emissions reduction by O&M improvement
- In some cases, emissions reduction achieved by upgrading parts of equipment
- Monitoring data in real time

Technology Outline

The image of maintain and improve thermal efficiency by accurate performance management

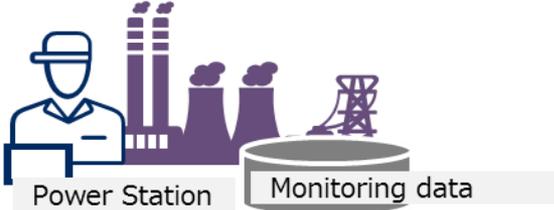


Table with 2 columns: part, Measurement points. Rows include boiler (387), turbine (378), electricity (30), fuel (48), generating (48), environment (21), and total (912).

Proposal of improvement measures
- Proposal of improvement measures against thermal efficiency degradation factor

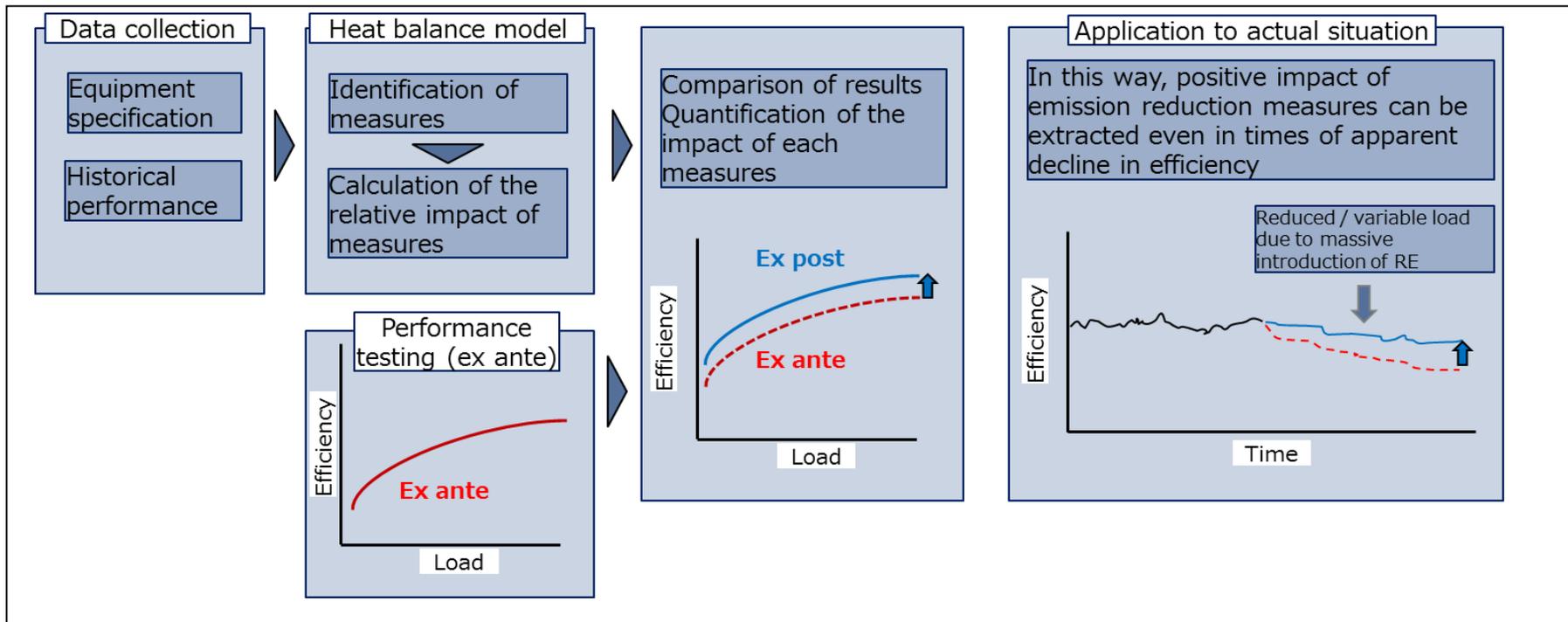
Real-time monitoring of operation data
- Prognostic detection
[Screenshot of Unit Performance Shinagawa Unit-1 dashboard with charts and data tables]

Performance management simulation (Heat balance analysis)
[Technical schematic diagram of a power plant system]

- To perform real-time monitoring of thermal efficiency
- To detects the thermal efficiency declining part from the difference between the measured value and the standard value (design value) .

Key Results

Monitoring, Reporting, Verification Methodologies and Estimated Emissions Reduction



Impacts:

An efficiency improvement of 0.27% translates to an emissions reduction of **21,300 t-CO₂**.

Further benefits:

Enabling plant operation at variable loads is key to accommodating substantial amounts of renewable energy sources, especially when considering constraints on transmission and storage, and provides an emissions reduction of **35,500 t-CO₂**.